Multi-Hazard Mitigation Plan

Prepared for

Village of Glenview

Prepared By

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CHAPTER 1 - INTRODUCTION

1.1 - NEED FOR PLAN

The Village of Glenview (Village), located in Cook County, Illinois, (Figure 1.1 – Location Map) has experienced a variety of flooding and drainage problems throughout its history. Recent storm events, in August 2007 and September 2008, greatly impacted homes, businesses and other properties in the Village. In September of 2008, the Village received over 9 inches of rain in less than 2 days resulting in severe flooding. The problems are not only from overbank flooding of the Des Plaines River and the North Branch of the Chicago River, but strained storm and sanitary sewer systems which result in flooding and basement backups in multiple areas of the Village.

Figure 1-1: Village of Glenview Location Map

In response to the August 2007 and September 2008 flooding events, the Glenview Board of Trustees created a Storm Water Task Force to provide a mechanism for community involvement in the preparation of a comprehensive Storm Water Master Plan for The Village. While flooding is a significant hazard of interest in The Village, the area is subject to the danger and damage caused by other hazards. Cook County has had 15 Presidential Disaster declarations in the last 41 years due to natural hazards (Table 1-1), including the severe storm and flooding experienced in the Village in both August 2007 and September 2008.

In the 2007 Illinois Natural Hazard Mitigation Plan (2007 State Plan), the State rated hazards by County based on occurrence, vulnerability, severity of impact and population. For Cook County, Severe Storms and Severe Winter Storms are rated as “Severe”; Floods, Extreme Heat, and

Tornado events are rated as "High"; and Drought and Earthquake events are rated as "Guarded" (2007 State Plan, Page III-16).

Table 1-1: Presidential disaster declarations in Cook County Illinois

(Source: http://www.fema.gov/news/disasters.fema)

Date	Number	Type
APRIL 1967	OEP 227-DR	TORNADO
SEPTEMBER 1972	OEP 351-DR	SEVERE STORM, FLOOD
APRIL 1973	OEP 373-DR	SEVERE STORM, FLOOD
JUNE 1976	FDAA 583-DR	SEVERE STORM, FLOOD
JANUARY 1979	FDAA 3068-EM	BLIZZARDS, SNOWSTORMS
JUNE 1981	FEMA 643-DR	SEVERE STORM, FLOOD, TORNADOES
OCTOBER 1986	FEMA 776-DR	SEVERE STORM, FLOOD
AUGUST 1987	FEMA 798-DR	SEVERE STORM, FLOOD
JULY 1993	FEMA 997-DR	FLOOD, SEVERE STORM
JULY 1996	FEMA 1129-DR	FLOOD
SEPTEMBER 1997	FEMA 1188	FLOOD
JANUARY 1999	FEMA 3134-EM	WINTER SNOW STORM
JANUARY 2001	FEMA 3161-EM	SEVERE WINTER STORM
SEPTEMBER 2007	FEMA-1729-DR	SEVERE STORM, FLOOD
OCTOBER 2008	FEMA-1800-DR	SEVERE STORM, FLOOD

The Disaster Mitigation Act of 2000 (42 USC 5165) established the requirement of a multi-hazard mitigation plan as a prerequisite for Federal Emergency Management Agency (FEMA) mitigation funds and went into effect on November 2004. Accordingly, the Village decided to prepare this Multi-Hazard Mitigation Plan (MHMP) to serve as the cornerstone of a long-term hazard mitigation strategy with the objective of reducing future disaster losses and to meet the eligibility requirements for FEMA hazard mitigation grant funding.

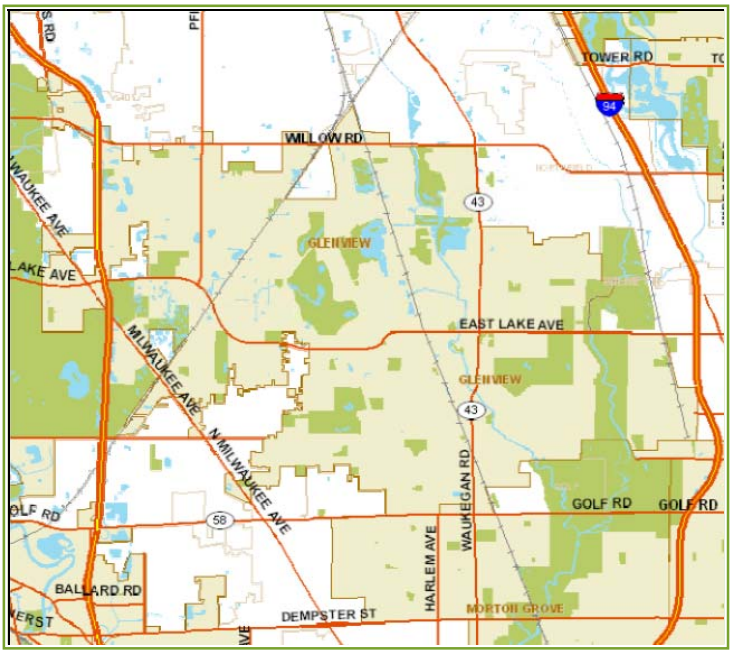
1.2 - VILLAGE PROFILE

The Village of Glenview, located in Cook County, Illinois, sits just west of Lake Michigan and is approximately 17 miles north of Chicago. The Village covers an area of 13.8 square-miles (Figure 1.1). The 2007 census estimated the population of the Village at 46,329. There are 17,913 households within the Village limits and the median family income is $120,500. (http://www.glenview.il.us/departments/development/planning/village_statistics.shtm)

The North Branch of the Chicago River (NBR) and the Des Plaines River are the main drainage outlets for the Village, with the majority of the Village draining to the NBR. The NBR consists of

three tributaries, two of which pass through the Village: the West Fork and Middle Fork. Of the 115 square mile NBR tributary area, approximately 60 square miles is located upstream of the Village. (Figure 1.2 – Vicinity Map)

Figure 1-2: Village of Glenview Vicinity Map



Cold winters, warm summers, and relatively large daily, monthly, and yearly variations in both temperatures and precipitation characterize the climate in the County. Average annual temperatures in northern Illinois ranges from 48°F, with highs ranging from 57°F north. Average winter highs range from the 30s, while average lows range from the teens. Average summer highs are in the 80s, while lows are in the 60s across the state. Both spring and fall have more moderate temperatures. Average spring highs range from 57°F, while average lows range from 36°F. Average fall highs range from 60°F, while average lows range from 40°F. Northern Illinois averages 10 days at or above 90°F. Days at or above 100°F are quite rare, occurring about every other year. Days at or below 0°F ranges from 16 days annually. The highest and lowest ranges temperatures ever reported in Illinois were 117°F in East St. Louis on July 14, 1954 and -36°F in Congerville on January 5, 1999. (2007 State Plan, Page I-3)

The average annual precipitation in northern Illinois is 32 inches. The average annual snowfall is 36 inches. Winter snowfall is heaviest in the Chicago area, enhanced by lake-effect snows from Lake Michigan. The greatest 24-hour rainfall was 16.94 inches at Aurora, just southwest of the Village, on July 17-18, 1996. The greatest one-year precipitation was 74.58 inches at New Burnside, southern Illinois, in 1950. The greatest 24-hour snowfall was 37.8 inches at Astoria, central Illinois, on February 27-28, 1900. The greatest winter snowfall was 105.1 inches at Antioch, just north of the Village, in 1978-1979. (2007 State Plan, Page I-4)

1.3 - MITIGATION PLANNING PROCESS

Hazard mitigation is any action that reduces the effects of future disasters. The primary purpose of hazard mitigation planning is to identify community policies, actions, and tools for implementation over the long term that will result in a reduction in risk and potential for future hazard losses within the Village. This MHMP was prepared within the framework of standard planning processes utilizing technical expertise, public and agency involvement, and comprehensive review and incorporation of existing plans.

Technical Expertise

Technical expertise was incorporated through the involvement of Village staff as well as representatives from other local agencies as well as state and federal agencies. The Village awarded two contracts to consulting engineering firms to study the Village's existing storm water systems and to develop a complete Village-wide understanding of flooding issues and possible solutions. The Village also awarded a contract for MHMP preparation to a consultant experienced in assisting communities with hazard mitigation planning and screening as well as mitigation grant funding. The mitigation measures reviewed and recommended are proven methodologies in reducing or eliminating damages.

Public and Agency Involvement

Coordinated public and agency involvement is key to developing a good MHMP. Many mitigation activities require the cooperation of residents to be effective. For this reason, public involvement was incorporated into the planning process through the Storm water Task Force (SWTF) as well as through general outreach projects. The SWTF was established to facilitate the development of a Storm Water Master Plan for the purpose of identifying and prioritizing flood problems and potential solutions. The purpose of the SWTF is to also provide a public forum where concerns can be voiced and engage the public in the planning process. Task force members are composed of Village staff and members of the public representing both residents and business owners in flood-prone and upland areas. Sixteen resident members, appointed by the Village President, Kerry Cummings, were named to work with staff and consultants and include:

- BILL ANDERSON
- GARY BOWYER
- PEGGY CHAMBERS
- MIKE GIANNINI
- MICHAELENE LEWAND
- BOB ROUNSFULL
- KATIE SIEGEL
- PETER STETTLER
- JUDY BECK
- SIMA BROWNE
- MARK DEMSKY
- SUSAN JOHNS
- ERIC MEANS
- PAUL RYAN
- TIM SPILLANE
- PHIL WEST

In October 2008 a Storm Water Community Workshop was held to discuss the impacts of the 2007 and 2008 storms. Following this Workshop, nine meetings of the SWTF have been held.

All SWTF meeting materials, as well as materials from the Workshop, can be located on the Village's website at:

http://www.glenview.il.us/departments/capital/swtaskforce/index.shtml

From this website, any interested party can become a virtual member of the SWTF by signing up for routine e-mail updates. In addition to SWTF members, meetings are open to the general public and generally have up to 30 members from the general public in attendance.

Given that severe storms and flooding were the high priority hazards at that time, the Village tasked the SWTF with:

- Defining existing and future flooding issues,
- Developing a flooding issue rating system, and
- Prioritizing flooding issues and improvement options.

Among its many accomplishments since January 2009, the SWTF has coordinated local neighborhood presentations for those impacted by the 2007 and 2008 storms; reviewed recently completed Storm Water Master Plans from other communities; published the *Property Owner's Guide to Flood Prevention* brochure; produced two video updates which were both televised on local TV and posted on the web; provided input and ideas to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) on their regional studies; provided numerous ancillary presentations on sanitary sewer back-ups, climate change, regional versus local flooding, etc.; developed a draft Sanitary Sewer Surcharge 2009-2015 Implementation Plan; identified contingency studies which are now underway; and determined tiers to classify properties vulnerable to flooding.

Given the success of the SWTF, the amount of public involvement and awareness, and the progress that has been made identifying and prioritizing severe storm and flood hazards (the two most prominent hazards in the Village), the Village decided this would be an ideal group to continue with the development of a MHMP.

Besides the regular meetings of the SWTF, public and agency involvement has been incorporated through a public workshop on sanitary sewer backups (February 24, 2009); a town hall meeting in storm water and environmental issues with MWRD staff (March 22, 2009);, distribution of the *Property Owner's Guide to Flood Prevention* brochure, development of a *Typical Question and Answer Fact Sheet* for public distribution (developed by SWTF); and providing a storm water open house to the public (August 22, 2009). Examples of documents prepared by the SWTF for distribution to public are provided in Appendix A – Public Involvement.

Comprehensive Review and Incorporation of Existing Plans

A comprehensive analysis of the potential loss of life, personal injury, economic injury, and property damage resulting from hazards was conducted by assessing the vulnerability of people, buildings, and infrastructure. As part of the process, the Village reviewed existing studies, reports, and other material to determine the Village's hazard vulnerability and mitigation measures that can be used to reduce the impact of these hazards. The following was reviewed and incorporated into the MHMP where appropriate:

- Village of Glenview Storm Water Master Plan;
- Village of Glenview Sanitary System Capital Improvement Program 2009-2015;
- 2007 Illinois Natural Hazards Mitigation Plan;
- 2007 Cook County Storm Water Management Plan;
- Village of Glenview Emergency Operations Plan;
- Storm Water Master Plans from Buffalo Grove and Downers Grove; and
- Natural Hazards Mitigation Plan, Calumet City, Illinois.

Six general strategies of hazard mitigation activities were explored and are discussed in Chapter 3 of this MHMP. The strategies include:

- Preventive (e.g., zoning, building codes and other development regulations);
- Property Protection (e.g., relocation, building retrofits);
- Natural Resources Protection (e.g., preserving wetlands, minimizing sedimentation);
- Emergency Services (e.g., warning, response, evacuation);
- Flood Control Projects (e.g., flood proofing, upgrade infrastructure, regional detention); and
- Public Information (e.g., outreach, technical assistance).

Drafts of this plan were made available to the SWTF for comprehensive review and discussion of mitigation strategies for each hazard and how applicable they are to the Village. After which, the SWTF drafted a "mitigation action plan" to specify recommended mitigation projects, an implementation schedule, and responsible parties. The mitigation action plan is provided in Chapter 3 of this MHMP. It should be noted that the mitigation measures presented in this MHMP are recommendations. Implementation of these recommended mitigation measures are dependent on adoption of this MHMP by the Village Board of Trustees and implementation by the responsible parties designated in the mitigation action plan. It is recommended that the SWTF monitor implementation and report on the progress to the Village Board and the public.

Agency Coordination

During the planning process coordination efforts were made with local, state and federal agencies to determine how various programs could impact or support the Villages hazard mitigation efforts. Copies of the draft MHMP executive summary were sent to representatives of these agencies with the web link to the full plan that could be downloaded and reviewed for comment. The following were included:

1) Federal agencies

- Federal Emergency Management Agency, Region V;

2) State agencies

- Illinois Department of Natural Resources, Office of Water Resources;
- Illinois Emergency Management Agency;
- Illinois Environmental Protection Agency;

3) Regional agencies

- Glenview Park District;
- Metropolitan Water Reclamation District of Greater Chicago; and
- Northeastern Illinois Planning Commission.

1.4 – THE COMMUNITY RATING SYSTEM

FEMA's National Flood Insurance Program (NFIP) administers the Community Rating System (CRS). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. This program can have a major influence on the design and implementation of flood mitigation activities, so a brief summary is provided here.

A community receives a CRS classification based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs. The CRS provides an incentive not just to start new mitigation programs, but also to keep them going.

There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction. 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. Information about the CRS can be found at http://www.fema.gov/business/nfip/crs.shtm.

The Village of Glenview has applied to become a CRS community, as many CRS-applicable credits are already being implemented. Additional CRS credits are outlined within this plan.

Benefits of CRS Participation

In addition to the direct financial reward for participating in the Community Rating System, there are many other reasons to participate in the CRS. Other benefits that are more difficult to measure in dollars include:

1) Activities credited by the CRS that provide direct benefits to residents:
   - Enhanced public safety;
   - A reduction in damage to property and public infrastructure;
   - Avoidance of economic disruption and losses;
   - Reduction of human suffering; and
   - Protection of the environment.

2) A community's flood programs are better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, are conducted on a sounder, more equitable basis.

3) A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.

4) Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.

5) The public information activities build a knowledgeable constituency interested in supporting and improving flood protection measures.

6) A community has an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood-related activity should be taken into account by the Village Board when considering such actions.

7) Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found at http://training.fema.gov/EMIWeb/CRS/.

CHAPTER 2 - RISK ASSESSMENT

In this Chapter the various natural hazards that the Village is subject to are identified and profiled. As mentioned above, the State of Illinois identified Severe Storms, Severe Winter Storms, Floods, Extreme Heat, Tornadoes, Drought, and Earthquakes as hazards that occur in Cook County. The SWTF also identified sewer backups and local drainage as hazards within the Village.

2.1 - SEVERE STORMS

Severe storms are not winter storms, they are severe thunderstorms that are most likely to occur in the spring and summer months during the afternoon and evening hours, however, they can occur year round and at all hours. All thunderstorms produce lightning and are dangerous. According to FEMA, on average 300 people are injured and 80 people are killed each year by lightning in the United States. Other associated dangers of thunderstorms include tornadoes, strong winds, hail, microbursts, and flash flooding. Flash flooding is responsible for more than 140 fatalities per year, which is more than any other thunderstorm hazard.

The effects of flooding and tornadoes caused by local storms are covered under separate chapters on flooding (Chapter 2.3), sewer backups (Chapter 2.8) and tornadoes (Chapter 2.5).

Thunderstorms occur when there is a collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains. They may occur singly, in clusters, or in lines and in the course of hours it is possible for multiple storms to affect one location for an extended time. (2007 State Plan, Page III-12)

Lightning, which occurs during all thunderstorms, can strike anywhere. Generated by the buildup of charged ions in a thundercloud, the discharge of a lightning bolt interacts with the best conducting object or surface on the ground. Lightning kills more people than tornadoes or hurricanes. Most lightning fatalities and injuries occur outdoors at recreation events and under or near trees. Illinois ranks high for lightning fatalities; over the past 40 years, lightning in Illinois has killed 96 people. As a result IEMA and NWS established the Lightning Safety Awareness Week as a public education project. (2007 State Plan, Page III-29)

High winds produced during thunderstorms include downbursts and microbursts. These are strong, concentrated, straight-line winds created by falling rain and sinking air that can reach speeds of 125 mph (200 km/h). A downward rush of cool descending air causes microbursts from a thunderstorm. The air rushing to the ground may look like a cloud. Once the air strikes the ground at a high speed, the air has to go somewhere, which is usually in all directions. The horizontal spreading of this air along the ground is termed straight-line winds. These winds may be 100-150 miles per hour, which are as strong as an EF1, EF2, or EF3 tornado.

Hailstones are ice crystals that form within a low-pressure front due to warm air rising rapidly into the upper atmosphere and the subsequent cooling of the air mass. The size of hailstones is a direct function of the severity and size of the storm. Significant damage does not result until the stones reach 1.5 inches in diameter, which occurs in less than half of all hailstorms.

Area Impacted

All counties in the State of Illinois are susceptible to severe storms; over 25% of the population in a county might experience a severe storm at any one time (2007 State Plan, Page III-12). Compared with other atmospheric hazards such as tropical cyclones and winter low-pressure systems, individual thunderstorms affect relatively small geographic areas. The average thunderstorm system is approximately 15 miles in diameter (75 square miles) and typically lasts less than 30 minutes at a single location. However, weather-monitoring reports indicate that coherent thunderstorm systems can travel intact for distances in excess of 600 miles.

Therefore, the entire Village, which is covered by this MHMP, is susceptible to severe storms.

