



City of Takoma Park Flood Mitigation Plan

Prepared for the Department of Public Works of the City of Takoma Park, Maryland – May 2009

Prepared by:



Flood Mitigation Plan City of Takoma Park, Maryland

Prepared for:

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Acknowledgments

This Flood Hazard Mitigation Plan was prepared under the guidance of the City's Public Works Department and the Mitigation Core Team. The members of the Core Team are listed in Chapter 1.

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TABLE OF CONTENTS

TABLE OF CONTENTS	2
LIST OF FIGURES	3
LIST OF TABLES.....	4
CHAPTER 1: INTRODUCTION.....	6
Background	6
Study Area.....	6
Flooding History.....	7
Plan Objectives.....	9
Planning Approach.....	9
Mitigation Core Team	11
Planning Process	11
Organization of the Report.....	13
CHAPTER 2: PROBLEM DESCRIPTION	14
Sources of Flooding	14
Vulnerability Assessment.....	19
Repetitive Loss Properties.....	26
Economic Impact.....	26
Development Trends	26
Conclusions.....	30
CHAPTER 3: PREVENTIVE MEASURES	31
Introduction.....	31
City and County Ordinances	31
State and Local Plans.....	36
City's Staffing and Training Capabilities.....	39
CHAPTER 4: PROPERTY PROTECTION	41
Introduction.....	41
Building Relocation	41
Acquisition	41
Building Elevation.....	41
Barriers.....	42
Dry and Wet Flood-proofing	42
Sewer Backup Protection.....	43
Flood Insurance.....	44
Mandates.....	45
CHAPTER 5: EMERGENCY SERVICES	46
Introduction.....	46
Threat Recognition.....	46
Warning.....	46
Response	47
Critical Facilities Protection.....	49
Post-Disaster Recovery and Mitigation	49
CHAPTER 6: STRUCTURAL PROJECTS.....	52
Introduction.....	52
Reservoirs and Dams	52
Levees/Floodwalls.....	53

City of Takoma Park Flood Mitigation Plan

Bridge Modifications	53
Channel Improvements	53
Dredging	54
Diversion	54
CHAPTER 7: NATURAL RESOURCE PROTECTION	55
Introduction.....	55
Wetlands.....	55
Erosion and Sedimentation Control	56
Best Management Practices	57
Dumping Regulations	57
CHAPTER 8: PUBLIC INFORMATION	58
Introduction.....	58
Map Information.....	58
Library and Web Sites	58
Outreach Projects	59
Technical Assistance	59
Real Estate Disclosure	60
Environmental Educational Programs	60
CHAPTER 9: GOALS AND OBJECTIVES	61
Introduction.....	61
Goals and Objectives	61
Mitigation Actions	63
Funding Sources	68
CHAPTER 10 - PRIORITIZATION.....	70
Mitigation Actions Prioritization	71
Plan Implementation/Maintenance	73
APPENDIX 1	75
Public Meeting Materials	75
APPENDIX 2	105
Mitigation Capability Questionnaire.....	105

LIST OF FIGURES

Figure 1.1 Regional context of the study area.....	7
Figure 1.2 Flooding sources and study area context	10
Figure 1.3 Takoma Park Mitigation Core Team meeting.....	11
Figure 1.4 Takoma Park citizens review the draft plan on 4 March 2009.....	12
Figure 2.1 City of Takoma Park 100-year floodplain from FIRMs	15
Figure 2.2 Schematic of a floodplain (Source: Ohio Dept of Natural Resources)	16
Figure 2.3 Stormwater issue locations known to the Department of Public Works	17
Figure 2.4 Predicted 100-year flood depth.....	21
Figure 2.5 A footbridge over Sligo Creek in Sligo Creek Park.....	22
Figure 2.6 A commercial property at 7601 Maple Avenue in Takoma Park. The flood model predicts water depth of 6 feet at this location during a 100-year flood event.....	23

City of Takoma Park Flood Mitigation Plan

Figure 2.7 The concrete flood wall around the Takoma Park Community Center.	23
Figure 2.8 Potential flooding along Maple Avenue	24
Figure 2.9 Potential flooding along 4th Avenue and Poplar Avenue	25
Figure 2.10 Future land use (from zoning) in the City of Takoma Park	28
Figure 2.11 Intersection of future land use (from zoning) and the modeled 100-year flood extent	29

LIST OF TABLES

Table 1.1 Mitigation Core Team members	11
Table 2.1 Peak discharges and flood elevations for 100-year event (Units are NAVD 1988 feet)	16
Table 2.2 Potential damage to structures/contents from a 100-year flood event by degree of damage category	20
Table 2.3 Potential damage to structures/contents from a 100-year flood event by general occupancy type	20
Table 2.4 Critical facilities in the 100-year floodplain	22
Table 2.5 Future land use within the modeled 100-year flood extent	27
Table 5.1 Flood emergency responses and responsible agencies	47
Table 10.1 Evaluation criteria for project prioritization	70

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CHAPTER 1: INTRODUCTION

Background

Floods are a common occurrence throughout the United States. In the document, “Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Strategy,” FEMA estimated that over 9 million households and \$390 billion in property are at risk from flooding in the United States. Floods result from large-scale weather systems that generate rainfall or on-shore winds for prolonged periods. Other causes of flooding include local thunderstorms, snowmelt, ice jams, and dam failures. Flash-floods are characterized by high velocity waters that carry large amounts of debris.

Over the years, communities have taken proactive measures to reduce the impact of flooding and the damage caused by it to residents and structures. In October 2007, the City of Takoma Park received funding from the Federal Emergency Management Agency (FEMA) for the development of a Flood Mitigation Plan for the City. The purpose of the Plan was to address flood hazards that threatened the health and welfare of the Takoma Park community and develop actions to mitigate the effects of flooding. In June 2008, the City hired consultants Deepa Srinivasan, President, Vision Planning & Consulting, and Dr. Michael Scott, Director, Eastern Shore Regional GIS Cooperative at Salisbury University to assist the City with the preparation of their Flood Mitigation Plan.

The Plan’s overarching goal was to *“develop a Flood Mitigation Plan for the City of Takoma Park to improve resistance to floods by planning and undertaking hazard mitigation strategies before floods strike.”*

Study Area

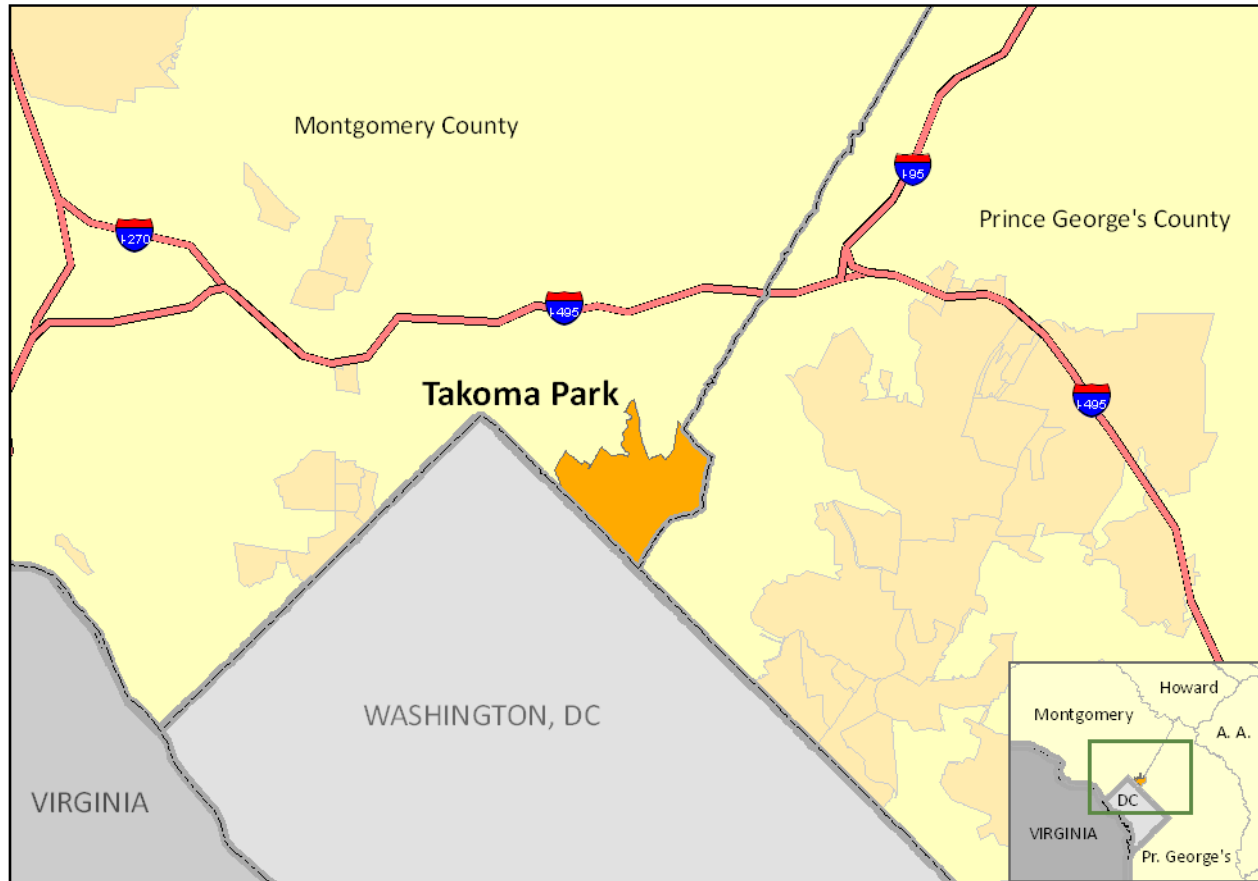
The City of Takoma Park is located in the southeast corner of Montgomery County in central Maryland (Figure 1.1). Takoma Park was founded in 1883 by B.F. Gilbert as a commuter suburb to Washington, DC. Takoma Park today is an important residential neighborhood in the Washington metro complex as well as a commercial, transportation, educational, and cultural center for the regions. According to the 2000 US Census, the population of Takoma Park was 17,229 with 6,893 households. Over 700 businesses and non-profit organizations call the city home.

The City of Takoma Park resides within a humid subtropical climate that is additionally moderated by the Chesapeake Bay and the Atlantic Ocean. According to the National Climatic Data Center, the City of Takoma Park experiences an annual average of 43 inches of precipitation; the average annual snowfall is 20 inches

The City of Takoma Park’s topography may be described as rolling with steep slopes typically along streams. The City is heavily urbanized except for areas reserved for park lands and other open space. It has an area of 2.36 mi², yielding a population density of 8152 people per square mile. The riverine flood threat in Takoma Park comes primarily from Sligo Creek, Long Branch, and unnamed relic tributaries, including those near Maple Ave and Fourth Ave (Figure 1.2).

City of Takoma Park Flood Mitigation Plan

Figure 1.1 Regional context of the study area



Flooding History

The City of Takoma Park has had numerous incidents of flooding, but none would be considered major. Most incidents are the result of flash flooding from sudden, short-lived rainstorms and storm water management issues. Little reference was found specifically for the City of Takoma Park when researching the history of floods in the region. The National Climatic Data Center maintains a national database of storm events, including flooding, from 1950 to 2008. A search of that database yielded 69 flood events in Montgomery County, beginning in 1993. Only a few of those events mention the southeastern portion of the County or Sligo Creek in particular:

June 1972 – Tropical Storm Agnes

The flood from Tropical Storm Agnes impacted most of Maryland, with considerable damage sustained in Montgomery County. Estimates of the damage in the county ranged up to \$2.5 million. Over eighty county roads were rendered impassable during the flood. Five bridges and three large culvert crossings required replacement. The flood caused five deaths, destroyed 25 homes, and caused major damage to 28 other homes. Three hundred families suffered losses and approximately five thousand people in the county required emergency shelter.

City of Takoma Park Flood Mitigation Plan

September 9, 1999 – Flash Flood

A round of thunderstorms generated heavy rainfall causing streets to flood and Sligo Creek to go out of its banks. Rainfall amounts between 3.55 inches and 7.39 inches were reported around the region. Several locations reported flooding, downed trees and power lines, and stalled cars.

June 22, 2001 – Flash Flood

During the afternoon, numerous showers and thunderstorms developed just east of the Appalachian Mountains and moved very slowly east across northwest and north central Maryland. In Montgomery County, heavy rainfall caused roads to flood so quickly that three people had to be rescued from their cars. Numerous roads had to be closed until the water subsided. Rainfall totals ranged from 5 inches to 2.46 inches.

August 11, 2001 – Flash Flood

Thunderstorms with very heavy rainfall, frequent lightning, and damaging winds moved across north central Maryland. In Montgomery County, rainfall totals ranged from 4.68 inches to 2.60 inches. In Gaithersburg, a large store was evacuated after excessive rainfall collected on its roof. A stream and wetland area flooded onto Clopper Road near I-270. Trees were downed along Rock Creek after it overflowed. Motorists were rescued from cars stalled in high water in several spots including Little Falls Parkway, River Road, Connecticut Avenue, and Beach Drive.

June 20, 2003 – Flash Flood

A round of showers and thunderstorms with heavy rainfall moved through Central Maryland. In Montgomery County, 10 Mile Creek overflowed onto Clarksburg Road at the intersection of West Old Baltimore Road. A water rescue was reported where 10 Mile Creek crossed West Old Baltimore Road near Clarksburg. Rock Creek and Sligo Creek also overflowed their banks in the southeast portion of the county, flooding Sligo Road and Beach Drive. The saturated soil allowed trees to fall onto Little Falls Parkway in Bethesda and Fernwood at Greentree.

September 19 – 21, 2003 – Hurricane Isabel

On September 18, 2003, Hurricane Isabel made landfall on the North Carolina Coast. Its wind field extended for hundreds of miles from the storm's center. While Hurricane Isabel brought drenching rains (rainfall totals ranged between 4.46 inches and 2.28 inches), only minor road flooding was reported in southeastern Montgomery County. Hurricane Isabel was primarily a wind event for the County with 240,000 people losing power due to downed power lines.

July 27 -28, 2004 – Flash Flood

A very slow moving frontal system came through the region. Two to five inches of rain produced widespread flash flooding in Montgomery and Prince Georges Counties. Several people were trapped in cars prompting numerous water rescues. In Silver Spring, on Sligo Creek Parkway near New Hampshire Avenue, several vehicles were halfway submerged by water. Additionally, drivers were rescued from flooded vehicles at

City of Takoma Park Flood Mitigation Plan

New Hampshire Avenue and Piney Branch Road. Five families were evacuated from an apartment in Laurel because water flooded the building.

June 25 – 26, 2006 – Flash flood

A slow-moving line of thunderstorms fired along a tropical moisture plume and dumped between 4 and 7 inches across the area, causing extensive urban flooding on June 25 and June 26. Numerous county roads closed in the southeastern part of the county near the Washington DC line. There were 147 reports of flooded basements. Twenty five swift water rescues occurred. In Chevy Chase, firefighters used boats to rescue 30 people trapped inside a recreational center. A road was washed out at US 29 at New Hampshire Avenue in Silver Spring. About 26 vehicles were recovered after water reached their windows. A driveway collapsed on Colesville Road in Silver Spring. Colesville received 12.5 inches during the event. Significant damage was reported in Northwest Branch Park when the river topped its banks by approximately 100 yards. In all, five people lost their lives due to flooding.

September 6, 2008 – Flash Flood

Tropical Storm Hanna tracked up the Mid-Atlantic coast on September 6th with maximum sustained winds around 50 mph. Hanna was responsible for heavy rain along with Tropical Storm force winds across Maryland. Rainfall amounts totaled around 4 to 8 inches across many locations. Numerous roads were closed due to flash flooding throughout Maryland including Kensington Drive at Beach Drive and Beach Drive at Sligo Creek Parkway

Plan Objectives

This Flood Mitigation Plan for the City fulfills the following objectives:

- It is consistent with the requirements of the 44 Code of Federal Regulations part 78.5 - Flood Mitigation Plan Development in accordance with the National Flood Insurance Act of 1968 (42 U.S.C. 4104c et seq.);
- It conforms to all pertinent criteria and regulations, including those found in applicable state and local ordinances and NFIP requirements;
- It identifies risks from flood and develop coherent mitigation strategies for the City of Takoma Park;
- It helps reduce the risk of loss of life, personal injury and property damage to the City's residences and businesses; and
- It will be submitted to MEMA and FEMA for approval, opening the way for future federal funding of flood mitigation projects.

Planning Approach

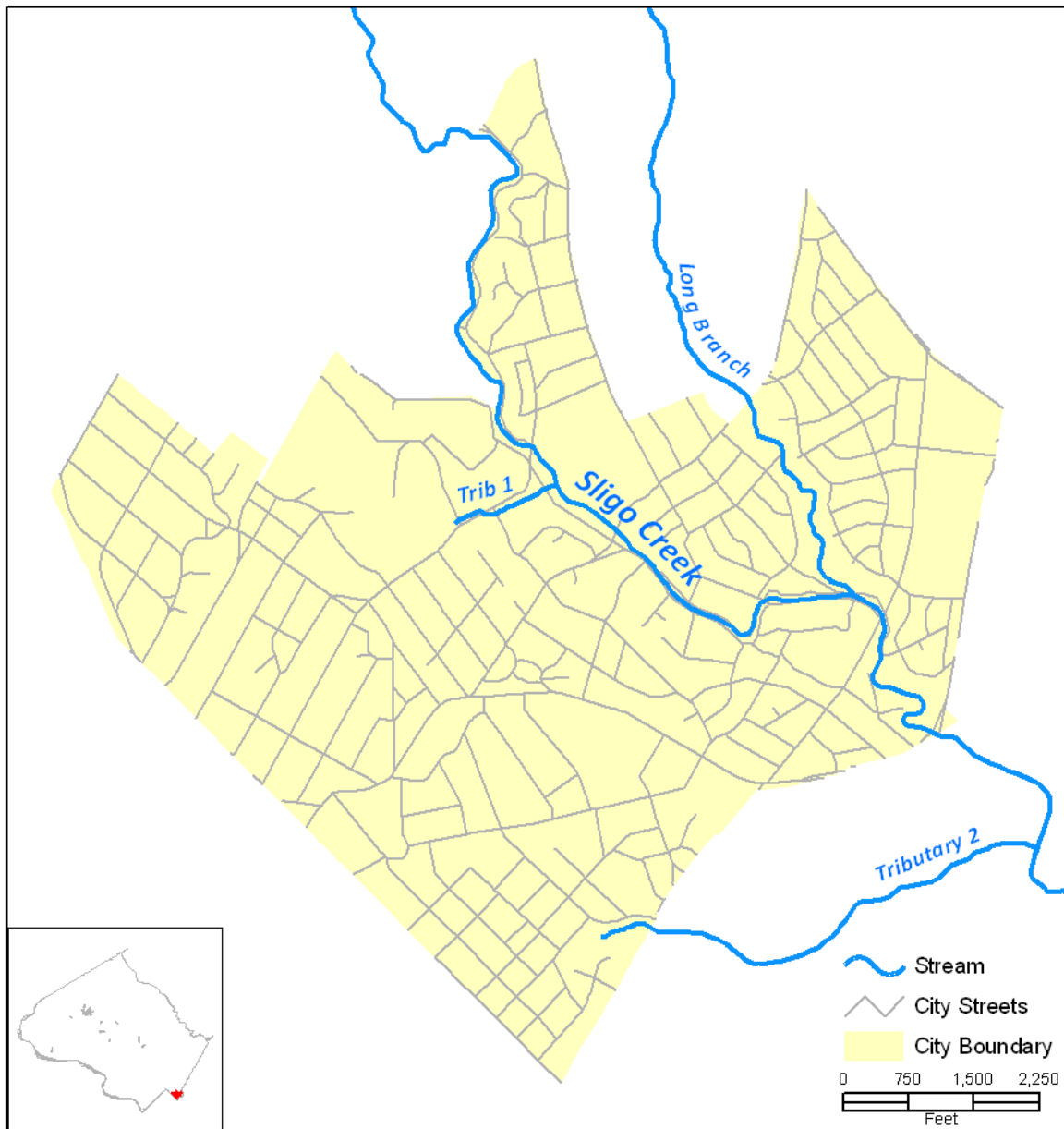
The Flood Mitigation Plan for Takoma Park has been developed in compliance by the 44 Code of Federal Regulations (CFR) 78.5 Flood Mitigation Plan Requirements. This Plan:

- Describes the planning process
- Describes public involvement
- Includes existing flood risk
- Includes the number of estimated structures in floodplain

City of Takoma Park Flood Mitigation Plan

- Identifies repetitive loss structures
- Identifies the extent of flood depth and damage potential
- Discusses floodplain management goals
- Identifies and evaluates feasible mitigation actions
- Presents a strategy for reducing flood risks
- Provides a strategy for continued compliance with NFIP
- Describes procedures for ensuring implementation, reviewing progress, and making revisions
- Provides documentation of Plan by legal authority

Figure 1.2 Flooding sources and study area context



City of Takoma Park Flood Mitigation Plan

Mitigation Core Team

A Mitigation Core Team (MCT) was formed to serve as the committee for this planning process. The MCT participated in all committee meetings, reviewed sections of the document and provided comments to the consultants. Table 1.1 lists the members of the Mitigation Core Team and the agencies they represent.

Table 1.1 Mitigation Core Team members

Name	Title	Agency
Braithwaite, Daryl	Director	Takoma Park Dept of Public Works
Daines, Sara	Director	Takoma Park Dept of Housing and Community Development
Khalilian, Ali	City Engineer	Takoma Park Dept of Public Works
Ludlow, Suzanne	Deputy City Manager	Takoma Park City Manager's Office
Coursey, Edward	Police Chief	Takoma Park Police Dept
Campbell, Granville	Plan Reviewer	Montgomery County Department of Permitting Services
Tunis, Catherine	Co-Chair	Committee on the Environment
Reed, Jenny	Resident	Friends of Sligo Creek

Planning Process

The planning process comprised of four main steps: 1) organizing work group and process; 2) assessing hazards, risks, vulnerability, and mitigation capability; 3) developing a mitigation plan; and 4) implementing the plan. These steps are elaborated below.

Step 1 – Organize work group and process

A Mitigation Core Team was formed by the City's Public Works Department that included staff representatives from various City and County agencies, and stakeholders from the Community. The Consultants worked closely with the Mitigation Core Team and met with them four times during the planning process.

The first Core Team meeting was held on 14 August 2008 at the City Public Works Building. At this meeting, the planning process, key elements of the Plan, schedule, and deliverables were discussed. A mitigation capability assessment questionnaire was also distributed to the Core Team for input on plans and ordinances and the City's capabilities with respect to flood mitigation.



Figure 1.3 Takoma Park Mitigation Core Team meeting

The second Core Team meeting was held on 5 December 2008 at the Public Works Building. At this meeting, the data on the flood hazard identification was presented and the progress of the hazard vulnerability and risk assessment was discussed.

City of Takoma Park Flood Mitigation Plan

At the third Core Team meeting held on 6 January 2009 at the Public Works building, the highlights of the mitigation capability assessment were presented and an exercise to develop goals and objectives was conducted. At this meeting, a range of mitigation actions were examined to address the Plan's goals.

The final Core Team meeting was held on 17 February 2009 at the Public Works building. At this meeting, mitigation alternatives were discussed and prioritized, along with an implementation strategy for each action. A plan maintenance schedule was finalized.

Public Involvement

City Residents were encouraged to provide input through representatives on the Core Team. They were also invited to attend meetings and provide their comments and concerns.

Public input was solicited at two public meetings during the planning process. The first public meeting was held at the Takoma Park Community Center on 22 January 2009. At this meeting, the planning process and the results of the hazard identification were presented to the public to solicit comment. The group discussed the community's risk to flooding in specific areas and offered suggestions for mitigation actions. A public notice was published in the local newspaper, the *Takoma Park Newsletter*.



Figure 1.4 Takoma Park citizens review the draft plan on 4 March 2009

The second Public Meeting was held on 4 March 2009 at the Takoma Park Community Center. At this meeting, mitigation goals and objectives along with actions were presented. A public notice of this meeting was published in the *Takoma Park Newsletter*. Copies of the draft plan were available for review during this meeting.

Step 2 – Assess hazards, risks, vulnerability, and mitigation capability

In this step, information on past flood events in the City was gathered and areas where flooding is an issue, were identified. This step also involved a literature review of publications addressing historical flood events, an internet search for data related to historic events, and an inventory and review of the existing GIS layers and other documentation pertinent to the City. The vulnerability analysis included estimates of potential losses, types and numbers of existing and future at-risk buildings, infrastructure, and critical facilities located in the identified hazard areas.

The Mitigation Capability Assessment included a review and analysis of the City's plans, ordinances, programs, and policies in light of flood mitigation and floodplain management.

City of Takoma Park Flood Mitigation Plan

Step 3 – Develop a mitigation plan

Based on flood hazard data and the vulnerability and capability assessments, mitigation goals and objectives were developed. These goals were aimed at protecting the city from long-term vulnerability to the identified flood hazards and were further refined to develop a range of specific mitigation actions.

The Plan explored categories for mitigation actions. Examples of the types of projects in each of these categories are included below:

- Preventive measures – e.g., zoning, floodplain management, stormwater, and other ordinances;
- Structural projects – e.g., levees, reservoirs, channel improvements;
- Property protection measures – e.g., relocation, flood-proofing, flood insurance;
- Emergency services – e.g., warning, sandbagging, evacuation;
- Natural resource protection – e.g., wetlands protection, best management practices; and
- Public information – e.g., outreach projects, technical assistance

Each of these categories is discussed in detail in Chapters 3 through 8 in the report.

Step 4 – Implement the Plan

An Action Plan was developed that described how the mitigation strategies and activities identified would be prioritized, implemented, funded, and administered.

