APPENDIX E. COUNTY PROFILE AND RISK ASSESSMENT SUPPLEMENTARY DATA

This appendix contains information and details to support information provided in Section 4 (County Profile) and Section 5 (Risk Assessment).

E.1 COUNTY PROFILE OVERVIEW

This section contains information and details to support information provided in Section 4 – County Profile which provides general information for Onondaga County (physical setting, population and demographics, general building stock, and land use and population trends) and critical facilities located within the county.

E.1.1 Onondaga County Population Data

Table E.1 presents the American Community Survey (ACS) five-year (2012-2016) estimates for Onondaga County and its jurisdictions. The table also presents statistics on the vulnerable populations, including population counts for population over 65 years of age, under five years of age, and population below the poverty threshold. According to the survey, Onondaga County had a total population of 468,050. Table E.2 and Table E.3 present population changes in the county. Table E.2 includes county population trends and projections from 1800 to 2040. Table E.3 population change, by municipality, from 2010 to 2016.

Table E.1. Onondaga County Population Statistics (2012-2016 American Community Survey 5-Year Estimates)

Jurisdiction	American Community Survey 2012 - 2016						
	Total	Pop. 65+*	% Pop. 65+	Population Under 5	% Under 5	Pop. In Poverty	% Below Poverty Level
Baldwinsville (V)	7,461	1,746	23.4%	303	4.1%	563	7.5%
Camillus (T)	23,149	4,256	18.4%	1,199	5.2%	1,395	6.0%
Camillus (V)	1,241	235	18.9%	64	5.2%	142	11.4%
Cicero (T)*	31,495	4,168	13.2%	1,998	6.3%	2,465	7.8%
Clay (T)*	59,517	8,106	13.6%	3,379	5.7%	5,266	8.8%
De Witt (T)	22,662	3,933	16.6%	965	4.3%	1,690	7.5%
East Syracuse (V)	3,021	323	10.7%	146	4.8%	560	18.5%
Elbridge (T)	3,383	589	16.6%	85	2.5%	387	11.4%
Elbridge (V)	987	189	19.1%	41	4.2%	27	2.7%
Fabius (T)	1,974	212	11.4%	124	6.3%	108	5.5%
Fabius (V)	313	51	16.3%	13	4.2%	21	6.7%
Fayetteville (V)	4,190	851	20.3%	121	2.9%	178	4.2%
Geddes (T)	10,418	2,365	20.5%	589	5.7%	504	4.8%
Jordan (V)	1,476	190	12.9%	65	4.4%	115	7.8%
La Fayette (T)	4,919	753	15.3%	386	7.8%	643	13.1%
Liverpool (V)	2,252	509	22.6%	42	1.9%	146	6.5%

Jurisdiction	American Community Survey 2012 - 2016						
	Total	Pop. 65+*	% Pop. 65+	Population Under 5	% Under 5	Pop. In Poverty	% Below Poverty Level
Lysander (T)*	22,527	3,798	16.9%	1,315	5.8%	1,752	7.8%
Manlius (T)	20,059	3,904	18.8%	837	4.2%	1,214	6.1%
Manlius (V)	4,600	750	16.3%	238	5.2%	261	5.7%
Marcellus (T)	4,482	686	17.7%	196	4.4%	173	3.9%
Marcellus (V)	1,703	410	24.1%	40	2.3%	63	3.7%
Minoa (V)	3,512	590	16.8%	311	8.9%	125	3.6%
North Syracuse (V)	6,679	1,229	18.4%	515	7.7%	834	12.5%
Onondaga (T)	23,107	3,865	16.7%	1,057	4.6%	1,105	4.8%
Onondaga Nation Reservation	112	74	66.1%	0	0.0%	0	0.0%
Otisco (T)	2,554	373	14.6%	128	5.0%	270	10.6%
Pompey (T)	7,327	1,020	13.9%	331	4.5%	255	3.5%
Salina (T)	31,234	6,045	19.6%	1,831	5.9%	3,154	10.1%
Skaneateles (T)	4,748	1,103	24.6%	125	2.6%	119	2.5%
Skaneateles (V)	2,498	682	27.3%	92	3.7%	103	4.1%
Solvay (V)	6,455	1,097	17.0%	401	6.2%	958	14.8%
Spafford (T)	1,704	313	18.4%	72	4.2%	129	7.6%
Syracuse (C)	144,350	17,153	11.9%	9,787	6.8%	44,060	30.5%
Tully (T)	1,663	263	15.2%	22	1.3%	49	2.9%
Tully (V)	1,068	153	14.3%	82	7.7%	145	13.6%
Van Buren (T)*	13,350	2,761	20.7%	766	5.7%	703	5.3%
Onondaga County	**468,050**	**71,770**	**15.7%**	**26,848**	**5.7%**	**68,285**	**14.6%**

Source: *2012-2016 American Community Survey 5-Year Estimates*
Note: *Pop. = population*
* *% Below Poverty Level = Percentage of Families and People Whose Income in The Past 12 Months Is Below the Poverty Level. Total population below the poverty level calculated by multiplying the percentage below the poverty level by the municipality's total population.*

Table E.2. Onondaga County Population Trends, 1800 to 2040

Year	Population	Change in Population	Percent (%) Population Change
1800	7,406	- -	- -
1810	25,987	18,581	250.90%
1820	41,467	15,480	59.60%
1830	58,973	17,506	42.20%
1840	67,911	8,938	15.20%
1850	85,890	17,979	26.50%
1860	90,686	4,796	5.60%
1870	104,183	13,497	14.90%
1880	117,893	13,710	13.20%
1890	146,247	28,354	24.10%
1900	168,735	22,488	15.40%
1910	200,298	31,563	18.70%

Year	Population	Change in Population	Percent (%) Population Change
1920	241,465	41,167	20.60%
1930	291,606	50,141	20.80%
1940	295,108	3,502	1.20%
1950	341,719	46,611	15.80%
1960	423,028	81,309	23.80%
1970	472,746	49,718	11.80%
1980	463,920	-8,826	-1.90%
1990	468,973	5,053	1.10%
2000	458,336	-10,637	-2.30%
2010	467,026	8,690	-0.30%
2020*	467,461	435	-0.60%
2030*	463,795	-3,666	-0.78%
2040*	457,256	-6,539	-1.41%

Source: *Source: U.S. Census Bureau, 1995 and 2007; University of Virginia, 2004*
Note: *Change in population and percent in population change was calculated from available data*
**Years listed are population projections*

Table E.3. Population Change from 2010 to 2016 by Municipality

Municipality	2010 Census	2016 ACS	Change in Population (2010-2016)	Percent Change
Baldwinsville (V)	7,378	7,461	83	1.12%
Camillus (T)	22,954	23,149	195	0.85%
Camillus (V)	1,213	1,241	28	2.31%
Cicero (T)	29,641	31,495	1,854	6.25%
Clay (T)	53,397	59,517	6,120	11.46%
Dewitt (T)	22,754	22,662	-92	-0.40%
East Syracuse (V)	3,084	3,021	-63	-2.04%
Elbridge (T)	3,496	3,383	-113	-3.23%
Elbridge (V)	1,058	987	-71	-6.71%
Fabius (T)	1,612	1,974	362	22.46%
Fabius (V)	352	313	-39	-11.08%
Fayetteville (V)	4,373	4,190	-183	-4.18%
Geddes (T)	10,534	10,418	-116	-1.10%
Jordon (V)	1,368	1,476	108	7.89%
Lafayette (T)	4,952	4,919	-33	-0.67%
Liverpool (V)	2,347	2,252	-95	-4.05%
Lysander (T)	17,175	22,527	5,352	31.16%
Manlius (T)	19,844	20,059	215	1.08%
Manlius (V)	4,704	4,600	-104	-2.21%
Marcellus (T)	4,397	4,482	85	1.93%
Marcellus (V)	1,813	1,703	-110	-6.07%
Minoa (V)	3,449	3,512	63	1.83%
North Syracuse (V)	6,800	6,679	-121	-1.78%
Onondaga (T)	23,101	23,107	6	0.03%

Municipality	2010 Census	2016 ACS	Change in Population (2010-2016)	Percent Change
Onondaga Nation Reservation	468	112	-356	-76.07%
Otisco (T)	2,541	2,554	13	0.51%
Pompey (T)	7,080	7,327	247	3.49%
Salina (T)	31,363	31,234	-129	-0.41%
Skaneateles (T)	4,669	4,748	79	1.69%
Skaneateles (V)	2,540	2,498	-42	-1.65%
Solvay (V)	6,584	6,455	-129	-1.96%
Spafford (T)	1,686	1,704	18	1.07%
Syracuse (C)	145,170	144,350	-820	-0.56%
Tully (T)	1,865	1,663	-202	-10.83%
Tully (V)	873	1,068	195	22.34%
Van Buren (T)	10,391	13,350	2,959	28.48%
Onondaga County	467,026	468,050	1,024	0.22%

E.1.2 Onondaga County Land Use Data

Table E.4 presents the 2011 land use data for Onondaga County. The table indicates that, combined, agricultural and forest lands make up more than half of the county's total land use area.

Table E.4. Land Use (2011) in Onondaga County

Land Use Category	2011 Data	
	Acreage	Percent of County
Agriculture	171,507.2	33.3%
Barren Land	2,647.6	0.5%
Forest	175,271.6	34.0%
Open Water	17,679.1	3.4%
Urban	101,374.2	19.7%
Wetlands	47,020.9	9.1%

Source: National Land Cover Database – USGS 2011

E.1.3 General Building Stock

Table E.5 - Number of Buildings and Replacement Cost Value by Municipality

Municipality	All Occupancies			
	Count	Estimated Structure RCV	Estimated Contents RCV	Total (Structure + Contents)
Village of Baldwinsville	3,321	$928,446,807	$576,380,502	$1,504,827,309
Town of Camillus	11,611	$3,052,036,657	$1,893,257,330	$4,945,293,987
Village of Camillus	490	$114,031,114	$68,299,121	$182,330,235
Town of Cicero	15,558	$4,266,651,090	$2,838,261,409	$7,104,912,499
Town of Clay	22,004	$8,137,341,185	$5,240,530,211	$13,377,871,396
Town of DeWitt	11,191	$6,404,939,359	$4,758,959,271	$11,163,898,629
Village of East Syracuse	1,662	$514,055,432	$387,183,851	$901,239,284

Municipality	All Occupancies			
	Count	Estimated Structure RCV	Estimated Contents RCV	Total (Structure + Contents)
Town of Elbridge	3,020	$729,399,165	$484,973,808	$1,214,372,973
Village of Elbridge	654	$148,857,976	$94,748,983	$243,606,959
Town of Fabius	1,717	$490,481,134	$383,101,558	$873,582,692
Village of Fabius	245	$60,048,901	$40,867,939	$100,916,840
Village of Fayetteville	1,999	$664,528,666	$400,887,734	$1,065,416,400
Town of Geddes	6,048	$2,350,056,049	$1,589,964,413	$3,940,020,462
Village of Jordan	754	$194,311,561	$130,105,200	$324,416,761
Town of Lafayette	3,742	$856,191,594	$529,181,444	$1,385,373,038
Village of Liverpool	1,379	$356,505,810	$229,482,449	$585,988,259
Town of Lysander	9,513	$3,452,247,706	$2,059,699,659	$5,511,947,365
Town of Manlius	10,101	$3,735,064,686	$2,196,356,225	$5,931,420,911
Village of Manlius	1,724	$763,326,145	$462,282,858	$1,225,609,003
Town of Marcellus	3,442	$968,785,581	$624,033,229	$1,592,818,810
Village of Marcellus	790	$264,320,392	$181,685,242	$446,005,634
Village of Minoa	1,579	$425,337,257	$252,333,558	$677,670,815
Village of North Syracuse	3,297	$826,812,636	$520,686,048	$1,347,498,685
Town of Onondaga	11,826	$3,681,301,149	$2,207,793,566	$5,889,094,715
Onondaga Nation Reservation	638	$121,429,137	$60,714,568	$182,143,705
Town of Otisco	2,567	$643,807,877	$426,251,319	$1,070,059,196
Town of Pompey	5,096	$1,594,497,578	$953,064,739	$2,547,562,317
Town of Salina	14,486	$4,973,963,168	$3,166,284,961	$8,140,248,129
Town of Skaneateles	4,439	$1,430,527,029	$903,696,216	$2,334,223,245
Village of Skaneateles	1,583	$530,891,718	$340,111,964	$871,003,682
Village of Solvay	3,003	$884,983,486	$517,116,474	$1,402,099,960
Town of Spafford	2,302	$521,398,251	$305,402,415	$826,800,666
City of Syracuse	51,837	$15,038,897,586	$9,971,125,718	$25,010,023,305
Town of Tully	1,585	$528,007,157	$354,527,602	$882,534,759
Village of Tully	511	$181,454,356	$133,334,972	$314,789,328
Town of Van Buren	5,971	$1,993,563,705	$1,354,203,875	$3,347,767,581
Onondaga County	**221,685**	**$71,828,499,104**	**$46,636,890,429**	**$118,465,389,533**

Source: Syracuse-Onondaga County Planning Agency, 2018; RS Means 2018

Notes: RCV = Replacement cost value.

Table E.6 Number of Buildings and Replacement Cost Value by Occupancy Class

Municipality	Residential		Commercial		Industrial		Agricultural		Education		Government		Religious	
	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)
Village of Baldwinsville	3,091	$1,056,198,915	92	$138,121,577	17	$10,981,064	1	$42,312	20	$171,555,916	14	$18,219,311	86	$109,708,213
Town of Camillus	10,915	$3,476,337,983	310	$805,824,736	58	$84,561,997	106	$70,267,742	24	$238,901,104	35	$76,133,572	163	$193,266,853
Village of Camillus	441	$137,195,980	17	$26,748,511	4	$1,307,020	1	$1,063,907	1	$1,952,899	1	$1,318,655	25	$12,743,263
Town of Cicero	14,058	$4,285,169,044	820	$1,755,079,652	101	$374,558,225	139	$112,118,074	34	$219,994,612	46	$67,022,986	360	$290,969,907
Town of Clay	20,681	$8,690,432,921	681	$3,415,513,705	270	$299,024,284	88	$48,334,346	34	$376,900,401	47	$264,284,787	203	$283,380,951
Town of DeWitt	9,678	$4,937,940,264	1,046	$4,895,185,841	77	$181,866,103	59	$45,778,030	86	$470,724,322	144	$410,052,956	101	$222,351,113
Village of East Syracuse	1,413	$380,614,744	181	$397,580,600	31	$39,555,800	0	$0	8	$34,418,198	10	$17,226,561	19	$31,843,382
Town of Elbridge	2,539	$733,276,071	254	$190,618,646	18	$23,572,235	168	$202,145,396	8	$42,544,329	1	$346,046	32	$21,870,251
Village of Elbridge	598	$162,326,979	20	$36,237,725	0	$0	16	$11,656,738	5	$17,536,855	5	$8,713,278	10	$7,135,384
Town of Fabius	1,169	$322,138,727	65	$43,721,975	7	$3,960,931	326	$378,882,785	19	$49,572,863	41	$25,918,701	90	$49,386,710
Village of Fabius	213	$57,542,887	4	$4,640,597	3	$1,266,412	2	$256,464	6	$22,300,277	3	$3,977,944	14	$10,932,259
Village of Fayetteville	1,861	$790,922,797	68	$115,190,603	4	$3,096,175	1	$1,347,859	5	$42,350,820	10	$14,898,644	50	$97,609,503
Town of Geddes	5,616	$2,280,274,910	323	$1,254,468,227	24	$177,043,898	0	$0	2	$36,887,916	12	$72,009,642	71	$119,335,869
Village of Jordan	662	$192,619,083	28	$30,371,810	8	$7,386,758	13	$6,770,288	6	$50,962,133	8	$9,161,575	29	$27,145,114
Town of Lafayette	3,320	$981,030,452	99	$82,999,039	28	$18,402,924	162	$124,495,886	14	$60,126,381	16	$45,427,080	103	$72,891,276
Village of Liverpool	1,261	$381,070,081	81	$122,813,007	0	$0	1	$2,850,324	2	$6,316,792	9	$17,836,938	25	$55,101,116
Town of Lysander	8,492	$4,177,644,142	217	$539,939,445	46	$66,575,274	433	$399,970,098	3	$19,239,380	141	$103,581,561	181	$204,997,466
Town of Manlius	9,337	$4,616,125,385	358	$572,143,345	46	$149,200,991	233	$161,246,772	21	$235,344,227	20	$41,627,498	86	$155,732,693
Village of Manlius	1,587	$903,129,862	72	$143,418,618	17	$26,708,189	0	$0	15	$83,989,167	21	$36,233,130	12	$32,130,038
Town of Marcellus	2,857	$1,034,257,058	87	$102,037,976	58	$76,535,728	373	$310,709,923	0	$0	11	$33,739,390	56	$35,538,735
Village of Marcellus	693	$247,905,450	46	$40,371,241	2	$2,037,934	0	$0	13	$116,075,182	6	$4,374,058	30	$35,241,768
Village of Minoa	1,512	$519,011,097	26	$29,332,611	17	$14,103,938	0	$0	12	$91,632,388	1	$13,873,960	11	$9,716,821

Municipality	Residential		Commercial		Industrial		Agricultural		Education		Government		Religious	
	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)	Count	Total (Structure + Contents)
Village of North Syracuse	2,991	$918,379,765	118	$216,105,578	8	$29,274,126	0	$0	10	$51,442,005	6	$9,255,818	164	$123,041,392
Town of Onondaga	11,038	$4,420,522,749	206	$468,638,646	58	$45,008,125	296	$322,909,432	34	$344,857,391	53	$138,944,677	141	$148,213,697
Onondaga Nation Reservation	638	$182,143,705	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Town of Otisco	1,947	$652,669,672	54	$40,759,370	105	$36,320,260	102	$108,038,067	0	$0	7	$7,452,035	352	$224,819,791
Town of Pompey	4,333	$1,924,298,519	119	$111,978,358	13	$8,022,789	477	$374,028,028	0	$0	27	$33,275,232	127	$95,959,392
Town of Salina	13,628	$5,423,034,623	613	$2,078,082,469	56	$106,182,382	8	$4,450,419	25	$255,735,684	38	$112,520,474	118	$160,242,078
Town of Skaneateles	3,688	$1,580,492,441	399	$390,449,646	75	$43,977,730	205	$217,267,814	1	$23,321,515	11	$13,736,019	60	$64,978,079
Village of Skaneateles	1,462	$572,339,260	27	$88,377,251	21	$15,910,803	2	$1,744,677	11	$98,324,014	15	$29,896,435	45	$64,411,242
Village of Solvay	2,888	$1,103,601,037	76	$198,844,887	10	$1,703,264	0	$0	4	$52,280,714	8	$24,328,438	17	$21,341,620
Town of Spafford	2,051	$647,987,510	55	$29,891,280	23	$4,752,931	125	$115,279,815	0	$0	6	$9,148,138	42	$19,740,992
City of Syracuse	49,274	$15,203,315,603	1,544	$5,750,986,258	114	$433,944,140	5	$6,001,424	189	$1,668,931,093	85	$491,870,098	626	$1,454,974,689
Town of Tully	1,330	$520,438,664	75	$241,057,320	9	$1,883,552	107	$78,550,389	0	$0	13	$5,184,370	51	$35,420,463
Village of Tully	420	$144,358,153	36	$36,800,651	16	$14,040,379	273	$218,489,433	12	$89,554,689	7	$12,991,914	20	$17,043,541
Town of Van Buren	5,080	$1,918,079,491	233	$664,781,922	94	$154,143,077	0	$0	7	$84,978,078	11	$31,598,006	273	$275,697,573
Onondaga County	**202,762**	**$75,574,826,026**	**8,450**	**$25,059,113,122**	**1,438**	**$2,456,909,436**	**3,722**	**$3,324,696,443**	**631**	**$5,058,751,345**	**889**	**$2,206,179,929**	**3,793**	**$4,784,913,232**

Source: Syracuse-Onondaga County Planning Agency, 2018; RS Means 2018

E.1.4 Critical Facilities

The following table summarizes the number of critical facilities, by type, for each jurisdiction in Onondaga County.

Table E.7. Number of Critical Facilities in Each Municipality

Municipality	Facility Type																															
	Airport	Ambulance	Bus Facility	Chemical Storage	Communication Facility	Correctional	County Facility	Dam	Day Care	DPW	Drug and Alcohol	Electric Facility	Electric Transfer	EOC	Fire Station	Homeless Shelter	Hospital	Library	Municipal Hall	Natural Gas	Police	Post Office	Potable Pump Station	Potable Treatment	Potable Water Storage	Public Health	Rail Facility	Red Cross	School	Wastewater Facility	Wastewater Pump Station	Well
Baldwinsville (V)	0	1	0	16	3	0	5	1	8	0	0	0	0	0	1	0	0	1	1	0	1	1	0	1	1	0	0	2	5	4	0	3
Camillus (T)	1	1	0	47	3	0	12	0	23	3	0	0	4	0	3	0	0	1	1	4	2	2	4	5	7	0	0	2	7	1	0	9
Camillus (V)	0	0	0	2	1	0	2	0	0	1	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2
Cicero (T)	0	1	0	91	3	0	27	0	19	2	0	0	5	0	6	0	0	2	1	2	2	3	0	0	1	0	0	2	6	1	1	19
Clay (T)	0	2	0	115	9	0	25	0	35	2	0	0	7	0	6	0	0	0	1	3	0	2	1	1	1	0	2	2	9	4	2	19
De Witt (T)	1	1	0	215	11	1	29	1	15	3	0	0	11	0	5	0	0	1	1	3	3	2	6	2	9	0	2	0	12	2	0	20
East Syracuse (V)	0	0	0	28	0	0	4	0	5	1	0	0	2	0	1	0	0	1	1	0	1	1	0	0	0	0	6	0	1	0	0	3
Elbridge (T)	0	0	0	16	2	0	2	0	4	0	0	0	3	0	0	0	0	0	0	1	0	0	0	5	2	0	0	0	1	0	0	0
Elbridge (V)	0	0	0	4	0	0	1	0	3	1	0	0	0	0	1	0	0	1	1	0	1	1	0	0	0	0	0	1	1	0	0	0
Fabius (T)	1	0	0	11	3	0	5	1	0	1	0	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	0
Fabius (V)	0	0	0	3	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0
Fayetteville (V)	0	1	0	15	1	0	3	0	4	0	0	0	1	0	1	0	0	1	2	0	0	1	0	0	0	0	0	0	1	0	0	2
Geddes (T)	0	0	0	40	2	0	17	0	5	4	0	1	3	0	1	0	0	0	0	3	1	0	1	0	2	0	0	0	6	1	0	7
Jordan (V)	0	0	0	4	1	0	1	0	4	2	0	0	0	0	1	0	0	1	2	0	1	1	0	0	0	0	0	1	2	0	1	0
La Fayette (T)	0	1	0	12	5	0	3	2	7	2	0	0	1	0	2	0	0	1	1	1	1	1	2	2	1	0	0	1	2	0	0	0
Liverpool (V)	0	0	0	9	0	0	13	0	1	1	0	0	0	0	1	0	0	1	1	0	1	1	0	0	1	0	0	0	0	0	0	1
Lysander (T)	0	1	0	36	4	0	15	1	10	3	0	0	1	0	8	0	0	0	1	4	1	1	1	1	1	0	0	2	1	1	1	12

Municipality	Facility Type																																
	Airport	Ambulance	Bus Facility	Chemical Storage	Communication Facility	Correctional	County Facility	Dam	Day Care	DPW	Drug and Alcohol	Electric Facility	Electric Transfer	EOC	Fire Station	Homeless Shelter	Hospital	Library	Municipal Hall	Natural Gas	Police	Post Office	Potable Pump Station	Potable Treatment	Potable Water Storage	Public Health	Rail Facility	Red Cross	School	Wastewater Facility	Wastewater Pump Station	Well
Manlius (T)	0	0	0	26	4	0	12	0	13	2	0	0	1	0	3	0	0	0	0	1	0	1	2	1	4	0	23	2	9	5	1	7
Manlius (V)	0	1	0	10	1	0	2	0	5	1	0	0	1	0	0	0	0	1	1	0	1	1	2	0	1	0	0	2	1	2	0	1
Marcellus (T)	1	2	0	15	4	0	5	1	2	2	0	0	3	0	1	0	0	0	0	2	0	1	4	2	3	0	0	1	3	0	1	0
Marcellus (V)	0	0	0	3	1	0	2	0	3	1	0	0	0	0	0	0	0	1	2	0	1	1	0	0	0	0	0	1	0	0	0	1
Minoa (V)	0	1	0	6	1	0	2	0	4	1	0	0	1	0	1	0	0	1	1	0	1	1	1	0	0	0	6	0	2	1	1	0
North Syracuse (V)	0	1	0	19	0	0	1	0	8	1	0	0	0	0	1	0	0	1	1	0	1	0	0	0	1	0	0	0	1	0	0	0
Onondaga (T)	0	0	0	41	11	1	66	0	17	1	0	1	8	0	10	0	1	1	1	9	1	2	4	0	7	0	0	3	7	5	0	8
Otisco (T)	0	0	0	6	6	0	2	0	1	2	0	0	0	0	2	0	0	0	1	3	0	0	0	0	1	0	0	0	0	0	0	0
Pompey (T)	0	1	0	12	9	0	5	0	1	1	0	0	1	0	2	0	0	0	1	1	0	2	0	1	1	0	0	0	0	0	0	1
Salina (T)	0	1	0	91	11	0	37	0	27	3	0	0	6	0	5	0	0	1	1	4	4	1	2	0	0	0	0	0	12	4	0	15
Skaneateles (T)	1	0	0	24	4	0	1	0	3	2	0	0	2	0	3	0	0	0	0	3	0	2	0	4	1	0	0	1	1	0	0	0
Skaneateles (V)	0	1	0	10	1	0	2	1	1	0	0	1	0	0	1	0	0	1	2	0	1	1	0	1	1	0	0	1	3	1	1	0
Solvay (V)	0	0	0	26	0	0	1	0	3	1	0	1	1	0	2	0	0	1	2	1	2	1	1	0	0	0	0	0	2	0	0	0
Spafford (T)	0	0	0	5	1	0	1	0	0	1	0	0	0	0	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Syracuse (C)	0	2	3	350	7	1	47	2	179	3	17	0	11	1	10	6	4	11	3	2	3	6	2	6	3	1	5	6	47	14	7	4
Tully (T)	0	0	0	6	2	0	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Tully (V)	0	1	0	7	1	0	2	0	1	2	0	0	0	0	1	0	0	1	2	0	0	1	0	2	0	0	0	1	2	0	1	0
Van Buren (T)	1	0	0	31	3	0	7	0	6	1	0	0	2	0	4	0	0	0	1	2	1	1	0	0	4	0	1	1	4	0	0	5
Onondaga County	**6**	**20**	**3**	**1,352**	**116**	**3**	**359**	**10**	**418**	**51**	**18**	**4**	**77**	**1**	**88**	**6**	**5**	**32**	**37**	**51**	**32**	**41**	**35**	**34**	**53**	**1**	**45**	**33**	**150**	**46**	**17**	**139**

Source: Syracuse-Onondaga County Planning Agency, 2018

E.2 HISTORY OF HAZARD EVENTS WITHIN THE COUNTY

To supplement the information provided in this plan, events prior to the update of this plan are included below by hazard of concern type.

E.2.1 Severe Storm

Many sources provided historical information regarding previous occurrences and losses associated with severe storms throughout New York State and Onondaga County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

Between 1955 and 2007, FEMA declared that New York experienced 39 severe storm-related disasters classified as one or a combination of the following disaster types: severe storms, hurricane (Ivan-2004, Floyd-1999, Bob-1991, Gloria-1985, Belle-1976, Agnes-1972), coastal storms, flooding, high tides and heavy rain (FEMA, 2007). Of those events, multiple sources, including FEMA, indicated that Onondaga County was declared a disaster area as a result of seven severe storm events. FEMA couples some disasters as severe storms and flooding events; therefore, those severe storm disasters that are also listed as flooding events have been discussed in Section E.2.3 (Flood) as well. Table E.8 summarizes the FEMA Presidential Disaster (DR) or Emergency Declarations (EM) for severe storm events in Onondaga County.

Table E.8. Presidential Disaster Declarations for Severe Storm Events in Onondaga County

Type of Event*	Date**	Declaration Number	Cost of Losses (approximate)
Tropical Storm Agnes	July 1972	DR-338	New York State experienced 24 deaths and had approximately $703 M in damages (NYSDPC) as a result of flooding. Onondaga County experienced approximately $1.6 M in property damages and crop damages. For the calendar year of 1972, many rivers and streams within the County experienced record peak streamflows during this flood, particularly along Seneca River, Onondaga Creek, Ninemile Creek and Limestone Creek. This event caused the Onondaga Lake to rise 370.8 feet, causing nearly $150 K in damages to the Town of Salina (which is 40-percent of the estimated $375 K in damages that occurred within the surrounding communities of Onondaga Lake). FIS' for the county indicate that this event created widespread flooding within most jurisdictions of the County.
Severe Storms and Flooding	July 1974	DR-447	The NYSDPC indicates that this is an undeclared event for four counties in New York State; however, FEMA and NYSEMO indicate that it was a declared disaster. Onondaga County experienced approximately $7.2 M in property damages, with $6.5 M in personal property losses (more than any other county impacted by the event). Most of these damages were a result of flooding throughout the County. Many rivers and streams within Onondaga County experienced peak streamflows and flooding during this event, particularly along Harbor Brook, Onondaga Creek, Butternut Creek and Limestone Creek. Floodwaters resulted in the evacuation of many homes and the flooding of houses, roads and underpasses throughout most of the County.
Severe Storms, Heavy Rain, Landslides, Flooding	September 1975	DR-487	Remnant flooding occurred in New York State as a result of Hurricane Eloise. Losses in New York State are unknown; however, it is reported that Onondaga County experienced approximately $6.3 M in property damages. Rain totals during this event within the vicinity of Onondaga County totaled between

Type of Event*	Date**	Declaration Number	Cost of Losses (approximate)
			3 and 5 inches. For the year of 1975, peak streamflows occurred along Ley Creek in Syracuse during this event.
Severe Storms and Flooding	January 1996	DR-1095	New York State experienced between $100 and $160 M in eligible damages, road closures, closed businesses, and 10 deaths (NYSDPC). New York State received $16.7 M in individual assistance and $103.7 M in public assistance. Onondaga County experienced approximately $7.6 M in flood damages. USGS indicated through information provided by FEMA that Onondaga County received approximately $1.1 M in public assistance (1997 USD).
Severe Storms	September 1998	DR-1244	Multiple New York State Counties suffered extensive damage during this 'Derecho' event. Towns in Onondaga County experienced approximately $90 M in property damages, 3 fatalities and 7 injuries. Thousands of trees were toppled throughout the County, heavy damage occurred at the New York State Fairgrounds in Geddes; many permanent buildings had roofs torn off, windows blown out, or siding severely damaged from felled trees; most roadways were rendered completely impassable from downed trees and live wires.
Severe Storms	May - September 2000	DR-1335	New York State experienced approximately $34.6 M in eligible damages (NYSDPC). Losses in Onondaga County are unknown. Heavy rains caused significant ponding of water on streets in Syracuse, Manlius, and Fayetteville.
Severe Storms and Flooding	August – September 2004	DR-1564	New York State experienced approximately $18.03 M in eligible damages (NYSDPC). Onondaga County experienced approximately $2.0 M in flood damages. Most of the damages were a result of flooding throughout the County. Rainfall totals in Onondaga County ranged between 2.2 inches in Camillus and 4.87 inches in Tully. As of December 10, 2004, more than $1.8 M in disaster aid has been approved for the State. Disaster aid for Onondaga County is unknown.

Source(s): FEMA, 2008; NYSDPC, 2008; Hazards & Vulnerability Research Institute (SHELDUS), 2008; NCDC, 2008; NYSEMO, 2006

* *The 'Type of Event' is the disaster classification that was assigned to the event by FEMA.*

** *Represents the date of the event*

Note (1): Dollars rounded to nearest thousand. Recorded losses indicate the dollar value of covered losses paid, as available through the public records reviewed. Some of these events overlap with events shown under the Flood and Severe Winter Storm hazard profiles of this Plan.

K = Thousands ($)

M = Millions ($)

USD = U.S. Dollars

Based on all sources researched, many notable severe storm events have impacted Onondaga County. All other severe storm events are identified in Table E.9 below; however, severe storm documentation for New York is extensive and, therefore, not all sources may have been identified or researched. Hence, this table may not include all events that have occurred throughout the region.

Table E.9. Severe Storm Events between 1871 and 2007

Event Name / Date	Location	Losses / Impacts	Source(s)
TSTM / Lightning July 9, 1871	Syracuse and Geddes	Two severe storms passed over Syracuse within a few hours of each other. The wind was so violent that it blew down numerous trees. A building was blown down and the high school in Geddes and several barns were unroofed. Lightning struck in every party of Syracuse. The lightning set fire to two private dwellings. During the storm, walnut-sized hailstones fell, causing great damage to crops in the area. One person was struck by lightning and killed.	New York Times
Hailstorm August 31, 1885	Multi-County	Severe hailstorm hit the southern part of Oswego County and the northern part of Onondaga County. Marble-sized hailstones fell and a large quantity of tobacco was damaged.	New York Times
Tornado December 26, 1889	Syracuse	A tornado from the southwest swept over Onondaga Lake, damaging many buildings. The roof of the People's Street Railway Company was blown off and the front walls of the building came down. Large amount of damage was done to the building. One death and three injuries were reported. Building damage was estimated around several thousand dollars.	New York Times
Tornado (F0) June 11, 1963	Countywide	A F0 tornado extended through the County for 5 miles, resulting in $2.5 K in property damages.	NOAA-NCDC
Remnants of Hurricane Agnes June 20-25, 1972 (FEMA DR-338)	Multi-State	See FEMA Disaster Declarations (Table E.8)	FEMA, Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO History of Declarations, USGS, NYSDEPC, USACE, NWS
Severe Storms and Flooding July 3-5, 1974 (FEMA DR-447)	Multi-County	See FEMA Disaster Declarations (Table E.8)	FEMA, NYSEMO, Endreny and Hassett, NYSC
Severe Storms, Heavy Rain, Landslides, Flooding September 22-27, 1975 (FEMA DR-487) (Remnants of Hurricane Eloise)	Multi-State	See FEMA Disaster Declarations (Table E.8)	FEMA, HPC, USGS, NYSEMO, Perry et al.
Tornado (F3) May 2, 1983	Countywide	An F3 tornado extended through the County for 14 miles, resulting in $2.5 M in property damages.	NOAA-NCDC

Event Name / Date	Location	Losses / Impacts	Source(s)
Tornado (F1) July 13, 1986	Countywide	An F1 tornado extended through the County for 4 miles, resulting in $250 K in property damages.	NOAA-NCDC
TSTM / Winds October 15, 1989	Countywide	Toppled trees caused many county residents to lose power. At least 1,000 Syracuse customers lost power when the storm hit.	NY Times
Tornado (F0) August 28, 1990	Countywide	An F0 tornado extended through the County for 6 miles, resulting in $25 K in property damages.	NOAA-NCDC
TSTM / Wind May 5, 1993	Syracuse	Winds downed power lines and trees; ¾-inch hail fell at Silver Lake. Experienced approximately $50 K in property damage.	NOAA-NCDC
TSTM / Wind August 2, 1993	Countywide	TSTMs produced golf-ball sized hail and strong winds downed many trees and power lines. Hardest hit area was East Syracuse. Experienced approximately $600 K in property damage.	NOAA-NCDC
Tornado (F0) August 24, 1993	Syracuse	An F1 tornado extended through Syracuse resulting in $500 K in property damages.	NOAA-NCDC
Hail July 2, 1994	Countywide	1.75 inch hail was reported in Baldwinsville and Cicero. LaFayette had 0.75 inch hail. Experienced approximately $60 K in property damage and $5 K in crop damage.	NOAA-NCDC
TSTM / Winds August 28, 1994	Clay	Experienced approximately $50 K in property damage.	NOAA-NCDC
High Winds November 11, 1995	Multi-County	A cold front coming from the Great Lakes brought high winds to much of the western Southern Tier and central New York State. Winds gusted to 44 mph at Hancock International Airport in Syracuse. The high winds downed trees and power lines, resulting in widespread power outages. Overall, Onondaga County had approximately $15 K in property damage from winter weather, with approximately $2 K in property damage from high winds.	NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS)
Severe Storms and Flood January 18-20, 1996 (FEMA DR-1095) "Deluge of 1996"	Northeastern U.S.	See FEMA Disaster Declarations (Table E.8)	FEMA, NOAA-NCDC, NYSDPC , NWS, Lumia (USGS WRIR 97-4252), Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO, USGS
TSTM / Winds January 27, 1996	Multi-County	Syracuse experienced 54 mph winds. Counties affected experienced approximately $133 K in property damages.	NOAA-NCDC
TSTM / Winds February 24-25, 1996	Multi-County	With downed trees and power lines, 20,000 customers from Syracuse to Utica were left without power. Counties affected experienced approximately $150 K in property damages.	NOAA-NCDC
TSTM / Wind July 19, 1996	Countywide (Cicero)	Severe TSTM snapped off large tree limbs and caused structural damage in northern Onondaga County. Several roofs were blown off storage sheds, road signs were bent, and a 9,000-pound trailer was blown on its side. Approximately $15 K in property damage.	NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS)

Event Name / Date	Location	Losses / Impacts	Source(s)
TSTM / Hail / Wind July 15, 1996	Countywide (Liverpool and Baldwinsville)	TSTM hit moved across northern Onondaga County, producing downburst winds that blew down large trees in Liverpool. Widespread damage was seen in Baldwinsville where several large trees were uprooted and utility poles were knocked down across several roadways. Approximately $30 K in property damage.	NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS)
TSTM / Wind May 29, 1998	Cicero to Manlius	Numerous trees and wires were downed across northern and eastern sections of the Syracuse metropolitan area. One man in Cicero was injured when he was shocked from falling wires. In Syracuse, another man was struck and killed by a large tree limb on the corner of Congress and Holland Streets. Many large trees and power lines littered streets in northern and eastern portions of the Syracuse metropolitan area in the wake of the thunderstorms. Towns affected experienced approximately $40 K in property damages.	NOAA-NCDC
TSTM / Hail / Tornado May 31, 1998 "Tornado Outbreak"	Multi-County	Several lines of severe TSTMs formed in eastern New York State. The series of storms resulted in 6 separate tornadoes and storm damage in every county. Widespread power outages occurred throughout eastern New York State. Strong winds downed power lines, power poles and trees. Some counties were declared disaster areas by Governor Pataki. In Onondaga County, the storms blew down transmission towers in Nedrow and downed many trees and power lines. Dime size hail in Camillus and Manlius. Wind gusts were estimated at 90 to 100 mph. Experienced approximately $200 K in property damage in the County.	NWS, NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS)
TSTM / Winds August 24, 1998	Countywide	Dime sized hail reported in the town of Clay. Wind gusts up to 70 mph caused several downed trees and power lines in Manlius. In the town of Lysander, several trees were toppled and/or uprooted. Two trees reportedly fell upon a parked vehicle and caused extensive damage. In Van Buren Township, the roof was blown off of a barn. Three adjacent silos were also heavily damaged. From northern sections of Syracuse straight across to Manlius, dozens of trees were blown down. Several roads had to be closed until crews could clear fallen debris and repair damaged traffic signals. In Manlius, two trees and a utility pole were toppled onto a house. Heavy damage was sustained in the home's front porch and garage areas. Towns affected experienced approximately $200 K in property damages.	NOAA-NCDC
TSTM / Winds September 7, 1998 (FEMA DR-1244)	Baldwinsville to Manlius	See FEMA Disaster Declarations (Table E.8)	NOAA-NCDC, Audet, SPC, Hazards & Vulnerability Research Institute (SHELDUS), Onondaga County
TSTM / Winds November 10, 1998	Multi-County	The strongest winds affected sections of northern Onondaga County north and west of Syracuse. In Lysander and Baldwinsville, emergency management officials reported that several trees blocked roadways for a	NOAA-NCDC