Magnitude and Severity

Generally, thunderstorms and their accompanying hazards do not warrant a disaster declaration or a lot of documentation. The National Weather Service classifies a thunderstorm as "severe" if its winds reach or exceed 58 mph, it produces a tornado, or it drops surface hail at least 0.75 inch in diameter. Of about 100,000 thunderstorms that occur annually in the United States, approximately 10 percent are classified as severe.

Cook County has been rated as "severe" for severe storms in the 2007 State Plan.

Historical Events

Storms in July 1993 caused numerous flash flood events. Three to six inches fell over portions of Cook counties on July 18-19, 1993. Some 500 residents below an earthen dam were evacuated in McHenry County after officials expressed concerns the dam might break; fortunately the dam held.

Hail occurs frequently in Illinois averaging 74 times a year or 3,951 times since 1950. There have been no deaths, but 23 injuries. Hail 0.75 inches in diameter was recorded in Glenview on May 17, 2006, however there was no reported damage or injury (NCDC Storm Event Database). Wind speeds of 50 knots were reported on September 22, 2006 with no damages and wind speeds of 60 knots were reported on August 23, 2007 with one injury and $50,000 in reported property damages (NCDC Storm Event Database). April 23, 1961, several six-inch hailstones were reported in Kankakee, IL. (2007 State Plan, Page III-29)

Frequency

Of about 100,000 thunderstorms that occur annually in the United States, approximately 10 percent are classified as severe. Illinois experiences 40 to 60 thunderstorm days per year (http://www.srh.noaa.gov/key/HTML/tstmhazards.htm) and thunderstorm events in the Cook County area occur on average 60 to 70 times per year (Calumet City Hazard Mitigation Plan). As stated above, over 25% of the population in a county might experience a severe storm at any one time, therefore, the Village is susceptible at any time during the storm season.

According to the Illinois State Climatologist's website, the average number of hail days in the Chicago area is 2.1 per year. Of the 3,951 times hail has occurred in Illinois since 1950, storms with hailstones greater than 2 inches occurred 327 times, or just under 1% of the storms had hail large enough to cause damage. (2007 State Plan, Page III-29)

Between 1993 and 2008, 6 fatalities and 22 injuries due to lightning have been reported in Cook County (NCDC Storm Event Database). Illinois experiences nearly 650,000 lightning strikes each year (2007 State Plan, Page III-29).

Vulnerability

Safety: The threat to life varies by the cause of death. Between 1995 and 2000, the National Weather Service reported that 20 people in Illinois were killed by flash floods, wind and lightning brought by thunderstorms (6 in Cook County). Hail rarely causes loss of life. (Calumet City Hazard Mitigation Plan, Page 2-31)

The number of deaths and injuries reported in Cook County are summarized in

Table 2-1. The leading cause of death and injury in the County from thunderstorms is by lighting and high wind. Most of these deaths can be prevented through safe practices.

TABLE 2-1: Deaths and injuries due to thunderstorms reported in Cook County since 1993.

	Lightning		Wind		Flash Flood	
Year	Death	Injury	Death	Injury	Death	Injury
1993	1	5	0	0	nr	nr
1994	1	1	0	0	nr	nr
1995	1	2	2	0	0	0
1996	2	3	0	0	0	0
1997	0	1	0	0	0	0
1998	0	0	0	6	0	0
1999	0	2	0	0	0	0
2000	0	1	1	0	0	0
2001	1	1	1	9	0	0
2002	0	1	4	4	0	0

	Lightning		Wind		Flash Flood	
Year	Death	Injury	Death	Injury	Death	Injury
2003	0	1	0	2	0	0
2004	0	0	0	0	0	0
2005	0	1	0	3	0	0
2006	0	2	0	13	0	0
2007	0	1	1	3	0	0
2008	0	0	0	7	1	0
Totals	6	22	9	47	1	0

Source: NCDC (nr = no record)

Much information has come out over the last 20 years about lightning safety. Before 1990, an average of 89 people were killed by lightning each year. By 2000, this number had dropped to 52. (Calumet City Hazard Mitigation Plan, Page 2-31)

Lighting kills more people than tornadoes or hurricanes. Most lightning fatalities and injuries occur outdoors at recreation events and under or near trees. Nationwide it is estimated that 25 million cloud-to-ground lightning flashes occur each year, 1,000 people are injured and 80 are killed (Illinois Hazard Mitigation Plan, page III-29).

In the almost 40- year period from 1970 to 2008, death tolls and injuries from severe winds exceeded tornado deaths. In this period there was only one year for which the death tolls from tornadoes exceeded that of severe winds and only four years for which the number of reported injuries exceeded from tornadoes exceeded that of severe winds. (NCDC Storm Event Database).

Hail occurs frequently in Illinois averaging 74 times a year and 3,951 times since 1950. There have been no deaths, but 23 injuries (Illinois Hazard Mitigation Plan, page III-29). None of the reported injuries occurred in Cook County.

Overall Safety Hazard: Moderate

Health Hazard: No special health problems are attributable to thunderstorms, other than the potential for tetanus and other diseases that arise from injuries and damaged property.

When lightning strikes a human being, serious burns or death are the common outcomes. For those who survive, their injuries can lead to permanent disabilities. 70% of the survivors suffer serious, long-term effects, such as memory loss, sleep disorders, depression, and fatigue.

Overall health hazard: Low

Economic: Thunderstorms can impact transportation and utilities. Airplanes have crashed when hit by downbursts or lightning. Power lines can be knocked out by lightning or knocked down by wind and debris. Lightning can also cause power surges that damage appliances, electronic equipment and computers. However, many buildings have lightning rods and back up power systems that can recover quickly and the overall economic impact is low.

Flash floods cause localized flooding problems that could impact transportation and business.

Overall economic impact: Low to Moderate

Potential Losses

Thunderstorm winds cause more damage year-to-year than tornadoes. In 1993, thirty-eight (38) thunderstorm events caused an estimated $5.0 million in damage (minimum estimate), while 34 tornadoes caused just over $1.5 million in damage (maximum estimate). The damages caused by high winds have been relatively consistent from year-to-year in the State. (2007 State Plan, Page III-28)

There is a potential for severe storms with high winds and hailstones greater than 0.75 inches, those of which cause the most damage, to occur in Glenview at any time during the storm season. Wind and water damage can result from flying debris and large hailstones breaking windows in buildings and vehicles. Lightning can cause direct damage to structures (especially those without lightning protection systems) and can cause fires that damage trees and structures.

Straight-line winds can damage roofs, push autos off the road and possibly damage/destroy attached garages. Straight-line winds are the leading cause of wind related damage. Although they do not receive as much recognition as tornado events, high winds cause more damage year-to-year than tornadoes. (Calumet City Hazard Mitigation Plan, Page 2-30).

Hail does extensive damage: property damage over $73 million in the last 53 years (2007 State Plan, Page III-29). One study of insured losses from hail found that 75% of the dollar damage resulting from hail storms was in damage to a structure's roofing, 12% to awnings, 6% to exterior paint, 4% to glass and 3% to siding (Hail Loss Potential in the US, Page 2).

During the period 1994 – 2000, the insurance industry paid out $17.5 billion in claims, or an average of $2.5 billion per year. Sixty-six percent of the losses were to personal buildings, 15% to commercial buildings, and 19% to vehicles (IBHS website). Of the nation's "Top Ten" hailstorms between 1994 and 2000, number 4 was the May 18, 2000, storm in the Chicago suburbs. A total of $572 million was paid in property claims. (Calumet City Hazard Mitigation Plan, Page 2-30)

In the Village, since 1955, only one event has reported damages. Wind speeds of 60 knots, reported on August 23, 2007, resulted in one injury with $50,000 reported in property damages

(NCDC Storm Event Database). Since severe storms can occur at any time, over any part of the Village, all property in the Village is vulnerable.

2.2 - SEVERE WINTER STORMS

According to the Illinois Emergency Management Agency, extreme winter weather is responsible for deaths of hundreds of people in the United States each year, primarily due to vehicle crashes, fires from improper use of heaters, overexertion, and exposure (**http://ready.illinois.gov/during/winterstorms.htm**).

A severe winter storm is defined as

- A snowstorm that produces six inches of snow within 48 hours or less,
- An ice storm which 10% of the cooperative National Weather Service stations in Illinois report glaze, and/or
- A snowstorm or ice storm in which deaths, injuries, or property damage occurs.

Severe winters are characterized by either extremely cold periods for one to two months in duration, or by severe ice storms or heavy snowfalls occurring repeatedly over a period of six to twelve weeks. The Glenview area is subject to lake effect snowstorms that develop from the passage of cold air over the relatively warm surface of Lake Michigan, which can cause heavy snowfall and blizzard conditions.

Winter storms can occur as heavy snowfalls, ice storms or extreme cold temperatures. Winter storms can occur as a single event or they can occur in combination, which can make an event more severe. For example, a moderate snowfall could create severe conditions if freezing rain and subsequent extremely cold temperatures followed it. The aftermath of a winter storm can impact a community or region for weeks, and even months.

Snow: Heavy snowfalls can range from large accumulations of snow over many hours to blizzard conditions with blowing snow that could last several days. The National Weather Service's snow classification is summarized in Table 2-2. In addition to the problems caused by a snowstorm are the subsequent melting and possible flooding.

TABLE 2-2: Summary of snow classifications by the National Weather Service.

Snow Classifications	
Blizzard	Winds of 35 miles per hour or more with snow and blowing snow, reducing visibility to less that ¼ mile for at least 3 hours.
Blowing Snow	Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.

Snow Classifications	
Snow Squalls	Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
Snow Showers	Snow falling at varying intensities for brief periods of time. Some accumulation possible.
Snow Flurries	Light snow falling for short duration with little or no accumulation.
Source: National Weather Service	

Ice Storms: An ice storm occurs when freezing rain falls from clouds and freezes immediately upon impact. Freezing rain is found in between sleet and rain. It occurs when the precipitation falls into a large layer of warm air and then does not have time to refreeze in a cold layer (near or below 32°F) before it comes in contact with the surface which is also near or below 32°F.

Area Impacted

Given the tendency for low temperatures, ice, and snow throughout the area, the entire Village, which is covered by this MHMP, is susceptible to severe winter storms.

Magnitude and Severity

Cook County has been rated as “severe” for severe winter storms in the 2007 State Plan.

Historical Events

One of the worst winter storms to impact the State was on January 26-27, 1967, when as much as 23 inches of snow fell on the Chicago area. Travel throughout northern Illinois was curtailed and areas to the south experienced a glaze of ice, which made travel virtually impossible until January 29. Fifty deaths were directly attributed to this storm.

In 1979, a Federal snow emergency was declared when the northern third of the State received 6 inches or more of snowfall between January 12 and 14. The heaviest snowfall, up to 20 inches, was recorded in the northeast quarter of the State, where traffic was paralyzed and transportation corridors closed.

The 1999 New Year’s Day storm resulted in record snowfall across the northern half of the State. High winds and frigid temperatures caused blizzard conditions behind the snowfall which left 21.6 inches in Chicago, second only to the 1967 January storm.

From December 10 through December 31, 2000, the cumulative effects of severe winter storms caused extensive road closures, school closings and hazardous road conditions and severely

taxed snow removal resources. During this time period, the Chicago area received a record 41.3 inches of snow.

Cook County received Presidential disaster or emergency declarations for the winter storms of 1979, 1999 and 2001.

Frequency

During the 20th century, there were at least two severe winter storms in Illinois each year. Due to the geographic latitude, and its proximity to the Great Lakes, most of these would hit the Village of Glenview. The probability of a severe winter storm may be slightly higher for the northern half of the State (occurring more severely and more often), but all of Illinois has a high probability of a severe winter storm. While it is impossible to predict with any accuracy the probability of a severe winter storm, it is a near certainty that each winter will produce at least one or two severe winter storms.

Vulnerability

Safety: Winter storms bring hazardous driving and walking conditions and heart attacks due to exertion caused by shoveling snow. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces. About 70% of the injuries caused by snow and ice storms result from vehicle accidents and 25% occur to people caught out in the storm.

As seen in the Table 2-3, 71 people have been killed by snow, ice or extreme cold in Cook County over the last ten years. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems.

Overall safety hazard: Moderate

TABLE 2-3: Deaths and injuries due to winter storms reported in Cook County since 1994.

	Snow-Ice		Extreme Cold	
Year	**Death**	**Injury**	**Death**	**Injury**
1994	0	0	nr	nr
1995	0	0	nr	nr
1996	0	0	3	0
1997	5	0	6	0
1998	0	0	0	0
1999	1	0	1	0
2000	0	0	0	0

	Snow-Ice		Extreme Cold	
Year	**Death**	**Injury**	**Death**	**Injury**
2001	0	0	0	0
2002	0	0	0	0
2003	0	0	4	0
2004	0	0	13	0
2005	0	0	8	0
2006	0	0	8	5
2007	0	0	13	0
2008	0	0	23	0
Totals	6	0	79	5

Source: NCDC (nr = no record)

Health Hazard: Winter storms bring extreme cold, due to low temperatures and loss of heat during power outages. The effect of cold on people is usually made more severe by the impact of wind chill factors. Wind chill is reported as a temperature, it is a measure of how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.

Extreme cold can result in frostbite and hypothermia in both people and animals. Frostbite is damage to tissue caused by the effects of ice crystals in frozen tissue. Extremities (hands, feet, ears, nose) with more circulation difficulties are most frequently affected.

Hypothermia is the lowering of the core body temperature. It is “clinically significant” when the body temperature is below 95°F. Severe hypothermia occurs when the body’s temperature drops below 85°F, resulting in unconsciousness and possibly death. Great care is needed to properly re-warm even mild cases of hypothermia.

Overall health hazard: Moderate

Economic: The major impacts of snow and ice storms on property are to utilities and roads. Power lines and tree limbs can be coated with heavy ice resulting in disrupted power and telephone service. Loss of power can cause businesses and stores to close until power is restored. Loss of access due to snow or ice covered roads has a similar effect.

Since the Village is in a Northern climate, most people and businesses are prepared for the average winter storm. However, there is still a hefty public cost for snow removal, which was enough to trigger Presidential emergency declarations for Cook County for the snowstorms of 1999 and 2001

Overall economic impact: Low

Potential Losses

Historically, roofs have collapsed due to heavy snow loads, but most buildings in the Village have been constructed with low temperatures, snow loads and ice storms in mind (e.g., good insulation and strong roofs). Winter storms do not have a major impact on buildings. Since severe winter storms can occur at any time, over any part of the Village, all property in the Village is vulnerable.

2.3- FLOODS

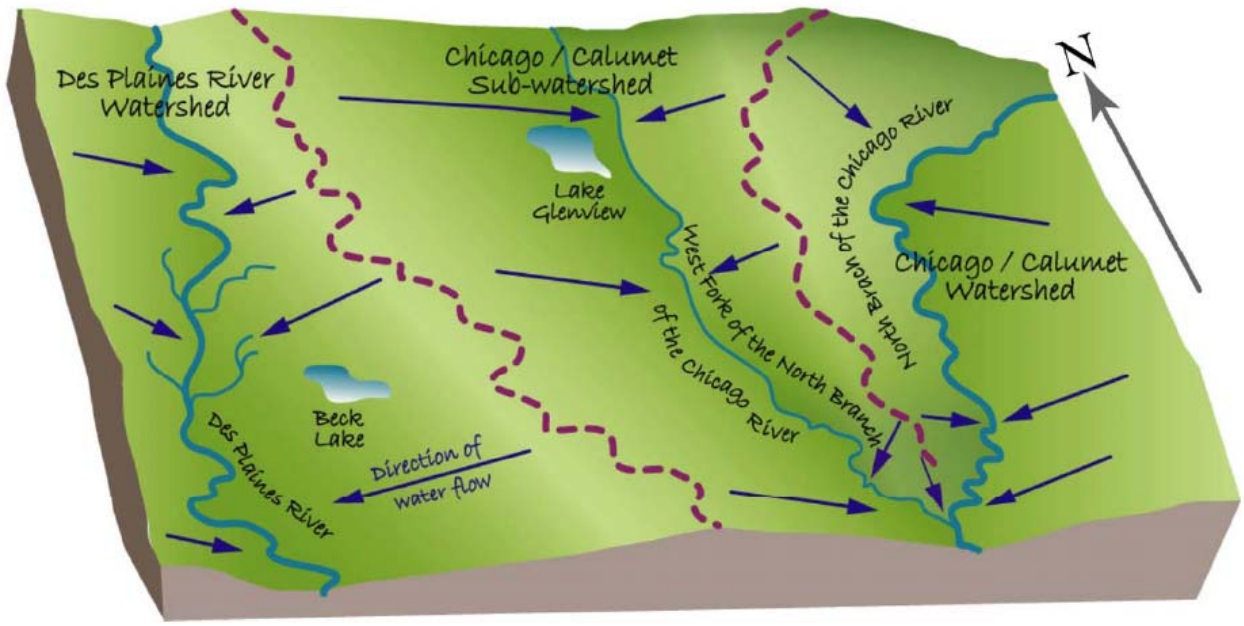
In urbanized areas, floods create damage when they inundate developed areas by damaging buildings and infrastructure, threatening health and safety, and disrupting business and traffic. Flooding can be caused by different sources and happen any time of the year through overbank flooding, localized drainage-related flooding, and sewer overflow and backups. Overbank flooding occurs when flows exceed stream capacity and spill into the floodplain. Flash flooding can also occur where impervious surfaces and storm sewers speed runoff to streams. Localized drainage-related flooding is not related to overbank flooding but to flooding from heavy localized rains and local systems that are under capacity and areas where flood routes are not well defined or become blocked. Localized flooding is common due to the flat topography in the area. Sewer system backups can occur when excess rainwater enters the system through inflow and infiltration (discussed under separate section).

History supports the assumption that all counties in Illinois are susceptible to some type of flooding. It is estimated that flooding at any one time would impact 10% of the county. Flood damage is often exacerbated by snowmelt and spring rains, which create excessive storm water run-off. The paving over of permeable soils and the fact that most storm water drainage systems are only designed for 10-year storm events increase both rural and urban run-off problems. As with all natural disasters, it is the presence of humans, which creates the problem. In the specific case of floods, the floodplain is a clear visual symbol, which tells us that, by nature, a river periodically overflows its banks and that we should expect it. Development of the floodplain without any heed to the flood threat is irrational and costly in both economic and ecological terms. (2007 State Plan)

There are three regional watersheds within the Village, the Des Plaines River and the forks of the North Branch of the Chicago River (FIGURE 2-1). The North Branch Chicago River watershed area is approximately 180 square miles. The river originates north of Cook County and flows south through the northeastern chapter of the County. The watershed area within the County is 160 square miles, which includes over 50 miles of rivers and creeks. The Average annual flood damages for the entire watershed were estimated to be $2,995,000. The Des

Plaines River originates in Wisconsin and flows south through the County. The total Des Plaines River watershed area is 681 square miles. The Lower Des Plaines watershed, approximately 330 square miles with 250 miles of rivers and creeks, is nearly fully urbanized through the County. The average annual residential and business flood damages have been estimated to be $21,400,000 for the entire Des Plains River watershed. (2007 Cook County Storm water Management Plan)

FIGURE 2-1: Village of Glenview Watersheds



Area Impacted

Reported flooding problems in the Village include sanitary sewer backups (discussed under separate chapter), basement flooding, street flooding, and overbank flooding.

