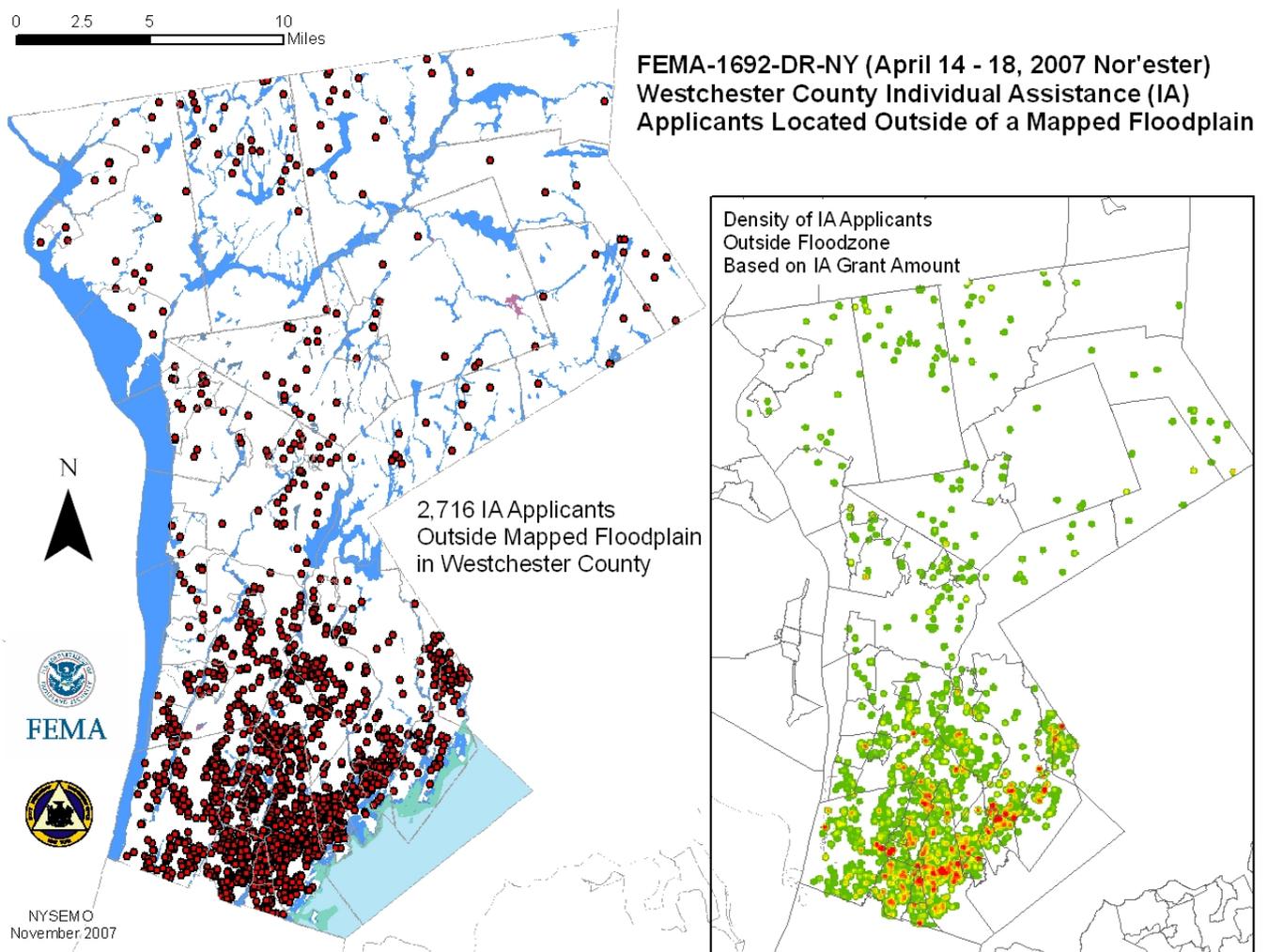


### Flooding Outside Mapped Flood Plains

It is a common misconception that Flood Insurance is only available if your home or business is located within a “mapped” 100 year flood plain. This is not correct. Flood insurance is also available outside the mapped flood plains because flooding can and does occur outside mapped flood plains. Businesses and homeowners should be encouraged to consider obtaining National Flood Insurance coverage even if they are outside the immediate 100 year floodplain. Larger floods will occur that extend beyond the 100 year flood plain and flooding occurs along rivers and streams that have no formal NFIP 100 year flood plain map. Over time flood plains change. Development upstream can change current hydraulic and hydrologic runoff patterns and impact downstream flooding. **Figure 3-84** shows the extent of flooding that occurred outside the NFIP mapped flood plains in Westchester County from the April 14-18<sup>th</sup>, 2007 Nor’easter.

**Figure 3-84**



### HAZUS Flood Loss Estimation Study – Town of Niskayuna, NY

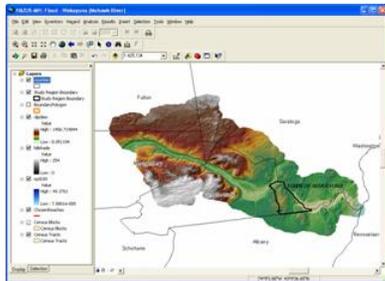
The 100-Year Floodplain Property Exposure Analysis that was conducted as part of the State Hazard Mitigation Plan update has identified the types, numbers and value of real property in the 100-year floodplain for 972 New York State Municipalities. As an “exposure” analysis it provides an indication of the flood risk but it does not provide an estimate of likely damage if a

100-year flood were to occur. In contrast, FEMA’s HAZUS model, which has been used by the State for earthquake and hurricane wind analysis as documented in other sections of this plan, generates loss estimates, including dollar damages, casualties, debris, shelter needs, etc.

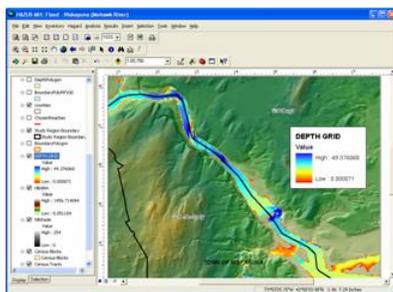
A test case use of the FEMA HAZUS Flood Model was conducted of the Town of Niskayuna, NY as part of the State Hazard Mitigation Plan update to evaluate the potentials of this model. This study identified advantages and limitations of the model, particularly in contrast to an exposure analysis and shown in **Figure 3-85**

**Figure 3-85**

**HAZARD IDENTIFICATION AND RISK ASSESSMENT**



*HAZUS calculates watershed for study area*



*HAZUS performs hydrologic analysis, generating flood inundation and water depths for depth-damage calculations*

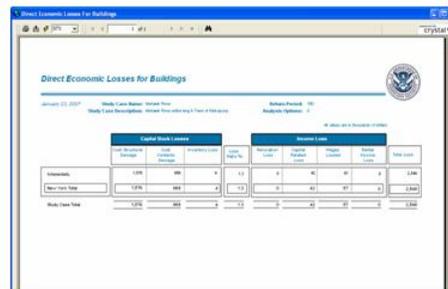
Use of FEMA HAZUS – GIS Based Modeling Software for Flood Loss Estimation\*

Advantages:

- Provides loss estimates for various flood scenarios, not just identification of properties at risk
- Analysis can be performed in areas where FEMA Q3 digital flood data is not available

Limitations:

- Default data is limited and may result in potentially wide margin of error in loss estimations



*HAZUS generates reports of estimated flood losses, including damage to buildings, vehicles, debris and shelter needs*

\* earthquake, hurricane, flood

The information gained from a HAZUS flood loss estimation study can be useful in developing a hazard mitigation plan and should be conducted as part of a flood risk assessment. This information will supplement the flood exposure analysis. The relationship of the numbers developed through exposure analysis to loss estimates should be explored further. With a significant number of community 100-year flood loss estimates generated from HAZUS, a comparison of these numbers to a community’s property exposure numbers may be possible. Through statistical analysis, it may be possible to determine the relationship between property exposure and loss estimates. For instance, this would enable estimates of how much damage is likely to occur in a 100-year flood given the types, numbers, and value of properties in the 100-year floodplain as provided by the exposure analysis. This would be useful given the number of communities we now have analyzed from a property exposure perspective.