Event Name / Date	Location	Losses / Impacts	Source(s)
		time and 10,000 to 15,000 customers were without power. Counties affected experienced approximately $145 K in property damages.	
TSTM / Winds July 3, 1999	Countywide	Numerous trees and powerlines blown down throughout the county with power outages reported in Syracuse, Liverpool, Lakeport, Manlius, Fayetteville and Tully. A few homes received minor damage from fallen trees and limbs in several of these towns. Numerous tents and booths were blown down at the "Taste of Syracuse" festival in the city of Syracuse. Eleven people sustained minor injuries from flying debris at this location. Several boats were overturned in Owasco Lake and a 4 year old girl drowned underneath a capsized pontoon boat. Towns affected experienced approximately $750 K in property damages.	NOAA-NCDC
Tornado (F0) September 24, 2001	Countywide	An F0 tornado extended through Fabius for 1 mile, resulting in $1 K in property damages. The initial touchdown occurred at the intersection of Goodrich Road and Route 80. Spotty damage was observed along a 1/2 mile long, 75 yard wide path. Most of the damage was concentrated at a residence near the initial touchdown where several large trees were downed and a small shed was destroyed. Maximum sustained winds were estimated at 50 to 70 mph.	NOAA-NCDC
Severe Storms May 3, – September 14, 2000 (FEMA DR-1335)	Statewide	See FEMA Disaster Declarations (Table E.8)	Chittenden, FEMA, NYSDPC, NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO
TSTM / Winds February 10, 2001	Multi-County	High winds with the fast moving front knocked down numerous trees and power lines. 75 mph winds were reported in East Syracuse. Counties affected experienced approximately $150 K in property damages.	NOAA-NCDC
Lightning June 15, 2002	Syracuse	Lightning struck the roof and chimney of a three story apartment building. Bricks flew as far as 100 feet. These flying bricks broke building and car windows across the street at Hiawatha Used Cars, bore holes in the roof of another building, and dented the siding of Tucci Furniture across the street. The lightning knocked out a window and partially collapsed a ceiling on the third floor. The seven families in the building had to find somewhere else to stay until the building was repaired. The Town experienced approximately $20 K in property damages.	NOAA-NCDC
TSTM / Wind / Tornado (F1) July 28, 2002	Skaneateles (Mottville)	A F1 tornado touched down briefly in the hamlet of Mottville of Skaneateles, resulting in over $2 M in damages. A trailer home was destroyed in the center of Mottville. Several large trees were sheared off 10 to 20 feet above the ground. Falling trees damaged several homes and businesses in the area. The Mottville post office had two	NOAA-NCDC

Event Name / Date	Location	Losses / Impacts	Source(s)
		large pine trees lying on the roof. The storm continued south into the center of the village of Skaneateles. Damage in this area was due to straight line winds. More than 3,000 customers lost electricity. There were no deaths or serious injuries caused by the tornado. A state of emergency was declared in the town of Skaneateles.	
Lightning August 23, 2002	Syracuse	A small commuter plane from the Hancock Syracuse Airport was struck by lightning, causing the plane to make an emergency landing. No passengers were injured.	The Post Standard (Syracuse)
Lightning March 21, 2003	Manlius	A lightning strike tripped a circuit breaker knocking out power to 1,000 electric customers in Fayetteville and Minoa, both in the town of Manlius. The Town experienced approximately $50 K in property damages.	NOAA-NCDC, The Post Standard
Severe Storm / Flooding / Lightning May 23-24, 2004	Solvay	3-inch diameter hail fell in Solvay. Approximately $110 K in property damage due to lightning, hail and flooding ($90 K from lightning and hail). In Syracuse, lightning struck the police headquarters on 550 South State Street blowing out the department's computer system. Also, lightning struck a vacant house at 201 Elliott Street in Syracuse.	NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS), The Post Standard
Severe Storms August 13 – September 16, 2004 (FEMA DR-1564)	Multi-County	See FEMA Disaster Declarations (Table E.8)	FEMA, NYSEMO, NWS, Hazards & Vulnerability Research Institute (SHELDUS), NOAA-NCDC
Lightning / TSTM August 27, 2004	Lyncourt	A 12 year old boy in Lyncourt was killed by lightning after taking shelter under a tree. A half inch of rain fell at Syracuse Hancock Airport. Many power outages were reported throughout the County.	The Post Standard
Lightning August 28, 2004	Baldwinsville	Lightning struck a substation knocking out power to 8,000 residents in the area and causing approximately $20 K in property damages.	NOAA-NCDC, The Post Standard
Lightning August 29, 2004	Pompey	Lightning started a fire destroying a detached two car garage on Henneberry Road in Pompey, resulting in over $100 K in property damage.	NOAA-NCDC, The Post Standard
Winds October 15, 2004	Multi-County	In Cicero, high winds caused a tree to fall on a car, injuring the occupant. Counties affected experienced approximately $1 M in property damages.	NOAA-NCDC
Severe Storms and Flood April 2-4, 2005	Multi-State	Resulted in a Disaster Declaration for 20 New York State counties (DR-1589), however, it did not include Onondaga County. New York State experienced approximately $66.2 M in eligible damages (NYSDPC). The County experienced approximately $100 K in property damages. There were some road closures and flooded basements in DeWitt, East Syracuse, Manlius, and Lafayette.	NCDC, NWS, FEMA, NYSDPC, NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO, AHPS, USGS
Lightning August 8, 2005	Manlius	Lightning struck an apartment complex deck in Manlius starting a fire. The fire spread to another apartment building that was attached. No injuries were reported. Approximate damages totaled $50 K.	NOAA-NCDC, The Post Standard

Event Name / Date	Location	Losses / Impacts	Source(s)
TSTM July 9, 2005	Baldwinsville	Over 2,000 residents in Baldwinsville were without power as a result of a fallen tree limb during the storm.	The Post Standard
Lightning Storm July 14, 2005	Syracuse	A lightning storm dumped a record 2.24 inches of rain on Syracuse, knocking out power to 38,000 residents and flooding streets and parking lots. There were no reported injuries.	The Post Standard
TSTM / Winds November 6, 2005	Cicero to East Syracuse	Thunderstorm winds uprooted trees in East Syracuse. Winds also downed several trees and partially destroyed a fence in Cicero. A tree fell on a parked car also in Cicero. Winds also blew down several trees in Mattydale. Towns affected experienced approximately $20 K in property damages.	NOAA-NCDC
High Winds February 17, 2006	Multi-County	Some of the more notable damage included a roof ripped off a carpet store in Onondaga County. Over 200,000 residents of north central New York were without power during the height of the storm. Some residents did not get their power restored for over one week. Counties affected experienced approximately $100 K in property damages.	NOAA-NCDC
Severe Storms and Flood June 25 - July 12, 2006	Multi-State	This event was the largest and most costly natural disaster that New York State has encountered since Hurricane Agnes hit the State in 1972. Resulted in a Disaster Declaration for 19 New York State counties (DR-1650), however, it did not include Onondaga County. New York State experienced approximately $246.3 M in eligible damages (NYSDPC). Onondaga County experienced approximately $29 K in property damages. Most of the damages were a result of flooding throughout the County. Although Onondaga County was not declared as an official disaster area under this declaration, all counties of the State were eligible to apply for federal assistance under the Hazard Mitigation Grant Program. As of December 29, 2006, more than $227 M in disaster aid was approved for the State. Disaster aid in Onondaga County is unknown. The storm overwhelmed county sewer systems, causing raw sewage to seep in Onondaga Lake after the Metropolitan Sewage Treatment Plant exceeded its capacity. A tornado spawned, cutting a three-mile swath from Marcellus to Onondaga, with the heaviest amount of damage reported in Cicero. On July 12th, 4.29 inches of rain was measured at Syracuse's Hancock Airport, making it the wettest day since record-keeping began at the airport in 1949.	FEMA, NOAA-NCDC, NWS, NYSEMO, NYSDPC, USGS, NOAA, Lanza, USGS, Goldberg and Greene (The Post Standard), Doherty (The Post Standard), Weiner, Baker
Tornado (F0) July 29, 2006	Marcellus	A F0 tornado touched down in the Village of Marcellus, resulting in over $10 K in property damages. Damage was largely to trees which were uprooted and snapped. A portion of a tin roof on a residence was pulled off the building and flipped to the other side. A definitive, convergent damage path was noted on the east side of the village in the Orchard Street and Kinderwood Road areas with scattered damage	NOAA-NCDC, NWS

Event Name / Date	Location	Losses / Impacts	Source(s)
		heading southeast out of town. An eyewitness observed a tornado pass just to the east of Marcellus Park, then track approximately 3 miles to the southeast before going out of view. Additional damage was noted in the vicinity of South Onondaga, including utility poles and power lines on Nichols and Hutchings Roads.	

Note (1): *The intensity of tornado events to affect Onondaga County is measured by the Fujita Scale in this Table, which was decommissioned on February 2007. NOAA-NCDC storm query indicated that Onondaga County has experienced 304 severe storm events between January 1, 1950 and May 31, 2008 (including Thunderstorm, Hail, Wind, Hurricane, Lightning, and Tornado events). However, not all of these events were identified in this table due to a lack of detail and/or their minor impact upon the County.*

Note (2): *Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.*

* *According to many sources, these events were known as Nor'easters, therefore, they are not discussed further in this hazard profile and are further mentioned in Section E.1.2 (Severe Winter Storm) and the flooding impact of the events are mentioned in Section E.2.3 (Flood)*

DR *Federal Disaster Declaration*
EM *Federal Emergency Declaration*
F *Fujita Scale (F0 – F5)*
FEMA *Federal Emergency Management Agency*
HMP *Hazard Mitigation Plan*
HPC *Hydrometeorological Prediction Center*
K *Thousand ($)*
M *Million ($)*
mph *Miles Per Hour*
NCDC *National Climate Data Center*
NOAA *National Oceanic Atmospheric Administration*
NWS *National Weather Service*
NYS DPC *New York State Disaster Preparedness Commission*
NYSEMO *New York State Emergency Management Office*
NRCC *Northeast Regional Climate Center*
OEM *Office of Emergency Management*
SHELDUS *Spatial Hazard Events and Losses Database for the U.S.*
SPC *Storm Prediction Center (NOAA)*
TSTM *Thunderstorm*
U.S. *United States*
USGS *U.S. Geological Survey*

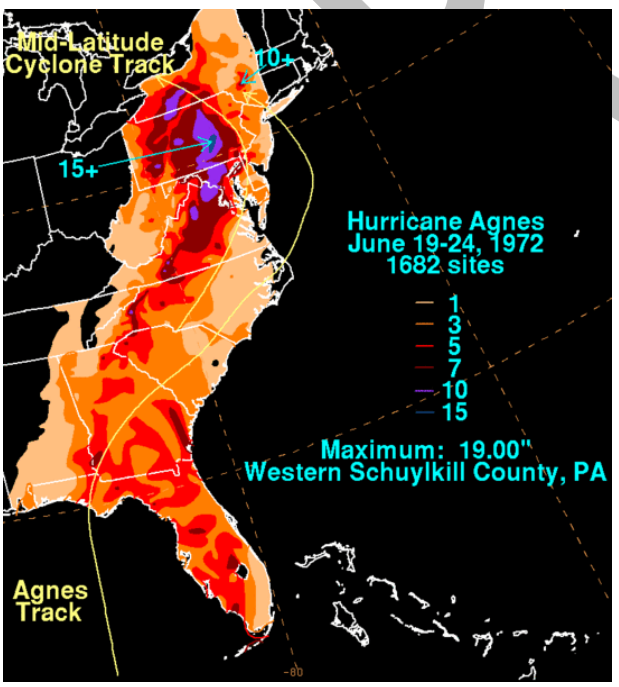
Further descriptions of select severe storm events that have impacted Onondaga County are provided in below with details regarding their impact (where available). These descriptions are provided to give the reader a context of the severe storm events that have affected the County and to assist local officials in locating event-specific data for their municipalities based on the time and proximity of these events. Many severe storm events resulted in major flooding throughout the County; therefore, the flood impacts of these events are further mentioned in more detail in Section E.2.3 (Flood). Certain severe storm events that have been classified as Nor'Easters are further included in Section E.2.2 (Severe Winter Storm).

Monetary figures within the following event descriptions were U.S. Dollar (USD) figures calculated during or within the approximate time of the event (unless present day recalculations were made by the sources reviewed). If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of increased inflation.

June 20-25, 1972 (Remnants of Tropical Storm Agnes) (FEMA DR-338): Tropical Storm Agnes dropped as much as 19 inches of rain as it left the Gulf of Mexico as a hurricane. Agnes downgraded to a tropical storm as it hit every state from Florida to New York State (Figure E-1). More than 210,000 people were forced to evacuate their homes. The storm broke long-standing flood records in six states, resulting in $3.2 billion in property damage and 122 fatalities. Tropical Storm Agnes remained the costliest disaster until Hurricane Andrew (1992). Pennsylvania and New York State experienced the greatest rainfall totals and suffered the most losses from this storm (NOAA, 1997; USACE, 1973). New York State experienced 24 deaths and approximately $703 million in damages as a result of flooding from this storm (NYSDPC, 2008; Middle Atlantic River Forecast Center [MARFC], 2006).

In Onondaga County, this event was documented as one of the major flood events of the County, experiencing approximately $1.6 million in property and crop damages (Hazards & Vulnerability Research Institute, 2007). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

Figure E-1. Tropical Storm Agnes Rainfall Totals



Source: Roth, Date Unknown

This storm resulted in a FEMA Disaster Declaration (FEMA DR-338) for New York State on June 23, 1972. Through this declaration, the following 26 counties were declared eligible for Federal and State disaster funds: Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Livingston, Madison, Monroe, Oneida, Onondaga, Ontario, Orange, Oswego, Rockland, Schuyler, Seneca, Steuben, Tioga, Tompkins, Ulster, Wayne, Westchester, Wyoming, Yates (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

July 3-5, 1974 (FEMA DR-447): A wide region of central and eastern New York State suffered from a storm system moving northward across the State, causing showers and thunderstorms in the Oswego-Syracuse-Cobleskill region. Precipitation totals ranged between 3.8 and 5.0 inches throughout the State. The City of Syracuse experienced over 4.5 inches of rain (Robison et al., 1976).

In New York State, Governor Wilson declared seven counties a major disaster area, including Chenango, Herkimer, Oneida, Onondaga, Oswego, Otsego and Schoharie Counties. The Governor applied to the Federal Government for financial aid under provisions of U.S. Public Law 93-228. Preliminary estimates of overall damage in New York State to private property, public property, and agricultural land and crops, as used in the application for aid, was approximately $12.6 million (Robison et al., 1976).

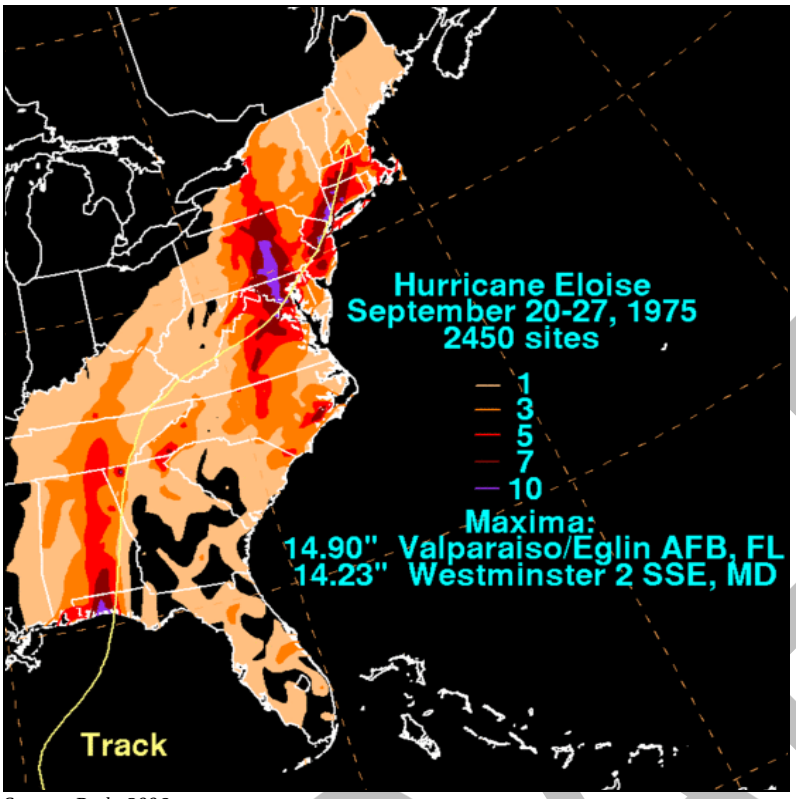
Onondaga County experienced the most damage over any other county in the State, estimated at $7.2 million. The County suffered $6.5 million in damages to private property; $500,000 to public property; and $200,000 to agricultural land (Robison et al., 1976). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

This storm resulted in a FEMA Disaster Declaration (FEMA DR-447) for New York State on July 23, 1974. Through this declaration, the following 4 counties were declared eligible for Federal and State disaster funds: Herkimer, Oneida, Onondaga, Oswego (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

September 22-27, 1975 (Remnants of Hurricane Eloise) (FEMA DR-487): Hurricane Eloise caused flooding throughout the eastern U.S and in Puerto Rico. This storm made landfall in southeastern Louisiana and then followed a northeasterly path from Mississippi and Alabama and further along the East Coast, up through New York State (Figure E-2). Total storm damages were estimated at $415 million. Counties in New York, Pennsylvania, Maryland, Florida, and Alabama were declared disaster areas (Perry et al., 2005).

Total losses in New York State are unknown; however, it was reported that Onondaga County experienced approximately $6.3 million in property damages from this event (Hazards & Vulnerability Research Institute, 2007). Rain totals within the vicinity of Onondaga County totaled between 3 and 5 inches (Roth, 2006). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

Figure E-2. Hurricane Eloise Rainfall Totals



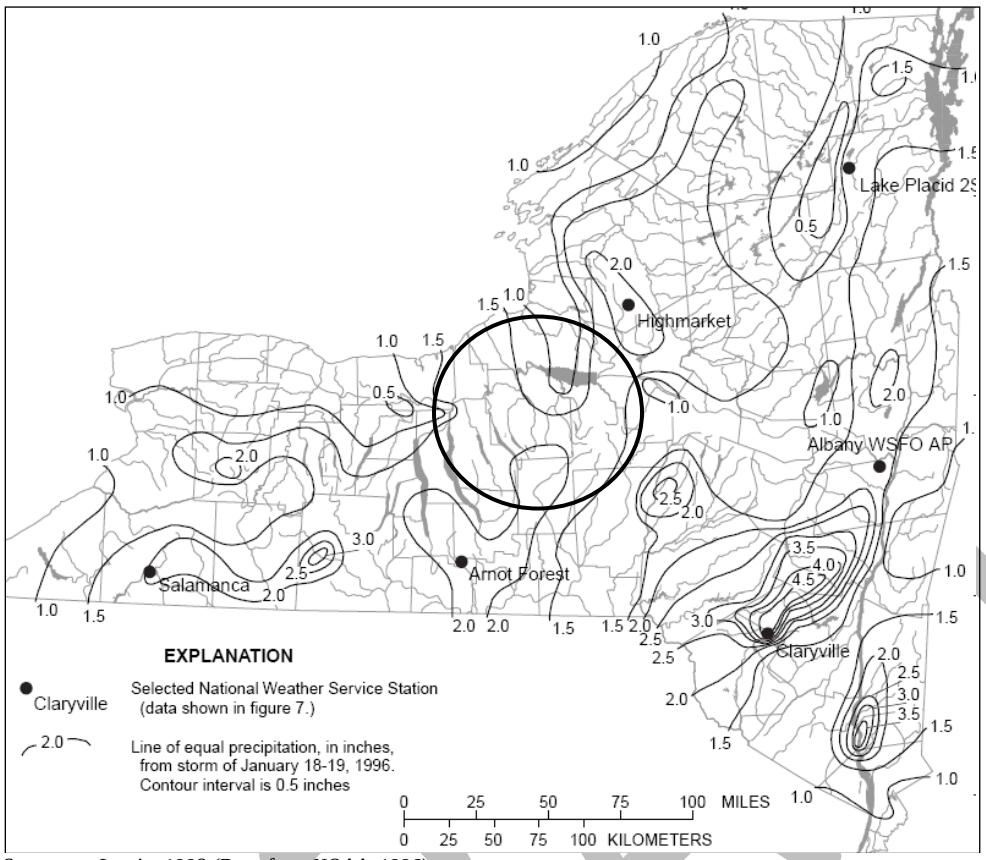
Source: Roth, 2006

This storm resulted in a FEMA Disaster Declaration (FEMA DR-487) for New York State on October 2, 1975. Through this declaration, the following 17 counties were declared eligible for Federal and State disaster funds: Allegany, Broome, Cayuga, Chemung, Cortland, Madison, Onondaga, Oswego, Putnam, Queens, Richmond, Rockland, Steuben, Tioga, Tompkins, Westchester, Yates (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

January 18-20, 1996 (FEMA DR-1095): A strong storm produced significant precipitation between January 18th and 20th. Combined with unseasonably warm temperatures, causing rapid snowmelt, extensive flooding occurred throughout New York State. The storm and flooding claimed ten lives, stranded hundreds of people, destroyed or damaged thousands of homes and businesses, and closed hundreds of roads. The areas within and surrounding the Catskill Mountains were severely affected by this event. More than 4.5 inches of rain fell on at least 45 inches of melting snow in the Catskill Mountain region and caused major flooding throughout the southeastern section of the State (Figure E-3). New York State experienced between $100 and $160 million in property damages from this event (Lumia, 1998; NYSDPC, 2008).

Onondaga County experienced approximately $7.6 million in flood damages from this event (NCDC, 2008; Hazards & Vulnerability Research Institute, 2007). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

Figure E-3. Lines of Precipitation during January 18-19, 1996

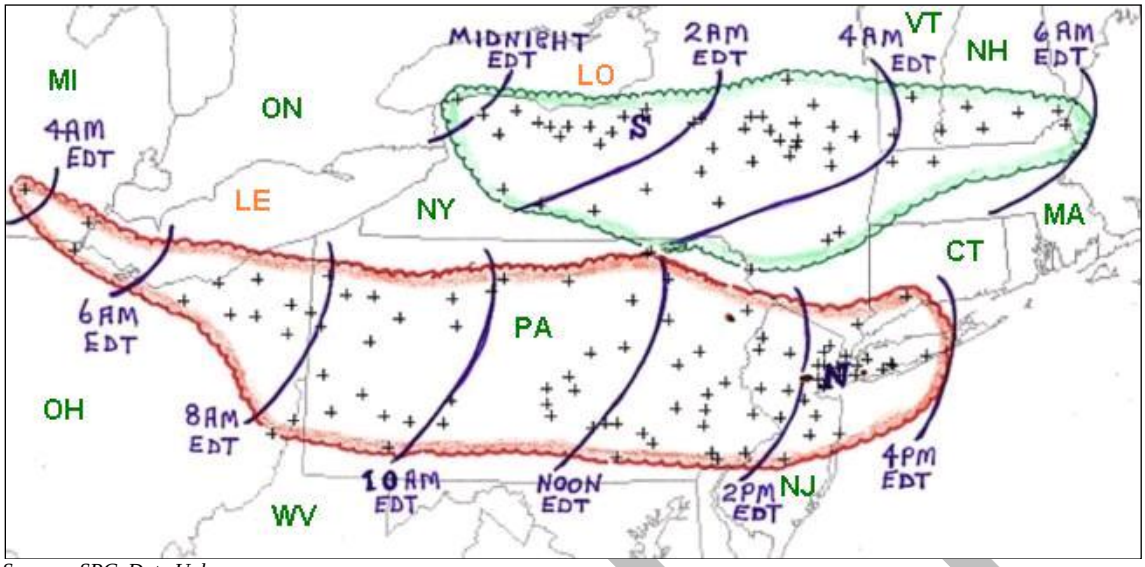


Source: *Lumia, 1998 (Data from NOAA, 1996).*
Note: *The black circle within New York State indicates the approximate location of Onondaga County*

This storm resulted in a FEMA Disaster Declaration (FEMA DR-1095) on January 24, 1996. Through this declaration, the following 41 counties were declared eligible for Federal and State disaster funds: Albany, Allegany, Broome, Cattaraugus, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Essex, Franklin, Greene, Herkimer, Jefferson, Lewis, Livingston, Madison, Montgomery, Onondaga, Ontario, Orange, Otsego, Putnam, Rensselaer, St. Lawrence, Saratoga, Schenectady, Schoharie, Schuyler, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wyoming and Yates (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State totaled approximately $16.7 million in individual assistance and $103.7 million in public assistance (1997 USD). Onondaga County received $1.1 million in public assistance (1997 USD) (Lumia, 1998).

September 7, 1998 (FEMA DR-1244) ("Syracuse Derecho of Labor Day 1998"): A cluster of fast-moving thunderstorms, known as a derecho, developed over western New York State and moved eastward towards the coast of New England resulting in significant wind and hail damage through much of the area. Figure E-4 displays the path of the derecho throughout the northeast U.S.

Figure E-4 September 7, 1998 Derecho Storm Path



Source: SPC, Date Unknown

Note: The two derecho events are outlined in green and red. The green indicates the Syracuse Derecho and the red indicates the New York City derecho. Curved purple lines represent the approximate locations of the "gust fronts" at two hourly intervals. "+" symbols indicate the locations of wind damage or wind gusts above severe limits (58 mph or greater). Red dots and paths indicate tornado events. A "gust front" is the leading edge of the downdraft (downward moving air) from a thunderstorm.

Along the storm track, tens of thousands of trees were blown down and over 100 homes and businesses were damaged. Many homes and businesses experienced power outages, some without power for a week (SPC, Date Unknown). Some of the worst damage areas were noted in a band across western and central New York State, within the vicinity of Rochester, Syracuse, and Utica. A total of three people were killed and ten were injured at the New York State Fairgrounds in Syracuse. Wind gusts were measured at 89 mph at the Rochester Airport and 77 mph at the Syracuse airport. Winds were estimated to have reached 115 mph in the areas with the worse damage. Along the storm track of the derecho, tens of thousands of trees were blown down and over 1,000 homes and businesses were damaged. Hundreds of thousands were without power, some without power for a week. Total damages in New York State were estimated at $130 million (1998 USD) (SPC, Date Unknown).

The severe windstorm struck Onondaga County and eight surrounding counties during the early morning of September 7th. Wind speeds in the area ranged between 70 and 90 mph, with gusts of up to 115 mph (Audet, 1998). The storm first entered the County just after 1:00 a.m. on September 7th, tearing through Baldwinsville, bringing down many trees and utility poles. The storm quickly progressed towards Clay across Onondaga Lake to Camillus and Geddes (NCDC, 2008).

The New York State Fairgrounds in Geddes suffered severe damaged. Most of the temporary holding structures and tents on the premises were either completely destroyed or had heavy damage. The winds were so strong that three large flagpoles at the entrance of the fairgrounds were bent to almost a 45 degree angle. Roofs of buildings were torn off, windows were blown out, and siding was damaged because of fallen trees. Two people were killed and seven were injured at the fairgrounds (NCDC, 2008).

In Marcellus and Camillus, thousands of trees were blown down just in this area alone. The Onondaga Hill section's roads were impassable from downed trees and live power lines. Several homes in the area had various degrees of damage to their siding and roofs, mainly from fallen trees. The storm then travelled to Marcellus and on to the Syracuse metropolitan area (NCDC, 2008).

Syracuse felt the brunt of the derecho. Thousands of trees were either damaged or knocked down throughout the city. One of the hardest hit areas was the Thornden Park area near Syracuse University. This section experienced substantial structural damage to nearby homes and buildings. A textile factory's roof was almost completely torn away and many student housing buildings at Syracuse University had windows blown out and damaged roofs. St. Lucy's Church was nearly destroyed when one of its steeples collapsed. Wind gusts at the Hancock International Airport were recorded at 75 mph. One person was killed in Syracuse (NCDC, 2008).

Post-storm damage surveys showed a damage swath 10 to 12 miles long and almost 30 miles wide. Estimated peak wind gusts were near 115 mph. Hundreds of thousands of people were without power. According to NOAA-NCDC and SHELDUS, Onondaga County experienced approximately $90 million in property damage from this event (NCDC, 2008; Hazards and Vulnerability Research Institute, 2007).

In a press release, dated March 26, 2001, from the Onondaga County Office of the County Executive, it was stated that the County was awarded $2.2 million from the New York State Housing Trust Fund Corporation, Disaster Recovery Initiative. The State allocated $12.9 million for 32 counties who were impacted as a result of the 1998 ice storm, tornadoes, flooding, and other severe storms. Onondaga County received the largest allocation for the damage sustained during the September 7th Labor Day Storm. Twenty-five projects were approved and the funding allowed seven municipalities of the County to remove and replace the damaged trees (County of Onondaga, 2001). The following projects were selected:

- Onondaga County: tree removal along Department of Transportation County Roads - $200,000
- Onondaga County: stream clearance and debris removal from streams in Manlius and DeWitt - $65,000
- Syracuse: housing and garage repairs - $645,811
- Syracuse: stream bank stabilization - $400,000
- Syracuse Housing Authority" tree planting - $44,800
- Elbridge: tree work in cemeteries - $5,900
- Fabius: reconstruction of Herlihy Road - $13,350
- Geddes: tree replanting in the Avery Tract - $20,000
- Geddes: stream clearance along Harbor Brook - $25,000
- Manlius: stream clearance along Limestone Creek - $40,000
- Onondaga: unreimbursed cleanup in Nedrow – $9,251
- Onondaga: stream bank stabilization along Onondaga Creek - $120,000
- Camillus: stream bank stabilization along Nine Mile Creek - $116,000
- Camillus: tree removal and replanting - $30,000
- Fayetteville: stream bank stabilization along Limestone Creek - $15,000
- Fayetteville: debris removal along the Ledyard Canal - $10,000
- Jordan: tree removal and replanting - $22,000
- Jordan: stream bank stabilization along Skaneateles Creek - $12,000
- Manlius: stream clearance along Limestone Creek - $37,000
- Marcellus: tree removal and replanting - $11,300
- North Syracuse: tree replanting - $10,000
- Solvay: Boyd Park repairs to play equipment and tennis courts - $1,000
- Solvay: Mountain Top Fire Station façade repairs - $39,500
- Solvay: Cooperative Extension Technical assistance and training - $57,000
- Solvay: Nursery Landscape Association Technical assistance and training - $10,000 (County of Onondaga, 2001)

This storm resulted in a FEMA Disaster Declaration (FEMA DR-1244) on September 11, 1998. Through this declaration, individual and public assistance was given to Cayuga, Fulton, Herkimer, Madison, Monroe, Onondaga, Oneida, Ontario and Wayne (FEMA, 2007; NYSEMO, 2006). Over $36 million was given out in public and individual assistance to those affected counties (NYSDPC, 2008).

May through September 2000 (FEMA DR-1335): Between May and September 2000, multiple severe storm events occurred throughout New York State resulting in significant flooding and over $34.6 million in damage throughout various New York State counties. Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

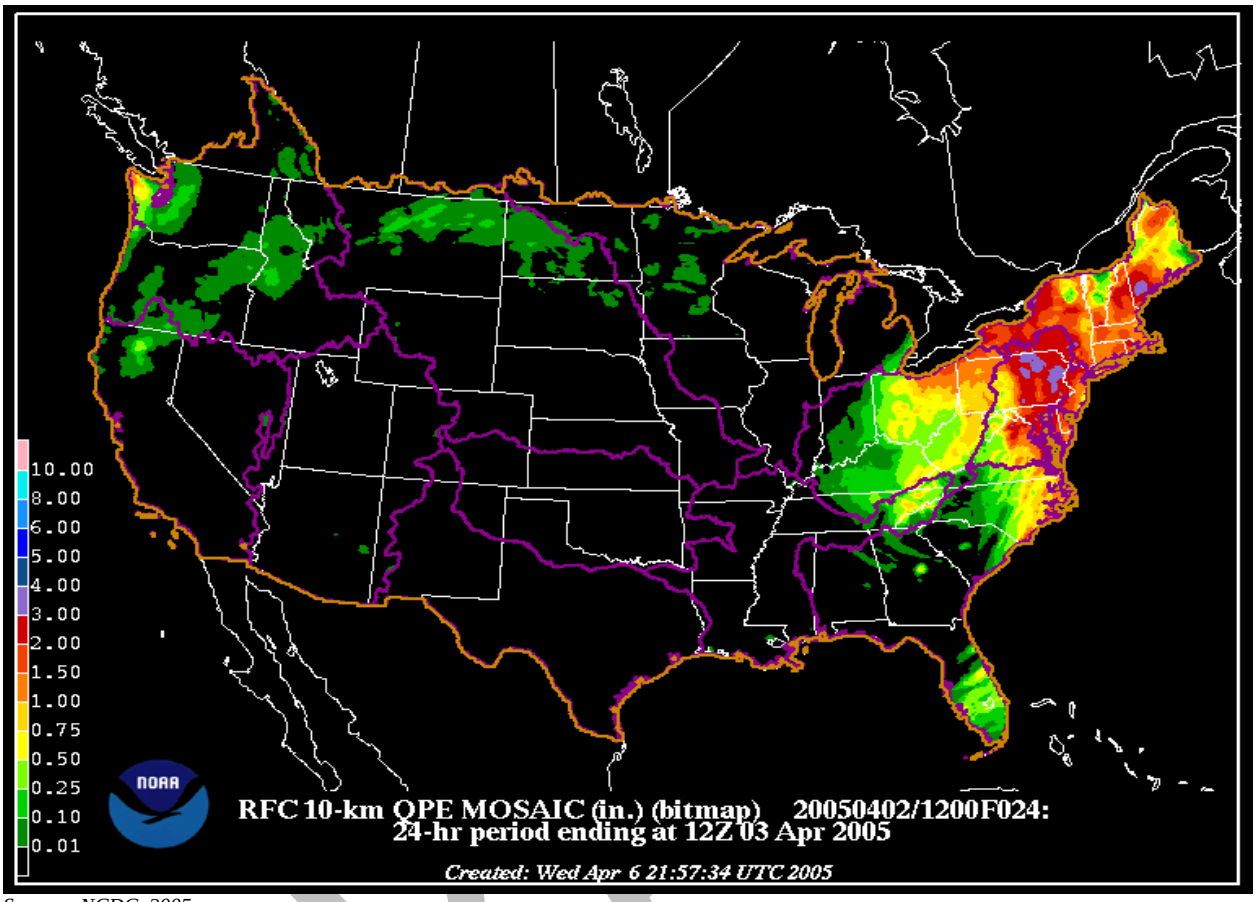
These storms resulted in a FEMA Declaration Disaster (FEMA DR-1335) on July 21, 2000. Through this declaration, the following 27 counties were declared eligible for Federal and State disaster funds: Albany, Allegany, Cattaraugus, Columbia, Dutchess, Erie, Essex, Greene, Herkimer, Lewis, Livingston, Madison, Montgomery, Niagara, Oneida, Onondaga, Orleans, Otsego, Rensselaer, Schenectady, Schoharie, Steuben, Sullivan, Tioga, Tompkins, Ulster and Yates (FEMA, 2003). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

August 13 – September 16, 2004 (FEMA DR-1564): A series of storms occurred between August and September 2004 within New York State, resulting in approximately $18 million in eligible damages (NYSDPC, 2008). NOAA-NCDC indicated that flooding during this time period in Onondaga County particularly occurred as a result of heavy thunderstorms on August 30-31, 2004. Onondaga County experienced approximately $2 million in flood damages from this event (NCDC, 2008). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

These storms resulted in a FEMA Declaration Disaster (FEMA DR-1564) on October 1, 2004. Through this declaration, the following 17 counties were declared eligible for Federal and State disaster funds: Allegany, Broome, Cattaraugus, Columbia, Delaware, Madison, Monroe, Niagara, Oneida, Onondaga, Orange, Orleans, Steuben, Sullivan, Ulster, Warren, and Wayne Counties (FEMA, 2005). As of December 10, 2004, more than $1.8 million in disaster aid had been approved for the State (FEMA, 2004). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

April 2-4, 2005 (FEMA DR-1589): A slow moving storm moved up through the Appalachians and into the northeast U.S. The heavy rainfall from this event produced flooding throughout New York State, New Jersey and Pennsylvania (NCDC, 2005). Prior to this storm, the rivers and streams in the area had high flow-rates due to a previous rainstorm on March 28th and snowmelt; therefore, flooding increased substantially and created additional damage as a result of this April storm (NYSDPC, 2008). Figure E-5 shows rainfall totals from this event for the northeast U.S.