Flooding is occurring due to inadequate storm sewer capacity, limited inlet and outlet capacities, depressed local topography and poorly defined overland flow paths, low areas without positive overland outlet, and location in floodway/floodplain.

Developments built in corporate Glenview before the early 1970s have adequate storm sewer conveyance but minimal storm water detention. Developments built in unincorporated areas but were later annexed to the Village have limited storm sewer conveyance and minimal detention (e.g. Glen Oak Acres). Developments in corporate Glenview after the early 1970s have adequate storm water conveyance and required storm water detention (e.g. Indian Ridge). (Storm Water Management Workshop, October 21, 2008)

Flood Hazard Maps

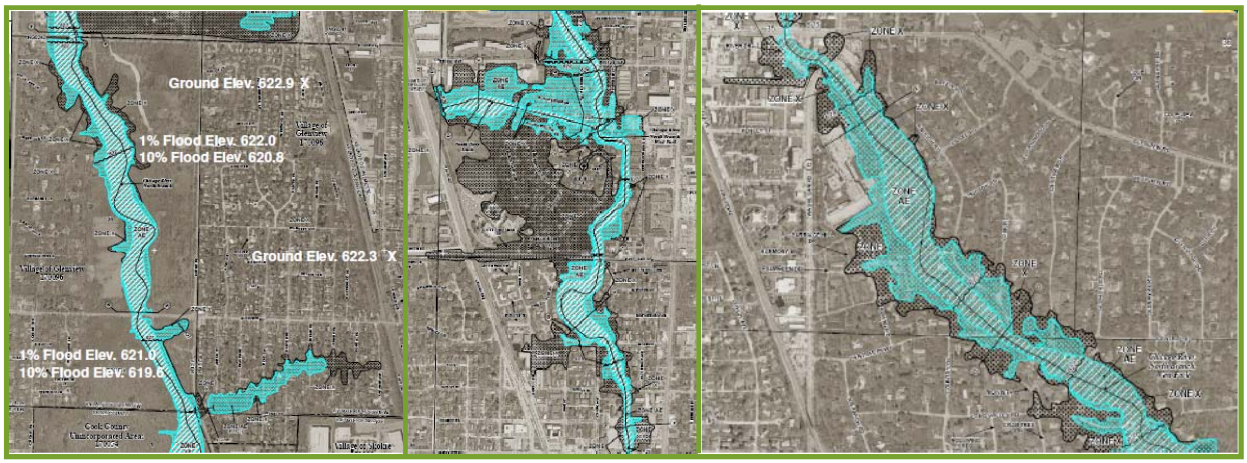
The Village is subject to overbank flooding from the Des Plaines River, the North Branch of the Chicago River, the North Navy Ditch, and the South Navy Ditch. Figure 2-1 illustrates the extent of the floodplains from the two flooding sources as mapped by FEMA. Of the mapped area within the Village, approximately 400 acres lie within the 100-year floodplain (AE Zone) and 200 acres are within the 500-year floodplain, and 8,000 acres are in Zone X.

A recent study of flooding in the Village indicated areas that are most affected by flooding include:

Middle Fork North Branch Chicago River: Approximately 25 homes are in the mapped floodplain, however, most of the areas north of Wilmette Avenue and west of the railroad are within 1 foot of 1% annual chance flood elevation. (FIGURE 2-2) (MWH SWTF Flooding Assessment Presentation dated June 24, 2009)

West Fork North Branch Chicago River: Impacted areas located north of Glenview Road include Riverside Court, Tall Trees (more than 50 homes in floodplain and 50 more are within about 1 foot of the 1% annual chance flood level), Pine Street, and Church Street. Impacted areas south of Glenview Road include Circles/Glen Ayre Park (20 homes in floodplain and 50 more within about 1 foot of the 1% annual chance flood level), Palmgren Drive, Central Parkway, and Long Valley Road. (FIGURE 2-1) (MWH SWTF Flooding Assessment Presentation dated June 24, 2009)

FIGURE 2-2: Flood Hazard Map for Middle Fork North Branch Chicago River (left), West Fork of the North Branch of the Chicago River (middle), West Fork North Branch of Chicago River (right)



Local Flood Studies

A Village-wide assessment was conducted to identify areas where drainage deficiencies contribute to street and property flooding, assess and rank problem areas based on extent and severity of flooding, and provide a basis for estimating overall costs needed for drainage

improvements. The results of the assessment identified 116 problem areas affected by overbank flooding, surface flooding and sewer backups. (July 8, 2009 MWH SWTF Presentation, September 9, 2009 MWH SWTF Presentation)

From this analysis, village-wide flooding issues are grouped into Tiers and are as follows:

Tier #1 – Sanitary Sewer and Basement Flooding (Discussed under separate section)

Tier #2 – Property Damage Flooding of Structures (over foundation)

13 identified problem areas, more than 600 affected properties (FIGURE 2-2)

Tier #3 – Surface Flooding that Impacts Vehicle Access

27 identified problem areas, more than 600 affected properties (FIGURE 2-3)

Tier #4 – Other Localized Flooding

36 identified problem areas, more than 1000 affected properties (FIGURE 2-4)

FIGURE 2-2: Tier #2 flooding areas.

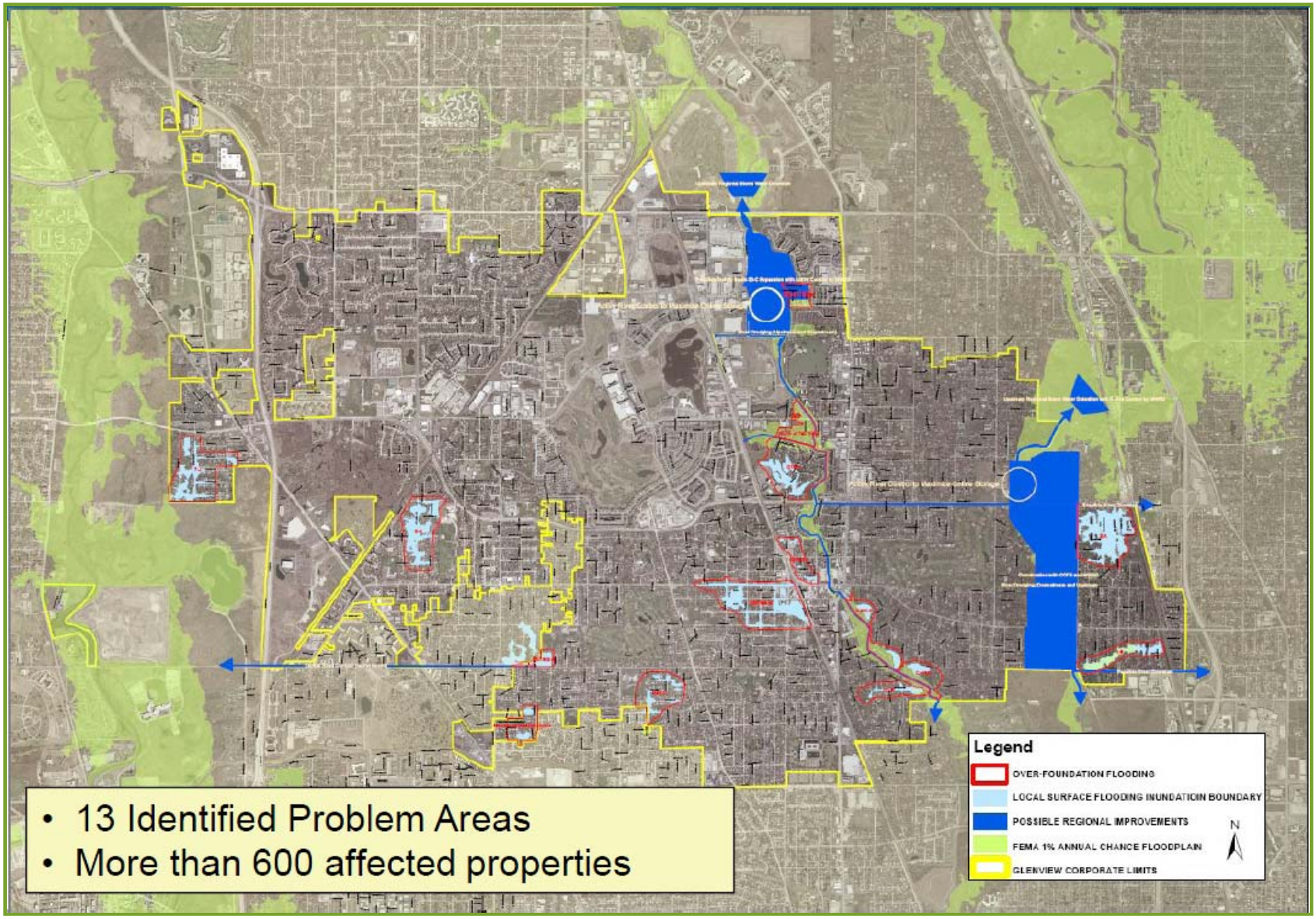


FIGURE 2-3:Tier#3 flooding areas

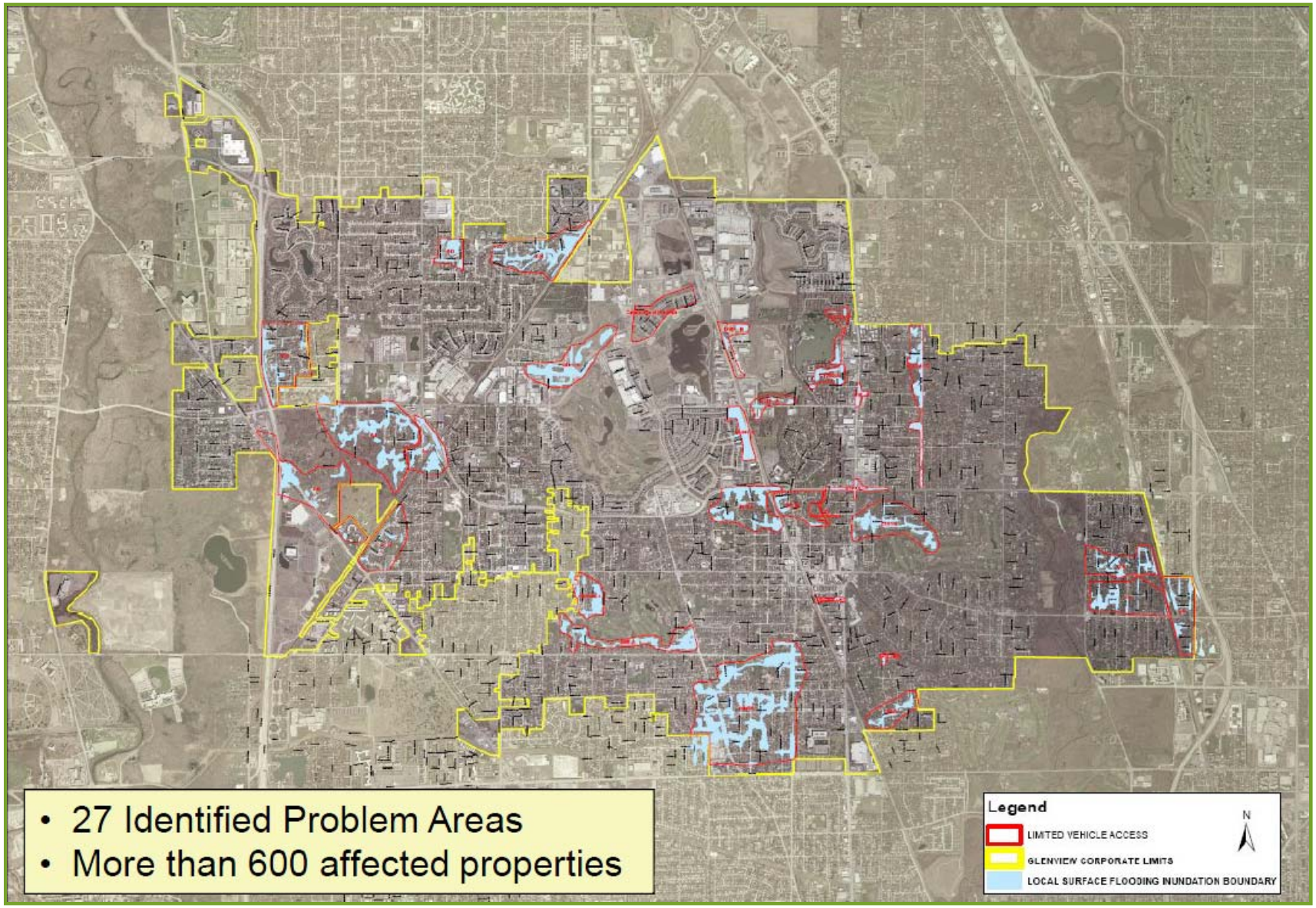
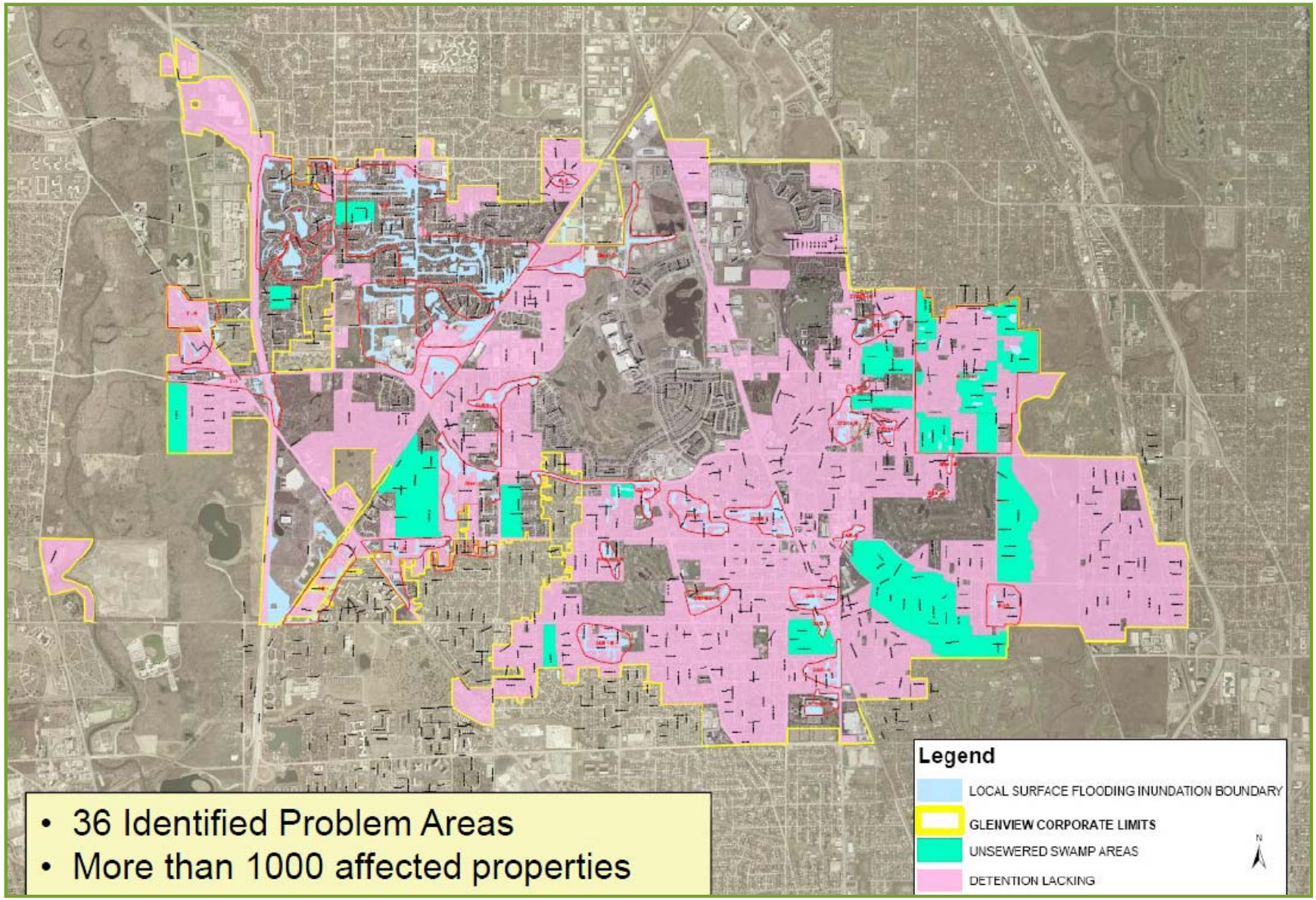


FIGURE 2-4: Tier #4 flooding areas.



Magnitude and Severity

Cook County is ranked as "high" for floods in the 2007 State Plan.

Events that can lead to flooding include major precipitation events (> 4 inches) that coincide with high river flows. Two events that were declared natural disasters in Cook County had (August 1987 and September 2008) had both major precipitation (9.94 inches and 7.23 inches, respectively) and coincided with streamflow greater than 2,000 cfs.

Surface flooding problem areas in the Village were assessed and ranked based on extent and severity of flooding (FIGURE 2-5). Priority areas, along with floodplain areas, are mapped in FIGURE 2-7). The Village-wide assessment identified 116 problem areas, 21% of which scored high risk factors and 27% scored moderate. Forty-one areas were identified as sensitive to very high (1% annual chance) river levels. Fourteen problem areas are also affected by significant backup from sanitary sewers (discussed under separate section). Priority flooding locations with high and limited river sensitivity are summarized in Table 2-4.

TABLE 2-4: Priority flooding locations with high and limited river sensitivity.

High River Sensitivity	Limited River Sensitivity
East of Harms – North (Heatherfield and Ferndale)	Pfingsten and Lindenwood
East of Harms – South (Hunter Road)	Colfax and Montgomery
Tall Trees	Dewes and Lincoln
East of Harms – East (Long Road)	Pfingsten and Keenan
East of Harms – Central (Echo Lane)	Avenue D and Shermer Road
The Circles	East Lake west of Shermer (Park and Gladish)
	Bonnie Glen
	Central east of Greenwood
	Swainwood/Buttonwood

FIGURE 2-5: Flooding severity-rating factors.