Cost estimates for the recommended projects, where available, and funding sources to implement recommended projects were identified. Finally, a description of the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle and also how community participation should be incorporated into the plan maintenance process was provided.

Organization of the Report

The Takoma Park Flood Mitigation Plan is comprised of 9 chapters. Chapter 1 includes an introduction to flooding and discusses the federal requirements and the planning process. Chapter 2 identifies the sources of flooding and assesses the City's vulnerability to flooding; Chapter 3 elaborates on preventive measures; Chapter 4 focuses on property protection techniques; Chapter 5 discusses emergency services; Chapter 6 identifies structural projects; Chapter 7 examines natural resources protection techniques; Chapter 8 identifies options for public outreach. Chapter 9 identifies goals and objectives for the plan and includes actions to mitigate the flood hazard. The final chapter determines the ranking and identifies the actions that are of top priority to the City.

CHAPTER 2: PROBLEM DESCRIPTION

Flooding occurs when rivers, creeks, streams, ditches, or other water bodies receive too much water from rain or snowmelt. The excess water flows over adjacent banks into the adjacent floodplain. As many as 85 percent of the natural hazard disasters across the United States have been attributed to flooding.

This chapter outlines the scope of Takoma Park's flooding problems including the sources of Takoma Park's flooding, the 100-year flood levels in each of Takoma Park's waterways, the hazards that could be expected from a flood, and the type and degree of damage a flood could cause. However, the primary focus of this chapter is to present the results of the flood vulnerability assessment including potential damage amounts, probable locations of flooding in a 100-year event, and an accounting of the critical facilities exposed to the flood hazard.

Sources of Flooding

In the City of Takoma Park, flood origins include riverine flooding along stream tributaries to Sligo Creek, including Long Branch, and the unnamed tributaries near 4th Avenue and Maple Avenue and the overflow of the City's stormwater system during heavy precipitation events.

Riverine Flooding

The following map (Figure 2.1) depicts the 100-year floodplains within the City of Takoma Park, as designated by FEMA on the Flood Insurance Rate Maps or FIRMs (Montgomery County – 2006, Prince George's County – 1987). The 100-year flood is a flood which has a 1 percent chance of being equaled or exceeded in any given year (MDE, *Maryland Floodplain Manager's Handbook*). According to the *Flood Insurance Study* (FIS) and the FIRMs, riverine flooding in Takoma Park is limited to the confines of Sligo Creek Park, thus not posing much of a threat to the City.

However, the City's *Flood Insurance Study* (2006) is incomplete as it identified Sligo Creek as the sole flooding source for Takoma Park. It is evident (Figure 2.1) that the flood hazard may be somewhat more significant when the tributaries of Sligo Creek are included. Using the current floodplain delineation, only 2.7 percent of the City's area is in the 100-year floodplain. The floodplain is defined as the area adjoining a river or stream that has been or may be covered by floodwater (Figure 2.2). This is different than the floodway, defined as the channel of a river or stream and the parts of the floodplain adjoining the channel that are reasonably required to efficiently carry and discharge the floodwater or flood flow of a river or stream. Encroachments in the floodway cause increased flood elevation, both upstream and downstream. Unfortunately, the FIRMs do not depict the floodway as a separate area.

City of Takoma Park Flood Mitigation Plan

Figure 2.1 City of Takoma Park 100-year floodplain from FIRMs



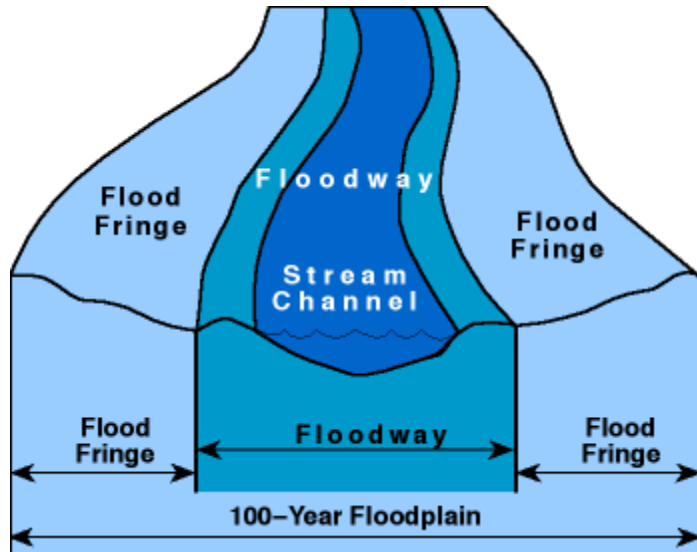
City of Takoma Park Flood Mitigation Plan

Dam Failure

Dams are water storage, control, or diversion barriers that impound water upstream in reservoirs. Dam failure is a collapse or breach of the structure. While most dams have storage volumes small enough that failures have little or no repercussions, dams with large storage volumes can cause significant flooding.

There are no dams within the vicinity of the City of Takoma Park that would create a flood threat.

Figure 2.2 Schematic of a floodplain (Source: Ohio Dept of Natural Resources)



Stormwater Flooding

The final source of flooding in the City of Takoma Park is stormwater system overflow, resulting from a large amount of precipitation in a short period of time. This type of flooding occurs much more often than riverine flooding, but the impacts are often localized and minimal. The locations of most of the stormwater flooding problems are well-known to the City Public Works staff. In Figure 2.3, the locations of those areas that have a recurring stormwater flooding problem are mapped.

Flood Levels

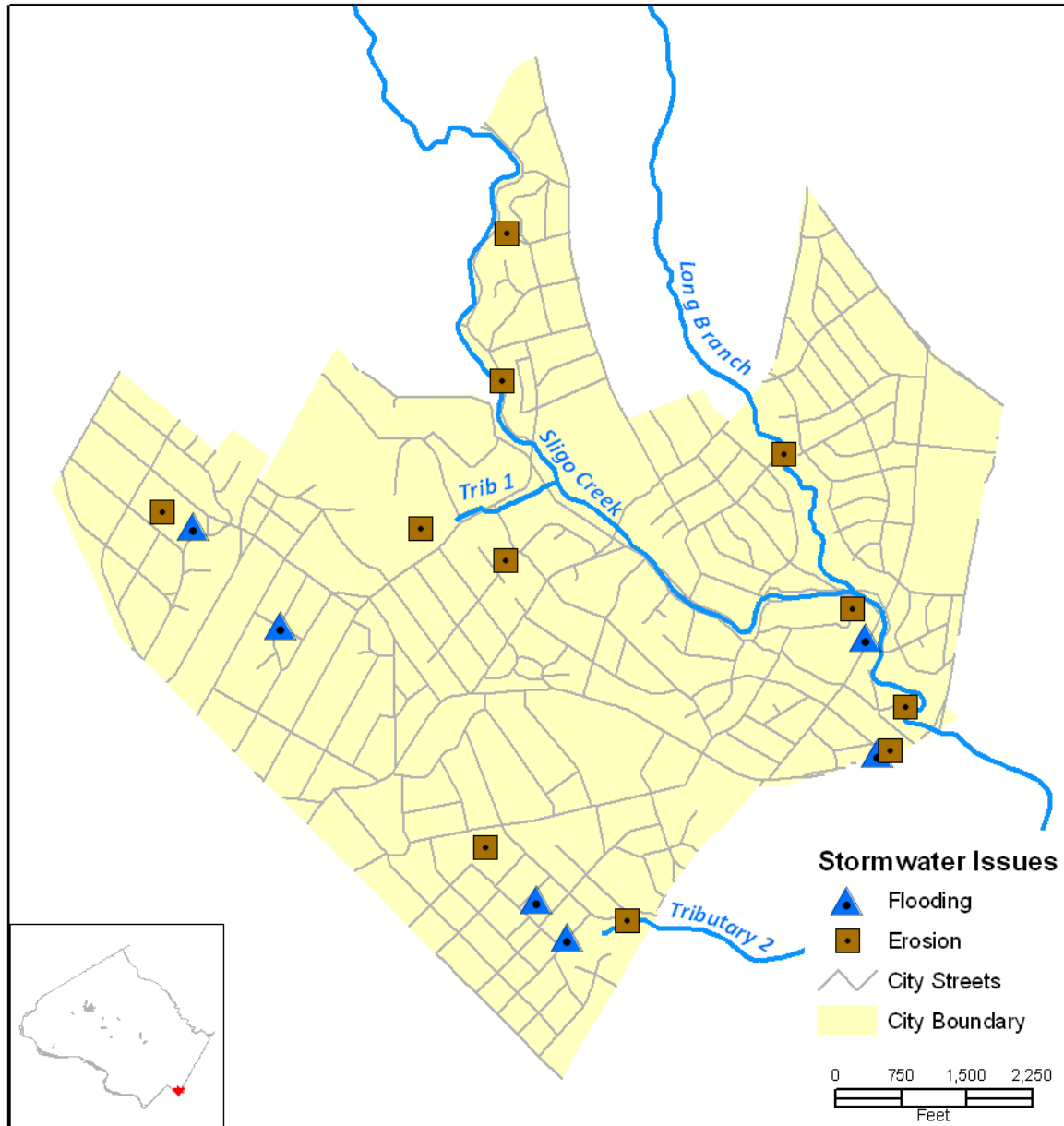
Unfortunately, there are neither active US Geological Survey gauging stations nor National Weather Service hydrographs within the Sligo Creek watershed within Takoma Park. Using the City of Takoma Park's Flood Insurance Study, the following tables report the flood elevations and discharge amounts for the key flooding sources.

Table 2.1 Peak discharges and flood elevations for 100-year event (Units are NAVD 1988 feet)

Flooding Source	Drainage Area	100-year Peak Discharge (CFS)	100-year Flood Elevation
Sligo Creek at Maple Avenue	7.47	5,002	167.4
Sligo Creek at Piney Branch Road	6.15	4,430	194.8

City of Takoma Park Flood Mitigation Plan

Figure 2.3 Stormwater issue locations known to the Department of Public Works



Hazards from Floods

Flooding causes \$6 billion in average annual losses in the United States annually and account for an average of 140 casualties annually (USGS, "Flood Hazards – A National Threat," 2006). While most people's vision of the threat from flooding may include being swept away or buildings being structurally impacted, there are actually a number of hazards associated with flooding that occur both during and after an event

During the Flood

While a flood event is underway, citizens will be faced with a number of threats. The hydraulic power of water is significant. Walking through as little as 6 inches of moving

City of Tacoma Park Flood Mitigation Plan

water is dangerous because of the possibility of losing stable footing. Driving through flood water is the cause of many flood deaths each year. As little as one foot of water will float many cars and two feet of rushing water will carry away most vehicles including SUVs. That fact, combined with an inability for drivers to judge the depth of flood water, as well as the potential for flood waters to rise quickly without warning which makes driving through flood water a very unwise action.

In addition to being swept away, flood water itself is to be avoided. Because of leaking industrial containers, household chemicals, and gas stations, it is not healthy to even touch the flood water without protective equipment and clothing. Downed power lines, flooded electric breaker panels, and other sources of electricity are a significant threat during a flood. One should also be prepared for the outbreak of fire. Electric sparks often cause fire to erupt and because of the inability of fire fighting personnel to respond, a fire can quickly burn out of control.

After the Flood

Cleaning up after a flood can also expose citizens to a number of threats. For example, electrical circuits or electrical equipment could pose a danger, particularly if the ground is wet. Buildings that have been exposed to floodwater may exhibit structural instability of walkways, stairs, floors, and possibly roofs. Flood waters often dislodge and carry hazardous material containers such as tanks, pipes, and drums. They may be leaking or simply very heavy and unstable. The combination of chemical contamination and the likely release of untreated sewage (necessary when the sewage treatment plant is overwhelmed with flood-swelled effluent) mean that drinking water supplies can be unusable. Fire continues to be a very real threat after a flood. First-responders could be occupied with more pressing emergencies and traditional fire suppression equipment may be inoperable, but there may be mobility problems that keep fire-fighting equipment to reach an outbreak. Finally, there is the mental toll of being involved in a disaster. Continued long hours of work, combined with emotional and physical exhaustion and losses from damaged homes and temporary job layoffs, can create a highly stressful situation for citizens. People exposed to these stressful conditions have an increased risk of injury and emotional crisis, and are more vulnerable to stress-induced illnesses and disease.

Impact to Buildings

Fortunately, the number of people killed or injured during floods each year is relatively small. The built environment within the floodplain, however, is likely to bear the brunt of a flood's impact. Whether the water is moving or standing, the exposure of buildings to flood water could cause a great deal of damage. If the water is moving, the differing hydraulic pressure inside the building vs. outside can cause the walls and foundation to buckle and fail. If the water is standing for any length of time, even materials above the flood height will become saturated with flood water as the flood water is absorbed (known as wicking). Certainly, most of the contents of flooded buildings that were located at or below the flood height will need to be discarded. This includes carpet, furniture, electronic equipment, and other household or commercial items. In most cases it is not simply the fact that the objects have become wet but that the flood water brings with it sediment and chemicals make it nearly impossible to recover all but the most precious/heirloom items.

City of Takoma Park Flood Mitigation Plan

Vulnerability Assessment

The goal of mitigation is to increase the flood resistance of a community, so that the residents and businesses will be less susceptible to future exposures to flooding. A key component to reducing future losses is to first have a clear understanding of what the current threats are, what the current probability would be that those threats will occur, and what the potential for loss from those threats would be. The Vulnerability Assessment is a crucial first step in the process as it is an organized and coordinated process of assessing potential hazards, their risk of occurring, and the possible impact of an event.

Methodology

The Vulnerability Assessment was conducted using HAZUS-MH MR3, FEMA's loss estimation software, to assess the City's built environment and critical facilities' vulnerability to flooding. 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 credible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across a variety of hazards, including floods, hurricane winds and earthquakes. The methodology supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

The primary input to any vulnerability assessment is a "depth of flood" grid. This flood depth grid was created using an elevation grid derived from topographic contours with a 2 foot elevation interval. For the flood plain boundaries and flood elevations, both the Montgomery County Flood Insurance Study was used, as well as two independent studies that focused on Maple Avenue and 4th Avenue. By incorporating the polygons of the 100-year floodplain, the flood elevations of all three sources, as well as the current elevation grid, HAZUS-MH was able to create a flood depth grid with a reasonable precision.

Once this flood depth grid was created, Takoma Park's tax parcel polygons and building footprints were digitally overlaid and those parcels and buildings that intersect the floodplain were selected. The height to the first finished floor of each building in the floodplain was determined by field inspection. The height to the first finished floor was then compared with the predicted flood depth to estimate the potential depth of water for each building. For each level of water depth, there is a corresponding percent damaged metric. The 2007 assessed value of the building was then increased according to a formula to account for the value of the contents of the building. The total value was multiplied by the percent damaged metric to calculate an estimate of damage from the 100-year flood event.

It is important to note when viewing the following results that the numbers generated carry with them a degree of uncertainty. The flood heights and flood boundaries used to generate the flood depths are either incomplete (the Flood Insurance Study) or not necessarily conducted using the same modeling standards (the two private studies). Therefore, we recommend that these damage statistics be viewed as merely an indicator of the potential degree of damage and not as a final and absolute number.

City of Takoma Park Flood Mitigation Plan

Results

Table 2.2 indicates that there are 14 buildings within the 100-year floodplain in the City of Takoma Park. When the flood depth grid (Figure 2.4) is intersected with the height of the foundations of each of these buildings, one of them shows minimal damage. The maximum amount of damage is 45 percent; three buildings in Takoma Park could possibly sustain that degree of damage. The total value of both the structures and their contents is just over \$12 million. The total potential damage from flooding is just over \$1.1 million. This number represents 9.3 percent of the total assessed value.

Table 2.2 Potential damage to structures/contents from a 100-year flood event by degree of damage category

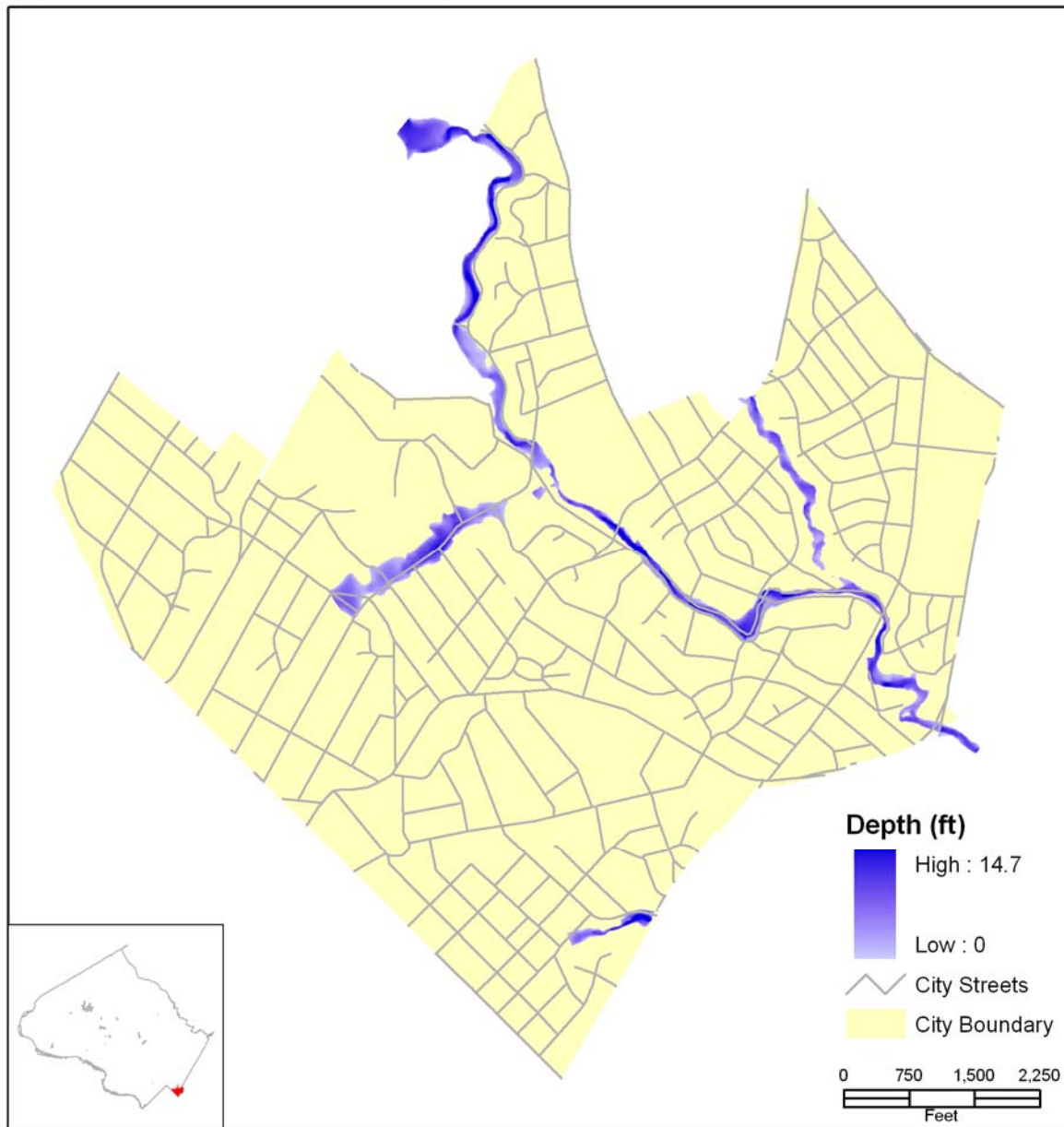
Degree of Damage	Building Count	% of Total	Value of Structure and Contents (2007)	Total Potential Damage	% of Total
Less than 1%	1	7.1%	\$5,462,420	\$52,210	4.5%
6 - 10%	3	21.4%	\$2,870,145	\$204,866	18.1%
11 - 15%	4	28.6%	\$1,512,660	\$189,571	16.8%
16 - 20%	3	21.4%	\$838,920	\$155,705	13.8%
30 - 45%	3	21.4%	\$1,432,950	\$529,338	46.8%
Total	14	100%	\$12,117,095	\$1,131,692	100%

When the potential damage was also examined with respect to land use, it was found that nearly all of buildings in the 100-year floodplain in the City of Takoma Park were residential (Table 2.3). Only one of the buildings was commercial, and one was educational. While that one commercial building only accounts for 7% of the buildings impacted, its potential damage is over one-fifth of the total. This suggests that mitigating that particular retail store on Maple Avenue might yield a better singular opportunity for reducing flood losses.

Table 2.3 Potential damage to structures/contents from a 100-year flood event by general occupancy type

General Occupancy Type	Building Count	% of Total	Value of Structure and Contents (2006)	Total Damage	% of Total
Residential	12	85.7%	\$6,064,275	\$823,858	72.8%
Commercial	1	7.1%	\$590,400	\$255,624	22.6%
Educational	1	7.1%	\$5,462,420	\$52,210	4.6%
Total	293	100%	\$12,117,095	\$1,131,692	100%

Figure 2.4 Predicted 100-year flood depth



Critical Facilities

In addition to the general building stock, critical facilities were also examined as part of the vulnerability assessment. As evident in the following table (Table 2.4), 11 different facilities could be impacted by the 100-year flood. They include eight bridges (primarily over Sligo Creek), one school, one government building/community center, and one park. While the Takoma Park Community Center (which also houses the City Council chambers, the Public Safety office, as well as other government functions) is listed here as being impacted by flood, the impact should be minimal at worst as the Center is protected by a floodwall designed to withstand a 100-year flood.

City of Takoma Park Flood Mitigation Plan

At this time, there are no future buildings, significant infrastructure projects, or critical facilities located within the flood hazard area.

Table 2.4 Critical facilities in the 100-year floodplain

Facility Type	Count	Examples
Park	1	Sligo Creek Park
School	1	Piney Branch Elementary School
Government Building	1	Takoma Park Community Center (protected by floodwall)
Bridge	8	Piney Branch Rd, Maple Ave, Carroll Ave, Flower Ave, New Hampshire Ave

Spatial Distribution of Flooding

Flooding in Takoma Park has a very distinct geographic distribution. While all areas near streams and rivers have some risk to flooding, certain areas are more prone than others.

Areas of moderate flood vulnerability include the following, each of which is elaborated below.

- Sligo Creek & Long Branch
- Maple Avenue (from just above of Philadelphia Ave to just below Lincoln Ave)
- Fourth Avenue (near the intersection with Poplar Ave)

Figure 2.5 A footbridge over Sligo Creek in Sligo Creek Park



Sligo Creek & Long Branch

The primary flood threats in the City of Takoma Park are Sligo Creek and Long Branch. As incised step-pool streams with significant drainage areas, both Sligo Creek and Long Branch experience minor flooding at regular intervals. In fact, a review of the historical flood record shows that only Sligo Creek is mentioned by name as a source. Fortunately, the County has made very prudent land use decisions in the past, and established Sligo Creek Park to prevent the area from being developed. In the event of a 100-year flood, a couple park maintenance buildings, recreational equipment, and

several footbridges will be inundated (Figure 2.5). However, the dollar losses related to a flood in Sligo Creek or Long Branch are likely minimal.

Figure 2.6 A commercial property at 7601 Maple Avenue in Takoma Park. The flood model predicts water depth of 6 feet at this location during a 100-year flood event



Maple Avenue (from Philadelphia to Lincoln) (Figures 2.6 – 2.8)

The potential flooding along Maple Avenue in central Takoma Park comes from a relic/buried tributary to Sligo Creek. Underneath Maple Avenue is a significant stormwater collection and distribution system that should capture potential flood water from high frequency events. However, if the drainage area above Maple Avenue were to experience a significant rainfall event in a very short period of time, the potential for flooding exists.

In the event of a 100-year flood event, several buildings between Philadelphia Avenue and Lincoln Avenue are at risk. Fortunately, the Takoma Park Community Center is protected by a flood wall designed to repel a 100-year flood level. However, the Piney Branch Elementary School, a couple apartment buildings, and one ground-level commercial building are likely to be impacted.

Figure 2.7 The concrete flood wall around the Takoma Park Community Center.



Fourth Avenue (near the intersection with Poplar Avenue) (Figure 2.9)

This area is vulnerable to the 100-year flood at the headwaters of Tributary 2, an unnamed tributary of Sligo Creek. This relic stream, some of which is buried and flows through culverts in its lower reaches, has the potential to flood three houses along Fourth Avenue, many of which are built slab-on-grade. In addition, this area is not currently known for its flooding threat and therefore the residents may be unaware of the potential for damage.