Figure E-5. Rainfall Totals for April 2-4, 2005



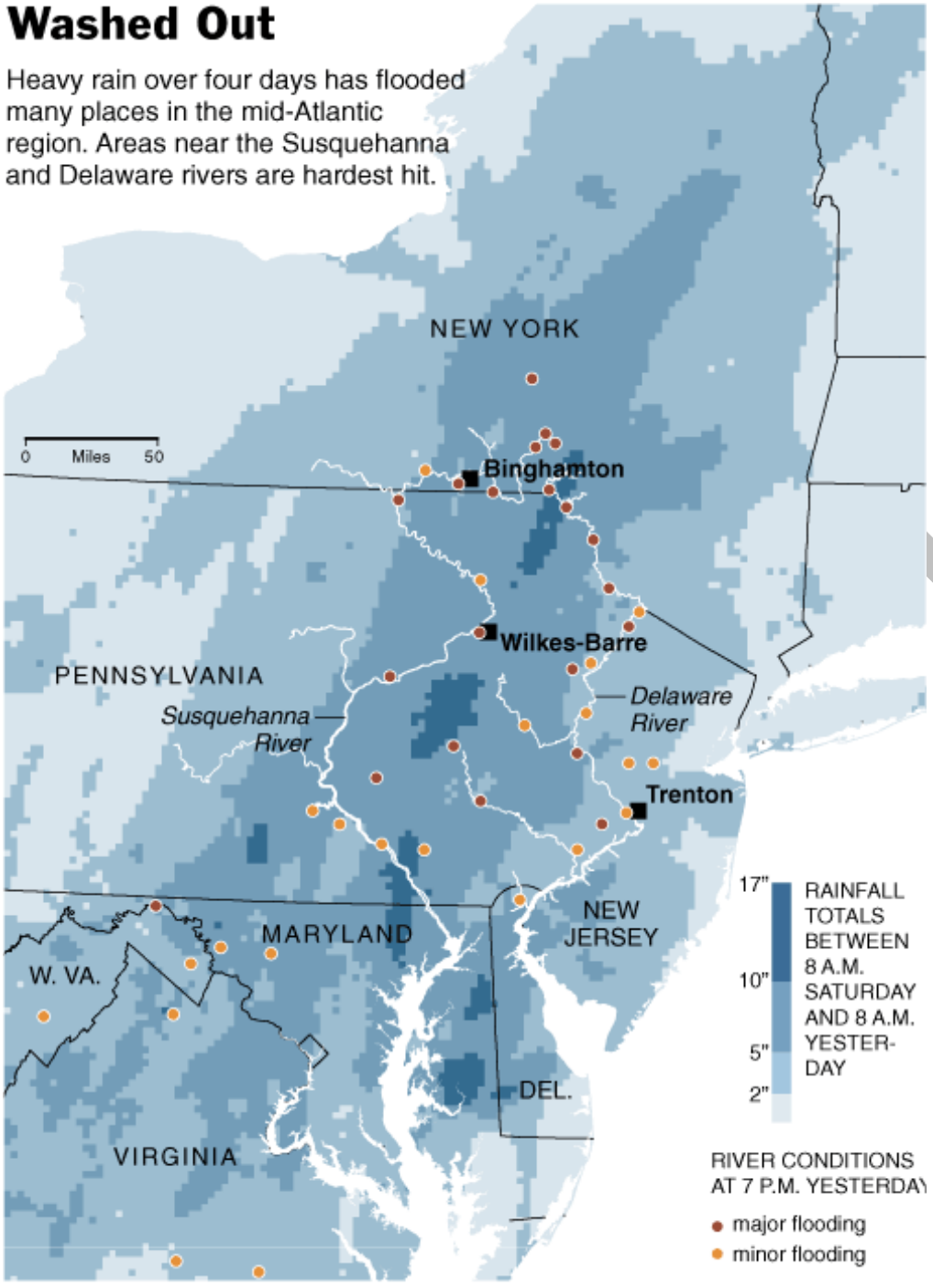
Source: NCDC, 2005

New York State experienced approximately $66.2 million in damages from this event (NYSDPC, 2008), and Onondaga County experienced approximately $100,000 in flood damages (NCDC, 2008; Hazards & Vulnerability Research Institute, 2007). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

This storm resulted in a FEMA Disaster Declaration (DR-1589) on April 19, 2005. Through this declaration, the following 20 counties were declared eligible for Federal and State disaster funds: Broome, Cayuga, Chautauqua, Chenango, Columbia, Cortland, Delaware, Greene, Madison, Montgomery, Niagara, Orange, Otsego, Putnam, Rensselaer, Schoharie, Sullivan, Tioga, Ulster and Westchester (NYSDPC, 2008; FEMA, 2008). Although Onondaga County suffered flood damages during this storm, it was not declared a disaster area by FEMA.

June 25 – July 12, 2006 (FEMA DR-1650): This severe storm event resulted in a significant flooding that affected much of the Mid-Atlantic region. The flooding was widespread, affecting numerous rivers, lakes and communities from North Carolina to New York State. Rain totals throughout the eastern U.S. ranged from 2 to 17 inches, particularly between June 27th and 29th, with the largest accumulations falling in Maryland, Pennsylvania and New York State (Feuer, 2006) (Figure E-6).

Figure E-6. 2-Day Rainfall Totals during June 27-28, 2006 Flood



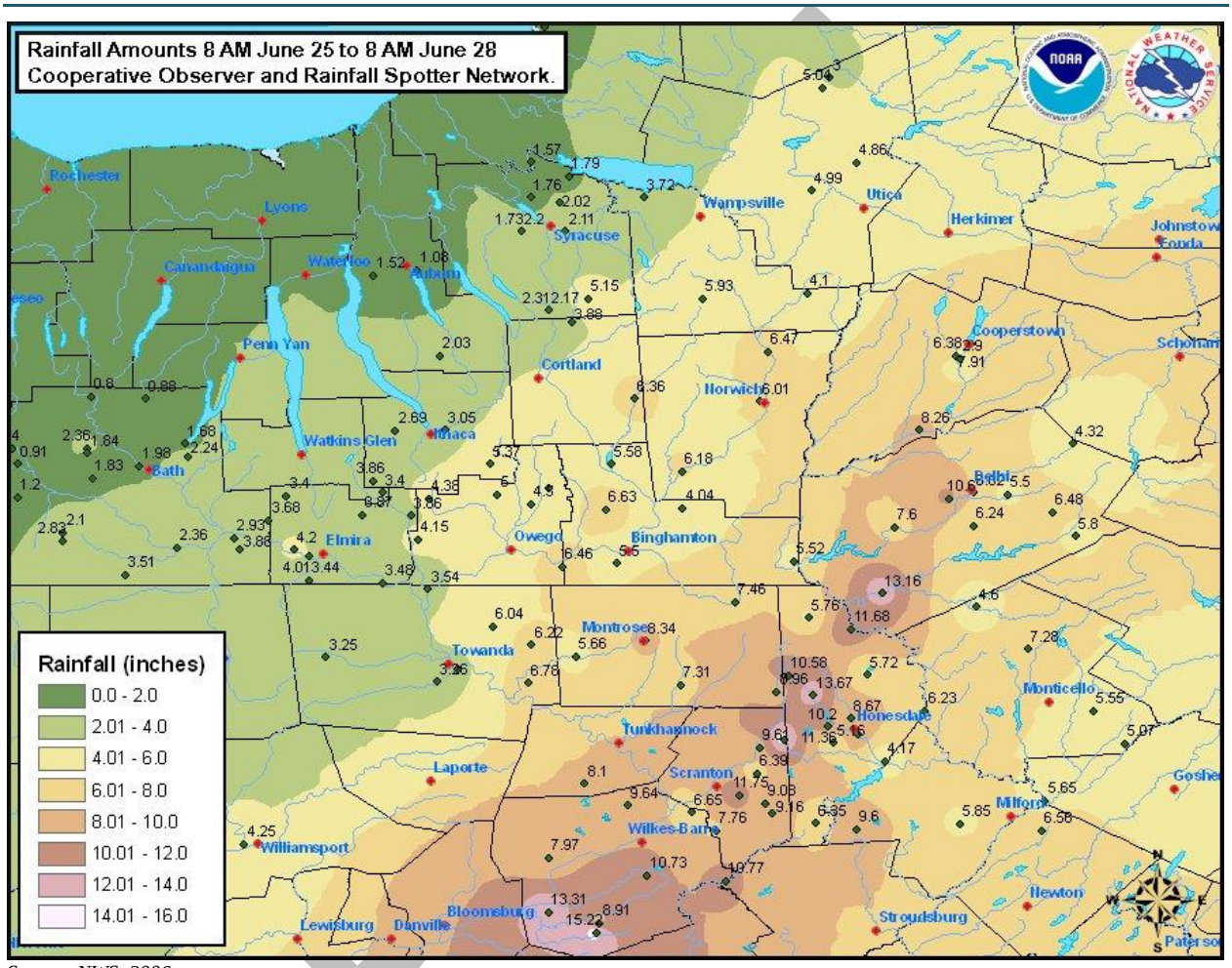
Source: National Weather Service
Source: Feuer, 2006
Note: Image provided to source by NWS

Overall, the storm resulted in over 16 deaths and millions of dollars in damages throughout the affected states (NWS, 2006). Some sources indicated that this flooding event was the largest and most costly natural disaster that New York State has encountered since Hurricane Agnes in 1972. The NYS HMP indicated that the counties

affected throughout the State experienced approximately $246.3 million in damages during this flood (NYSDPC, 2008).

In Onondaga County, precipitation totals between June 25 through June 28, 2006 averaged between 0 to 6 inches of rain, with largest accumulations generated in the southeastern portion of the County (Figure E-7) (NWS, 2006). Over 4.29 inches of rain fell at the Hancock Airport in Syracuse, shattering a 31-year-old rainfall record of 3.9 inches on July 3, 1974 (Goldberg and Greene, 2006). Flood impacts within New York State and Onondaga County are further mentioned in Section E.2.3 (Flood).

Figure E-7. Rainfall Amounts in Central New York on June 25 through June 28, 2006



Source: NWS, 2006

This event resulted in a FEMA Emergency Declaration (FEMA EM-1650) on July 1, 2006. Through this declaration, the following 12 Counties were declared eligible for Federal and State disaster funds: Broome, Chenango, Delaware, Herkimer, Montgomery, Oneida, Orange, Otsego, Schoharie, Sullivan, Tioga, and Ulster Counties (FEMA, 2008). Although Onondaga County was not declared as an official disaster area under this declaration, all counties of the State were eligible to apply for federal assistance under the Hazard Mitigation Grant Program. This program provides assistance to State and local governments and certain private nonprofit organizations for actions taken to prevent or reduce long term risk to life and property from natural hazards. As of December 29, 2006, FEMA indicated that nearly $227 million in disaster aid was made available to all

declared counties as result of this event (FEMA, 2008). Disaster assistance for Onondaga County affected in the State was not disclosed in the materials reviewed to develop this plan.

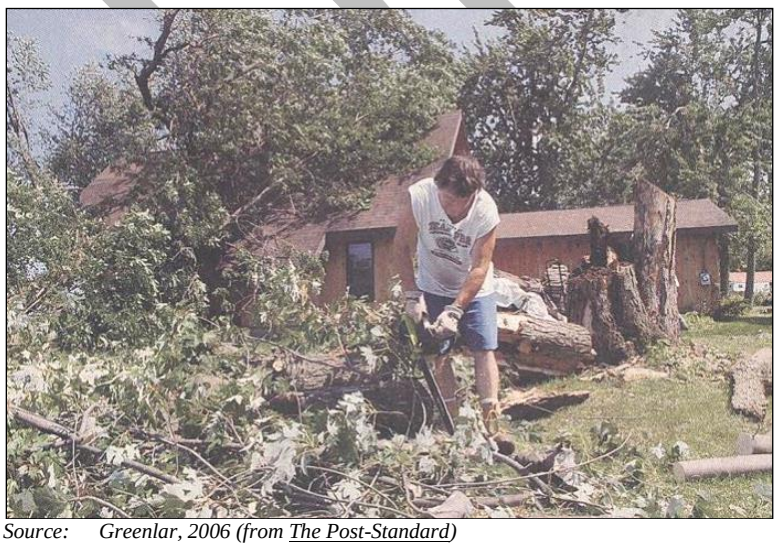
July 29, 2006: A severe storm entered Onondaga County, affecting northern and southern portions of the County. The storm brought heavy rain and strong winds. The winds snapped numerous utility poles, uprooted trees and downed power lines in many areas of the County. This severe storm event produced a microburst over Cicero and a tornado that traveled from Marcellus to Onondaga (Doherty, 2006).

The microburst struck Cicero, with winds of 60 to 80 miles per hour. It snapped utility poles and uprooted trees in Cicero's South Bay and Cicero Center areas. The tornado was a low-grade tornado with winds of 40 to 70 miles per hour. It cut a three-mile swath from Marcellus to Onondaga, downing trees and power lines (Doherty, 2006). Figure E-8 and Figure E-9 show the damages from the storm that hit the area.

Figure E-8. Fallen Trees on Brewerton, New York Home

Source: Greenlar, 2006 (from The Post-Standard)

Figure E-9. Downed Trees in Brewerton, New York



Source: Greenlar, 2006 (from The Post-Standard)
Note: Brewerton resident cutting up a tree that fell on the roof of his house during the storm.

The tornado touched down in Marcellus around 4 p.m. The National Weather Service surveyed the affected area and observed that the damage was consistent with a weak tornado. It was estimated that the tornado was an F0 on the Fujita Scale, with winds up to 70 miles per hour. Damage was largely to trees, which were uprooted and snapped. The estimated width of the tornado was approximately 75 yards (NWS, 2006).

The heaviest amount of damage was in the Cicero area, where several roadways were closed due to fallen down trees and power lines (Doherty, 2006). According to NOAA-NCDC and SHELDUS, Onondaga County experienced approximately $17,000 in property damage from this event (NCDC, 2008; Hazards and Vulnerability Research Institute, 2007).

June 10, 2008: Severe thunderstorms occurred in two separate waves on June 10th. The first wave occurred during the morning and produced severe weather across the northern sections of central New York State. The second wave of storms occurred during the afternoon and evening of June 10th, producing scattered reports of damage across central New York State and northeast Pennsylvania (NWS, 2008). A tornado watch was in effect for many counties of New York State, including Onondaga County (NWS, 2008).

In Cicero, maximum wind gusts only reached about 40 mph, which is below severe criteria. Many power outages and some minor damage occurred in southern Cicero. In East Syracuse, large tree limbs were blown down, taking out power lines in many locations and causing other generally minor damage. The strong winds also ripped part of the roof off of Bishop Ludden Jr./Sr. High School in Syracuse (Smith, 2008). Figures Figure E-10 and Figure E-11 present tree and power line damage in East Syracuse:

Figure E-10. Maconi Street in East Syracuse

Figure E-11. East Avenue in East Syracuse

Source: Smith, 2008
Note: Photographs taken by Kevin Smith

E.2.2 Severe Winter Storm

Many sources provided historical information regarding previous occurrences and losses associated with flooding throughout New York State and Onondaga County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

According to Paul Kocin of The Weather Channel, Louis Uccellini of the NWS, and Jesse Enloe of NOAA, over 74 snowstorm incidences were identified and ranked that affected the northeastern U.S between 1888 and 2007 (Table E.10) (Kocin and Uccellini, 2004; Enloe, 2007). These storms have large areas of 10 inch snowfall accumulations and greater. Although the severity of these events may vary throughout the State, many of these listed storms impacted Onondaga County. This list does not represent all storms that may have impacted the northeastern U.S.

Table E.10. Snowstorm Cases That Affected the Northeastern U.S (1888 – 2007)

Rank	Date	NESIS	Category	Description	Snowfall Range in Onondaga County (in inches)
1	March 12-14, 1993	12.52	5	Extreme	30-40
2	January 6-8, 1996	11.54	5	Extreme	0
3	February 15-18, 2003	8.91	4	Crippling	4-20
4	March 11-14, 1888	8.34	4	Crippling	4-10
5	February 11-14, 1899	8.11	4	Crippling	0
6	March 2-5, 1960	7.63	4	Crippling	4-20
7	January 21-24, 2005*	6.80	4	Crippling	NA
8	February 10-12, 1983	6.28	4	Crippling	0
9	February 5-7, 1978	6.25	4	Crippling	10-20
10	February 2-5, 1961	6.24	4	Crippling	20-40
11	February 14-17, 1958	5.98	3	Major	4-20
12	January 19-21, 1978	5.90	3	Major	10-20
13	January 11-14, 1964	5.74	3	Major	0-4
14	February 12-15, 2007*	5.63	3	Major	10-30
15	December 25-28, 1969	5.19	3	Major	10-30
16	January 29-31, 1966	5.05	3	Major	20-40
17	January 21-23, 1987	4.93	3	Major	4-10
18	January 7-8, 1988	4.85	3	Major	NA
19	February 8-12, 1994	4.81	3	Major	4-10
20	December 11-13, 1960	4.47	3	Major	0-4
21	January 22-23, 1966	4.45	3	Major	NA
22	February 17-19, 1979	4.42	3	Major	0
23	December 24-25, 2002	4.42	3	Major	4-10
24	February 18-20, 1972	4.19	3	Major	10-30
25	February 14-15, 1960	4.17	3	Major	NA
26	January 16-18, 1978	4.10	3	Major	NA
27	February 12-13, 2006*	4.10	3	Major	0
28	February 22-28, 1969	4.01	3	Major	0-4
29	March 18-21, 1958	3.92	2	Significant	0-4
30	February 5-7, 1967	3.82	2	Significant	0
31	December 23-25, 1966	3.79	2	Significant	4-20
32	April 6-7, 1982	3.75	2	Significant	4-10
33	March 3-5, 1971	3.73	2	Significant	NA
34	March 12-13, 1959	3.64	2	Significant	NA

Rank	Date	NESIS	Category	Description	Snowfall Range in Onondaga County (in inches)
35	January 27-29, 1922	3.63	2	Significant	0
36	March 3-5, 2001	3.53	2	Significant	10-20
37	February 2-4, 1995	3.51	2	Significant	4-20
38	December 26-27, 1947	3.50	2	Significant	0-4
39	January 18-21, 1961	3.47	2	Significant	0
40	March 2-4, 1994	3.46	2	Significant	NA
41	February 8-10, 1969	3.34	2	Significant	0
42	December 19-20, 1995	3.32	2	Significant	NA
43	December 22-23, 1963	3.17	2	Significant	NA
44	January 24-26, 2000	3.14	2	Significant	4-20
45	December 10-12, 1992	3.10	2	Significant	NA
46	January 13-15, 1982	3.08	2	Significant	NA
47	March 16-17, 1956	2.93	2	Significant	NA
48	January 3-5, 1994	2.87	2	Significant	NA
49	March 6-7, 1962	2.76	2	Significant	NA
50	January 3-4, 2003	2.65	2	Significant	10-20
51	March 15-18, 2007*	2.55	2	Significant	4-20
52	December 30-31, 2000	2.48	1	Notable	0
53	February 19-20, 1964	2.39	1	Notable	NA
54	March 31-April 1, 1997	2.37	1	Notable	0-4
55	November 25-27, 1971	2.33	1	Notable	NA
56	January 1-2, 1987	2.26	1	Notable	NA
57	March 18-19, 1956*	2.23	1	Notable	0
58	March 15-16, 1999	2.20	1	Notable	NA
59	February 16-17, 1952	2.17	1	Notable	NA
60	December 31 – January 1, 1971	2.10	1	Notable	NA
61	February 2-4, 1996	2.03	1	Notable	NA
62	December 4-5, 2002	1.99	1	Notable	0
63	January 16-17, 1965	1.95	1	Notable	NA
64	March 28-29, 1984	1.86	1	Notable	NA
65	January 25-26, 1987	1.70	1	Notable	0
66	February 16-17, 1996	1.65	1	Notable	NA
67	February 14-15, 1962	1.59	1	Notable	NA
68	December 26-27, 1990	1.56	1	Notable	0-4
69	February 22-23, 1987	1.46	1	Notable	0

Rank	Date	NESIS	Category	Description	Snowfall Range in Onondaga County (in inches)
70	December 23-25, 1961	1.37	1	Notable	NA
71	December 3-5, 1957	1.32	1	Notable	NA
72	March 8-9, 1984	1.29	1	Notable	NA
73	March 21-22, 1967	1.20	1	Notable	NA
74	February 6-7, 2003	1.18	1	Notable	0

Source: *Kocin and Uccellini, 2004; Enloe, 2007*
Note (1): *The two sources used for this table identify different NESIS ratings for each event; therefore, the NESIS rating may vary upon reviewing the source.*
Note (2): *Storms are arranged by rank/category*
* *Additional events listed by Jesse Enloe (NOAA) between 2003 and 2007 that were not identified by Kocin and Uccellini.*
NA *Information regarding actual snowfall totals was not provided for these events.*

Between 1953 and 2007, FEMA declared that New York State experienced over 18 winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: winter storms, severe storms, coastal storms, ice storm, blizzard, snowstorm, severe Nor'Easter and flooding. Generally, these disasters covered a wide region of the State; therefore, they may have impacted many counties. However, not all counties were declared as disaster areas. Of those events, the NYS HMP and other sources indicate that Onondaga County has been declared as a disaster area as a result of 2 winter storm events (FEMA, 2008; NYSDPC, 2008). No extreme cold temperature events resulted in federal disaster declarations. Table E.11 summarizes the FEMA Presidential Disaster (DR) or Emergency (EM) Declarations for winter storm events for the County.

Table E.11. Presidential Disaster / Emergency Declarations for Severe Winter Storm Events in Onondaga County

Type of Event*	Date**	Declaration Number	Cost of Losses (approximate)***
Severe Blizzard ("The Storm of the Century") (also identified as a Nor'Easter);	March 1993	EM-3107	Listed as a top billion dollar weather disaster storm, impacting 26 states and resulted in approximately $3 B in damages. FEMA declared an EM in 17 states, including New York State. New York State experienced approximately $8.4 M in eligible damages (NYSDPC). Onondaga County received between 30 to 50 inches of snow from this event. Syracuse received 43.0 inches of snow. Snow totals in Skaneateles ranged between 26.0 and 34.9 inches. All Onondaga County schools were closed from this event, including Syracuse University. Onondaga County experienced approximately $455 K in property damages.
Ice Storm	April 2003	DR-1467	In central New York State this storm caused widespread damage, disrupted vital transportation routes and downed trees and power lines, cutting electric power to more than 300,000 customers. New York State experienced between $28.5 and $41.4 M in eligible damages (NYSDPC) In the Town of Clay, the Moyer's Corner Fire Department received 157 calls related to water problems, downed wires, pole fires, citizen assistance, fumes, outdoor fires, structure fires, car accidents, chimney fires, an explosion, and EMS-related incidences all caused by this ice storm event. Onondaga County experienced approximately $2.9 M in property damages. More than $25 M in disaster aid has been approved for the State. Disaster aid within Onondaga County is unknown.

Source: FEMA, 2008; NCDC, 2008; NYSEMO, 2006; Kocin and Uccellini, 2004

* *The 'Type of Event' is the disaster classification that was assigned to the event by FEMA.*

** *Date of Incident*

*** *Flood impact or damage associated with any of these events are further discussed in Section E.2.3 (Flood)*

Notes: Dollars rounded to nearest thousand. Recorded losses indicate the dollar value of covered losses paid, as available through the public records reviewed. B = Billion, K = Thousand, M = Million

Based on all sources researched, many severe winter storm and extreme cold events have impacted Onondaga County, as summarized in Table E.12. With flood documentation for New York State being so extensive, not all sources may have been identified or researched. Hence, this table may not include all events that have occurred throughout the region.

Table E.12. Severe Winter Events between 1888 and 2007

Event Date / Name	Location	Losses / Impacts	Source(s)
Blizzard March 11-14, 1888 (Blizzard of '88 or "Great White Hurricane")	Multi-State	$25 M nationwide in fire losses, 4 to 10 inches of snow fell in Onondaga County.	Brunner, Kocin and Uccellini, NWS
Snowstorm March 1, 1900	Village of Baldwinsville	Village of Baldwinsville received 20.0 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm January 17, 1904	Village of Baldwinsville	Village of Baldwinsville received 19.0 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold January 19, 1904	Village of Baldwinsville	Record cold event for this station between 1893 and 1908 recorded at -28^{O}F.	MRCC
Extreme Cold December 30, 1917	Countywide	Low temperatures throughout the Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Village of Minoa: -20^{O}F.	The Weather Channel
Extreme Cold November 16, 1933	Countywide	Record low temperatures for month of November throughout Town of Elbridge, Town of Marcellus, Town of Skaneateles: 1^{O}F.	The Weather Channel
Extreme Cold December 29-30, 1933	Countywide	Low temperatures throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Village of Minoa: -24^{O}F. Record low temperatures for month of December throughout Town of Elbridge, Town of Marcellus, Town of Skaneateles: -21^{O}F.	The Weather Channel
Extreme Cold February 8-10, 1934	Countywide	Low temperatures throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Village of Minoa: -22 to -24^{O}F. Record low temperatures for month of February throughout Town of Elbridge, Town of Marcellus, Town of Skaneateles: -32^{O}F.	The Weather Channel
Extreme Cold March 3, 1938	Countywide	Record low temperatures for month of March throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Town of Minoa: -41^{O}F.	The Weather Channel
Extreme Cold November 25, 1942	Countywide	Record low temperatures for month of November throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Village of Minoa: 1^{O}F.	The Weather Channel
Extreme Cold December 19-20, 1942	Countywide	Record low temperatures for month of December throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Village of Minoa: -26^{O}F. Low temperatures also throughout Town of Elbridge, Town of Marcellus, Town of Skaneateles: -20^{O}F.	The Weather Channel
Snowstorm November 30 – December 3, 1944	Town of Skaneateles, City of Syracuse	Town of Skaneateles received 29.5 inches of snow; City of Syracuse received 30.4 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold January 18, 1945	Countywide	Record low temperatures for month of January throughout Town of Elbridge, Town of Marcellus, Town of Skaneateles: -23^{O}F.	The Weather Channel

Event Date / Name	Location	Losses / Impacts	Source(s)
Snowstorm February 15-16, 1946	City of Syracuse	City of Syracuse received 34.2 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm March 3-5, 1947	Hamlet of Brewerton	Hamlet of Brewerton received between 17.0 and 46.8 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold February 1, 1948	Countywide	Low temperatures throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, East Syracuse, Town of Fayetteville, Village of Liverpool, Town of Manlius, Village of Minoa: -20^{O}F.	The Weather Channel
Extreme Cold March 12, 1948	Countywide	Low temperatures throughout Town of Elbridge, Town of Marcellus, Town of Skaneateles: -14^{O}F.	The Weather Channel
Extreme Cold March 4, 1950	Countywide	Low temperatures throughout Village of Baldwinsville, Town of Camillus, Town of Cicero, Town of Clay, City of Syracuse, Village of East Syracuse, Village of Fayetteville, Village of Liverpool, Town of Manlius, Town of Minoa: -16^{O}F.	The Weather Channel
Snowstorm December 16-19, 1951	Village of Baldwinsville	Village of Baldwinsville received between 19.5 and 27.3 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold December 21, 1955	Countywide	Low temperatures throughout Village of Baldwinsville, Towns of Camillus, Cicero, and Clay, City of Syracuse, Village of East Syracuse, and Towns of Fayetteville, Liverpool, Manlius, Minoa: -20^{O}F.	The Weather Channel
Extreme Cold January 15, 1957	Countywide	Low temperatures throughout the Village of Baldwinsville, Towns of Camillus, Cicero, and Clay, City of Syracuse, Village of East Syracuse, and Towns of Fayetteville, Liverpool, Manlius, Minoa: -24^{O}F.	The Weather Channel
Snowstorm February 10, 1958	Hamlet of Brewerton	Hamlet of Brewerton received 22.0 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm February 14-15, 1960	Village of Baldwinsville	Onondaga County experienced over $8 K in property damages. Village of Baldwinsville received 20.5 inches of snow.	Hazards and Vulnerability Research Institute (SHELDUS), NCDC Station Snow Climatology Database
Snowstorm February 18-20, 1960	Town of Skaneateles	Onondaga County experienced over $8 K in property damages. Town of Skaneateles received 22.0 inches of snow.	NCDC Station Snow Climatology Database, Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm March 2-5, 1960	Multi-County	Onondaga County experienced over $8 K in property damages. 4 to 20 inches of snow fell in Onondaga County.	Hazards and Vulnerability Research Institute (SHELDUS), Kocin and Uccellini
Extreme Cold March 11, 1960	Countywide	Low temperatures throughout the Towns of Elbridge, Marcellus, Skaneateles: -14^{O}F.	The Weather Channel
Snowstorm / Extreme Cold February 2-5, 1961	Statewide	Onondaga County experienced approximately $80 K in property damages. 20 to 40 inches of snow fell in Onondaga County.	Hazards and Vulnerability Research Institute (SHELDUS), Kocin and Uccellini, Evans, The Weather Channel
Snowstorm October 23-27, 1962	City of Syracuse	City of Syracuse received 26.0 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold January 26, 1966	City of Syracuse	Record cold event for this station between 1922 and 2003 recorded at -26^{O}F. Also a record cold event for the month of January in the Village of Baldwinsville, Towns of Camillus, Cicero, Clay, Village of East Syracuse, and the Towns of Fayetteville, Liverpool, Manlius, Minoa	MRCC, The Weather Channel
Snowstorm January 29-31, 1966	Multi-County	20 to 40 inches of snow fell in Onondaga County. Town of Skaneateles received 21.0 inches of snow.	Kocin and Uccellini, NCDC Station Snow Climatology Database

Event Date / Name	Location	Losses / Impacts	Source(s)
Snowstorm January 30 through February 5, 1966	Town of Skaneateles, City of Syracuse	Town of Skaneateles received 31.5 inches of snow; City of Syracuse received 44.0 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm December 23-29, 1966	Multi-County	4 to 20 inches of snow fell in Onondaga County. Hamlet of Brewerton received 16.5 inches of snow.	Kocin and Uccellini, NCDC Station Snow Climatology Database
Extreme Cold November 16, 1967	Countywide	Record low temperatures for month of November throughout the Towns of Fabius, Pompey, Tully: 0^{O}F.	The Weather Channel
Extreme Cold January 8-9, 1968	Countywide	Low temperatures throughout the Village of Baldwinsville, Towns of Camillus, Cicero, Clay, City of Syracuse, Village of East Syracuse, Towns of Fabius, Fayetteville, Liverpool, Manlius, Minoa, Pompey, Tully: -17 to -22^{O}F.	The Weather Channel
Snowstorm November 13-14, 1968	Town of Skaneateles	Town of Skaneateles received 15.0 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm December 25-28, 1969	Multi-County	Onondaga County experienced approximately $8 K in property damages. 10 to 30 inches of snow fell in Onondaga County.	Kocin and Uccellini, NCDC Station Snow Climatology Database, NWS, Hazards and Vulnerability Research Institute (SHELDUS)
Extreme Cold February 26, 1970	Countywide	Low temperatures throughout Fabius, Pompey, Tully: -21^{O}F.	The Weather Channel
Snowstorm March 4-5, 1971	Village of Baldwinsville, Town of Skaneateles	Onondaga County experienced approximately $806 in property damages. Village of Baldwinsville received 31.0 inches of snow; Town of Skaneateles received 30.8 inches of snow.	NCDC Station Snow Climatology Database, Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm / Extreme Cold February 18-23, 1972	Multi-County	Onondaga County experienced approximately $803 in property damages. 10 to 20 inches of snow fell in Onondaga County. Town of Skaneateles received 17.0 inches of snow.	Kocin and Uccellini, NCDC Station Snow Climatology Database, The Weather Channel, Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm November 6-9, 1973	Village of Baldwinsville	Village of Baldwinsville received 14.8 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm December 20, 1973	Countywide	Onondaga County experienced approximately $83 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm April 5-8, 1975	Town of Skaneateles	Town of Skaneateles received 19.0 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm May 18, 1976	Countywide	Onondaga County experienced approximately $31 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Extreme Cold January 18, 1976	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -20^{O}F.	The Weather Channel
Snowstorm November 9-14, 1976	Village of Baldwinsville, Hamlet of Brewerton	Village of Baldwinsville received 17.7 inches of snow; Hamlet of Brewerton received 26.5 inches of snow	NCDC Station Snow Climatology Database
Extreme Cold November 30, 1976	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: 1^{O}F.	The Weather Channel

Event Date / Name	Location	Losses / Impacts	Source(s)
Blizzard January 27-28, 1977	Countywide	Resulted in an Emergency Declaration in New York State counties (EM-3027), however, it did not include Onondaga County. Onondaga County experienced approximately $2.1 M in property damages.	FEMA, Hazards and Vulnerability Research Institute (SHELDUS)
Blizzard January 7, 1978	Countywide	Onondaga County experienced approximately $31 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm January 17-25, 1978	Countywide	10 to 20 inches of snow fell in Onondaga County. Onondaga County experienced approximately $63 K in property damages. Town of Skaneateles received 25.0 inches of snow.	Kocin and Uccellini, Hazards and Vulnerability Research Institute (SHELDUS), NCDC Station Snow Climatology Database
Blizzard February 5-8, 1978	Multi-County	10 to 20 inches of snow fell in Onondaga County. Onondaga County experienced approximately $31 K in property damages.	Kocin and Uccellini, NCDC Station Snow Climatology Database
Snowstorm December 25-29, 1978	Town of Skaneateles	Town of Skaneateles received 26.0 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold February 17-18, 1979	Countywide	Record low temperatures for month of February throughout the Village of Baldwinsville, Towns of Camillus, Cicero, Clay, City of Syracuse, Village of East Syracuse, and Towns of Fabius, Fayetteville, Liverpool, Manlius, Minoa, Pompey, Tully: -22 to 26^{O}F.	The Weather Channel
Extreme Cold March 1, 1980	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -9 to -10^{O}F.	The Weather Channel
Extreme Cold December 25, 1980	Countywide	Low temperatures throughout the Village of Baldwinsville, Towns of Camillus, Cicero, and Clay, City of Syracuse, Village of East Syracuse, and Towns of Fayetteville, Liverpool, Manlius, Minoa: -22^{O}F. Record low temperatures for month of December throughout the Towns of Fabius, Pompey, Tully: -29^{O}F.	The Weather Channel
Extreme Cold January 3-4, 1981	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -10 to -20^{O}F.	The Weather Channel
Snowstorm / Extreme Cold January 10-12, 1982	City of Syracuse	Onondaga County experienced approximately $5 K in property damages. City of Syracuse received 22.9 inches of snow. Low temperatures throughout Village of Baldwinsville, Towns of Camillus, Cicero, and Clay, City of Syracuse, Village of East Syracuse, and Towns of Fayetteville, Liverpool, Manlius, Minoa: -25^{O}F.	Hazards and Vulnerability Research Institute (SHELDUS), NCDC Station Snow Climatology Database, The Weather Channel
Snowstorm April 6-7, 1982	Multi-County	Onondaga County experienced approximately $20 K in property damages. 4 to 10 inches of snow fell in Onondaga County.	Hazards and Vulnerability Research Institute (SHELDUS), Kocin and Uccellini
Snowstorm April 20-22, 1983	Town of Skaneateles	Town of Skaneateles received 19.0 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm February 27, 1984	Multi-County	Onondaga County experienced approximately $156 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm March 1-4, 1984	Village of Baldwinsville, Hamlet of Brewerton	Village of Baldwinsville received 35.5 inches of snow; Hamlet of Brewerton received 39.7 inches of snow.	NCDC Station Snow Climatology Database
Extreme Cold March 12, 1984	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -11^{O}F.	The Weather Channel
Snowstorm March 29, 1984	Multi-County	Onondaga County experienced approximately $42 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm December 6-8, 1984	Village of Baldwinsville, Hamlet of Brewerton	Village of Baldwinsville received 20.0 inches of snow; Hamlet of Brewerton received 25.3 inches of snow.	NCDC Station Snow Climatology Database

Event Date / Name	Location	Losses / Impacts	Source(s)
Snowstorm January 21-24, 1987	Multi-County	4 to 10 inches of snow fell in Onondaga County.	Kocin and Uccellini, NCDC Station Snow Climatology Database
Extreme Cold February 15-16, 1987	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -19^{O}F.	The Weather Channel
Extreme Cold December 12, 1988	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -10 ^{O}F.	The Weather Channel
Snowstorm January 29, 1989	Countywide	Onondaga County experienced approximately $24 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm February 15, 1990	Countywide	Onondaga County experienced approximately $20 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm December 3, 1990	Countywide	Onondaga County experienced approximately $27 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm December 15, 1990	Countywide	Onondaga County experienced approximately $25 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm December 28, 1990	Countywide	Onondaga County experienced approximately $25 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm November 11, 1991	Countywide	Onondaga County experienced approximately $27 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm December 4-7, 1991	Village of Baldwinsville	Onondaga County experienced approximately $2 K in property damages. Village of Baldwinsville received 21.5 inches of snow.	Hazards and Vulnerability Research Institute (SHELDUS), NCDC Station Snow Climatology Database
Snowstorm January 3, 1993	Countywide	Onondaga County experienced approximately $31 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm February 6, 1993	Countywide	Onondaga County experienced approximately $31 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Severe Blizzard "The Storm of the Century" March 12-15, 1993 FEMA EM-3107	Statewide	See FEMA Disaster Declarations (Table E.11)	FEMA, Kocin and Ucceliini, NYSDPC, NCDC Station Snow Climatology Database, NWS, Arnold (The Post Standard), Carr (Syracuse-Herald Journal)
Extreme Cold March 19, 1993	Countywide	Record low temperatures for month of March throughout the Towns of Elbridge, Marcellus, Skaneateles: -14^{O}F.	The Weather Channel
Snowstorm April 21-22, 1993	Countywide	Onondaga County experienced approximately $100 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm December 21, 1993	Countywide	Onondaga County experienced approximately $50 K in property damages.	NOAA-NCDC
Snowstorm January 4-7, 1994	Village of Brewerton	Onondaga County experienced approximately $21 K in property damages. Village of Brewerton received 28.4 inches of snow.	Hazards and Vulnerability Research Institute (SHELDUS), NCDC Station Snow Climatology Database
Extreme Cold / Snow January 17, 1994	Countywide	Low temperatures throughout the Towns of Fabius, Pompey, Tully: -20^{O}F. Onondaga County experienced approximately $2 K in property damages from heavy snow.	The Weather Channel, Hazards and Vulnerability Research Institute (SHELDUS)

Event Date / Name	Location	Losses / Impacts	Source(s)
Snowstorm March 1-3, 1994	Town of Skaneateles	Onondaga County experienced approximately $35 K in property damages.	NOAA-NCDC, Hazards and Vulnerability Research Institute (SHELDUS)
Snowstorm February 2-4, 1995	Multi-State	4 to 20 inches of snow fell in Onondaga County.	Kocin and Uccellini
Snowstorm February 7-10, 1995	Village of Baldwinsville	Village of Baldwinsville received between 26.0 and 36.5 inches of snow.	NCDC Station Snow Climatology Database
Snowstorm November 14-16, 1995	Town of Skaneateles, City of Syracuse	Onondaga County experienced approximately $2.5 K in property damages. Town of Skaneateles received 17.5 inches of snow; City of Syracuse received 25.8 inches of snow.	Hazards and Vulnerability Research Institute (SHELDUS), NCDC Station Snow Climatology Database
Extreme Cold January 5-7, 1996	Countywide	Low temperatures throughout the Village of Baldwinsville, Towns of Camillus, Cicero, and Clay, City of Syracuse, Village of East Syracuse, and Towns of Fayetteville, Liverpool, Manlius, Minoa: -11 to -24^{O}F.	The Weather Channel
Extreme Cold February 5-7, 1996	Multi-County	Low temperatures in the City of Syracuse ranging between -15 and -24^{O}F	NOAA-NCDC
Snowstorm December 30-31, 1997	Syracuse	Syracuse received 18.6 inches of snow. City officials declared a state of emergency, and for the first time in more than four years, postal service was canceled in the City of Syracuse.	NCDC Station Snow Climatology Database, Sengupta (New York Times)
Snowstorm March 5, 1999	Multi-County	Resulted in an Emergency Declaration for 6 New York State counties (EM-3138), however, it did not include Onondaga County. However, Governor George E. Pataki did declare a disaster emergency for 17 counties in western New York State after this huge snowfall immobilized the region. The 17 counties included Monroe, Seneca, Schuyler, St. Lawrence, Madison, Onondaga, Oswego, Broome, Chenango, Wyoming, Livingston, Wayne, Cayuga, Cortland, Oneida, Lewis and Jefferson.	FEMA, New York Times
Snowstorm November 29, 1999	Multi-County	Baldwinsville received nearly a foot of snow. Elsewhere the City of Syracuse metro area demonstrated just how variable lake effect snow can be. The downtown observation recorded 7 inches of new snowfall, while just a few miles north of the city, the Syracuse International airport received only 3.2 inches.	NOAA-NCDC
Lake Effect Snowstorm December 26-27, 1999	Multi-County	Village of Baldwinsville received 12 inches of snow.	NOAA-NCDC
Snowstorm January 24-26, 2000	Multi-County	New York State experienced approximately $577 K in property damages. 4 to 20 inches of snow fell in Onondaga County.	NOAA-NCDC, Kocin and Uccellini
Extreme Cold March 2000	Multi-County	Governor George E. Pataki today announced that he requested emergency disaster aid to farm families in 30 New York State counties who've suffered devastating fruit crop losses from hail storms, freezing temperatures and other crop losses from continual heavy rains.	Chittenden (New York State Department of Agriculture and Markets)
Snowstorm November 21-22, 2000	Countywide	In Onondaga County, 7 to 12 inches of snow fell in the extreme northeast portion of the county, including the Hamlet of Kirkville and the Hancock International Airport in the Village of North Syracuse.	NOAA-NCDC
Lake Effect Snowstorm December 5-6, 2000	Countywide	A band of snow was stationary across northern Onondaga County north of the City of Syracuse. Maximum estimated hourly snowfall rates were 1.5 inches per hour. 6 to 9 inches fell in the Towns of Camillus and Clay, and at the Syracuse International Airport in the Village of North Syracuse.	NOAA-NCDC
Snowstorm December 20, 2000	Countywide	The largest snow totals were 6 to 11 inches from the Town of Lysander through the Village of North Syracuse and the Town of Clay, all in northern Onondaga county	NOAA-NCDC
Snowstorm December 28-31, 2000	Hamlet of Brewerton	Hamlet of Brewerton received 27.1 inches of snow.	Kocin and Uccellini, NCDC Station Snow Climatology Database
Lake Effect Snowstorm December 31 - January 1, 2001	Countywide	6 to 16 inches of snow fell in extreme northern Onondaga County over the entire event. The areas affected included the Towns of Lysander and Clay, and the Village of North Syracuse.	NOAA-NCDC