(Source – MWH Presentation to SWTF dated June 24, 2009)

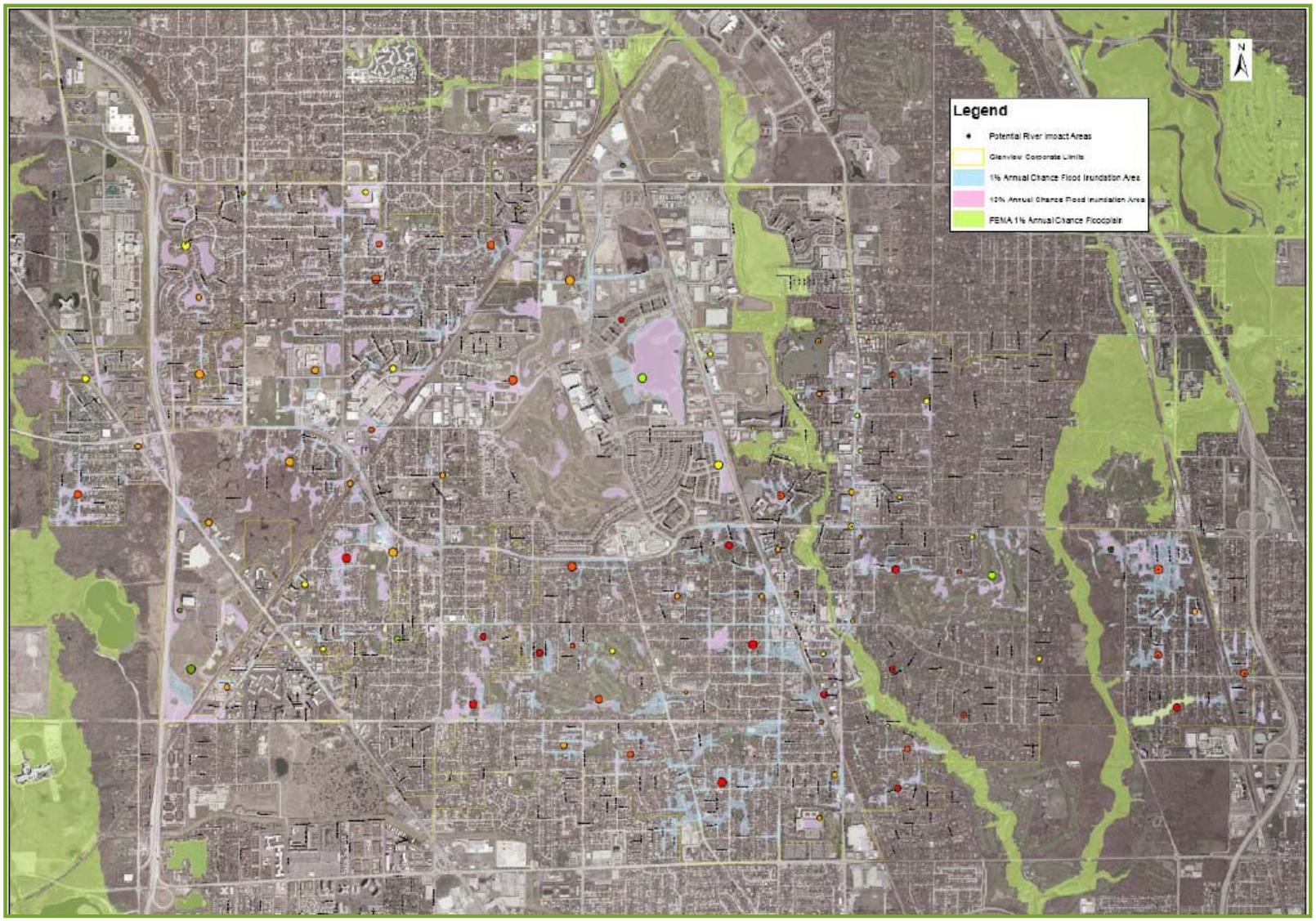
Severity Factor	
Factor	**Criteria Description**
	No Impact
	Nuisance Flooding Category 1: Minor street flooding in public right-of-way, or minor flooding on private property with no resulting damages. Streets still accessible by car.
	Nuisance Flooding Category 2: Moderate street flooding with minor flooding on private property. Emergency vehicle access is not impaired. No property damage flooding.
	Nuisance Flooding Category 3: Major street flooding with impaired emergency vehicle access. Moderate property flooding with no property damage.
	Property Damage Flooding Category 1: Minor property damage caused by significant localized flooding. Does not include damages from sanitary backups or riverine flooding.
	Property Damage Flooding Category 2: Moderate property damage caused by significant flooding less than 1-foot adjacent structures. Does not include damages from sanitary backups or riverine flooding.
	Property Damage Flooding Category 3: Significant property damage caused by significant flooding greater than 1-foot adjacent to structures. Does not include damages from sanitary backups or riverine flooding.

FIGURE 2-6: Flooding extent-rating factor

(Source – MWH Presentation to SWTF dated April 22,2009)

Extent Factor	
Factor	**Criteria Description**
0	No affect on streets, homes, businesses
3	Affects less than 1-2 blocks of roadway or major intersections, less than 11 homes/businesses, or 1 significant non-residential property
	Affects 2-5 blocks or roadway or major intersections
6	Affects 11-20 homes/businesses, or 2-3 significant non-residential properties
	Affects 5-10 blocks of roadway or major intersections
10	Affects 20 or more homes/businesses, or more than 3 signification non-residential properties
	Affects 10 or more blocks of roadway or major intersections

FIGURE 2-7: Prioritized flooding areas within the Village (Source – MWH presentation to SWTF dated July 8, 2009)



Historical Events

Large magnitude floods occurred on the West Fork of the North Branch Chicago River in 1938, 1954, 1957, 1960, 1967, 1982, 1987, 1994 and 2001. Flood damages in the North Branch Chicago River watershed have been most severe in the West Fork because of relatively greater levels of floodplain development, such as that which has occurred along the 2.6 mile West Fork stream reach in the Village. Historical flood data is summarized in TABLE 2-5 (2008 Cook County FIS).

TABLE 2-5: Historical Flood Data for West Fork of North Branch Chicago River at Northbrook, IL.

West Fork of North Branch Chicago River at Northbrook, Illinois USGS Gage Number 15535500 Source: 2008 Cook County FIS		
Date	**Peak Streamflow (cfs)**	**River Stage (ft)**
August 14, 1987*	1,190	10.10
July 22, 1982	1,070	9.66
July 13, 1957	930	9.65
October 13, 2001	848	8.77
June 24, 1994	767	8.38
*Declared Federal Disaster		

The West Fork of the North Branch Chicago River flooded the Village of Northbrook on July 22, 1982, when a 12-hour rainfall of 7 inches was reported. This flood was the most extreme event recorded at the gage since the 1950's.

The most severe flooding event on record on the North Branch Chicago River occurred in Glenview on August 13-14, 1987, when 8 inches of rain fell in a sixteen-hour period over the southern portions of the watershed. This event exceeded the 24-hour 1% chance storm event. Peak discharges approximated the 1% annual chance recurrence interval. Downstream peak discharges probably exceeded the 1% annual chance recurrence interval since precipitation depths generally increased from north to south for the event.

During the September 2008 event six inches of rain fell in four hours (beyond a 100-year or one-percent annual chance storm) with 9.5 inches of precipitation from September 12 through the 14th. During this storm all local and regional storm water facilities exceeded capacity. The forks of the North Branch of the Chicago River rose to the 100-year level

and remained at that level for approximately 36 hours, affecting about 200 structures and there were 10 arterial and numerous road closures. Approximately 127 homes had recorded basement flooding through over foundation flooding, sewer backups in older gravity sanitary sewer systems, over-whelmed sump pumps, and seepage. The August 2007 storm was around a 10-year storm, but high winds caused downed trees and mass power outages of up to 4 days. (Storm Water Management Workshop, October 21, 2008)

Frequency

Floodwater damage in the North Branch Chicago River watershed and can be attributed to a number of factors, the most notable of which is urbanization of upland areas, which has increased the rate and volume of storm runoff. Another factor is floodplain filling (encroachment). Floodplain development reduces natural floodplain storage, and it often obstructs conveyance of flood flows. Although continued floodplain development and encroachment is restricted by the Village Flood Control ordinance, impacts from past development have resulted in increased frequency of flooding and higher flood stages.

Past floods are indications of what can happen in the future, but flood studies and mitigation plans are based on the risk of future flooding. Flood studies extrapolate from historical records to determine that the statistical potential that storms and floods of certain magnitude will recur. FEMA uses the “base” flood as the basis for its regulatory requirements and flood insurance rate setting. The base flood is the one percent chance flood, i.e., the flood that has one percent (one out of 100) chance of occurring in any given year. The one percent chance flood has also been called the 100-year flood. Minor drainages are typically designed to pass a 10-year event, or a ten percent chance event.

Vulnerability

Safety: There are many non-economic costs associated with flooding. The most important is the potential for loss of life. While the relatively slow rising and slow moving floodwaters are not generally considered life threatening, in the 1981 and 1982 floods, two young people died in neighboring suburbs trying to cross flooded areas, one on a bicycle and one in a small boat. People are at risk of electrocution when they reenter a flooded house or basement without turning the power off.

Overall safety hazard: Moderate.

Health Hazard: Three general types of health problems accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the storm water runoff picked up, including dirt, oil, and farm and industrial chemicals. The second type of health problem comes after the water is gone. Stagnant pools become breeding grounds for mosquitoes, and wet areas of a building that have not been cleaned breed mold and mildew. A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced-air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

The third problem is the long-term psychological impact of having been through a flood, seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flooded home puts a severe strain on people, especially the unprepared and uninsured.

There is also a long-term problem for those who know that their homes can be flooded again. The resulting strain on floodplain residents takes its toll in the form of aggravated health and mental health problems. Children are particularly susceptible to this post-traumatic stress.

Overall health hazard: Moderate.

Economic: In urbanized areas, floods can impact a community by damaging buildings and infrastructure, threatening health and safety, and disrupting business and traffic. Furthermore, repetitively flooded areas tend to deteriorate over time and property values go down.

Overall economic impact of a 100-year flood: high.

Potential Losses

Flooding is a major, recurring problem in the State. As stated above, millions of dollars in damages have been experienced over the years due to flooding in the North Branch Chicago River and the Des Plain River Watersheds.

There are currently 203 active NFIP policies in the Village. In total, these policies insure $51,037,100 in structures and personal belongings (an average of $251,414 insured per policy). The average NFIP policy in the Village costs the policyholders $840.34 per year.

According to the FEMA flood statistics website, between January 1, 1978 and July 31, 2009, there have been 207 NFIP claims within the Village. Out of the 154 claims that had been paid as of this date, total payments totaled $3,906,662. This breaks down to an average of $25,367 per claim and a total average of $130,222 per year. Fifty-three claims were closed without payment.

2.4 - EXTREME HEAT

Extreme heat for a region occurs when temperatures hover 10 degrees or more above the average high temperature for several days to several weeks. The definitions vary by region, however, a heat wave is usually defined as a period of at least three consecutive days above 90 degrees.

Heat kills by elevating the normal body's temperature above its limits for a prolonged period of time. Normally the body's internal thermostat produces perspiration that

evaporates to cool and regulate the body's temperature to 98.6 degrees. Sweating does nothing to cool the body unless the sweat is removed by evaporation. High humidity retards this process. Because the body has been robbed of its ability to cool itself, the body must work much harder to maintain a normal temperature in extreme heat and high humidity. Sunburn will slow the skin's ability to release excess heat.

Stagnant atmospheric (humid and muggy) conditions and poor air quality can induce heat-related illnesses. In addition to air quality, concrete and asphalt store heat longer and gradually release the heat at night, which produces higher nighttime temperatures. Therefore, people living in urban areas may be at a greater risk than people in rural regions.

The "heat index" is a measure of the air temperature in relation to the relative humidity and is used as an indicator of the perceived temperature (how it actually feels). For example, a temperature of 90°F combined with a relative humidity of 85% equates to a heat index (or perceived temperature) of 115°F.

Prolonged exposure to conditions with high heat indexes can cause heat stroke or sunstroke. Summarized in Table 2-6 are the medical problems that might be experienced by high-risk groups when exposed to different values of heat index.

TABLE 2-6: Possible heat disorders for people in higher risk groups for ranges of heat index.

Heat Index	Possible Heat Disorders for People in Higher Risk Groups
130° or higher	Heat stroke/sun stroke, highly likely with continued exposure.
106° – 130°	Sun stroke/heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
90° – 108°	Sun stroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
80° – 90°	Fatigue possible with prolonged exposure and/or physical activity.

Heat related medical symptoms experienced include heat cramps, heat exhaustion, heat stroke, and sunstroke and are summarized below:

Heat Cramps – Muscular pains and spasms due to heavy exertion. Although heat cramps are the least severe of heat related medical problems, they are often the first signal that the body is having trouble with the heat.

Heat Exhaustion – Typically occurs when people exercise heavily or work in a hot, humid place where body fluids are lost through heavy sweating. Blood flow to the skin increases, causing blood flow to decrease to the vital organs. This results in a form of mild shock. If not treated, the victim's condition will worsen. Body temperature will keep rising and the victim may suffer heat stroke.

Heat Stroke – Heat stroke (aka, sunstroke) is life-threatening. The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can get so high that brain damage and death may result if the body is not cooled quickly.

Area Impacted

The average annual high temperatures in northern Illinois are in the 80's. Extreme heat can occur anywhere in the Village during summer months.

Therefore, the entire Village, which is covered by this MHMP, is susceptible to extreme heat conditions.

Magnitude and Severity

Cook County has been rated as "high" for extreme heat in the 2007 State Plan.

Historical Events

A total of 583 fatalities were associated with heat waves in July 1995, a number previously unseen in the State of Illinois from such a phenomenon. Throughout the entire State, the combination of record or near record high temperatures and high dewpoint temperatures led to heat indices routinely above the 120 degrees from July 12-17 of that year. The heat index peaked at 125 degrees on July 14 when the air temperature was 98 degrees and the relative humidity was 63%. Conditions such as these create hardships for respiratory and cardiovascular systems of every person, especially in toddlers and the elderly.

Of the 583 fatalities associated with the July 1995 Illinois heat wave, 75 death certificates listed heat as the primary cause, and 508 as the secondary cause. In a sampling of 134 of the heat victims, 61% were over the age of 65, but only 2 of the 134 fatalities (1.5%) were toddlers; 504 of the deaths were in Chicago.

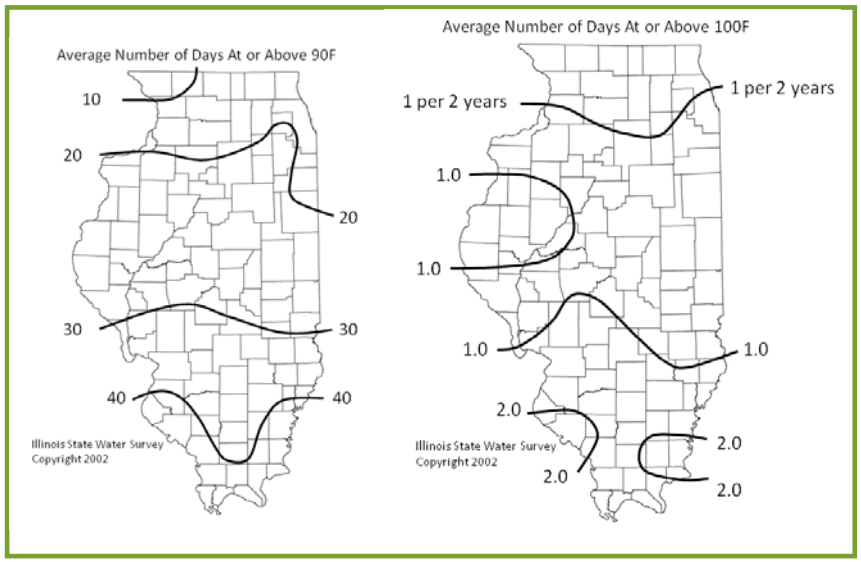
At the time there was a perception that the numbers were inflated, later studies indicated the opposite was true and the heat victims were significantly undercounted. Local officials believed that many of the elderly were scared to come out of their apartments because of high amounts of crime in their neighborhoods. Many were found in their rooms with air temperatures in excess of 120 degrees.

In 1999, Cook County experienced another heat wave that closely matched the 1995 event, but the death toll was greatly reduced. A paper written by the State Water Survey attributes much of the reduction in deaths to mitigation efforts, such as education by the news media and monitoring procedures for the urban elderly. (2007 State Plan, page III-102)

Frequency

The Village can expect an average of 10 to 20 days with temperatures above 90°F, and can expect at least one day in every two years (50% annual chance recurrence) with temperatures above 100°F (Figure 2-8). Between 1995 and 2007, reports of death by excessive heat occurred 11 out of 12 years in Cook County.

FIGURE 2-8: Average number of days at or above 90°F and 100°F in Illinois



Vulnerability

Safety: As discussed above, heat kills by pushing the human body beyond its limits. Heat waves kill more people in the United States than all other natural disasters combined (New York Times, August 13, 2002). The article goes on to state that a University of Delaware study indicated that 1,500 American city dwellers die each year because of heat compared with 200 from tornadoes, earthquakes and floods combined. Summarized in Table 2-7 are the deaths caused by heat in Cook County since 1995.

Overall safety hazard: High

TABLE 2-7: Total deaths in Cook County due to extreme heat since 1995.

Extreme Heat	
Year	**Death**
1995	622
1996	7
1997	22
1998	15
1999	118
2000	0
2001	35
2002	40

Extreme Heat	
Year	**Death**
2003	3
2004	0
2005	1
2006	38
2007	5
Totals	906
Source: NCDC	

Health Hazard: Anyone is susceptible to health problems due to extreme heat, especially young children, the elderly, and those who are sick, overweight or have alcohol problems. Men in general (because they sweat more and become more quickly dehydrated) can also be more susceptible to extreme heat. Usually extreme heat victims have been overexposed to heat or have over-exercised for their age and physical condition. Stagnant atmospheric (humid and muggy) conditions and poor air quality can induce heat-related illnesses.

In addition to air quality, concrete and asphalt store heat longer and gradually release the heat at night, which produces higher nighttime temperatures. Therefore, people living in urban areas, such as the Village of Glenview, may be at a greater risk than people in rural regions.

Overall health hazard: Moderate

Economic: During a period of extreme heat, there will be a higher demand for water and electricity. Both of these can typically be supplied in the Village with no economic disruption. Heat may cause buckling of street pavements.