Figure 2.8 Potential flooding along Maple Avenue

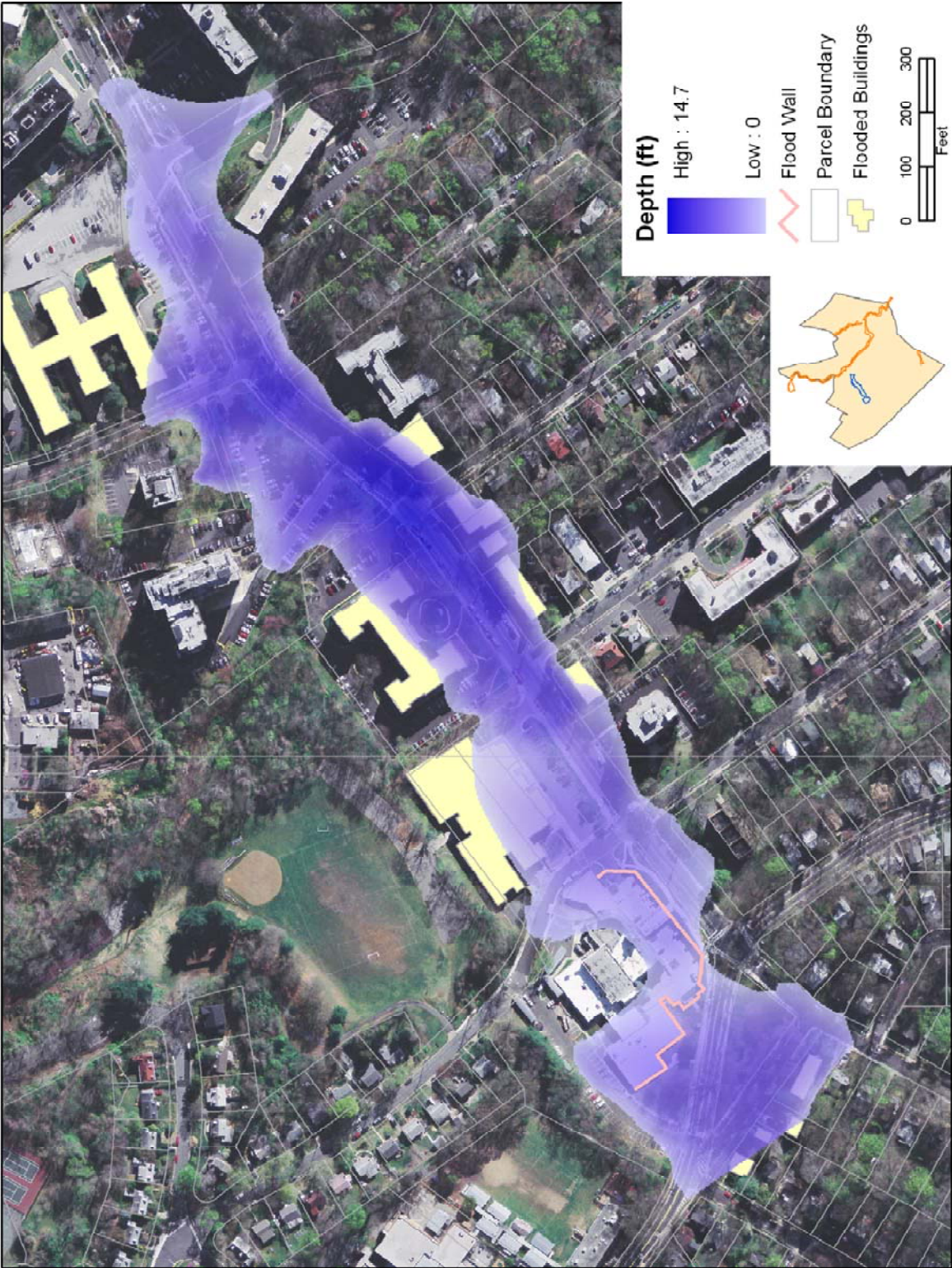
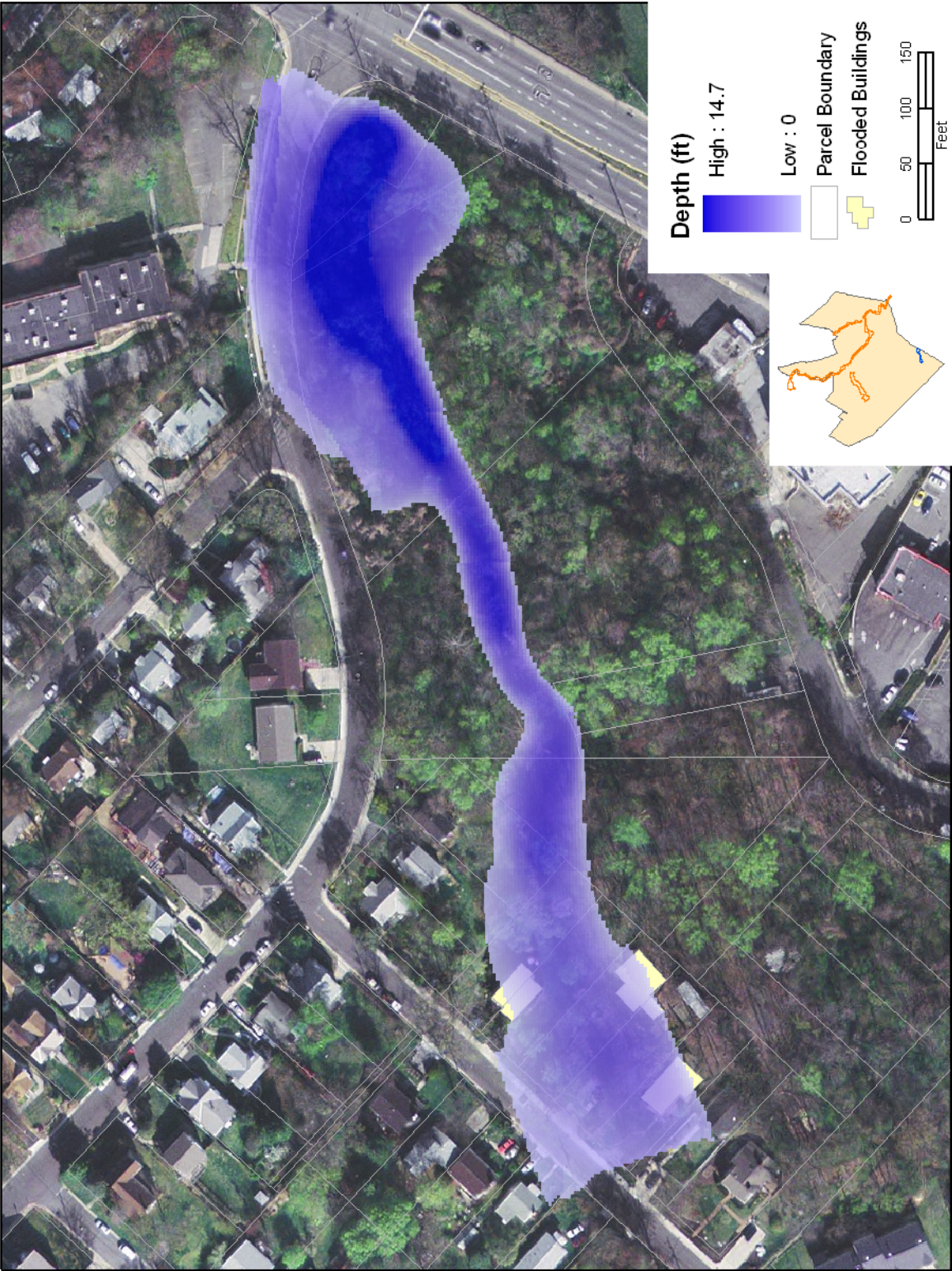


Figure 2.9 Potential flooding along 4th Avenue and Poplar Avenue



City of Takoma Park Flood Mitigation Plan

Repetitive Loss Properties

A repetitive loss property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Structures that flood frequently strain the National Flood Insurance Fund. Repetitive loss properties not only increase the NFIP's annual losses and the need for borrowing; but they drain funds needed to prepare for catastrophic events. Community leaders and residents are also concerned with the repetitive loss problem because residents' lives are disrupted and may be threatened by the continual flooding.

According to the Maryland Department of the Environment, the City of Takoma Park does not currently contain any repetitive loss properties as of 2008.

Economic Impact

Businesses

Floods cause other problems that are not as easy to identify as damage to buildings and critical facilities. Businesses that are disrupted by floods often have to be closed, often for long stretches of time. Inventories are lost, customers cannot access businesses, and employees are often busy protecting or cleaning up their flooded homes.

Impact on taxes

Public expenditures on flood fighting, sandbags, fire department calls, clean up and repairs to damaged public property would affect all residents of Takoma Park. While a state or federal disaster declaration may help reimburse the City, these handouts cannot be counted on in the future. Further, a recent law now requires that public agencies purchase insurance. The amount of insurance that should be carried will be deducted from disaster assistance payments. Even with federal and state disaster assistance, public agencies incur many expenses that must be paid by local taxpayers.

Transportation

Loss of road access is a major flood impact that could affect the residents and businesses in Takoma Park, not just those that own property in the floodplain. This can have an impact on not only the direct costs to fix the roads/bridges but also the value of lost time and productivity for the City's residents. As with taxes, these costs are borne by everyone, not just floodplain residents.

Other impacts

Finally, areas that are consistently prone to flooding will have a negative impact on property values, encouraging neighborhood destabilization factors such as blight, high proportion of renters vs. owners, and crime to take hold

Development Trends

The resident population of the State of Maryland is projected to increase from 5,296,486 in 2000 to approximately 6,533,900 by 2025 (U.S. Census Bureau). Maryland's rate of population change, at 23.3 percent, ranks as the 22nd largest in the Nation. This trend

City of Takoma Park Flood Mitigation Plan

demonstrates that Maryland's population is increasing, and consequently the number of residential structures and the associated exposure of residential buildings will increase as well. The trend for the City of Takoma Park is expected population increase of 6.9% over the same period.

When we examine the potential growth of the City of Takoma Park in greater detail, the future vulnerability to flooding is revealed. The City's zoning classification is kept up-to-date as part of the comprehensive planning process in Montgomery County. (Figure 2.10). Therefore, the City land-use zoning map is an accurate depiction of the desired future land use for the citizens and leaders of the City of Takoma Park. Note that the zoning categories in the following figure are generalized for clarity. For example, all four types of commercial zoning categories were collapsed into one.

When one examines the composition of the future land use within the floodplain (Figure 2.11 and Table 2.5), a few important points should be highlighted. First, the modeled flood zone represents exactly 4% of the land area of the City of Takoma Park. However, as noted above, much of that zone is contained within parkland. Unfortunately, the future land use categories does not include a parkland zone, so the green space along Sligo Creek and the other tributaries are classed as a future single family residential. There does seem to be an inordinate amount of future townhome development within the floodzone, it is the result of a small starting area in the City. It should be noted that the City has done an excellent job keeping potential commercial development away from the flood hazard area.

Table 2.5 Future land use within the modeled 100-year flood extent

Future Land Use	Original Area (Ac)	Area within 100-year Flood Extent (Ac)	Percent of Area Vulnerable to 100-year Flood
Single Family Residential	902.60	36.21	4.01%
Townhomes	5.34	1.18	22.10%
Multi-Family Residential – Low Density	21.14	0.67	3.17%
Multi-Family Residential – Medium Density	31.58	1.41	4.46%
Multi-Family Residential – High Density	45.74	3.54	7.74%
Commercial	72.09	0.13	0.02%

Finally, there are two future trends one must be aware of while considering the vulnerability of the City of Takoma Park to flooding. First, high frequency, low impact stormwater flooding currently occurs in several parts of the city. In the future, if the stormwater collection and distribution system is not maintained, the flooding vulnerability of the City could be exacerbated. Second, while not much open developable land remains in the City of Takoma Park, particularly in the floodplain, the City is likely to experience occasional surges in redevelopment. The City leadership will want to make sure that redevelopment takes place in a way that reduces stormwater run-off and flood vulnerability generally.

Figure 2.10 Future land use (from zoning) in the City of Takoma Park

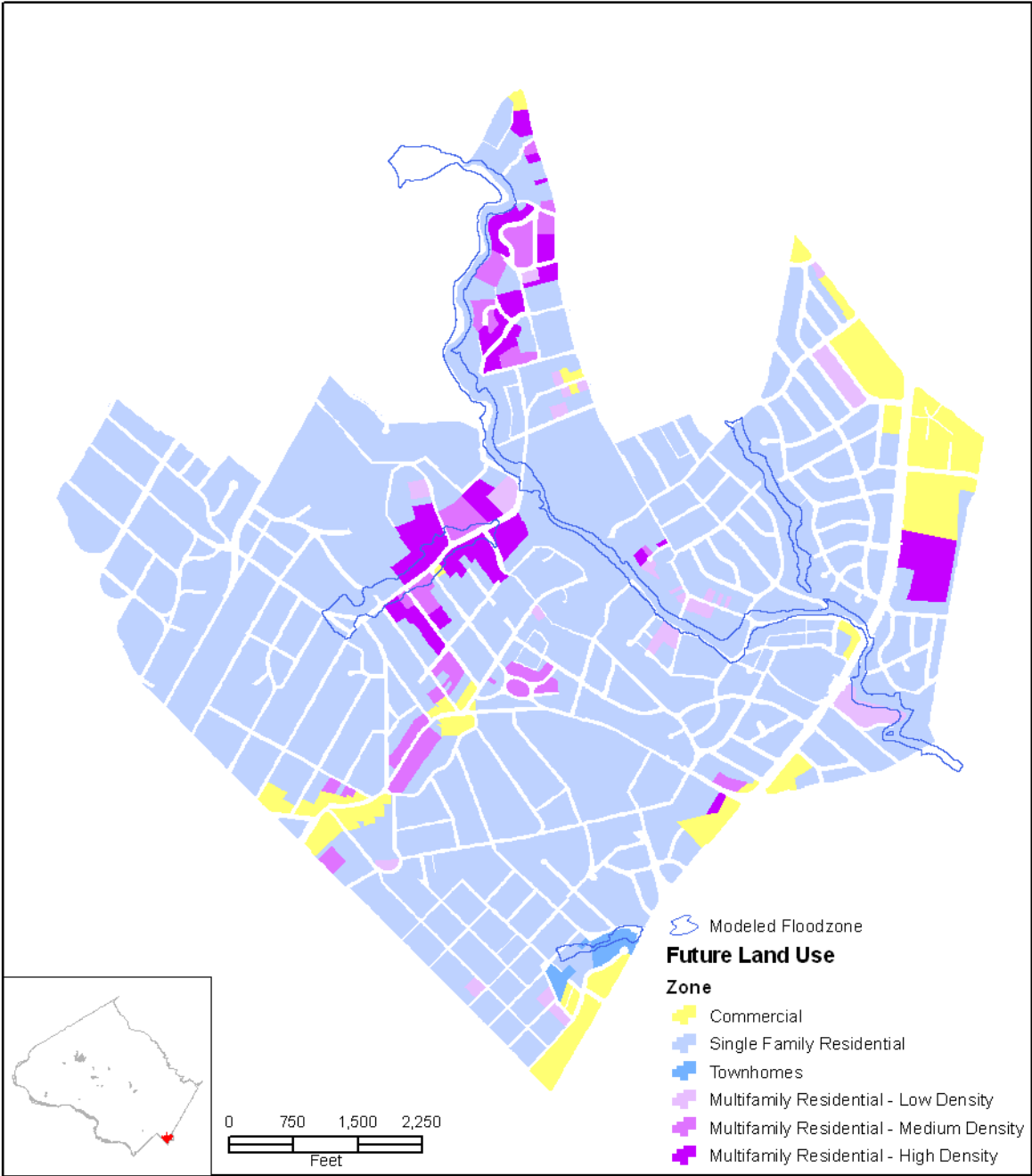
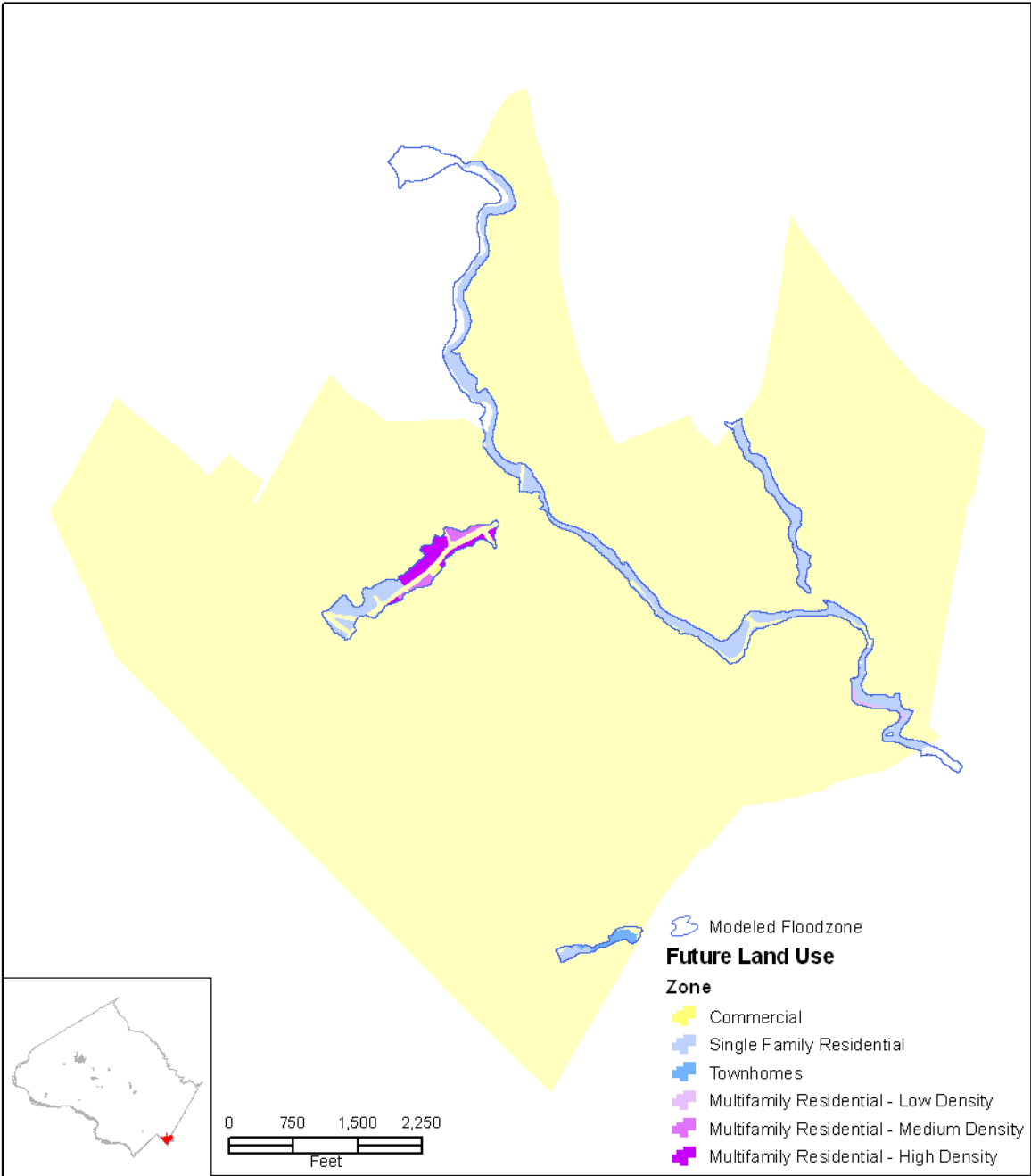


Figure 2.11 Intersection of future land use (from zoning) and the modeled 100-year flood extent



Conclusions

Several conclusions can be made regarding the question of flooding vulnerability in the City of Takoma Park. First, the city as a whole is remarkably free from riverine flooding. This is surprising given the intensity of the residential and commercial development and the presence of a set of significant streams passing through the City. However, the land use decisions made long ago to preserve those areas most susceptible to flooding as open space and parkland has reduced the vulnerability of Takoma Park immensely. On the other hand, there is cause for concern. It seems that a detailed, comprehensive study of the riverine flooding potential of the tributaries of Sligo Creek has not been conducted. Stormwater issues continue to plague Takoma Park and point to the potential for system vulnerabilities if the City is subjected to a 100-year precipitation event. As most properties in Takoma Park are already developed, there is little chance that development will move into flood-prone areas. However, in order to either keep the same level of vulnerability or improve it, the City must take care to not allow ill-conceived redevelopment that might exacerbate the flood threat.

CHAPTER 3: PREVENTIVE MEASURES

Introduction

Preventive measures comprise regulations that are included in plans and ordinances such as zoning ordinances, building codes, floodplain development regulations, and stormwater management regulations. These ordinances are usually administered by the jurisdiction's planning, public works, and/or code enforcement departments. In the context of this Plan, preventive measures are those regulations that are enforced to ensure that future development does not increase the damage caused by a flood and that new construction does not contribute to the flood risk, thereby reducing the community's vulnerability to flooding.

Comprehensive plans, master plans, and zoning ordinances typically contain language to keep damage-prone development out of the hazardous or sensitive areas. Building codes and floodplain development regulations impose construction standards on what is allowed to be built in the floodplain. They protect buildings, roads, and other projects from flood damage and prevent development from aggravating the flood problem. Stormwater management regulations address the runoff of stormwater from new developments onto other properties.

City and County Ordinances

The sections below include a review of the County's and City's codes, plans, and ordinances and identify areas where hazard mitigation principles are addressed to help develop recommendations on how to better integrate hazard mitigation into other plans and activities.

Zoning Ordinance

A zoning ordinance is an important tool used to implement the comprehensive plan as it provides guidance on how land should be developed. A zoning ordinance defines: 1) use of land and structures and the height and bulk of structures; 2) density of population and intensity of land and structural use; and 3) provision for yards and setbacks. The zoning ordinance regulates development by dividing the community into zones or districts and setting specific development parameters for each of these districts.

The City follows the Montgomery County Zoning Ordinance, subdivision regulations, and stormwater regulations. Montgomery Code Chapter 59 addresses local zoning and subdivision ordinances and is implemented by the County's Department of Permitting Service. The County's zoning regulations have prohibited construction within the 100-year floodplain for several decades. The County prohibits development in regions through restrictive zoning and subdivision requirements. New construction is prohibited in the floodplain of the major waterways such as Sligo Creek.

City of Takoma Park Flood Mitigation Plan

Subdivision Controls

Subdivision regulations for the City are also administered by Montgomery County. The County's Department of Permitting Service enforces the County Code by restricting development in areas through the site planning approval process.

Stormwater Management Regulations

Stormwater management regulations address the runoff of stormwater from new developments on to other properties and into floodplains. Development outside a floodplain can contribute significantly to flooding problems; when land is developed, the natural ground cover is replaced and runoff is increased. In order to prevent stormwater from flooding roads and buildings, storm sewers and ditches are constructed to transport the water effectively.

Stormwater management regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage systems. The goal is to ensure that the increased rate of stormwater discharge after development, in comparison to the site's conditions prior to development is as small as possible.

A retention basin or retention pond is a type of runoff control mechanism. It provides a space to collect and hold water from a small surrounding that would otherwise flow into neighborhoods, roads, or other areas possibly causing flooding. The water remains in the local area that it was deposited in. A detention basin holds water for a limited period of time from a larger basin area to prevent flooding and releases all the water contained in a short period of time. The Montgomery County Department of Environmental Protection regulates stormwater management, erosion, and sediment control. The County's Stormwater Management Regulations include strategies such as condemnation and design and implementation of containment ponds. With the exception of low density agricultural and residential zones, all development is required to treat and store stormwater run-off. This provides flood protection, minimizes stream bank erosion, removes pollutants, minimizes sedimentation of waterways and in some cases, recharges the groundwater supply. In the case of Takoma Park, the City regulates stormwater management through the City Code. Other functions are listed above are managed by the County.

Erosion and Sediment Control

Chapter 19. Erosion, Sediment Control and Storm Water Management of the Montgomery County Zoning and Ordinance Codes states that a sediment control permit must not be issued for any grading or land-disturbing activity that is located within or within twenty-five (25) feet of a 100-year floodplain if the activity requires and has not received a floodplain district permit.

City of Takoma Park Flood Mitigation Plan

Building Code

Building codes set construction standards for the minimum acceptable level of safety for buildings in a community. Building codes are also important in mitigating the impact of non-flood hazards on new buildings. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code.

Chapter 8 of the Montgomery County Code, the International Building Code (IBC) is the County's basic building code. The IBC regulates construction materials and methods for all structures (except for one and two family dwellings). The one- and two-family dwellings are regulated by the International Residential Code (IRC). The IBC and IRC establish criteria that resist damage to natural hazards including wind speed (for hurricane, tornados, thunderstorms, winter storms) seismic activity, snow load, and flooding. This code prohibits building in any 100-year floodplain or stream or drainage course. This section of the code also prohibits development in any area that is subject to flooding, erosion, destabilized slopes or fills within the danger reach of a high-hazard dam. However, these codes are not retroactive codes, and do not include older buildings. Pre-existing structures are subject only to the codes that exist at the time of construction and when there are major additions to structures, they need to be brought up to the new code's standards. Older buildings are more vulnerable to damage from natural hazards unless they are brought up to the current code's standards.

Building Code Effectiveness Grading Schedule

The Building Code Effectiveness Grading Schedule (BCEGS) is a program that measures local building code, natural hazard protection standards, and code administration. The Building Code Effectiveness Grading Schedule is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. As part of the BCEGS program, the Insurance Services Offices (ISO) assigns each municipality a BCEGS grade of 1 (exemplary commitment to building-code enforcement) to 10.

Montgomery County (including the City of Takoma Park) has an overall residential score of 5, and a commercial score of 4. In the 28 different areas evaluated by ISO, Montgomery County has received a perfect score in 8 commercial areas and 7 residential areas. In Section 330 - Inspections for Natural Hazard Mitigation the County received a perfect score of 1.5 points in both residential and commercial.

The last time the BCEGS score was evaluated for Montgomery County was in 2005. The county is due for another assessment in 2010. At this time, the County's goal is to improve and obtain a score of 3 in both categories. A score of 3 will result in a reduction of insurance rates for the county's jurisdictions.

Floodplain Development Regulations

Floodplain development regulations protect building and infrastructure from damage and prevent development in areas that will increase the flood risk to surrounding buildings or cause other problems. The Montgomery County Code, Chapter 19, Article III, Floodplain District Requirements, applies in the City of Takoma Park.

City of Takoma Park Flood Mitigation Plan

Based on the County Code, development is allowed in the 100-year flood plain. A floodplain permit is required for land disturbing activity within the floodplain district and within 25 feet of the district's boundary." The County's guidelines require stream buffers that range from 100-200 feet on each side of a stream. These buffers exceed the State's recommended buffer of 50 feet.

A floodplain district permit is not required for any minor land-disturbing activity that disturbs less than 5,000 square feet of ground surface area; is promptly stabilized to prevent erosion and sedimentation; and does not substantially block or impede the flow of water or change the cross-section of the floodplain.