Event Date / Name	Location	Losses / Impacts	Source(s)
Snowstorm February 28 - March 1, 2001	Countywide	Snowfall amounts ranged from almost two feet in the Town of Lysander in extreme northwest Onondaga County to 6 inches at the Syracuse International Airport in the Village of North Syracuse.	NOAA-NCDC
Snowstorm March 4-7, 2001	Multi-State	10 to 20 inches of snow fell in Onondaga County.	Kocin and Uccellini
Lake Effect Snowstorm November 30 - December 1, 2002	Countywide	Lake effect snow moved into northern Onondaga County. Snow accumulations were between 6 to 10 inches across northern Onondaga County. Locations which had this snowfall included the City of Syracuse, Village of North Syracuse, and Towns of Clay, Camillus, and Lysander.	NOAA-NCDC
Snowstorm December 24-25, 2002 and January 3-4, 2003	Multi-County	Resulted in an Emergency Declaration for 18 New York State counties (EM-3173), however, it did not include Onondaga County. In December 4 to 10 inches of snow fell in Onondaga County. In January 10 to 20 inches of snow fell in Onondaga County and the County experienced approximately $353 K in property damages.	FEMA, Kocin and Uccellini, NOAA-NCDC, Hazards and Vulnerability Research Institute (SHELDUS), NWS
Snowstorm February 12-15, 2003	Countywide	Snowfall amounts were highest north of the New York State Thruway in western Oneida, northern Madison, and extreme northern Onondaga counties. Onondaga County experienced approximately $83 K in property damages. Hamlet of Brewerton received 31.5 inches of snow.	Hazards and Vulnerability Research Institute (SHELDUS), NOAA-NCDC
Snowstorm "President's Day Storm" February 17-18, 2003	Multi-County	Resulted in an Emergency Declaration for 17 New York State counties (EM-3184), however, it did not include Onondaga County. Onondaga County experienced approximately $153 K in property damages. Between four and 20 inches of snow fell in Onondaga County.	FEMA, NWS, NOAA-NCDC, NYSDPC, Hazards and Vulnerability Research Institute (SHELDUS), Kocin and Uccellini
Extreme Cold March 3-4, 2003	Countywide	Record low temperatures for month of March throughout the Towns of Fabius, Pompey, Tully: -11^{O}F.	The Weather Channel
Ice Storm April 3-5, 2003 (FEMA DR-1467)	Multi-County	See FEMA Disaster Declarations (Table E.11)	FEMA, NYSDPC, NYSEMO, NWS, Hazards and Vulnerability Research Institute (SHELDUS), NYSDOT
Snowstorm December 14-15, 2003	Multi-County	Snowfall amounts were mostly 10 to 18 inches across Onondaga County. All counties affected experienced approximately $510 K in property damages.	NOAA-NCDC
Snowstorm December 18, 2003	Multi-County	Snowfall amounts were mostly 6 to 12 inches across Onondaga County.	NOAA-NCDC
Extreme Cold / Snow January 10, 2004	Countywide	Low temperatures throughout the Tows of Fabius, Pompey, Tully: -20^{O}F. Onondaga County experienced approximately $11 K in property damages from snow.	The Weather Channel, Hazards and Vulnerability Research Institute (SHELDUS), NOAA-NCDC
Extreme Cold / Snow January 14-15, 2004	Countywide	Record low temperatures for month of January throughout the Towns of Fabius, Pompey, Tully: -21^{O}F. Onondaga County experienced approximately $13 K in property damages from snow.	The Weather Channel, Hazards and Vulnerability Research Institute (SHELDUS), NOAA-NCDC
Snowstorm January 22-23, 2004	Multi-County	Snowfall amounts were mostly 6 to 12 inches across northern Onondaga County.	NOAA-NCDC
Snowstorm January 30-31, 2004	Countywide	Onondaga County experienced approximately $50 K in property damages. Snowfall rates were as high as 5 inches an hour throughout the County. Snowfall amounts were 10 to 20 inches across this area, which included the City of Syracuse and the Village of Baldwinsville.	Hazards and Vulnerability Research Institute (SHELDUS), Syracuse.com, NOAA-NCDC
Snowstorm March 16-17, 2004	Multi-County	5.5 to 12.2 inches of snow fell in Onondaga County.	NWS
Snowstorm / Extreme Cold January 22-23, 2005	Countywide	Onondaga County experienced approximately $28 K in property damages. 12.3 to 18.7 inches of snow fell in Onondaga County. Low temperatures were reported in the City of Syracuse: -14^{O}F	Hazards and Vulnerability Research Institute (SHELDUS),

Event Date / Name	Location	Losses / Impacts	Source(s)
			McFadden (New York Times), NOAA-NCDC, NWS
Snowstorm February 18-19, 2005	Countywide	Snowfall amounts were 8 to 14 inches in and north of the City of Syracuse. The highest amounts were right along the Onondaga/Oswego County line. Temperatures during the event fell through the 20s into the teens.	NOAA-NCDC
Snowstorm February 28 – March 1, 2005	Multi-County	8.6 to 12.3 inches of snow fell in Onondaga County.	NWS
Snowstorm October 25, 2005	Multi-County	Snow fell mainly over the higher elevations of central New York State and the Catskills. The hardest hits areas were in Broome, Chenango, Delaware, Cortland, Madison, Otsego and Onondaga counties. Between 6 and 12 inches of heavy wet snow fell above 1,400 feet elevation in these areas.	NOAA-NCDC, NWS
Lake-Effect Snowstorm December 2, 2005	Countywide	Onondaga County experienced approximately $18 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Extreme Cold December 14, 2005	Multi-County	Low temperatures were reported in the City of Syracuse, Village of North Syracuse and Town of Tully: -1 to -8^{o}F	NWS
Snowstorm December 16, 2005	Countywide	Onondaga County experienced approximately $27 K in property damages.	Hazards and Vulnerability Research Institute (SHELDUS)
Lake Effect Snowstorm / Extreme Cold February 2-12, 2007	Multi-County	Resulted in an Emergency Declaration for 3 New York State counties (EM-3273), however, it did not include Onondaga County. Northern Onondaga County experienced between 10 and 40 inches of snow from this lake effect snow event. Governor Eliot Spitzer asked President Bush to declare a federal emergency for the counties of Oswego, Jefferson, Lewis, Madison, Oneida and Onondaga to support the extraordinary actions taken by State and local governments to clear roads and battle the record amount of lake-effect snows that have fallen since February 2. County officials indicated that Onondaga County expended over $3 M responding to this event.	FEMA, Weather Underground, The State of New York, NYSEMO, Gibb
Snowstorm "Valentine's Day Storm" February 12-15, 2007	Multi-County	10 to 30 inches of snow fell in Onondaga County. The Town of Cicero received the highest amount of snowfall totaling 21.5 inches.	FEMA, Evans, Enloe, Kocin and Uccellini, NOAA-NCDC, Syracuse.com, NWS
Snowstorm / Wind March 5, 2007	Countywide	A fatal three car crash occurred on Route 11 in Town of Cicero as a result of snowy roads. A 26-car pileup occurred on Onondaga Lake Parkway in City of Syracuse.	Syracuse.com
Snowstorm "St. Patrick's Day Storm" March 15-18, 2007	Multi-County	4 to 20 inches of snow fell in Onondaga County.	Kocin and Uccellini, Enloe
Severe Storms and Inland and Coastal Flooding (also identified as a Nor'Easter) April 16, 2007	Multi-County	Resulted in a Disaster Declaration for 13 New York State counties (EM-1692), however, it did not include Onondaga County. Between 3.5 and 16 inches of snow fell in Onondaga County. City of Syracuse and Town of Dewitt experienced many fallen trees and power lines. Many flights were delayed or canceled at the Syracuse Hancock International Airport. Over 5,600 residences of Onondaga County experienced power outages.	NOAA, FEMA, NWS, Syracuse.com, National Grid
Lake Effect Snowstorm December 4, 2007	Multi-County	This snow storm delivered a first blast of winter to a large part of upstate New York State, forcing schools to close in an area stretching from Syracuse to western New York State. Over 12 inches of snow fell throughout Onondaga and Lewis Counties. More than three dozen school districts in central New York State, including the cities of Syracuse, Binghamton, Cortland, Rome and Ithaca, shut down as blowing snow caused traffic problems. Many weather related accidents occurred throughout Syracuse.	The Associated Press (USA Today), Syracuse.com
Snowstorm December 13-14, 2007	Multi-County	3.8 to 9.0 inches of snow fell in Onondaga County, particularly in the Town of Camillus.	NWS

Event Date / Name	Location	Losses / Impacts	Source(s)
Snowstorm December 15-17, 2007	Multi-County	9.0 to 14.5 inches of snow fell in Onondaga County, particularly in the Town of Camillus. Many flights were canceled at the Syracuse Hancock International Airport.	Syracuse.com, NOAA-NCDC, NWS
Snowstorm February 26-27, 2008	Multi-County	The storm brought heavy snow accumulations to much of central New York State. Snowfall amounts ranged generally between 5 and 10 inches throughout Onondaga County.	NOAA-NCDC, NWS

Note (1): *This table does not represent all events that may have occurred throughout the County due to a lack of detail and/or their minor impact upon the County. The NOAA NCDC storm query indicated that Onondaga County has experienced 93 snow and ice storm events and 14 extreme cold temperature events between January 1, 1950 and February 28, 2008. However, most events are regional events not specific to Onondaga County alone. Therefore, not all of these events were identified in this table due to minimal information made available or their minor impact on the County.*

Note (2): *Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.*

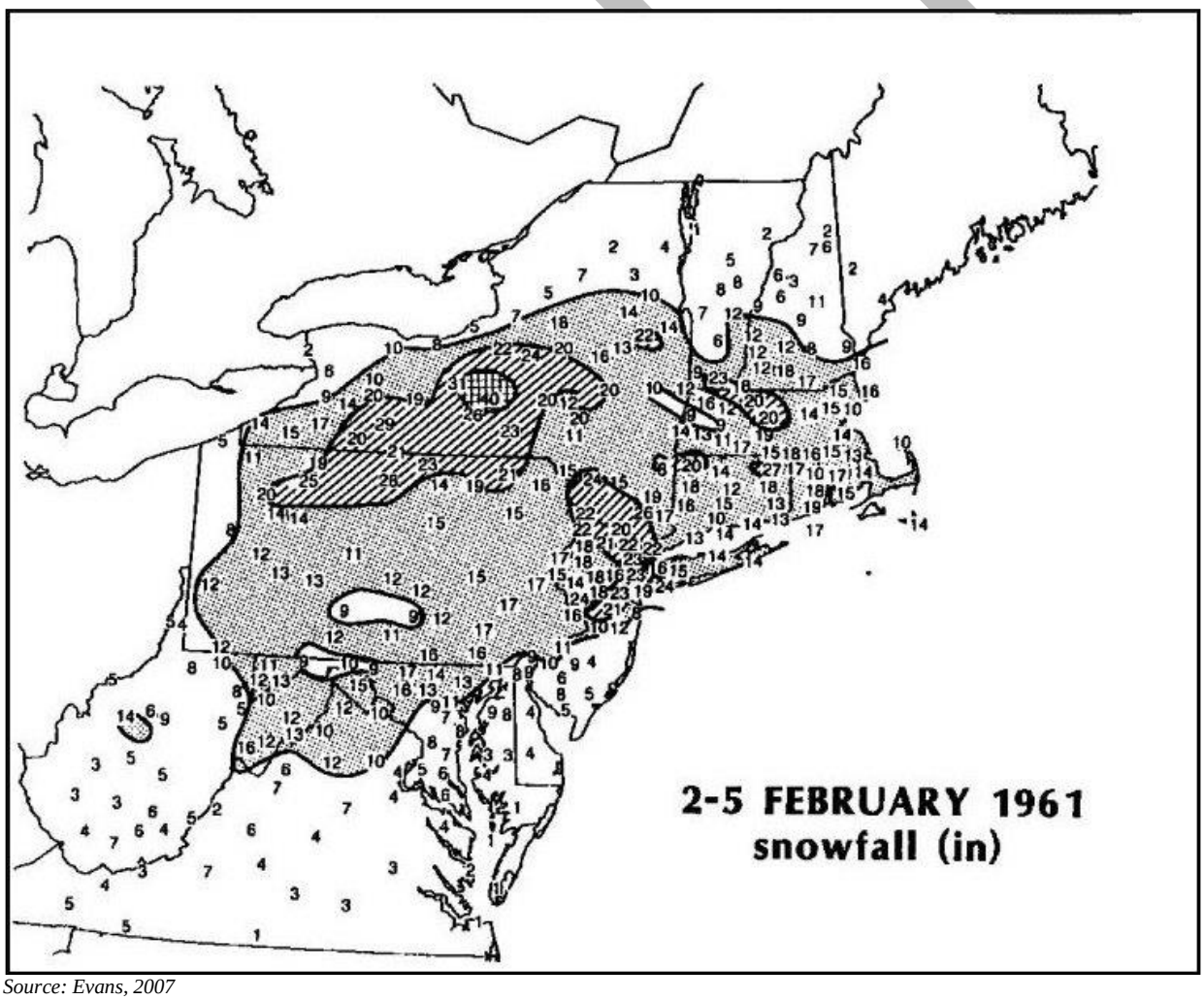
B *Billion ($)*
DR *Federal Disaster Declaration*
EM *Federal Emergency Declaration*
FEMA *Federal Emergency Management Agency*
HMP *Hazard Mitigation Plan*
K *Thousand ($)*
M *Million ($)*
MRCC *Midwest Regional Climate Center*
NCDC *National Climate Data Center*
NOAA *National Oceanic Atmospheric Administration*
NRCC *Northeast Regional Climate Center*
NSIDC *National Snow and Ice Data Center*
NWS *National Weather Service*
NYS *New York State*
NYS DPC *New York State Disaster Preparedness Center*
NYSEMO *New York State Emergency Management Office*
SHELDUS *Spatial Hazard Events and Losses Database for the United States*

Further descriptions of particular severe winter storm and extreme cold events that have impacted Onondaga County are provided below for selected events where details regarding their impact were available. These descriptions are provided to give the reader a context of the winter storm and extreme cold events that have affected the County and to assist local officials in locating event-specific data for their municipalities based on the time and proximity of these events.

Monetary figures within the event descriptions were U.S. Dollar (USD) figures calculated during or within the approximate time of the event (unless present day recalculations were made by the sources reviewed). If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

February 2-5, 1961: This 1961 storm produced a maximum of 40 inches of snow in central New York State. A large area of one to two feet of snow accumulated across central New York State and northeast Pennsylvania (Evans, 2007) (Figure E-12). In Onondaga County, 20 to 40 inches of snow fell during this event, resulting in over $80,000 in property damages (Kocin and Uccellini, 2004; Hazards and Vulnerability Research Institute, 2008).

Figure E-12. February 1961 Snowfall Totals

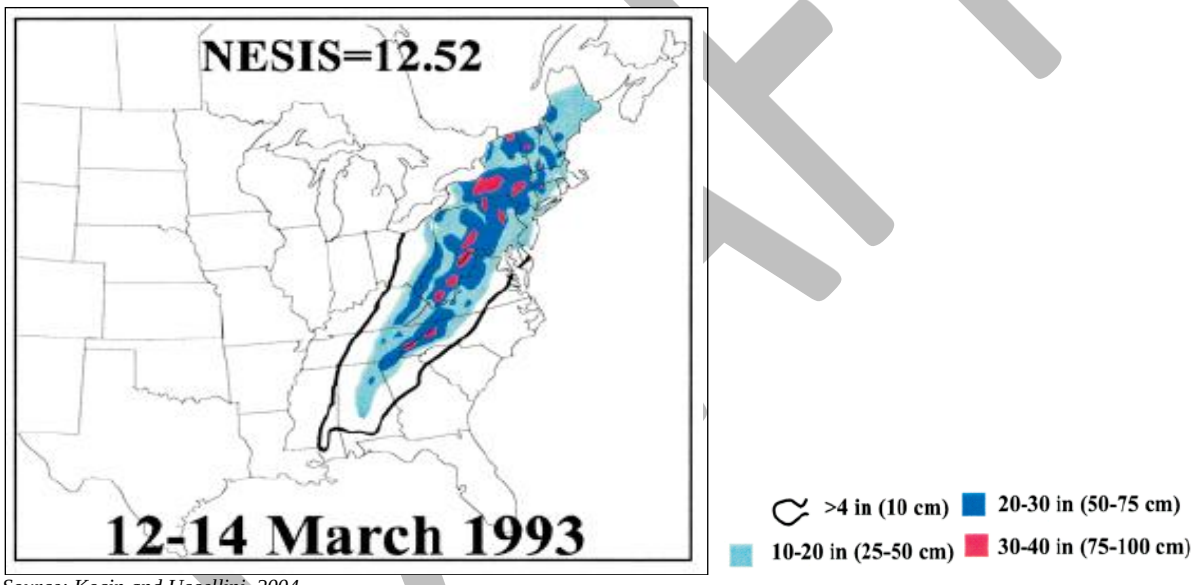


Source: Evans, 2007

March 12-15, 1993 ("Superstorm of 1993," "Storm of the Century" or "Great Storm of 1993") (FEMA EM-3107): This storm was identified as both a Nor'Easter and a blizzard by many sources. It was a massive storm complex, affecting at least 26 states and much of eastern Canada. The March 1993 storm is listed among the NOAA Top Billion Dollar Weather Disasters, reportedly causing a total of $6.6 billion in damages along the eastern coast of the U.S. and resulting in over 270 fatalities (23 fatalities in New York State) (Miller, 1995-2007; Lott, 1993). According to NYS HMP and NYSEMO, this blizzard resulted in total eligible damages of approximately $8.5 million through New York State (NYSDPC, 2008; NYSEMO, 2006).

Achieving a NESIS rating of 12.52, the "Storm of the Century" ranks as an 'Extreme' snow event. With a total area impacting, at peak, from Maine to Florida, a final snowfall total between 5 and 50 inches, and hurricane force winds, this storm brought most of the eastern seaboard to a halt for days (Figure E-13). Total snowfall accumulations for Onondaga County were between 30 and 50 inches (Kocin and Uccellini, 2004). The City of Syracuse received 43.0 inches of snow and the Town of Skaneateles received between 26.0 and 34.9 inches. All Onondaga County schools were closed from this event, including Syracuse University (Arnold, 1993; Carr, 1993). Onondaga County experienced approximately $455,000 in property damages during this event (Hazards and Vulnerability Research Institute, 2007).

Figure E-13. "Storm of the Century" NESIS Category 5 Storm

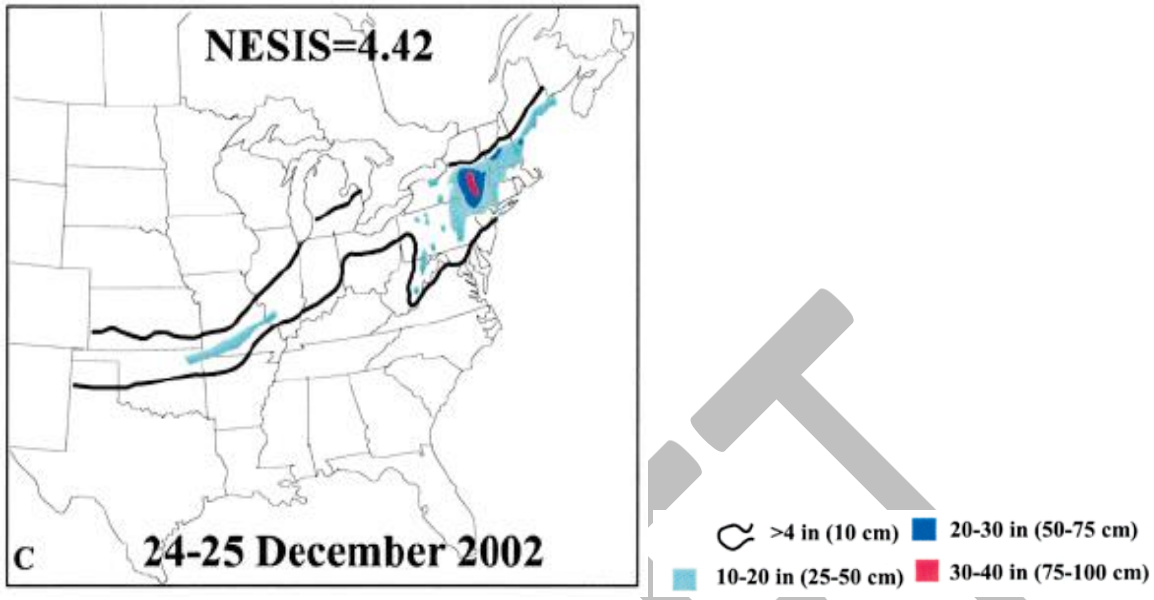


Source: Kocin and Uccellini, 2004

This storm resulted in a statewide FEMA Emergency Declaration (FEMA EM-3107) on March 17, 1993. Through this declaration, all counties were declared eligible for federal and State disaster public assistance funds (NYSEMO, 2006; FEMA, 2008). Disaster aid for Onondaga County was not available in the materials reviewed to develop this plan.

December 24-26, 2002 and January 2-4, 2003 (FEMA EM-3173): Two major storm systems extended through the northeast U.S. and struck on December 25-26, 2002 and January 3-4, 2003. Achieving a NESIS rating of 4.42, the December event placed itself in the 'Major' category (Figure E-14) (Kocin and Uccellini, 2004).

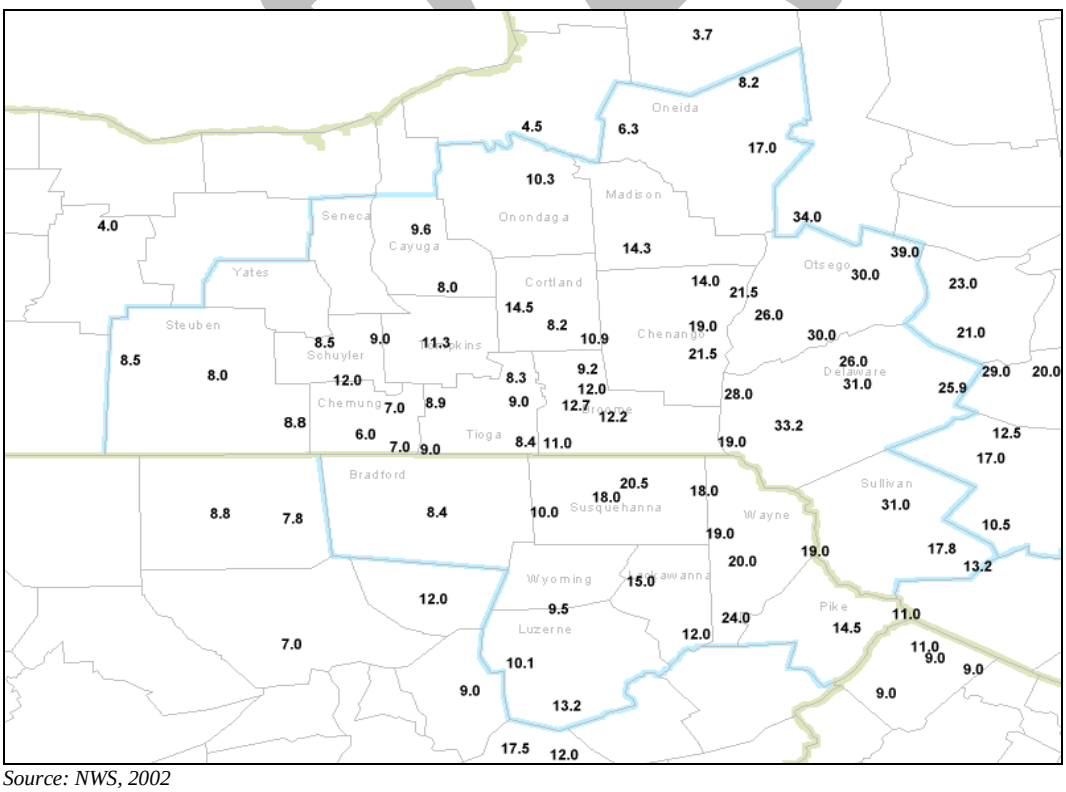
Figure E-14. December 24-25, 2002 NESIS Category 3 Storm



Source: Kocin and Uccellini, 2004

In central New York State, snowfall rates were several inches an hour, resulting in snow amounts ranging from 8 inches to 3 feet (NCDC, 2008). Snowfall totals for the December storm in Onondaga County ranged between 10 and 20 inches. At the Syracuse Airport in North Syracuse, approximately 10.3 inches of snow fell (Figure E-15) (NWS, 2002).

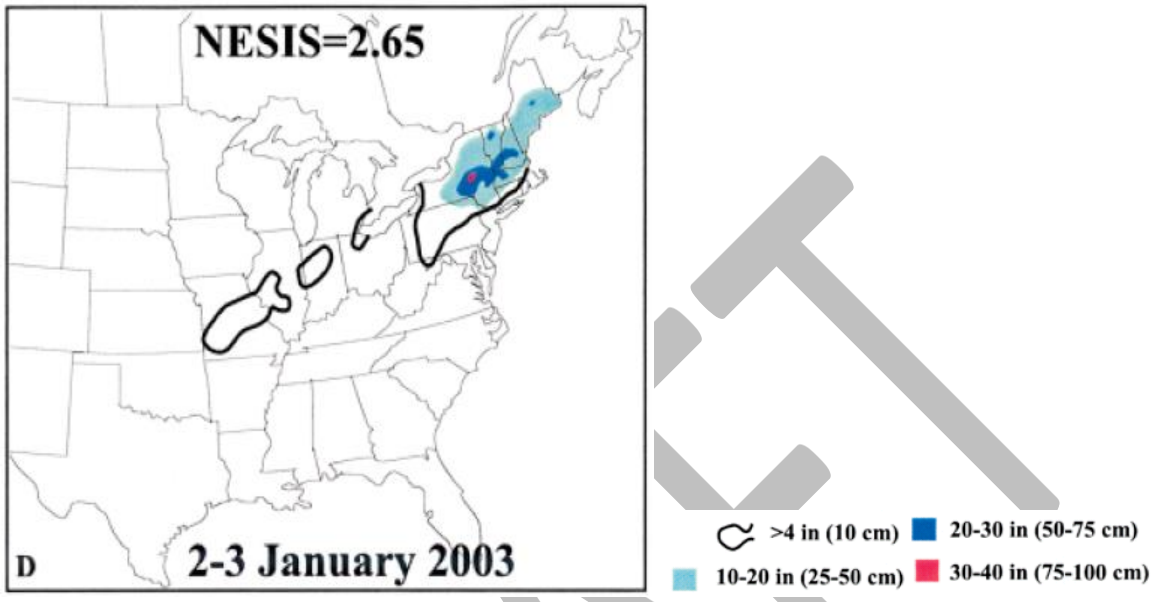
Figure E-15. December 25th, 2002 Snowfall in Central New York State



Source: NWS, 2002

The second storm on January 3-4, 2003 also brought heavy snow to New York State, resulting in approximately $434,000 in property damages in the counties affected. Achieving a NESIS rating of 2.65, this event placed itself in the 'Significant' category (Figure E-16) (Kocin and Uccellini, 2004).

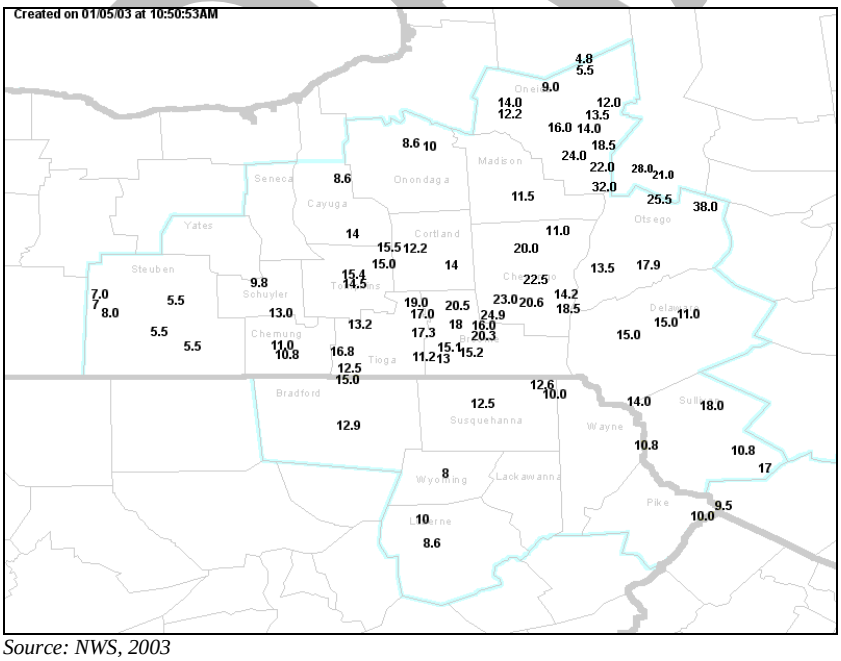
Figure E-16. January 2-3, 2003 NESIS Category 2 Storm



Source: Kocin and Uccellini, 2004

Snowfall totals in Onondaga County ranged between 10 and 20 inches during this January event. Snowfall totals for certain locations in Onondaga County included: Syracuse University, 8.6 inches; and Syracuse Airport in North Syracuse, 10 inches (Figure E-17) (NWS, 2003). Total damages throughout Onondaga County were not disclosed in the materials reviewed to develop this plan.

Figure E-17. January 2nd thru 4th, 2003 Snowstorm in Central New York State



Source: NWS, 2003

These storms resulted in a FEMA Emergency Declaration (FEMA EM-3173) on February 25, 2003. Through this declaration, the following Counties were declared eligible for federal and State disaster funds: Albany, Broome, Chenango, Columbia, Delaware, Fulton, Greene, Herkimer, Madison, Montgomery, Oneida, Orange, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Sullivan, Tioga and Ulster (NYSEMO, 2006; FEMA, 2008). Onondaga County was not declared as an official disaster area under this declaration. Therefore, disaster aid for Onondaga County was not available through FEMA for these storms.

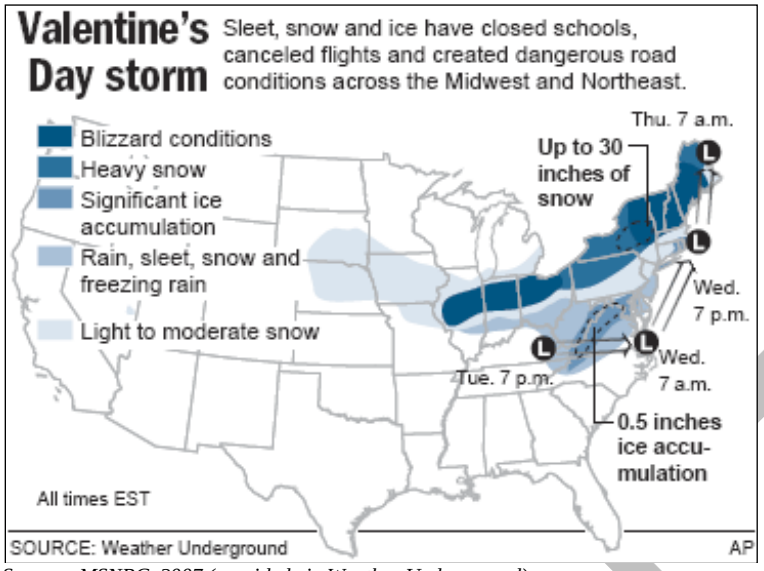
April 3-5, 2003 (FEMA DR-1467): A major ice storm disrupted vital transportation routes and downed trees and power lines, cutting electric power to more than 300,000 customers throughout western and central New York State (New York State Department of Transportation [NYSDOT], 2003). New York State experienced between $28.5 and $41.4 million in property damages from this event (NYSDPC, 2008; NCDC, 2008).

In Onondaga County, the Moyer's Corner Fire Department of the Town of Clay received 157 calls related to water problems, downed wires, pole fires, citizen assistance, fumes, outdoor fires, structure fires, car accidents, chimney fires, an explosion, and EMS-related incidences all caused by this ice storm event (Zaferakis, 2003). In the Village of Baldwinsville, the cost of cleaning up the Village after the ice storm surpassed $100,000, according to the Village's public works superintendent (The Post Standard, 2003). In the City of Syracuse, many tree limbs and power lines snapped and a transformer gave way on Howlett Hill Road causing a powerful, yet localized, fire. The loss of the transformer left hundreds of households within the area without electricity (Howlett Hill Fire Department, 2003). Onondaga County experienced approximately $2.9 million in property damages during this event (Hazards and Vulnerability Research Institute, 2007).

This storm resulted in a FEMA Emergency Declaration (FEMA DR-1467) on May 12, 2003. Through this declaration, the following Counties were declared eligible for federal and State disaster funds: Cayuga, Chenango, Livingston, Madison, Monroe, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Seneca, Schenectady, Wayne and Yates. Disaster assistance for all counties affected in the State totaled approximately $25 million (FEMA, 2008). Disaster aid for Onondaga County was not available in the materials reviewed to develop this plan.

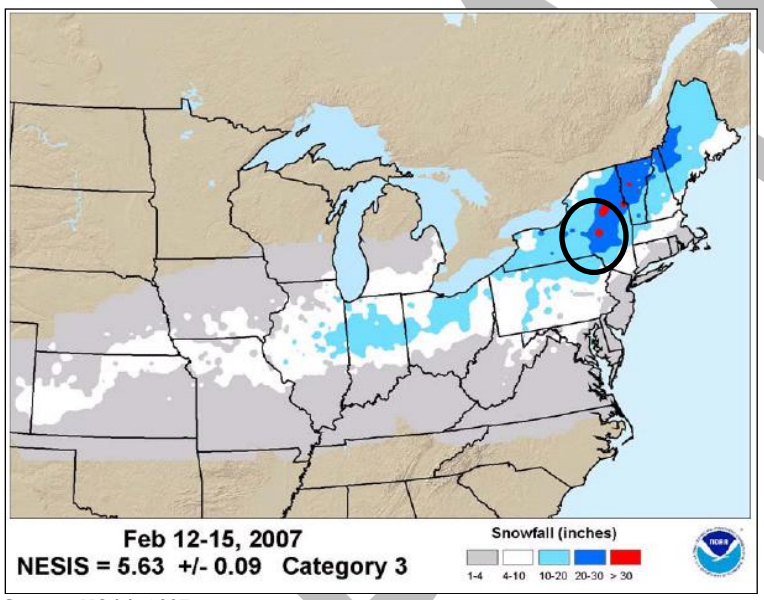
February 12-15, 2007 ("Valentine's Day Storm"): The "Valentine's Day Storm" was the largest storm to affect central New York State and north-northeast Pennsylvania during the 2006-2007 winter season. In much of the area, the storm was the biggest blizzard in several years, with snow accumulations of up to 30 inches in some areas (Evans, 2007; MSNBC, 2007) (Figure E-18). This storm achieved a NESIS rating of 5.63, placing the storm in the 'Major' category (Figure E-19) (Kocin and Uccellini, 2004).

Figure E-18. "Valentine's Day Storm" of February 2007



Source: MSNBC, 2007 (provided via Weather Underground)

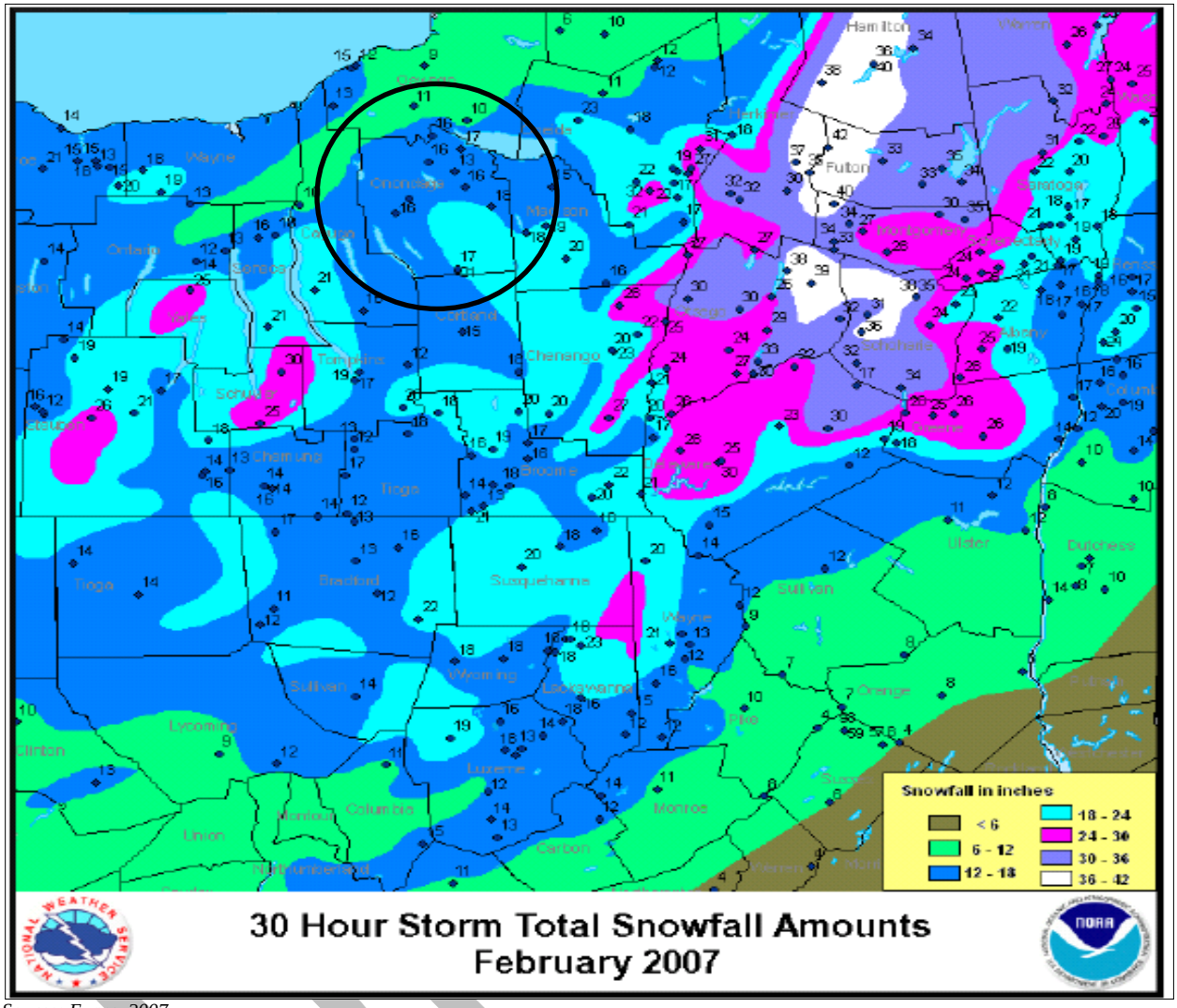
Figure E-19. "Valentine's Storm" NESIS Category 3 Storm



Source: NOAA, 2007

In New York State, Schenectady, Schoharie, Montgomery, Washington, Essex, Warren and Clinton Counties, which were affected by extensive snowfall from the storm, had declared a state of emergency. The NWS indicated that accumulations within Onondaga County from this storm ranged between 12.0 and 24.0 inches, with the greatest accumulation in the southeastern portion of the county (Evans, 2007; NOAA, 2007) (Figure E-20).

