SECTION 5: RISK ASSESSMENT

METHODOLOGY AND TOOLS

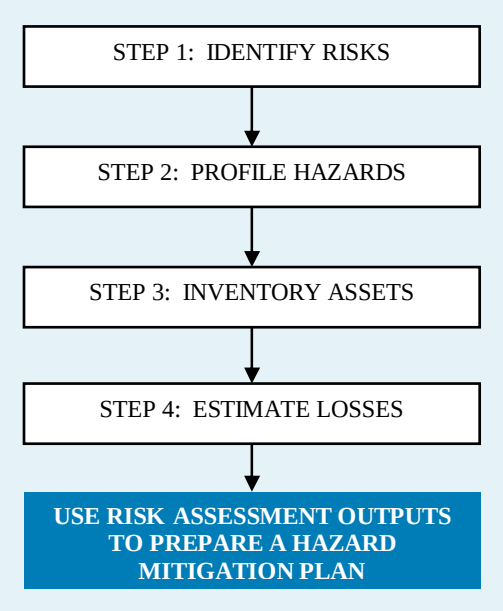
This section describes the methodology and tools used to support the risk assessment process.

Methodology

The risk assessment process used is consistent with the process and steps presented in FEMA 386-2, State and Local Mitigation Planning How-to-Guide, *Understanding Your Risks – Identifying Hazards and Estimating Losses* (FEMA 2001). This process identifies and profiles the hazards of concern and assesses the vulnerability of assets (population, structures, critical facilities and the economy) at risk in the community. A risk assessment provides a foundation for the community's decision makers to evaluate mitigation measures that can help reduce the impacts of a hazard when one occurs (Section 6 of this plan).

Step 1: The first step of the risk assessment process is to identify the hazards of concern. FEMA's current regulations only require an evaluation of natural hazards. Natural hazards are natural events that threaten lives, property, and many other assets. Often, natural hazards can be predicted, where they tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area. In addition, the Village is evaluating one man-made hazard (vehicular accidents including hazardous materials in transit).

Figure 5-1. Risk Assessment Process



Step 2: The next step of the risk assessment is to prepare a profile for each hazard of concern. These profiles assist communities in evaluating and comparing the hazards that can impact their area. Each type of hazard has unique characteristics that vary from event to event. That is, the impacts associated with a specific hazard can vary depending on the magnitude and location of each event (a hazard event is a specific, uninterrupted occurrence of a particular type of hazard). Further, the probability of occurrence of a hazard in a given location impacts the priority assigned to that hazard. Finally, each hazard will impact different communities in different ways, based on geography, local development, population distribution, age of buildings, and mitigation measures already implemented.

Steps 3 and 4: To understand risk, a community must evaluate what assets it possesses and which assets are exposed or vulnerable to the identified hazards of concern. Hazard profile information combined with data regarding population, demographics, general building stock, and critical facilities at risk prepares the community to develop risk scenarios and estimate potential damages and losses for each hazard.

Tools

To address the requirements of DMA 2000 and better understand potential vulnerability and losses associated with hazards of concern, the Village used standardized tools, combined with local, state, and federal data and expertise to conduct the risk assessment. Two standardized tools used to support the risk assessment are introduced below.

Hazards NY (HAZNY)

HAZNY is an automated interactive spreadsheet designed to support communities in evaluating hazards that could be a concern. This tool was developed by NYSEMO and the ARC to support consistent identification and ranking of hazards across the State. HAZNY includes historical and expert data on selected hazards. HAZNY is designed specifically for group, rather than individual, use and was prepared for use at a municipal, rather than a county level. The program interface asks specific questions about potential hazards in a community and records and evaluates the responses to these questions to prepare a preliminary score for each hazard. This score helps the community to develop an initial ranking of the priority of each hazard. The planning process for this effort used HAZNY to identify and profile hazards and hazard events; this process included a consideration of background and local conditions, historic frequency and probability of occurrence, severity, historic losses and impacts, and designated hazard areas. It also identified the potential impact, onset, frequency, hazard duration, cascading effects and recovery time for each hazard.

On February 12, 2005, the Village, in conjunction with the WCOEM, local and WC officials and members of emergency services-related agencies, organizations and homeowner's groups assembled to support the hazard identification process. Representatives from the emergency services, Village management and department heads also participated in the process. Results of the HAZNY session are discussed in detail in Appendix E.

Hazards U.S. – Multi-Hazard (HAZUS-MH)

In 1997, FEMA developed a standardized model for estimating losses caused by earthquakes, known as Hazards U.S. or HAZUS. HAZUS was developed in response to the need for more effective national-, state-, and community-level planning and the need to identify areas that face the highest risk and potential for loss. HAZUS was expanded into a multi-hazard methodology, HAZUS-MH with new models for estimating potential losses from wind (hurricanes) and flood (riverine and coastal) hazards. HAZUS-MH is a Geographic Information System (GIS)-based software tool that applies engineering and scientific risk calculations that have been developed by hazard and information technology experts to provide defensible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across a variety of hazards. The GIS framework also supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

HAZUS-MH uses GIS technology to produce detailed maps and analytical reports that estimate a community's direct physical damage to building stock, critical facilities, transportation systems and utility systems. To generate this information, HAZUS-MH uses default HAZUS-MH provided data for inventory, vulnerability, and hazards; this default data can be supplemented with local data to provide a more refined analysis. Damage reports can include induced damage (inundation, fire, threats posed by hazardous materials and debris) and direct economic and social losses (casualties, shelter requirements, and economic impact) depending on the hazard and available local data. HAZUS-MH's open data architecture can be used to manage community GIS data in a central location. The use of this software also promotes consistency of data output now and in the future and standardization of data collection and

storage. The guidance *Using HAZUS-MH for Risk Assessment: How-to Guide* (FEMA 433) was used to support the application of HAZUS-MH for this risk assessment and plan. More information on HAZUS-MH is available at http://www.fema.gov/hazus.

Two methodologies were used to assess potential exposure and losses associated with hazards of concern for the Village. Both approaches used HAZUS-MH to some extent and are summarized below:

- **HAZUS-MH** was applied using HAZUS-MH software and associated tools to estimate losses associated with the flood and hurricane hazards. (Note: Hurricanes are considered unlikely to impact the Village at full force so the risks associated with the hurricane hazard are primarily considered to include wind and are integrated for presentation with the severe storm hazard, which also includes severe windstorms, thunderstorms, hailstorms, lightning and tornadoes.)

- **HAZUS-MH support** was used to evaluate other hazards, as feasible. For most of the hazards evaluated in this risk assessment, historic data are not adequate to model future losses at this time. However, HAZUS-MH can map hazard areas and calculate exposures if geographic information on the locations of the hazards and inventory data are available. For some of the other hazards of concern, areas and inventory susceptible to specific hazards were mapped and exposure was evaluated to help guide mitigation efforts discussed in Section 6. For other hazards, a qualitative analysis was conducted using the best available data and professional judgment. This approach was applied to all hazards of concern to the Village.

In addition, this approach was applied to the non-hurricane components of the severe storm hazard. For this risk assessment, the loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their affects on the built environment. Uncertainties also result from the following:

1) approximations and simplifications necessary to conduct such a study
2) incomplete or dated inventory, demographic, or economic parameter data
3) the unique nature, geographic extent, and severity of each hazard
4) mitigation measures already employed by the Village and the amount of advance notice residents have to prepare for a specific hazard event

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, the Village will collect additional data to assist in estimating potential losses associated with other hazards.