City Flood Insurance Rate Map

The City's Flood Insurance Rate Map (FIRM) and Flood Insurance Study were developed in March 1984. The administration of floodplain information is done in the City's Public Works Department. Digital FIRMs have been completed for Montgomery County. Montgomery County's new DFIRM is a digital conversion of the old paper map converted into a digital layer. However, this project did not include the preparation of DFIRMs for the City of Takoma Park.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a Federal program that enables property owners in participating communities to purchase flood insurance as protection against flood losses, while requiring State and local governments to enforce floodplain management regulations that reduce future flood damages. The NFIP plays a critical role in encouraging communities to adopt and enforce floodplain management regulations and to implement broader floodplain management programs. The City of Takoma Park participates in the Flood Insurance Program (Resolution of Intent to enter the NFIP (No.2006-3) was adopted by the city on May 22nd, 2006). The City's Public Works Department works with the Montgomery County Department of Permitting Services which conducts public inspections, furnishes flood insurance risk premium rates, and maintains elevation certificates.

Continued Compliance with NFIP

The Maryland Department of the Environment (MDE) cooperates with FEMA to provide assistance to communities participating in the NFIP. As noted earlier, the City of Takoma Park participates in the NFIP and has its own floodplain ordinance. The floodplain ordinance requires that all insured structures damaged over 50 percent of the market value of the property must comply with the floodplain ordinance when the building is repaired. That could mean elevation, acquisition and demolition, or relocation to a location out of the floodplain. Through MDE's Community Assistance Program, periodic Community Assistance Visits (CAV) are conducted to review community performance. The City has met requirements for continued participation in the NFIP and discourages development in the floodplain. The City has not had a Community Assistance Visit (CAV) to date and no floodplain permits have been issued.

City of Takoma Park Flood Mitigation Plan

Capital Improvements Program

The City's Capital Improvements Program (CIP) is administered by the City's Public Works Department. The CIP identifies funding for street resurfacing, among other projects. The public works projects slated for construction in FY09 stormwater management include TV inspection and cleaning of 1/3 of the system, installation of a stormwater filtration system for the Public Works yard, design of LID system for Linden Avenue, repairs to outfall at the New York Ave/Baltimore Ave stream channel and site assessment and planning for Poplar Mills/Sligo Mill parcel.

State of Maryland Model Floodplain Management Ordinance

Some highlights from the Maryland State Model Floodplain Ordinance are included below:

- All new and substantially improved structures are required to be built one foot above the base flood elevation.
- Ordinances do not allow buildings or fill in the floodway. Any development that impedes floodwaters or causes an increase in water surface elevations during the 100-year flood is not allowed.
- Existing buildings can only be replaced or substantially improved so long as they don't increase in footprint and any minor additions are required to be elevated.

The Community Rating System

The Community Rating System (CRS) program is an incentivized program that encourages communities to go beyond the minimum floodplain management requirements and develop extra measures to provide protection from flooding. The incentives are in the form of premium discounts. The CRS is administered by the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. A community receives a CRS classification based upon the credit points it receives for its activities. It can take on a wide range of activities that reduce flood losses. These activities include but are not limited to: better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs.

For CRS participating communities, flood insurance premium rates are discounted in increments of 5 percent; i.e., a Class 1 community would receive a 45percent premium discount, while a Class 9 community would receive a 5 percent discount. The CRS classes for local communities are based on 18 activities that are credit worthy; they are organized under the following four categories: 1) public information; 2) mapping and regulations; 3) flood damage reduction; and 4) flood preparedness.

There are 10 CRS classes. A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a class 10 community. As of May 1, 2008, there were 1,049 communities in the United States in the CRS (class 9 and below). Of these, six are Maryland communities:

- Town of Bel Air, (class 8)

City of Takoma Park Flood Mitigation Plan

- Caroline County (class 9)
- Harford County (class 7)
- Howard County (class 8)
- City of North Beach (class 8)
- Town of Ocean City (class 7)
- Prince George's County (class 5)

In order for the City of Takoma Park to join the CRS program, this flood mitigation plan should first be adopted, after which, the City would be required to submit an application. Once accepted into the program, the City would receive credit for this Plan, in addition to other flood-related activities that are currently being performed by the City. In order to retain the credit each year, the City would be required to submit an evaluation/progress report on the implementation of the projects in the Plan. The CRS program not only encourages starting new programs but also emphasizes the fact that the programs should be ongoing in order to receive credit year after year. Therefore the City would be required to be recertified by FEMA annually so long as it is continuing to implementing its CRS selected activities. If the City fails to maintain the same level of involvement in flood protection each year, it could result in a loss of CRS credit points, thereby leading to an increase of flood insurance rates to residents.

State and Local Plans

Planning studies include a wide variety of projects such as comprehensive plans, master plans, land use plans, revitalization plans, mitigation plans, and transportation plans. In general, land use plans and comprehensive plans discuss the direction of growth of the community and can pave the way to integrate principles of hazard mitigation.

State of Maryland Hazard Mitigation Plan - September 2004

The State Hazard Mitigation Plan identifies a number of objectives and policies to assist local communities such as Takoma Park with their hazard mitigation strategies. The following specific mitigation actions discuss the State's support to local governments with local mitigation projects:

- Since many important mitigation decisions are and will continue to be made at the local government level MEMA will continue to support the development and implementation of local hazard mitigation plans.
- MEMA will integrate local mitigation plan mitigation goals, objectives and strategies into the 2007 State of Maryland Hazard Mitigation Plan and future updates.
- MEMA will continue to support local governments in the updating and development of local hazard mitigation plans by providing extensive technical assistance. This assistance will include continued training on regulatory requirements and the use of Hazard Analysis and Risk Assessment Data.
- MEMA will partner with responsible State agencies to identify mitigation strategies for State-owned facilities that have been identified in the Risk Assessment as located in hazard areas for flash and riverine flooding.

City of Takoma Park Flood Mitigation Plan

2007 Montgomery County Hazard Mitigation Plan

The following flood-related mitigation strategies proposed in the County Plan have a direct bearing on the Takoma Park Flood Mitigation Plan.

- Encourage all municipalities to participate in the NFIP.
- Continue on-going land use policies and programs to prohibit new development within recognized flood zones.
- Explore solutions to mitigation possible flood damage to the 199 homes in the 100-year floodplain.
- Pursue mitigation projects in areas that frequently flood to improve waste management including larger culverts, channelization, retention ponds, and on-going maintenance of stormwater systems.
- Continue to coordinate with DPWT to sustain or increase the level of effort to maintain and clear storm drains on an ongoing basis and develop a system for regular storm drainage inventory and condition reporting.
- Work with the County agencies on the County's Technical Planning Committee to annually review and prioritize hazard mitigation priorities.
- Secure mitigation funds to design and construct improved stormwater management facilities throughout the County to adequately handle rainfall by increase the capacity of certain stormwater management facilities, roadways, and other public structures to assist in protecting public row, public infrastructure, and ultimately low lying private infrastructure located near public row or stormwater management facilities.

The following Montgomery County hazard mitigation planning goals directly pertain to the City of Takoma Park and the flood mitigation plan:

- Promote the use of cost-effective, technically-feasible mitigation techniques to make the community, buildings, structures, and infrastructure resistant to natural and/or technological hazard events.
- Institutionalize hazard mitigation planning in continuity of government operations. Require bodies and implementing departments to include hazard mitigation planning into the wider scope of strategic planning so that government services are more resistant to interruption from hazard events.
- Foster public education and preparedness for disasters. Foster individual responsibility for preparedness.
- Promote policies that incorporate natural hazard mitigation in community land use planning and development, and protect environmentally sensitive areas that mitigate the impact of natural disasters.
- Coordinate emergency management planning with first responders to minimize impacts and risks from hazard events and facilitate the identification of future prevention strategies for such events.
- Foster improvements in the communications and coordination among public and private entities, regionally and locally.

The following mitigation strategies are suggested for municipalities in the 2007 Hazard mitigation plan:

City of Takoma Park Flood Mitigation Plan

- Use newsletters, email, and other methods to assist residents in preparing for emergencies.
- Survey municipally owned or leased properties for potential flooding problems and identify mitigation strategies for making the City Halls and meeting areas (including parking lots) resistant to flooding.
- Participate with the County to review current projects and identify new hazard mitigation projects.

Montgomery County General Plan - General Plan Refinement of the Goals & Objectives (1993)

Guiding Principles of the General Plan Refinement - The Plan calls on development to mitigate the negative impacts in order to balance the human need for places to live, work, and play, with the need to protect the environment. The refinement promotes mixed use development and sensitive increases in intensity within appropriate boundaries in centers to control sprawl and to reduce development pressure on rural open space areas and farmland.

The environment goal seeks to: 1) manage the impacts of human activity on the environment; 2) conserve natural resources to maintain a steady eco-system; and 3) protect public health and safety. The environment goal is integrated with the land use goal in the need to balance the protection of land in urbanized areas with the push for compact communities. The Plan also advocates the use of flexible development standards and concentration of development to minimize environmental impacts. The environment goal responds to Vision 2 of the Maryland Planning Act, which requires that sensitive areas be protected.

The key strategies that pertain to flood mitigation include the following:

- Control runoff and flooding by controlling impervious surfaces;
- Require and enforce sediment and erosion control during public and private development; continue parkland acquisition in key stream valleys, limit the potential damage to life and property from flooding;
- Prohibit development too close to streams, in the 100-year floodplain, and in flooding danger reach areas of dams, unless no feasible alternative is available; and
- Encourage the use of vegetated swales or other techniques rather than enclosed pipes or concrete swales to carry stormwater runoff, infiltration, to minimize erosion and water velocity.

The General Plan includes a section on flood protection (Flooding Fact Sheet). Prior to 1974, the 50-year floodplain was the standard. Currently the County Code restricts the construction of homes, other structures, and the disturbance of the 100-year floodplain. Construction activities in 100-year floodplains require a State waterway construction permit when the disturbance of a floodplain is unavoidable. This is designed to limit the construction in floodways which could result in increased flooding. Construction of residences and other structures are not permitted within an area that may be flooded in the case of a dam break (danger reach) areas. A county program to reduce the potential damage to private homes has purchased approximately 24 homes located in floodplains.

City of Takoma Park Flood Mitigation Plan

City of Takoma Park Master Plan

The Takoma Park Master Plan functions as a comprehensive and land use plan, was implemented in December 2000, and is administered by the MNCPPC. The Plan includes a Priority Actions Table that identifies improvements that are needed throughout the City. The following improvements have a direct bearing on the City's flood mitigation policies: Reconstruct the Takoma Park Fire Station, Reconstruct Piney Branch Road; and Construct a park at 315 University Boulevard. The City of Takoma Park Master Plan offers the following recommendations that have an impact on flooding:

- Support provision of new public buildings at the Municipal Center as well as streetscape improvements along Maple Avenue and a community park between Maple Avenue and Piney Branch Road.
- Complete open space networks and support additions to City open space properties.
- Support an Urban Forestry Concept to encourage enhancement of environmental resources such as woodlands and trees, and stewardship of stream valley parks.
- Recommend a variety of innovative techniques to protect and enhance streams.
- Adopt a new neighborhood retail overlay zone to allow for a few neighborhood shops to serve the residents of the Maple Avenue apartment area.
- Support residential and commercial uses as well as the protection of open space on the large vacant property on Sligo Mill Road near New Hampshire Avenue.
- Acquire additional properties as needed to enhance public use of Long Branch Stream Valley Park.

City's Staffing and Training Capabilities

The City of Takoma Park was incorporated in 1890 and follows a council/city manager form of government. It comprises a police department, public works department, economic and community development office, and public library. The City has a stormwater review authority and also provides neighborhood planning services. Building permits are handled by the County. City, County and M-NCPPC staff work hand in hand to perform planning, development review, and environmental protection functions.

In terms of staffing for flood related projects, the City of Takoma Park does not currently employ a building official/inspector or a floodplain administrator. The County's Department of Permitting Service determines if the property studied is in the floodplain. If the property is in the floodplain, the City Engineer advises the resident to continue the process with the County's Department of Permitting Services. Most GIS work is conducted by a contractor. The City uses existing GIS database from the M-NCPPC. GIS updates are done at the City; however, there is no formal process to update City information on the County's database. It is done as and when staff is available. In the past, interns have been hired to help with the update of the City's GIS database.

The City's Planning Office reviews site plans. The Planning Department is comprised of a Senior Planner, Associate Planner, and Supervisor. Site plan approval is conducted by the City staff and sent to the County for final approval. The City is in need of additional staff to assist the City Engineer with specific projects including public outreach and grant writing.

City of Takoma Park Flood Mitigation Plan

Zoning and construction permits are issued by the County. Multi-family residential and commercial inspections and code enforcement and inspections are conducted by the County. The City's Permit Authority plays an advisory role on variances, etc. Testimonies are prepared by the Planning Office and the City Council, based on the testimony and makes a decision to support or not support a land use decision. If approved by City Council, it is forwarded to the County for construction and building permits, variances, etc.

The City's Government Structure

This section identifies the functions that are in effect at the various levels of government and summarizes the roles of agencies in the City of Takoma Park that implement hazard mitigation-related activities directly or indirectly.

Department of Housing and Community Development - The Department of Housing and Community Development provides services which enhance Takoma Park's existing development while preserving and restoring historical commercial and residential areas in a safe and affordable manner.

Community Planning Group - The Community Development Group works to maintain the livelihood of Takoma Park through: offering economic development incentives, historic preservation, community outreach, transportation projects, and managing public space. The Community Development Block Grant (CDBG) Committee directs and advises the distribution of Takoma Park's annual CDBG allocation.

Public Works Department - This Department functions as the main infrastructure management in the City. Its responsibilities and services include; streets, sidewalks, city vehicles, city buildings, parks, gardens, recycling and trash pickup, leaf collection, snow removal, and tree management.

Recreation Department - Takoma Park Recreation Department develops and institutes programs and services which promote safe, diverse, and innovative forms of recreation.

Committee on the Environment - The main function of the Committee on the Environment is to advise the City Council and comment on City plans or projects that impact environmental quality. The Committee works closely with Takoma Park to review any legislation, regulations, policy, administrative actions, plans, or resolutions which it believes may affect environmental quality.

The Safe Roadways Committee - The Safe Roadways Committee develops and evaluates local, state, and regional transportation policies and projects.

Public Safety Citizens Advisory Committee - The Public Safety Citizens Advisory Committee (PSCAC) provides local input to the Council and the City's public safety agencies.

CHAPTER 4: PROPERTY PROTECTION

Introduction

Property protection measures involve those techniques used to modify existing buildings that are subject to flood damage. Most of these measures are implemented by or cost-shared with property owners and are thus relatively inexpensive to the community compared with other (more structural) flood protection measures. Most protection measures do not affect the appearance or use of a building. Examples of property protection measures include: relocation, acquisition, building elevation, flood-proofing, sewer backup protection, flood insurance, and mandates. These measures are elaborated below.

Building Relocation

Relocation involves moving a building to another location on higher ground. While this is often the best way to protect it from flooding, it can prove expensive for heavier (exterior brick and stone wall structures) and for large and irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where a new flood-free lot (or portion of their existing lot) available. Currently, there are no records of any relocations within the City.

Acquisition

Acquisition is similar to relocation, where buildings in the flood-prone area are removed to avoid future damage to them. However, in this case, the buildings are acquired by the local or state government and the land is converted to public use such as a park. Acquiring buildings and removing them from the floodplain is not only the most effective flood protection measure available, it is also a method to convert a problem area into a community asset and obtain environmental benefits. However, a “checkerboard” pattern in which nonadjacent properties are acquired could occur when some owners are reluctant to leave. Typically, no cost is borne by the homeowner in an acquisition project.

Acquisitions can be funded by the Federal Emergency Management Agency (FEMA) using post-disaster mitigation funds that are administered through MEMA. The buyout would involve eligible willing sellers only and be funded with 75 percent federal dollars and a 25 percent local match. The City does not have a record of any acquisitions and there are no acquisitions in consideration at the present time.

Building Elevation

This technique involves raising a building above the flood level so that water can flow under the building, causing little or no damage to the structure or its contents. Elevating a building will change its appearance. If only a small elevation is required, such as a couple feet, the front door would be three steps higher than before. If the building is raised 8 or more feet, the lower area can be wet flood-proofed and used for parking and for storage of items that will not be damaged by flood waters.

City of Takoma Park Flood Mitigation Plan

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with NFIP regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation. There is no record of any residential structures within Takoma Park that have been elevated.

Barriers

A barrier can be built of dirt or soil (“berm”) or concrete or steel (“floodwall”) and are used to prevent floodwaters from reaching a building. The standard design for earthen berms is three horizontal feet for each vertical foot (3:1 slope) requiring a minimum area six feet wide for each foot in height. Floodwalls need less room, but are more expensive. Barriers must be placed so as not to create flooding or drainage problems on neighboring properties, nor can they be constructed in the floodway. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, a barrier needs to handle leaks, seepage of water underneath, and rainwater that falls inside the perimeter. This is usually done with a sump and/or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. The only barrier wall is the one surrounding the municipal building on Maple Avenue.

Dry and Wet Flood-proofing

The dry flood-proofing technique involves using measures to seal up a building so floodwaters are prevented from entering it. All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting and openings such as doors, windows, and vents are closed, either permanently, with removable shields, or with sandbags. Examples of dry flood-proofing modifications include the following:

- installing watertight shields over doors and windows;
- reinforcing walls to withstand floodwater pressures and impact forces generated by floating debris;
- using membranes and other sealants to reduce seepage of floodwater through walls and wall penetrations;
- installing drainage collection systems and sump pumps to control interior water levels, collect seepage, and reduce hydrostatic water pressures on the floor slab and walls;
- installing backflow valves to prevent the entrance of floodwater or sewage flows through utilities; and
- anchoring the building to resist flotation, collapse, and lateral movement.

Dry flood-proofing of a building has the following advantages and disadvantages:

Advantages

- The appearance of the building is not altered.
- It is appropriate for buildings on concrete slab floors (without basements) and for those without no cracks.
- It is recommended where floodwaters are less than 3 feet and slow moving or for buildings that are too expensive to elevate (e.g., a slab building).

Disadvantages

- The waterproofing compounds can deteriorate over a period of time.
- It is dependent on human action for the installation of closures on windows and doorways.
- It cannot be used if the structure has a basement.

Wet flood-proofing, unlike dry flood-proofing, allows floodwaters to enter a structure. Wet flood-proofing is appropriate for structures with uninhabited areas below the flood elevation, such as unfinished basements, garages, and crawlspaces. Because wet flood-proofing allows floodwaters to enter a structure, modifications must be made to minimize damage to the portion of the structure below the flood elevation and its contents. Typically, the structure is designed so that walls and floors below the flood elevation are resistant to damage from floodwaters, and utilities and other valuable equipment are located above the flood elevation.

Wet flood-proofing is not feasible for one-story houses because the flooded areas are the living areas. However, basements, crawlspaces, garages, and accessory buildings can be wet proofed simply by relocating furnaces, heavy furniture and electrical outlets. Fuse and electric breaker boxes should be located high and near a door in order to safely turn the power off to the circuits serving flood prone areas.

No matter how little it is done, flood damage is reduced by wet proofing. For example, thousands of dollars in damage can be prevented by simply moving furniture and electrical appliances out of a basement. The City does not have any documentation of properties that have been flood-proofed.

Sewer Backup Protection

In areas where sanitary and storm sewers are combined, basement flooding can be caused by storm-water overloading the system and backing up into the basement through the sanitary sewer line. In areas where sanitary flows and storm-water are carried in separate pipes, the same problem can be caused by cross connections between the sanitary and storm sewers or by infiltration or inflow into the lines.

Buildings that have downspouts, footing drain tile, and/or a sump pump connected to the sanitary sewer service may be flooded inside when heavy rains overload the system. If local code does not require these systems to be directly connected to the sewer system, they should be disconnected. Rain water and surface water should be directed out onto the ground where it will flow away from the building.

Other approaches may be used to protect a structure against sewer backup: floor drain plugs, floor drain stand-pipes, overhead sewers, and backflow protection valves. The first two devices keep water from flowing out of the lowest opening in the building, the floor drain. They cost less than \$25 a piece. However, if water becomes deep enough in the sewer system, it can flow out of the next lowest opening, such as a toilet or tub, or it can overwhelm a drain plug by hydrostatic pressure and flow into the building through the floor drain. The other two measures are more secure, but more expensive (\$3,000-\$4,000). An overhead sewer keeps water in the sewer line during a backup. A backflow protection valve prevents backups from flowing into the building.

City of Tacoma Park Flood Mitigation Plan

The Washington Sanitary Sewer Commission reviews the damage to sewer lines. The City directs its residents to WSSC in case they have problems with sewer lines. If there are multiple complaints from residents, the City requests WSSC to conduct a damage review. However, there is a need to improve coordination between the City and WSSC.

The City is responsible for managing stormwater issues. The City has a database of TV inspections via Video Pipe service. One-third of the City's drains have been inspected each year for the last 6 years. The City Engineer oversees the contract and identifies repair projects including those that will be entered into the CIP. In-house cleaning such as removing debris from inlets is conducted by City Staff. The City Engineer is responsible for stormwater management permit reviews, civil engineering projects, City's resurfacing program (sidewalk, curbs, etc).

Flood Insurance

With the purchase of flood insurance, as long as the policy is in force, the property is protected. Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program.

Flood insurance coverage is provided for insurable buildings and their contents damaged by a "general condition of surface flooding" in the area. Building coverage is for the structure. This includes all things that typically stay with the building when it changes ownership, including: utility equipment (furnace or water heater); wall-to-wall carpeting; built-in appliances; and wallpaper and paneling.

Ten percent of a residence's building coverage may apply to a detached garage or carport. Other appurtenant structures are required to be insured under a separate policy. Contents coverage is for the removable items inside an insurable building. A renter can take out a policy with contents coverage, even if there is no structural coverage. Items not insurable include:

- items outside a building, such as fences, car ports, landscaping and driveways;
- jewelry, artwork, furs and similar items valued at more than \$250;
- finished structural parts of a basement, such as paneling and wall to wall carpeting;
- animals and livestock;
- licensed vehicles;
- money or valuable papers; and
- contents in a basement.

In most cases, a 30-day waiting period follows the purchase of a flood insurance policy before it goes into effect. The objective of this waiting period is to encourage people to keep a policy at all times and not wait for the river 'to rise' before they buy their coverage.

Through the Basement Backup Insurance, the National Flood Insurance Program covers seepage and sewer backup for an additional deductible provided there is a general condition of flooding in the area which was the proximate cause of the basement becoming wet. Several insurance companies offer coverage for damage incurred should a sump pump fail or a sewer line back-up. Most exclude damage from surface flooding

City of Takoma Park Flood Mitigation Plan

that would be covered by the NFIP. Each company has different amounts of coverage, exclusions, deductibles, and arrangements.

There is a need to encourage property owners in the 100-year floodplain to purchase flood insurance.

The City of Takoma Park is a member of the National Flood Insurance Program (NFIP). Records¹ for the City of Takoma Park indicate that between 1 January 1998 and 31 August 2008, a total of 11 insurance policies have been written totaling to \$2,514,000 insured and \$2,989 in premiums. Montgomery County has a total of 1,519 insurance policies totaling to \$398,683,500 insured and \$672,475 in premiums during the same period.

Mandates

Mandates are compulsions that are used when incentives are inadequate to convince a property owner to take protective actions. An example of a mandate could include the improvements or repairs made to a building in the mapped floodplain. If the project is worth more than 50 percent of the value of the original building it is considered a “substantial improvement”. The building must then be elevated or otherwise brought up to current flood protection codes.

The City’s floodplain ordinance requires that all insured structures damaged over 50 percent of the market value of the property must comply with the floodplain ordinance when the building is repaired. That could mean elevation, acquisition and demolition, or relocation to a location out of the floodplain.

¹ FEMA Policy and Claim Statistics for Flood Insurance
<http://www.fema.gov/business/nfip/statistics/pcstat.shtm>

CHAPTER 5: EMERGENCY SERVICES

Introduction

Emergency services involve measures to protect people during and after a disaster. In this Chapter, the following five types of emergency services measures are discussed: 1) Threat recognition; 2) Warning; 3) Response; 4) Critical facilities protection; and 5) Post-disaster recovery and mitigation.

Threat Recognition

A flood threat recognition system provides early warning to emergency managers. NOAA Weather Radio is considered the official source for weather information. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAA uses two levels of notification in flood warning programs: 1) flood watch: conditions are right for flooding; and 2) flood warning: a flood has started or is expected to occur. Under certain conditions, the National Weather Service may issue a “flash flood watch.” This means the amount of rain expected may cause rapid increases in local stream flows and/or localized ponding. However, these events are so localized and so rapid that a “flash flood warning” is seldom issued.

In the State of Maryland, all County Emergency Management Agencies are alerted by the Maryland Emergency Management Agency (MEMA). Warnings from the National Weather Service are relayed to municipalities by County Emergency Management Agencies (EMAs), who monitor weather radio and broadcast networks. Montgomery County has the capability to notify citizens of potential flooding through the Emergency Alert System (EAS), emergency messaging (Alert Montgomery), and mass voice messaging over the telephone (Reverse 9-1-1). The Reverse 911 system operated by the County is used by all the municipalities including the City of Takoma Park. The City uses 800 megahertz radio system and can stay in contact with the Maryland State Police, City of Rockville, Montgomery County, and Gaithersburg. The local forecast center is in Gaithersburg. There are no flood gauges within the City of Takoma Park.

In the event of an evacuation due to a flood, a door-to-door evacuation is conducted by the City police. Television stations (Channel 13) and the City’s website are also used to disseminate information during an evacuation. In power outage situations, ‘Takoma Alert’ or ‘Montgomery Alert’ is transmitted via telephone and emails to various listserves.