Figure E-20. February 2007 Snowfall Accumulations



Source: Evans, 2007
Note: Snowfall totals for Onondaga County range from 12 inches to 24 inches.

Specific snowfall totals within the County include:

- Town of Camillus (21.5 inches)
- Town of Tully (11.7 to 20.5 inches)
- Town of Manlius (17.5 inches)
- Town of Cicero (15.5 to 17.2 inches)
- Town of Clay (16.3 inches)
- Town of Marcellus (16.0 inches)
- Village of East Syracuse (15.5 inches)
- Village of North Syracuse (13.2 inches)
- City of Syracuse (10.5 inches) (NWS, 2007).

Overall cost estimates of property damage or losses throughout the State, including Onondaga County, were not available in the materials reviewed to develop this plan. Figure E-21 and Figure E-22 present the snow conditions within Onondaga County during and after this event.

Figure E-21. Snowfall in Tully

Source: Syracuse.com, 2002-2008

Figure E-22. Downtown Syracuse

Source: Syracuse.com, 2002-2008

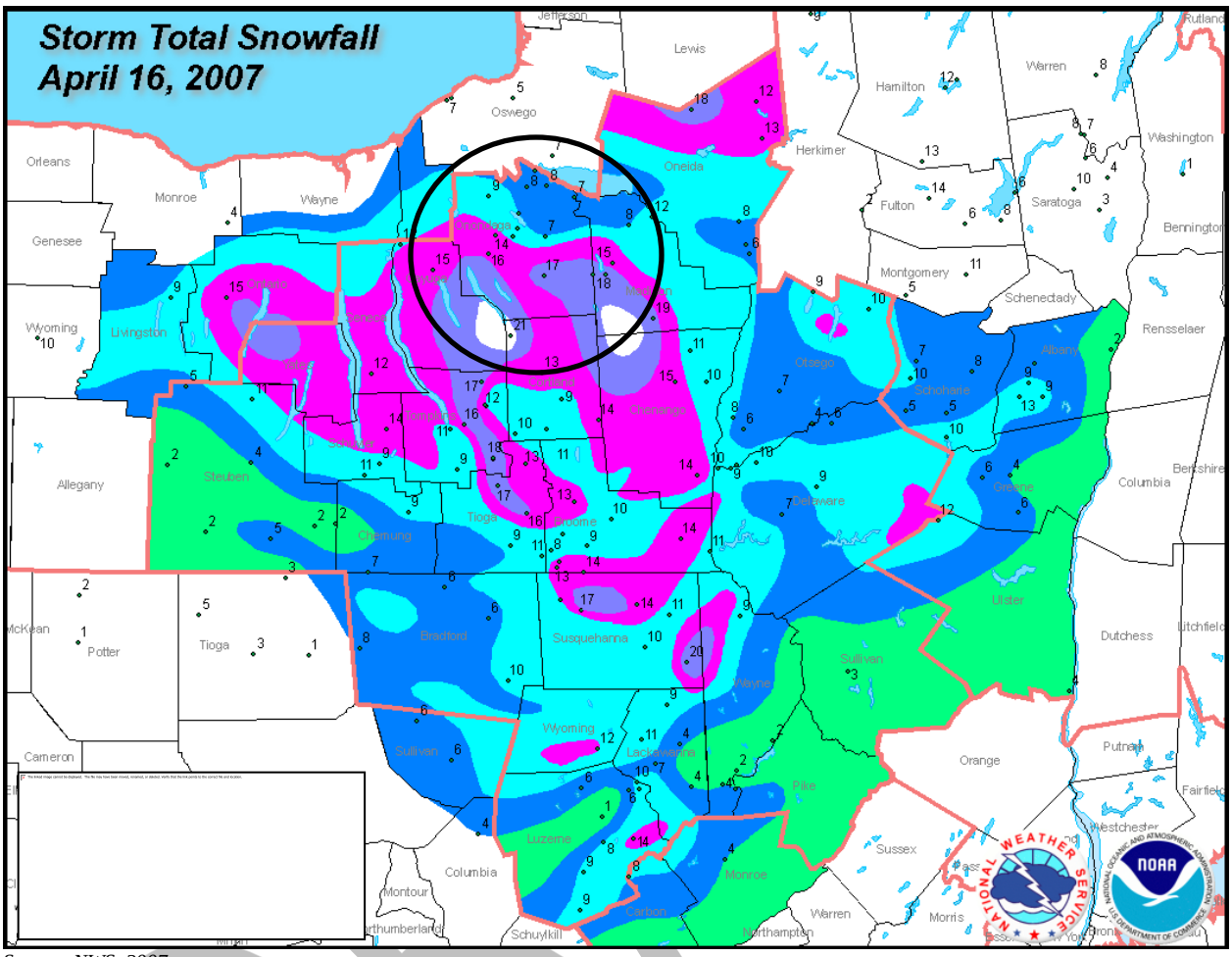
April 14-18, 2007: This Nor'Easter impacted New York State, New Jersey and Connecticut, bringing flooding rains and a heavy wet snowfall to the region. This event began as a spring storm, with high winds and heavy rainfall; which led to flooding, power outages, evacuations, and disruption of traffic and commerce in many locations throughout the affected states (NWS, 2007).

In New York State, various counties in the eastern Catskills and Mid-Hudson Region were impacted by several inches of rain. However, the heavy rains turned to snow on April 16th, resulting in extensive snowfall throughout the higher altitudes of central New York State. As a snowstorm event, it is one of the greatest April snowstorms on record for central New York State, as well as northeast Pennsylvania. One to two feet of snow was reported. The snow was heavy and wet and brought down many trees and power lines, along with wind gusts of over 40 mph (NWS, 2007)

In Onondaga County, snowfall totals ranged from 3.5 to 16.0 inches, with the greatest accumulations located within the southern portion of the County (Figure E-23). Specific snowfall totals within the County include:

- Town of Marcellus (16.0 inches)
- Town of Camillus (14.0 inches)
- Town of Cicero (8.1 inches)
- Village of North Syracuse (6.5 inches)
- Hamlet of Little Utica (3.5 inches) (NWS, 2007).

Figure E-23. Record Breaking Snow Storm Totals on April 16, 2007 in Central New York State



Source: NWS, 2007

As identified in Figures Figure E-24 through Figure E-26, the heavy snowfall within Onondaga County disrupted transportation, downed tree limbs and power lines, caused extensive power outages, created car accidents, closed schools and businesses, and canceled or delayed flights. Total damages throughout Onondaga County were not available in the materials reviewed to develop this plan.

Figure E-24. Snowfall in Syracuse

Source: Sutherland, 2007 (Taken by H. Renee Ford)

Figure E-25. Snow caused Trees to Snap in Dewitt

Source: Syracuse.com, 2002-2008

Figure E-26. Sliding Vehicles in Syracuse

Source: Syracuse.com, 2002-2008

Figure E-27. Trailer disabled from the Storm in Tully

Source: Syracuse.com, 2002-2008

This storm was classified by FEMA as a severe storm that caused inland and coastal flooding, resulting in a FEMA Disaster Declaration (FEMA DR-1692) on April 24, 2007. Through this declaration, the following Counties were declared eligible for federal and State disaster funds: Albany, Columbia, Dutchess, Essex, Greene, Montgomery, Orange, Putnam, Rockland, Schoharie, Suffolk, Ulster and Westchester Counties. Disaster assistance for all counties affected in the State totaled approximately $61 million (FEMA, 2008). This declaration was not issued as a result of the snow accumulation during the event; therefore, Onondaga County was not declared as a disaster area under this declaration.

E.2.3 Flood

Many sources provided historical information regarding previous occurrences and losses associated with flooding throughout New York State and Onondaga County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

Between 1953 and 2008, FEMA declared that New York State experienced over 36 flood-related disasters classified as one or a combination of the following disaster types: flooding, heavy rains, severe storms, coastal storms and/or high tides (FEMA, 2008). Of those events, the NYS HMP and FEMA indicate that Onondaga County has been declared as a disaster area as a result of six flood events between 1953 and 2007 (NYSEMO, 2006; NYSDPC, 2008).

Table E.13 summarizes the FEMA Presidential Disaster (DR) or Emergency (EM) Declarations for flood events in Onondaga County. Many of these federal disasters were associated with a severe storm or tropical or extra tropical disturbance (hurricanes, tropical storms, Nor'Easters) either passing over or located within proximity to the State. These disasters resulted in flooding in the County, hence the reason for the occasional categorization by FEMA as a "severe storms and flooding" event. Because flooding was the primary impact of many of these types of hazard events, only the severe flooding impact of major events are discussed in this Hazard Profile and are also mentioned in their designated sections of this HMP: Section E.2.1 (Severe Storm) and Section E.2.2 (Severe Winter Storm).

Table E.13. Presidential Disaster Declarations for Flooding Events in Onondaga County

Type of Event*	Date**	Declaration Number	Cost of Losses (approximate)
Tropical Storm Agnes	July 1972	DR-338	New York State experienced 24 deaths and had approximately $703 M in damages as a result of flooding. Onondaga County experienced approximately $1.6 M in property damages and crop damages. For the calendar year of 1972, many rivers and streams within the County experienced record peak streamflows during this flood, particularly along Seneca River, Onondaga Creek, Ninemile Creek and Limestone Creek. Onondaga Creek at the City of Syracuse reached its second highest flood stage at 6.2 feet (1.2 feet above 5-foot flood stage). This event caused the Onondaga Lake to rise 370.8 feet, causing nearly $150 K in damages to the Town of Salina (which is 40-percent of the estimated $375 K in damages that occurred within the surrounding communities of Onondaga Lake). FISs for the county indicate that this event created widespread flooding within most jurisdictions of the County.
Severe Storms and Flooding	July 1974	DR-447	The NYSDPC indicates that this is an undeclared event for four counties in New York State; however, FEMA and NYSEMO indicate that it was a declared disaster. Onondaga County experienced approximately $7.2 M in property damages, with $6.5 M in personal property losses (more than any other county impacted by the event). For the calendar year of 1974, many rivers and streams within the County experienced peak

Type of Event*	Date**	Declaration Number	Cost of Losses (approximate)
			streamflows during this flood, particularly along Harbor Brook, Onondaga Creek, Butternut Creek and Limestone Creek. Onondaga Creek at the City of Syracuse reached its highest flood stage at 6.48 feet (1.48 feet above 5-foot flood stage). 3.09 inches of rain fell within a 24-hour period in Syracuse. When Harbor Brook overflowed, it forced more than 200 persons to evacuate their homes on the south side of the City of Syracuse. Underpasses were flooded and houses along Meadow Brook had water in their cellars. Many streets in the city were flooded with water 1.5 ft (0.5 m) deep. Almost all the entrance and exit ramps on Route 81 were blocked by water. Roads in the Towns of Camillus, Solvay, and Cicero were flooded; some were impassable. More than 1,000 city and county residents were evacuated from their homes in the City of Syracuse. The major flooding was along Onondaga Creek and its tributaries. Also, almost all low-lying areas were affected as well. In the Town of Liverpool area, Bloody Brook overflowed and flooded a drive-in theatre with more than 4 feet of water.
Severe Storms, Heavy Rain, Landslides, Flooding	September 1975	DR-487	Remnant flooding occurred in New York State as a result of Hurricane Eloise. Losses in New York State are unknown; however, it is reported that Onondaga County experienced approximately $6.3 M in property damages. Rain totals during this event within the vicinity of Onondaga County totaled between 3 and 5 inches. For the year of 1975, peak streamflows occurred along Ley Creek in the City of Syracuse during this event.
Severe Storms, Heavy Rain, Landslides, Flooding	September 1975	DR-487	Remnant flooding occurred in New York State as a result of Hurricane Eloise. Losses in New York State are unknown; however, it is reported that Onondaga County experienced approximately $6.3 M in property damages. Rain totals during this event within the vicinity of Onondaga County totaled between 3 and 5 inches. For the year of 1975, peak streamflows occurred along Ley Creek in the City of Syracuse during this event.
Severe Storms and Flooding	January 1996	DR-1095	New York State experienced between $100 and 160 M in eligible damages, road closures, closed businesses, and 10 deaths (NYSDPC). New York State received $16.7 M in individual assistance and $103.7 M in public assistance. Onondaga County experienced approximately $7.6 M in flood damages. USGS indicated, through information provided by FEMA, which Onondaga County received approximately $1.1 M in public assistance (1997 USD).
Severe Storms	May - September 2000	DR-1335	New York State experienced approximately $34.6 M in eligible damages (NYSDPC). Losses in Onondaga County are unknown. In Syracuse, heavy rains caused significant ponding of water on Park Street, McBride Street, and Burt Street on June 21, 2000. Route 174 as well as the northbound lanes of Interstate 81 were closed for a short time. On July 16, 2000 significant ponding of water was reported on roadways from the Towns of Manlius to Fayetteville.
Severe Storms and Flooding	August – September 2004	DR-1564	New York State experienced approximately $18.03 M in eligible damages (NYSDPC). Onondaga County experienced approximately $2.0 M in flood damages. In the Towns of Pompey, Lafayette, Tully, Lafayette and Manlius, roads were either washed out, closed or impassable. A golf course flooded in Manlius. There was significant flooding along Limestone Creek (mainly in the southern part of town but spreading north). A bridge was washed out in near the Village of Manlius. An animal hospital was evacuated in Fayetteville. Many basements were flooded. This event was reported as the worst flooding in 20 years within the Village of Manlius. Rainfall totals in Onondaga County ranged between 2.2 inches in Camillus and 4.87 inches in Tully. As of December 10, 2004, more than $1.8 M in disaster aid has been approved for the State. Disaster aid for Onondaga County is unknown.

Source(s): FEMA, 2008; NYSDPC, 2008; Hazards & Vulnerability Research Institute (SHELDUS), 2008; NCDC, 2008; NYSEMO, 2006

* *The 'Type of Event' is the disaster classification that was assigned to the event by FEMA.*

** *Represents the date of the event*

Note: Dollars rounded to nearest thousand. Recorded losses indicate the dollar value of covered losses paid, as available through the public records reviewed. Some of these events overlap with events shown under the Severe Storm and Severe Winter Storm hazard profiles of this Plan.
K = Thousands ($)
M = Millions ($)
USD = U.S. Dollars

As part of the USGS's program for disseminating water data within USGS, to USGS cooperators, and to the general public, the USGS maintains a distributed network of computers and fileservers for the acquisition, processing, review, and long-term storage of water data. This network of computers is called the National Water Information System (NWIS) and the data is continuously collected at over 1.5 million sites, also known as stream flow stations or gages, around the country and at some border and territorial sites. Many types of data are stored in NWIS, including comprehensive information for site characteristics, well-construction details, time-series data for gage height, streamflow, ground-water level, precipitation, and physical and chemical properties of water. Additionally, peak stream flows, chemical analyses for discrete samples of water, sediment, and biological media are accessible within NWIS (USGS, 2008).

Onondaga County consists of 28 stream flow stations; with each station having different periods of record up to 2007 (USGS, 2008). For the purpose of this HMP, the peak stream flows of each of these stations during their period of record were reviewed to identify the record peak events at those stations. Peak flow data identifies the *annual flood* or largest flood with the highest maximum instantaneous peak streamflow (or discharge) and gage height for a given station of each water year. Stations with the longest periods of record indicate that the most prominent events that have impacted the stations of the County appear to have occurred in March 1936, March 1960, June 1972, July 1974, September 1975, and October 1981.

Table E.14. USGS Stations and Record Peak Flows for Onondaga County

USGS Station ID	Currently Active	USGS Station Name	Period of Record				Record Peak(s)	
			Begin Date	End Date	Daily Average Discharge (Cubic Feet / Second) (approx. range) [1]	Total Peak Events	Event Date	Peak Discharge (Cubic Feet / Second) [2]
04237500	Yes	Seneca River at Baldwinsville	3/25/1936	3/28/2007	1,000 – 7,400	59	3/25/1936	22,100
04237946	No	Onondaga Creek Tributary 6 below mudboil area at Tully	3/27/1992	11/30/2006	0.1 – 2.3	16	3/27/1992	45
04237962	Yes	Onondaga Creek near Cardiff	4/15/2002	3/15/2007	17 - 225	6	4/3/2005	1,070
04239000	Yes	Onondaga Creek at Dorwin Ave. in Syracuse	3/11/1952	3/14/2007	30 - 400	56	7/3/1974	3,260
04239500	No	Onondaga Creek at Syracuse	4/1/1940	1/6/1949	20 - 550	10	12/30/1942	3,980
04240010	Yes	Onondaga Creek at Spencer St. in Syracuse	3/15/1971	6/19/2007	60 - 500	37	7/3/1974	4,050
04240100	Yes	Harbor Brook at Syracuse	3/30/1960	3/14/2007	4 - 30	48	7/3/1974	726
04240105	Yes	Harbor Brook at Hiawatha Blvd. in Syracuse	7/24/1971	3/14/2007	5 - 40	37	7/3/1974	824
04240120	Yes	Ley Creek at Park Street in Syracuse	4/5/1973	3/14/2007	10 - 120	35	9/26/1975	1,310
0424014980	No	Spafford Creek tributary near Sawmill Road near Spafford	1/8/1998	2/4/2003	0.01 – 0.20	6	1/8/1998	2.5
04240180	No	Ninemile Creek near Marietta	2/8/1965	3/26/2007	8 - 130	43	6/23/1972	1,030
04240200	No	Ninemile Creek at Camillus	1/22/1959	1/24/1999	40 - 300	35	3/30/1960	2,760
04240300	Yes	Ninemile Creek at Lakeland	3/16/1971	3/15/2007	70 - 430	36	6/23/1972	2,110
04245000	No	Limestone Creek at Fayetteville	3/31/1940	11/2/1994	30 - 470	56	10/28/1981	7,490
04245200	No	Butternut Creek near Jamesville	1/22/1959	3/15/2007	9 - 160	49	10/28/1981	1,880
04245236	No	Meadowbrook at Hurlburt Road in Syracuse	7/24/1971	3/14/2007	0.9 - 6	37	7/3/1974	418

Source: USGS, 2008

Note (1): Daily average discharge is the daily mean discharge amount for the period of record based on surface-water daily statistics provided by the USGS data for each station. A constant discharge amount is not assigned to an individual station since stream flow is always changing.

Note (2): Record peaks are only available during the "Period of Record" for the station.

NA Daily discharges were unavailable

Based on all sources researched, many flood events have impacted Onondaga County, as summarized in Table E.15. With flood documentation for New York State being so extensive, not all sources may have been identified or researched. Hence, Table E.15 may not include all events that have occurred throughout the region. This summary table does not include ice jam events.

Table E.15. Flooding Events between 1865 and 2007

Event Date / Name	Location	Losses / Impacts	Source(s)
Flood Winter 1864 – Spring 1865	City of Syracuse	Unusual winter snowfall combined with heavy March rains result in floods over large parts of eastern and southeastern City of Syracuse, damaging and destroying many bridges.	Stone
Flood December 15, 1901	City of Syracuse	Sudden rising of Onondaga Creek caused great property damage and drove several hundred people from their homes in the City of Syracuse. The water rose six feet in eight hours, but is now receding. Many people were rescued by police and firemen in boats and no lives are known to have been lost.	Horton
Flood September 1915	Town of Dewitt, Village of East Syracuse	Major flood event within both jurisdictions of the County.	FEMA
Flood March 13, 1920	Town of Onondaga	Major flood event within this Town.	FEMA
Flood June 2-3, 1922	City of Syracuse	4.79 inches of rain fell within a 24-hour period in the City of Syracuse.	USGS, NYSC
Flood June 18, 1922	City of Syracuse	The City of Syracuse and neighboring towns were impacted by a cloudburst, tying up railroads, paralyzing the local trolley and telephone services, flooding immense areas in the low-lying districts. Unofficial estimates of property loss in the City of Syracuse were nearly $800 K.	New York Times
Flood 1925	Jordan	A major flood event within the Village occurred in 1925, putting Elbridge, North Main and Mechanic Streets underwater.	FEMA
Flood July 6-10, 1935	Countywide	Rainfall totals within Onondaga County ranged between 2.0 and 8.0 inches during this storm.	NWS
Flood March 25, 1936	Countywide	Heavy rains and high winds caused severe flooding in the Onondaga Valley and along Onondaga Lake. The greatest local danger was to the Towns of Marcellus and Camillus when strong south winds and heavy rain threatened to break up Otisco ice and send it over the spillway. Residents of the two villages feared the ice would jam Nine Mile Creek. Resulted in peak stream flows along Seneca River in the Village of Baldwinsville (USGS) 22,100 cfs. In the Town of Elbridge, this flood event causing the inundation of camps and cottages at Quimby's Bridge.	Scripophily.com, USGS, FEMA
Flood March 31 - April 1, 1940	Town of Dewitt, Village of East Syracuse	Resulted in peak stream flows for the year of 1940 along Onondaga Creek and Limestone Creek. Major flood event within both jurisdictions of the County.	USGS, FEMA
Flood December 30, 1942	Countywide	Resulted in peak stream flows for the year of 1942 along Limestone Creek at the Village of Fayetteville. It was a major flood event in the Town of Manlius.	USGS, FEMA
Heavy Rain August 1943	City of Syracuse	3.26 inches of rain fell within a 24-hour period in the City of Syracuse.	NYSC

Event Date / Name	Location	Losses / Impacts	Source(s)
Flood June 3, 1947	Countywide	Resulted in peak stream flows for the year of 1947 along Limestone Creek at the Village of Fayetteville. It was a major flood event in the Town of Manlius.	USGS, FEMA
Flood March 20, 1950	Town of Dewitt, Village of East Syracuse, Village of Fayetteville, Town of Salina	Major flood event within these jurisdictions of the County.	FEMA
Flood March 28, 1950	Village of Fayetteville, Towns of Manlius and Pompey	Resulted in peak stream flows for the year of 1950 along Limestone Creek at the Village of Fayetteville. It was a major flood event in the Towns of Manlius and Pompey.	USGS, FEMA
Heavy Rain October 1955	City of Syracuse	3.55 inches of rain fell within a 24-hour period in the City of Syracuse.	NYSC
Flood March 12, 1956	Village of Baldwinsville	Major flood event within this Village. Resulted in peak stream flows for the year of 1956 along Seneca River.	FEMA, USGS
Flood June 1-2, 1958	Town of Pompey	Major flood event within this Town. Resulted in peak stream flows for the year of 1958 along Onondaga Creek and Limestone Creek.	USGS, FEMA
Flood January 22, 1959	Town of Pompey	Major flood event within this Town. Resulted in peak stream flows for the year of 1959 along Onondaga Creek, Ninemile Creek, Limestone Creek and Butternut Creek.	USGS, FEMA
Flood March 30-31, 1960	Countywide	Resulted in peak stream flows for the year of 1960 along Limestone Creek, Onondaga Creek, Harbor Brook, Ninemile Creek and Butternut Creek. It was a major flood event in the Village of East Syracuse, and Towns of Camillus, Geddes, Manlius, Marcellus, Pompey and Salina. Onondaga Creek at the City of Syracuse reached its 5th highest flood stage at 5.06 feet (.06 feet above 5-foot flood stage).	USGS, FEMA, AHPS
Flood April 4, 1960	Multi-Jurisdictional	Resulted in peak stream flows along Seneca River in the Village of Baldwinsville (USGS) 17,200 cfs. Major flood event within both jurisdictions of the County.	USGS, FEMA
Flood February 25-26, 1961	Town of Pompey	Major flood event within this Town. Resulted in peak stream flows for the year of 1961 along Onondaga Creek, Harbor Brook, Ninemile Creek, Limestone Creek and Butternut Creek	USGS, FEMA
Flood February 4, 1963	Village of Baldwinsville, City of Syracuse	The Syracuse Herald American reported that floodwaters broke a beaver dam on the Village of Baldwinsville's Tannery Creek, and up to 'four feet of water' covered several streets and flooded 50 cars.	Endreny and Hassett
Flood June 26, 1963	City of Syracuse	The Syracuse Herald Journal reported that nearly 2.5 inches of rain had fallen on Central New York and flooded hundreds of cellars and numerous roads. The Claramont Park tract in the City of Syracuse was surrounded by 3 to 4 feet of water.	Endreny and Hassett
Flood March 4-5, 1964	Multi-Jurisdictional	Major flood event within these jurisdictions of the County. Resulted in peak stream flows for the year of 1964 along Onondaga Creek, Harbor Brook, Ninemile Creek, Limestone Creek and Butternut Creek.	USGS, FEMA
Flood May 1966	Town of Salina	This flood event resulted in over $90 K in damages to the Town.	FEMA

Event Date / Name	Location	Losses / Impacts	Source(s)
Flood July 29-31, 1967	City of Syracuse	The Syracuse Herald Journal indicated that the Syracuse Department of Public Works crews were on the cleanup brigade after rainwater flowed down West Seneca Turnpike in Syracuse. Lawns, driveways and sidewalks were inundated. A series of cloudbursts brought on the deluge and a clogged storm drain at Hopper Brook was blamed for the flooding.	Robison (USGS)
Flood February 3-4, 1968	Village of Baldwinsville	The Syracuse Herald Journal indicated that local fire department, power, and telephone company personnel were busy cleaning up water that flooded several streets and a bowling alley after a beaver dam broke in Baldwinsville's Tannery Creek. The creek was plugged up at West Genesee Street and flooded streets with up to four feet of water. Parts of Elizabeth, Warner, and Oneida Avenues were flooded as well as the parking lot and bowling lanes of the Sports Bowl. More than 50 cars were flooded above the engines. Many cars required towing.	Robison (USGS)
Flood June 26, 1968	Multi-Jurisdictional	The Syracuse Herald Journal indicated that nearly 2.5 inches of rain had fallen on Central New York, flooding hundreds of cellars and putting many roads under water. At least 250 homes in the Claramont Park tract in Syracuse were surrounded by three to four feet of water. West Genesee Street and Erie Boulevard, east, were under water in many spots. Young Road in Mattydale was also flooded.	Robison (USGS)
Flood July 9, 1968	Multi-Jurisdictional	The Syracuse Herald Journal indicated that Jordan officials were seeking the aid of the Army Corps of Engineers to clean up silt, rocks and debris strewn about Skaneateles Creek by flood waters on July 9th. During this storm a large amount of water was released from Skaneateles Lake. This water filled the stream to the top of its banks in the Village of Jordan and left boulders, tree limbs and a large amount of gravel and silt when it receded. The Camillus Advocate indicated that Nine Mile Creek and a small connecting creek overflowed its banks in the Town of Camillus, causing minor flooding of yards and streets.	Robison (USGS)
Flood May 18-20, 1969	Multi-Jurisdictional	This event resulted in flooding in the City of Syracuse, the Towns of Elbridge, and Skaneateles and the Villages of East Syracuse and Liverpool. The flooding in these jurisdictions resulted in over $105 K in property damages, particularly in Syracuse.	FEMA, USGS, Robison (USGS)
Flood June 18, 1970	Multi-Jurisdictional	1.3 inches of rain fell in 37 minutes at the City of Syracuse based U.S. Weather Bureau Airport station, causing streets and roads to flood by two feet of water. Town of Skaneateles received from 3.0 to 4.6 inches of rain in 24 hours. This was also a major flood in the Towns of Camillus and Geddes.	Endreny and Hassett, FEMA, USGS
Flood July 3, 1970	Countywide	Onondaga County experienced approximately $250 K in property damages.	Hazards & Vulnerability Research Institute (SHELDUS)
Flood March 15, 1971	Towns of Camillus, and Geddes	Major flood event within both jurisdictions of the County.	FEMA
Flood May 15, 1972	Town of Cicero, City of Syracuse	The NYS HMP indicated that Cicero experienced a flood event on this date. Resulted in peak stream flows for the year of 1972 along Meadow Brook in the City of Syracuse.	NYSDPC, USGS
Flood June 20-25, 1972	Multi-State	See FEMA Disaster Declarations (Table E.13)	FEMA, Hazards & Vulnerability Research Institute

Event Date / Name	Location	Losses / Impacts	Source(s)
(Remnants of Tropical Storm Agnes) (FEMA DR-338)			(SHELDUS), NYSEMO History of Declarations, USGS, NYSDPC, USACE, NWS
Flood January 2, 1973	Villages of Baldwinsville, and Liverpool	The Syracuse Herald Journal indicated that heavy precipitation during November and December 1972, ground saturation after the June (Tropical Storm Agnes) flooding, and recent warm weather that melted snow were among factors that caused the worst winter flooding potential since 1942. The most serious conditions were along the Seneca River in the Village of Baldwinsville area. Trouble spots include shore areas west of the Village of Baldwinsville, some places near the Village of Liverpool, and the low-lying Hayes Road neighborhood east of the Village of Baldwinsville.	USGS, Robison et al.
Flood March 17, 1973	Countywide	Onondaga County experienced approximately $200 K in property damages.	Hazards & Vulnerability Research Institute (SHELDUS)
Flood April 5-6, 1973	City of Syracuse, Village of Baldwinsville, Town of Cicero, Village of East Syracuse	The Syracuse Herald Journal indicated that heavy rainfall today pushed area lakes and streams to abnormally high levels, and flooded yards and cellars of some homes in the Town of Cicero and the Village of Baldwinsville. The Syracuse Post-Standard indicated that rainfall in the City of Syracuse area totaled .58 inches. This event also resulted in the flooding of some streets, yards, and basements in the Village of East Syracuse.	Endreny and Hassett, Robison et al.
Flood June 6, 1973	City of Syracuse, Village of Baldwinsville	Minor flooding occurred in the City of Syracuse and Village of Baldwinsville. The Syracuse Herald Journal indicated that thunderstorms hit the City of Syracuse area last night and flooded several streets when the storm drains could not handle the runoff. Meadowbrook Drive and Euclid Avenue were the most seriously affected.	Endreny and Hassett, Robison et al.
Severe Storms and Flooding July 3-5, 1974 (FEMA DR-447)	Multi-County	See FEMA Disaster Declarations (Table E.13)	FEMA, NYSEMO, Endreny and Hassett, NYSC
Flood April 4-5, 1974	Multi-Jurisdictional	Minor flooding was reported which resulted in inundation of 50 basements in the Syracuse Harbor and Furnace brook watersheds. The Syracuse Herald Journal indicated that the rapid melting of heavy snow resulted in flooded basements on this city's south side and the inundation of two roads in the towns of Marcellus and Elbridge. A cutlery plant at the Town of Camillus was forced to move some of its equipment and personnel when Ninemile Creek flooded parts of the building.	Endreny and Hassett, Robison et al.
Severe Storms, Heavy Rain, Landslides, Flooding September 22-27, 1975 (FEMA DR-487) (Remnants of Hurricane Eloise)	Multi-State	See FEMA Disaster Declarations (Table E.13)	FEMA, HPC, USGS, NYSEMO, Perry et al.

Event Date / Name	Location	Losses / Impacts	Source(s)
Flood April 1, 1976	Countywide	Onondaga County experienced approximately $313 K in property damages.	Hazards & Vulnerability Research Institute (SHELDUS)
Flood July 16, 1977	City of Syracuse	Resulted in peak stream flows for the year of 1977 along Ley Creek at Park Street in the City of Syracuse 1,250 cfs.	USGS
Flood October 1, 1977	Countywide	Onondaga County experienced approximately $313 K in crop damages and $3 K in property damages.	Hazards & Vulnerability Research Institute (SHELDUS)
Flood March 5-6, 1979	City of Syracuse	Onondaga Creek at the City of Syracuse reached its 3rd highest flood stage at 5.49 feet (.49 feet above 5-foot flood stage).	AHPS, USGS
Flood October 27-28, 1981	Countywide	Resulted in peak stream flows for the year of 1981 along Ley Creek, Onondaga Creek, Butternut Creek, Ninemile Creek, Meadow Brook, Harbor Brook and Limestone Creek. Onondaga County experienced approximately $833 K in property damages. In the Village of Fayetteville, the flood caused a levee on the western bank of Limestone Creek to breach in several places, causing a splitting in the flow of the Creek.	USGS, Hazards & Vulnerability Research Institute (SHELDUS), FEMA
Flood March 27, 1992	Town of Tully	Major flood event within this Town.	FEMA
Flood April 27-28, 1993	Village of Baldwinsville, City of Syracuse, Towns of Lafayette and Van Buren	Residents of Cayuga, Onondaga, Oswego, Seneca, Tompkins, Cortland and Wayne Counties were declared eligible to apply for Small Business Administration loans as a result of flood damages. In the Town of Van Buren, west of the City of Syracuse, Town officials have hired armed guards to patrol flooded homes along the Seneca River. A mudslide in the Town of LaFayette, left a crater 40 feet deep and a quarter of a mile wide. Resulted in peak stream flows for the year of 1993 along Seneca River and Ninemile Creek.	New York Times, USGS
Flood March 23-25, 1994	Multi-County	Three counties in New York State experienced approximately $500 K in property damages. Resulted in peak stream flows for the year of 1994 along Onondaga Creek, Ley Creek, Ninemile Creek, Limestone Creek, Butternut Creek.	NOAA-NCDC, USGS
Flood August 15, 1995	Countywide	Onondaga County experienced approximately $25 K in property damages.	Hazards & Vulnerability Research Institute (SHELDUS)
Severe Storms and Flood January 18-20, 1996 (FEMA DR-1095) “Deluge of 1996”	Northeastern U.S.	See FEMA Disaster Declarations (Table E.13)	FEMA, NOAA-NCDC, NYSDPC , NWS, Lumia (USGS WRIR 97-4252), Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO, USGS

Event Date / Name	Location	Losses / Impacts	Source(s)
Flood November 8-9, 1996	Countywide	Onondaga County experienced approximately $100 K in property damages. Resulted in peak stream flows for the year of 1996 along Onondaga Creek, Harbor Brook, Ley Creek, Ninemile Creek and Butternut Creek. 3.56 inches of rain fell within a 24-hour period in the City of Syracuse.	Hazards & Vulnerability Research Institute (SHELDUS), USGS, NYSC
Flood August 24, 1998	Town of Manlius	As a severe thunderstorm moved through the region, it dumped torrential rains within the County. Rainfall amounts of 1 to 2 inches were observed in less than 30 minutes in the Town of Manlius. This caused the Limestone Creek to quickly rise out of its banks. One fatality occurred within Manlius, when a four year old girl was swept downstream by floodwaters. Some minor damage was also incurred to portions of other properties from the force of the water. The Town of Manlius experienced approximately $20 K in property damages.	NOAA-NCDC
Severe Storms May 3, – September 14, 2000 (FEMA DR-1335)	Statewide	See FEMA Disaster Declarations (Table E.13)	Chittenden, FEMA, NYSDPC, NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO
Flood June 14, 2002	Countywide	Heavy thunderstorm rains caused flash flooding across northern Onondaga County. The worst flooding was reported in Baldwinsville. Flooding also occurred in the Towns of Lysander, Clay, Liverpool, and Cicero and the Village of North Syracuse. Resulted in peak stream flows for the year of 2002 along Harbor Brook and Ley Creek. Onondaga County experienced approximately $2 M in property damages.	NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS), USGS
Flood June 27, 2002	City of Syracuse	Heavy thunderstorm rains caused street and basement flooding throughout the City of Syracuse. Some cars were under water. Sump pumps in the Hotel Syracuse were overwhelmed. The City experienced approximately $20 K in property damages.	NOAA-NCDC
Flood May 24, 2004	Town of Cicero	Several Town parks flooded. A storm culvert collapsed under Eastwood Road south of Route 31. The Town of Cicero experienced approximately $20 K in property damages.	NOAA-NCDC
Flood June 2004	Cross Lake (Onondaga and Cayuga Counties)	Flooding found along the shorelines of Cross Lake.	CNY Waterways
Severe Storms August 13 – September 16, 2004 (FEMA DR-1564)	Multi-County	See FEMA Disaster Declarations (Table E.13)	FEMA, NYSEMO, NWS, Hazards & Vulnerability Research Institute (SHELDUS), NOAA-NCDC
Severe Storms and Flood	Multi-State	Resulted in a Disaster Declaration for 20 New York State counties (DR-1589), however, it did not include Onondaga County. New York State experienced approximately $66.2 M in eligible damages.	NCDC, NWS, FEMA, NYSDPC,

