

The Borough of Milton, Pennsylvania was settled along the banks of the Susquehanna in 1792. The Borough contains a large historic district that has a long history of repetitive flooding. Because Milton's residents and their historic buildings are subjected to a continued risk of devastating floods, a comprehensive plan was sought that addressed how to protect cultural resources from ongoing flood damage.

Through funding provided by the Federal Emergency Management Agency (FEMA), the Pennsylvania Emergency Management Agency (PEMA), and the Bureau of Historic Preservation of the Pennsylvania Historical and Museum Commission (PHMC) worked with the Borough of Milton to examine possible solutions and create a Model Demonstration Study that integrated the reduction of future flood damage with the protection of historic resources. The primary goal of this study was to provide the Borough with a planning process for the creation of a safe and sustainable historic community.

This document provides approaches that may be undertaken by the Borough to better integrate historic preservation goals into the Hazard Mitigation planning process. The study contains detailed information concerning the study's goals, the historical patterns of flooding in Milton, and proves a method for determining the cost-effectiveness of hazard mitigation options. The study is intended for use by Borough residents and local government officials, as well as representatives from regional, state, and federal agencies to select projects requesting Hazard Mitigation funding assistance. Other historic flood-prone communities may consider using this methodology to help develop their own pre-disaster plans to better protect historic properties.

Additional goals for this study were to:

- Provide recommendations for streamlining regulatory procedures for federal undertakings affecting historic properties;
- Suggest options for future integration of historic preservation and hazard mitigation land-use planning efforts; and
- Create a template for use by other historic communities in Pennsylvania.

A. HISTORY & PRESERVATION IN MILTON

Milton is a small river town in Central Pennsylvania settled on the floodplain of the West Branch of the Susquehanna River. Milton has a large historic district with over 700 buildings. The Borough has experienced a variety of man-made and natural disasters, including repeated and substantial flooding for more than two centuries. Milton maintains an existing and historical connection to industrial growth. The town was linked to a branch of the Pennsylvania Canal system, was an important local center for railroad traffic, and continues to be an industrial center.

Milton has demonstrated an ongoing commitment to the recognition of its historic buildings. Milton's governmental functions are housed in two historic railroad depots. Milton's historic district provides the visitor with a visual catalog of American town development and architecture from the 19th and 20th centuries. The district includes:

- A historic commercial business area that demonstrates early hazard mitigation approaches.
- A tree-lined street featuring impressive set-back Victorian-era homes with noteworthy architectural details.
- A neighborhood with numerous gable-front worker homes, closely set, located in a factory-sponsored development dating from the early 20th century.
- A neighborhood with examples of vernacular residential buildings that pre-date a 1880 fire and are examples of Milton's early history.

Milton's historic district, and four individual properties within the Borough, are listed in the National Register of Historic Places. The National Register is a formal listing of properties important to national, state, or local history and worthy of preservation. Projects receiving funds, involvement or permits from federal agencies must carefully consider the potential impact to buildings listed, or eligible for listing, in the National Register.

B. METHODOLOGY: INCORPORATING HISTORIC RESOURCES INTO HAZARD MITIGATION PLANNING

This study took place between June and December 2001 and involved multiple tasks, including an historic architectural survey, data gathering, public participation, and planning. Data concerning past flooding were gathered to form a predictive model for Milton. Historical accounts of flooding were researched, and a variety of qualitative flood data was collected that demonstrated the likely impact of future flooding.

One important goal of a historic community that is vulnerable to flooding is to create a vision for its future that achieves both the preservation of historic significance and historic architectural fabric of the community, while providing for relative safety and continuity for the future. To begin the visioning process, the community needed to identify and evaluate historic resources. A literature search was undertaken which identified important historic resources within the community. Interviews were also conducted with individuals familiar with local history. The existing National Register historic district was reviewed, with 100 properties selected to provide a representative sample of historic structures within the district. As part of this historic architectural survey, exterior photographs were taken of each property, and important information was collected regarding the construction and significance of each of the 100 properties. The boundaries of the historic district were compared with the boundaries of the 100-year and 500-year floodplains to delineate buildings that may be potentially affected by floods.

Using historic architectural survey data and other background information, a "preservation hierarchy" was developed. A numerical system was assigned to each surveyed structure based on a visual evaluation of the original physical fabric and design remaining at the time of the survey. The preservation hierarchy selected buildings based on the amount of remaining historic architectural elements and the strength of the resource's relationship to important local historic themes and important historical associations, not on aesthetic qualities. This information was correlated with other data collected in the field. The preservation hierarchy considered the value of surrounding historic buildings within a block-by-block and neighborhood basis, and resulted in a map that reflected the relative level of architectural and/or historical importance of each of the 100 buildings.