Warning

After a flood threat is recognized, the first priority is to alert others through the flood warning system. The second priority is to respond with actions that can prevent or reduce damage and injuries. The following responses to flood emergencies are undertaken by various agencies in the City and County:

City of Takoma Park Flood Mitigation Plan

Table 5.1 Flood emergency responses and responsible agencies

Action	Responsible Agency
Ordering an evacuation	Mayor's Office
Activating the emergency operations center	County Executive on the advice of the Director of County's Department of Emergency Management and Homeland Security
Opening and operating evacuation shelters	Managed by the County Emergency Operations Center. The Community Center serves as an additional shelter.
Sandbagging certain areas	The Montgomery County Public Works Department is in charge of sandbagging Sligo Creek. For other parts of the City, the Department of Public Works is entrusted with the responsibility.
Closing levee and floodwall systems	Not applicable
Closing streets or bridges	The City Police Department determines which ones to close and the Public Works Department sets out barricades.
Monitoring water levels at the high hazard dams which fall outside the city limits	Not applicable
Shutting off power to threatened areas	PEPCO
Releasing children from school	School district's decision after receiving notification from the Emergency Operations Center.

In the event of an emergency, the City Manager or his designee mobilizes City resources and personnel, reallocating them to address critical needs. City employees are assigned tasks that may differ from their normal work routines but lie within the realm of their expertise and training.

Response

An Emergency Operations or Response Plan identifies emergency planning, organization, and response policies and procedures and lays out details to address the integration and coordination with other governmental levels, during an emergency or when required. The Plan addresses how the jurisdictions will respond to extraordinary events or disasters from preparation through recovery. Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available and revised after disasters based on the changing conditions. A well written Emergency Operations Plan (EOP) will contain information to enable emergency management staff to identify the number of properties flooded, roads that will be under water, critical facilities that will be affected. This information will enable staff to prepare a plan that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

Montgomery County has recently updated its Emergency Operations Plan (2008) and is currently updating its 2000 Continuity of Operations Plan. The Montgomery County Homeland Security Department is responsible for developing and maintaining the Montgomery County Emergency Operations Plan. The County EOP incorporates the National Incident Management System (NIMS) and assigns roles and responsibilities to county departments and agencies for use in responding to disasters and emergencies. The Plan is intended to be used in conjunction with more detailed department and

City of Takoma Park Flood Mitigation Plan

agency plans and operating procedures. The EOP is comprised of three sections: 1) Base Plan – defines emergency management roles and responsibilities for the County Executive, County Council, and departments and agencies and describes how the County will respond to and recover from a major incident; 2) Functional Annexes – address common functional processes such as damage assessment, training and exercise, etc. and identify specific department and agency roles related to the function; 3) Incident Specific Annexes – address potential major hazards (biological, hazard materials release, nuclear/radiological, etc.) in the County as identified in the County Hazard Identification and Risk Assessment.

The City's Emergency Operations Plan was completed in February 2004 and is based on the following assumptions:

1. The Montgomery County Fire and Rescue Service will be the first responder for most events and will exercise incident command, with the City playing a support role.
2. The City has limited current resources and when the event is of major proportions, the Memorandum of Understanding (MOU) with Montgomery County would be invoked along with the Council of Governments Mutual Aid Agreements.

The City of Takoma Park Emergency Operations Plan and explains the roles and responsibilities of City leaders, department directors, City employees, and related agencies during an emergency. It covers the sequence of events that should occur before, during, and after an emergency. The Plan is based on various emergency response functions, such as law enforcement and public information, rather than departmental functions.

A MOU on Emergency Management between the City of Takoma Park and Montgomery County is in place and provides for the following:

- If there is a major emergency occurring within the City and the City requires the use of governmental resources that are not provided by it, the County agrees to provide police, fire/rescue, and other resources as necessary.
- When in the judgment of the County Executive, threats to life and property resulting from a major emergency, occurring partially within or immediately adjacent to the City would be reduced by a joint County-City response, the City agrees to provide its police and other resources to the extent permitted by law as deemed necessary.

The MOU and the County's Emergency Operations Plan are integral parts of the City's Emergency Operations Plan and are incorporated as essential elements of the City's plan.

The Plan is based on the following assumptions:

- The Montgomery County Fire and Rescue Service will be the first responder for most events and thus will exercise incident command with the City playing a support role.
- The City has limited current resources and when the event is of major proportions, the MOU with Montgomery County would be invoked along with the Council of Governments Mutual Aid Agreements.
- The City will continue to update its emergency plans and possesses the capability to execute these plans;
- Prediction and warning systems have been established which make it possible to anticipate some disaster situations which may affect the City;
- The City has entered into mutual-aid agreements with other local governments, special districts and private organizations to assist during emergency operations;

City of Takoma Park Flood Mitigation Plan

- The MOU with Montgomery County continues in effect and is the basis for handling emergencies which require resources not available to the City;
- Montgomery County and the State of Maryland have certain expertise and resources available including specific plans and procedures that may be utilized in relieving emergency or disaster related problems that are beyond the capability of the City;
- Should City, County and State resources be inadequate to cope with disaster demands, the Governor will request federal assistance under a presidential declaration.

Emergency Services (Fire Department) is located on Carroll Avenue in Takoma Park and is a part of the County Fire and Rescue system. The Police staff is comprised of 42 sworn officers, 25 civilians, and a chief and deputy chief. The Emergency Operations Center is located in the Communication Section of the City's Police Department on the Community Center's first floor.

The City has 2-3 schools designated as shelters in the City. They include: Takoma Park Elementary, Piney Branch Elementary and Takoma Middle School

Critical Facilities Protection

Critical facilities are defined as those buildings or infrastructure that are vital to the functioning of a community and to the flood response effort. If a critical facility is flooded, workers and resources may be unnecessarily drawn away from protecting the rest of the community. If such a facility is adequately prepared, it will be better able to support the community's flood response efforts.

Critical facilities include emergency operations centers, police and fire stations, hospitals, and roads and bridges. Critical facilities also include those buildings or locations that, if flooded, would create secondary disasters such as hazardous materials facilities, water and wastewater treatment plants and pump stations, schools, and nursing homes.

The City of Takoma Park police department is located within the 100-year floodplain, behind the same flood wall that protects the Community Center.

The County's Department of Emergency Management and Homeland Security keeps an up-to-date list of major facilities (schools, public facilities, etc.) and their contacts and phone numbers.

Post-Disaster Recovery and Mitigation

Post disaster recovery refers to steps taken by communities to prepare people and property after a disaster and for the next disaster. These activities are implemented during recovery to keep people from immediately going "back to normal" (i.e., the way they were before the disaster). While recovery operations follow a disaster, mitigation actions are undertaken when communities are in 'quiet' mode, prior to a disaster or several months after a disaster occurs in order to reduce the impact of a disaster.

Some examples of recovery actions include the following:

- Clearing streets;

City of Takoma Park Flood Mitigation Plan

- Cleaning up debris and garbage;
- Patrolling evacuated areas to prevent looting;
- Providing safe drinking water;
- Monitoring for diseases and vaccinating residents for diseases such as tetanus; and
- Regulating reconstruction to ensure that it meets all code requirements.

Some examples of mitigation actions include the following:

- Conducting a public information campaign to advise residents about various mitigation alternatives that could be considered;
- Assessing damage to public facilities and developing measures to mitigate hazards in the future;
- Acquiring substantially or repeatedly damaged properties from willing sellers; and
- Applying for post-disaster mitigation funds.

The Montgomery County Emergency Management and Department of Homeland Security ensures that the Federal, State and County activities are implemented with respect to emergency management procedures. The Montgomery County Emergency Operations Plan lists tasks and responsibilities of various entities in the City and County, during an emergency situation. If County resources prove to be inadequate during an emergency; assistance for equipment, supplies, and personnel may be obtained through the negotiated mutual-aid agreements. Montgomery County has inter-jurisdictional coordination and collaboration with its municipalities and also with regional partners such as the Washington Suburban Sanitary Commission, Maryland National Capital Park and Planning Commission, and the Metropolitan Washington Council of Governments (MWCOC). Through the COG, there has been an increase of regional capabilities to respond to disasters in the National Capital Region. In addition to this, the County may also rely on support from the State and the National Guard.

Montgomery County follows three phases in conducting response operations:

- Increased Readiness for disasters with an advance warning such as a weather forecast, actions will be taken prior to the projected impact to save lives and property. During this phase, warning systems may be activated, EOC may be activated, and evacuations implemented as appropriate.
- Immediate Response – during this phase, emphasis will be laid on saving lives and minimizing effects of the disaster and these response activities will be accomplished within the impacted communities by county department and agencies supported by local mutual aid agreements, and segments of the private sector.
- Sustained Response: as emergency continues, assistance is provided to those affected and regional, statewide mutual aid and federal assistance may be secured and response support facilities may be established.

Within the City of Takoma Park, post-disaster damage assessment efforts are carried out cooperatively between the city/county emergency management officials, Fire Department personnel and the City's Code Enforcement, Building Inspection Officer and City Engineer.

After a flood event, the City's Engineer and Police Chief should coordinate activities with the Mitigation Core Team ensure that relevant mitigation actions are brought to the City

City of Takoma Park Flood Mitigation Plan

Council for potential implementation. This coordination between the City staff and the Core Team should be reflected in the City's Emergency Operations Plan Update.

The City of Takoma Park has a very active Local Emergency Preparedness Committee (LEPC) established by the City Council to provide community input to and assist in the City's planning and preparations for emergency operations and to involve residents in providing appropriate assistance during emergency functions. The Committee's membership is comprised of seven Takoma Park residents, senior City Staff, one member selected by the Public Safety Citizens Advisory Committee (PSCAC), one member selected by the Takoma Park Volunteer Fire Department, one member selected by the Washington Adventist Hospital, one member selected by the Montgomery County Department of Homeland Security.

CHAPTER 6: STRUCTURAL PROJECTS

Introduction

Structural projects are designed to control floodwaters. Based on their sheer magnitude, structural flood control is generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts. It therefore, requires considerable thought and analysis before a structural project is selected. Since these projects often have regional or watershed-wide implications, they could be planned, funded and implemented by regional agencies such as watershed authorities. The following are the advantages and disadvantages of flood control projects:

Advantages

- Flood control projects can provide the greatest amount of protection for land area used.
- Due to land limitations, they may be the only practical solution in some circumstances.
- They can also be beneficial to the community for water supply and recreational uses.
- Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.

Disadvantages

- They disturb the land and disrupt natural water flows, often destroying wildlife habitat.
- They require regular maintenance in order to function properly.
- They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage
- They can create a false sense of security as people protected by a project often believe that no flood can ever reach them.
- They end up promoting more intensive land use and development in the floodplain.

Examples of structural projects include: reservoirs and dams, levees and floodwalls, channel improvements, crossings and roadways, drainage and storm sewer improvements, and drainage system maintenance. Each of these is elaborated below.

Reservoirs and Dams

Reservoirs control flooding by holding high flows behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate that the river can accommodate downstream. The lake created may provide recreational benefits or water supply (which could help mitigate a drought). Reservoirs are suitable for protecting existing development downstream from the project site. Unlike levees and channel modifications, they do not have to be built close to or disrupt the area to be protected. Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to store. Building a reservoir in flat areas

City of Takoma Park Flood Mitigation Plan

and on large rivers may not be cost-effective, because large areas of land have to be purchased.

Reservoirs are very efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to store. Building a reservoir in flat areas and on large rivers may not be cost-effective, because large areas of land have to be purchased. In urban areas, some reservoirs are simply manmade holes with the capacity to store floodwaters.

On the other hand, reservoirs and detention basins can have the following disadvantages:

- There is the threat of flooding the protected area should the reservoir's dam fail.
- There is a constant expense for management and maintenance of the facility.
- They may fail to prevent floods that exceed their design levels.
- Sediment deposition may occur and reduce the storage capacity over time.
- They can impact water quality as they are known to affect temperature, dissolved oxygen, nitrogen, and nutrients.
- If not designed correctly, they may cause backwater flooding problems upstream.

There are no reservoirs or any ponds that have small dams and spillways that control flood elevations within the City.

Levees/Floodwalls

Earth barriers are generally termed as levees whereas concrete or steel barriers between the watercourse and properties are termed floodwalls. Levees occupy more space than floodwalls; therefore, when adequate space for a levee is not available, floodwalls are used, even though they are usually more expensive than levees. Levees and floodwalls may not be constructed in the floodway. Designs for both levees and floodwalls must provide for access through (e.g., watertight closures) or over (e.g., ramps or stairs) the barrier. In addition, the designs for both levee and floodwall projects must compensate for any loss of flood storage that will result from construction.

There are no levees in the City of Takoma Park. Since Maple Avenue floods from time to time, the municipal building at the corner of Maple Avenue has a floodwall built around it. The floodwall is two feet above the base flood elevation and surrounds the excavated front of the building and includes an inflatable gate that closes off the driveway entrance to the lower level parking area. The flood wall was constructed by the County based on the determination that the site was located in the 100-year floodplain.

Bridge Modifications

Modifications to bridges involve the replacement, enlargement, or removal of existing bridge decks at roadway and railway crossings. Often bridges are not large enough to pass flood flows, resulting in floodwater backing up upstream of the structure. There are no bridge modifications in the City.

Channel Improvements

Improving channel conveyance causes more water to flow through it at a faster rate. However, channelized streams could create or worsen flooding problems downstream

City of Takoma Park Flood Mitigation Plan

as larger volumes of water are transported at a faster rate. Channels can be improved by making them wider, deeper, or straighter.

While channel improvements are one-time projects, they have to be maintained to clean out blockages caused by overgrowth or debris. Some communities also pass ordinances prohibiting dumping and making riverfront owners responsible for maintaining their areas. A proper maintenance program includes picking up debris as well as riparian restoration, i.e., removing non-native growth. By planting native grasses and plants, there are fewer sources of logs and woody debris, soils are better stabilized, bank erosion is reduced and habitat is improved.

In terms of channel improvements within the City, routine maintenance is performed four times a year and also when complaints are received. A large house at the intersection of Baltimore and New York Avenue is in need of channel improvements. Several improvements have been made to the City's stormwater pipes through the City's Public Works Department which undertakes pipe repair, inlet repair, and water quality projects. For NPDES projects, the City prepares a report for the County, and the County enforces the regulations after conducting an investigation.

Dredging

Dredging is a form of conveyance improvement. However, due to the need to dispose of the dredged material, it is often cost prohibitive. Dredging may not be effective in most cases given the large volume of water that comes downstream during a flood, and so removing a foot or two from the bottom of the channel will have little effect on the height of the flood. Dredging is not a permanent improvement. Unless in-stream and/or tributary erosion are corrected upstream, the dredged areas usually fill back in within a few years, and the process and expense have to be repeated. In order to protect the natural values of the stream, Federal law requires a Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires much advance planning and many safeguards to protect habitat.

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. During normal flows, the water stays in the old channel. During flood flows, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river. Unless the receiving water body is relatively close to the flood-prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed. Sometimes diversions could cause new flood problems when diversion channels may be blocked by residents who do not understand, or disagree with, their purpose.

CHAPTER 7: NATURAL RESOURCE PROTECTION

Introduction

While open space is an amenity and serves the community in many ways in terms for parks, greenways, recreational opportunities, and golf courses, it also serves a beneficial function; it reduces the vulnerability to flooding when the floodplain is preserved as open space. By preserving floodplains, wetlands, and natural water storage areas the existing stormwater storage capacities of an area are maintained. Open space can exist in the form of reserve open lands, purchased, or dedicated by developers (in the form of easements).

Natural resource protection activities focus on preserving floodplains and watersheds, thereby improving their naturally beneficial functions. These functions include: storage of floodwaters, absorption of flood energy, groundwater recharge, removal/filtering of excess nutrients, pollutants, and sediments from floodwaters, habitat for flora and fauna, and recreational and aesthetic opportunities, among others. These measures are implemented by a variety of public and private parties ranging from local park districts, forest preserves and regulatory agencies to land developers and farmers. The following five natural resource protection activities are discussed below in light of reducing the City's susceptibility to flood damage and also in improving the quality of life in the community: 1) wetland protection and forest conservation; 2) erosion and sedimentation control; 3) river restoration; 4) best management practices; and 5) dumping regulations.

Wetlands

Wetlands are often found in floodplains and depression areas of a watershed and also serve as a natural filter to help improve water quality and provide healthy habitat for fish, plants, and wildlife. Wetlands receive and store floodwaters, thus slowing and reducing downstream flows and protect shorelines from erosion. Wetlands are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency under Section 404 of the Clean Water Act. Both these agencies are required to authorize individual permits. There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits. The purpose of the permit is to protect wetlands by preventing development that would adversely affect them, and in this case, wetlands are required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands. The appropriate type of mitigation is addressed in each permit. Development regulations and educating property owners and local officials on the benefits are some ways to protect wetlands.

The County's wetlands are protected and regulated through the Maryland Department of the Environment. The City has adopted Chapter 19 of the County Code – requirements for Floodplain Protection which addresses wetland protection. Encroachment by development into wetlands is not allowed without State and Federal permits. Disturbance of wetlands must be avoided. Unless it is demonstrated to the appropriate State or Federal Authorities that no alternatives exist and the encroachment is the minimum necessary, and in that case, mitigation may be required by the appropriate regulatory authorities.

City of Takoma Park Flood Mitigation Plan

The Maryland Forest Service defines a buffer of at least 50 feet to be forested on each side of a stream with an increase of 4 feet for every 1 percent increase in slope. The Montgomery County Forest Conservation Law (chapter 22A of the County Code) requires a forest conservation plan to be submitted to the county prior to the approval of most subdivisions or approval of grading projects clearing more than 40,000 square feet of forest. These requirements do not apply to activities on an existing single lot of any size that is required to construct a dwelling house or accessory structure (such as a pool, tennis court, or shed) intended for the use of the owner, if the activity does not require a special exception, does not result in the cutting, clearing, or grading of more than 40,000 square feet of forest or any forest in a stream buffer.

Erosion and Sedimentation Control

Erosion occurs along stream banks and shorelines when the volume and velocity of flow or wave action destabilize and wash away the soil. Surface water runoff can erode soil from construction sites, sending sediment into downstream waterways. This sediment tends to settle down when the water flow slows down and can clog storm sewers, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and flooding cannot deposit sediment in the bottomlands, and results in clogged streams or increased dredging costs. These issues are addressed through sedimentation and erosion measures which include: phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices. Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. They are usually oriented toward construction sites rather than farms. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project.

Erosion and sediment control practices are required to be conformance with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control published jointly by Water Resources Administration, Soil Conservation Service and State Soil Conservation Committee. Sediment and erosion control approval must be obtained from MDE if more than 5,000 square feet of surface area or more than 100 cubic yards is disturbed.

The City's Public Works Department has the authority to regulate stormwater projects. All commercial, industrial, and institutional projects are required to go through the City's permitting process. For residential projects, stormwater management permits are required for all properties where the area of disturbance is greater than 5,000 square feet. Consequently, no permits are required if the area is less than 5,000 square feet. Permits are required for all commercial properties regardless of size.

Erosion and Sediment Control - Chapter 19. Erosion, Sediment Control and Storm Water Management of the Montgomery County Zoning and Ordinance Codes states that a sediment control permit must not be issued for any grading or land-disturbing activity that is located within or within 25 feet of a 100-year floodplain if the activity requires and has not received a floodplain district permit.

The City does not have a woodland conservation plan. However, the City does have a Tree Protection ordinance and a Tree Removal Ordinance that requires permits to

City of Takoma Park Flood Mitigation Plan

remove a tree greater than 7 5/8 “ in diameter or to do any construction within 50 feet of an urban forest tree. The City also has an Open Space Plan.

Best Management Practices

The term Best Management Practices refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). In addition to preventing increases in downstream flooding and minimizing water quality degradation, BMPs preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple uses of drainage and storage facilities.

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the U.S. and Maryland Department of the Environment. Nonpoint source pollutants come from non-specific locations and are harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry.

Chapter 19 of the County Code requires a Special Protection Area (SPA) conservation plan for all projects in the SPA. The SPA conservation plan is used as guidance to develop site specific performance goals, and best management practices (BMP) performance goals. BMP performance goals are applied and monitored to assess relationships between land use, the effectiveness of various BMPs, individually and in combination, and measured impacts of development on water quality, stream habitat, and aquatic life.

Dumping Regulations

While BMPs address pollutants that are liquids or suspended in water that are washed into a lake or stream, dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Although these materials do not pollute the water, they can obstruct flows and reduce the channels' and wetlands' ability to convey or clean stormwater. Many cities have nuisance ordinances that prohibit dumping garbage or other “objectionable waste” on public or private property. People may not realize the consequences of their actions and for example, may fill in the ditch in their front yard without realizing that it is needed to drain street runoff. Therefore, a dumping enforcement program could prevent this and help in education people on the same.

Dumping regulations for Takoma Park are part of the Best Management Practices. The City Code includes prohibitions on dumping on private and public properties

CHAPTER 8: PUBLIC INFORMATION

Introduction

The Public Information aspect of flood mitigation involves the dissemination of pertinent information to property owners, renters, businesses, and local officials about hazards such as flooding and ways to protect people and property from these hazards. These actions are intended to educate the community and encourage them to be better prepared to face a hazard. Public information can be disseminated in many ways. The following six methods of disseminating public information are discussed in this chapter: 1) Map information; 2) Library and websites; 3) Outreach projects; 4) Technical assistance; 5) Real estate disclosure; and 6) Educational programs

Map Information

Flood maps provide valuable information about past and potential flood hazards and can help residents and businesses who are aware of the potential hazards, take steps to avoid problems and/or reduce their exposure to flooding. They are also useful to real estate agents and house hunters as they can determine if a property is flood-prone and whether flood insurance may be required.

Takoma Park's staff (City Engineer) also assists residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain. They also provide information on additional hazards, flooding outside mapped areas and zoning. The City Engineer is the main point of contact for flooding issues. The City Communications Office works closely with the City Engineer to obtain information and disseminate it to city residents via email, phone calls, and the City's webpage.

Library and Web Sites

Community library and local web sites are common places for residents to seek information on hazards, hazard protection, and protecting natural resources. Interested property owners can read or check out handbooks or other publications as required. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government. However, more recently, web sites have become popular as research tools as they provide quick access to a wealth of public and private sites and sources of information.

The Takoma Park City Library on Philadelphia Avenue houses brochures, newspapers, and catalogues on a variety of topics including flooding. The e-library is a free service offered to residents and includes a full text database of articles from over 1,000 newspapers and magazines, Congressional testimony, and radio/TV transcripts. The City's website contains the City's notice board that is hosted by the Communications Office. <http://www.bulletinboards.com/v2.cfm?comcode=takoma>. This board is used by City staff use it for posting of service changes (for example, trash & recycling collection dates changed) and upcoming events and meetings.

City of Takoma Park Flood Mitigation Plan

Outreach Projects

Outreach projects are the first step in providing property owners information on property protection and assisting them in the design and implementation of projects. They include distributing notices to flood prone property owners to introduce the idea of property protection and identify sources of assistance or articles in the newspaper. Other approaches include the following:

- displays in public buildings or shopping malls;
- articles and special sections in newspapers;
- radio and TV news releases and interview shows;
- flood protection video for cable TV programs or to loan to organizations;
- presentations at meetings of neighborhood groups, realtors, bankers, or other special interest groups;
- open houses that discuss flood-proofing techniques;
- web site notices with hyperlinks to other sources of information; and
- school curriculums on flood preparedness and flood safety

In terms of local outreach activities, the City conducts programs from public outreach including one for NPDES. Information and articles are also included in the Takoma Park Newsletter. The newsletter is published monthly and is considered the official publication of the City. It features a broad range of articles from emergency preparedness to housing and development updates. The newsletter can be found online at <http://www.takomaparkmd.gov/news/newsletter/index.htm>. In general, the City is not very proactive on flood mitigation related outreach efforts due to inadequate staff capacity and needs to identify ways to improve outreach efforts.

The County has a Home Guide to Emergency Preparedness that is available in nine languages. The County conducts outreach regularly to community groups and forums including special populations and pet owners. The Montgomery County Homeland Security Department provides emergency preparedness workshops for residents and County employees to discuss issues such as sheltering-in-place, etc.

Technical Assistance

In many communities, technical assistance is typically provided by experts such as the local building department staff who offer free advice to residents in terms of various available options. In some cases, staff from the building department and public works visit properties and offer suggestions, and some even recommend or identify qualified or licensed companies, an activity that is especially appreciated by owners who are unsure of the project or the contractor. This is very helpful to educate owners who do not feel ready to retrofit their buildings without appropriate guidance. Technical assistance can be provided in one-on-one sessions with property owners or can be provided through seminars or open houses on specific topics such as: retrofitting techniques, selecting qualified contractors, and carrying out preparedness activities.

The City of Takoma Park currently does not have staff to who have the expertise to provide technical assistance on flood-related issues. The City does not provide advice or recommendations on contractors due to liability issues and the lack of a means to evaluate local contracting companies.

City of Takoma Park Flood Mitigation Plan

Real Estate Disclosure

In many instances, people feel, in hindsight, that they would have taken steps to protect themselves from a disaster such as a flood if they it been disclosed to them that their property was in a flood-prone area.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building that the property is in a floodplain as shown on the Flood Insurance Rate Map. Flood insurance is required for buildings located within the base floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, often the applicant is already committed to purchasing the property when they first learn of the flood hazard.