Event Date / Name	Location	Losses / Impacts	Source(s)
April 2-4, 2005		The County experienced approximately $100 K in property damages. There were some road closures and flooded basements in the Towns of DeWitt, Manlius, and Lafayette and the Village of East Syracuse. Streams and creeks came out of their banks including Butternut Creek. Onondaga Creek at the City of Syracuse reached its 4th highest flood stage at 5.16 feet (.16 feet above 5-foot flood stage).	NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS), NYSEMO, AHPS, USGS
Flood July 13-14, 2005	Countywide	Nearly stationary thunderstorms with heavy rain caused a flash flood in the City of Syracuse, the Town of DeWitt, and the Hamlet of Mattydale. Rainfall was two to four inches in less than two hours in the City. Flooding closed and damaged numerous roads and train tracks, including State Route 5 and State Route 41A. Dozens of cars were under water and dozens of homes and businesses had several feet of water in them. Onondaga County experienced approximately $500 K in property damages.	NYSDPC, NOAA-NCDC, Hazards & Vulnerability Research Institute (SHELDUS)
Flood / High Winds November 29, 2005	Countywide	1.16 inches of rain fell in the City of Syracuse. Overflowing roads caused several cars to break down and contributed to numerous crashes in the Town of Onondaga County. Several drivers reported that rain had washed out parts of Route 80, near Griffen Road in South Onondaga. Winds were strong enough to blow over an elderly man in the County.	The Post Standard
Severe Storms and Flood June 25 - July 12, 2006	Multi-State	This event was the largest and most costly natural disaster that New York State has encountered since Hurricane Agnes hit the State in 1972. Resulted in a Disaster Declaration for 19 New York State counties (DR-1650), however, it did not include Onondaga County. New York State experienced approximately $246.3 M in eligible damages (NYSDPC). Onondaga County experienced approximately $29 K in property damages. Although Onondaga County was not declared as an official disaster area under this declaration, all counties of the State were eligible to apply for federal assistance under the Hazard Mitigation Grant Program. As of December 29, 2006, more than $227 M in disaster aid was approved for the State. Disaster aid in Onondaga County is unknown. Peak streamflows within Onondaga County for the year of 2006 occurred during this event along Seneca River, Onondaga Creek, Harbor Brook, Ley Creek, Ninemile Creek and Meadow Brook. Streams and creeks overflowed their banks in the Village of Liverpool. There was standing water on many roadways and surrounding areas within the Village. In the Village of Baldwinsville, several roads were impassable and State Route 370 was closed. The water covered many roads and bridges in the Village. In the Town of Cicero, Volmer Creek overflowed its banks flooding Thompson Road. The water rose into the first floor of several homes. In the Towns of Van Buren and Cicero, many roads were closed. In the Hamlet of Mattydale, the Hollywood Theatre and many homes were flooded. In the Town of Dewitt, over 100 homes throughout the town had significant level of water in their basements. In the Town of Camillus, a mudslide closed Gorge Road. 4.29 inches of rain fell at Hancock Airport in the City of Syracuse. The storm overwhelmed county sewer systems, causing raw sewage to seep in Onondaga Lake. A tornado spawned, cutting a three-mile swath from the Towns of Marcellus to Onondaga, with the heaviest amount of damage reported in the Town of Cicero.	FEMA, NOAA-NCDC, NWS, NYSEMO, NYSDPC, USGS, NOAA, Lanza, USGS, Goldberg and Greene (The Post Standard), Doherty (The Post Standard), Weiner, Baker
Flood March 14-18, 2007	City of Syracuse, Town of Lysander	Minor flooding occurred on the Onondaga Creek at the City of Syracuse from the evening hours of March 14th to the morning of the 15th. The creek at the City crested at 5.1 feet (.1 feet over 5 foot flood stage). Over an inch of rain combining with snowmelt caused the minor flooding. Peak	NOAA-NCDC, USGS

Event Date / Name	Location	Losses / Impacts	Source(s)
		streamflows within Onondaga County for the year of 2007 occurred during this event along Seneca River, Onondaga Creek, Harbor Brook, Ley Creek, Willow Brook, Ninemile Creek, Butternut Creek and Meadow Brook.	
Flood December 24, 2007	City of Syracuse	The Syracuse Post-Standard indicated that rainfall and melting snow flooded roads and basements throughout Central New York. The weather led to the evacuation of a City of Syracuse home when part of its foundation crumbled. Cars stalled in the midst of flooded streets that police officers said looked like lakes. Firefighters and National Grid workers spent the night responding to reports of basement flooding that threatened furnaces and other utilities.	The Post Standard

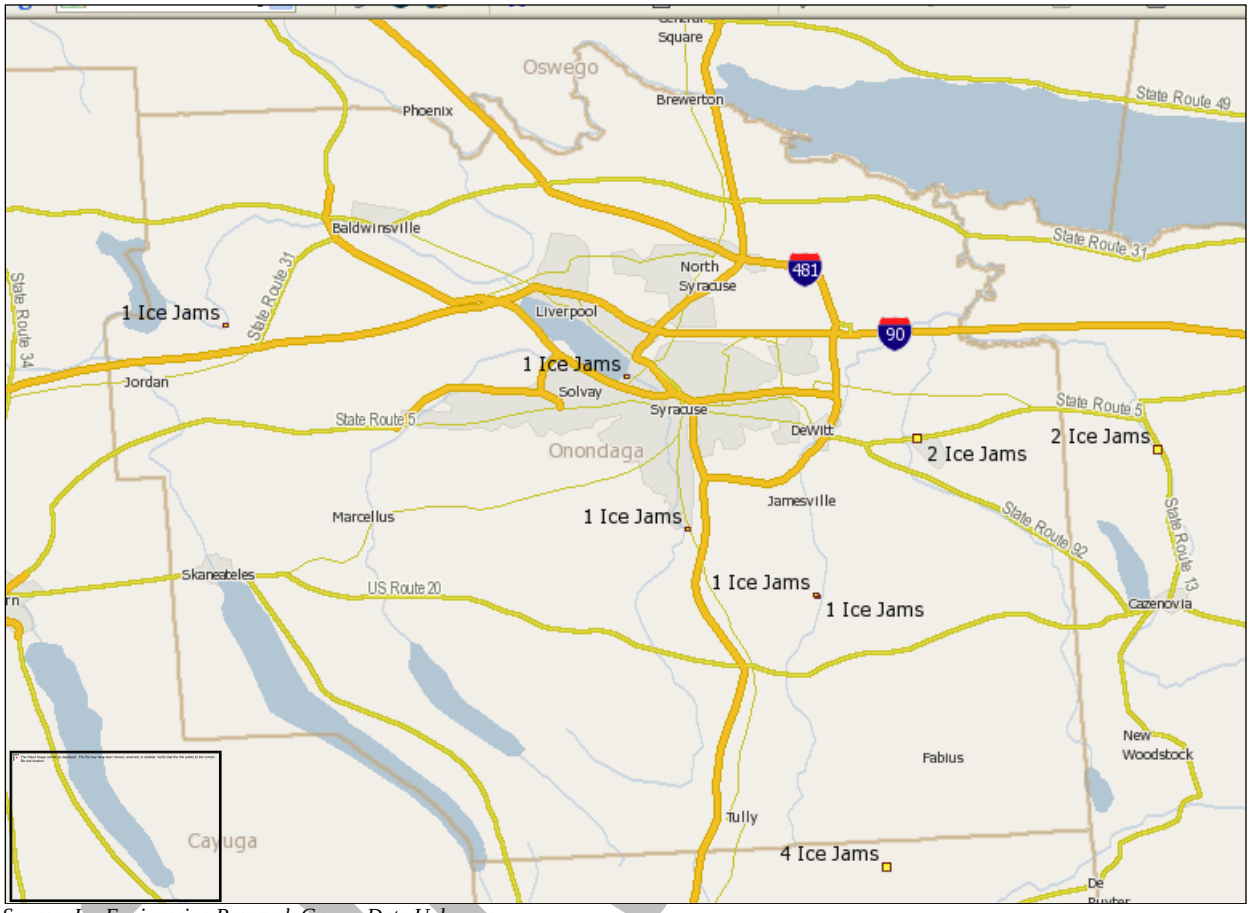
Note (1): *This table does not represent all events that may have occurred throughout the County. NOAA/NCDC storm query indicated that Onondaga County has experienced 28 flood events between January 1, 1950 and February 28, 2008 (including flash floods). However, not all of these events were identified in this table due to a lack of detail and /or their minor impact upon the County.*

Note (2): *Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.*

AHPS *Advanced Hydrologic Prediction Service*
CNY *Central New York*
DR *Federal Disaster Declaration*
FEMA *Federal Emergency Management Agency*
HPC *Hydrometeorological Prediction Center*
K *Thousand ($)*
M *Million ($)*
NCDC *National Climate Data Center*
NOAA *National Oceanic Atmospheric Administration*
NWS *National Weather Service*
NYSC *New York State Climate Office*
NYSDPC *New York State Disaster Preparedness Commission*
NYSEMO *New York State Emergency Management Office*
SHELDUS *Spatial Hazard Events and Losses Database for the U.S.*
USGS *U.S. Geological Survey*
WRIR *Water Resources Investigation Report*

According to the CRREL database, ice jam incidences in Onondaga County are not common in comparison to many other counties of the State (Ice Engineering Research Group, Date Unknown). Figure E-28 identifies the approximate location of where all ice jams have formed throughout the County between 1936 and 2007.

Figure E-28. Onondaga County Ice Jam Events



Source: Ice Engineering Research Group, Date Unknown.

Based on review of all available sources, Table E.16 lists seven ice jam events that have occurred in Onondaga County between 1936 and 2007. Information regarding losses associated with these reported ice jams was unavailable or limited.

Table E.16 Ice Jam Events in Onondaga County between 1941 and 2004

Event Date	River / Stream	Location	Description	Source(s)
March 19, 1941	Limestone Creek	Fayetteville	Gage height of 4.48 feet, affected by backwater from ice, reported at USGS gage Limestone Creek at Fayetteville, on March 19, 1941. Not maximum gage height for year. Both banks are high and not subject to overflow.	CRREL
March 16, 1948	Limestone Creek	Fayetteville	Maximum annual gage height of 5.92 feet, affected by backwater from ice, reported at USGS gage Limestone	CRREL

Event Date	River / Stream	Location	Description	Source(s)
			Creek near Fayetteville, on March 16, 1948. Both banks were high and subject to overflow.	
March 20, 1948	Onondaga Creek	Syracuse	Maximum annual gage height of 5.93 feet, with ice effect of 0.38 feet, reported at USGS Onondaga Creek at Syracuse, on March 17, 1948.	CRREL
February 28, 1962	Butternut Creek	Jamesville	An ice jam caused the maximum annual gage height of 7.51 ft on Butternut Creek at Jamesville, NY on Feb. 28, 1962. The associated discharge was 120 cfs.	CRREL
January 1, 1966	Hemlock Creek	Nedrow	At Hemlock Creek at Nedrow, New York the ice jam was broken up by dynamiting before serious flooding occurred.	CRREL
January 2, 1979	Butternut Creek	Jamesville	The USGS reported backwater from ice and/or sluggish intakes on the Butternut Creek near Jamesville, NY on January 2, 1979. The water discharge was 772 cubic feet per second. The gage height was 7.69 ft.	CRREL
January 20, 2004	Seneca River	Jacks Reef	The NY State Emergency Management Office reported on Jan. 20 that there is an ice jam near Jacks Reef, NY (on the border of Onondaga and Cayuga counties) on the Seneca River that has raised the level at the Port Byron gauge. The water level at the Baldwinsville dam is down indicating a constriction up stream (near Jacks Reef).	CRREL

Further descriptions of select flood events that have impacted Onondaga County are provided below with details regarding their impact (where available). These descriptions are provided to give the reader a context of the flood events that have affected the County and to assist local officials in locating event-specific data for their municipalities based on the time and proximity of these events. Flood impacts associated with hurricanes, tropical storms or Nor'Easters, are discussed in this profile and are also mentioned in their designated hazard profiles (Section E.2.1 Severe Storm and Section E.2.2 Severe Winter Storm).

Monetary figures within the event descriptions were U.S. Dollar (USD) figures calculated during or within the approximate time of the event (unless present day recalculations were made by the sources reviewed). If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

June 18, 1922: A cloudburst of heavy rain impacted the City of Syracuse and neighboring towns, resulting in the tying up of railroads, paralyzing the local trolley and telephone services, and the flooding low-lying areas. According to the NWS, the downpour from this even broke all previous records. In a 90-minute span, the heavy rains brought great damage to the City of Syracuse (New York Times, 1922).

A dozen streams in Syracuse, within the vicinity of Syracuse University, poured rushing water in the New York Central tunnel, where a train was stalled from a previous flood the week before. The tunnel was filled to a new high water mark and all trains were routed over the old West Shore tracks (New York Times, 1922).

Unofficial estimates of property damage in Syracuse alone were nearly $800,000. Overbank flooding of one brook in Syracuse inundated an area containing 12 blocks, toppled two houses from their foundations, causing over $100,000 in damages. Two families were rescued during the flood's peak. Four women and three children climbed out of windows of their home, into boats piloted by fireman. Two more women and a child were rescued from another home. For the first time in history, the downstream business district of Syracuse was flooded, causing damage to several factories. The Franklin Automobile Factory suffered an estimated $200,000 in damages. Trains on the Lackawanna Railroad were held up for five hours by a 200-foot washout (New York Times, 1922).

May 18-20, 1969: During this time period, very heavy rains affected central New York State (Cayuga and Onondaga Counties) and the southwestern Adirondacks. Rain fall totals ranged from 3.5 inches to 6.5 inches. Due to a large part of the affected area being rural, most of the damage was done to highways, bridges and farmland (Robison, 1973).

In the City of Syracuse, total rainfall between May 19th and 20th measured 3.13 inches. The heavy rain caused the Ley Creek to overflow, flooding city streets, low-lying areas and basements. One furniture store in the City reported $100,000 in damages. Wellington Road and the New York State Thruway in the City of Syracuse were entirely inundated from this event. In the Town of Skaneateles, commercial establishments suffered thousands of dollars in damages when their basements flooded. Many businesses suffered serious losses in merchandise when the water rose in their basements, between seven and eight feet. The Village of Liverpool and the Hamlet of Mattydale were hit hard, with four to five feet of water in basements (Robison, 1973). Total damages throughout Onondaga County were not disclosed in the materials reviewed to develop this plan.

June 20-25, 1972 (Remnants of Tropical Storm Agnes) (FEMA DR-338): Tropical Storm Agnes dropped as much as 19 inches of rain as it left the Gulf of Mexico as a hurricane. Agnes downgraded to a tropical storm as it hit every state from Florida to New York State. More than 210,000 people were forced to evacuate their homes. The storm broke long-standing flood records in six states, resulting in $3.2 billion in property damage and 122 fatalities. Tropical Storm Agnes remained the costliest disaster until Hurricane Andrew (1992). Pennsylvania and New York State experienced the greatest rainfall totals and suffered the most losses from this storm (NOAA, 1997; USACE, 1973). New York State experienced 24 deaths and approximately $703 million in damages as a result of flooding from this storm (NYSDPC, 2008; Middle Atlantic River Forecast Center [MARFC], 2006).

In Onondaga County, Tropical Storm Agnes was documented as one of the major flood events of the County. The County experienced approximately $1.6 million in property and crop damages (Hazards & Vulnerability Research Institute, 2007). According to FEMA FIS's for each municipality of Onondaga County, most experienced widespread flooding of varying degrees from this event. Record peak streamflows within Onondaga County for the year of 1972 occurred during this event along Seneca River, Onondaga Creek, Ninemile Creek and Limestone Creek (USGS, 2008). Onondaga Creek at the City of Syracuse reached its second highest historical flood stage at 6.2 feet (1.2 feet above 5-foot flood stage) (AHPS, 2007). Onondaga Lake rose to 370.8 feet, causing nearly $150,000 in damages to the Town of Salina (which is 40-percent of the estimated $375,000 in damages that occurred within the surrounding communities of Onondaga Lake) (FEMA, 1982).

This storm resulted in a FEMA Disaster Declaration (FEMA DR-338) for New York State on June 23, 1972. Through this declaration, the following 26 counties were declared eligible for Federal and State disaster funds: Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Livingston, Madison, Monroe,

Oneida, Onondaga, Ontario, Orange, Oswego, Rockland, Schuyler, Seneca, Steuben, Tioga, Tompkins, Ulster, Wayne, Westchester, Wyoming, Yates (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

July 3-5, 1974 (FEMA DR-447): A wide region of central and eastern New York State suffered from a storm system moving northward across the State, causing showers and thunderstorms in the Oswego-Syracuse-Cobleskill region. Precipitation totals ranged between 3.8 and 5.0 inches throughout the State. The City of Syracuse experienced over 4.5 inches of rain (Robison et al., 1976).

In New York State, Governor Wilson declared seven counties a major disaster area, including Chenango, Herkimer, Oneida, Onondaga, Oswego, Otsego and Schoharie Counties. The Governor applied to the Federal Government for financial aid under provisions of U.S. Public Law 93-228. Preliminary estimates of overall damage in New York State to private property, public property, and agricultural land and crops, as used in the application for aid, was approximately $12.6 million (Robison et al., 1976).

Onondaga County experienced the most damage over any other county in the State, estimated at $7.2 million. The County suffered $6.5 million in damages to private property; $500,000 to public property; and $200,000 to agricultural land (Robison et al., 1976). Peak streamflows within Onondaga County for the year of 1974 occurred during this event along Harbor Brook, Onondaga Creek, Ley Creek, Ninemile Creek, Meadow Brook, Butternut Creek and Limestone Creek (USGS, 2008). Onondaga Creek at the City of Syracuse reached its highest historical flood stage at 6.48 feet (1.48 feet above 5-foot flood stage) (AHPS, 2007). In the City of Syracuse, Harbor Brook overflowed its banks, forcing more than 200 persons to evacuate their homes on the south side of the City. Underpasses were flooded and houses along Meadow Brook had water in their cellars. Many streets in the City were flooded with water 1.5 feet deep. Almost all the entrance and exit ramps on Route 81 were blocked by water. Roads in the Towns of Camillus, Solvay, and Cicero were flooded; with some being impassable. Bloody Brook in the Town of Liverpool overflowed and flooded a drive-in theatre with more than 4 feet of water (Robison et al., 1976).

This storm resulted in a FEMA Disaster Declaration (FEMA DR-447) for New York State on July 23, 1974. Through this declaration, the following 4 counties were declared eligible for Federal and State disaster funds: Herkimer, Oneida, Onondaga, Oswego (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

September 22-27, 1975 (Remnants of Hurricane Eloise) (FEMA DR-487): Hurricane Eloise caused flooding throughout the eastern U.S and in Puerto Rico. This storm made landfall in southeastern Louisiana and then followed a northeasterly path from Mississippi and Alabama and further along the East Coast, up through New York State. Total storm damages were estimated at $415 million. Counties in New York, Pennsylvania, Maryland, Florida, and Alabama were declared disaster areas (Perry et al., 2005).

Total losses in New York State are unknown; however, it was reported that Onondaga County experienced approximately $6.3 million in property damages from this event (Hazards & Vulnerability Research Institute, 2007). Rain totals within the vicinity of Onondaga County totaled between 3 and 5 inches (Roth, 2006). Peak streamflows within Onondaga County for the year of 1975 occurred during this event along Seneca River, Harbor Brook, Ninemile Creek, Ley Creek, Limestone Creek, Butternut Creek, Meadow Brook and Onondaga Creek (USGS, 2008).

This storm resulted in a FEMA Disaster Declaration (FEMA DR-487) for New York State on October 2, 1975. Through this declaration, the following 17 counties were declared eligible for Federal and State disaster funds: Allegany, Broome, Cayuga, Chemung, Cortland, Madison, Onondaga, Oswego, Putnam, Queens, Richmond, Rockland, Steuben, Tioga, Tompkins, Westchester, Yates (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008).

Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

January 18-20, 1996 (FEMA DR-1095): A strong storm produced significant precipitation between January 18th and 20th. Combined with unseasonably warm temperatures, causing rapid snowmelt, extensive flooding occurred throughout New York State. The storm and flooding claimed ten lives, stranded hundreds of people, destroyed or damaged thousands of homes and businesses, and closed hundreds of roads. The areas within and surrounding the Catskill Mountains were severely affected by this event. More than 4.5 inches of rain fell on at least 45 inches of melting snow in the Catskill Mountain region and caused major flooding throughout the southeastern section of the State. New York State experienced between $100 and $160 million in property damages from this event (Lumia, 1998; NYSDPC, 2008).

Onondaga County received between 1.0 and 2.0 inches of rain during this event, resulting in widespread flooding along the major rivers and small streams of the County. Onondaga County experienced approximately $7.6 million in flood damages from this event (NCDC, 2008; Hazards & Vulnerability Research Institute, 2007).

This storm resulted in a FEMA Disaster Declaration (FEMA DR-1095) on January 24, 1996. Through this declaration, the following 41 counties were declared eligible for Federal and State disaster funds: Albany, Allegany, Broome, Cattaraugus, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Essex, Franklin, Greene, Herkimer, Jefferson, Lewis, Livingston, Madison, Montgomery, Onondaga, Ontario, Orange, Otsego, Putnam, Rensselaer, St. Lawrence, Saratoga, Schenectady, Schoharie, Schuyler, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wyoming and Yates (NYSEMO, 2006; FEMA, 2008; NYSDPC, 2008). Disaster assistance for all counties affected in the State totaled approximately $16.7 million in individual assistance and $103.7 million in public assistance (1997 USD). Onondaga County received $1.1 million in public assistance (1997 USD) (Lumia, 1998).

May through September 2000 (FEMA DR-1335): Between May and September 2000, multiple severe storm events occurred throughout New York State resulting in significant flooding and over $34.6 million in damage throughout various New York State counties. In Onondaga County, NOAA-NCDC indicated that flooding during this time period particularly occurred as a result of heavy thunderstorms between June 21st and July 16th. On June 21st, heavy rains caused significant ponding of water on Park Street, McBride Street, and Burt Street in the City of Syracuse. Route 174 and the northbound lanes of Interstate 81 were closed for a short time. On July 16th, significant ponding of water was reported on roadways from the Town of Manlius to the Village of Fayetteville (NCDC, 2008). Total damages throughout Onondaga County were not disclosed in the materials reviewed to develop this plan.

These storms resulted in a FEMA Declaration Disaster (FEMA DR-1335) on July 21, 2000. Through this declaration, the following 27 counties were declared eligible for Federal and State disaster funds: Albany, Allegany, Cattaraugus, Columbia, Dutchess, Erie, Essex, Greene, Herkimer, Lewis, Livingston, Madison, Montgomery, Niagara, Oneida, Onondaga, Orleans, Otsego, Rensselaer, Schenectady, Schoharie, Steuben, Sullivan, Tioga, Tompkins, Ulster and Yates (FEMA, 2003). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

June 14, 2002: Heavy thunderstorm rains caused flash flooding across northern Onondaga County, with the worst flooding occurring in the Village of Baldwinsville. Tannery Creek overflowed its banks, resulting in the declaration of a state of emergency that closed all streets of the Village of Baldwinsville. Water in the streets was two to three feet deep, flooding an estimated 80 homes. A bowling alley in the Village suffered major water damage. The bowling alley was recently renovated and worth more than one million dollars. This event resulted in the evacuation of an eight block area within the Village of Baldwinsville. The area was bordered by Route

31, Virginia Street, East Oneida Street, and Mechanic Street. The Elden elementary school closed as a result of a leaky roof and high water (NCDC, 2008).

Flooding was also reported in the Towns of Lysander, Clay, and Cicero and the Villages of Liverpool and North Syracuse. Route 370 was closed in the Town of Lysander due to high water. In the Town of Clay, a plugged catch basin flooded a ballpark and Caughdenoy Road. Nearby streets had as much as 2 feet of water on them. Also in the Town of Clay, high water was reported on many roads including Route 31 and in Cold Springs. In the Village of Liverpool, the basement of Mother's Restaurant flooded. In North Syracuse, many roads had water on them. In the Town of Cicero, East Gillette Road, Hogan Road Beach Road and Thompson Road were inundated by floodwaters. Onondaga County experienced approximately $2 million in flood damages from this event (NCDC, 2008; Hazards & Vulnerability Research Institute, 2007).

August 13 – September 16, 2004 (FEMA DR-1564): A series of storms occurred between August and September 2004 within New York State, resulting in approximately $18 million in eligible damages (NYSDPC, 2008). NOAA-NCDC indicated that flooding during this time period in Onondaga County particularly occurred as a result of heavy thunderstorms August 30-31, 2004. Roads were either washed out, closed or impassable in the Towns of Pompey, Lafeyette and Manlius.

In the Town of Manlius, a golf course flooded and a bridge was washed out and significant flooding was reported within the vicinity of Limestone Creek. This event was reported as the worst flooding in 20 years within the Town. In the Village of Fayetteville, an animal hospital was evacuated and many basements were flooded. According to the Post-Standard, Butternut Creek in the Town of Dewitt, Limestone Creek in the Village of Fayetteville and the southern section of Onondaga Creek were flooded. In the Town of Otisco, the Town supervisor declared a state of emergency after the heavy rain made several roads impassable and flooded 10 to 15 basements. The biggest flooding occurred on Barker Street, Case Hill and Otisco Valley roads, causing most the road shoulders to be washed away. In the Town of Tully, low-lying sections of Woodmancy Road were closed indefinitely after water eroded the shoulders to the point where the road became too narrow. In the Town of Lafeyette, nearly 200 feet of Tully Farm Road was under water (McKeever, 2004). Rainfall totals in Onondaga County ranged between 2.2 inches in the Town of Camillus and 4.87 inches in the Town of Tully (NCDC, 2008; NWS, 2004). Onondaga County experienced approximately $2 million in flood damages from this event (NCDC, 2008).

These storms resulted in a FEMA Declaration Disaster (FEMA DR-1564) on October 1, 2004. Through this declaration, the following 17 counties were declared eligible for Federal and State disaster funds: Allegany, Broome, Cattaraugus, Columbia, Delaware, Madison, Monroe, Niagara, Oneida, Onondaga, Orange, Orleans, Steuben, Sullivan, Ulster, Warren, and Wayne Counties (FEMA, 2005). As of December 10, 2004, more than $1.8 million in disaster aid had been approved for the State (FEMA, 2004). Disaster assistance for all counties affected in the State was not disclosed in the materials reviewed to develop this plan.

April 2-4, 2005 (FEMA DR-1589): A slow moving storm moved up through the Appalachians and into the northeast U.S. The heavy rainfall from this event produced flooding throughout New York State, New Jersey and Pennsylvania (NCDC, 2005). Prior to this storm, the rivers and streams in the area had high flow-rates due to a previous rainstorm on March 28th and snowmelt; therefore, flooding increased substantially and created additional damage as a result of this April storm. New York State experienced approximately $66.2 million in damages from this event (NYSDPC, 2008).

In Onondaga County, there were some road closures and flooded basements in the Towns of DeWitt, Manlius, and Lafayette and the Village of East Syracuse. Streams and creeks overflowed their banks, including Butternut Creek (NCDC, 2008). Onondaga Creek at the City of Syracuse reached its 4th highest flood stage at 5.16 feet (.16 feet above 5-foot flood stage) (AHPS, 2007). Peak streamflows within Onondaga County for the year of

2005 occurred during this event along Seneca River, Onondaga Creek, Harbor Creek, Ninemile Creek and Butternut Creek (USGS, 2008). Onondaga County experienced approximately $100,000 in flood damages from this event (NCDC, 2008; Hazards & Vulnerability Research Institute, 2007)

This storm resulted in a FEMA Disaster Declaration (DR-1589) on April 19, 2005. Through this declaration, the following 20 counties were declared eligible for Federal and State disaster funds: Broome, Cayuga, Chautauqua, Chenango, Columbia, Cortland, Delaware, Greene, Madison, Montgomery, Niagara, Orange, Otsego, Putnam, Rensselaer, Schoharie, Sullivan, Tioga, Ulster and Westchester (NYSDPC, 2008; FEMA, 2008). Although Onondaga County suffered flood damages during this storm, it was not declared a disaster area by FEMA.

June 25 – July 12, 2006 (FEMA DR-1650): This severe storm event resulted in a significant flooding that affected much of the Mid-Atlantic region. The flooding was widespread, affecting numerous rivers, lakes and communities from North Carolina to New York State. Rain totals throughout the eastern U.S. ranged from 2 to 17 inches, particularly between June 27th and 29th, with the largest accumulations falling in Maryland, Pennsylvania and New York State (Feuer, 2006). Overall, the storm resulted in over 16 deaths and millions of dollars in damages throughout the affected states (NWS, 2006). Some sources indicated that this flooding event was the largest and most costly natural disaster that New York State has encountered since Hurricane Agnes in 1972. The NYS HMP indicated that the counties affected throughout the State experienced approximately $246.3 million in damages during this flood (NYSDPC, 2008).

In Onondaga County, precipitation totals from June 25th through June 28th averaged between 0 and 6 inches of rain, with largest accumulations generated in the southeastern portion of the County (NWS, 2006). Over 4.29 inches of rain fell at the Hancock Airport in Syracuse, shattering a 31-year-old rainfall record of 3.9 inches on July 3, 1974 (Goldberg and Greene, 2006).

On July 12th, NOAA-NCDC reported that streams and creeks overflowed their banks in the Village of Liverpool resulting in standing water along many roadways in the Village and surrounding areas. Several roads were impassable and State Route 370 was closed. Volmer Creek overflowed its banks, flooding Thompson Road. The water rose into the first floor of several homes (NCDC, 2008). Flash flooding was also reported throughout the City of Syracuse, and the Village of North Syracuse (Figure E-29) and the Village of Baldwinsville (Figure E-30) during this event (Syarcuse.com, 2008).

Figure E-29. 207 Palmer Drive, North Syracuse.

Source: Syracuse.com, 2006
Note: Photograph taken by Chrissie Cowan

Figure E-30. Floral Park Mobile Home Park, Baldwinsville

Source: Syracuse.com, 2006
Note: Photograph taken by Jim Commentucci

In the Hamlet of Mattydale, the Hollywood Theatre was flooded out. Estimated repairs of the theatre averaged between $500 and $1,000 (Goldberg and Greene, 2006). The storm overwhelmed Onondaga County's sewer system, sending raw sewage into Onondaga Lake after the Metropolitan Sewage Treatment Plant exceeded its capacity (Baker et al., 2006). Overall, Onondaga County experienced approximately $29,000 in total property damages from this event (NCDC, 2008; Hazards & Vulnerability Research Institute, 2007).

This event resulted in a FEMA Emergency Declaration (FEMA EM-1650) on July 1, 2006. Through this declaration, the following 12 Counties were declared eligible for Federal and State disaster funds: Broome, Chenango, Delaware, Herkimer, Montgomery, Oneida, Orange, Otsego, Schoharie, Sullivan, Tioga, and Ulster Counties (FEMA, 2008). Although Onondaga County was not declared as an official disaster area under this declaration, all counties of the State were eligible to apply for federal assistance under the Hazard Mitigation Grant Program. This program provides assistance to State and local governments and certain private nonprofit organizations for actions taken to prevent or reduce long term risk to life and property from natural hazards. As of December 29, 2006, FEMA indicated that nearly $227 million in disaster aid was made available to all declared counties as result of this event (FEMA, 2008). Disaster assistance for Onondaga County affected in the State was not disclosed in the materials reviewed to develop this plan.

E.2.4 Ground Failure

Many sources provided historical information regarding ground failures events in Onondaga County. Ground failure events within the County occurred in the Tully Valley area in the form of a landslide or land subsidence. According to a landslide inventory prepared by the USGS and Department of Geography at the University of Heidelberg, landslide history of the Tully Valley dates back 14,000 years ago. This inventory indicates that 73 total landslides have occurred, of which 22-percent (16) are classified as active/recently-active (present to 200 years), 52-percent (38) fall in the category old (200 to 10,000 years), and 26-percent (19) are termed ancient (10,000 to 40,000 years) (Jäger and Wieczorek, 2001; Tamulonis, 2007). The approximate location of these 73 landslide events was not available in the documents reviewed for this plan.

Most landslide events within the Tully Valley area were an immediate occurrence with little to no warning. However, land subsidence within the County occurred over a longer period of time. The approximate date or period of occurrence of many landslides or land subsidence events is unknown. Additionally, many landslide or land subsidence events may have occurred in remote areas causing their existence or impact to go unnoticed. Therefore, this hazard profile may not identify all ground failure events that have impacted the County.

Based on all sources researched, major ground failure events or periods have impacted Onondaga County are summarized in Table E.17. Not all sources may have been identified or researched. Hence, Table E.17 many not include all events that occurred throughout the region. Monetary losses associated with each incident are scarce.

Table E.17 Ground Failure Events in Onondaga County

Event Date / Name	Location	Losses / Impact	Source(s)
Webster Road Landslides (between 6,100 and 9,870 years ago)	Tully Valley	Two landslides occurred at the same location approximately 300 feet north of April 1993 Landslide. The scarp (steep slope) of the Webster Road landslide is 40 to 50 feet high and about 1,200 feet long. Impacts of this landslide are unknown. Studies indicate that this landslide most likely occurred as a result of greater-then-normal precipitation patterns, such as a storm or snowmelt.	Kappel et al., Pair et al. (USGS)
First Reported Mudboil October 1899	Tully Valley	Report of "miniature volcano" with "quicksand and water" on Otisco Rd. crossing of Onondaga Creek (near Rattlesnake Gulf).	Kappel et al.
Landslide 1921	Tully Valley	Large man-made landslide within the Tully gravel pit along Tully Farms Road, on the west side of the Tully Moraine. The over-steepened slope within the pit failed. Several workers were injured and two were killed.	Kappel et al.
Mudboil Activity Late 1920's	Tully Valley	"Volcanoes" seen in King farm vicinity.	Kappel et al.
Sinkhole March 1949	Tully Valley	Sinkhole appears in east brine field.	Kappel et al.
Mudboil Activity 1936 - 1951	Tully Valley	Mudboil areas expanded rapidly; Onondaga Creek became turbid.	Kappel et al.
Mudboil 1952	Tully Valley	First mudboil occurrence found on Snavlin farm.	Kappel et al.
Sinkhole 1953	Tully Valley	Sinkhole appears in east brine field.	Kappel et al.
Sinkhole 1954	Tully Valley	Sinkhole appears in east brine field.	Kappel et al.
Mudboils 1955	Tully Valley	A New York State Department of Health stream survey notes "quicksand pits" near Onondaga Creek tributary T-21, South of Otisco Rd.	Kappel et al.
Mudboil 1958	Tully Valley	Second mudboil occurrence found on Snavlin farm.	Kappel et al.
Mudboil Activity Early 1960's	Tully Valley	Mudboil activity at Otisco Rd.	Kappel et al.
Sinkhole 1962	Tully Valley	Large sinkhole develops in west brine field.	Kappel et al.
Land Subsidence 1967	Tully Valley	Sun Pipeline exposed at Snavlin Farm (either by subsidence or stream erosion).	Kappel et al.
Mudboil / Subsidence 1972	Tully Valley	Mudboil/subsidence occurrences on Henderson land.	Kappel et al.

Event Date / Name	Location	Losses / Impact	Source(s)
Mudboils Late 1970's	Tully Valley (in the MDA)	First documented brackish mudboils appear in the MDA.	Kappel et al.
Sinkholes 1979	Tully Valley	Sinkhole appears near well in west brine field.	Kappel et al.
Mudboil Activity 1983 - 1987	Tully Valley	Significant increase in mudboil activity noted.	Kappel et al.
Land Subsidence 1989	Tully Valley	More than 9 feet of subsidence noted at former Sun Pipeline location since 1978.	Kappel et al.
Mudboil / Subsidence June 1991	Tully Valley	Otisco Road Bridge collapsed in response to mudboil-induced subsidence.	Kappel et al., Kappel and McPherson (USGS)
Landslide April 27, 1993	Tully Valley	The largest landslide in New York State since the early 1900's. It occurred on east-facing slope of Bare Mountain, between Nickols and Webster Roads. Three houses destroyed, four houses evacuated, 1,200 feet of Tully Farms Rd. covered with over 12 feet of mud and debris. The total volume of earth moved by the slide is estimated to be about 1.3 million cubic yards. Most residents were away from their homes at the time of the slide; there were no fatalities or serious injuries reported.	Kappel et al., NYSDPC, USGS, The Living Schoolbook
Landslide April 9, 2001	Town of Lafayette and Lysander	Closed one road in Town of Lysander.	NYSDPC
May 2002	Manlius	A landslide occurred at Limestone Creek in Manlius behind Suburban Park Apartments (also known as The Bluffs), just 1,000 feet below Edwards Falls. These apartments are currently located on the edge of a cliff. Homeowners at 8181 Bluffview (one of four condominiums on the bluff) have incurred approximately $100K in costs to date.	Footprint Press Inc.; Novek, 2009
Landslide Fall 2004	Tully Valley (near Rainbow Creek)	A 1,000-foot long section of hillside collapsed into the Rainbow Creek channel from the eroded toe of a steep hillside. On the opposite side of the stream channel, another shorter section of hillside also collapsed.	OLP
Landslide April 2005	Tully Valley (near Rattlesnake Gulf)	A 1,200-foot section of the hillside in the middle reach of Rattlesnake Gulf failed. As the hillside gave away, large masses of clay slid into the bedrock ravine, blocking the stream and causing massive amounts of sediment to flow downstream to Tully Farms Road. Several farm fields were inundated with water, sand and gravel deposits.	OLP

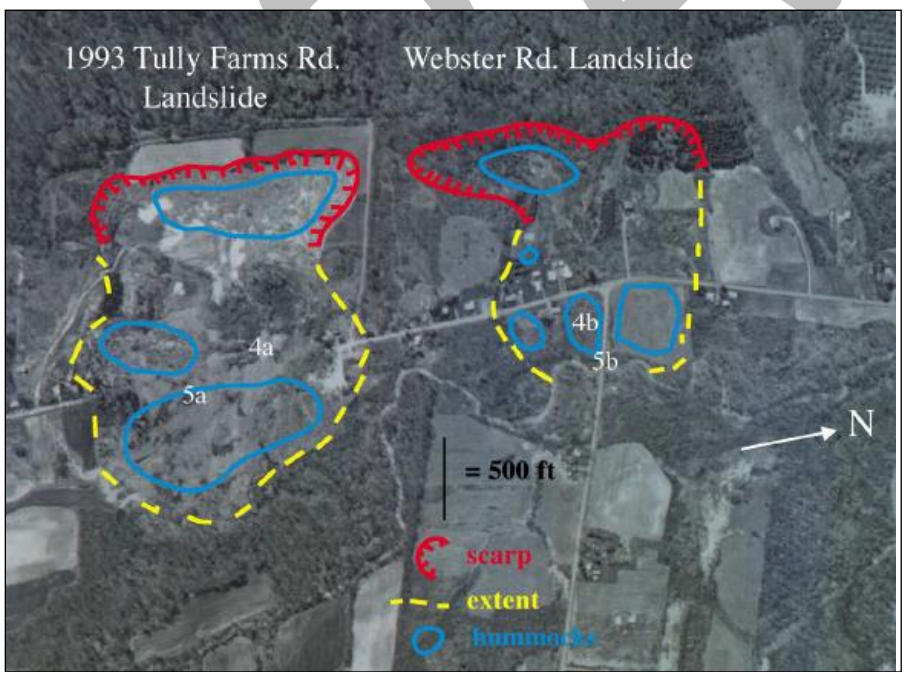
MDA *Mudboil/Depression Area*
NYSDPC *New York State Disaster Preparedness Commission*
OLP *Onondaga Lake Partnership*
USGS *U.S. Geological Survey*

Further descriptions of select ground failure events that have impacted Onondaga County are provided below with details regarding their impact (where available). As discussed earlier, land subsidence has generally occurred gradually over an extended period of time within the Tully Valley; therefore, information on a specific event or incident was scarce. Therefore, only major landslide events are mentioned below. These descriptions are provided to give the reader a context of the landslide events that have affected the County and to assist local officials in locating event-specific data for their municipalities based on the time and proximity of these events.