**Community Rating System Program of the NFIP**

The NFIP’s Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. According to the FEMA web site, nationwide 1,002 communities

receive flood insurance premium discounts based on their implementation of local mitigation, outreach, and educational activities that go beyond minimum NFIP requirements. While premium discounts are one of the benefits of participation in CRS, it is more important that these communities are carrying out activities that save lives and reduce property damage. FEMA NFIP statistics indicate that those 1,002 CRS communities represent a significant portion of the Nation's flood risk as evidenced by the fact that over 66% of the NFIP's policy base is located in these communities. Based on this statistic, we must recognize those New York communities participating in CRS as being at higher flood risk than other communities. Twenty-seven New York communities in eleven Counties receive flood insurance discounts through participation in the CRS program of the NFIP. Of the over 1,600 communities participating in the NFIP program in NYS, only 27 are eligibly enrolled in the CRS program. While it is important that these 27 communities are carrying out activities that save lives and reduce property damage, they are also securing reduced National Flood Insurance Policy rates for individuals and families within these communities. Increasing overall CRS participation in New York State would have two potential significant positive impacts: 1) it would increase flood mitigation actions across the State and reduce flood losses; 2) it would result in added savings for individuals and families that have NFIP policies. NYS has already taken Flood Hazard Mitigation actions on a statewide basis that provides credits toward Local governments meeting the minimum requirement of 500 points to qualify for participation in the CRS program. Modest additional steps at the local level could result in further premium cost reductions and provided added flood mitigation measures. The insert below provides an example of what one Washington State community has done through the CRS program to reduce flooding risk and significantly lower flood insurance premium costs to its constituents.

King County Residents in the state of Washington will enjoy reduced flood insurance premiums, thanks to their county's active participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS). According to FEMA Region 10 Administrator Susan Reinertson, they'll not only pay less in insurance premiums, but enjoy reduced exposure to flood damage.

"The CRS rewards communities that proactively regulate floodplains, champion flood maps, flood preparedness and flood damage reduction policies, and engage in effective public awareness programs," said Reinertson. "King County's aggressive commitment to public safety and sound floodplain management has earned a Class 2 CRS rating, the highest of any County in the nation."

King County Executive Ron Sims agrees. "We've worked hard to foster community responsibility for hazard reduction, while enhancing education, training, and the public's awareness of flood hazards in King County," Sims said. "As a national leader in the Community Rating System, we are preparing for, responding to, and minimizing the impacts of future flood disasters."

Flood insurance premium reductions resulting from qualifying community activities run in five percent increments, from five percent to 45 percent. Class ratings range from Ten to One. The higher the flood protection activity, the lower the Class rating. King County's Class 2 Rating provides a 40 percent discount on King County NFIP policies, for an average annual premium of \$546. With 1,965 policies currently in force in unincorporated King County, that's an average savings of \$399 per policy for floodplain residents.

**Table 3-15** identifies jurisdictions receiving NFIP discounts by participation in the CRS program. Status: C = Current, R = Rescinded no longer qualify for program

**Table 3-15  
NFIP CRS Participants**

CRS#	Community	County	Current Class	Status
360226	Amherst, Town of	Erie	8	C
360147	Ashland, Town of	Chemung	9	C
360988	Bayville, Village of	Nassau	8	C
360148	Big Flats, Town of	Chemung	8	C
360149	Chemung, Town of	Chemung	9	C
360772	Corning, City of	Steuben	9	C
360463	East Rockaway, Village of	Nassau	9	C
360150	Elmira, City of	Chemung	8	C
360151	Elmira, Town of	Chemung	9	C
360774	Erwin, Town of	Steuben	9	C
360464	Freeport, Village of	Nassau	8	C
360417	Greece, Town of	Monroe	9	C
360153	Horseheads, Town of	Chemung	9	C
360154	Horseheads, Village of	Chemung	9	C
360308	Ilion, Village of	Herkimer	9	C
360047	Johnson City, Village	Broome	9	C
360247	Lackawanna, City of	Erie	9	C
360476	Lawrence, Village of	Nassau	7	C
360506	Niagara Falls, City of	Erie	8	C
360801	Northport, Village of	Suffolk	9	C
360667	Oneonta, City of	Otsego	9	C
360932	Scarsdale, Village of	Westchester	8	C
365342	Southampton, Town of	Suffolk	9	C
360156	Southport, Town of	Chemung	9	C
360595	Syracuse, City of	Onondaga	9	C
360056	Union, Town of	Broome	9	C
360157	Wellsburg, Village of	Chemung	9	C

**Probability of Future Flood Hazard Events**

Given the history of occurrences in New York State, it is certain that future flooding will occur. Therefore, we can express the probability of future flooding in New York State as high. This Plan expresses the probability of future flooding using simple historic frequency to indicate the future flooding potential.

Using documented historical flood disaster and emergency declaration information to estimate the probability of future flood declarations, our records indicate New York State has experienced 24 flood related disasters since 1984, therefore, can expect, on average, of one flood event meeting disaster criteria every year.

Based on analysis of records from the National Climatic Data Center of the National Oceanic and Atmospheric Administration (NOAA) future occurrences of flooding, which results in at least \$25 thousand in damages, can be projected as follows: 54 individual flooding events can be expected annually, of which 28 per year classified as “flash flood” events, and 25 per year classified as “flood” events. Further analysis indicates flash floods from ice jams is estimated to occur once every three (3) years, and coastal flooding approximately once every seven (7) years.

In summary, historical data indicates high frequency of general flood occurrence in New York State. The fact that the elements required for flooding exist and major damaging flooding has

occurred throughout the State in the past suggests that many people and properties are at risk from the flood hazard in New York State.