Based on a review of the historic architectural survey information, the historic district was subdivided into five distinguishable neighborhoods. Thirty of these representative properties were selected for further risk analysis and use in the planning project. *Reproduction Costs* were developed for these thirty properties. These *Reproduction Costs* were determined through a standard valuation of the costs of modern construction and materials, and were then multiplied by a factor that reflected the costs associated with the reproduction or repair of important historic details. A further analysis of these thirty representative buildings was performed to determine their level of risk to harm from future natural disasters. The cost-effectiveness of different hazard mitigation alternatives was calculated through an analysis of the cost of the building and the potential severity of future flooding, and the cost of the hazard mitigation alternative. For each hazard mitigation alternative, hazard mitigation project costs for each building were estimated through consultation with a local contractor, house mover, and realtor. This analysis included consideration of costs associated with different types of historic buildings.

Historic architectural survey information, including risk data as well as the preservation hierarchy, was placed into an integrated Geographic Information System (GIS). The integration of different types of data illustrated the relationship between the location of historic properties, their different *Reproduction Costs*,

the different levels of risk of flooding, the cost-effectiveness of hazard mitigation alternatives, and their placement within the preservation hierarchy.

Several public outreach efforts provided the study with the views of local residents and integrated their valuable input into the process. A detailed questionnaire was mailed to all residents and owners in the flood-prone portion of the historic district. This questionnaire asked for input regarding the identification of historic buildings and the use of various hazard mitigation alternatives. Three public meetings presented information about the study and featured public discussion. An interactive poster encouraged residents to identify neighborhoods and places they thought did the best job of illustrating local history.

C. POTENTIAL HAZARD MITIGATION OPTIONS

One of the goals of this demonstration study was to examine various options that would minimize future damage from flooding. Milton has experienced several centuries of consistent flooding that have exacted a heavy financial and emotional toll on the Borough's residents. The following options were examined both for their effectiveness at reducing flood-related damages and also for their potential effects to historic structures:

- *Acquisition and Demolition* – This option would include the demolition of flood-prone historic structures, leaving the property in “open space” usage. Although it is likely that these properties would be documented, the demolition would have a severe negative impact upon these historic properties in that affected historic properties would be lost through demolition. However, demolition would remove affected properties completely out of the path of future flooding, eliminating future disaster costs.
- *Relocation* – This option would result in the relocation of flood-prone historic structures out of the floodplain. This option is highly effective in reducing potential harm from flooding. However, to minimize negative impacts to historic buildings, moved buildings would need to be relocated in a manner that replicates their setting, including landscape elements, outbuildings, and their relationship to surrounding structures.
- *Elevation* – This option would entail the in-place elevation of existing flood-prone historic buildings and would require the construction of new, stronger foundations. This option is effective in minimizing flood-related damages; in the case of Milton, many structures would only need to be elevated several feet. Elevated structures could still be eligible for listing in the National Register of Historic Places if elevation work included the re-creation of the original grading, landscaping, and other elements so that they approximate their original scale and setting.
- *Floodproofing* – This option would include the retrofitting of flood-prone historic structures. Potential methods of floodproofing might include the relocation and elevation of utilities, or, in the case of some commercial buildings, the structural retrofitting of buildings to make them watertight below a selected elevation. Floodproofing is the least intrusive means of preventing flood-related damages, but also the least effective if the floodwater exceeds the flood protection elevation.
- *Structural Flood Diversion Improvements & Stream Channel Modifications* – This option would include the construction of structural elements that would divert the river flow away from the Borough. A combination of a levee and structural floodwall, although expensive, could provide considerable protection to the Borough against future flooding. The construction of a floodwall/levee would also require the demolition of several historic buildings (although the use of a specialized floodwall rather than a levee would spare many buildings from demolition). Channel Modifications, such as removing islands, were also examined but were determined to have a minimal or no effect in lowering flood levels.

The following table compares each of the different hazard mitigation alternatives, as described above, for their potential to reduce the level of risk (to life and property) and the effects such alternatives might have upon historic buildings.

Hazard Mitigation Alternative	Reduction of Risk	Level of Impact to Historic Properties
Acquisition & Demolition	High	High
Relocation	High	Medium - High
Elevation	Medium	Medium
Dry Floodproofing	Low - Medium	Low - Medium
Wet Floodproofing	Low	Low
Stream Channel Improvements	Low	High (archeology)
Levees & Floodwalls	Medium	Medium

D. OUTCOME & RECOMMENDATIONS

This study identified a planning process that applied each of the hazard mitigation options to buildings within the representative sample. This planning process used the least intrusive options for the most significant buildings.