Maryland Real Property Disclosure Act: Effective October 1, 2005, a new Maryland law took effect that substantially affects residential real estate sales within the State. Under the new law, a seller of residential real property - unless otherwise exempt - would still be required to complete and deliver to the purchaser a disclosure or disclaimer statement. In addition to this, a seller - whether the seller elects to give disclosure or disclaimer - is required to disclose to the purchaser, any latent defects of which the seller has actual knowledge. Under the new law, a latent defect is defined as material defects in real property or an improvement to real property that a purchaser would not reasonably be expected to ascertain or observe by a careful visual inspection of the real property and which would pose a direct threat to the health or safety of the purchaser or an occupant of the real property, including a tenant or invitee of the purchaser.

The City does not currently have any policies related to real estate disclosure.

Environmental Educational Programs

Environmental education programs can teach children about natural hazards, their cause and effect, and ways to be better prepared to face hazards, which can, in turn, be imparted to their parents. Assignments on developing an emergency kit for specific hazards can get parents interested and become involved in the exercises. Educational programs can be undertaken by schools, park and recreation departments, conservation associations, and youth organizations, such as the Boy Scouts, Campfire Girls and summer camps.

The City currently does not conduct any environmental education programs.

CHAPTER 9: GOALS AND OBJECTIVES

Introduction

The Mitigation Strategy serves as the long-term roadmap for reducing potential losses identified in the earlier sections of the report. This Chapter of the City's Flood Mitigation Plan discusses goals and objectives to help the City to be better prepared to face flooding and ultimately reduce its vulnerability, in addition to specific actions that should be implemented to reduce the community's vulnerability to flooding.

Communities that participate in the NFIP are required to adopt flood maps and local requests for map updates; adopt and enforce minimum floodplain management regulations that help mitigate the effects of flooding on new and improved structures in the Special Flood Hazard Area; offer property owners flood insurance as a protection against flood losses in exchange for floodplain management regulations that reduce future flood damages; and perform community assistance and monitoring activities. Since Takoma Park is an NFIP community, the aforementioned requirements remain valid at present and in the future. A large number of mitigation actions recommended below are geared to mitigating the effects on new and existing structures in the flood hazard areas

Goals and Objectives

The goals and objectives form a basis upon which specific mitigation actions will be developed to address the vulnerabilities and gaps discussed in previous chapters.

During the Mitigation Core Team and Public Meetings held in January 2008, residents and local government representatives discussed the findings of the vulnerability assessment, the implications for flooding, and actions that needed to be taken to mitigate the flood risk to the City. With this in mind, mitigation goals and objectives have been developed, that would protect people, property, and the local economy from the effects of flooding. For the purpose of this report, goals and objectives have been defined as the following:

- *Goals are general guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term, and represent global visions.*
- *Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, they are more specific and measurable.*

The following goals and objectives developed in this plans have been divided into six categories, following the report chapters 3 to 8: prevention; property protection; structural projects; emergency services; natural resource protection; and public information.

Prevention

Goal 1: Ensure language in existing plans and ordinances protect properties within the City from flooding.

- Identify techniques to ensure that development or redevelopment in the City does not increase the vulnerability to flooding.

City of Takoma Park Flood Mitigation Plan

- Ensure proper enforcement of standards and ordinances to make them more effective.

Goal 2: Promote land use practices that reduce potential for flooding.

- Identify methods to retain stormwater on site to reduce the flooding potential.
- Preserve environmentally sensitive areas.

Property Protection

Goal 3: Continue to ensure that new development/redevelopment is resistant to flood damage.

- Encourage property owners of high-risk, pre-FIRM residential structures in the floodplain to use retrofitting techniques to reduce the impact from flooding of their properties.
- Discourage new development in the floodplain.

Emergency Services

Goal 4: Disseminate evacuation and shelter information to residents in an efficient manner.

- Work with the County to identify safe and efficient evacuation routes prior to floods.
- Improve coordination between departments within the City and County that would be responsible for implementing flood mitigation activities.

Structural Projects

Goal 5: Reduce flooding problems in drainage ways.

- Require developers to conduct flood studies in drainage ways.
- Identify areas that are in need of channel improvements.

Natural Resource Protection

Goal 6: Protect existing natural resources.

- Raise the level of importance of preserving environmentally sensitive areas.
- Identify measures to protect existing natural resources and open-space, including parks and wetlands within the floodplain and watersheds.

Public Information

Goal 7: Increase awareness among city residents on flood issues.

City of Takoma Park Flood Mitigation Plan

- Involve community residents in the implementation of this Flood Mitigation Plan and in protecting their own health, safety and property.
- Educate citizens on flood risks and practices to reduce the flooding potential in the City.
- Identify and participate in programs that help reduce the flood risk in the City.

Mitigation Actions

This section includes specific mitigation projects that have been derived from the goals and objectives in Chapter 9 that should be implemented over a period of time. The mitigation actions developed have been classified in the following seven categories: 1) Prevention; 2) Property Protection; 3) Emergency Services; 4) Structural Projects; 5) Natural Resource Protection; 6) Public Information; and 7) Plan Implementation. For each action item, the relevant issue and the goal(s) that the action supports are identified. The agency or agencies responsible for implementation as well as applicable funding sources, an approximate cost, and general timeline for the implementation of each mitigation action are included. A detailed list of funding sources is provided at the end of this chapter. The abbreviations used below in the mitigation actions refer to the funding sources listed.

Prevention

During the recent preparation of DFIRMs for Montgomery County, Takoma Park was not included and there was no restudy done to address the flood threat in the City. In addition, stormwater flooding is possibly the primary source of flood damage in the City. Action 1: Develop DFIRMs for the City to include the floodplain on 4th Avenue and along Maple Avenue. The study should use the Montgomery County floodplain criteria (mapping of drainage areas over 600 acres).

Goal: 1

Responsible Agency: City Public Works (project may be contracted out)

Possible Funding Sources: HMGP, PDM, Map Modernization Program

Approximate Cost: \$100,000-150,000

Timeline: 1-2 years

The current floodplain ordinance does not allow for new development in the 100-year floodplain but allows redevelopment in the 100-year floodplain so long as the cost of the improvements do not exceed 50% of the structure's market value.

Action 2a: Continue to work with the County to ensure that the current building codes, floodplain ordinances and standards follow FEMA guidelines.

Action 2b: Examine necessary codes and regulations from other communities that restrict development in their 100-year floodplains.

Goal: 1

Responsible Agencies: City Public Works Department, County Public Works

Department, M-NCPPC, City Department of Housing and Community Development

Possible Funding Sources: None required

Approximate Cost: Not applicable

Timeline: Ongoing

City of Takoma Park Flood Mitigation Plan

Proper land use practices that address the retention of stormwater on site are needed to reduce potential for flooding.

Action 3a: Evaluate each city project to ensure it has a low-impact-development component. Identify specific city projects to retain stormwater on site.

Action 3b: Incorporate stormwater retention principles in all city projects including the Green Roof on the deck of the Municipal Building and the Linden Avenue stormwater retrofit project.

Action 3c: Develop guidelines for reduction of impervious surfaces in conjunction with the Property Maintenance Code.

Goal: 2

Responsible Agencies: County Department of Permitting, City Public Works Department, City Department of Housing and Community Development, City Council, Friends of Sligo Creek

Possible Funding Sources: None required

Approximate Cost: Not applicable

Timeline: Ongoing

Currently, flood issues are not elaborated on in the City's Master Plan.

Action 4a: Consider integration of comprehensive plans with flood and other all-hazard mitigation plans by adding goals and objectives that address flooding.

Action 4b: During the next update of the comprehensive plan, encourage planners and staff from Public Works to work together to cross reference goals and objectives and actions between the Comprehensive Plan and the Flood Mitigation Plan to ensure that flood issues are addressed in the Comprehensive Plan.

Action 4c: Update the Flood Mitigation Plan periodically and after a flood event.

Action 4d: Integrate this Plan into the Montgomery County All-Hazard Mitigation Plan.

Action 4e: Apply for funding to develop an all-hazard mitigation plan for the City of Takoma Park; the flood mitigation plan may be integrated into the city's plan as an annex.

Goal: 1

Responsible Agencies: City Department of Housing and Community Development, Public Works Department, M-NCPPC

Funding Source: PDM

Approximate Cost: \$30,000-\$40,000 to develop an all-hazard mitigation plan

Timeline: 1-2 years

Property Protection

There are 19 properties in the floodplain that should be retrofitted or acquired. If a property in the floodplain cannot be retrofitted, acquisition may be considered. However, currently no properties warrant acquisition.

Action 5a: Once the DFIRMS are complete, work with property owners in the floodplain and direct them to resources to help them retrofit their properties.

Action 5b: Identify funding sources to retrofit properties that are impacted by flooding.

Action 5c: Acquire those flood prone properties that cannot be retrofitted when they come up for sale.

Goal: 3

Responsible Agencies: County Department of Permitting, City Public Works Department, M-NCPPC

Possible Funding Sources: SRL, RL, PDM, FMA

City of Takoma Park Flood Mitigation Plan

Approximate Cost: Varies by property

Timeline: 5-10 years

An area along Baltimore Avenue is known to be vulnerable to flooding during extreme rain events.

Action 6: Consider channel improvements and/or other remediation actions to the area along Baltimore Avenue.

Goal: 3

Responsible Agencies: Public Works

Possible Funding Sources: PDM, HMPG

Approximate Cost: Consultant fees

Timeline: 1-2 years

Certain stormwater conduits in the City (towards Maple Avenue) may not be capable of handling 100-year volumes.

Action 7a: Identify opportunities to reestablish riparian wetlands to absorb the flood waters and also streams and potential wetland areas to absorb water downstream.

Action 7b: Coordinate with WSSC regularly to obtain information on the calls received by WSSC when a house floods due to stormwater backups.

Action 7c: Develop a database of flooding reports received after a rain storm to track buildings with wet basements to address the stormwater issue.

Goal: 3

Responsible Agencies: Public Works, M-NCPPC, WSSC

Possible Funding Sources: Department of Natural Resources

Approximate Cost: None required immediately

Timeline: 3-5 years

Emergency Services

There is need for improved coordination between various City departments.

Action 8: Improve coordination between Public Works, Police, and Planning (Housing and Community Development) through the creation of an Action Committee. The Committee should meet periodically to discuss growing concerns, upcoming plans, and flood-related issues as identified by the constituent groups.

Goal: 4

Responsible Agencies: Public Works, Police Department, Housing and Community Development, City Manager

Possible Funding Sources: None required

Approximate Cost: Not applicable

Timeline: Ongoing

Identify safe and efficient evacuation routes prior to a flood event.

Action 9a: Work closely with city departments and the county to disseminate evacuation and shelter information to the residents.

Action 9b: Include a flood component in the Emergency Operations Plan (EOP) and ensure it is updated regularly.

Action 9c: Become involved with businesses and other entities in the city when they prepare or update their EOPs.

Goal: 4

Responsible Agencies: Public Works, Police Department, Communications Office

City of Takoma Park Flood Mitigation Plan

Possible Funding Sources: None required

Approximate Cost: Not applicable

Timeline: 1-2 years

Currently, there is not enough space to stock supplies such as blankets, cots, etc.
Action 10: Identify and rent a space, preferably a climate controlled facility to house supplies

Goal: 4

Responsible Agencies: Police Department

Possible Funding Sources: Local funds

Approximate Cost: Cost will vary based on space rented

Timeline: 1-2 years

Structural Projects

Buildings in the 7500-7700 blocks of Maple Avenue are threatened by the 100-year flood.

Action 11: Study the feasibility of using decorative walls and landscaping along Maple Avenue to convey the flood water to Sligo Creek, thus protecting the buildings while enhancing the aesthetic appeal of the streetscape.

Goal: 5

Responsible Agencies: Public Works Department

Funding Source: PDM, FMA

Approximate Cost: \$20,000

Timeline: 3-5 years

Natural Resource Protection

There is a need to emphasize the importance of preserving environmentally sensitive areas.

Action 12a: Continue to explore low impact development techniques to manage stormwater and increase the amount of pervious surfaces by incorporating innovative methods such as including bio-retention areas, dry wells, infiltration trenches, filter/buffer strips, and vegetated swales to reduce the impact of flooding in the City.

Action 12b: Develop incentives to promote green infrastructure concepts for stormwater retention on private properties.

Goal: 6

Responsible Agencies: Public Works, County Department of Permitting, City Council

Possible Funding Sources: PDM, FMA

Approximate Cost: \$ No immediate cost

Timeline: 1-2 years

Existing natural resources and open-space, including parks and wetlands, within the floodplain and watersheds should be protected.

Action 13a: Ensure all properties that are acquired are cleared of habitable structures and remain as open space in perpetuity.

Action 13b: Work with M-NCPPC to protect the Sligo Creek floodplain and other streams as a natural resource asset.

Action 13c: Review and update the Open Space Plan as necessary.

City of Takoma Park Flood Mitigation Plan

Goal: 6

Responsible Agency: Public Works, M-NCPPC, Housing and Community Development

Possible Funding Sources: None required

Approximate Cost: Not applicable

Timeline: 3-5 years

Public Information

There is a need to improve coordination between the City and residents in the floodplain and make residents aware of flood issues and literature that is readily available.

Action 14a: Continue to ensure that the Takoma Park City Library is stocked with flood protection publications. See <http://www.fema.gov/library/index.jsp> for a detailed listing of flood-related publications. Include this link on the City's webpage.

Action 14b: Include flood-related articles and success stories in the City newsletter.

Action 14c: Prepare an annual mailing to all property owners in the floodplain. The mailing should include: flood and hazard data, safety precautions and emergency procedures, flood mitigation options, and sources of funding.

Goal: 7

Responsible Agency: Communications Office, Public Works, Takoma Park Public Library

Possible Funding Sources: Local funds

Approximate Cost: Not applicable

Timeline: 1-2 years

The City has insufficient staff to engage in wide outreach activities.

Action 15: Identify resources to assist the City with specific projects.

Goal: 7

Responsible Agencies: Public Works, City Manager's Office

Possible Funding Sources: Local Funds

Approximate Cost: \$

Timeline: 1-2 years

Currently, the City does not participate in the Community Rating System (CRS). Enrolling in the CRS program will enable the City to get a reduction in flood insurance premium for performing activities that reduce the impacts of flooding. Since a number of flood mitigation actions, when implemented, will reduce the flooding risk in the City. Joining the CRS will not only help reduce the flood insurance premiums for City residents, but will also encourage the community to carry out flood mitigation actions on a regular basis.

Action 16: Consider submitting an application to join the Community Rating System (CRS) program.

Goal: 7

Responsible Agencies: City Manager's Office, Public Works

Possible Funding Sources: FMA could fund technical assistance to prepare initial application. Ongoing CRS activities would be the responsibility of the City.

Approximate Cost: Consultant fees, if applicable

Timeline: 3-5 years

City of Takoma Park Flood Mitigation Plan

Plan Implementation

Action 17: Forward this Flood Mitigation Plan for approval to FEMA and ensure that the City Council adopts the approved plan.

Goal: All goals

Responsible Agencies: Public Works, City Manager's Office

Funding Source: None needed

Approximate Cost: None

Timeline: Immediately

It must be ensured that this Flood Mitigation Plan is properly implemented and updated.
Action 18: Work with the Flood Mitigation Plan Core Team and members of the public who are interested in flood-related issues to implement this plan and review its progress. Schedule Core Team meetings once a year to review projects that have been completed, altered, or are no longer applicable.

Goal: All goals

Responsible Agencies: Public Works, County Department of Emergency Management, M-NCPPC

Funding Source: FMA, PDM, HMGP

Approximate Cost: Dependant on project to be implemented

Timeline: 3-5 years

Funding Sources

The following funding sources provide grants for flood mitigation planning and project related activities:

- Hazard Mitigation Grant Program (HMGP) – HMGP is administered by FEMA and provides grants to states, tribes and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation activities to be implemented as a community recovers from a disaster. Eligible projects include: elevating flood-prone homes or businesses; acquisition of flood-prone homes from willing owners and returning the property to open space; retrofitting buildings; and construction of floodwall systems to protect critical facilities.
- Pre-Disaster Mitigation (PDM) Program – The PDM program provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. The program provides technical and financial assistance to States and local governments to assist in the implementation of pre-disaster mitigation actions, which must be cost-effective and designed to reduce injuries, loss of life and damage and destruction of property.
- Flood Mitigation Assistance (FMA) Program – FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, or other National Flood Insurance Program (NFIP) insurable structures with a focus on repetitive loss properties. The NFIP enables property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Three types of FMA grants are available to States and communities: 1) planning

City of Takoma Park Flood Mitigation Plan

grants to prepare Flood Mitigation Plans; 2) project grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures; and 3) technical assistance grants for the State to help administer the FMA program and activities.

- Severe Repetitive Loss (SRL) - A SRL property is defined as a residential property that is covered under a NFIP flood insurance policy and: 1) that has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or 2) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. Eligible flood mitigation project activities under the SRL program include: 1) acquisition and demolition or relocation of at risk structures and conversion of the property to open space; 2) elevation of existing structures to at least the base flood elevation; 3) minor physical localized flood reduction projects; and 4) dry flood-proofing for historic properties.
- Emergency Management Performance Grants (EMPG) – The EMPG program provides resources to state and local governments to develop an all-hazards planning approach to emergency management. The EMPG program provides resources to assist State and local governments to sustain and enhance all-hazards emergency management capabilities.

Most State and Federal grant programs require local communities to provide at least part of the necessary project funding in real dollars or through “in-kind” services. While the percentage of local contribution varies from program to program, Local communities need to assess their financial capability and resources to implement their hazard mitigation action plans.

CHAPTER 10 - PRIORITIZATION

Once the mitigation actions were finalized by the Core Team, mitigation actions were prioritized based on the following evaluation criteria. Answers to the following questions for each consideration were provided to the Consultant by the Core Team for incorporation into the prioritization table.

Social Considerations – Life/Safety Impact

- Will the project have minimal/direct/or significant impact on the safety of businesses, residents, and properties?
- Will the proposed action adversely affect one segment of the population?
- Will the project be a proactive measure to reducing flood risk?

Administrative Considerations – Administrative/Technical Assistance

- Is there sufficient staff currently to implement the project?
- Is training required for the staff to implement this project?

Legal Considerations – Statutory Requirements

- Does the action satisfy a statutory requirement?
- Does the action improve data collection and storage?

Economic Considerations – Project Cost

- What is the approximate cost of the project?

These considerations were then grouped into low, medium, and high categories and assigned points: low priority - 3 points; medium priority – 5 points; and high priority -10 points. Timelines for these projects were also established: Short range projects – implemented within first 2 years; Medium range projects - 3 to 5 years; and Long range projects – over 5 years.

Table 10.1 Evaluation criteria for project prioritization

Evaluation Criteria	Evaluation Value		
	Low (L) 3 points	Medium (M) 5 points	High (H) 10 points
Life/Safety Impact	Minimal/negligible impact on businesses, residents, properties; reactive measure	Direct impact on businesses, residents, properties; proactive measure	Significant impact on public safety for businesses, residents, properties; proactive measure
Administrative/Technical Assistance (staffing, funding, maintenance)	Additional staff and/or training required to implement project	Additional staff/training or funding may be needed to implement project	Adequate staff and funding to implement project
Statutory (codes, plans, ordinances)	Does not satisfy a statutory requirement	Improves data collection and storage	Satisfies a statutory requirement
Project Cost	>\$250,000	\$50,000 to \$250,000	<\$50,000

City of Takoma Park Flood Mitigation Plan

Mitigation Actions Prioritization

Action No.	Project Description	Life/ Safety Impact	Admin/ Tech Support	Statutory Implications	Cost	Total Score	Timeline
1	Develop DFIRMS for the City to include the floodplain on 4 th Avenue and along Maple Avenue. The study should use the Montgomery County floodplain criteria (mapping of drainage areas over 600 acres).	10	5	10	5	30	M
2a/2b	Continue to work with the County to ensure that the current building codes, floodplain ordinances and standards follow FEMA guidelines. Examine necessary codes and regulations from other communities that restrict development in their 100-year floodplains.	10	10	5	10	35	M
3a/3b/3c	Evaluate each city project to ensure it has a low-impact-development component. Identify specific city projects to retain stormwater on site. Incorporate stormwater retention principles in all city projects including the Green Roof on the deck of the Municipal Building and the Linden Avenue stormwater retrofit project. Develop guidelines for reduction of impervious surfaces in conjunction with the Property Maintenance Code.	5	5	10	5	25	S
4a/4b/4c/4d /4e	Consider integration of comprehensive plans with flood and other all-hazard mitigation plans by adding goals and objectives that address flooding. During the next update of the comprehensive plan, encourage planners and staff from Public Works to work together to cross reference goals and objectives and actions between the Comprehensive Plan and the Flood Mitigation Plan to ensure that flood issues are addressed in the Comprehensive Plan. Update the Flood Mitigation Plan periodically and after a flood event. Integrate this Plan into the Montgomery County All-Hazard Mitigation Plan. Apply for funding to develop an all-hazard mitigation plan for the City of Takoma Park; the flood mitigation plan may be integrated into the city's plan as an annex.	10	10	5	10	35	M
5a/5b/5c	Once the DFIRMS are complete, work with property owners in the floodplain and direct them to resources to help them retrofit their properties. Identify funding sources to retrofit properties that are impacted by flooding. Acquire those flood prone properties that cannot be retrofitted when they come up for sale.	10	5	5	5	25	L
6	Consider channel improvements and/or other remediation actions to the area along Baltimore Avenue.	5	5	5	5	20	S

City of Takoma Park Flood Mitigation Plan

Action No.	Project Description	Life/ Safety Impact	Admin/ Tech Support	Statutory Implications	Cost	Total Score	Timeline
7a/7b/7c	Identify opportunities to reestablish riparian wetlands to absorb the flood waters and also streams and potential wetland areas to absorb water downstream Coordinate with WSSC regularly to obtain information on the calls received by WSSC when a house floods due to stormwater backups Develop a database of flooding reports received after a rain storm to track buildings with wet basements to address the stormwater issue	10	5	10	10	35	S
8	Improve coordination between Public Works, Police, and Planning (Housing and Community Development) through the creation of an Action Committee. The Committee should meet periodically to discuss growing concerns, upcoming plans, and flood-related issues as identified by the constituent groups.	5	10	5	10	30	S
9a/9b/9c	Work closely with city departments and the county to disseminate evacuation and shelter information to the residents. Include a flood component in the EOP and ensure it is updated regularly. Become involved with businesses and other entities in the city when they prepare or update their EOPs.	10	5	5	10	30	S
10	Identify and rent a space, preferably a climate controlled facility to house supplies	5	10	10	10	35	S
11	Study the feasibility of using decorative walls and landscaping along Maple Avenue to convey the flood water to Sligo Creek, thus protecting the buildings while enhancing the aesthetic appeal of the streetscape.	10	5	5	3	23	L
12a/12b	Continue to explore low impact development techniques to manage stormwater and increase the amount of pervious surfaces by incorporating innovative methods such as including bio-retention areas, dry wells, infiltration trenches, filter/buffer strips, and vegetated swales to reduce the impact of flooding in the City. Develop incentives to promote green infrastructure concepts for stormwater retention on private properties.	5	5	5	5	20	S
13a/13b/13c	Ensure all properties that are acquired are cleared of habitable structures and remain as open space in perpetuity. Work with M-NCPPC to protect the Sligo Creek floodplain and other streams as a natural resource asset. Review and update the Open Space Plan as necessary.	5	10	5	5	25	L

City of Takoma Park Flood Mitigation Plan

Action No.	Project Description	Life/Safety Impact	Admin/Tech Support	Statutory Implications	Cost	Total Score	Timeline
14a/14b/14c	Continue to ensure that the Takoma Park City Library is stocked with flood protection publications. See http://www.fema.gov/library/index.jsp for a detailed listing of flood-related publications. Include this link on the City's webpage. Include flood-related articles and success stories in the City newsletter. Prepare an annual mailing to all property owners in the floodplain. The mailing should include: flood and hazard data, safety precautions and emergency procedures, flood mitigation options, and sources of funding.	10	5	10	10	35	S
15	Identify resources to assist the City with specific projects.	5	5	5	10	25	M
16	Consider submitting an application to join the Community Rating System (CRS) program.	10	5	5	10	30	M
17	Forward this Flood Mitigation Plan for approval to FEMA and ensure that the City Council adopts the approved plan.	10	10	10	10	40	S
18	Work with the Flood Mitigation Plan Core Team and members of the public who are interested in flood-related issues to implement this plan and review its progress. Schedule Core Team Meetings once every year to review projects that have been completed, altered, or are no longer applicable.	10	10	5	10	35	S

Plan Implementation/Maintenance

Once this Plan has been reviewed by the Maryland Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA), the Plan will be adopted by the Takoma Park City Council. Since the Plan is envisioned to be a 'living document', plan adoption is not considered the final step in the planning process but rather as a first step to implementation. The plan monitoring and maintenance schedule is a cycle of events that involves periodic review, adjustments, and improvement. This section establishes a method to monitor how the Plan will be evaluated and maintained in the future.

The City of Takoma Park currently uses several mechanisms to guide development: comprehensive land use planning, transportation planning, and floodplain and stormwater management regulations, as mentioned in Chapter 3. Each of these mechanisms will continue to be used to meet the intent of this Plan, as appropriate. Once this Flood Mitigation Plan is adopted by the City, mitigation strategies discussed in this Plan will be implemented via the aforementioned mechanisms as well as through the Subdivision Regulations and the Zoning Ordinance. The flood mitigation planning effort recommends the integration of mitigation planning into the development of the other plans. For example, the Flood Mitigation Plan helped to identify that specific land uses are prohibited or discouraged in flood hazard areas and this should be taken into consideration while developing the Future Land Use Plan for the City.

City of Takoma Park Flood Mitigation Plan

In order to ensure that the Plan continues to provide a framework for reducing the flood risk to the City, the Public Works Department will take responsibility to convene an annual meeting of the Mitigation Core Team. At this meeting, the Core Team will determine the status of each mitigation action. Each action proposed in the Mitigation Plan will be categorized as one of the following: completed, in progress, not started/delayed, modified, or cancelled. The Core Team will assist the Public Works Department in preparing a status report of the mitigation actions.