### **Flood Risk Assessment Methodologies**

In the previous sections, various ways of evaluating and looking at the risk of flooding were laid out for consideration. They include:

- a listing and statewide map of all high hazard dams in NYS
- a listing of all documented ice jam events occurring over the last five years
- a statewide map depicting the location of all recorded ice jam events, including the total number of incidences on individual waterways
- a listing of all the recorded coastal flooding events in NYS
- a listing of communities located within Coastal Erosion Hazard areas across NYS
- a listing of both un-declared and declared flood disaster events across the State
- maps and associated spreadsheet of the National Flood Insurance Program data for New York State municipalities
- maps and spreadsheets of Municipal and County totals of the number, type, and value of property located in a 100-year floodplain based on GIS analysis of FEMA Q3 digital flood maps with the NYS Office of Real Property Services parcel data (35 Counties only)
- comparison of NYS Municipalities NFIP statistics with the GIS flood property analysis, providing an indication of those communities that are potentially at greater risk due to percentages of property owners without flood insurance.
- an example of a flood loss estimation study using the HAZUS flood model, including a comparison of loss estimation with a property exposure analysis
- individual County maps showing the location and concentration “hot spots” of residential property within the 100-year floodplain
- a ranking of flood risk by County using specified risk factors

Obviously, there is no one, all encompassing way of looking at risk and we’re not suggesting that we identified all the factors that need to be considered. We’ve primarily focused on defining risk for those areas within the 100-year floodplain (those areas having at least a 1% chance of flooding during any given year). While we have focused on the 100-year floodplain, it is important for a community not to dismiss the risk associated with the 500-year floodplain. The probability for flooding to the full extent of the 500-year level is low (0.2% chance of flooding in any given year); however, flooding above the 100-year level is not uncommon as was shown in certain areas of the State during the June 2006 flooding event where 300-year flood levels were reached. In addition, it must be recognized that much of the flood damage that typically occurs is in areas that are outside a floodplain altogether, particularly in urban and densely populated areas where storm water runoff and ponding conditions are more likely.

While the GIS analysis of property in the 100-year floodplain includes information for all property classifications (agricultural, commercial, vacant, etc), a primary focus has been on residential property. This is based on residential properties comprising the greatest number and total value of property within floodplains and that damage to residences has the greatest impact on citizens. The analysis that has been conducted is an “exposure” assessment - identifying property that is in harm’s way. While indicating the potential for loss, exposure does not equate to the actual losses from a 100-flood event. In order to project actual flood losses - damage to structures, dollar losses, debris generation, number of people requiring shelter, etc - information

on flood inundation depths and elevations of individual structures is needed. While this information can be collected, it is generally not widely available and for most Municipalities it is cost prohibitive to obtain. The FEMA HAZUS flood modeling tool provides a cost effective alternative to estimate losses as it can be undertaken without building first floor elevations or for that matter a digital floodplain map. This may be of particular interest in those areas of the State where neither a FEMA Q3 digital flood map nor a Digital Flood Insurance Map (DFIRM) is available. This plan includes a sample HAZUS community flood loss estimation study for the Town of Niskayuna, N.Y. including a contrasting of the advantages and disadvantages of this tool with a property exposure analysis.

We encourage all Jurisdictions and Entities to use the following information and tools as guides in evaluating your community's risk to flooding. Your knowledge of local events, conditions, and special situations are critical and may cause you to include additional factors that we have not documented or discard methods employed in this plan.

### **Jurisdictions Threatened by and Vulnerable to Flood Hazard and Estimating Potential Losses**

**Tables 3-16 and 3-17** present the results of our vulnerability assessment depicting how vulnerable a County may be to flood hazards as determined by a final rating score. Each County accumulates points based on the value of each vulnerability indicator. The higher the indication for flood exposure the more points assigned resulting in a final rating score (see scoring table below). This plan presents two methods of analysis using two tables. The two tables are identical with one major exception. The first assessment method employed in **Table 3-16** overlays Q3 floodplain analysis data and NYS Office of Real Property Services assessed property value data. This approach provides a significant improvement over the methodology used in the previous Statewide Hazard Mitigation Plan to identify the properties and structures and the associated value of the structures that are exposed to the risk of flooding within a County. This methodology calculates a vulnerability score using 10 vulnerability indicators. The second method employed in **Table 3-17**, excludes Q3 floodplain analysis data resulting in 7 vulnerability indicators. The single reason for the two analysis presentations is simply because Q3 digital floodplain data is not yet available for all New York State Counties and in order to show a true comparison of County flood hazard vulnerability it is essential to use identical indicators. **[Please note that SEMO is aware that in addition to Q3 data, other ortho-digital information products have been developed, such as the digital flood plain maps developed by NYSDEC and various FEMA mapping Contractors. For the purposes of uniformity, other non Q3 digital floodplain sources such as FEMA DFIRM and local government floodplain digital products have not been incorporated.]**

The results of our flood hazard assessment present a gross indication of a County's vulnerability to flood hazard using readily available information. The analysis methodology for this section uses key vulnerability indicators to provide an assessment of vulnerability. Those vulnerability indicators reflect both the characteristics of the hazard and the built environment for the County. We acknowledge the limitations of this analysis to provide site specific or community specific accuracy and recognize that its applicability may not be appropriate beyond a general indication. Instead, the analysis results may be best used as a guide to help target communities that would benefit from further flood hazard and vulnerability analysis. Additional data for individual communities is available in the EXCEL spreadsheets in **Appendix 1** and should be used in assisting community planners in identifying the more specific risks and vulnerabilities of an individual community. The EXCEL spreadsheets provide detail on property exposed to risk

from flooding in the 100 year floodplain for each municipality and a breakdown of the number and value of structures according to various property classes (residential, commercial, industrial, etc.).

New York State has continued to improve on the data needed in order to allow a more comprehensive and accurate vulnerability assessment to be accomplished at the local level. In the previous Statewide Hazard Mitigation Plan, SEMO had committed to advance the accuracy of flood hazard risk assessment through future, more detailed, analyses using better data including local risk assessment information as it became available, and continued application of GIS technology. The analysis of Q3 floodplain data and the Real Property Exposure analysis in the 2008 Plan resulted in valuable data and creation of county floodplain maps. The floodplain maps provide valuable spatial representation of properties in the floodplain.

The use of real property data rather than HAZUS-MH census blocks that were used in the previous report produces better estimates of flood prone property exposure with better accuracy. This can be attributed to several factors. First, the property parcel data is the actual conditions as opposed a statistical estimate of buildings and consists of the most current data (2006) as reported in the local municipal tax roles. Secondly, as the RPS files maps individual property parcels as opposed to a census block aggregation (groups of parcels), it provides a better delineation of what is likely to be in or out of the flood zone. Parcel data is available in all of the 35 Counties where FEMA Q3 data is available. This “flood zone property exposure” methodology has been applied in each of the 35 Counties where the “Building Inventory within the 100-Year Flood Zone” maps have been developed. As this methodology results in more accurate estimates for Local level analysis of flood exposure, communities are encouraged to employ this method of assessment, where the Q3 data is available