Overall economic impact: Low

Potential Losses

Severe heat waves (prolonged periods of excessive heat) have caused catastrophic crop failures, thousands of deaths and widespread power outages due to increased use of air conditioning. There is little or no damage to structures caused by high temperatures or humidity, thus potential losses in the Village should be minor.

2.5 - TORNADOES

A tornado is a swirling column of air extending from a thunderstorm to the ground. Tornadoes can have wind speeds from 40 mph to over 300 mph. A majority of tornadoes have wind speeds of 112 mph or less.

Tornadoes are most frequent in the Midwest and Southeast. The usual tornado season runs March through August, however a tornado can occur in any month. Tremendous destruction can occur in paths over a mile wide and 50 miles long with winds reaching 300 mph. The Enhanced Fujita Scale (Table 2-8) uses the categories of EF0 through EF5 to rate the strength of tornadoes in the United States estimated via the damage they cause. Implementation of this enhanced scale began February 1, 2007. None of the tornadoes recorded on or before January 31, 2007, will be re-categorized.

TABLE 2-8: Enhanced Fujita scale used to categorize tornadoes.

Category	Wind Speed (mph)	Description
EF0	65 – 85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86 – 110	Moderate damage. Roofs severely stripped: mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111 – 135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.

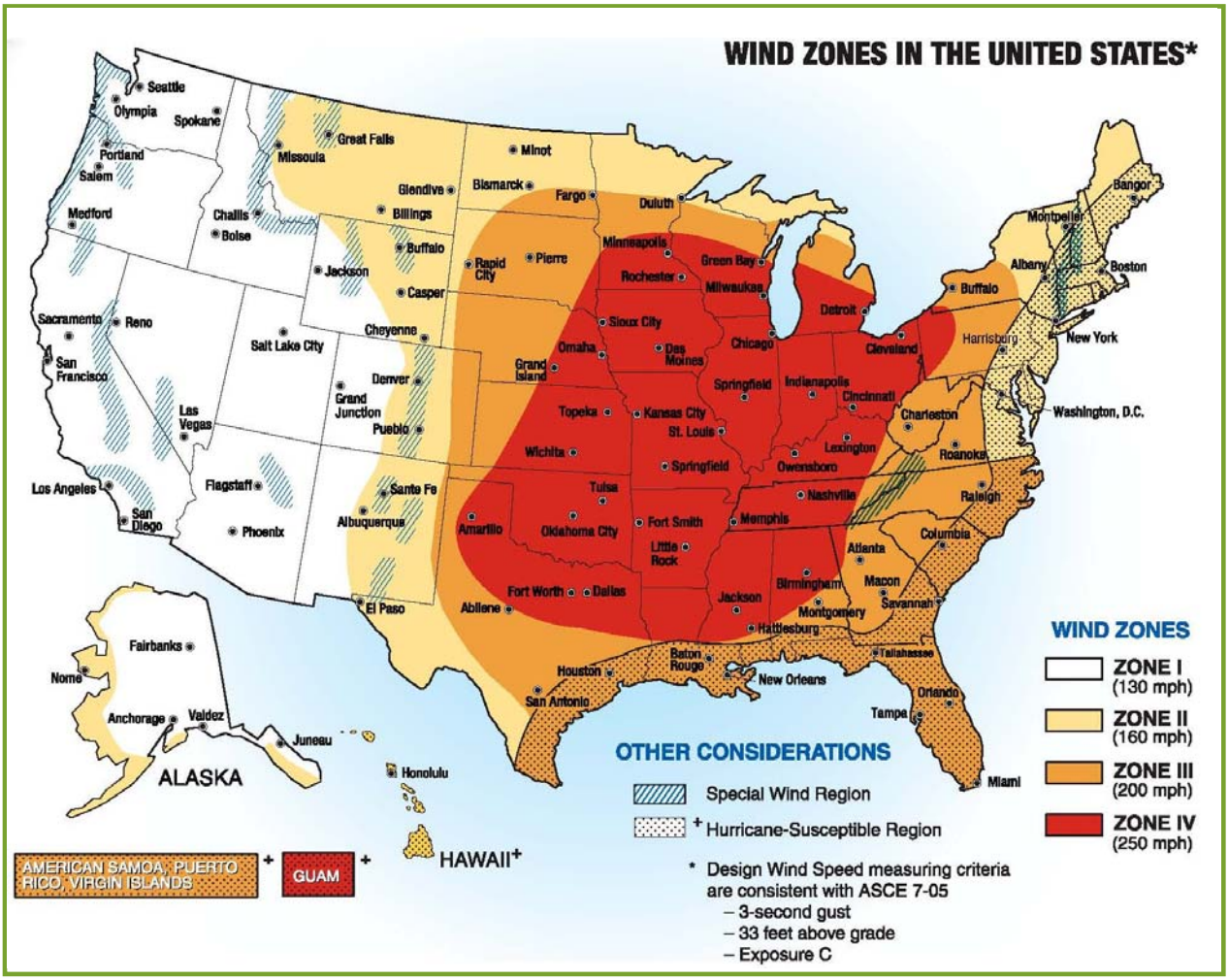
Category	Wind Speed (mph)	Description
EF3	135 – 165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166 – 200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	> 200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Area Impacted

Illinois is situated on the northeast edge of "tornado alley," the tornado-prone area that extends approximately 400 miles on either side of a line from Fort Worth, Texas, to Detroit, Michigan. This area is the battleground of warm, moist air from the Gulf of Mexico and cold air from Canada, resulting in the world's leading breeding area for twisters. The greatest frequency of tornadoes in Illinois occurs in a wide band from Madison and St. Clair counties northeastward to Lake and Cook counties. The American Society of Civil Engineers (ASCE) set forth design wind speeds for the United States. Cook County is located in an area of highest design wind speed (Figure 2-9)

The entire Village, which is covered by this MHMP, is susceptible to tornadoes.

FIGURE 2-9: Design wind speeds set forth by the American Society of Civil Engineers (ASCE 7-98).



Magnitude and Severity

Based on data on tornadoes in the Illinois between 1950 and 2007, nearly 73% were rated as weak, 25% were rated as strong, and 2% were rated as violent. From the same data it is that weak tornadoes are typically 100 yards wide with a path length of 1 to 2 miles, strong tornadoes are usually 0.25 to 0.5 mile wide with a path length of up to 20 miles, and violent tornadoes are around 1 mile wide with path lengths greater than 20 miles. (2007 State Plan, Page III-13)

Cook County has been rated as “high” for tornadoes in the 2007 State Plan.

Historical Events

Officially, there have been 1,892 tornadoes in Illinois from 1950 through September 30, 2003. Between 1954 and 2008 there have been 51 tornadoes in Cook County.

Illinois has one of the higher tornado death tolls of the 50 states due to rare, intense tornadoes that have directly struck towns or cities. Since 1916, the State has recorded 1,109 tornado deaths. Of the 921 deaths prior to 1953, 695 occurred in 1925 in the Great Tri-state Tornado. This is the deadliest tornado in United States history. In the 53 years from 1950 to September 30, 2003, there have been 192 deaths. Twenty-nine of these came in the recent Plainfield-Joliet tornado on August 28, 1990 (FEMA 878-DR). This was the worst to hit Illinois since 1967, when a twister struck Oak Lawn and Belvidere, killing 57.

Tornado outbreaks on May 9, 13, and 18, 1995 brought 54 tornadoes throughout the entire State, five reaching the F3 level and two the F4 level of the Fujita Scale. Even though there were no deaths attributed to these twisters, 87 people were injured, and the F3 and F4 tornadoes alone caused over $37,800,000 in property damage. Tornado outbreaks of this magnitude are not uncommon in Illinois.

Frequency

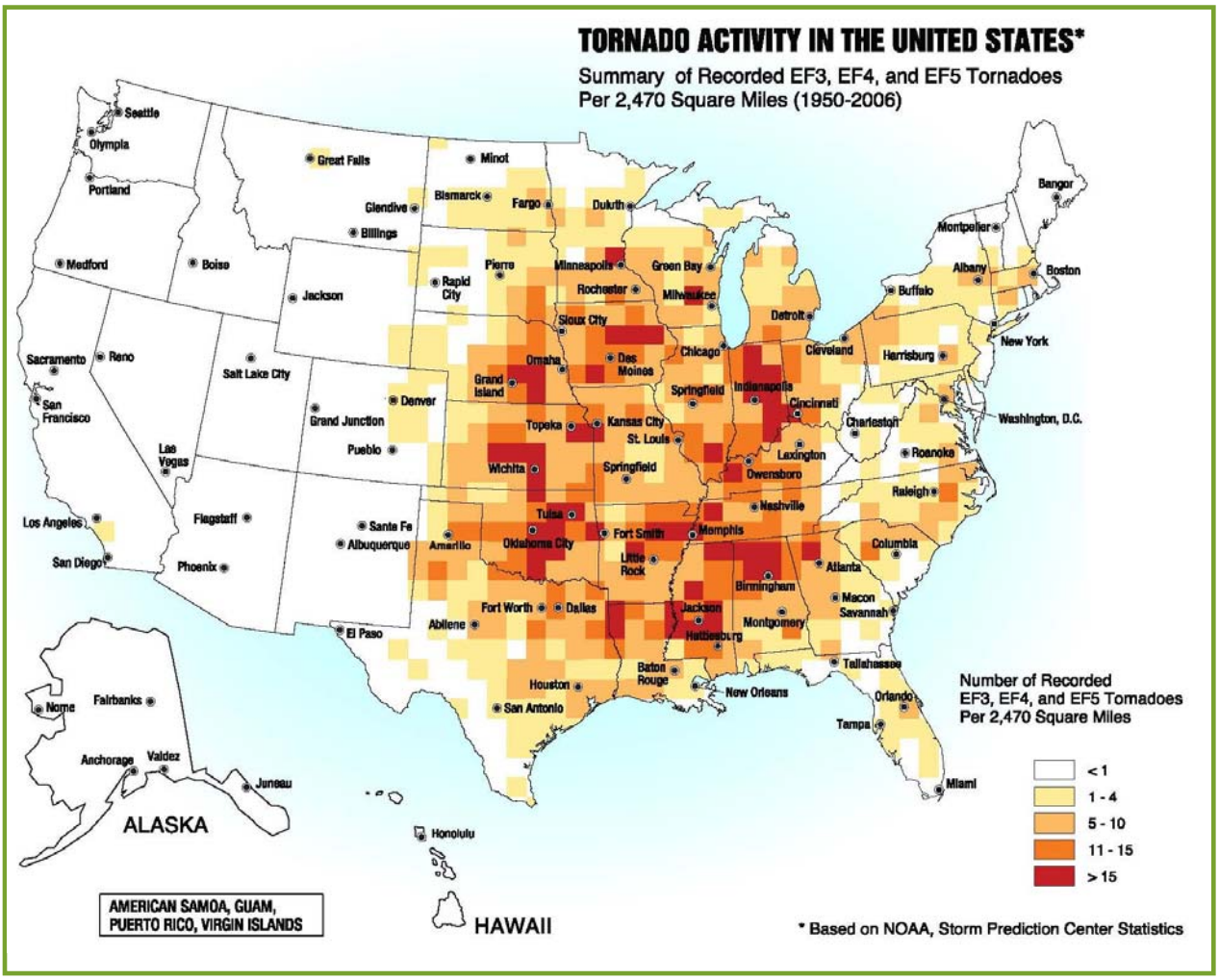
Since 1950, Illinois has averaged 36 tornadoes per year; however, in some years, this average was greatly exceeded. In 1974, 107 tornadoes were reported, and in 1998, 105 were reported followed by 79 in 1999. The year of 2003 had a record number of tornadoes with 155 tornadoes occurring. There are between 5 and 10 EF3, EF4, and EF5 tornadoes in Cook County per square mile (Figure 2-10)

Contrary to the belief that there are numerous tornadoes in March, during the last fifty years the primary tornado season in Illinois has been within the months April, May and June. Of the 1,892 tornadoes recorded since 1950, 62 percent (950 in number) occurred during the above three months. The months of March, July, August and September account for a total of 19 percent, leaving 19 percent for the period October through February. More than half of all tornadoes occur between the hours of 3:00 PM and 7:00 PM, but they can occur at any time of day or night. There are no official recurrence intervals calculated for tornadoes.

Cook County has had 44 of the 1,472 tornadoes recorded in Illinois between 1950 and 1999. With 44 occurrences over 50 years, the likelihood of a tornado hitting somewhere in the county is 0.88 (88%) in any given year (Calumet City Hazard Mitigation Plan). Assuming a tornado affects one square mile and there are 946 square miles in Cook County, the odds of a tornado hitting any of the 14 square miles of the Village are roughly 0.013% (14/946*.88).

According to a publication by the National Weather Service (A Study of the Chicago Areas Significant Tornadoes) there were 92 significant tornadoes in the 8 counties around the Chicago metro area (which includes Cook County) between 1855 and 2008. A significant tornado is defined as an EF2 or greater. The most recent significant tornadoes occurred on June 2, 2008 over Will and Cook Counties. The majority of the significant tornadoes were F2, but the majority of deaths result from F4 and F5 tornadoes. The significant tornado frequency per 100 square miles in Cook County was determined to be 3.38. Thus, the odds of a severe tornado hitting any of the 14 square miles of the Village are roughly 0.005% (3.38/92*14/100).

FIGURE 2-10: Map of the number of EF3, EF4, and EF5 tornadoes per square mile in the United States.



Vulnerability

Safety: Although there have not been deaths as a result of tornadoes in Cook County recently (Table 2 – 9) , death is still likely when a tornado does hit. The August 1990 twister caused 28 deaths and the 2004 Utica tornado killed eight people.

The major hazard from tornadoes is physical injury from flying debris or collapsed buildings. Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions any glass, brick or other debris blown into the interior is life threatening.

Based on national statistics for 1970 – 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care. The August 1990 twister injured 350 people.

Overall safety hazard: High

Table 2-9: Deaths and injuries from tornadoes in Cook County since 1954.

Tornadoes		
Year	Death	Injury
1955	0	2
1956	0	3
1959	0	14
1961	1	115
1962	0	10

Tornadoes		
Year	Death	Injury
1966	1	30
1967	33	500
1970	0	9
1972	0	3
1976	4	64

Tornadoes		
Year	Death	Injury
1983	0	3
1986	0	10
1991	0	7
Totals	39	770
Source: NCDC		

Health Hazard: Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage, water lines, and electrical lines may also be damaged and cause risk to persons health. Tornadoes can also lead to power outages, which is hazardous during periods of extreme heat as happened in the Mt. Vernon area in July 2006 (2007 State Plan, Page III-28).

Overall health hazard: Low

Economic: The major impact of a tornado on the local economy is damage to businesses, infrastructure, and loss of services. The 1990 Plainfield tornado post-disaster damage report stated that at least 50 businesses were destroyed.

Infrastructure damage is usually limited to above ground utilities, such as power lines. The 1990 tornado knocked out two 345,000 volt transmission towers, leaving 65,000 Com Ed costumers without power. Damage to phone lines left 14,000 customers without service. Damage to utility lines can usually be repaired or replaced relatively quickly.

Damage to roads and railroads are also localized. Typically alternate routes are available for when repairs cannot be made promptly. Transportation was disrupted when highways were closed during the August 1990 storm due to high winds and debris.

Public expenditures include search and rescue, shelters, and emergency protection measures. The largest expenses are for repairs to public facilities and clean up and disposal of debris. Most public facilities are insured, so the economic impact on the local treasury may well be small. However, some public buildings, such as schools and fire stations, may be particularly susceptible to damage because of their long roof spans.

Clean up and disposal can be a larger problem, especially with limited landfill capacity near the damage site. Preliminary damage assessments for public expenditures after the 1990 tornado totaled $4 million, 2/3 of that for debris clearance.

Overall economic impact: High

Potential Losses

Although tornadoes strike at random, making all buildings vulnerable, the types of structures more likely to suffer damage in the Village are homes built on top of crawlspaces (more susceptible to lift) and buildings with large spans, such as airplane hangers, gymnasiums and factories.

Structures within the direct path of a tornado vortex are often reduced to rubble. However structures adjacent to the tornadoes path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado's path where the building type and construction techniques are critical to the structure's survival.

In 1999, FEMA conducted an extensive damage survey of residential and non-residential buildings in Oklahoma and Kansas following an outbreak of tornadoes on May 3, 1999, which killed 49 people. The assessment found, among other things, that:

- Failure of many residential structures occurred where the framing was attached to the foundation or when nails were the primary connectors between the roofing and the walls. A home in Kansas was lifted from its

foundation where the addition of nuts to the bolts anchoring the wood framing to the foundation may have been all that was needed to have kept this from happening,

- Roof geometry played a significant role in a building's performance, and
- Failure of garage doors, commercial overhead doors, residential entry doors or large windows caused a significant number of catastrophic building failures.

In the 2007 State Plan, tornado-prone counties, including Cook County, were considered at risk for damages (Page III-36). The risks for each county were calculated from historic data from the NCDC Storm Event Database. The State determined the average number of tornadoes that each county would be expected to have. Then, an average dollar amount of property damage (not including crop damages), for each tornado event, was compiled. An estimate of annual losses was determined by multiplying the expected number of tornadoes by the average historic damages for each event. In Cook County, the estimated annual losses are $2.13 million. The 2008 Census Bureau reported a population of 5,294,664 in the County and the population of the Village is 46,329 or 0.9% of the Cook County population. Thus, the annual damages from tornadoes in the Village would be less than a percent of the County losses, or around $20,000.

2.6 - DROUGHT

Cook County is ranked as "guarded" for drought in the 2007 State Plan. However, the source of the Village's drinking water is Lake Michigan. Many unincorporated water customers obtain water via the City of Chicago. The Village does not consume all of the water it receives and sells the remainder to other communities. Severe droughts impact agricultural areas most significantly. There are no agricultural areas in the Village.

As the Village has an ample supply of Lake Michigan water, drought, although ranked as "guarded" for the County (as well as most of the State), is not considered a hazard to the Village.

2.7 - EARTHQUAKES

Earthquakes are one of nature's most damaging hazards. Earthquakes are caused by the release of strain between or within the Earth's tectonic plates. The severity of an earthquake depends on the amount of strain, or energy, that is released along a fault or at the epicenter of an earthquake. The energy released by an earthquake is sent to the earth's surface and released.

There are several common measures of earthquakes, including the Richter scale and the Modified Mercalli Intensity (MMI) scale (Table 2-10). The Richter scale is a measurement of the magnitude, or the amount of energy released by an earthquake.

Magnitude is measured using seismographs. The MMI is an observed measurement of the earthquake's intensity felt at the earth's surface. The MMI varies, depending on the observer's location to the epicenter of the earthquake.