In addition to conducting an annual review of the Plan, the Core Team will review the Plan within 30 days after a flood event. Each goal and objective will be examined for its relevance and its validity to the changing situation in the City, and the mitigation actions will be reviewed to ensure that they address any recent issues that may have stemmed from the disaster.

APPENDIX 1

Public Meeting Materials

Mitigation Core Team Meeting 1 – 14 August 2008

City of Takoma Park
FLOOD MITIGATION PLAN

Mitigation Core Team Meeting #1

14 August 2008

11am-1pm

AGENDA

Introductions – Daryl Braithwaite

- City Staff
- Mitigation Core Team Members
- Consultants
 - Deepa Srinivasan, Vision Planning and Consulting
 - Dr. Mike Scott, ESRGC

PowerPoint Presentation – Deepa Srinivasan and Dr. Mike Scott

- FMA Plan Requirements
- Overview of the Hazard Mitigation Planning Process
- Schedule
- Requested Information

Discussion - Group

- Hazard Identification and Risk Assessment
- Mitigation Capability Analysis and Distribution of Questionnaires

Wrap-up – Deepa Srinivasan

- Next steps
- Schedule Mitigation Core Team Meeting #2
- Questions

Adjournment

Flood Mitigation Plan City of Takoma Park, MD

14 August 2008
1st Steering Committee Meeting

Presented by:
Deepa Srinivasan, Vision Planning and Consulting, LLC
Dr. Michael Scott, ESRGC/Salisbury University



Project Purpose

To develop a flood mitigation plan to improve the City's resistance to floods by identifying actions to reduce the impact of floods to city residents and structures.

Key Players

- City of Takoma Park Staff
- Montgomery County Staff
- Flood Mitigation Plan Steering Committee
- Consultants
 - Deepa Srinivasan, President, Vision Planning & Consulting, LLC
 - Dr. Mike Scott, Director, Eastern Shore Regional GIS Cooperative @ Salisbury University
- Public
- Maryland Emergency Management Agency (MEMA)
- Federal Emergency Management Agency (FEMA)

Project Goals

The Flood Mitigation Plan for the City of Takoma Park will:

- Be consistent with the requirements of the 44 Code of Federal Regulations part 78.5 Flood Mitigation Plan Development;
- Help reduce the risk of loss of life, personal injury and property damage to the City's residences and businesses by identifying the flood risk;
- Include mitigation strategies to address the flood risk within the City; and
- Gain approval from the MEMA and FEMA, paving the way for future federal funding of flood mitigation projects.

44 Code of Federal Regulations 78.5 Flood Mitigation Plan Requirements

- Describe the planning process
- Describe public involvement
- Include existing flood risk
- Include number of estimated structures in the floodplain
- Identify repetitive loss structures
- Identify extent of flood depth and damage potential
- Discuss floodplain management goals
- Identify and evaluate feasible mitigation actions
- Present a strategy for reducing flood risks
- Provide a strategy for continued compliance with NFIP
- Describe procedures for ensuring implementation, reviewing progress, and making revisions
- Provide documentation of Plan by legal authority

Steps in the Planning Process

1. Organize work group and process (meetings)
2. Assess hazards, risks, vulnerability
3. Assess local capabilities
 - Existing Plans, Programs, Policies
 - Personnel and Equipment Resources
 - Local Codes and Zoning Ordinances
 - Current and Proposed Construction Projects
4. Develop goals and objectives and mitigation actions
 - Prevention
 - Property Protection
 - Public education and Awareness
 - Natural Resource Protection
 - Emergency Services
 - Structural Projects

Steps in the Planning Process (cont'd)

4. Write mitigation plan and prioritize projects

Evaluation Criteria: STAPLEE

- Social
- Technical
- Administrative
- Political
- Legal
- Economic
- Environmental

5. Develop implementation plan

- Priorities for Mitigation Actions
 - Short-, Medium-, or Long-Range
 - Potential Funding Sources
 - Responsible Entities
 - Target Completion Dates
- Five-Year Plan Maintenance Cycle

Meetings

4 Steering Committee Meetings

- Meeting 1: Planning process, schedule, deliverables
- Meeting 2: Hazard identification and risk assessment
- Meeting 3: Capability assessment and goals and objectives
- Meeting 4: Mitigation actions and implementation

2 Public Meetings

- Meeting 1
 - Planning process
 - Hazard identification and risk assessment
- Meeting s
 - Capability assessment and goals and objectives
 - Mitigation actions and implementation

Hazard Identification and Vulnerability Assessment

- Definitions
 - Hazard – the threat to things we value
 - Risk – the probability the hazard might occur
 - Vulnerability – the potential for loss
 - Mitigation Capability – the degree of ability to either remove the threat or to resist and/or recover from a hazard event

Hazard Identification and Vulnerability Assessment

- Seek to determine for the 100-year riverine event:
 - Where will it flood?
 - How deep will the floodwater likely be?
 - Which structures are likely to be impacted?
 - What is the value of those structures and their contents?
 - What is the likely damage to occur from a 100-year event?
- 100-year flood – has a 1% chance of happening every year
- Also, seek to inventory known or suspected stormwater flooding issues/locations

Hazard Identification and Vulnerability Assessment

- Determined using:
 - Flood insurance rate maps (FIRMs) - both old and new
 - Most recent flood modeling software (HAZUS-MH) developed by FEMA
 - The best data available
 - USACE, MDNR, MDP, MDAT, MDE, County/City Planning
 - All the data has been compiled except for topography
 - A GIS-based spatial analysis
 - Digital mapping and analysis system
 - Input from local experts

Hazard Identification and Vulnerability Assessment

- Method and Approach
 - Collect all necessary data
 - Air photos, LiDAR, building locations, FIS, FIRMs, etc
 - Field check all structures in the floodplain for construction types and foundation height
 - Realign FIRMs and create new interpolated cross sections, if necessary.
 - Use the FIS to inform flood heights
 - Input all data to HAZUS-MH model
 - Display results

Local Capability Assessment

Codes and Ordinances

- City/County Zoning Ordinance
- Subdivision Regulations
- Building Code
- Flood plain development ordinance -Montgomery County Code , Chapter 19, Article III, Floodplain District
- Stormwater management and sediment and erosion control requirements - City ofTakoma Park Code Title 16
- National Flood Insurance Program (adopted by the City in May 2006)

Local Capability Assessment

Plans

- Montgomery County Hazard Mitigation Plan
- Montgomery County General Plan
- City ofTakoma Park Master Plan
- City ofTakoma Park Emergency Management Plan
- State of Maryland Hazard Mitigation Plan
- Planning & Community Initiatives for the Univ. Boulevard Corridor
- Urban Parks & Open Space Concept for Silver Spring and Takoma Park
- Takoma Park Historic District Master Plan
- Takoma Transportation Study
- Planned Development Projects

Local Capability Assessment

City Departments

- Housing and Community Development Office
- Public Works
- Emergency Management
- Police
- Department of Permitting Services
- Parks and Recreation
- Communications Office

Schedule

Task	July	August	September	October	November	December	January	February	March
Organize Work Group and Process									
Assess Hazards, Risks, Vulnerability									
Assess Local Capabilities									
Develop Mitigation Plan									
Write Mitigation Plan									
Develop Implementation Plan									
Build Plan									
Organize Resources									
Steering Committee Meetings									
Public Meetings									

Next Steps

- Data Collection
- Hazard Identification and Risk Assessment
- Review of Plans and Ordinances
- Mitigation Capability Assessment
- Steering Committee Meeting #2 (mid October)

Thank You!

City of Takoma Park Flood Mitigation Plan

Mitigation Core Team Meeting 2 – 5 December 2008

City of Takoma Park
FLOOD MITIGATION PLAN

Mitigation Core Team Meeting #2
5 December 2008
11am-1pm
AGENDA

PowerPoint Presentation and Discussion

- Findings
- Hazard and Vulnerability Assessment
- Preliminary Mitigation Actions

Wrap-up and Next Steps

- Discuss Public Meeting #1 (Jan 2009)

Questions

Adjournment

2nd MCT Meeting: Hazard and Vulnerability Assessment Progress

Michael S. Scott, PhD, GISP
ESRGC/Salisbury University
December 5, 2008

Meeting Agenda

- Discuss method steps
- Examine maps
- Examine GIS, if necessary
- Discuss particular areas that need extra attention as well as particular mitigation strategies
- Discuss public meeting agenda

Method Steps

- Gather historical flood information
 - Completed
- Review available GIS data
- Conduct vulnerability assessment
- Conduct mitigation capability assessment
 - On-going, will be the subject of the next MCT meeting.

Review Available GIS Data

- Flood Information
 - FIRM and Flood Insurance Study (2006)
 - dFIRMs
 - Flawed, missing the old PG County portion of TP
 - Independent studies (4th Ave & Maple Ave)
- Tax parcel polygons
 - Obtained, building tax assessment info not included
- Maryland PropertyView points
- Critical facilities
- Orthophotography
- Topography
 - 30 m DEM for county
 - 2 m DEM for City, generated from contours
- Building footprints

Conduct Hazard Assessment

- Rectify the scans of the two independent studies and digitize the flood boundary
- Interpolate likely flood boundary beyond mapped area of independent studies
- Digitize the old PG County portion of the flood polygons
- Break the dFIRM polygons into their respective stream reaches
- Digitize the location of cross-sections and capture the 100-year flood height and discharge amounts
- Create additional cross-sections for HAZUS modeling requirements

Conduct Hazard Assessment (cont.)

- Denote the center of the floodway
- Buffer the center to enclose the floodplain
- Clip the LiDAR data to the extent of each reach
- Run HAZUS Flood Information Tool (FIT)
 - Provide the cross sections, the floodplain extent, and the LiDAR data
 - Calculates initial flood depths then asks for the definition of non-conveyance areas
- Merge all of the stream reach results
- Result is the flood depth grid for the City

Conduct Vulnerability Assessment

- Find the intersection with the flood boundary
 - Tax parcels
 - Building footprints
 - Critical infrastructure
- For each building footprint, we collected:
 - Building use
 - SFR, MFR, Retail, Warehousing, Light Industrial, etc.
 - Construction materials
 - Date of construction
 - Height of foundation
 - Assessed value of the improvements

Conduct Vulnerability Assessment (cont.)

- Preliminary work completed, comparing building/property locations with 100-yr flood zone
 - 21 buildings affected, 13 have assessed value, 1 impact is insignificant
 - 6 SFR, 6 MFR, 1 Comm
 - \$6,654,675 in assessed improvements value
 - \$4,338,050 from assessed building value
 - \$2,316,625 from estimated contents value
 - All of the buildings can expect more than 2' of water
 - 19 properties affected
- Final work to be done with HAZUS after today's review

Next Steps

- Besides 4th Ave & Maple Ave, are there other areas of critical concern?
- Specifically, where are the stormwater flooding problems?
- Are there areas where mitigation measures
 - Have been implemented in the past?
 - Are planned for the future?
- What sort of mitigation strategies are most achievable, given the fiscal, environmental, and political realities of Takoma Park?

City of Takoma Park Flood Mitigation Plan

Mitigation Core Team Meeting 3 – 6 January 2009

City of Takoma Park
FLOOD MITIGATION PLAN

Mitigation Core Team Meeting #3
6 January 2009
11am-1pm
AGENDA

Discussion of 1st Public Meeting

PowerPoint Presentation and Discussion

- Findings
- Goals and Objectives
- Preliminary Mitigation Actions

Wrap-up and Next Steps

- Draft Plan
- Discuss Mitigation Core Team Meeting #4 (Early Feb 2009)
- Discuss Public Meeting #2 (Late Feb 2009)

Questions

Adjournment

Flood Mitigation Plan City of Takoma Park

6 January 2009
3rd Steering Committee Meeting

Presented by:
Deepa Srinivasan, AICP, CFM
Vision Planning and Consulting, LLC



Takoma Park Flood Mitigation Plan Plan Elements

- Preventive Measures
- Property Protection
- Structural Projects
- Natural Resource Protection
- Public Information
- Emergency Services

Preventive Measures

- County's zoning regulations have prohibited construction within the 100-year floodplain for several decades. The County prohibits development in regions through restrictive zoning and subdivision requirements. New construction is prohibited in the floodplain of the major waterways such as Sligo Creek.
- IBC prohibits building in any 100-year floodplain or stream or drainage course. Code also prohibits development in any area that is subject to flooding, erosion, unstabilized slope, or fill within the danger reach of a high-hazard dam.
- The Montgomery County Code, Chapter 19, Article III, Flood plain District Requirements applies in the City of Takoma Park. Development is allowed in the 100-year floodplain.

Preventive Measures (continued)

- A floodplain permit is required for land disturbing activity within in the flood plain district and within 25 feet of the district's boundary. A floodplain district permit is not required for any minor land-disturbing activity that disturbs < 5,000 sq.ft. of ground surface area; is promptly stabilized to prevent erosion and sedimentation; and does not substantially block or impede the flow of water or change the cross-section of the floodplain.
- The floodplain ordinance requires that any insured structures damaged over 50 percent of the market value of the property must comply with the floodplain ordinance when the building is repaired.

Preventive Measures (continued)

- City's FIRM and FIS were developed in March 1984. During the DFIRM creation for Mont Co, there was no restudy done of flood threat. DFIRMs do not include the flood zone in Sligo Creek and Long Branch in the part of Takoma Park that were once part of Prince George's County. The floodplain ends at the old Montgomery County line while the creek continues.
- City is a member of the NFIP but not the CRS.
- City does not employ a building official/inspector or a floodplain administrator. The County's Department of Permitting Service determines if a specific property is in the floodplain and if so, the City Engineer advises the resident to continue the process with the County's Department of Permitting Services.

Structural Projects

- There are no reservoirs or any ponds that have small dams and spillways that control flood elevations within the City.
- There are no levees in the City. The municipal building at the corner of Maple Avenue has a floodwall built around it that is 2 feet above the base flood elevation.
- There are no bridge modifications in the City.
- In terms of channel improvements, routine maintenance is performed four times a year and also when complaints are received. A house at the intersection of Baltimore and New York Avenue is in need of channel improvements.

Property Protection

- No records of relocations.
- No records of acquisitions. No acquisitions in consideration.
- No record of elevating residential structures.
- No documentation of floodproofed properties.
- The only barrier wall is the one surrounding the municipal building on Maple Avenue.
- City is responsible for managing stormwater issues. Database of TV inspections via Video Pipe service. One-third of the City's drains have been inspected each year for the last 6 years.
- City Engineer responsible for SWM permit reviews, engineering projects, resurfacing programs (sidewalk, curbs, etc).

Property Protection (continued)

- 01/01/98-08/31/08, a total of 11 insurance policies have been written totaling to \$2,514,000 insured and 2,989 in premiums. Montgomery County has 1,519 insurance policies totaling to \$398,683,500 insured and 672,475 in premiums.
- Mandates - Floodplain ordinance requires that all insured structures damaged over 50 percent of the market value of the property must comply with the floodplain ordinance when the building is repaired. This includes elevation, acquisition and demolition, or relocation out of the floodplain.

Natural Resource Protection

- City currently not involved with any wetland initiatives.
- The City does not have a woodland conservation plan. City does have a Tree Protection ordinance and a Tree Removal Ordinance that requires permits to remove a tree greater than 7 5/8 " in diameter or to do any construction within 50 feet of an urban forest tree.
- The City also has an Open Space Plan.
- Erosion, Sediment Control and Storm Water Management of the Montgomery County Codes states that a sediment control permit must not be issued for any grading or land-disturbing activity that is located within 25 feet of a 100-year floodplain if the activity requires and has not received a floodplain permit .

Public Information

- City Engineer assists residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain and provide information on additional hazards, flooding outside, mapped areas and zoning.
- FIRMs available to the public at the County PWD.
- The Takoma Park City Library on Philadelphia Road houses brochures, newspapers, and catalogues on a variety of topics including flooding.
- City is not very proactive on flood mitigation related outreach efforts due to inadequate staff capacity and needs to identify ways to improve outreach efforts.
- City does not conduct any environmental education programs.

Emergency Services

- Reverse 911 system operated by the County.
- City uses 800 megahertz radio system.
- No flood gages within the City of Takoma Park.
- Montgomery County updated its EOP in (2008) and is currently updating its 2000 Continuity of Operations Plan.
- City's EOP was completed in February 2004 and states:
 1. The Montgomery County Fire and Rescue Service will be the first responder for most events and thus will exercise incident command with the City playing a support role.
 2. The City has limited current resources and when the event is of major proportions, the Memorandum of Understanding (MOU) with Montgomery County would be invoked along with the Council of Governments Mutual Aid Agreements.

Goals and Objectives Prevention

- *Goal 1: Ensure language in existing plans and ordinances protect properties within the City from flooding.*
 - Ensure that any development or redevelopment in the City does not increase the vulnerability to flooding.
 - Prohibit new development and limit redevelopment in the 100-year floodplain.
 - Continue to work with the County to ensure that the current building codes, floodplain ordinances and standards follow FEMA guidelines and are properly enforced.
 - Ensure proper enforcement of wetland protection, erosion and sediment control, and woodland protection standards to make them more effective.

Prevention (cont'd)

Goal 2: Promote land use practices that retain stormwater on site to reduce potential for flooding.

- Consider developing guidelines for reduction of impervious surfaces in light of the Property Maintenance Code.
- Consider city projects to retain stormwater on site.
- Promote adoption of green infrastructure for stormwater retention on private properties.

Goals and Objectives Property Protection

Goal 2: Continue to ensure that new development / redevelopment is resistant to flood damage.

- Encourage high-risk, pre-FIRM residential structures to use retrofitting techniques to avoid repeated flooding.

Structural Projects

Goal 3: Solve flooding problems by employing a variety of techniques as applicable.

- Reduce vulnerability of critical facilities to flooding by identifying appropriate mitigation techniques.

Goals and Objectives Natural Resource Protection

Goal 4: Protect existing natural resources and open-space, including parks and wetlands, within the floodplain and watersheds.

- Ensure all properties that are acquired are cleared of structures and remain as open space in perpetuity.
- Work with M-NCPPC to protect the Sligo Creek floodplain and other streams as a natural resources asset.
- Review and update the Open Space Plan as necessary.

Goals and Objectives Emergency Services

Goal 5: Work with the County to identify safe and efficient evacuation routes prior to floods.

Goal 6: Improve coordination between departments within the City and County that would be responsible for implementing flood mitigation activities.

- Maintain a database of properties that are acquired, relocated, retrofitted, elevated, etc.

Goals and Objectives Public Information

Goal 7: Increase awareness among city residents on flood issues and educate them on practices to reduce the flooding potential.

- Involve community residents in the implementation of this Flood Mitigation Plan and in protecting their own health, safety and property.
- Educate citizens on the flood risk in the City.
- Educate citizens on the importance of flood insurance.
- Consider programs to enhance flood mitigation capabilities such as CRS.
- Educate citizens on topics such as green infrastructure and stormwater management practices.

Preliminary Mitigation Actions

1. Since there was no restudy done of flood threat in Takoma Park during the creation of the DFIRMS for the County, DFIRMS should be developed for the City to include the new floodplain that encompasses Maple Avenue and 4th Avenue.
2. Identify staff resources to assist the City with specific projects including public outreach and grant writing.
3. Encourage the City to join the CRS and promote continued compliance of the NFIP.
4. Consider channel improvements to the house at the intersection of Baltimore and New York Avenue.

Preliminary Mitigation Actions (cont'd)

5. Consider identifying drainage ways within the City with drainage areas greater than.....x acres for restudy: (check with Ali)
6. Identify specific measures for the 19 properties in the floodplain.
7. Conduct a comprehensive study to research the entire system; particularly on 4th Avenue and along Maple Avenue where stormwater run-off issues are significant and to eliminate discrepancy between FEMA studies and private studies on the delineation of the 100-year flood plain.
8. Conduct training sessions on flood related topics (expand).

Next Steps

- 4th Core Team Meeting – Week of February 2009
 - Finalize Goals
 - Finalize Mitigation Measures
 - Discuss Final Public Meeting (Early March)
- Preparation of Draft Plan
- Submission of Draft Plan

Thank You!

City of Takoma Park Flood Mitigation Plan

Public Meeting 1 – 22 January 2009

Meetings to Consider New Flood Protection Plan

By DARYL BRAITHWAITE
PUBLIC WORKS DIRECTOR

As winter descends, the possibility of snow storms and electrical outages looms. But emergency planning and hazard mitigation is a year-round concern for City officials. This month, Public Works is focusing on flood control.

With a grant from the Maryland Emergency Management Agency to develop a flood mitigation plan for the City, staff is working with a consultant team of Deepa Srinivasan from Vision Planning and Consultants and Dr. Michael Scott, from the Eastern Shore Regional GIS Cooperative and Salisbury University, to conduct the research and develop proposals for flood mitigation. Their intent is to map out areas vulnerable to flooding, develop strategies to protect property, public health and natural resources

and improve resistance to floods.

A steering committee of City and County staff as well as local environmental groups will work with the consultants as they research past flood history, review federal and state records and run software programs designed to predict areas of flooding based on elevation. The consultants have prepared information for public review and comment related to the likely flood zones in the City and potential strategies to mitigate damage from flooding. The first of two public meetings have been scheduled for Thursday, January 22, at 7 p.m., in the Takoma Park Council Chambers at 7500 Maple Avenue, to discuss the draft plan.

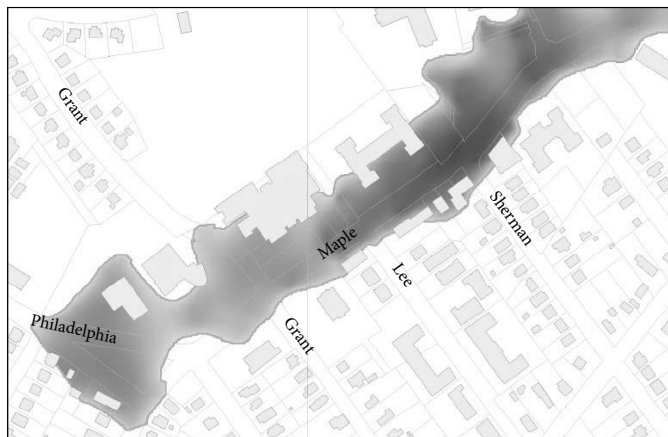
The maps below have been prepared to show the potential area of flooding in a 100 year storm event. The maps illustrate Maple Avenue and 4th Avenue.

If you have any questions, please contact Ali Khalilian, City Engineer at 301-891-7620 or AliK@takomagov.org.



The area shown here, around Fourth Street in the Pine Crest neighborhood, is vulnerable to flooding in a 100-year storm event.

Maple Avenue, with its apartments and residential neighborhoods, could experience flooding in the shaded areas of this map in an extreme storm event.



Energy Assistance Available

With the cost of electricity and gas having dramatically increased in the past few years, this is a reminder that the Maryland Energy Assistance Program (MEAP) and the Electric Universal Service Program (EUSP) are available to income-eligible renters and homeowners. Applications can be obtained at the Department of Health and Human Service Office located at 1301 Piccard Drive, 4th floor, Rockville, Maryland (240-777-4450). You can also call Takoma Park's Office on Landlord-Tenant Affairs at 301-891-7222 to obtain an application. To apply, you will need proof of residence, social security numbers, proof of your household's total gross income and the name of your utility suppliers and account numbers.



"third Thursday" Poetry Reading

This month's "third Thursday" poetry reading features the work of local poets Ellen Cole, E. Laura Golberg and Judy Neri. Please join us at 7:30 p.m. on Thursday, January 15 in Gallery 3 on the third floor of the Takoma Park Community Center.

Attention All Poets!

Are you interested in being considered for a spot as one of the featured poets in the popular "third Thursday" poetry readings? The Commission is soliciting work from local poets for the second half of the series. To be considered, please send three to five poems to the Commission at ahc@takomagov.org. Selected poets will be featured in the readings beginning in April 2009. Submission deadline is Friday, February 27, 2009.

"Writing a Village: Adult Poetry Workshop"

Takoma Park Poet Laureate Anne Becker is offering a series of community poetry workshops on the third Monday of every month from 7:30 to 9:30 p.m. in the Hydrangea Room at the Takoma Park Community Center. The workshops are free but registration is required. This month's workshop is scheduled for Monday, January 19, 2009.

Exhibits Feature Students, Prisoners

Two new exhibits can be viewed at the Takoma Park Community Center during the month of January. The first, "Drawing and Watercolor: Students of Katie Dell Kaufman," is on display in the Atrium Gallery on the main level of the community center. The second, "Pano: Prison Art," features original works of art created by prison inmates and can be viewed in Gallery 3 on the third floor.

Interested in Exhibiting at the Community Center?

The Arts and Humanities Commission is seeking proposals from visual artists and crafts people interested in exhibiting their work at the Takoma Park Community Center. If selected, the work would be exhibited in one of four galleries: the Atrium Gallery, the Richard Dempsey Memorial Gallery, Gallery Three or The Corridor. Exhibits may feature the work of a group of artists or crafts people or the work of an individual.