**Table 3-16 County Jurisdictions Threatened and Vulnerable to Flood Loss (including Q3 flood & RPS data)**

County	Rating Score (Max 50)	# of NFIP insurance policies	# of NFIP claims	\$ total NFIP claims	\$ Mil total NFIP policy coverage	# of Repetitive Flood Loss Properties	# of residential structures in 100yr Floodplain	% of residential structures in 100yr Floodplain	% of County in 100yr Floodplain	# of Flood Disaster	Pop den. (sq mile)
Westchester	40	4,828	7,399	42,433,203	1,239,401,800	654	2,636	.7	10.87	6	1,988
Suffolk	39	35,499	15,315	142,171,144	9,261,714,400	1,747	15,113	2.8	7.81	4	1,603
Erie	37	4,206	2,532	9,083,194	502,888,700	167	10,197	2.4	6.89	7	888
Onondaga	36	1,832	790	4,702,386	256,379,500	38	4,318	2.2	11.41	5	569
Orange	35	1,598	1,073	7,454,353	271,314,300	82	2,644	2.0	9.7	7	445
Rockland	34	1,461	2,431	9,755,682	336,413,800	205	1,406	1.5	11.1	5	1,470
Broome	33	2,043	1,616	43,353,524	306,817,000	231	2,078	2.3	4.48	8	275
Monroe	33	2,211	561	2,336,790	304,892,300	24	7,501	2.4	7.95	4	1,106
Tioga	33	867	825	13,642,085	98,762,800	132	1,533	7.1	5.21	8	99
Ulster	31	1,085	642	7,934,274	192,468,600	46	1,854	2.3	7.03	12	157
Sullivan	31	756	880	13,396,032	124,256,100	108	1,551	3.3	4.82	11	77
Delaware	30	1,256	941	23,536,596	147,096,600	74	1,626	5.5	3.57	13	32
Chautauqua	29	705	2,105	7,565,573	79,509,700	266	1,935	3.0	6.61	4	126
Dutchess	28	966	332	1,801,774	204,016,900	13	2,345	2.1	7.79	5	358
Cattaraugus	27	794	698	3,258,705	91,808,200	98	1,833	4.6	4.75	8	62
Oneida	26	767	388	1,783,576	99,586,100	19	1,969	1.9	9.35	4	186
Steuben	26	957	382	1,650,104	113,301,300	11	2,138	4.6	4.81	9	70
Chemung	25	757	233	1,135,883	99,734,500	12	2,169	5.7	6.74	5	218
Chenango	25	618	385	5,374,124	64,256,800	32	1,460	6.1	4.87	5	58
Rensselaer	25	1,154	260	1,004,958	149,627,700	12	2,183	3.2	5.66	6	233
Allegany	24	466	563	1,657,308	36,825,200	97	1,314	5.3	4.14	9	49
Madison	24	626	214	929,244	65,479,300	11	1,677	5.7	7	5	106
Saratoga	24	859	361	2,885,351	130,656,900	42	1,992	2.2	6.27	2	255
Albany	23	758	195	1,765,509	133,991,500	18	1,317	1.0	5.01	3	559
Cayuga	23	377	235	879,676	43,849,100	12	1,882	5.3	11.18	4	111
Herkimer	23	497	159	1,001,323	49,758,400	4	2,042	6.3	8.9	7	44
Niagara	23	787	105	194,371	80,909,000	1	2,822	2.9	5.41	5	411

Oswego	23	414	184	1,013,195	51,790,500	10	2,165	4.0	15.55	4	122
Genesee	22	595	120	639,320	50,360,400	7	1,369	2.6	12.55	4	120
Cortland	21	523	269	2,171,717	49,636,800	17	1,142	5.6	4.19	4	97
Livingston	20	336	100	366,550	35,290,900	1	1,190	4.8	8.6	5	100
Ontario	19	425	200	853,408	71,968,000	3	989	2.2	6.35	3	158
Tompkins	19	299	213	1,519,737	45,252,300	12	443	1.1	3.17	8	204
Jefferson	18	365	168	671,642	47,445,500	7	2,246	4.1	5.46	2	90
Columbia	17	218	134	1,113,413	42,976,400	8	646	2.1	5.43	7	98
Nassau +	N/A	30,831	12,958	81,955,796	7,483,162,800	1,332	N/A	N/A	10.31	4	4,637
New York City +	N/A	28,143	21,016	68,245,464	5,609,680,200	2,323	N/A	N/A	10.54	4	26,824
Greene*	N/A	490	279	3,837,368	62,769,700	27	N/A	N/A	N/A	8	76
Schoharie*	N/A	446	357	4,086,182	66,869,900	39	N/A	N/A	N/A	8	52
Montgomery*	N/A	286	162	3,893,465	41,316,500	9	N/A	N/A	N/A	9	119
Otsego*	N/A	499	284	6,180,373	66,023,200	5	N/A	N/A	N/A	5	62
Schenectady*	N/A	363	191	1,423,894	49,410,500	18	N/A	N/A	N/A	4	712
Putnam*	N/A	294	222	670,728	79,300,500	11	N/A	N/A	N/A	5	409
Essex*	N/A	231	266	1,445,832	36,542,600	18	N/A	N/A	N/A	5	21
Clinton*	N/A	213	190	1,492,713	34,075,000	16	N/A	N/A	N/A	3	78
Fulton*	N/A	155	72	686,103	19,228,300	6	N/A	N/A	N/A	3	104
Orleans*	N/A	108	35	69,411	12,659,900	1	N/A	N/A	N/A	4	110
Warren*	N/A	238	107	376,044	44,152,400	2	N/A	N/A	N/A	3	70
Washington*	N/A	181	114	600,998	23,132,900	4	N/A	N/A	N/A	3	75
Wayne*	N/A	224	104	523,617	31,389,800	3	N/A	N/A	N/A	1	154
Wyoming*	N/A	194	124	1,105,557	18,019,500	9	N/A	N/A	N/A	3	72
Yates*	N/A	240	92	206,269	33,008,400	0	N/A	N/A	N/A	6	66
Hamilton*	N/A	64	44	204,650	9,782,300	3	N/A	N/A	N/A	3	3
Lewis*	N/A	75	44	344,304	8,286,300	3	N/A	N/A	N/A	4	21
Schuyler*	N/A	78	49	302,890	10,027,800	0	N/A	N/A	N/A	4	57
Seneca*	N/A	136	79	433,767	17,838,900	7	N/A	N/A	N/A	0	89
St.Lawrence*	N/A	163	76	351,238	18,629,700	3	N/A	N/A	N/A	1	40
Franklin*	N/A	113	33	165,196	14,156,400	0	N/A	N/A	N/A	3	30

Sources: FEMA NFIP, Q3, US Census and NYS ORPS data, Analysis supported by GIS technology. + indicates that RPS data not available. \* indicates Q3 not available.

