

### 5.3 HAZARD RISK RANKING

After the hazards of concern were identified for Tioga County, the hazard risks were ranked to describe their probability of occurrence and their impact on population, property (general building stock including critical facilities) and the economy. Each participating Town or Village may have differing degrees of risk exposure and vulnerability compared to the County as a whole; therefore each Town/Village ranked the degree of risk to each hazard as it pertains to their community using the same methodology as applied to the County-wide ranking. This assures consistency in the overall ranking of risk process. The hazard risk ranking for each participating Town or Village can be found in their jurisdictional annex in Volume II of this Plan. It is noted that, although the raw rankings are unique for each participant, the overall resulting rankings are consistent with the County hazard risk rankings. This may be due, in part, to the recent flood hazard events (both riverine and flash flooding) that have affected all jurisdictions hence increasing exposure and damages resulting from flooding across the County.

#### HAZARD RISK RANKING METHODOLOGY

The methodology used to rank the hazards of concern for Tioga County is described below. Estimates of risk for the County were developed using methodologies promoted by FEMA’s hazard mitigation planning guidance and generated by FEMA’s HAZUS-MH risk assessment tool.

#### Probability of Occurrence

The probability of occurrence is an estimate of how often a hazard event occurs. A review of historic events assists with this determination. Each hazard of concern is rated in accordance with the numerical ratings and definitions in Table 5.3-1.

Table 5.3-1. Probability of Occurrence Ranking Factors

Rating	Probability	Definition
0	None	Hazard event is not likely to occur.
1	Rare	Hazard event is not likely to occur within 100 years.
2	Occasional	Hazard event is likely to occur within 100 years.
3	Frequent	Hazard event is likely to occur within 25 years.

#### Impact

The impact of each hazard is considered in three categories: impact on population, impact on property (general building stock including critical facilities), and impact on the economy. Based on documented historic losses and a subjective assessment by the Planning Committee, an impact rating of high, medium, or low is assigned with a corresponding numeric value for each hazard of concern. In addition, a weighting factor is assigned to each impact category: three (3) for population, two (2) for property, and one (1) for economy. This gives the impact on population the greatest weight in evaluating the impact of a hazard.

Table 5.3-2 presents the numerical rating, weighted factor and description for each impact category. The impact rating definitions for population and property are consistent with the New York State Hazard

## SECTION 5.3: RISK ASSESSMENT - HAZARD RISK RANKING

Mitigation Plan (NYS HMP) ranking methodology with minor modifications. Impact to the economy is also being evaluated.

Table 5.3-2. Numerical Values and Definitions for Impacts on Population, Property and Economy

Category	Weighting Factor	Low Impact (1)	Medium Impact (2)	High Impact (3)
Population*	3	14% or less of your developed land area is exposed to a hazard due to its extent and location	15% to 29% of your developed land area is exposed to a hazard due to its extent and location	30% or more of your developed land area is exposed to a hazard due to its extent and location
Property*	2	Property exposure is 14% or less of the total replacement cost for your community	Property exposure is 15% to 29% of the total replacement for your community	Property exposure is 30% or more of the total replacement cost for your community
Economy	1	Loss estimate is 9% or less of the total replacement cost for your community	Loss estimate is 10% to 19% of the total replacement cost for your community	Loss estimate is 20% or more of the total replacement cost for your community

Note: A numerical value of zero is assigned if there is no impact.

\*For the purposes of this exercise, “impacted” means exposed for population and property and loss for economy.

### Risk Ranking Value

The risk ranking for each hazard is then calculated by multiplying the numerical value for probability of occurrence by the sum of the numerical values for impact. The equation is as follows: Probability of Occurrence Value (1, 2, or 3) X Impact Value (6 to 18) = Hazard Ranking Value. Based on the total for each hazard, a priority ranking is assigned to each hazard of concern (high, medium, or low).

### HAZARD RISK RANKING RESULTS

Using the process described above, the risk ranking for the identified hazards of concern was determined for Tioga County. Based on the combined risk values for probability of occurrence and impact to Tioga County, a priority ranking of “high”, “medium” or “low” risk was assigned. The hazard ranking for Tioga County, from high to low risk, is summarized below:

1. Flooding
2. Severe Storm
3. Severe Winter Storm
4. Earthquake
5. Drought

The following tables present the step-wise process for the ranking. Table 5.3-3 shows the probability ranking assigned for likelihood of occurrence for each hazard.

Table 5.3-3. Probability of Occurrence Ranking for Hazards of Concern for Tioga County

Hazard of Concern	Probability	Numeric Value
Drought	Frequent	3
Earthquake	Occasional	2

## SECTION 5.3: RISK ASSESSMENT - HAZARD RISK RANKING

Hazard of Concern	Probability	Numeric Value
Flood	Frequent	3
Severe Storm	Frequent	3
Severe Winter Storm	Frequent	3

Table 5.3-4 shows the impact evaluation results for each hazard of concern, including impact on property, structures, and the economy. The weighting factor results and a total impact for each hazard also are summarized.

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**SECTION 5.3: RISK ASSESSMENT - HAZARD RISK RANKING**

Table 5.3-4. Impact Ranking for Hazards of Concern for Tioga County

Hazard of Concern	Population			Property			Economy			Total Impact Rating (Population + Property + Economy)
	Impact	Numeric Value	Multiplied by Weighting Factor (3)	Impact	Numeric Value	Multiplied by Weighting Factor (2)	Impact	Numeric Value	Multiplied by Weighting Factor (1)	
Drought	Low	1	3	Low	1	2	Low	1	1	6
Earthquake	Low	1	3	High	3	6	Low	1	1	10
Flood	Low	1	3	High	3	6	Low	1	1	10
Severe Storm	Low	1	3	High	3	6	Low	1	1	10
Severe Winter Storm	Medium	2	6	High	3	6	Low	1	1	13

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## SECTION 5.3: RISK ASSESSMENT - HAZARD RISK RANKING

Table 5.3-5 presents the total ranking value for each hazard.

Table 5.3-5. Total Risk Ranking Value for Hazards of Concern for Tioga County

Hazard of Concern	Probability	Impact	Total = (Probability x Impact)
Drought	3	6	18
Earthquake	2	10	20
Flood	3	18	54
Severe Storm	3	10	30
Severe Winter Storm	3	13	39

Table 5.3-6 presents the hazard ranking category assigned for each hazard of concern. The ranking categories are determined by an evaluation of the total risk ranking score into three categories, low, medium, and high whereby a total score of below 20 is categorized as low, 20 to 39 is medium, and 40 and over is considered a high risk category.

Table 5.3-6. Hazard Ranking Results for Hazards of Concern for Tioga County

Hazard Ranking	Hazard of Concern	Category
1	Flood	High
2	Severe Winter Storm	High
3	Severe Storm	Medium
4	Earthquake	Low
5	Drought	Low

### HAZARDS PROFILES AND VULNERABILITY ASSESSMENT

The following sections profile and assess vulnerability for each hazard of concern. For each hazard, the profile includes: the hazard description; its location and extent; previous occurrences and losses; and the probability of future events. The vulnerability assessment for each hazard includes: an overview of vulnerability; the data and methodology used; the impact on life, health and safety; impact on general building stock; impact on critical facilities; impact on the economy; additional data needs and next steps; and the overall vulnerability assessment finding. Hazards are presented as listed above, starting with the flood hazard and ending with the drought hazard.