An earthquake's intensity depends on the geologic makeup of the area and the stability of underlying soils. The effects of an earthquake can be localized near its epicenter or felt significant distances away. For example, a 6.8-magnitude earthquake in the New Madrid Fault in Missouri would have a much wider impact than a comparable event on the California Coast.

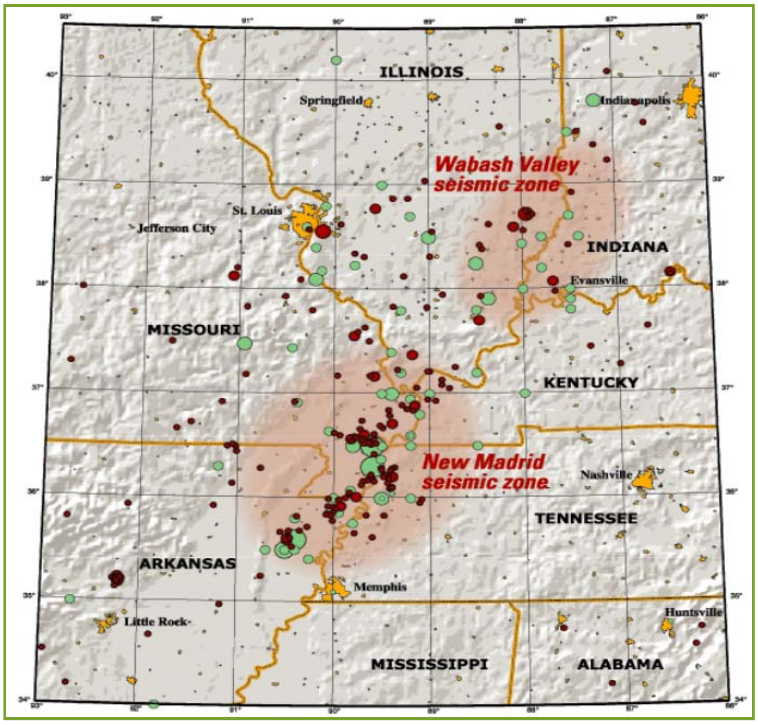
TABLE 2-10: Earthquake measurement scales.

		Earthquake Measurement Scales
Mercalli	**Richter**	**Felt Intensity**
I	0-4.3	Not felt except by a very few people under special conditions. Detected mostly by instruments
II		Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III		Felt noticeably indoors. Standing automobiles may rock slightly.
IV	4.3-4.8	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V		Felt by nearly everyone. Many People are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	4.8-6.2	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII		Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction,
VIII	6.0-7.3	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX		Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X		Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Landslides occur on steep slopes.
XI	7.3-8.9	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII		Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.
Source: *Multi-Hazard Identification and Risk Assessment*		

Earthquake intensity is a description of the effects brought about by an earthquake, using the observations of people in the area affected. Intensities are based on descriptive reports, rather than calculated from instrument readings. In general, intensities decrease at greater distances from an epicenter. Intensities are influenced by the soils resting on bedrock. Thick, loose, saturated soils such as in river valleys may amplify earthquake ground motions and thus have higher intensities reported than just outside of the valley. Several formal intensity scales have been proposed for use in

different parts of the world. In the U. S., earthquake intensities are reported using the twelve-point Modified Mercalli Intensity Scale, increasing from barely detectable to catastrophic. For any earthquake, there will be different intensities, depending on the location of observers - but only one magnitude.

FIGURE 2-11: Seismic zones in Illinois



(Source: http://pubs.usgs.gov/fs/fs-131-02/NMmap6flat.html)

Earthquake Study (IEMA) - IEMA has funded a project by the Mid-America Earthquake Center to conduct a Comprehensive Seismic Loss Assessment for the State. The Assessment is in final draft form and is providing insight into the damages the State can expect in a major earthquake event along the New Madrid or Wabash Valley faults. The insights will assist the State's efforts to plan and prepare for these disasters, and how to best direct mitigation efforts.

Earthquakes in Illinois originate within the crust at depths of 1 to 20 km. The vibrations move out away from the point of origin (hypocenter or focus) through the bedrock and then up through the overlying soils on top of the bedrock. In the central part of the U.S., the bedrock is flat-lying, old, intact, and strong. Earthquake vibrations travel very far through material such as this in comparison to the young, broken, weak bedrock of the west coast. Because of this difference in bedrock, Central U. S. earthquakes are felt over, and cause damage over, an area 15 to 20 times larger than California earthquakes with similar magnitudes.

Area Impacted

Causal locations of earthquakes in and around Illinois are the New Madrid Seismic Zone and the Wabash Valley Fault Zone (Figure 2-11). The New Madrid Seismic Zone, sometimes called the New Madrid Fault Line, is a major seismic zone and a prolific source of intraplate earthquakes (earthquakes within a tectonic plate) in the Southern and Midwestern United States stretching to the southwest from New Madrid, Missouri. The Wabash Valley Fault Zone is located in southeastern Illinois, southwestern Indiana, and adjacent corner of Kentucky and extends about 60 miles north-northeastward from just north of the Shawneetown and Rough Creek Fault Zones. Reports of shaking in and around the Village, which is located to the north of both fault zones, have been recorded for earthquakes caused by both fault zones. Also, earthquakes have occurred in northern Illinois that were related to the La Salle anticline in the Illinois Basin. The La Salle anticline is located further north of the Wabash Valley Seismic Zone.

Earthquake activity has been experienced in the Village, even though the Village is located to the north of both the New Madrid and Wabash Valley Seismic Zones. Information regarding earthquakes events, history and intensity is available through the USGS Earthquake Hazards Program (http://earthquake.usgs.gov/). Due to the size and location of the Village, the entire Village, which is covered by this MHMP, is susceptible to shaking from earthquakes originating from all three causal locations.

Magnitude and Severity

The national Peak Ground Acceleration (PGA), reported as % g, The PGA is a measure of the strength of ground movements; a 100% g earthquake is very severe. In northern Illinois, severe earthquakes are rare, there is a 10% chance of exceeding a 3% g in 50 years (Figure 2-12) and a 2% chance of exceeding an 8 % g in 50 years (Figure 2-13).

Cook County is ranked as "guarded" for earthquakes in the 2007 State Plan.

FIGURE 2-12: Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded in 50 years.

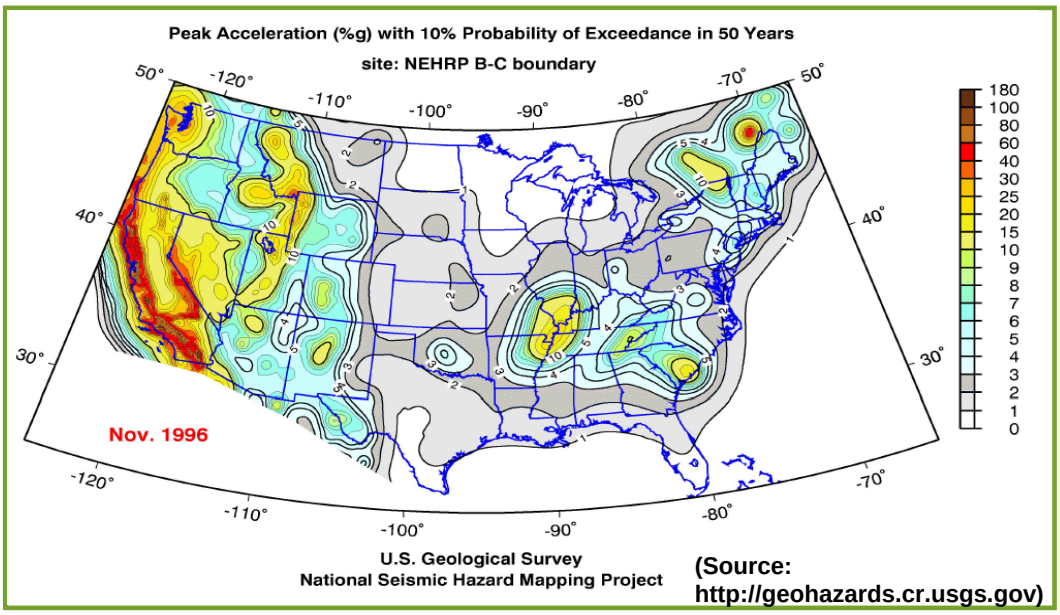
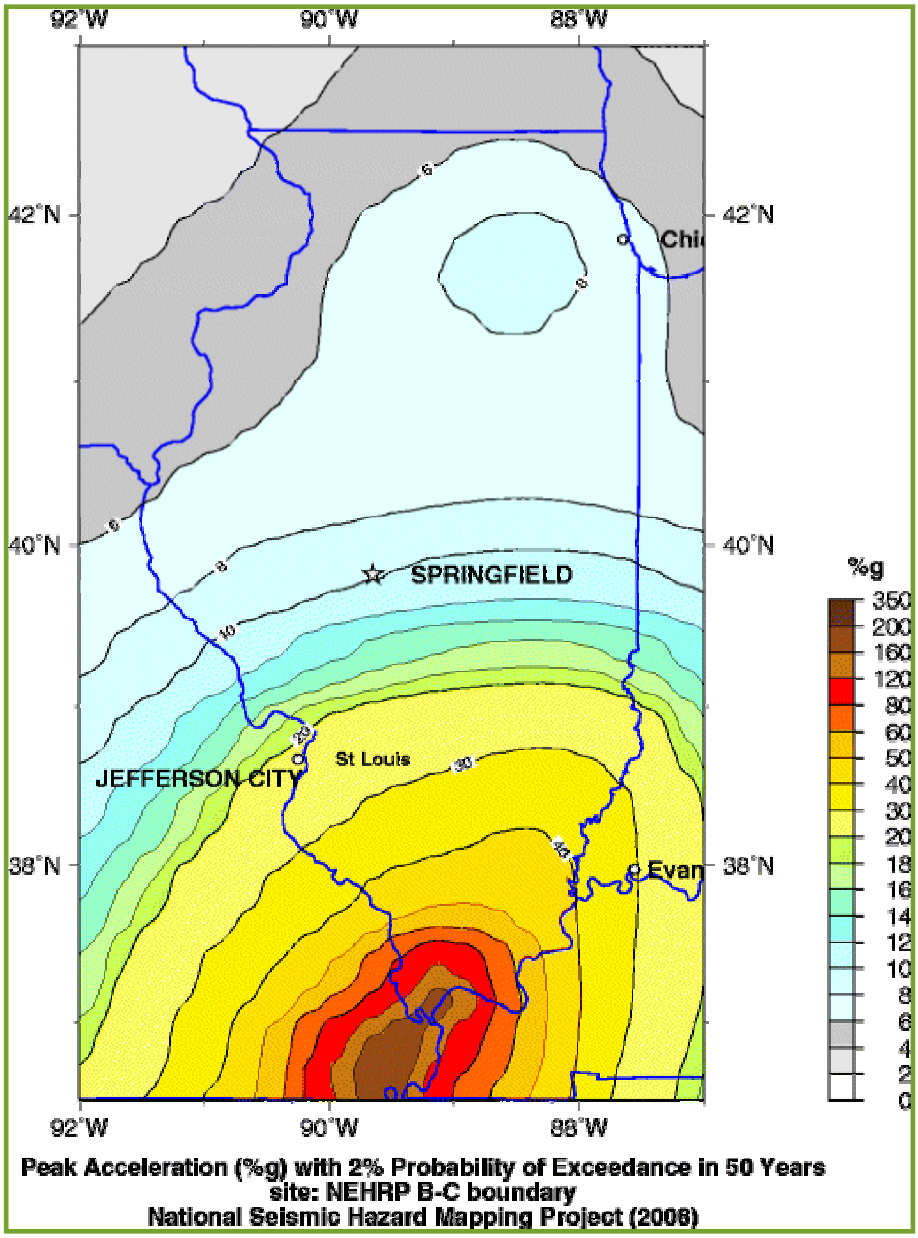


FIGURE 2-13: Peak Ground Acceleration (PGA) values for Illinois with a 2% chance of being exceeded in 50 years.



(Source: http://geohazards.cr.usgs.gov)

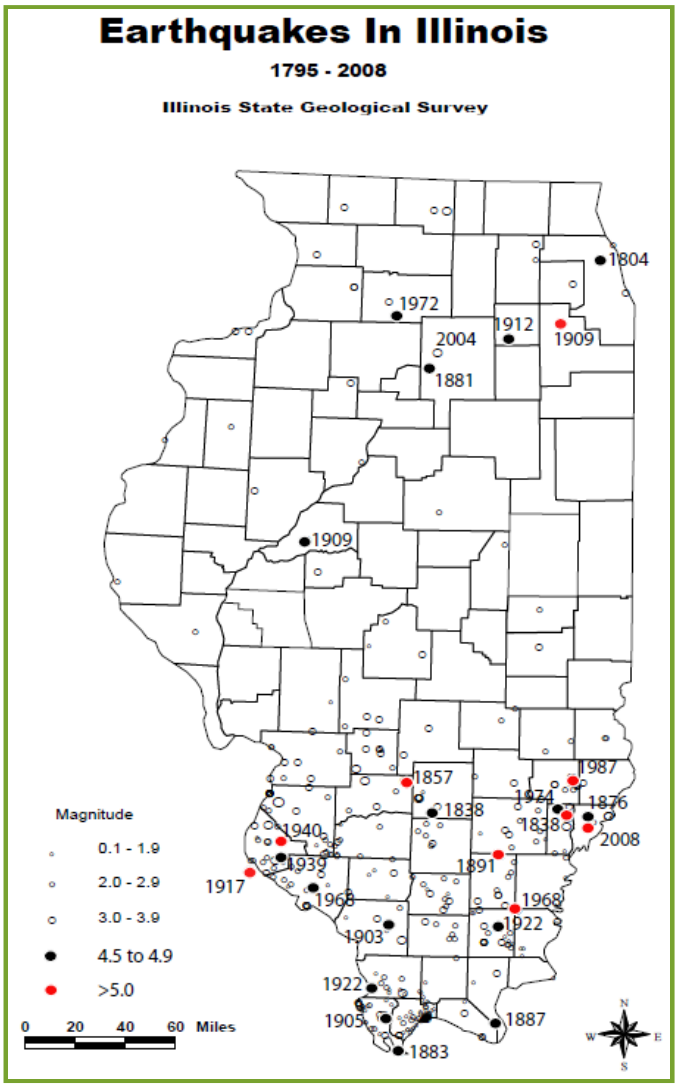
Historical Events

In the United States, the most frequent reports of earthquakes come from the West coast, but the largest earthquakes felt in the US occurred in Missouri in 1811 and 1812 along the New Madrid Fault Zone. The Great New Madrid Earthquakes are the

benchmarks from which all earthquakes in the Midwest are measured. An important fact is that the earthquakes of 1811 and 1812 were not single events. Rather the earthquakes were a series of over 2,000 shocks in five months.

Over 250 small to moderate earthquakes are known to have occurred in Illinois during the past two centuries. Of these, 31 caused at least some damage. Illustrated in Figure 2-14 are the locations of major earthquakes that have occurred within the state. The larger earthquakes are shown with filled circles and the year of occurrence. Smaller earthquakes are shown with open circles that are proportional to the size of the earthquakes. Of the 253 earthquakes (most shown in the figure), 80 percent occurred in the southern third of the State. Ten percent of the earthquakes (24) occurred in the central part of the state and another 10 percent (26) occurred in the northern part of the state. Thirty-one of these caused at least some damage.

FIGURE 2-14: Earthquakes occurring in Illinois between 1796 and 2008.
(Source: Illinois State Geological Survey)



There was a report of a quake at Fort Dearborn (Chicago) in August 1804 and at Aurora in 1909. The US Geological Survey website, "Earthquake History of Illinois" provides the following reports:

> *Among the largest earthquakes occurring in Illinois was the May 26, 1909, shock which knocked over many chimneys at Aurora. It was felt over 500,000 square miles and strongly felt in Iowa and Wisconsin. Buildings swayed in Chicago where there was fear that the walls would collapse. Beds moved on their casters…. [G]as line connections broke at Aurora. [This was listed as an MMI VII.]*

The largest earthquake experienced in Illinois occurred on November 9, 1968, measured magnitude of 5.4 on the Richter scale, was centered in southwestern Illinois, and was felt farther north than the Village. The 1909 earthquake centered just south of Aurora had a magnitude of 5.1 and was most likely related to the La Salle anticline in the Illinois Basin. Many chimneys fell, a stove overturned, and gas line connections broke at Aurora, west of Chicago. Several chimneys were downed at Forreston, Naperville, Streator, Triumph, and Troy Grove, and one fell at Waukegan. Brick walls cracked at Bloomington, and sidewalks cracked and many chimneys were damaged at Freeport. At Platteville, Wisconsin, about 130 kilometers northwest of Chicago, and old building was cracked; houses were jostled out of plum at Beloit, Wisconsin, about 240 kilometers northwest of Chicago. Felt from Missouri to Michigan and Minnesota to Indiana. (http://earthquake.usgs.gov/regional/states/illinois/)

Since 2003 there have been twelve earthquakes in Illinois, two-thirds of which were felt as far north as the Village with reported weak to light shaking and little to no damage (Table 2-11).

TABLE 2-11: Reported earthquake activity in Illinois since 2003.