**Score Method-Jurisdiction Most Threatened/ Vulnerable to Flood/Flood Loss (including Q3 flood data)**

County	Rating Score	# of NFIP insurance policies	# of NFIP claims	\$ total NFIP claims	\$ Mil total NFIP policy coverage	# of Repetitive Flood Loss Properties	# and % of residential structures in 100yr Floodplain		% of County in 100yr Floodplain	# of Flood Disasters	Pop. Density
<b>Rating Score - Variables Distributions and Point Values</b>	1	64-300	33-259	36-700k	2-18.5m	1-10	646-1899	0-2	3-4.9	2	1 – 49
	2	301-525	260-461	701-1.5M	18.6m-45m	11-20	1900-2499	3-4	5-6.9	3-4	50 – 99
	3	526-750	462-778	1.5M-3.0M	46m-150m	21-100	2500-2999	5-6	7-8.5	5-6	100 – 299
	4	751-1950	779-5956	3.0M-10.0M	151m-735m	101-1000	3000-4999	7-8	8.6-10.5	7-8	300 – 1999
	5	1951-35499	5957-21016	10.0M-142.2M	736m-9.3B	1001-2500	5000-27000	9-10	10.6-17	9-13	2000 - 67,000

**Table 3-17 - County Jurisdiction Threatened and Vulnerable to Flood Loss**

<b>(excluding Q3 flood data)</b>									
County	Rating Score	# of NFIP insurance policies	# of NFIP claims	\$ total NFIP claims	\$ Mil total NFIP policy coverage	# of Repetitive Flood Loss Properties	# of Flood Disasters	Pop density (HAZUS)	
Nassau	32	30,831	12,958	81,955,796	7,483,162,800	1,332	4	4,637	
New York City	32	28,143	21,016	68,245,464	5,609,680,200	2,323	4	26,824	
Suffolk	31	35,499	15,315	142,171,144	9,261,714,400	1,747	4	1,603	
Westchester	31	4,828	7,399	42,433,203	1,239,401,800	654	6	1,988	
Broome	29	2,043	1,616	43,353,524	306,817,000	231	8	275	
Erie	29	4,206	2,532	9,083,194	502,888,700	167	7	888	
Orange	27	1,598	1,073	7,454,353	271,314,300	82	7	445	
Rockland	27	1,461	2,431	9,755,682	336,413,800	205	5	1,470	
Onondaga	26	1,832	790	4,702,386	256,379,500	38	5	569	
Tioga	26	867	825	13,642,085	98,762,800	132	8	99	
Ulster	26	1,085	642	7,934,274	192,468,600	46	12	157	
Cattaraugus	25	794	698	3,258,705	91,808,200	98	8	62	
Delaware	25	1,256	941	23,536,596	147,096,600	74	13	32	
Monroe	24	2,211	561	2,336,790	304,892,300	24	4	1,106	
Sullivan	24	756	880	13,396,032	124,256,100	108	11	77	
Chautauqua	23	705	2,105	7,565,573	79,509,700	266	4	126	
Dutchess	22	966	332	1,801,774	204,016,900	13	5	358	
Steuben	21	957	382	1,650,104	113,301,300	11	9	70	
Chenango	20	618	385	5,374,124	64,256,800	32	5	58	
Greene	20	490	279	3,837,368	62,769,700	27	8	76	
Schoharie	20	446	357	4,086,182	66,869,900	39	8	52	
Albany	19	758	195	1,765,509	133,991,500	18	3	559	
Allegany	19	466	563	1,657,308	36,825,200	97	9	49	
Oneida	19	767	388	1,783,576	99,586,100	19	4	186	

Rensselaer	19	1,154	260	1,004,958	149,627,700	12	6	233
Saratoga	19	859	361	2,885,351	130,656,900	42	2	255
Chemung	18	757	233	1,135,883	99,734,500	12	5	218
Montgomery	18	286	162	3,893,465	41,316,500	9	9	119
Madison	17	626	214	929,244	65,479,300	11	5	106
Niagara	17	787	105	194,371	80,909,000	1	5	411
Cortland	16	523	269	2,171,717	49,636,800	17	4	97
Schenectady	16	363	191	1,423,894	49,410,500	18	4	712
Tompkins	16	299	213	1,519,737	45,252,300	12	8	204
Cayuga	15	377	235	879,676	43,849,100	12	4	111
Putnam	15	294	222	670,728	79,300,500	11	5	409
Genesee	14	595	120	639,320	50,360,400	7	4	120
Herkimer	14	497	159	1,001,323	49,758,400	4	7	44
Ontario	14	425	200	853,408	71,968,000	3	3	158
Oswego	14	414	184	1,013,195	51,790,500	10	4	122
Columbia	13	218	134	1,113,413	42,976,400	8	7	98
Essex	13	231	266	1,445,832	36,542,600	18	5	21
Livingston	13	336	100	366,550	35,290,900	1	5	100
Clinton	12	213	190	1,492,713	34,075,000	16	3	78
Fulton	11	155	72	686,103	19,228,300	6	3	104
Jefferson	11	365	168	671,642	47,445,500	7	2	90
Orleans	10	108	35	69,411	12,659,900	1	4	110
Warren	10	238	107	376,044	44,152,400	2	3	70
Washington	10	181	114	600,998	23,132,900	4	3	75
Wayne	10	224	104	523,617	31,389,800	3	1	154
Wyoming	10	194	124	1,105,557	18,019,500	9	3	72
Yates	10	240	92	206,269	33,008,400	0	6	66
Hamilton	8	64	44	204,650	9,782,300	3	3	3
Lewis	8	75	44	344,304	8,286,300	3	4	21
Schuyler	8	78	49	302,890	10,027,800	0	4	57
St.Lawrence	8	163	76	351,238	18,629,700	3	1	40
Franklin	7	113	33	165,196	14,156,400	0	3	30
Seneca	7	136	79	433,767	17,838,900	7	0	89

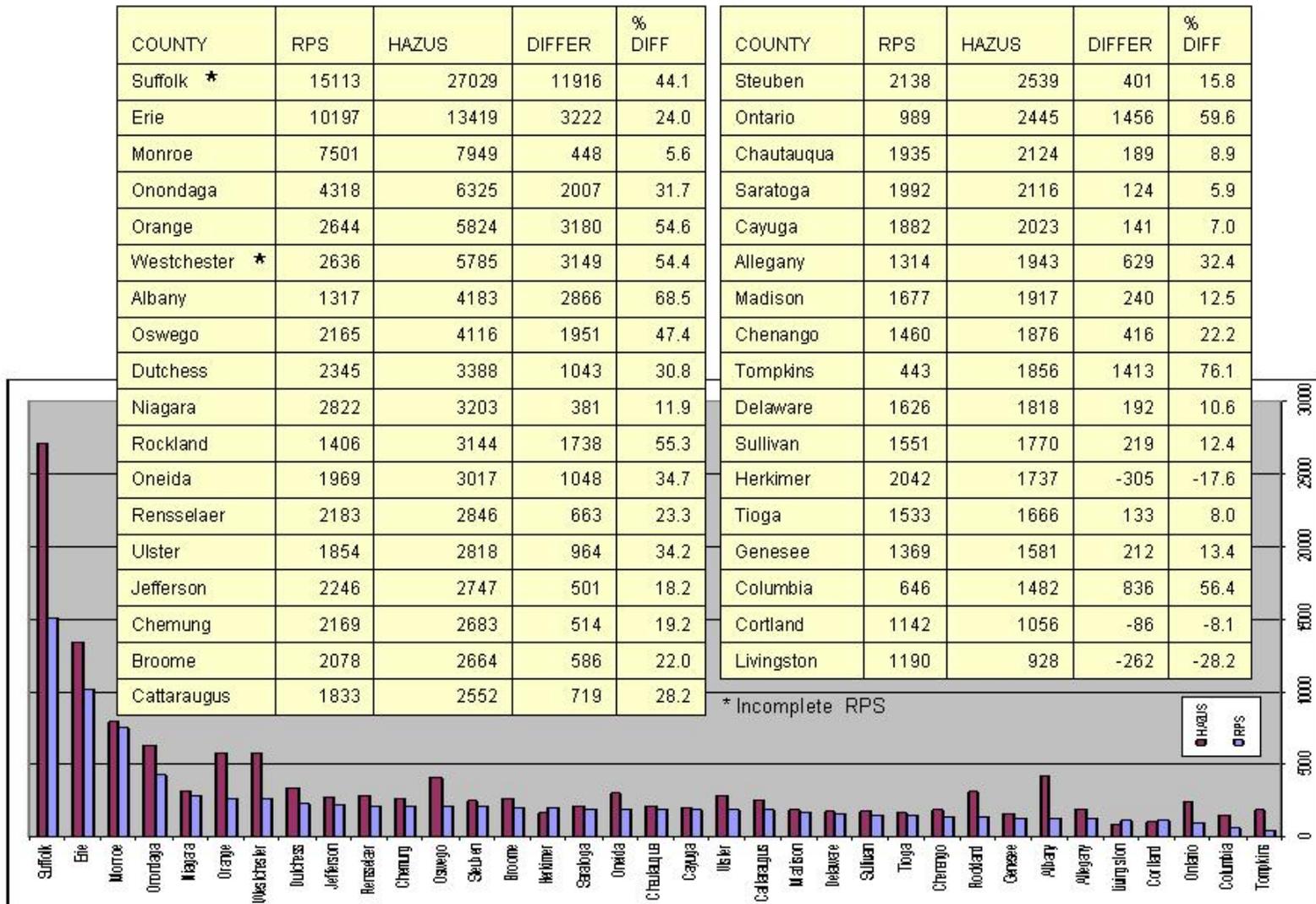
Sources: FEMA NFIP and US Census data. Analysis supported by GIS technology.