For more information on these and other activities sponsored by the Takoma Park Arts and Humanities Commission, please contact Sara Anne Daines at 301-891-7224 or by email at ahc@takomagov.org or check online at www.takomaparkmd.org

PLEASE SIGN IN

FLOOD MITIGATION - FIRST COMMUNITY MEETING -
JANUARY 22, 2009

Name:

Address:

Contact Info: phone/email

Andrew Parta 25 Holt Pl TP 301 270 4173 ASPe PARTAN.
com

Diana Viduto^(cistern) 7416 PINEY AVE 301-588-5749 DVIDUTTS@aol.com

Andre Vanbridge 7600 Maple Ave 301 270 3100

Jay Markowitz 7415 Cedar Ave 301-588-0628

Catherine Tunis 907 Larch Ave tunis, catherine @evols.com

adandridge@smcmail.com

Amy Alderfer aasb211@verizon.net

Geoffrey Mason geoffreymason@rcn.com

Leandra Goedraik

The City of Takoma Park's Flood Mitigation Plan (Proposed): Planning Process and Hazard Assessment

Michael S. Scott, PhD, GISP
ESRGC/Salisbury University
January 22, 2009

Meeting Agenda

- Why are we creating this plan?
- What are the goals of this plan?
- What is the process to create the plan?
- What areas of Takoma Park are susceptible to flooding?
- Mitigation capability assessment

Consulting Team

- Ms. Deepa Srinivasan, President
 - Vision Planning & Consulting, LLC
- Dr. Michael S. Scott, Director
 - Eastern Shore Regional GIS Cooperative at Salisbury University

Why are we creating this plan?

- Takoma Park by B.F. Gilbert in 1883 was founded with water (Sligo Creek) in mind.
- The City of Takoma Park contains a large portion of Sligo Creek, the confluence of Sligo Creek and Long Branch, and has several unstudied intermittent tributaries.
- Takoma Park is an important residential neighborhood in the Washington, DC metro complex as well as a commercial, transportation, educational, and cultural center for the region.
- Plan Goal: To reduce the vulnerability of Takoma Park's residents and business owners to flooding
 - Riverine only
 - Floodplain
 - Storm water

What are the objectives of this plan?

- Be consistent with 44 CFR 78.5 – Flood Mitigation Plan Development in accordance with the National Flood Insurance Act
- Conform to all pertinent criteria, particular those found in state and local ordinances, as well as the NFIP
- Identify risks from flood
- Develop coherent mitigation strategies
- Help reduce the loss of life, personal injury and property damage to the City's residents and businesses
- Be approved by MEMA and FEMA, paving the way for future federal funding of mitigation projects

What is the process to create the plan?

- Step 1 – Organize work group and process
- Step 2 – Assess hazards, risk, vulnerability, and mitigation capability
- Step 3 – Develop the mitigation plan
- Step 4 – Implement the plan

Step 1 – Organize the work group and process

- Core Team has been established
 - Director, Public Works
 - City Engineer
 - City GIS Analyst
 - Director, Housing and Community Development
 - Deputy City Manager
- 1st Core Team meeting was August 14th
 - Discussed were:
 - Planning process
 - Key elements of the plan
 - Schedule
 - Deliverables
 - Mitigation capability assessment questionnaire was distributed

Step 2 – Assess hazards, risk, vulnerability, and mitigation capability

- 2nd Core Team meeting was held Dec 5th
 - Preliminary hazard assessment was presented and comments incorporated
- 1st Public Meeting (tonight) will review the findings
- Definitions
 - Hazard – the threat to things we value
 - Risk – the probability the hazard might occur
 - Vulnerability – the potential for loss
 - Mitigation Capability – the degree of ability to either remove the threat or to resist and/or recover from a hazard event

Step 3 – Develop the Mitigation Plan

- 3rd Core Team Meeting – January 6th
 - Present the mitigation capability assessment
 - Development of specific plan goals and objectives
- Final Core Team Meeting – February 3rd
 - Discussion of mitigation alternatives, prioritization of alternatives, and the implementation plan
- 2nd Public Meeting – late February/early March
 - Present mitigation options and projects, the prioritization matrix, and the plan implementation schedule
 - Draft plans will be available

Hazard and Vulnerability Assessment

- Sought to determine for the 100-year event:
 - Where will it flood?
 - How deep will the floodwater likely be?
 - Which structures are likely to be impacted?
 - What is the value of those structures and their contents?
 - What is the likely damage to occur from a 100-year event?
- 100-year flood – has a 1% chance of happening every year

Hazard and Vulnerability Assessment

- Determined using:
 - Flood insurance rate maps (FIRMs) - both old and new/digital
 - Independent flood studies (Maple Ave & 4th Ave)
 - Most recent flood modeling software (HAZUS-MH) developed by FEMA
 - The best data available
 - USACE, MDNR, MDP, MDAT, MDE, County/City Planning & Public Works
 - A GIS-based spatial analysis
 - Digital mapping and analysis system

Hazard and Vulnerability Assessment: Caveats

- Reliable engineering studies of the City's flood threat have been sporadic and incomplete
 - HAZUS-MH cannot replace high-quality engineering studies
 - Piecemeal studies have been undertaken but have constraints of scope and consistency
- Divided history between Prince George's and Montgomery County has resulted in flood mapping errors in official FEMA maps
- DFIRMs were conversions of old paper maps, not a restudy of the flood threat

What areas are susceptible to flooding?

- Moderate flood threat
 - Maple Avenue
 - (at least) 10 properties
 - Fourth Avenue
 - 4 properties
- Minimal flood threat
 - Sligo Creek
 - Long Branch

What is the vulnerability of the City's built environment?

Degree of Damage	Building Count	% of Total	Value of Structure and Contents	Total Potential Damage	% of Total
Less than 1%	1	7.1%	\$5,462,420	\$52,210	4.5%
6 - 10%	3	21.4%	\$2,870,145	\$204,866	18.1%
11 - 15%	4	28.6%	\$1,512,660	\$189,571	16.8%
16 - 20%	3	21.4%	\$838,920	\$155,705	13.8%
30 - 45%	3	21.4%	\$1,432,950	\$529,338	46.8%
Total	14	100%	\$12,117,095	\$1,131,692	100%

Total Damage Percentage: 9.3%

What is the vulnerability of the City's built environment?

General Occupancy Type	Building Count	% of Total	Value of Structure and Contents	Total Potential Damage	% of Total
Residential	12	85.7%	\$6,064,275	\$823,858	72.8%
Commercial	1	7.1%	\$590,400	\$255,624	4.6%
Educational	1	7.1%	\$5,462,420	\$52,210	22.6%
Total	14	100%	\$12,117,095	\$1,131,692	100%

What are Takoma Park's current capabilities to mitigate losses from flooding?

- Complete set of ordinances, plans, and policies are currently being reviewed
- Information is currently being reviewed on:
 - Preventive Measures
 - Property Protection
 - Structural Projects
 - Natural Resource Protection
 - Public Information
 - Emergency Services
- Results will be presented to the public in late February/early March

Key Documents Reviewed

- Codes and Ordinances
 - City/County Zoning Ordinance
 - Subdivision Regulations
 - Building Code
 - Floodplain development ordinance -Montgomery County Code , Chapter 19, Article III, Floodplain District
 - Stormwater management and sediment and erosion control requirements - City of Takoma Park Code Title 16
 - National Flood Insurance Program (adopted by the City in May 2006)
- Plans
 - Montgomery County Hazard Mitigation Plan
 - Montgomery County General Plan
 - City of Takoma Park Master Plan
 - City of Takoma Park Emergency Management Plan
 - State of Maryland Hazard Mitigation Plan
 - Planning & Community Initiatives for the Univ. Boulevard Corridor
 - Urban Parks & Open Space Concept for Silver Spring and Takoma Park
 - Takoma Park Historic District Master Plan
 - Takoma Transportation Study
 - Planned Development Projects

What to do now?

- Please review the maps
- Point out areas that you think flood often so that we can investigate them
- Ask lots of questions
- Stay involved
 - Public meeting with draft plan – an announcement will go out well ahead of time
 - Contact me with any thoughts or concerns (msscott@salisbury.edu)

City of Takoma Park Flood Mitigation Plan

Mitigation Core Team Meeting 4 – 17 February 2009

City of Takoma Park
FLOOD MITIGATION PLAN

Steering Committee Meeting #4
17 February 2009
1:30-3:30pm
AGENDA

Overview of Draft Plan

Mitigation Actions

- Discussion
- Review/comments by Steering Committee
- Identification of Responsible Agencies and Implementation Schedule

Prioritization of Actions

Wrap-up

- Next steps
- Discuss Public Meeting #2 (4 March 2009)
- Questions

Adjournment

Mitigation Actions Evaluation Criteria

Evaluation Criteria	Evaluation Value		
	Low (L)	Medium (M)	High (H)
Life/Safety Impact	Minimal/negligible impact on businesses, residents, properties	Direct impact on businesses, residents, properties	Significant impact on public safety for businesses, residents, properties
Administrative/Technical Assistance (staffing, funding, maintenance)	Additional staff and/or training required to implement project	Additional staff/training or funding may be needed to implement project	Adequate staff and funding to implement project
Statutory (codes, plans, ordinances)	Does not satisfy a statutory requirement	Improves data collection and storage	Satisfies a statutory requirement
Project Cost	>\$150,000	\$50,000 to \$150,000	<\$50,000

Timeline for Implementation

Short range - within first 2 years.

Medium range - 3 to 5 years

Long range – 5+ years

Scoring

10 points for a “high” score

5 points for a “medium” score

3 point for a “low” score

City of Takoma Park Flood Mitigation Plan

Public Meeting 2 – 4 March 2009

CITY COUNCIL AND COMMITTEE CALENDAR*

Monday, March 2 - City Council meeting, 7:30 p.m. (CC Auditorium)

Thursday, March 5 - Police Employees' Retirement Plan Committee meeting, 8:30 a.m. (CC Hydrangea Room)

Monday, March 9 - City Council meeting, 7:30 p.m. (CC Auditorium)

Tuesday, March 10 - Facade Advisory Board meeting, 7 p.m. (CC Hydrangea Room)

Tuesday, March 10 - TP Board of Elections meeting, 7 p.m. (CC Council Conference Room)

Tuesday, March 10 - Committee on the Environment meeting, 7:30 p.m. (CC Forsythia Room)

Tuesday, March 10 - Tree Commission meeting, 6:30 p.m. (CC Atrium Room)

Monday, March 16 - City Council meeting, 7:30 p.m. (CC Auditorium)

Monday, March 16 - Public Safety Citizens Advisory Committee meeting, 6:30 p.m. (CC Room TBA)

Tuesday, March 17 - Washington Adventist Hospital Land Use Committee meeting, 7:30 p.m. (CC Hydrangea Room)

Thursday, March 19 - Emergency Preparedness Committee meeting, 8:30 a.m. (CC Hydrangea Room)

Monday, March 23 - City Council meeting, 7:30 p.m. (CC Auditorium)

Tuesday, March 24 - Arts and Humanities Commission meeting, 7:30 p.m. (CC Hydrangea Room)

Thursday, March 26 - WSSC public forum, 7:30 p.m. (CC Auditorium)

Monday, March 30 - City Council will not meet (fifth Monday)

*For the most up to date information, check www.takomaparkmd.gov. Most meetings are held in the Takoma Park Community Center - Sam Abbott Citizens' Center, 7500 Maple Avenue (CC). Individuals interested in receiving a weekly Council agenda and calendar update by e-mail should contact the City Clerk at 301-891-7267 or clerk@takomagov.org.

The City of Takoma Park is committed to ensuring that individuals with disabilities are able to fully participate in public meetings. Anyone planning to attend a Takoma Park public meeting or public hearing, and who wishes to receive auxiliary aids, services, or accommodations is invited to contact the City Clerk at 301-891-7267, at least 48 hours in advance, at the telephone number listed in the notice or through the Maryland Relay Service (1-800-735-2258 TTY/Voice).

Volunteers Needed

TO SERVE ON COUNCIL APPOINTED BOARDS, COMMITTEES AND COMMISSIONS

There are positions for Takoma Park residents available on many City boards, commissions and committees.

Please consider volunteering to serve. Additional information can be found at www.takomaparkmd.gov or contact the City Clerk for more information (301-891-7267 or Clerk@takomagov.org).

Arts and Humanities Commission (vacancies)	(vacancies)
Commission on Landlord-Tenant Affairs (vacancies - tenants are encouraged to apply)	Nuclear-Free Takoma Park Committee (vacancies)
Committee on the Environment (vacancies)	Public Safety Citizens Advisory Committee (vacancies)
Facade Advisory Board (one vacancy)	Safe Roadways Committee (vacancies)
Noise Control Board	Takoma Park Board of Elections (one vacancy)

City Council Action*

*Only negative votes and abstentions are noted. For additional information, contact the City Clerk at Clerk@takomagov.org.

January 26, 2009 - Regular Meeting

The consent agenda was adopted. It consisted of:

Resolution 2009-5 appointing Harry W. Lawrence III to the Ethics Commission

Resolution 2009-6 Recommending Appointment of Johnathan Edmund as the City's Representative to the Montgomery County Dr. Martin Luther King, Jr.

Commemorative Committee

Resolution 2009-7 appointing Jennifer Kurtinitis and Lawrence Hawkins to the Emergency Preparedness Committee

Resolution 2009-8 appointing Drew Sommers and Mary Beth O'Quinn as non-voting members to the Washington Adventist Hospital Land Use Committee

NOTICES

PUBLIC HEARING TO RECEIVE COMMENTS ON THE CITY OF TAKOMA PARK STRATEGIC PLAN

Monday, March 16, 2009 - 7:30 p.m.

Takoma Park Community Center - Sam Abbott Citizens' Center Auditorium

The City Council will hold a public hearing to accept comments on the City of Takoma Park Strategic Plan. All interested persons may attend the public hearing and sign up to speak. A full copy of the plan will be available for review by March 6 in the City Clerk's office or at www.takomaparkmd.gov.

Written comments may be sent to the City Clerk, 7500 Maple Avenue, Takoma Park, Maryland 20912, faxed to 301-270-8794, or e-mailed to Clerk@takomagov.org.

NOTICE OF FINAL ACTION

Administrative Regulation Establishing Bylaws for the Takoma Park Board of Elections (AR-2009-01)

The December 2008 edition of the Takoma Park Newsletter included notice of the City's intention to adopt an administrative regulation establishing bylaws for the Takoma Park Board of Elections. The notice was published in accordance with the require-

ments of the "Administrative Regulations Ordinance" (Authority: Chapter 2.12, Administrative Regulations, of the Takoma Park Code) to allow citizens the opportunity to comment on the proposal. An exact copy of the proposed regulation was posted on the City's web page. No comments have been received by the City Clerk's Office. Regulation AR2009-01 will become final on March 10, 2009.

NOTICE OF FINAL ACTION

Administrative Regulation Regarding Registration of Tenant Associations (AR-2009-02)

The January 2009 edition of the Takoma Park Newsletter included notice of the City's intention to adopt an administrative regulation to provide a formal process for registering a tenant association in the City of Takoma Park. The regulation supplements Section 6.16.030 of the Takoma Park Code. The notice was published in accordance with the requirements of the "Administrative Regulations Ordinance" (Authority: Chapter 2.12, Administrative Regulations, of the Takoma Park Code) to allow citizens the opportunity to comment on the proposal. An exact copy of the proposed regulation was posted on the City's web page. No comments have been received by the City Clerk's Office. Regulation AR2009-02 will become final on March 10, 2009.

Public Meetings

WSSC Forum for Resident Feedback

Residents are invited to attend a public forum with representatives of the Washington Suburban Sanitary Commission (WSSC) on Thursday, March 26, in the Community Center Auditorium, from 7:30 - 9 p.m. The meeting will be sponsored by the District 20 Delegation, County Council Member Valerie Ervin, and the Takoma Park City Council to provide an opportunity to give input to WSSC on projects and to allow WSSC to let residents know what is being done to address their concerns.

Ride On Is Proposing Changes to Bus Routes 3, 15, 17, 18 and 25

A public forum is scheduled for Tuesday, March 24 at 6:30 p.m. in Rockville. Sign up to speak by March 17. For information, contact Suzanne Ludlow at 301-

891-7229 or go to www.takomaparkmd.gov/rideon.

Flood Mitigation Plan—Community Meeting

The second public meeting to discuss the Flood Mitigation Plan for Takoma Park is scheduled for Wednesday, March 4, 2009 at 7:30 p.m. in the Community Center.

The purpose of the meeting is to review the final Flood Mitigation Plan. The Plan identifies areas in the City that are potentially vulnerable to flooding in a severe storm event. The plan also includes mitigation strategies to prevent floods, protect vulnerable property and natural resource protection and provide public information.

The City received a grant from the Maryland Emergency Management Agency to produce the plan. A consulting team of Deepa Srinivasin, from Vision Consulting and Dr. Michael Scott from Salisbury University were hired and worked with City Departments and a steering committee to develop the plan.



Speak with the Mayor

Mayor Bruce Williams welcomes community input and invites you to meet with him during his regular office hours on Tuesdays, 2-5 p.m. (by appointment only) and 5-7 p.m. (for walk-ins), in the third floor Council Conference Room of the Takoma Park Community Center. Walk-ins are requested to check in at the reception desk on the main floor.

For appointments, contact Peggy Washington, 301-891-7230 or peggyew@takomagov.org.

FLOOD MITIGATION MEETING - SECOND COMMUNITY SESSION

PLEASE SIGN IN

Name	Address	Contact Info
Daryl Brantwite	TP Public Works	daryl.b@takoma.gov
Joy Markowitz	7415 Cedar Ave. TP 20912	301-588-0628
Jane Holmes	6455 Kansas La Pine Crest Comm. Assn	301-588-5885
SARA DAINES	TP-HCD	301-891-7224
C. Tunis	907 Larch	301-270-4763 tunis.catherine@veris. com

Flood Mitigation Plan

City of Takoma Park, MD

4 March 2009
2nd Public Meeting

Presented by:
Deepa Srinivasan, Vision Planning and Consulting, LLC
Dr. Michael Scott, ESRGC/Salisbury University




Project Purpose

To develop a flood mitigation plan to improve the City's resistance to floods by identifying actions to reduce the impact of floods to city residents and structures.

Key Players

- City of Takoma Park Staff
- Montgomery County Staff
- Flood Mitigation Plan Steering Committee
- Consultants
 - Deepa Srinivasan, President, Vision Planning & Consulting, LLC
 - Dr. Mike Scott, Director, Eastern Shore Regional GIS Cooperative @ Salisbury University
- Public
- Maryland Emergency Management Agency (MEMA)
- Federal Emergency Management Agency (FEMA)

Project Goals

The Flood Mitigation Plan for the City of Takoma Park will:

- Be consistent with the requirements of the 44 Code of Federal Regulations part 78.5 Flood Mitigation Plan Development;
- Help reduce the risk of loss of life, personal injury and property damage to the City's residences and businesses by identifying the flood risk;
- Include mitigation strategies to address the flood risk within the City; and
- Gain approval from the MEMA and FEMA, paving the way for future federal funding of flood mitigation projects.

Schedule

Task	July	August	September	October	November	December	January	February	March
Organize Work Group and Process									
Assess Hazards, Risks, Vulnerability									
Assess Local Capabilities									
Develop Mitigation Plan									
Write Mitigation Plan									
Develop Implementation Plan									
Draft Plan									
Organize Resources									
Steering Committee Meetings									
Public Meetings									

Steps in the Planning Process

1. Organize work group and process (meetings)
2. Assess hazards, risks, vulnerability
3. Assess local capabilities
 - Existing Plans, Programs, Policies
 - Personnel and Equipment Resources
 - Local Codes and Zoning Ordinances
 - Current and Proposed Construction Projects
4. Develop goals and objectives and mitigation actions
 - Prevention
 - Property Protection
 - Public education and Awareness
 - Natural Resource Protection
 - Emergency Services
 - Structural Projects

Steps in the Planning Process (cont'd)

4. Write mitigation plan and prioritize projects
5. Develop implementation plan
 - Priorities for Mitigation Actions
 - Short-, Medium-, or Long-Range
 - Potential Funding Sources
 - Responsible Entities
 - Target Completion Dates
 - Five-Year Plan Maintenance Cycle

Criteria for Prioritization

- Social Considerations – Life/Safety Impact
- Administrative Considerations – Administrative/Technical Assistance (staffing, training)
- Legal Considerations – Statutory Requirements
- Economic Considerations – Project Cost

Meetings

4 Steering Committee Meetings

- Meeting 1: Planning process, schedule, deliverables
- Meeting 2: Hazard identification and risk assessment
- Meeting 3: Capability assessment and goals and objectives
- Meeting 4: Mitigation actions and implementation

2 Public Meetings

- Meeting 1
 - Planning process
 - Hazard identification and risk assessment
- Meeting 2
 - Goals and objectives
 - Mitigation actions and implementation

Local Capability Assessment

- Montgomery County Hazard Mitigation Plan
- Montgomery County General Plan
- City of Takoma Park Master Plan
- City of Takoma Park Emergency Management Plan
- State of Maryland Hazard Mitigation Plan
- Takoma Park Historic District Master Plan
- Takoma Transportation Study
- Planned Development Projects

Local Capability Assessment

City Departments

- Housing and Community Development Office
- Public Works Department
- Police Department
- Department of Permitting Services
- Parks and Recreation
- Communications Office

Goals and Objectives

Prevention

Goal 1: Ensure language in existing plans and ordinances protect properties within the City from flooding.

- Identify techniques to ensure that development or redevelopment in the City does not increase the vulnerability to flooding.
- Ensure proper enforcement of standards and ordinances to make them more effective.

Goals and Objectives

Property Protection

- *Goal 3: Continue to ensure that new development / redevelopment is resistant to flood damage.*
- Encourage property owners of high-risk, pre-FIRM residential structures in the floodplain to use retrofitting techniques to reduce the impact from flooding of their properties.
- Discourage new development in the floodplain.

Goals and Objectives

Emergency Services

- *Goal 4: Disseminate evacuation and shelter information to residents in an efficient manner.*
- *Work with the County to identify safe and efficient evacuation routes prior to floods.*
- *Improve coordination between departments within the City and County that would be responsible for implementing flood mitigation activities.*

Goals and Objectives

Structural Projects

Goal 5: Reduce flooding problems in drainage ways.

- Require developers to conduct flood studies in drainage ways.
- Identify areas that are in need of channel improvements.

Goals and Objectives

Natural Resource Protection

Goal 6: Protect existing natural resources.

- Raise the level of importance of preserving environmentally sensitive areas.
- Identify measures to protect existing natural resources and open-space, including parks and wetlands within the floodplain and watersheds.

Goals and Objectives

Public Information

Goal 7: Increase awareness among city residents on flood issues.

- Involve community residents in the implementation of this Flood Mitigation Plan and in protecting their own health, safety and property.
- Educate citizens on flood risks and practices to reduce the flooding potential in the City.
- Identify and participate in programs that help reduce the flood risk in the City.

Thank You!

APPENDIX 2

Mitigation Capability Questionnaire

FLOOD MITIGATION PLAN
City of Takoma Park, MD
Flood Mitigation Capabilities Assessment Questionnaire

1. Critical Facilities Information

- a. Have any critical facilities such as police and fire stations, hospitals, schools, etc. been damaged from past hazards? If so, please indicate the hazard event and describe the damage.

Critical Facility	Address	Hazard Event	Damage Description

- b. Do any critical facilities fall within flood hazard areas? If so, please indicate the type of facility and location.

Critical Facility	Location

2. Existing Plans and Ordinances

- a. Does the City have the following plans? If so, indicate the document, year adopted, and the agency/department that administers it.

Type of Plan	Name of Document	Year Adopted	Administered by
Comprehensive Plan			
Land Use Plan			
Zoning Ordinance			
Subdivision Ordinance			
Hazard Mitigation Plan			
Beachfront Management Plan			
Floodplain Development Ordinance			
Stormwater Management Plan			
Local Emergency Operations Plan			
Risk Assessment			
Capital Improvements Program			

- b. Do your plans and ordinances contain the following policies? If yes, please indicate the name of the plan or ordinance.

Policy	Yes/No	Plan/Ordinance
Is there a freeboard requirement? If yes, how many feet?		
Is there a policy preventing new development or substantial improvements to structures in floodplains?		
Is there a regulation prohibiting fill in the floodplain?		
Is there a regulation prohibiting enclosure of structural elements below BFE?		
Is there a regulation requiring fill and building foundations be designed to protect them from scour, erosion?		
Is there a requirement that critical facilities be protected from higher flood levels?		
Is there a policy encouraging cluster development near floodplains, wetlands?		
Is there a policy for prohibition against dumping or placing debris in stream channels?		
Is there a regulation requiring erosion and sedimentation control during construction projects to reduce siltation and loss of channel carrying capacity?		
Is there a requirement for new structures in the floodplain to submit 1 st floor elevations?		

3. Flood Mitigation Projects

- a. Has the City completed any flood mitigation projects in the past? If so, please indicate the type of project, location, and year of completion.

Flood Mitigation Projects	Yes/No	Location	Year Completed
Property Protection			
Buy outs			
Elevation of structures			
Floodproofing			
Berms/floodwalls			
Structural Projects			
Levees			
Drainage facilities			
Retention/detention basins			
Emergency Services			
Hazard warning (sirens, reverse 911)			
Hazard response (EOC activation, evacuation orders)			
Post disaster recovery (clearing streets, debris removal)			
Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)			
Natural Resource Projects			
Wetlands protection			
Erosion and sedimentation control			
Public Outreach			
Map information			
Library resources			
Outreach projects (newsletters, brochures)			
Environmental education programs			
Real estate disclosure			

4. Staff Capabilities and Building Data

- a. Please provide information on the City's staff capabilities and buildings in the floodplain with respect to the following:

Staff	Yes/No	Department
Floodplain Administrator		
Building Official/Inspector		
Site Plan Reviewer		
Surveyor		
GIS Specialist		
Total buildings in floodplain		
Total flood insurance policies		
Total repetitive loss structures		

5. Training

- a. Has your staff had any training in the following?

Training	Yes/No	Staff Position
GIS		
Floodplain management/NFIP regulations		
Community Rating System		
Building inspection		
Building code administration		
Building retrofits		

Please include your information: Name _____ Title _____
Phone number _____ Email address _____