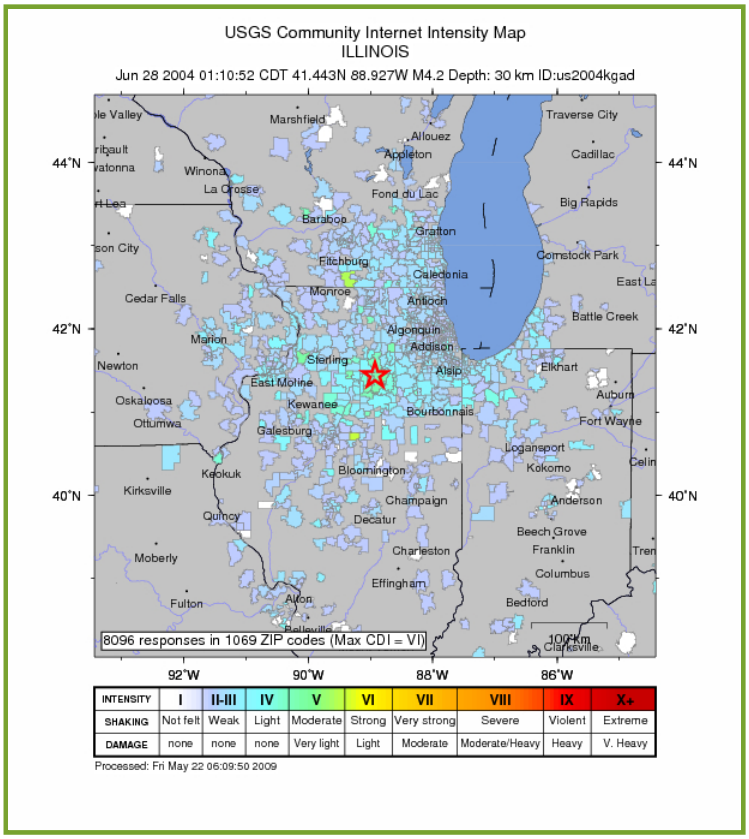
Reported Earthquake Activity in Illinois Since 2003							
Date	Center	Mag	Felt Near Glenview?	Approx. Distance South of Glenview (mi)	Level of Shaking Felt (intensity)	Number of Responses	Location in Illinois
12/29/2003	Southeast	3	No			40	Southern
6/28/2004	Ottawa	4.2	Yes	115	Light	8096	Central
6/27/2005	Pomona	3	No			58	Southern
1/2/2006	Ridgeway	3.6	No			590	Southern

Reported Earthquake Activity in Illinois Since 2003							
Date	Center	Mag	Felt Near Glenview?	Approx. Distance South of Glenview (mi)	Level of Shaking Felt (intensity)	Number of Respons es	Location in Illinois
4/18/2008	Mt. Carmel	5.2	Yes	385	weak to light	26447	Southern
4/18/2008	Mt. Carmel	3.4	Yes	385	weak	920	Southern
4/18/2008	Mt. Carmel	4.6	Yes	400	weak	8170	Southern
4/21/2000	Mt. Carmel	4	Yes	385	weak	2882	Southern
4/25/2008	Mt. Carmel	3.7	Yes	385	weak	729	Southern
5/1/2008	Mt. Carmel	3.3	No			209	Southern
6/5/2008	Mt. Carmel	3.6	Yes	385	weak	171	Southern
7/18/2008	Mt. Carmel	3.1	Yes	389	weak	152	Southern
Source: http://earthquake.usgs.gov/eqcenter/dyfi/							

On June 28, 2004 an earthquake with magnitude 4.2, centered near Ottawa, Illinois (115 miles south of the Village), was felt all over northern Illinois. People in and around the Village reported experiencing weak shaking (Figure 2-15).

On April 18, 2008 an earthquake with magnitude 5.2, centered near Mt. Carmel, Illinois, was felt 400 miles north in the Village. There were reports of weak shaking from the Village. In Chicago, people reported experiencing weak to light shaking. Two aftershocks occurred on the same day with magnitudes 3.4 and 4.6. Weak shaking was reported for the larger of the two aftershocks.

FIGURE 2-15: Reported earthquake activity (reported as intensity) for the June 28, 2004 earthquake in Illinois.



Frequency

There have been over 250 earthquakes in experienced in Illinois since 1795, the majority of which occurred in the southern half of the state. According to the PGA frequency curves, the chance of exceeding an 8% g earthquake in the next 50 years is small. However, two earthquakes, greater than 4.5 in magnitude, have occurred near the Village in each of the last two centuries. If this pattern holds, the area could expect an earthquake greater than magnitude 4.5 every 100 years, or less than a 1% annual chance occurrence.

Vulnerability

Safety: "Trauma caused by partial or complete collapse of human-made structures is the overwhelming cause of death and injury in most earthquakes." (The Public Health Consequences of Disasters, pages 18 – 19). Earthquakes in the US have killed

approximately 1,600 people since colonial times, 1,000 of them were in California and 700 of those were in the 1906 San Francisco quake.

Because the greatest potential for loss of life is to people within a collapsing building, the threat to Village residents is directly related to the condition of the buildings. Other life safety threats include collapsing roads and bridges, fires from ruptured gas lines, and release of hazardous chemicals from broken storage tanks or trucks.

Overall safety hazard: High

Health Hazard: The main health concerns from earthquakes arise from sheltering people and caring for injuries. These would be the same as for other quick and destructive hazards, such as tornadoes.

Overall health hazard: Low

Economic: As with tornadoes, the major impact of an earthquake on the local economy is damage to businesses and infrastructure. Relatively minor amount of damages are expected (this depends on the level of seismic protection buildings in the village have)

Overall economic impact: Low

Potential Losses

Generally, wood frame buildings and structures on solid ground fare best during an earthquake. Wood frame buildings are flexible enough to withstand ground shaking and swaying. Evaluations of recent earthquakes found that damage was primarily caused to:

- Un-reinforced masonry structures
- Older buildings with some degree of deterioration
- Buildings without foundation ties
- Multi-story structures with open or “soft” first floors

Most building codes have standards related to the first three concerns. This means that the most threatened buildings are older ones (built before current codes), masonry ones, and taller ones with open first floors.

In addition to the building type, damage is related to the underlying soils. Buildings on solid ground fare better, while those on loose or sandy soils will suffer more from shaking. These can be found in floodplains. If there is enough water present, the shaking can liquefy the underlying soils, which removes the support under the foundation.

Given the relatively low threat of a quake at magnitude greater than 4.5, the expected threat to buildings in the Village would be limited to large, older, un-reinforced masonry structures is limited. Earthquakes less than 4.5 in magnitude typically have little or no damage reported.

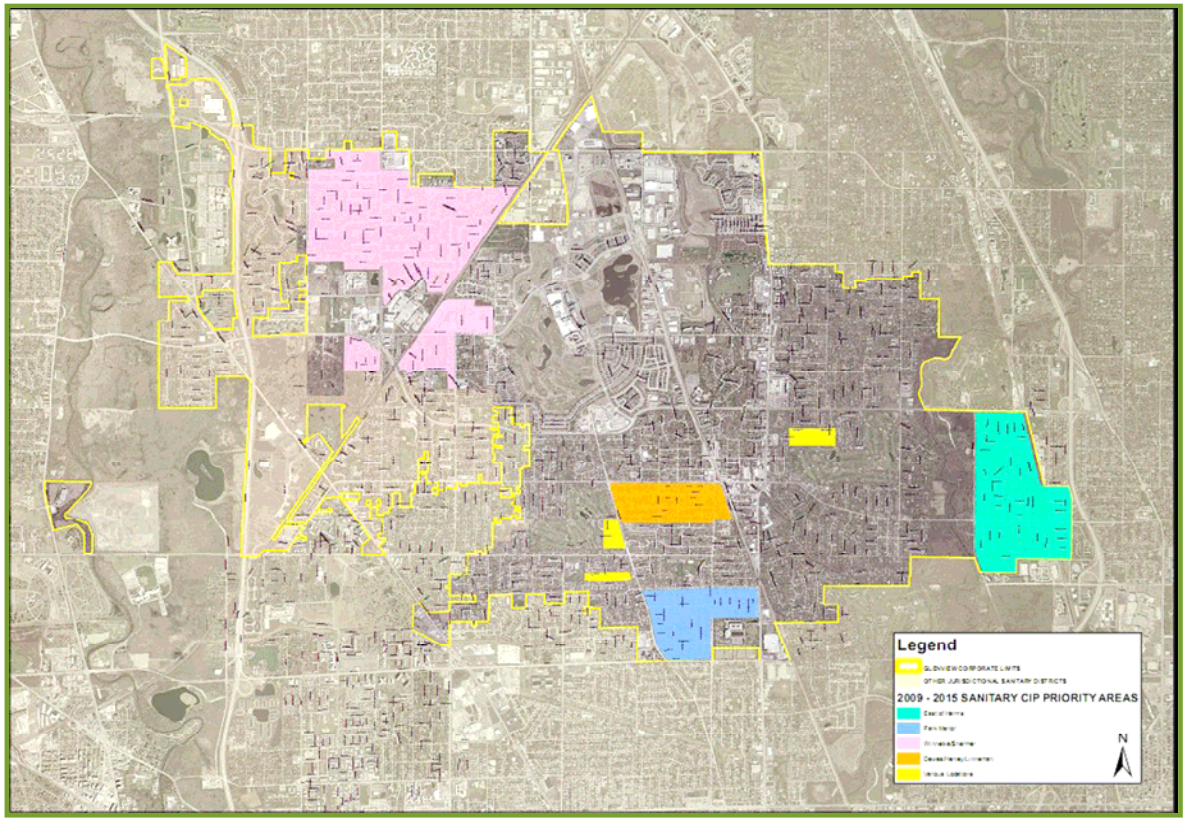
2.8 - SEWER BACKUPS

The heavy rains from the September 2008 storm strained the Village's storm and sanitary sewer systems that led to flooding and basement backups in multiple areas of the Village. As a result of this event, the Village increased its efforts to improve storm and sanitary collection systems in the Village. To improve the sanitary sewer system and minimize basement backups during flood events, the Village developed the Sanitary System Capital Improvement Program for Fiscal Years 2009-2015 (SSCIP).

The Village does not have a combined sanitary and storm water sewer system. However, sanitary sewer system backups occur due to excess rainwater (storm flow) entering the system through inflow and infiltration. When overloaded, the sewers back up and flow into the lowest opening in the sewer line and into basements. The sources of inflow and infiltration come from defects in the existing sanitary sewer system.

About 60% of the excess inflow and infiltration entering the sanitary system typically originates from privately owned sources (service laterals, sump pumps, foundation drains, area drains, etc.). In order to properly address the basement backups, it is important that many of these private sources be eliminated.

FIGURE 2-16: Areas impacted by basement flooding from sanitary sewer surcharging.



Area Impacted

Developments built in corporate Glenview before the early 1970s have adequate storm sewer conveyance but minimal storm water detention. Developments built in unincorporated areas but were later annexed to the Village have limited storm sewer conveyance and minimal detention (e.g. Glen Oak Acres). Developments in corporate Glenview after the early 1970s have adequate storm water conveyance and required storm water detention (e.g. Indian Ridge). (Storm Water Management Workshop, October 21, 2008)

The priority areas were determined from reports of basement backups to the Village: 1) East of Harms, 2) Park Manor, and 3) Winnetka/Shermer (Figure 2-16). Problems in the area east of Harms are exacerbated by the fact that the Metropolitan Water Reclamation District of Greater Chicago's Harms Road Interceptor backs up into this area.

Magnitude and Severity

Backups occur during medium to large storm events. During the September 2008 storm, approximately 127 homes reported sewer backups.

Historical Events

The flooding in September 2008 strained the Village's storm and sanitary sewers and led to basement backups in multiple areas of the Village. Backups have also been experienced during lesser storm events.

Frequency

The base flood is the one percent chance flood, i.e., the flood that has one percent (one out of 100) chance of occurring in any given year. The one percent chance flood has also been called the 100-year flood. Minor drainages are typically designed to pass a 10-year event, or a ten percent chance event.

Vulnerability

Health and Safety Hazards: Health and safety hazards come from the fact that there is sewage in the backed up water. Backed up sewers create a significant health problem, even in empty basements. Clean up must be careful and thorough to ensure there are no lingering hazards. The health, mental health, and non-economic impacts are similar to those described for overbank flooding

Safety hazard: Low

Health hazard: High

Economic: Flood insurance does not cover sewer backup. Most structures should be covered under standard homeowners/property insurance. Other economic impacts can

result from loss of income if businesses are impacted, however closures could be anticipated to last less than a few days.

Overall economic impact: Moderate

Potential Losses

Sewer backups in basements can effectively destroy many basement contents. Finished basements, with carpeting and furniture, are especially susceptible to damage. Even in unfinished basements, water damages washing machines, dryers, furnaces, water heaters, and utilities. Since flood insurance does not cover sewer backup, there are no insurance figures to base the cost of property damage. Such flooding can be shallow or deep and can affect finished or unfinished basements.

2.9 - AREAS OF CONCERN

All areas in Glenview are equally exposed to all hazards except flooding and sewer backups. Areas of concern include areas of potential flooding including repetitive loss areas, areas prone to sewer backups, and areas containing critical facilities.

Critical facilities are buildings and infrastructure whose exposure to damage can affect the well being of a large group. For example, the impact of a flood or tornado on a hospital is greater than on a home or most businesses. Generally, critical facilities fall into two categories:

- Buildings or locations vital to public safety and the disaster response and recovery effort, such as police and fire stations and telephone exchanges, and
- Buildings or locations that, if damaged, would create secondary disasters. Examples of such buildings or locations are hazardous materials facilities and nursing homes.

For this mitigation planning effort, the following the categories summarized in the below are included in the definition of critical facilities

TABLE 2-12: Summary of types of critical facilities and their description.

Type of Facility	Description
Essential Facility	Essential to health and welfare of the Village and especially important following hazard events; hospitals, police and fire stations, emergency operation centers, evacuation shelters, schools
Transportation System	Airways, highways, railways, waterways

Type of Facility	Description
Lifeline Utility System	Potable water, wastewater, oil, natural gas, electric power, communication
High Potential Loss Facilities	Facilities that would have a high loss associated with them; nuclear power plants, dams, military installations
Hazardous Material Facilities	Include facilities housing industrial/hazardous materials such as corrosives, explosives, flammable materials, radioactive materials, and toxins.

Critical Facilities

Summarized in Table 2-13 are the critical facilities and infrastructure in the Village.

TABLE 2-13: Summary of critical facilities and infrastructure located in the Village

Name	Location Size (sq. ft.)	In flood plain?	Sewer Backup Problem Area?
Essential Facilities			
Village Hall	1225 Waukegan Rd	--	--
Capital Projects Building	1370 Shermer Rd	--	--
Public Works	1333 Shermer Rd	--	--
NIPSTA*	2300 Patriot Blvd	--	--
Police Station	2500 East Lake Ave	--	--
Fire Station 6 (Headquarters)	1815 Glenview Rd	--	--
Fire Station 7	3507 Glenview Rd.	--	--
Fire Station 8	1901 Landwehr Rd.	--	--
Fire Station 13	831 East Lake Ave.	--	--

Name	Location Size (sq. ft.)	In flood plain?	Sewer Backup Problem Area?
Fire Station 14	2250 Patriot Blvd	--	--
Glenbrook Hospital	2100 Pfingsten Rd	--	Yes
Children's Memorial Hospital	2100 Pfingsten Rd	--	--
Public Library	1930 Glenview Rd	--	Yes
Post Office	1400 Patriot Blvd	--	--
Willowbrook Elementary School	2500 Happy Hollow Rd	--	Yes
Pleasant Ridge Elementary School	1730 Sunset Ridge Rd	--	--
Glen Grove Elementary School	3900 Glenview Rd	--	--
Henry Winkelman Elementary School	1919 Landwehr Rd	--	--
Hoffman Elementary School	2000 Harrison St	--	Yes
Springman Middle School	2701 Central Rd	--	--
Attea Middle School	2500 Chestnut Ave	--	--
Glenbrook South High School	4000 W Lake Ave	--	--
Special Populations			
Glenview Terrace	1511 Greenwood Rd	--	--
Maryhaven Nursing & Rehab Center	1700 E Lake Ave	--	--
Abington of Glenview	3901 Glenview Rd	--	--
Orchard Village	418 Hazelwood Ln	--	--
Glenview Senior Center	2400 Chestnut Ave	--	--
Classic Residences by Hyatt	2500 Indigo Lane	--	--

Name	Location Size (sq. ft.)	In flood plain?	Sewer Backup Problem Area?
Depot Square Senior Housing	1220 Depot	500-year	--
Belmont Village	2200 Golf Rd	--	--
Transportation Systems			
Downtown Train Station	1116 Depot St	--	--
Metra Station @ Glen	3000 Old Willow Rd	--	--
Lifeline Utility Systems			
North Maine	Various	Yes	--
Pump Stations	Various	Yes	Yes
Water Stations	Various	Yes	--
High Potential Loss Facilities			
Wyndham	1400 N Milwaukee	--	--
Staybridge Suites	2600 Lehigh	--	--
Motel 6	1535 Milwaukee Ave	--	--
Baymont Inn	1625 Milwaukee Ave	--	--
Marriot	1801 Milwaukee Ave	--	--
Glen Tower Center	1951 Tower Drive	--	--
Kraft	1 Kraft Court	--	--
Caremark	2211-2215 Sanders	--	--
Haverford	2600 Waukegan	--	--

Name	Location Size (sq. ft.)	In flood plain?	Sewer Backup Problem Area?
Hazardous Material Facilities			
Citgo Glenview	750 Waukegan Rd	--	--
Minuteman Glenview	242 Waukegan Rd	--	--
Citgo Foodshop	1533 Waukegan Rd	--	--
B&G Oil Inc	451 Glenview Rd	--	Yes
7-Eleven	2200 Waukegan Rd # F	--	--
Harmswood Automotive	451 Glenview Rd	--	Yes
Glenview Shell	3255 Central Rd	--	--
7-Eleven	3120 Glenview Rd	--	--
Six J's Inc	601 Greenwood Rd	--	--
Sunset Propane	2450 Waukegan Rd	--	--
C&M Auto Services	835 Milwaukee Ave	--	--
Cultural Resources			
Wagner Farm	1510 Wagner Road	--	--
Glenview Historical Society	1121 Waukegan Road	--	--
Park Center	2400 Chestnut Ave # P	--	--
The Grove	1421 N Milwaukee Ave	--	--
*Northeastern Illinois Public Safety Training Academy			

VULNERABILITY

The vulnerability of critical facilities and infrastructure, as identified in the 2007 State Plan, for each hazard is summarized below.