**Score Method-Jurisdiction Most Threatened/ Vulnerable to Flood/Flood Loss (excluding Q3 flood data)**

County	Rating Score	# of NFIP insurance policies	# of NFIP claims	\$ total NFIP claims	\$ Mil total NFIP policy coverage	# of Repetitive Flood Loss Properties	# of Flood Disasters	Pop. Density
<b>Rating Score - Variables Distributions and Point Values</b>	1	64-300	33-259	36-700k	2-18.5m	1-10	2	1 - 49
	2	301-525	260-461	701-1.5M	18.6m-45m	11-20	3-4	50 - 99
	3	526-750	462-778	1.5M-3.0M	46m-150m	21-100	5-6	100 - 299
	4	751-1950	779-5956	3.0M-10.0M	151m-735m	101-1000	7-8	300 - 1999
	5	1951-35499	5957-21016	10.0M-142.2M	736m-9.3B	1001-2500	9-13	2000 - 67,000

**Figure 3-85A**

Comparison of Estimated Residential Properties in a 100-Year Flood Zone  
 2004 State Hazard Mitigation Plan HAZUS Census Block Intersection with Q3 vs 2007 Plan RPS Parcel Center Point



## Estimating Potential Flood Loss by Jurisdiction

**Table 3-18** is the result of our flood loss analysis which presents a gross estimate of potential flood losses by County using readily available information. We believe our analysis methodology is sound in that it provides a reasonable estimate of potential flood loss expressed in terms of total exposure. We certainly acknowledge its limitations for complete accuracy and that its applicability may not be appropriate beyond a general indication, especially at the Local level. We have established activities in our mitigation strategy that will advance the accuracy of the flood risk assessment through future more detailed analysis using Local risk assessment information, better data as it becomes available and continued application of GIS technology. Furthermore, it is our position that the State plan addresses issues at the County level. Municipalities understand that they should use the information herein as a guide in their detailed and locally specific analyses.

Our flood loss analysis and estimation methodology involved the following: an identification of properties considered vulnerable to flooding and an estimation of dollar value. The total number of at-risk residential structures is presented for analysis two ways: first, using Q3 floodplain data and applying GIS technology and analysis by overlaying the Q3 data and the Office of Real Property Services data and second, through statistical estimation of total structures in the floodplain using NFIP insurance report data which provides the number of insured structures in the floodplain. Federal and State NFIP and floodplain management officials estimate that the overall number of insured structures in the floodplain represents only 30% of the actual number of structures in the floodplain. Using this assumption, a simple calculation was made to estimate total number of structures in the floodplain. Dollar value of the identified at-risk structures is estimated using median sales price of existing (residential) single family homes by County as found in the 2003 New York State Statistical Reference Almanac. **Table 3-18** presents the two methods of loss estimate analysis, sorted by dollar value loss from greatest to lowest loss potential. It is recommended that you use the right side of **Table 3-18** to estimate loss potential only where Q3 or Real Property Services data is missing.

**Table 3-19** is shown for comparison purposes only. This is the exact data presented in the original 2005 Statewide Hazard Mitigation Plan. You will note that the 2005 estimates of structures within the Q3 zones are considerably higher, for the most part, than the data shown in the 2008 plan. In the 2005 plan, the Q3 data was overlaid on the HAZUS-MH statistical data. This was the best data available at that time, but significantly inflated the number of structures at risk.

**Table 3-18**  
**Estimating Potential Flood Loss by County**

Using Q3- number and estimated value of residential structures in 100yr Floodplain			Using NFIP data – calculated estimate- number and estimated value of structures in 100y floodplain				
County (2)	Q3 # in floodplain	Calculated estimate \$ Value	County	FEMA NFIP #	Calculated NFIP #	Median Sale Price (1)	Calculated estimate \$ Value
Suffolk	15,133	\$15,284,000,000	Nassau	30,831	102,770	\$489,000	\$50,254,530,000
Westchester	2,636	\$2,523,000,000	New York City**	28,143	93,810	\$520,000	\$48,781,200,000
Erie	10,197	\$1,263,000,000	Suffolk	15113	50,377	\$397,450	\$20,022,338,650
Monroe	7,501	\$1,053,000,000	Westchester	4,828	16,093	\$670,000	\$10,782,310,000