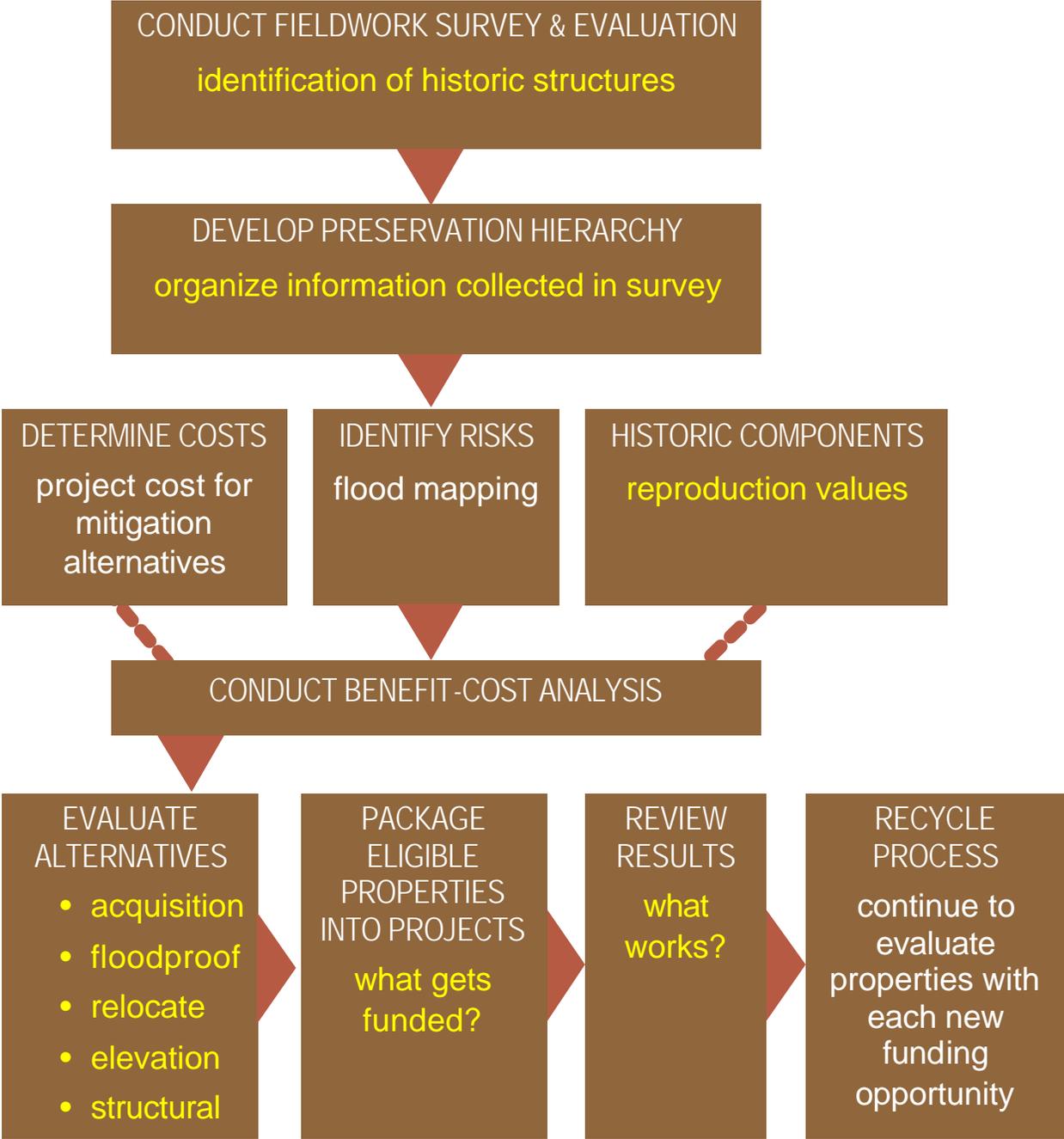
The key study conclusions include:

- Various hazard mitigation alternatives are feasible for Milton. The study showed that Milton’s citizens have options in selecting how to minimize future flood-related damages to their properties. The Borough of Milton should undertake a comprehensive review of the potential impacts of all hazard mitigation alternatives to both industrial buildings, and to the community as a whole.
- The hazard mitigation alternatives evaluated in this study illustrated that, for individual structures, selected alternatives produced different levels of flood protection for life and property and differing impacts on the historic integrity of their structure and the overall historic character of the Borough.

Several useful planning tools identified include:

- A Community-Based Decision Making Model (page PS-5) that utilizes public input and integrates hazard mitigation planning, historic preservation goals, and community development objectives.
- Suggested information to be included in Hazard Mitigation Grant applications for projects that focus upon historic resources.
- Points to be considered in a potential interagency agreement which would streamline regulatory review of federal projects concerning flood-prone historic buildings.
- Highlights of areas in which the State Emergency Management Agency (PEMA) and the State Historic Preservation Office (PHMC) can continue to integrate land-use planning efforts.

Recommended Decision Making Process for Milton



 = public input on community values & goals