Webster Road Landslide: A paleo landslide, referred to as the "Webster Road Landslide", occurred over 6,100 years ago at the base of Bare Mountain in the Tully Valley area of Onondaga County. Based on a series of recent investigations, the geomorphology (geology and physical character) of the Webster Road landslide is strikingly similar to that of a 1993 landslide on Tully Farms Road, located 300-feet to the south (Figure E-31). The scarp of the Webster Road Landslide is between 40 and 50 feet high and about 1,200 feet in length, whereas the scarp of the Tully Farms Road landslide between 30 and 50 feet high and 1,400 feet in length. Another similarity is the topography— large, transported soil blocks, some of which had retained vegetation and trees, were found at the base of the slope and within the toe of the 1993 landslide and have weathered such that the topography now resembles an area of hummocky ground at the toe of the Webster Road slide. Thus, the 1993 Tully Farms Road Landslide and the Webster Road Landslide are approximately the same size and probably displaced the same volume of material from the lower slope of Bare Mountain (Pair and Kappel, 2001; Pair et al., 2000).

The age of the Webster Road Landslide was estimated from radiocarbon dating of peat-like organic and woody material found directly beneath mudflow deposits at several locations within the toe of the Webster Road landslide. Radiocarbon ages on these organics indicate that the land surface and associated vegetation were buried by a mudflow approximately 6,100 years ago (Pair and Kappel, 2001). This landslide is further depicted in Figure E-31 under the 1993 Tully Farms Road description.

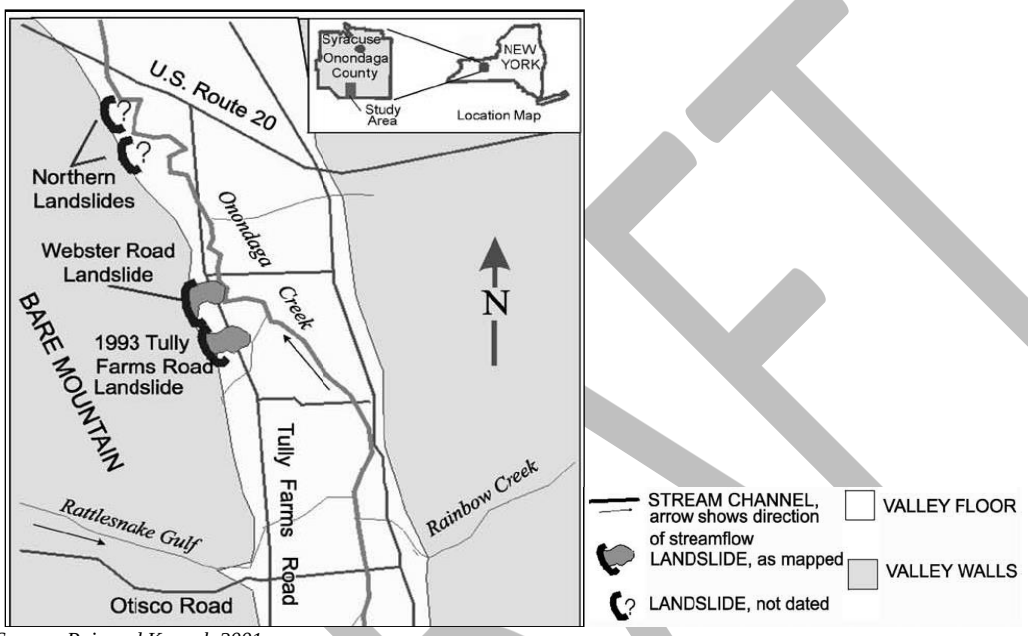
Figure E-31. Aerial View of Webster Road and 1993 Tully Farms Road Landslides



Source: Pair and Kappel, 2001
Note: Aerial view of the 1993 Tully Farms Road landslide taken May 1, 1993, 4 days after the slide occurred, and approximate location of Webster Road landslide to the north. Dashed lines indicate probable extent of the Webster Road landslide beyond Onondaga Creek. Numbers reference figures located in the Pair / Kappel report.

April 27, 1993 (Tully Farms Road Landslide): New York State's largest landslide in the past 75 years occurred along the foot of Bare Mountain in the Town of LaFayette in Onondaga County (Figures **Error! Reference source not found.**and **Error! Reference source not found.**). A complex earth-slump/mudflow moved from the lower slope of Bare Mountain onto the valley floor, where it affected nearly 20 hectares of land, destroyed three houses, necessitated the evacuation of several others, and covered 365 meters of Tully Farms Road with as much as 5 meters of remolded clay. Three individuals were rescued from their home by helicopter from the middle of the landslide area. Fifteen homes lost their drinking water supply as a result of changes in local groundwater flow patterns (Pair and Kappel, 2001).

Figure E-32. Four Landslide Locations in the Tully Valley



Source: Pair and Kappel, 2001

Figure E-33. Photograph of Tully Farm Road Landslide

Source: Jäger and Wieczorek, 2001

Initial efforts were directed toward stabilizing the landslide and draining the water discharging from fresh and brackish springs at the base of the main scarp area. Remediation activities (construction of diversion ditches and road clearing) were funded and directed by the NRCS through their Watershed Protection Program. The Onondaga County Department of Highways constructed all remedial works. Media coverage continued over the ensuing weeks, and several town meetings were held to keep the affected residents informed as to the stability of the landslide and vicinity, how soon homeowners could safely return, when Tully Farms Road would be reopened, and when electric and telephone utilities would be restored (Pair and Kappel, 2001).

Two weeks after the slide, the area was considered stable enough to allow most homeowners to return. However, Tully Farms Road remained blocked for several months because of the high water content of the remolded clay. Utility lines were redirected from either end of the slide but still do not pass through the slide area. A local citizens group, the Tully Valley Conservation Association, quickly formed to secure financial aid because the economic losses were not large enough to warrant financial aid under federal or state disaster formulas. The citizens met with a Deputy White House Secretary who assembled representatives from several federal agencies. As a result of this meeting, affected landowners received small loans and grants to assist in either rebuilding or relocating. Within about a year, residents whose houses had been destroyed or severely damaged had relocated.

About 10 landowners within and adjacent to the slide area received a property-tax reduction from the Town of LaFayette as a means of providing further economic relief. Soon after the 1993 slide occurred, 15 households north of the 1993 landslide lost their water supply from springs within the scarp of the Webster Road landslide area. These ‘‘reliable’’ springs remained dry during the summer of 1993, which forced the residents to obtain water from other sources. At present, the springs flow from the late fall through spring but are dry the remainder of the year. The Town of Lafayette has sought alternative sources of water for these residents but found that connection to the county water-authority system or development of nearby water sources for a small community system would be too costly. Efforts to supply water for these residents continue, but the costs associated with a community-based water supply remain prohibitive (Pair and Kappel, 2001).

In the seven years following the 1993 slide, several studies were conducted by federal and state environmental agencies and by local universities to identify the cause of the 1993 landslide; investigate the history of landslides within the area and assess the potential for future landslides (Pair and Kappel, 2001). These studies identified several geologic, climatologic, and hydrologic factors as probable causes of the 1993 Tully Farms Road landslide, including:

- *Interbeds of clay within the sand and gravel deposit at the base of the hillside*: The fresh scarp face of the 1993 landslide reveals interbeds of clay within the sand and gravel deposit. These clay layers could have trapped groundwater in the coarse sand and gravel, and when the artesian pressure exceeded the weight of the overlying soil, this may have led to soil movement. Also, below the clay and sand and gravel interbeds is a thick lacustrine unit with a stiff upper part and an extremely soft middle that possibly created a "slip surface."
- *A dense till layer below the clay, sand, and gravel*: This unit confines brackish water in the bedrock aquifer and separates it from freshwater in the upper aquifer. Pressure from the confined brackish water may have increased the artesian pressure in the overlying glacial and colluvial sediments.
- *Instability of the lower hillside in the Tully Farms Road landslide area before 1993*: In 1990, the New York State Department of Environmental Conservation noted ground cracks, earth bulging, and slumping on the lower hillside. The basement wall of a house along Tully Farms Road was slowly failing in 1992, apparently from the increasing soil pressure on the wall facing Bare Mountain.
- *Greater-than-normal snowfall in the winter of 1992-93, followed by the blizzard of March 1993*: Snow melt increased the water content of near-surface soils and increased the artesian pressures in the confined interbed unit. This condition, followed by heavy rainfall in April, increased the already greater-than-normal surface-water and groundwater flow throughout the Tully Valley and increased pore-water pressures within the interbed units along the base of Bare Mountain. This pressure, coupled with the unstable soil conditions along the lower slope, resulted in the April 27, 1993 landslide (Pair et. al., 2000; Pair and Kappel, 2001).

Scientists have concluded that the 1993 slide was the result of a combination of natural processes. Despite newspaper accounts speculating otherwise, no human activity, such as land-use changes (the backscarp of the slide was within a cultivated area at the base of a forested hillside) or brine field operations at the southern end of the valley, appears to have played a role (Pair and Kappel, 2001). Monetary losses in the Tully Valley associated with this landslide were not available in the materials reviewed for this plan.

May 2002: Four attached condominiums along Bluffview in the Town of Manlius (The Bluffs) located close to the edge of an approximately 80-foot high bluff overlooking Limestone Creek, experienced a landslide/ground failure in May of 2002. In May 2002, an approximate 40-foot wide area of the bluff slid into Limestone Creek carrying the ground surrounding the south-side of condominium unit 8181. The earth slope failed after a heavy rain event. According to an Engineering Feasibility Study conducted, if repair is not done, the building's structure will eventually suffer. A remedy suggested in the study is to strengthen the ground in order to stabilize the slope utilizing soil nails (steel bars) and heavy steel cable netting. At the time this study was published, the estimated cost of the project was approximately $350,000 and $440,000 (2005 dollars) (John P. Stopen Engineering Partnership, 2005). Homeowners are still living at 8181 Bluffview and are concerned for their safety and the structural soundness of their home. They have tried to mitigate the ground failure behind their home and have incurred tremendous costs in doing so (over $100K) (Novek, 2009). **Error! Reference source not found.** and Figure E-35 illustrate the slope behind 8181 Bluffview.

Figure E-34. Aerial Photograph of The Bluffs on October 26, 2006.

Source: Novek, 2009

Figure E-35. The Rear of 8181 Bluffview Drive in Manlius on April 30, 2007

Source: Novek, 2009

Notes: This photograph was taken prior to a jute mat placed on the soil behind this unit to mitigate the eroding soil.

Fall 2004 through Spring 2005 (Landslides): The southern Onondaga Valley experienced two landslides in 2004 and 2005. These landslides occurred in isolated locations, therefore few people know of their existence. Residents became aware of these events because nearby streams carried massive amounts of sediment down to the valley floor blocking bridge openings and flooding adjacent farm fields (OLP, 2005-2006).

During the fall of 2004, excess rainfall and runoff from several tropical storms resulted in over-saturated soil conditions on the upper slopes of Rainbow Creek, between Interstate-81 and U.S. Route 11A in the Tully Valley. A 1,000-foot long section of hillside collapsed into the creek channel from the eroded toe of a steep hillside. On the opposite side of the stream channel, another shorter section of hillside also collapsed. Most of the hillside was sand and gravel, and much of this sediment traveled rapidly downstream and eventually clogged two 6-foot culverts under Route 11A. Hundreds of truckloads of gravel had to be removed from the channel to allow the culverts to function properly and to prevent flooding of nearby property (OLP, 2005-2006).

In April 2005, rapid snowmelt, followed by several days of persistent rain caused flooding throughout central and southern New York State. While the volume of flow measured in Onondaga Creek was not as great as that measured the previous fall, there was enough water to cause a 1,200-foot section of the hillside in the middle reach of Rattlesnake Gulf to fail. Unlike the Creek Rainbow Landslide, the Rattlesnake soils consist almost entirely clay and silt over bedrock. There were a number of streams flowing off the upper slopes into the landslide area, saturating the entire soil column. As the hillside gave way, large masses of clay, the size of homes slid into the bedrock ravine, blocking the stream and causing massive amounts of sediment to flow downstream to Tully Farms Road. A large buildup of sand and gravel was found at the Tully Farms Road bridge crossing of Rattlesnake Gulf. These sediments were removed from the area around the bridge, but downstream, the sediment forced the stream to abandon its channel and inundate several farm fields with water, sand and gravel deposits. Figure E-36 illustrates damage from the Rattlesnake Gulf landslide, showing blocks of clay (not bedrock) that slid into the channel of the Rattlesnake Creek, partially blocking the flow of the stream (OLP, 2005-2006).

Rattlesnake Gulf usually flows turbid each spring due to small slope failures. Review of aerial photography for the last 30 years indicates that this area has slowly been failing, probably due to a number of springs which saturate the hillside, but the spring runoff in 2005 probably caused the massive failure (The Upstate Freshwater Institute, 2008).

Figure E-36. Rattlesnake Gulf Landslide

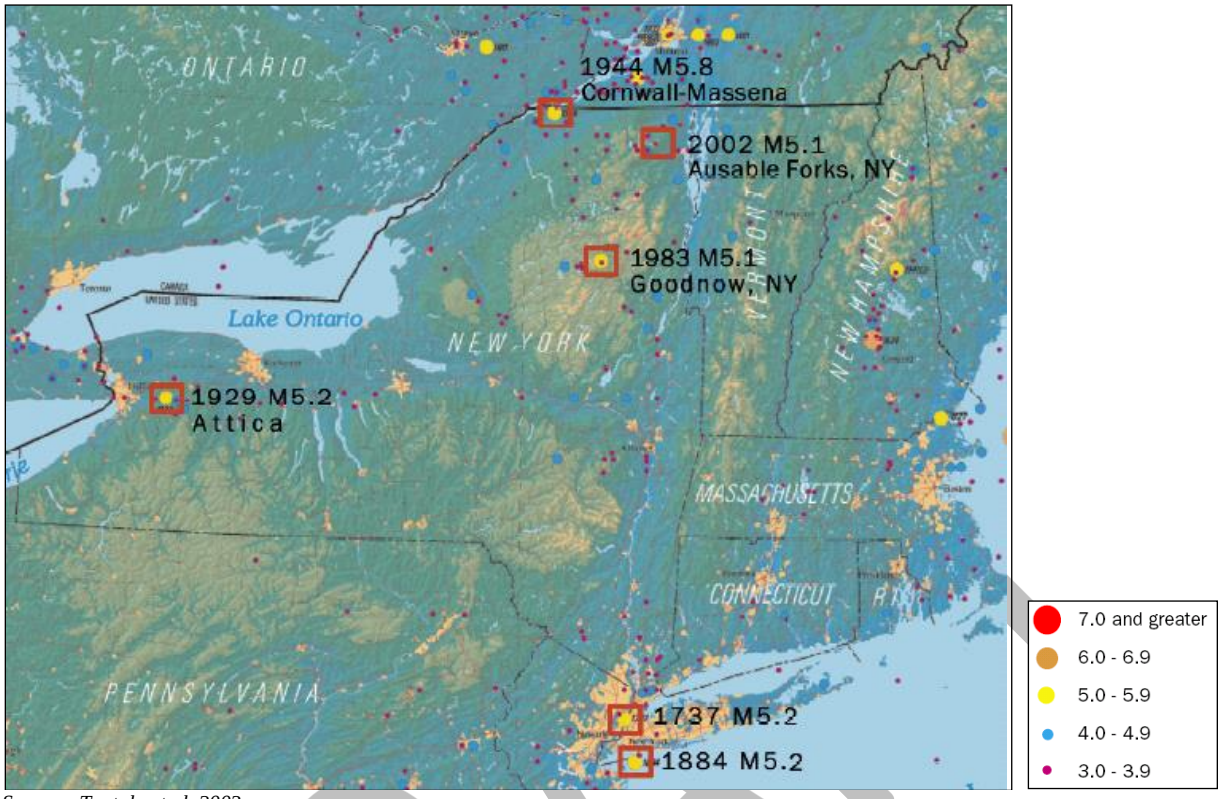
Source: OLP, 2005-2006

E.2.5 Earthquake

Many sources provided historical information regarding previous occurrences and losses associated with earthquakes throughout New York and Onondaga County. Therefore, with so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the sources.

Based on seismic records, thousands of earthquakes with magnitudes larger than 2.0, have occurred in New York State over the past few centuries. Between 1730 and 1986, more than 400 earthquakes with a magnitude of greater than 2.0 are on record in New York State, but many more have occurred unrecorded (Figure E-37) (Tantala et al., 2003).

Figure E-37. Significant Seismic Events in the Northeast U.S., 1730-1986



Source: Tantala et al, 2003

According to the NYSDPC, approximately 48 earthquakes have affected New York State between 1737 and 2009. Additional sources have noted other earthquake events within New York State as well. Table E.18 depicts these earthquakes events. None of these events were located within the immediate vicinity of Onondaga County.

Table E.18. Earthquake History in New York State, 1737-2008

Event Date / Name	Location	Size / General Magnitude*	Losses / Impacts	Source(s)
Earthquake December 18, 1737	New York City	5.0 – 5.2	Several chimneys were knocked down and bells rung in New York City. The earthquake was felt from Boston to New Castle, Delaware.	NYSDPC, Stover and Coffman, Kim
Earthquake November 18, 1755 ("Cape Ann Earthquake")	Cape Ann, MA	6 (VIII max.)	Chimneys and brick buildings down in Boston. Produced a tsunami that grounded boats in the West Indies.	NYSDPC
Earthquake November 30, 1783	West of New York City	4.9 (VII max.)	Felt from New Hampshire to Pennsylvania. Chimneys were thrown down.	NYSDPC, Kim
Earthquake December 16, 1811 ("New Madrid Earthquake")	New Madrid, Missouri	8.0 – 8.8	Four great earthquakes. Changed courses of the Mississippi River. Town of New Madrid destroyed. Loss of life low due to sparse settlement. Damage in Chicago.	NYSDPC
Earthquake January 16, 1840	Herkimer, NY	3.7	No reference and/or no damage reported	NYSDPC
Earthquake October 26, 1845	Greater New York City Area	3.8	No reference and/or no damage reported	Kim
Earthquake September 2, 1847	Offshore of New York City	3.5	No reference and/or no damage reported	NYSDPC
Earthquake September 9, 1848	Rockland Lake, NY	4.4	Felt by many	NYSDPC, Kim
Earthquake March 12, 1853	Lowville, NY	4.8 est.	Felt as far east as Springfield, MA. This was a non-tectonic event caused by the freezing action of ice, ice-soil, and ice-rock materials. Event knocked down machinery.	NYSDPC, Stover and Coffman
Earthquake February 7, 1855	Saugerties, NY (Hudson River Valley)	VI	The quake was caused by freezing action in ice, ice-soil, and ice-rock materials.	NYSDPC, Lacroix, Stover and Coffman
Earthquake October 23, 1857	Buffalo, NY	4.0	Crocks fell from shelves in Buffalo; bells rang and walls vibrated and surged. A man was thrown from his chair. Felt from Warren, Pennsylvania to Port Hope on Lake Ontario and in the Montreal, Canada region.	NYSDPC, Stover and Coffman
Earthquake December 18, 1867	Canton, NY	4.8 est.	Described as "quite severe" at Hammond, New York. The earthquake awakened people in Ogdensburg and Syracuse, New York; Burlington,	NYSDPC, Stover and Coffman, von Hake

Event Date / Name	Location	Size / General Magnitude*	Losses / Impacts	Source(s)
			Vermont; and Hamilton, Ontario. It was felt from Whitehall, New York to Belleville, Ontario and Sackville, New Brunswick.	
Earthquake October 20, 1870	Baie-St-Paul, Quebec	IX	Greatest damage occurred in Baie-St-Paul, Quebec. It was felt throughout eastern Canada and in the U.S. westward to Iowa and southward to Virginia, a total area of over 1 million square miles. In New York City, the area that felt the most effects was the area to the south of 23rd Street.	Natural Resources Canada, New York Times
Earthquake December 11, 1874	Tarrytown, NY	4.8 est.	No reference and/or no damage reported	NYSDPC
Earthquake November 4, 1877	Lyon Mountain, NY	VII	Effects of the shock were most severe along the St. Lawrence River and Lake Champlain. Chimneys were downed, crocks were overturned, and ceilings were cracked in these areas. As far southwest as Auburn, New York, windowpanes were damaged. The earthquake was felt from Pembroke, Ontario to Traoi-Rivieres, Quebec; and from Boston, Massachusetts, Providence, Rhode Island, Hartford, Connecticut and Auburn, New York.	NYSDPC, Stover and Coffman
Earthquake February 5, 1878	Flushing, NY	Not Stated	Severe shock broke windows and crockery and shook houses in Flushing, NY.	Stover and Coffman
Earthquake August 10, 1884	Rockaway Beach, NY	5.2 – 5.3	Affected the Atlantic Coast, from southern Maine to central Virginia and westward to Cleveland, Ohio. Chimneys were knocked down and walls were cracked in several states. Property damage was severe in Amityville and Jamaica, New York. Several aftershocks were reported on August 11th.	NYSDPC, Stover and Coffman, Kim
Earthquake January 4, 1885	Hudson Valley, New York	3.4	No reference and/or no damage reported	Kim
Earthquake September 1, 1895	North Central New Jersey	4.3	No reference and/or no damage reported	Kim
Earthquake September 1, 1886	Charleston, South Carolina	7.7	Sixty deaths; over 10,000 chimneys down.	NYSDPC
Earthquake May 27-28, 1897	Plattsburgh, NY	Not Stated	Earthquake was reported as severe, but little damage occurred. Felt in Massachusetts, New Hampshire, New York and Vermont, and in some parts of Canada.	NYSDPC, Stover and Coffman

Event Date / Name	Location	Size / General Magnitude*	Losses / Impacts	Source(s)
Earthquake January 20, 1905	Greater New York City Area	4.5	No reference and/or no damage reported	Kim
Earthquake February 10, 1914	Ontario, Canada	5.5	Strong earthquake broke water pipes in Canton, New York. It also caused a cave-in in Binghamton and cracked a road in Johnson City. Objects were thrown from their shelves and walls in Albany and Syracuse. Windows break in Syracuse. The earthquake was felt in Connecticut, Massachusetts and Pennsylvania. One person died in Binghamton, NY.	Stover and Coffman, Stone, New York Times
Earthquake February 2-3, 1916	Schenectady, NY	3.8	Earthquake broke windows and dishes threw people out of bed, and shook houses. Residents within a 24-mile radius felt the shock.	NYSDPC, Stover and Coffman
Earthquake August 12, 1920	Attica, NY	5.2	250 chimneys fell, brick buildings damaged, Attica prison walls damaged, wells went dry.	NYSDPC
Earthquake June 1, 1927	Near Asbury Park, New Jersey	3.9	Very high intensity in Asbury Park, New Jersey.	Kim
Earthquake March 18, 1928	Saranac Lake, NY	4.5 est.	At Saranac Lake, dishes fell from shelves. In Malone, people rushed from their homes. The shock was widely felt in northeast New York State and adjacent areas.	NYSDPC, Stover and Coffman
Earthquake August 12, 1929	Attica, NY	4.4	Earthquake was strongest in Attica and areas to the east. In Attica, 250 chimneys were knocked down, several brick buildings were damaged and a crack formed in the railroad embankment near the station. It was felt from New Hampshire to Michigan and from Maryland to northern Ontario.	Stover and Coffman
Earthquake April 20, 1931	Warrensburg, NY	4.8	Most severe damage occurred in Warrensburg, north of Lake George. Several chimneys were thrown down and a church steeple was twisted. Minor damage occurred in Glens Falls, Luzerne and Lake George.	NYSDPC, Stover and Coffman
Earthquake April 14-15, 1934	Damnemora, NY	3.9	Strongest in Lake Champlain region, Keeseville and Saranac Lake. In Beekmantown, a house shifted off its foundation. It was felt in Vermont and Montreal.	NYSDPC, Stover and Coffman
Earthquake November 1, 1935	Quebec-Ontario, Canada border	5.9	Heavy damage occurred in Timiskaming area of Canada. In the U.S., chimneys and plaster sustained minor damage at Cortland. Felt in	Stover and Coffman

Event Date / Name	Location	Size / General Magnitude*	Losses / Impacts	Source(s)
			eastern Maine south to Washington D.C., and west to Wisconsin.	
Earthquake July 9, 1937	Brooklyn, NY	3.5	No reference and/or no damage reported	NYSDPC
Earthquake July 19, 1937	Western Long Island, New York	3.5	No reference and/or no damage reported	Kim
Earthquake August 23, 1938	Central New Jersey	3.8	No reference and/or no damage reported	Kim
Earthquake September 4-5, 1944	Massena, NY	4.5 - 6.0	A severe earthquake that was felt from Canada to Maryland and from Maine west to Indiana. Caused property damage, estimated at $2 million at Massena and Cornwall. Many chimneys in that area had to be rebuilt and several structures were unsafe for occupancy.	NYSDPC, Stover and Coffman
Earthquake September 3, 1951	Rockland County	3.6	No reference and/or no damage reported.	NYSDPC, Kim
Earthquake March 23, 1957	Central New Jersey	3.5	No reference and/or no damage reported.	Kim
Earthquake January 1, 1966	Attica, NY	4.6	Chimneys and walls were slightly damaged in Attica and Varysburg. In Attica, the plaster from the walls of the state prison fell and its main smokestack was damaged. Felt in western New York State, northwest Pennsylvania, and southern Ontario, Canada.	NYSDPC, Stover and Coffman
Earthquake June 13, 1967	Attica, NY	4.4	In Attica, plaster fell from walls, chimneys cracked, and light fixtures were damaged. In Alabama, about 18 miles north of Attica, ceiling tile fell in a church. The shock was felt over a small area of western New York State.	NYSDPC, Stover and Coffman
Earthquake May 23, 1971	Blue Mountain Lake, NY	3.5 - 4.1	No reference and/or no damage reported.	NYSDPC
Earthquake June 7, 1974	Wappingers Falls, NY	3.0	Earthquake caused windows to break and a bookcase to topple. More than 100 aftershocks were reported through June 13th.	NYSDPC, Stover and Coffman
Earthquake June 9, 1975	Plattsburgh, NY	3.5	In Beekmantown on Lake Champlain, a chimney and fireplace were cracked. East of Beekmantown, in Fairfax, Vermont, slight damage was reported.	NYSDPC, Stover and Coffman
Earthquake November 3, 1975	Raquette Lake, NY	4.0	No reference and/or no damage reported.	NYSDPC
Earthquake	Central New Jersey	3.2	Felt by some in Manhattan	Kim

Event Date / Name	Location	Size / General Magnitude*	Losses / Impacts	Source(s)
March 10, 1979				
Earthquake February 2, 1983	Scarsdale-Livingston, NY	3.0	Chimneys cracked	NYSDPC
Earthquake October 7, 1983	Newcomb, NY / Blue Mountain Lake, NY	5.1	An old chimney collapsed, about 20 tombstones slid or rotated, and some minor cracks formed in plaster walls in Blue Mountain Lake. Several landslides were reported. Light damage was reported in surrounding towns. It was felt over a wide range, including two provinces in Canada and 12 states.	NYSDPC, Stover and Coffman
Earthquake October 19, 1985	White Plains, NY	4.0	Windows broken in Newburgh, New York and Glenville, Connecticut. Plaster and drywall were cracked and glassware broke in Newburgh. Light damage was sustained in some towns in Connecticut, New Jersey and New York. It was felt over a large area of Connecticut, Massachusetts, New Jersey, New York and Pennsylvania. A moderate aftershock was felt on October 21st in Connecticut, New York and New Jersey.	NYSDPC, Stover and Coffman, Kim
Earthquake June 17, 1991	Summit, NY	4.1	No reference and/or no damage reported.	NYSDPC
Earthquake March 10, 1992	East Hampton, NY	2.8	Very minor damage to the area. The earthquake was centered in the Atlantic Ocean, about 15 miles south of Montauk. It was felt from the tip of eastern Long Island to New London, Connecticut.	NYSDPC, New York Times, Albany Times Union
Earthquake March 22, 1994	Cuylerville, NY	3.6	No reference and/or no damage reported	NYSDPC
Earthquake April 20, 2000	Newcomb, NY	3.8	Aftershock of the 1983 event; no damage reported.	NYSDPC
Earthquake January 17, 2001	Manhattan, New York	2.4	Felt in Upper East Side of Manhattan, Long Island city and Queens.	Kim
Earthquake October 17, 2001	Manhattan, New York	2.6	Felt in Upper West Side of Manhattan, Astoria and Queens	Kim
Earthquake April 20, 2002 (FEMA DR-1415)	Au Sable Forks, NY	5.1	Largest earthquake to hit New York State in 20 years. People felt the earthquake from Washington, D.C. to Bangor, Maine. A state of emergency was declared in Essex and Clinton Counties.	NYSDPC, USGS

Event Date / Name	Location	Size / General Magnitude*	Losses / Impacts	Source(s)
Earthquake May 24, 2002	Au Sable Forks, NY	3.1	Aftershock of the April 20th event; no damage reported.	NYSDPC, USGS
Earthquake February 27, 2008	Amsterdam, NY	2.7	No reference and/or no damage reported.	USGS
Earthquake May 28, 2008	Saratoga Springs, NY	1.8	No reference and/or no damage reported.	USGS

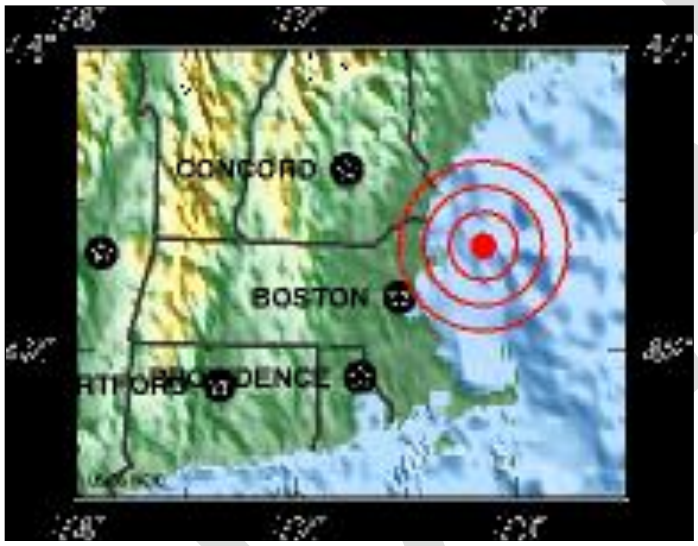
Source(s): NYSDPC, 2008; USGS, 2008; Stover and Coffman, 1993; Kim, 1999
Note: The size/magnitude of the earthquake is reported for the location of the earthquake.
** Some sources cited the size/general magnitude of the earthquake using the Mercalli Scale, while others used the Richter Scale. The Mercealli Scale relies on how much damage is caused by an earthquake. The Richter Scale is used to measure the strength or intensity of the shock waves produced by an earthquake.*

DR = Declared Disaster
FEMA = Federal Emergency Management Agency
NY = New York
NYSDPC = New York State Disaster Preparedness Commission
USGS = U.S. Geological Survey

Earthquakes in Onondaga County are not common, with documented information on earthquake events and their location being relatively scarce. According to County officials, there is no record of earthquake occurrences within the County. However, depending on the magnitude, the impacts of earthquake events can be far-reaching; therefore, reported incidences within the surrounding counties or states could have created indirect impacts upon the County. The following events described below may or may not have created indirect impacts upon Onondaga County.

November 18, 1755 ("Cape Ann Earthquake"): This earthquake, also known as the "Cape Ann Earthquake" impacted areas from Halifax, Nova Scotia, south to the Chesapeake Bay in Maryland and from Lake George, New York, east to a ship 320 kilometers east of Cape Ann. The largest impact was felt in Massachusetts, particularly in Cape Ann and Boston. In Boston, much of the damage was confined to areas near the wharfs. Many homes were damaged, with fallen chimneys and roof damage. Homes outside of the Boston area reported their stone fences were thrown down. Many temporary springs were formed that dried up. The ground was cracked in various locations throughout Massachusetts. Additionally, several aftershocks occurred throughout the area resulting in minimal damage (Stover and Coffman, 1993). Figure E-38. Cape Ann Earthquake Epicenter illustrates the epicenter of the Cape Ann Earthquake. Details regarding the impact of the earthquake in Onondaga County were unavailable in the materials reviewed to develop this plan.

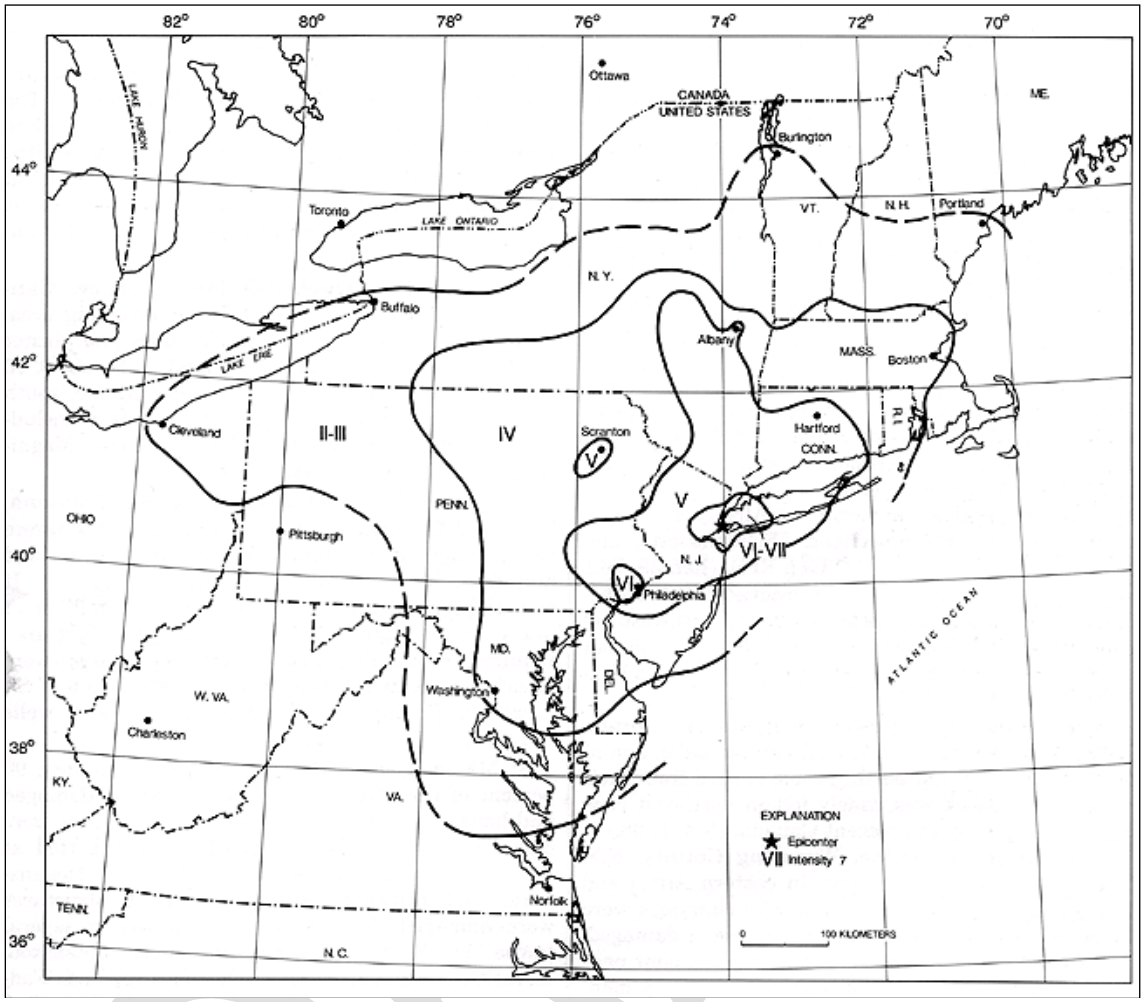
Figure E-38. Cape Ann Earthquake Epicenter



Source: USGS, 2007

August 10, 1884: The August 10, 1884 earthquake was felt over 70,000 square miles, extending along the Atlantic Coast from southern Maine to central Virginia and westward to Cleveland, Ohio. It was a strong earthquake, with the epicenter located at a distance of approximately 17 miles from New York City (Figure E-39) (NYCEM, 2003). Damages included knocked down chimneys and cracked walls in several states, including Connecticut, New Jersey, New York, and Pennsylvania. Many towns from Hartford, Connecticut to West Chester, Pennsylvania reported fallen bricks and cracked plaster (Stover and Coffman, 1993).

Figure E-39. Location of the August 10, 1884 Earthquake



Source: Stover and Coffman, 1993
Note: In Onondaga County, the August 10, 1884 earthquake had an intensity between II and IV.

Property damage was severe at Amityville, New York and Jamaica, New York, where several chimneys were overturned and large cracks formed in walls. Two chimneys were thrown down and bricks were shaken from other chimneys at Stratford, Connecticut; water in the Housatonic River was agitated violently. Many other chimneys and walls were downed or damaged in Bloomfield, New Jersey; Mount Vernon, New York; and Allentown, Chester Easton, and Philadelphia, Pennsylvania (Stover and Coffman, 1993).

Three aftershocks occurred on August 10th, the second of which was most violent. Several slight aftershocks were also reported on August 11, 1884 (Stover and Coffman, 1993). According to NYCEM, this earthquake remains the best documented earthquake for the New York City region (NYCEM, 2003). Details regarding the impact of the earthquake in Onondaga County were unavailable in the materials reviewed to develop this plan.

February 10, 1914: An earthquake struck the New York City area during the early afternoon of February 10th. The earthquake shook cities and towns in upstate New York, and even in Montreal, Washington D.C., and St. Louis (New York Times, 1914).

According to a New York Times article, few people felt the earthquake in Manhattan; however, hundreds of people in Brooklyn reported feeling the earth rock. The tremors from the quake were most distinctly felt in the

neighborhood of the Borough Hall and Court House. Many people thought that an explosion had occurred (New York Times, 1914).

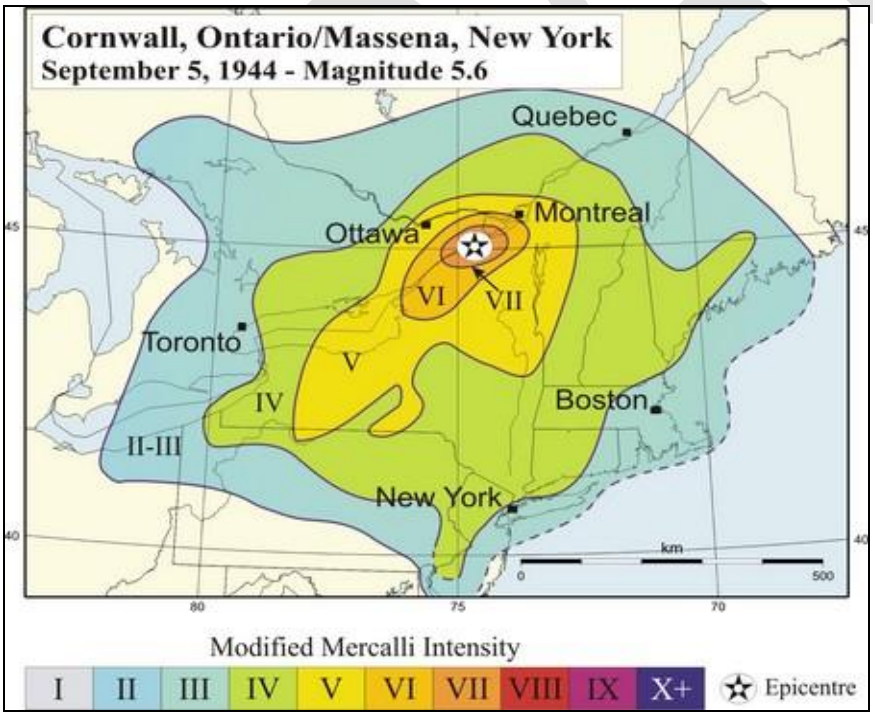
The earthquake caused one death in Binghamton, New York. The trembling from the quake caused a four-foot trench in a building's basement to cave in, crushing a man. In Trenton, New Jersey, the brass shop of the Mott plant was shaken so hard that 250 employees fled from the building.