County		Using Q3- number and estimated value of residential structures in 100yr Floodplain		County		Using NFIP data – calculated estimate- number and estimated value of structures in 100y floodplain		
County (2)	Q3 # in floodplain	Calculated estimate \$ Value	County	FEMA NFIP #	Calculated NFIP #	Median Sale Price (1)	Calculated estimate \$ Value	
Dutchess	2,345	\$715,000,000	Dutchess	966	3,220	\$342,000	\$4,794,840,000	
Orange	2,644	\$690,000,000	Rockland	1,461	4,870	\$498,000	\$2,425,260,000	
Rockland	1,406	\$612,000,000	Orange	1,598	5,327	\$317,600	\$1,691,855,200	
Onondaga	4,318	\$524,000,000	Ulster	1,085	3,617	\$250,000	\$904,250,000	
Ulster	1,854	\$395,000,000	Monroe	2,211	7,370	\$118,000	\$869,660,000	
Saratoga	1,992	\$332,000,000	Onondaga	1,832	6,107	\$123,000	\$751,161,000	
Herkimer	2,042	\$296,000,000	Rensselaer	1,154	3,847	\$155,000	\$596,285,000	
Ontario	989	\$285,000,000	Columbia	218	727	\$239,000	\$416,577,000	
Niagara	2,822	\$272,000,000	Putnam	294	980	\$410,000	\$401,800,000	
Cayuga	1,882	\$269,000,000	Sullivan	756	2,520	\$159,000	\$400,680,000	
Jefferson	2,246	\$265,000,000	Allegany	466	1,553	\$52,268	\$355,945,080	
Sullivan	1,551	\$247,000,000	Cortland	523	1,743	\$84,800	\$355,057,600	
Steuben	2,138	\$206,000,000	Albany	758	2,527	\$189,900	\$294,914,700	
Rensselaer	2,183	\$204,000,000	Tioga	867	2,890	\$100,850	\$291,456,500	
Chautauqua	1,935	\$201,000,000	Schenectady	363	1,210	\$230,000	\$278,300,000	
Oswego	2,165	\$196,000,000	Steuben	957	3,190	\$79,750	\$254,402,500	
Oneida	1,969	\$181,000,000	Madison	626	2,087	\$119,450	\$249,292,150	
Madison	1,677	\$174,000,000	Broome	2043	6,810	\$92,500	\$244,847,500	
Livingston	1,190	\$169,000,000	Oneida	767	2,557	\$91,050	\$232,814,850	
Albany	1,317	\$162,000,000	Niagara	787	2,623	\$85,000	\$222,955,000	
Broome	2,078	\$136,000,000	Schoharie	446	1,487	\$141,850	\$210,930,950	
Columbia	646	\$135,000,000	Cayuga	377	1,257	\$86,000	\$202,100,000	
Cattaraugus	1,833	\$132,000,000	Otsego	499	1,663	\$112,500	\$187,087,500	
Delaware	1,626	\$127,000,000	Saratoga	859	2,863	\$65,000	\$186,095,000	
Tioga	1,533	\$114,000,000	Ontario	425	1,417	\$125,900	\$178,400,300	
Chemung	2,169	\$110,000,000	Chautauqua	705	2,350	\$69,000	\$174,087,000	
Genesee	1,369	\$103,000,000	Tompkins	299	997	\$164,800	\$164,305,600	
Cortland	1,142	\$93,000,000	Chemung	757	2,523	\$77,250	\$159,135,000	
Chenango	1,460	\$88,000,000	Fulton	155	517	\$75,000	\$148,725,000	
Tompkins	443	\$70,000,000	Genesee	595	1,983	\$85,000	\$138,805,000	
Allegany	1,314	\$59,000,000	Warren	238	793	\$174,950	\$138,735,350	
			Herkimer	497	1,657	\$74,900	\$124,109,300	
			Livingston	336	1,120	\$105,750	\$118,440,000	
Bronx	Not available	Not available	Jefferson	365	1,217	\$92,500	\$112,572,500	
Clinton*	Not available	Not available	Oswego	414	1,380	\$77,000	\$106,260,000	
Essex*	Not available	Not available	Clinton	213	710	\$123,000	\$89,421,000	
Franklin*	Not available	Not available	Yates	240	800	\$111,000	\$88,800,000	
Fulton*	Not available	Not available	Cattaraugus	794	2,647	\$69,000	\$86,733,000	
Greene*	Not available	Not available	Wayne	224	747	\$110,000	\$82,170,000	
Hamilton*	Not available	Not available	Erie	4,206	14,020	\$105,000	\$80,850,000	
Kings Brooklyn	Not available	Not available	Montgomery	286	953	\$77,500	\$73,857,500	
Lewis*	Not available	Not available	Washington	181	603	\$105,000	\$63,315,000	
Montgomery*	Not available	Not available	Essex	231	770	\$165,000	\$62,205,000	
Nassau	Not available	Not available	Chenango	618	2,060	\$80,000	\$56,800,000	
Manhattan	Not available	Not available	Wyoming	194	647	\$77,913	\$50,409,711	
Orleans*	Not available	Not available	Seneca	136	453	\$105,000	\$47,565,000	
Otsego*	Not available	Not available	St. Lawrence	163	543	\$87,000	\$47,241,000	
Putnam*	Not available	Not available	Franklin	113	377	\$78,500	\$40,584,500	
Queens	Not available	Not available	Delaware	1256	4,187	\$114,900	\$36,768,000	
Richmond	Not available	Not available	Greene	490	1,633	\$164,000	\$34,932,000	
Schenectady*	Not available	Not available	Schuyler	78	260	\$120,000	\$31,200,000	
Schoharie*	Not available	Not available	Orleans	108	360	\$73,000	\$26,280,000	
Schuyler*	Not available	Not available	Lewis	75	250	\$73,000	\$18,250,000	
Seneca*	Not available	Not available	Hamilton	64	213	NA	NA	
St. Lawrence*	Not available	Not available						
Warren*	Not available	Not available						
Washington*	Not available	Not available						
Wayne*	Not available	Not available						
Wyoming*	Not available	Not available						
Yates*	Not available	Not available						

Source: (1) 2006 median sales prices by county for residential single family homes derived from NYS Real Property Services statistical data base . (2) County\* indicates Q3 data not readily available. \*\* New York City NFIP stats include 5 boroughs, value estimate determined using average of known median sale prices ~290K.

**Table 3-19**  
**Estimating Potential Flood Loss by County 2005 TABLE (for comparison only)**

Using Q3- number and estimated value of residential structures in 100yr Floodplain		County		Using NFIP data – calculated estimate- number and estimated value of structures in 100yr floodplain			
County	Q3 # in floodplain	Calculated estimate \$ Value*	County	FEMA NFIP #	Calculated NFIP #	Median Sale Price ***	Calculated estimate \$ Value*
Nassau	23,592	8,611,080,000	Nassau	16,103	53,676	\$365,000	19,591,740,000
Suffolk	27,029	7,703,265,000	Suffolk	18,190	60,633	\$285,000	17,280,405,000
Queens	10,132	3,368,890,000	New York City**	10,276	**34,253	\$288,000	9,933,370,000
Westchester	5,785	3,034,232,500	Westchester	1,790	6,203	\$524,500	3,253,473,500
Richmond (Staten Island)	7,065	2,034,720,000	Erie	2,495	9,816	\$88,850	872,151,600
Orange	5824	1,455,708,800	Rockland	536	1786	\$362,500	647,425,000
Erie	13419	1,192,278,150	Monroe	1468	4893	\$113,000	552,909,000
Kings Brooklyn	4309	1,169,893,500	Orange	639	2130	\$249,950	532,393,500
Rockland	3144	1,139,700,000	Onondaga	1155	3850	\$90,000	346,500,000
Monroe	7949	898,237,000	Dutchess	381	1270	\$265,000	336,550,000
Dutchess	3388	897,820,000	Rensselaer	696	2320	\$117,075	271,614,000
Onondaga	6325	569,250,000	Saratoga	481	1603	\$167,000	267,701,000
Albany	4183	551,319,400	Ulster	448	1493	\$156,500	233,654,500
Ulster	2818	441,017,000	Albany	406	1353	\$131,800	178,325,400
Saratoga	2116	353,372,000	Tioga	461	1536	\$103,750	163,968,000
Rensselaer	2846	333,195,450	Niagara	632	2106	\$69,750	146,893,500
Oswego	4116	288,243,480	Madison	425	1416	\$79,900	113,138,400
Ontario	2445	244,500,000	Genesee	381	1270	\$87,500	111,125,000
Herkimer	1737	243,180,000	Delaware	537	1790	\$60,000	107,400,000
Columbia	1482	228,228,000	Broome	428	1426	\$71,900	102,529,400
Niagara	3203	223,409,250	Putnam	83	276	\$347,000	95,772,000
Tompkins	1856	214,368,000	Oneida	418	1393	\$68,250	95,072,250
Oneida	3017	205,910,250	Steuben	454	1513	\$61,100	92,444,300
Broome	2664	191,541,600	Cortland	417	1390	\$66,250	92,087,500
Chemung	2683	182,444,000	Sullivan	270	900	\$99,500	89,550,000
Jefferson	2747	178,555,000	Chautauqua	409	1363	\$64,775	88,288,325
Tioga	1666	177,845,500	Chemung	388	1293	\$68,000	87,924,000
Sullivan	1770	176,115,000	Greene	219	730	\$115,000	83,950,000
Cayuga	2023	155,265,250	Essex	108	360	\$227,000	81,720,000
Steuben	2539	155,132,900	Ontario	233	776	\$100,000	77,600,000
Madison	1917	153,168,300	Cattaraugus	427	1423	\$53,000	75,419,000
Genesee	1581	138,337,500	Allegany	296	986	\$62,250	61,378,500
Chautauqua	2124	137,582,100	Tompkins	159	530	\$115,500	61,215,000
Cattaraugus	2552	135,256,000	Schoharie	214	713	\$85,450	60,925,850
Allegany	1943	120,951,750	Warren	127	423	\$144,000	60,912,000
Delaware	1818	109,080,000	Chenango	318	1060	\$54,353	57,614,180
Chenango	1876	101,966,228	Otsego	188	626	\$90,000	56,340,000
Livingston	928	72,384,000	Columbia	109	363	\$154,000	55,902,000
Cortland	1056	69,960,000	Cayuga	214	713	\$76,750	54,722,750
Wyoming*	73	5,964,100	Oswego	210	700	\$70,030	49,021,000
Fulton*	Not available	369,999	Schenectady	143	476	\$101,000	48,076,000
Bronx	2183	Not available	Livingston	178	593	\$78,000	46,254,000
Clinton*	Not available	Not available	Yates	134	446	\$86,000	38,356,000
Essex*	Not available	Not available	Wayne	121	403	\$92,750	37,378,250
Franklin*	Not available	Not available	Wyoming	123	410	\$81,700	33,497,000
Greene*	Not available	Not available	Jefferson	148	493	\$65,000	32,045,000
Hamilton*	Not available	Not available	Clinton	91	303	\$97,500	29,542,500
Lewis*	Not available	Not available	Seneca	81	270	\$83,000	22,410,000
Montgomery*	Not available	Not available	Washington	79	263	\$79,310	20,858,530
New York City**	Not available	Not available	Montgomery	74	246	\$70,000	17,220,000
NYC Manhattan	920	Not available	Franklin	60	200	\$271,500	14,000,000
Orleans*	Not available	Not available	Herkimer	296	986	\$14,000	13,804,000
Otsego*	Not available	Not available	St. Lawrence	71	236	\$55,000	12,980,000
Putnam*	Not available	Not available	Fulton	78	260	\$41,111	10,688,860

Using Q3- number and estimated value of residential structures in 100yr Floodplain			Using NFIP data – calculated estimate- number and estimated value of structures in 100y floodplain				
County	Q3 # in floodplain	Calculated estimate \$ Value*	County	FEMA NFIP #	Calculate d NFIP #	Median Sale Price ***	Calculated estimate \$ Value*
Schenectady*	Not available	Not available	Orleans	44	146	\$67,300	9,825,800
Schoharie*	Not available	Not available	Schuyler	26	86	\$105,000	9,030,000
Schuyler*	Not available	Not available	Lewis	42	140	\$56,000	7,840,000
Seneca*	Not available	Not available	Hamilton	24	80	\$87,000	6,960,000
St. Lawrence*	Not available	Not available	Bronx	**Not available		**Not available	Not available
Warren*	Not available	Not available	Kings Brooklyn	**Not available		**Not available	Not available
Washington*	Not available	Not available	NYC Manhattan	**Not available		**Not available	Not available
Wayne*	Not available	Not available	Queens	**Not available		**Not available	Not available
Yates*	Not available	Not available	Richmond Staten Isl.	**Not available		**Not available	Not available

Source: FEMA NFIP Q3 data and \*\*\* 2003 New York State Statistical Yearbook, 28<sup>th</sup> Edition by the Rockefeller Institute of Government, State University of New York which provided median sales prices by county for residential single family homes used to calculate estimated value exposed property. County\* indicates Q3 data not readily available. \*\* New York City NFIP stats include 5 boroughs, value estimate determined using average of known median sale prices ~290K.

## State Facilities – Assessing Vulnerability and Estimating Loss from Flood Hazard

Table 3-20 presents the results of our flood vulnerability assessment and loss analysis for State facilities. The results present a gross estimate of potential flood losses to those identified vulnerable State facilities in terms of dollar value of exposed property. Collaboration with key State agencies that manage State fixed assets resulted in the identification of two (2) State databases that provided key facility information. The NYS Offices of General Services (OGS) fixed asset data base and Cyber Security Critical Infrastructure Coordination (CSCIC) database included fields identifying whether the facility is in the floodplain (yes or no) and building replacement value. The analysis methodology for this plan section presents potential loss estimate in terms of total exposure and property value using generally accepted and readily available information. We certainly acknowledge its limitations for complete accuracy and that its applicability may not be appropriate beyond a general indication. Instead, the first level analysis is best used as a stepping stone to continue the analysis; it identifies facilities that might benefit from further analysis. Further analysis may include activity as simple as determining the general accuracy or verification of the floodplain field in the data base or a more sophisticated analysis such as determining elevation of structures so that 100 year floodplain water depths can be established. We have established activities in our mitigation strategy that will advance the accuracy of the flood risk assessment including further analysis using GIS technology application and Q3 or other digital flood data as it becomes available.

**Table 3-20  
Flood Hazard Exposure (in 100 year floodplain)New York State Agency Facilities**

NY State Agency	Total Facilities	Total number # and percent % in floodplain		Critical facilities total number # and \$ and percent % in floodplain
		# and \$	%	
Department of Environmental Conservation	1880	7	0.4 %	0
	\$104,611,361	\$1,782,837	1.7 %	0
Department of Transportation	908	33	3.6 %	0*
	\$232,514,852	\$48,153,066	20 %	0*
Office of General Services	130	6	4.6 %	6 (4.6%)
	<b>\$2,133,659,048</b>	\$8,110,562	0.40%	\$8,110,562 (.4%)
State Emergency Management Office	4	0		0
	\$3,365,434	0		0
<b>Number of facilities Total</b>	<b>2922</b>	<b>46</b>	<b>1.6%</b>	<b>6 (.2%)</b>
<b>Approximate Replacement Value of Structure(\$)</b>	<b>\$2,472,819,244</b>	<b>\$58,046,465</b>	<b>2.35%</b>	<b>\$8,110,562 (.38%)</b>

Source: NYS Fixed Asset information -Offices of General Services and Cyber Security Critical Infrastructure Coordination data bases, FEMA Q3 digital floodplain mapping data. Analysis supported by GIS technology. \* DOT facility determined critical is included in the OGS listing. Data last updated in 2003.