Locations in Onondaga County felt the earthquake as well, with some severe tremors. In Syracuse, tremors were felt throughout. The Grant School released students early after the building rocked and plaster began to fall from the walls. Details regarding the impact of the earthquake in Onondaga County were unavailable in the materials reviewed to develop this plan.

September 5, 1944: An intensity VII earthquake was felt over 172,000 square miles in the U.S., including all of the New England states, Delaware, Maryland, New Jersey, New York, Pennsylvania, and parts of Michigan and Ohio. Parts of Illinois, Indiana, Virginia, West Virginia, and Wisconsin all reported feeling tremors (Stover and Coffman, 1993).

As identified in Figure E-40, the epicenter was located between Massena, New York and Cornwall, Ontario, Canada. It caused an estimated $2 million in damaged between the two cities. With an intensity of VIII (Figure E-40), the shock damaged (or destroyed) about 90-percent of the chimneys in Massena. The damage effects were similar in Cornwall as well (Lamantagne and Halchuck, 2001). Although Onondaga County was located within the earthquake's range; details regarding the impact of the earthquake in the County were unavailable in the materials reviewed to develop this plan.

Figure E-40. Largest Earthquake in New York State - September 5, 1944



Source: Lamantagne and Halchuck, 2001
Note: The September 5, 1944 earthquake had an intensity between IV and V in Onondaga County.

April 20, 2002 (FEMA DR-1415): A moderate earthquake occurred about 15 miles southwest of Plattsburgh, New York. The earthquake was felt widely across the northeastern U.S., Mid-Atlantic States and southern Canada, including Montreal, Quebec (USGS, 2002). Boston, Massachusetts; Bangor, Maine; Washington, D.C.; Cleveland, Ohio; and Baltimore, Maryland were among the cities that experienced indirect impacts from this event (Cappiello and Tilghman, 2002).

In New York State, this was the largest earthquake in nearly 20 years with an intensity of 5.1 on the Richter scale and resulted in widespread impacts. Governor George Pataki declared a state of emergency in Clinton and Essex Counties, after feeling the earthquake in Albany (Cappiello and Tilghman, 2002). Overall damage within the State included tipped chimneys and cracked roads; however, no injuries were reported. Road damage and closures were reported at Keeseville and Au Sable Forks (Essex County). Chimney damage was reported in Lake Placid (Essex County). The Township of Jay (Essex County), there was bridge damage and a reported landslide. Slight damage was reported at Blue Mountain Lake, Indian Lake, Minerva, and North River. The earthquake was also felt in Adirondack, Childwold, Moriah Center, Newcomb, North Creek, Old Forge, Olmstedville, Piercefield, Severance, Wanakena, and many other localities of upstate New York, most reporting at an intensity of V (USGS, 2002). Additionally, two aftershocks were felt the morning of the earthquake, which registered 2.2 on the Richter scale. Seven seismographs were set up around the epicenter of the earthquake to gauge activity and pick up data that could help seismologists gain a better understanding of earthquakes (Hughes, 2002). Details regarding the impact of the earthquake in Onondaga County were unavailable in the materials reviewed to develop this plan.

This earthquake resulted in a FEMA Disaster Declaration (FEMA DR-1415) on May 16, 2002. Through this declaration, the following Counties were declared eligible for federal and State disaster public assistance funds: Clinton, Essex, Franklin, Hamilton, Warren and Washington. Onondaga County was not declared eligible for assistance from this FEMA disaster.

E.3 RISK ASSESSMENT TABLES

The following tables display the results from the Vulnerability Assessment for each Hazard of Concern. The following list features abbreviations that pertain to the tables below:

- RCV – Replacement Cost Value
- DPW – Department of Public Works
- EOC – Emergency Operation Center

E.3.1 Drought

Qualitative analysis conducted; no tables.

E.3.2 Earthquake

The below tables display results of the exposure and HAZUS-MH v4.2 analyses conducted for the County.

Table E.19. Estimated Values of Residential and Commercial Buildings and Contents Damaged by the 250- and 1,000-Year MRP Earthquake Events

Municipality	Total Replacement Cost Value (RCV) (Building and Contents)	Estimated Residential Damage		Estimated Commercial Damage	
		250-Year	1,000-Year	250-Year	1,000-Year
Village of Baldwinsville	$1,504,827,309	$176,535	$1,362,115	$36,281	$302,868
Town of Camillus	$4,945,293,987	$247,027	$2,314,078	$79,774	$751,906

Table E.19. Estimated Values of Residential and Commercial Buildings and Contents Damaged by the 250- and 1,000-Year MRP Earthquake Events

Municipality	Total Replacement Cost Value (RCV) (Building and Contents)	Estimated Residential Damage		Estimated Commercial Damage	
		250-Year	1,000-Year	250-Year	1,000-Year
Village of Camillus	$182,330,235	$69,190	$473,228	$13,099	$98,232
Town of Cicero	$7,104,912,499	$2,579,967	$16,855,050	$1,311,580	$9,217,627
Town of Clay	$13,377,871,396	$4,098,122	$27,561,730	$1,754,558	$12,819,227
Town of DeWitt	$11,163,898,629	$1,594,949	$11,094,204	$3,093,234	$21,851,554
Village of East Syracuse	$901,239,284	$273,701	$1,772,389	$334,836	$2,295,713
Town of Elbridge	$1,214,372,973	$73,747	$588,085	$19,591	$173,152
Village of Elbridge	$243,606,959	$15,287	$121,903	$4,061	$35,892
Town of Fabius	$873,582,692	$24,998	$191,572	$3,196	$28,104
Village of Fabius	$100,916,840	$2,747	$21,053	$351	$3,088
Village of Fayetteville	$1,065,416,400	$78,129	$599,135	$21,478	$173,966
Town of Geddes	$3,940,020,462	$372,914	$2,881,016	$438,833	$3,489,946
Village of Jordan	$324,416,761	$19,637	$156,590	$5,217	$46,105
Town of Lafayette	$1,385,373,038	$0	$462,962	$0	$48,801
Village of Liverpool	$585,988,259	$112,285	$820,542	$48,696	$379,226
Town of Lysander	$5,511,947,365	$687,070	$5,266,022	$117,363	$954,497
Town of Manlius	$5,931,420,911	$893,852	$6,646,870	$108,188	$849,065
Village of Manlius	$1,225,609,003	$35,921	$535,888	$5,273	$67,157
Town of Marcellus	$1,592,818,810	$0	$428,436	$0	$60,182
Village of Marcellus	$446,005,634	$0	$131,200	$0	$15,903
Village of Minoa	$677,670,815	$280,864	$1,852,969	$35,461	$246,746
Village of North Syracuse	$1,347,498,685	$602,787	$3,923,730	$183,748	$1,285,185
Town of Onondaga	$5,889,094,715	$24,253	$1,536,542	$9,287	$210,834
Onondaga Nation Reservation	$182,143,705	$0	$78,995	$0	$0
Town of Otisco	$1,070,059,196	$0	$229,925	$0	$15,524
Town of Pompey	$2,547,562,317	$0	$757,496	$0	$47,081
Town of Salina	$8,140,248,129	$1,886,501	$13,126,479	$833,361	$6,135,555
Town of Skaneateles	$2,334,223,245	$0	$746,050	$0	$192,434
Village of Skaneateles	$871,003,682	$0	$289,633	$0	$80,736
Village of Solvay	$1,402,099,960	$143,373	$1,232,877	$34,873	$305,957
Town of Spafford	$826,800,666	$0	$209,874	$0	$9,845
City of Syracuse	$25,010,023,305	$2,887,171	$22,139,387	$2,402,895	$17,649,960
Town of Tully	$882,534,759	$27,818	$253,925	$16,041	$143,255
Village of Tully	$314,789,328	$10,084	$92,048	$5,815	$51,930
Town of Van Buren	$3,347,767,581	$194,973	$1,555,603	$78,391	$634,659
Onondaga County	**$118,465,389,533**	**$17,413,901**	**$128,309,596**	**$10,995,481**	**$80,671,914**

Source: HAZUS-MH v4.2.

Table E.20. Numbers of Critical Facilities Located on Soils of NEHRP Class D or E

Municipality	Adult Home	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	Communications	Correctional	County Facility	Dam	Day Care	DPW	Drug and Alcohol	Electric Power Facilities	Electric Transfer	EOC	Fire Station	Homeless Shelter	Hospital	Library	Municipal Hall
Village of Baldwinsville	0	0	1	1	16	0	1	0	4	1	7	0	0	0	0	0	1	0	0	1	1
Town of Camillus	0	1	0	0	7	0	0	0	9	0	4	3	0	0	2	0	2	0	0	0	0
Village of Camillus	0	0	0	0	2	0	1	0	2	0	0	1	0	0	0	0	0	0	0	1	1
Town of Cicero	0	0	1	0	91	0	3	0	26	0	19	1	0	0	4	0	6	0	0	2	1
Town of Clay	1	0	1	1	93	0	7	0	25	0	32	2	0	0	7	0	6	0	0	0	1
Town of DeWitt	0	1	1	0	181	0	8	0	15	1	8	3	0	0	8	0	4	0	0	1	1
Village of East Syracuse	0	0	0	0	28	0	0	0	4	0	5	1	0	0	2	0	1	0	0	1	1
Town of Elbridge	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Elbridge	0	0	0	0	2	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	1
Town of Fabius	0	1	0	0	6	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Village of Fabius	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Village of Fayetteville	0	0	0	0	5	0	1	0	1	0	1	0	0	0	1	0	0	0	0	1	1
Town of Geddes	0	0	0	0	31	0	1	0	15	0	1	3	0	1	2	0	1	0	0	0	0
Village of Jordan	0	0	0	0	4	0	1	0	1	0	2	2	0	0	0	0	1	0	0	1	2
Town of Lafayette	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Village of Liverpool	0	0	0	0	7	0	0	0	13	0	1	1	0	0	0	0	0	0	0	1	1
Town of Lysander	0	0	0	1	26	0	3	0	13	1	3	2	0	0	1	0	5	0	0	0	1
Town of Manlius	1	0	0	1	13	0	1	0	4	0	9	1	0	0	0	0	2	0	0	0	0
Village of Manlius	1	0	1	0	7	0	1	0	1	0	1	1	0	0	1	0	0	0	0	1	1
Town of Marcellus	0	0	1	0	4	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0
Village of Marcellus	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	1
Village of Minoa	0	0	1	0	6	0	1	0	2	0	4	1	0	0	1	0	1	0	0	1	1
Village of North Syracuse	0	0	1	0	19	0	0	0	1	0	8	1	0	0	0	0	1	0	0	1	1

Table E.20. Numbers of Critical Facilities Located on Soils of NEHRP Class D or E

Municipality	Adult Home	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	Communications	Correctional	County Facility	Dam	Day Care	DPW	Drug and Alcohol	Electric Power Facilities	Electric Transfer	EOC	Fire Station	Homeless Shelter	Hospital	Library	Municipal Hall
Town of Onondaga	0	0	0	0	3	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
Town of Otisco	0	0	0	0	3	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0
Town of Pompey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Salina	0	0	1	3	71	0	9	0	36	0	21	3	0	0	5	0	3	0	0	1	1
Town of Skaneateles	0	0	0	0	3	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0
Village of Skaneateles	0	0	1	0	9	0	1	0	2	1	0	0	0	1	0	0	1	0	0	1	2
Village of Solvay	0	0	0	0	9	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Town of Spafford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Syracuse	1	0	1	2	233	3	3	1	37	1	62	3	11	0	6	1	6	5	1	5	3
Town of Tully	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Village of Tully	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Town of Van Buren	0	1	0	0	10	0	0	0	2	0	1	1	0	0	1	0	2	0	0	0	0
Onondaga County	**4**	**4**	**11**	**9**	**901**	**3**	**45**	**1**	**218**	**6**	**191**	**33**	**11**	**3**	**48**	**1**	**48**	**5**	**1**	**20**	**25**

Source: NYS DHSES 2008, Onondaga County 2018

Table E.21. Numbers of Critical Facilities Located on Soils of NEHRP Class D or E Continued

Municipality	Facility Types															
	Natural Gas	Nursing Home	Police	Post Office	Public Health	Rail Facility	Red Cross	Retirement Homes	School	Waste Water Other	Waste Water Pump Station	Waste Water Treatment Plant	Water Pump Station	Water Supply Treatment	Water Towers and Tanks	Well
Village of Baldwinsville	0	0	1	1	0	0	2	0	5	0	3	0	0	1	0	0
Town of Camillus	1	0	1	1	0	0	0	0	0	0	6	0	1	0	0	1
Village of Camillus	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Town of Cicero	2	1	2	3	0	0	2	0	5	0	18	1	0	0	1	5
Town of Clay	3	1	0	2	0	1	2	1	9	0	19	2	1	1	1	3
Town of DeWitt	2	0	3	1	0	2	0	1	5	0	12	0	0	1	2	0
Village of East Syracuse	0	0	1	1	0	6	0	0	1	0	3	0	0	0	0	0
Town of Elbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Village of Elbridge	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Town of Fabius	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	5
Village of Fabius	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Village of Fayetteville	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Town of Geddes	2	1	1	0	0	0	0	0	0	0	5	0	0	0	0	0
Village of Jordan	0	0	1	1	0	0	1	0	2	0	0	1	0	0	0	0
Town of Lafayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Village of Liverpool	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0
Town of Lysander	2	0	1	0	0	0	0	0	0	0	11	1	1	1	1	20
Town of Manlius	1	1	0	0	0	17	2	0	5	0	3	1	1	0	0	6
Village of Manlius	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
Town of Marcellus	0	0	0	1	0	0	0	0	0	0	0	0	1	2	1	2
Village of Marcellus	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Village of Minoa	0	1	1	1	0	6	0	0	2	0	0	1	1	0	0	0

Table E.21. Numbers of Critical Facilities Located on Soils of NEHRP Class D or E Continued

Municipality	Facility Types															
	Natural Gas	Nursing Home	Police	Post Office	Public Health	Rail Facility	Red Cross	Retirement Homes	School	Waste Water Other	Waste Water Pump Station	Waste Water Treatment Plant	Water Pump Station	Water Supply Treatment	Water Towers and Tanks	Well
Village of North Syracuse	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0
Town of Onondaga	0	0	0	0	0	0	1	0	2	0	3	0	0	0	0	4
Town of Otisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Pompey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Town of Salina	3	0	4	1	0	0	0	1	7	0	14	0	2	0	0	0
Town of Skaneateles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
Village of Skaneateles	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0
Village of Solvay	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Spafford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Syracuse	2	1	3	3	1	4	2	0	24	5	4	1	1	0	0	2
Town of Tully	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Village of Tully	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
Town of Van Buren	2	0	0	1	0	1	0	0	0	0	2	0	0	0	1	7
Onondaga County	**21**	**6**	**25**	**21**	**1**	**37**	**16**	**3**	**72**	**5**	**106**	**10**	**10**	**8**	**10**	**69**

Source: NYS DHSES 2008, Onondaga County 2018

Table E.22. Estimated Debris Generated by the 250- and 1,000-year MRP Earthquake Events

Municipality	250-Year		1,000-Year	
	Brick/Wood (tons)	Concrete/Steel (tons)	Brick/Wood (tons)	Concrete/Steel (tons)
Village of Baldwinsville	173.0	40.5	746.6	247.6
Town of Camillus	293.8	68.6	1,668.1	498.4
Village of Camillus	52.7	13.6	201.0	77.9
Town of Cicero	2,312.2	722.1	8,550.9	4,174.5
Town of Clay	3,064.1	897.3	11,723.2	5,263.4
Town of DeWitt	2,527.1	941.0	9,850.1	5,744.1
Village of East Syracuse	341.9	123.9	1,246.3	760.8
Town of Elbridge	97.8	23.7	454.7	149.1
Village of Elbridge	20.3	4.9	94.3	30.9
Town of Fabius	48.4	14.0	223.5	86.1
Village of Fabius	5.3	1.5	24.6	9.5
Village of Fayetteville	82.0	18.5	367.3	110.5
Town of Geddes	439.9	148.1	1,875.6	910.5
Village of Jordan	26.0	6.3	121.1	39.7
Town of Lafayette	0.0	0.0	361.9	94.4
Village of Liverpool	118.4	32.0	470.3	186.8
Town of Lysander	581.8	132.0	2,513.1	800.8
Town of Manlius	630.0	153.1	2,807.8	935.4
Village of Manlius	32.4	6.8	303.8	76.7
Town of Marcellus	0.0	0.0	329.2	102.8
Village of Marcellus	0.0	0.0	96.3	26.0
Village of Minoa	187.6	52.2	697.8	300.1
Village of North Syracuse	422.7	124.3	1,546.9	711.6
Town of Onondaga	28.0	6.2	1,065.8	275.7
Onondaga Nation Reserve	0	0	38.8	7.3
Town of Otisco	0.0	0.0	199.5	55.3
Town of Pompey	0.0	0.0	487.8	126.0
Town of Salina	1,496.6	422.4	5,868.8	2,471.7
Town of Skaneateles	0.0	0.0	514.6	147.8
Village of Skaneateles	0.0	0.0	208.2	59.7
Village of Solvay	118.3	29.5	621.0	204.8
Town of Spafford	0.0	0.0	135.2	33.9
City of Syracuse	3,536.0	1,154.8	15,304.9	7,253.8
Town of Tully	42.3	10.0	218.9	72.8
Village of Tully	15.3	3.6	79.3	26.4
Town of Van Buren	328.5	81.3	1,490.5	498.3
Onondaga County:	**17,022.6**	**5,232.3**	**72,507.4**	**32,570.9**

Source: HAZUS-MH v4.2

E.3.3 Extreme Temperature

Qualitative analysis conducted; no tables.

E.3.4 Flood

The below tables display results of the exposure and HAZUS-MH v4.2 analyses conducted for the County.

Table E.23. Number of Critical Facilities Located in the 1-Percent Annual Chance Flood Zone

Municipality	Facility Types																						
	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	County Facility	Dam	Day Care	DPW	Electric Transfer	Fire Station	Homeless Shelter	Major Communication Facility	Natural Gas	Police	Post Office	Rail Facility	Wastewater Other	Wastewater Pump	Wastewater Treatment	Water Pump Station	Water Supply Treatment	Well
Village of Baldwinsville	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Town of Camillus	0	0	0	3	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Camillus	0	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0
Town of Cicero	0	0	0	1	0	8	0	0	0	0	1	0	0	0	0	0	0	0	8	0	0	0	1
Town of Clay	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Town of DeWitt	0	0	0	19	0	2	0	0	0	2	0	0	1	0	0	0	0	0	2	0	1	0	0
Village of East Syracuse	0	0	0	12	0	2	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Town of Elbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Elbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fayetteville	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Geddes	0	0	0	5	0	6	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0
Village of Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Town of Lafayette	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Village of Liverpool	0	0	0	1	0	11	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Lysander	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Town of Manlius	0	0	0	4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Village of Manlius	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Marcellus	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Village of Marcellus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Minoa	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Village of North Syracuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Onondaga	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Town of Otisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Pompey	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Salina	0	0	0	12	0	23	0	1	1	0	0	0	0	2	0	0	0	0	6	0	0	0	0

Municipality	Facility Types																						
	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	County Facility	Dam	Day Care	DPW	Electric Transfer	Fire Station	Homeless Shelter	Major Communication Facility	Natural Gas	Police	Post Office	Rail Facility	Wastewater Other	Wastewater Pump	Wastewater Treatment	Water Pump Station	Water Supply Treatment	Well
Town of Skaneateles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Skaneateles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Solvay	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Spafford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Syracuse	0	0	0	20	2	3	1	3	0	1	0	1	0	0	0	0	1	2	1	0	0	0	0
Town of Tully	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Tully	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Town of Van Buren	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Onondaga County	**1**	**1**	**1**	**92**	**2**	**62**	**5**	**8**	**7**	**4**	**2**	**1**	**3**	**4**	**2**	**1**	**2**	**2**	**25**	**3**	**2**	**1**	**6**

Sources: FEMA 2016; Syracuse-Onondaga County Planning Agency

Table E.24. Number of Critical Facilities Located in the 0.2-Percent Annual Chance Flood Zone

Municipality	Facility Types																						
	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	County Facility	Dam	Day Care	DPW	Electric Transfer	Fire Station	Homeless Shelter	Major Communication Facility	Natural Gas	Police	Post Office	Rail Facility	Wastewater Other	Wastewater Pump	Wastewater Treatment	Water Pump Station	Water Supply Treatment	Well
Village of Baldwinsville	0	1	0	3	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Town of Camillus	0	0	0	4	0	1	0	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Village of Camillus	0	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0
Town of Cicero	0	0	0	2	0	8	0	0	0	0	1	0	0	0	0	0	0	0	8	0	0	0	1

Municipality	Facility Types																						
	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	County Facility	Dam	Day Care	DPW	Electric Transfer	Fire Station	Homeless Shelter	Major Communication Facility	Natural Gas	Police	Post Office	Rail Facility	Wastewater Other	Wastewater Pump	Wastewater Treatment	Water Pump Station	Water Supply Treatment	Well
Town of Clay	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0
Town of DeWitt	0	0	0	23	0	3	0	0	1	2	0	0	1	0	0	0	0	0	2	0	1	0	0
Village of East Syracuse	0	0	0	14	0	2	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Town of Elbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Elbridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fayetteville	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Geddes	0	0	0	8	0	6	0	0	0	0	0	0	0	1	1	0	0	0	3	0	0	0	0
Village of Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Town of Lafayette	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Village of Liverpool	0	0	0	2	0	12	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Town of Lysander	0	0	0	2	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
Town of Manlius	0	0	0	4	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	2
Village of Manlius	0	0	1	2	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Marcellus	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Village of Marcellus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Minoa	0	0	0	5	0	1	0	0	1	0	0	0	0	0	0	0	3	0	0	1	0	0	0
Village of North Syracuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Onondaga	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Town of Otisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Pompey	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Municipality	Facility Types																						
	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	County Facility	Dam	Day Care	DPW	Electric Transfer	Fire Station	Homeless Shelter	Major Communication Facility	Natural Gas	Police	Post Office	Rail Facility	Wastewater Other	Wastewater Pump	Wastewater Treatment	Water Pump Station	Water Supply Treatment	Well
Town of Salina	0	0	0	14	0	23	0	1	1	0	0	0	0	2	0	0	0	0	6	0	1	0	0
Town of Skaneateles	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Village of Skaneateles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Solvay	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Spafford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Syracuse	0	0	0	24	2	3	1	10	0	1	0	2	0	0	0	0	1	3	1	0	0	0	0
Town of Tully	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Tully	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Town of Van Buren	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Onondaga County	**1**	**1**	**1**	**118**	**2**	**69**	**5**	**16**	**10**	**5**	**2**	**2**	**3**	**5**	**2**	**2**	**5**	**3**	**28**	**5**	**4**	**2**	**6**

Sources: FEMA 2016; Syracuse-Onondaga County Planning Agency

Table E.25. Estimated Debris Generated from the 1-Percent Annual Chance Flood Event

Municipality	1% Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Baldwinsville (V)	162.0	159.6	1.4	0.9
Camillus (T)	488.6	350.7	80.1	57.7
Camillus (V)	54.2	54.2	0.0	0.0
Cicero (T)	1,631.5	1,281.8	211.7	138.1
Clay (T)	753.4	656.3	44.9	52.2
De Witt (T)	627.8	529.7	42.8	55.3
East Syracuse (V)	96.4	96.4	0.0	0.0
Elbridge (T)	194.1	106.3	51.7	36.1
Elbridge (V)	15.3	9.7	3.4	2.2
Fabius (T)	65.8	56.1	5.6	4.0
Fabius (V)	0.0	0.0	0.0	0.0
Fayetteville (V)	558.7	547.8	6.5	4.4
Geddes (T)	130.6	68.9	36.4	25.3
Jordan (V)	28.6	28.6	0.0	0.0
La Fayette (T)	244.1	177.1	30.9	36.0
Liverpool (V)	42.4	42.4	0.0	0.0
Lysander (T)	517.9	424.1	54.4	39.3
Manlius (T)	2,659.0	2,078.1	285.0	295.9
Manlius (V)	200.7	181.0	12.1	7.6
Marcellus (T)	545.5	106.5	265.6	173.4
Marcellus (V)	709.3	191.0	287.9	230.4
Minoa (V)	348.3	317.5	18.9	11.9
North Syracuse (V)	33.5	33.5	0.0	0.0
Onondaga (T)	1,030.4	392.9	369.3	268.3
Otisco (T)	62.4	37.8	9.2	15.4
Pompey (T)	368.6	253.4	68.1	47.1
Salina (T)	1,272.2	1,015.8	156.2	100.3
Skaneateles (T)	99.0	75.5	13.5	10.0
Skaneateles (V)	14.8	14.8	0.0	0.0
Solvay (V)	5.3	2.8	1.6	1.0
Spafford (T)	10.7	5.6	2.7	2.5
Syracuse (C)	5,309.6	3,394.5	1,078.2	836.9
Tully (T)	51.0	50.9	0.0	0.0
Tully (V)	7.2	7.2	0.0	0.0
Van Buren (T)	676.6	676.6	0.0	0.0
Onondaga County:	**19,015.4**	**13,425.1**	**3,138.1**	**2,452.2**

Source: HAZUS-MH 4.2

E.3.5 Geologic

The below tables display results of the exposure analysis conducted for the County.

Table E.26. Estimated Number of Critical Facilities Exposed to the Steep Slopes and Tully Valley Hazard Areas by Municipality

Municipality	Facility Types								
	Chemical Storage	County Facility	Dam	Fire Station	Potable Pump Station	Potable Water Treatment	Potable Water Storage	Wastewater Pump Station	Well
Landslide									
Camillus (T)	0	0	0	0	0	0	1	0	0
De Witt (T)	0	0	0	0	1	0	0	0	0
Fabius (T)	0	0	0	0	0	0	0	0	1
Geddes (T)	0	1	0	0	0	0	0	1	0
LaFayette (T)	0	0	0	0	0	0	0	0	1
Manlius (T)	1	0	0	0	0	1	0	0	0
Pompey (T)	1	0	0	0	0	0	0	0	0
Skaneateles (T)	0	0	0	0	0	1	0	0	0
Syracuse (C)	1	0	1	0	0	0	0	0	0
Tully (Y)	1	0	0	0	0	0	0	0	1
Onondaga County	**4**	**1**	**1**	**0**	**1**	**2**	**1**	**1**	**3**
Tully Valley									
LaFayette (T)	0	0	0	1	0	0	0	0	2

Source: Syracuse-Onondaga County Planning Agency, 2018

Table E.27. Numbers of Critical Facilities Located on Carbonate Bedrock

Municipality	Adult Home	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	Correctional	County Facility	Dam	Day Care	DPW	Drug and Alcohol	Electric Power Facilities	Electric Transfer	EOC	Fire Station	Homeless Shelter	Hospital	Library	Major Communication Facility	Municipal Hall
Village of Baldwinsville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Camillus	0	0	1	1	39	0	0	4	0	20	0	0	0	3	0	1	0	0	1	3	1
Village of Camillus	0	0	0	0	2	0	0	2	0	0	1	0	0	0	0	0	0	0	1	1	1
Town of Cicero	0	0	0	0	24	0	0	11	0	11	2	0	0	1	0	2	0	0	1	2	1
Town of Clay	0	0	0	0	20	0	0	9	0	9	1	0	0	2	0	2	0	0	0	2	1
Town of DeWitt	0	0	0	0	58	0	1	18	0	10	2	0	0	7	0	2	0	0	1	4	1
Village of East Syracuse	0	0	0	0	28	0	0	2	0	4	1	0	0	2	0	1	0	0	0	0	1
Town of Elbridge	0	0	0	0	10	0	0	2	0	4	0	0	0	3	0	0	0	0	0	2	0
Village of Elbridge	0	0	0	0	4	0	0	1	0	3	1	0	0	0	0	1	0	0	1	0	1
Town of Fabius	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fayetteville	0	0	1	0	15	0	0	3	0	4	0	0	0	1	0	1	0	0	1	1	2
Town of Geddes	0	0	0	0	10	0	0	3	0	4	1	0	0	1	0	0	0	0	0	1	0
Village of Jordan	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Town of Lafayette	0	0	0	0	1	0	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0
Village of Liverpool	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Lysander	0	0	0	0	3	0	0	6	0	4	1	0	0	0	0	1	0	0	0	0	0
Town of Manlius	0	0	0	2	13	0	0	11	0	10	1	0	0	1	0	2	0	0	0	1	0
Village of Manlius	1	0	1	1	10	0	0	2	0	5	1	0	0	1	0	0	0	0	1	1	1
Town of Marcellus	0	1	1	0	5	0	0	2	0	2	1	0	0	1	0	0	0	0	0	0	0
Village of Marcellus	0	0	0	0	3	0	0	1	0	3	1	0	0	0	0	0	0	0	1	1	2
Village of Minoa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of North Syracuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table E.27. Numbers of Critical Facilities Located on Carbonate Bedrock

Municipality	Adult Home	Airport	Ambulance	Assisted Living	Bulk Chemical Storage	Bus Facility	Correctional	County Facility	Dam	Day Care	DPW	Drug and Alcohol	Electric Power Facilities	Electric Transfer	EOC	Fire Station	Homeless Shelter	Hospital	Library	Major Communication Facility	Municipal Hall
Town of Onondaga	0	0	0	1	22	0	0	9	0	7	0	0	1	3	0	4	0	1	0	1	1
Town of Otisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Town of Pompey	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Town of Salina	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Town of Skaneateles	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Village of Skaneateles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Solvay	0	0	0	0	25	0	0	1	0	3	1	0	0	1	0	2	0	0	1	0	2
Town of Spafford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Syracuse	1	0	2	8	221	2	1	29	2	168	1	15	0	7	1	8	5	4	10	5	3
Town of Tully	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Village of Tully	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Van Buren	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onondaga County	**2**	**1**	**6**	**13**	**521**	**2**	**2**	**120**	**4**	**277**	**17**	**15**	**1**	**34**	**1**	**28**	**5**	**5**	**19**	**30**	**18**

Source: USGS 2005; Onondaga County 2018

Table E.28. Numbers of Critical Facilities Located on Carbonate Bedrock Continued

Municipality	Facility Types																
	Natural Gas	Nursing Home	Police	Post Office	Public Health	Rail Facility	Red Cross	Retirement Homes	School	Waste Water Other	Waste Water Pump Station	Waste Water Treatment Plant	Water Pump Station	Water Supply Reservoir	Water Supply Treatment	Water Towers and Tanks	Well
Village of Baldwinsville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Camillus	2	0	1	1	0	0	2	0	7	0	4	0	3	0	5	7	4
Village of Camillus	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	0
Town of Cicero	0	1	1	2	0	0	2	0	3	0	9	0	0	0	0	0	3
Town of Clay	1	0	0	0	0	0	0	0	0	0	5	1	0	0	1	0	0
Town of DeWitt	1	0	1	2	0	0	0	2	10	0	11	0	6	0	2	7	1
Village of East Syracuse	0	0	1	1	0	5	0	0	1	0	2	0	0	0	0	0	0
Town of Elbridge	1	0	0	0	0	0	0	0	1	0	0	0	0	0	5	2	6
Village of Elbridge	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0
Town of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fabius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Fayetteville	0	0	0	1	0	0	0	0	1	0	2	0	0	0	0	0	0
Town of Geddes	1	1	0	0	0	0	0	0	5	0	3	0	1	0	0	2	0
Village of Jordan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Lafayette	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Village of Liverpool	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Lysander	1	0	0	0	0	0	1	0	0	0	6	0	0	0	0	0	9
Town of Manlius	1	0	0	0	0	6	1	1	6	0	7	0	2	0	1	3	15
Village of Manlius	0	0	1	1	0	0	2	0	1	0	1	0	2	0	0	1	0
Town of Marcellus	0	0	0	0	0	0	1	0	3	0	0	1	2	0	0	0	1
Village of Marcellus	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Village of Minoa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table E.28. Numbers of Critical Facilities Located on Carbonate Bedrock Continued

Municipality	Facility Types																
	Natural Gas	Nursing Home	Police	Post Office	Public Health	Rail Facility	Red Cross	Retirement Homes	School	Waste Water Other	Waste Water Pump Station	Waste Water Treatment Plant	Water Pump Station	Water Supply Reservoir	Water Supply Treatment	Water Towers and Tanks	Well
Village of North Syracuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Onondaga	3	1	1	1	0	0	2	0	5	0	4	0	2	0	0	1	2
Town of Otisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Town of Pompey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4
Town of Salina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Skaneateles	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Village of Skaneateles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Village of Solvay	1	0	2	1	0	0	0	0	2	0	0	0	1	0	0	0	0
Town of Spafford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
City of Syracuse	2	4	3	4	1	2	5	1	43	2	0	0	2	2	6	1	0
Town of Tully	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Village of Tully	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Town of Van Buren	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onondaga County	**14**	**7**	**14**	**17**	**1**	**13**	**18**	**4**	**89**	**2**	**56**	**2**	**23**	**2**	**21**	**24**	**54**

Source: USGS 2005; Onondaga County 2018

E.3.6 Harmful Algal Bloom

Qualitative analysis conducted; no tables.

E.3.7 Invasive Species

Qualitative analysis conducted; no tables.

E.3.8 Severe Storm

The below tables display results of the HAZUS-MH 4.2 analysis conducted for the County.

Table E.29. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
No Damage or Very Minor Damage Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof over, with no or very Limited water penetration.	≤2%	No	No	No	No	No
Minor Damage Maximum of one broken window, door or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.	>2% and ≤15%	One window, door, or garage door failure	No	<5 impacts	No	No
Moderate Damage Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.	>15% and ≤50%	> one and ≤ the larger of 20% & 3	1 to 3 panels	Typically 5 to 10 impacts	No	No
Severe Damage Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.	>50%	> the larger of 20% & 3 and ≤50%	>3 and ≤25%	Typically 10 to 20 impacts	No	No
Destruction Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.	Typically >50%	>50%	>25%	Typically >20 impacts	Yes	Yes

Source: HAZUS-MH Hurricane Technical Manual

Table E.30. Estimated Residential and Commercial Building Value (Structure Only) Damaged by the 100-Year and 500-Year MRP Wind Events

Municipality	Total Replacement Value (Structure Only)	Estimated Residential Damage		Estimated Commercial Damage	
		100-Year	500-Year	100-Year	500-Year
Village of Baldwinsville	$928,446,807	$0	$0	$0	$99
Town of Camillus	$3,052,036,657	$0	$0	$0	$0
Village of Camillus	$114,031,114	$0	$0	$0	$0
Town of Cicero	$4,266,651,090	$0	$0	$0	$0
Town of Clay	$8,137,341,185	$0	$0	$0	$135

Municipality	Total Replacement Value (Structure Only)	Estimated Residential Damage		Estimated Commercial Damage	
		100-Year	500-Year	100-Year	500-Year
Town of DeWitt	$6,404,939,359	$0	$1,993	$0	$64
Village of East Syracuse	$514,055,432	$0	$0	$0	$0
Town of Elbridge	$729,399,165	$0	$0	$0	$0
Village of Elbridge	$148,857,976	$0	$0	$0	$0
Town of Fabius	$490,481,134	$0	$1,804	$0	$0
Village of Fabius	$60,048,901	$0	$0	$0	$0
Village of Fayetteville	$664,528,666	$0	$0	$0	$0
Town of Geddes	$2,350,056,049	$0	$0	$0	$0
Village of Jordan	$194,311,561	$0	$0	$0	$0
Town of Lafayette	$856,191,594	$0	$2,486	$0	$0
Village of Liverpool	$356,505,810	$0	$0	$0	$0
Town of Lysander	$3,452,247,706	$0	$0	$0	$0
Town of Manlius	$3,735,064,686	$0	$8,939	$0	$0
Village of Manlius	$763,326,145	$0	$0	$0	$0
Town of Marcellus	$968,785,581	$0	$405	$0	$0
Village of Marcellus	$264,320,392	$0	$0	$0	$0
Village of Minoa	$425,337,257	$0	$0	$0	$0
Village of North Syracuse	$826,812,636	$0	$0	$0	$0
Town of Onondaga	$3,681,301,149	$0	$1,749	$0	$0
Onondaga Nation Reservation	$121,429,137	$0	$0	$0	$0
Town of Otisco	$643,807,877	$0	$848	$0	$0
Town of Pompey	$1,594,497,578	$0	$4,080	$0	$0
Town of Salina	$4,973,963,168	$0	$0	$0	$0
Town of Skaneateles	$1,430,527,029	$0	$0	$0	$0
Village of Skaneateles	$530,891,718	$0	$0	$0	$0
Village of Solvay	$884,983,486	$0	$0	$0	$0
Town of Spafford	$521,398,251	$0	$1,948	$0	$0
City of Syracuse	$15,038,897,586	$0	$702	$0	$0
Town of Tully	$528,007,157	$0	$233	$0	$0
Village of Tully	$181,454,356	$0	$8	$0	$0
Town of Van Buren	$1,993,563,705	$0	$0	$0	$0
Onondaga County	**$71,828,499,104**	**$0**	**$25,195**	**$0**	**$0**

Source: HAZUS-MH 4.2

Table E.31. Debris Production for 500-Year Mean Return Period Wind Event

Municipality	Brick and Wood (tons)	Concrete and Steel (tons)	Tree (tons)	Eligible Tree Volume (cubic yards)
Village of Baldwinsville	0	0	0	0
Town of Camillus	0	0	0	0
Village of Camillus	0	0	0	0
Town of Cicero	0	0	0	0
Town of Clay	0	0	0	0
Town of DeWitt	0	0	0	0
Village of East Syracuse	0	0	0	0
Town of Elbridge	0	0	0	0
Village of Elbridge	0	0	0	0
Town of Fabius	0	0	129	98
Village of Fabius	0	0	4	22
Village of Fayetteville	0	0	1	5
Town of Geddes	0	0	0	0
Village of Jordan	0	0	0	0
Town of Lafayette	0	0	3	15
Village of Liverpool	0	0	0	0
Town of Lysander	0	0	0	0
Town of Manlius	0	0	3	6
Village of Manlius	0	0	0	0
Town of Marcellus	0	0	0	0
Village of Marcellus	0	0	0	0
Village of Minoa	0	0	0	0
Village of North Syracuse	0	0	0	0
Town of Onondaga	0	0	0	3
Onondaga Nation Reservation	0	0	0	0
Town of Otisco	0	0	0	0
Town of Pompey	0	0	181	158
Town of Salina	0	0	0	0
Town of Skaneateles	0	0	0	0
Village of Skaneateles	0	0	0	0
Village of Solvay	0	0	0	0
Town of Spafford	0	0	0	0
City of Syracuse	0	0	1	1
Town of Tully	0	0	40	39
Village of Tully	0	0	0	0
Town of Van Buren	0	0	0	0
Onondaga County	**0**	**0**	**362**	**347**

Source: HAZUS-MH 4.2

E.3.9 Severe Winter Storm

No tables.