TABLE 2-14: Facility vulnerability to Severe Storms and Tornadoes

Type of Facility	Vulnerability
Critical Buildings	Damage or destroy facilities, thus cutting off vital services to the citizens in that area
Parks	Can fell trees, cut power, and deposit debris, rendering park unsafe and forcing it to close
Communication Infrastructure	Lightning from severe storms can disrupt radio and telephone communications. High winds from severe storms can fell telecommunications lines and radio towers
Bridges over Waterways	Storms and Tornadoes can deposit debris on the bridge deck and approaches, closing the bridge to traffic
Natural Gas Transmission Lines	Where natural gas lines are exposed above ground they are vulnerable to the high winds of severe storms and tornadoes
Roads	Can deposit debris on roadways closing them to traffic
Electrical Lines and Relay Stations	Can knock down power lines and disrupt service

TABLE 2-15: Facility vulnerability to Severe Winter Storms

Type of Facility	Vulnerability
Critical Buildings	Can cut off access to facilities by blocking roads. This not only prevents the public from traveling to the facility to access the services provided there, it can also degrade the emergency response capabilities emanating from that facility
Parks	Can block roads, blocking access
Communication Infrastructure	Can also sever land-based telecommunications lines when the lines are covered with more snow and ice than the line can support
Bridges over Waterways	Can also block traffic with large amounts of snow

Type of Facility	Vulnerability
Natural Gas Transmission Lines	Effects are minimal
Roads	Can block roadways with large amounts of snow and ice
Electrical Lines and Relay Stations	Can bring down power lines, when they deposit large amounts of snow and ice on them

Table 2-16: Facility vulnerability to Floods

Type of Facility	Vulnerability
Critical Buildings	Can inundate the facility rendering it inoperable
Parks	Inundate park area, forcing closure and costing local revenue
Communication Infrastructure	Can inundate communications centers, telecommunications lines and radio towers rendering them inoperable
Bridges over Waterways	Can inundate the approaches to the bridge causing the bridge to be closed to traffic
Natural Gas Transmission Lines	Effects are minimal
Roads	Can inundate or washout roadways rendering them impassable to traffic. The number one cause of death from flooding is drowning caused by people trying to drive cars through moving water
Electrical Lines and Relay Stations	Can inundate Relay Stations and render them inoperable

TABLE 2-17: Facility vulnerability to Extreme Heat

Type of Facility	Vulnerability
Critical Buildings	Effects are minimal
Parks	Park use may be down during episodes of extreme heat, however effects are minimal.
Communication Infrastructure	Can cause power outages that may have a detrimental effect on the communications infrastructure
Bridges over Waterways	Effects are minimal
Natural Gas Transmission Lines	Effects are minimal
Roads	Can cause roadways to buckle, posing a hazard to traffic
Electrical Lines and Relay Stations	Can cause power outages when increased public demand for power outpaces the generating station's ability to produce power

TABLE 2-18: Facility vulnerability to Drought

Type of Facility	Vulnerability
Critical Buildings	Effects are minimal
Parks	Degrade negotiation under severe conditions, causing loss of appeal and tourist revenue
Communication Infrastructure	Effects are minimal
Bridges over Waterways	Effects are minimal
Natural Gas Transmission Lines	Effects are minimal
Roads	Effects are minimal
Electrical Lines and Relay Stations	Has no significant impact on power stations. Less than one-tenth of one percent of Illinois's power comes from hydroelectric dams

TABLE 2-19: Facility vulnerability to Earthquake

Type of Facility	Vulnerability
Critical Buildings	Can destroy buildings, cut power and block access to the facility, rendering it inoperable to the detriment of the community
Parks	Can fell trees and buildings and destroy access roads
Communication Infrastructure	Can bring down radio towers, telephone lines and/or the communications centers themselves
Bridges over Waterways	Can destroy bridges and their approaches
Natural Gas Transmission Lines	Can rupture Natural Gas Transmission Lines, resulting in a loss of service and a potential fire hazard
Roads	Can sever roadways and stop the flow of traffic
Electrical Lines and Relay Stations	Can sever transmission lines and destroy generation and relay stations

TABLE 2-20: Facility vulnerability to Sewer Backups

Type of Facility	Vulnerability
Critical Buildings	Create hazards in buildings causing them to be inoperable until cleanup is possible
Parks	Effects are minimal
Communication Infrastructure	Effects are minimal
Bridges over Waterways	Effects are minimal
Natural Gas Transmission Lines	Effects are minimal
Roads	Effects are minimal
Electrical Lines and Relay Stations	Effects are minimal

Critical facilities located in the floodplain are summarized in Figures 2-17 and 2-18.

FIGURE 2-17: Location of Village Critical Facilities in Relation to Floodplains.

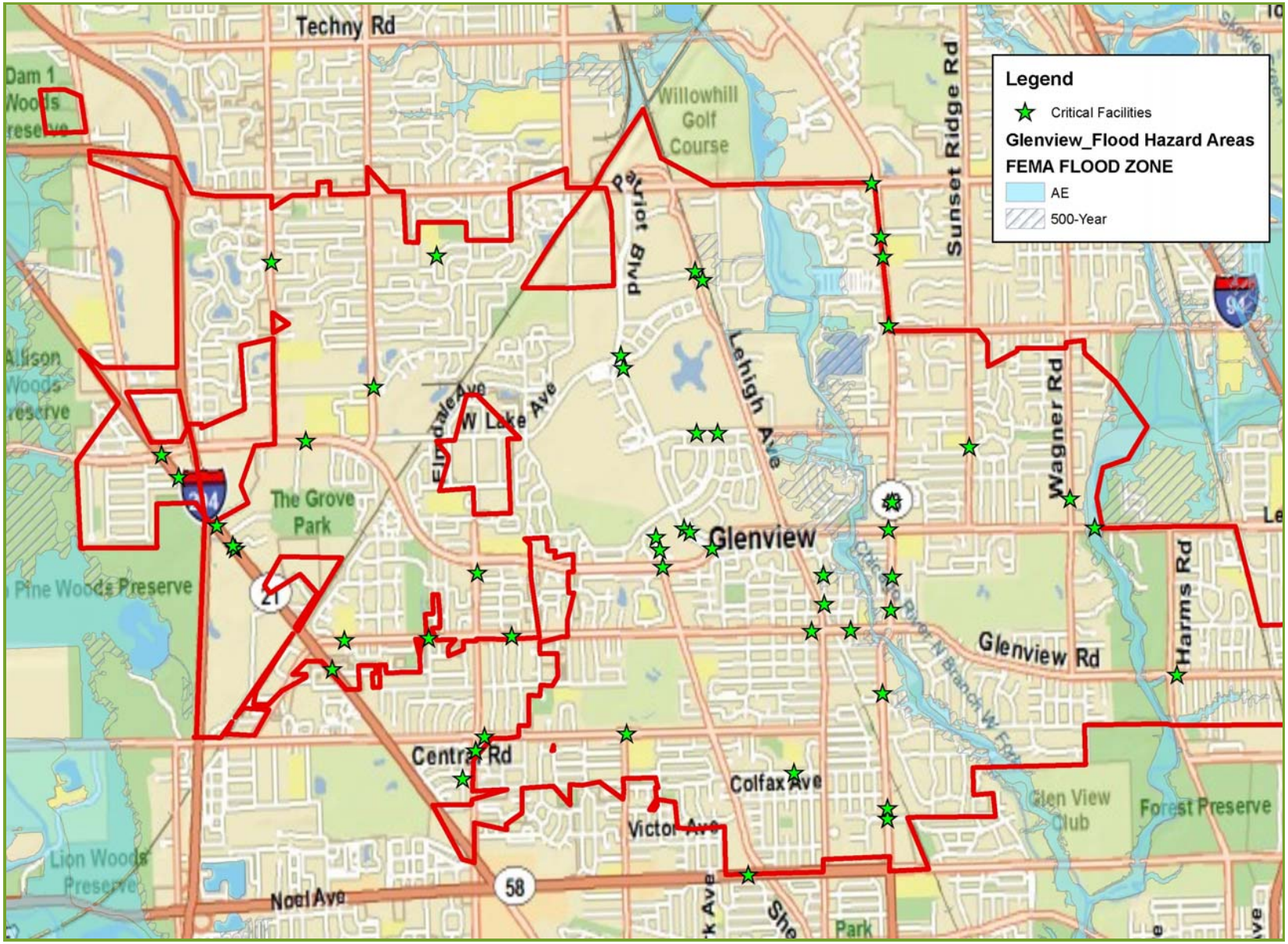


FIGURE 2-18: Village Critical Facility Within a Defined Floodplain

Repetitive Loss Areas

As of this time, no FEMA identified Repetitive Loss Areas exist within the Village. The Village has however identified 4 areas of repetitive flood concern, these include:

- Tall Trees
- Pine Street (just south of Lake Ave)
- South Circles and
- East of Harms

Potential Losses

Potential losses to repetitive loss areas included structural damage due to floods, roadway closures from overtopping, emergency management expenses, roadway damages from flooding, and the impacts to the community of such closures (detour delays and excess mileage).

2.10 - HAZARD PRIORITIZATION

Hazards were prioritized on a Countywide scale in the 2007 State Plan. To help prioritize hazards within the Village, the Village considered the ranking identified in the 2007 State Plan as well as local impacts associated with each Hazard. Hazard ratings for the County, as determined in the 2007 State Plan, were based on a combination of frequency of occurrence and severity of impacts. The following categories were used in the 2007 State Plan prioritization:

- Historical/Probability - Identifying what has occurred in the past to project the probability for future occurrences;
- Vulnerability - Potential residents impacted resulting from vulnerability assessment;
- Severity of Impact – Potential dollar impacts resulting from vulnerability assessment;
- Population – Considering both existing and future population trends; and
- Economic Impact – Specific impacts experienced by the Village.

Each prioritization criteria is scored on a scale of low, medium and high, and is assigned a numerical score based on the grading scales shown below. Ultimately, these scores were totaled and used to help prioritize the potential hazard impacts for the purpose of identifying mitigation priorities for the County. The ratings were ranked, in order of decreasing severity, as Severe, High, Elevated, Guarded, and Low.

Hazards that were not considered, because the likelihood is extremely low or not applicable to the MHMP area, are: avalanche, dam failure, coastal erosion, coastal storm, expansive soils, hurricane, land subsidence, landslide, levee failure, tsunami, volcano, and wildfire.

The local impact is based on the impact, locally, to safety and health, economic impacts, and the potential level of severity that can be experienced in the Village. Individual local impact rankings are based on a score of 3-High, 2-Moderate, 1-Low. The total village priority is based on the sum of the State ranking and the individual local impact ranking:

- Severe – score of 17 to 20
- High – score of 13 to 16
- Moderate – score of 10 to 12
- Low – score of 6 to 9

TABLE 2-21: Prioritization of potential hazards in the Village of Glenview

Potential Hazard	State Priority	Local Impact					Village Priority	
		Frequency	Safety	Health	Economic	Severity	Score	Rank
Floods/Local Drainage	High (4)	Moderate (2)	Moderate (2)	Moderate (2)	High (3)	High (3)	16	High
Severe Storms	Severe (5)	High (3)	Moderate (2)	Low (1)	Moderate (2)	High (3)	16	High
Severe Winter Storms	Severe (5)	High (3)	Moderate (2)	Moderate (2)	Low (1)	High (3)	16	High
Tornadoes	High (4)	Low (1)	High (3)	Low (1)	High (3)	High (3)	15	High
Extreme Heat	High (4)	Moderate (2)	High (3)	Moderate (2)	Low (1)	High (3)	15	High
Sewer Backups	Not Rated -assume same as Flood (4)	Moderate (2)	Low (1)	Moderate (2)	Moderate (2)	High (3)	14	High
Earthquake	Guarded (2)	Low (1)	High (3)	Low (1)	Low (1)	Low (1)	9	Low
Drought	Guarded (2)	None (0)	Low (1)	Low (1)	Low (1)	Low (1)	6	Low

CHAPTER 3 – PREVENTATIVE MEASURES

3.1 - DEVELOPMENT TRENDS

Since the Village is already fully developed, little change in the existing sewer system load is expected. With public information efforts on sewer backup protection and infiltration and inflow reduction (discussed in Chapter 2.8), it is not expected that this problem will worsen over time.

3.2 - PREVENTATIVE MEASURES

Preventive measures, in the form of planning and regulations, can help to reduce the impact of future events. Seven types of preventive measures were considered:

- Planning and Zoning
- Open Space Preservation
- Floodplain regulations
- Subdivision regulations
- Storm water management
- Building code
- Development incentives

Planning and Zoning

General: Planning and zoning activities direct development away from hazardous areas, especially floodplains and wetlands. Reserving flood hazard areas for open space, parking lots, backyards, or similar low-damage activities could reduce the impacts of floods. Land use plans are used to plan proposed appropriate uses. However, a land use plan is just a guide for what the community would like to see. Authority to implement a plan is found in the zoning ordinance, capital improvements program and subdivision ordinance.

A zoning ordinance regulates development by dividing the community into zoning districts and setting development criteria for each district. Appropriate zoning districts for a floodplain include public use, conservation, agriculture, and low-density residential development. Public use and conservation generally require public ownership of the land to avoid a legal challenge that the restrictions are so severe they amount to a “taking” of the land.

A capital improvements program identifies where major public expenditures will be made over the next 5-20 years. These include acquisition of land for public uses, such as parkland, and extension of roads and utilities. If the long-range plan calls for preserving the floodplain as open space, then the capital improvements program should support the plan by acquiring flood prone areas for park and by not improving or extending roads into the floodplain.

The Village of Glenview’s Planning and Zoning: In 2004, the Village updated the Comprehensive Plan for the purpose of guiding the Village in its planning efforts over the next 10 years. The plan sets the stage for the zoning districts (Figure 2-17). Establishing zoning districts provides the Village with the regulatory authority to limit development in hazardous areas. In the North Branch Chicago River floodplain through the Village, the zoning districts match the current land uses.

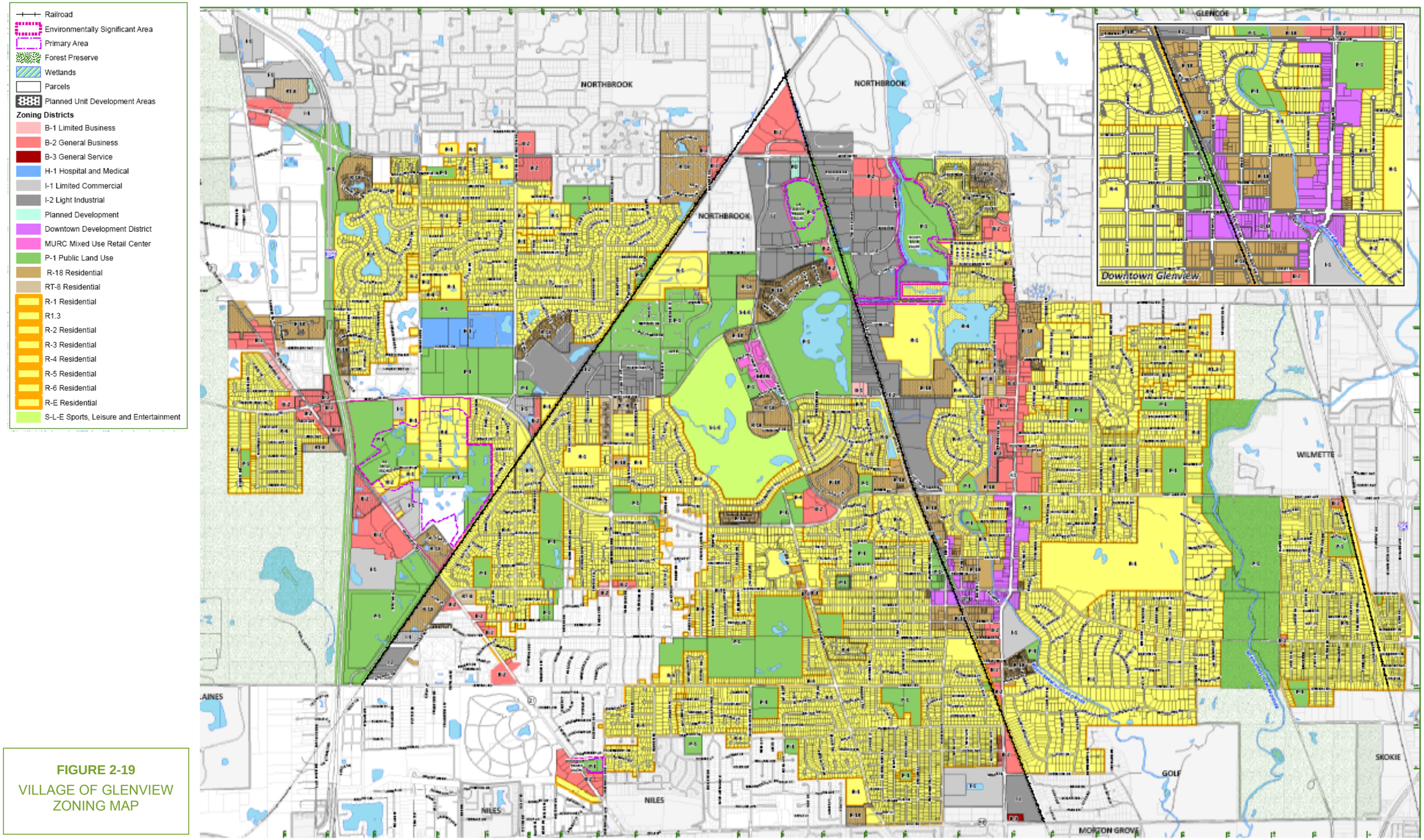


FIGURE 2-19
VILLAGE OF GLENVIEW ZONING MAP

The impact of a zoning ordinance is primarily in vacant areas. Mostly planned residential and business development is on the perimeter of the Village. The floodplains areas have mixed zoning of residential, business and industrial.

CRS Credit: Up to 100 points are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan.

Open Space Preservation

General: Preserving open space in hazardous areas has two benefits: it prevents hazardous development and it provides attractive sites for parks and recreation. While this can be expensive, there are sources of financial assistance for park acquisition or development. Many communities have been successful in getting owners to donate land for tax purposes or to ensure it is kept open for future generations to enjoy.

As an alternative to public ownership, an easement can be purchased. With an easement, the owner is able to develop and use his or her private property but is paid to not build on the flood prone part or the part set aside in the easement. In some cases, the owner is allowed to develop the area for low hazard uses or to transfer the right to develop other flood-free parcels (known as "TDR" or transfer of development rights).

Easements do not always have to be purchased. Flood flow, drainage, or maintenance easements can be required of developers as a condition of approval of the development. These are usually linear parcels along property lines or streams. Maintenance easements can also be negotiated with riverside property owners in return for a community channel maintenance program.

The Village of Glenview's Open Space: As shown in Figure 2.17 - Zoning Map, some of the Village's floodplains and wetlands are in publicly owned open spaces. These parcels represent about 34% of the total floodplain. Preserving more acreage, especially to provide waterfront greenways and trails, has support from both residents and regional plans.

CRS Credit: Preserving flood-prone areas as open space is one of the highest priorities of the CRS. Up to 700 points can be given, based on how much of the floodplain is in parks, forest preserves, golf courses, undeveloped floodway or other uses that can be depended on to stay open. Additional credit is provided if there are deed restrictions on the parcels.

Subdivision Regulations

General: A subdivision ordinance comes into effect after the zoning ordinance has identified where various land uses are appropriate. If the zoning for a site allows buildings, these regulations set protection standards for the streets, utility lines, and other infrastructure.

Subdivision regulations govern the development of large vacant areas that the developer intends to subdivide into individual lots. They set the construction and location standards for the infrastructure provided by the developer, including the roads, sidewalks, utility lines, storm

sewers and drainage ways. Subdivision regulations often require that every lot have an area large enough to build on that is entirely above the flood level. If they don't, the building code or a separate floodplain ordinance should provide flood protection standards for building construction. These should include criteria to ensure that the foundation will withstand flood forces and that all damageable portions of the building are above or protected from floodwaters.

The Village of Glenview's Regulations: Since the Village is almost entirely urbanized; there are few opportunities for new subdivisions of land. The Village however has enacted a subdivision ordinance with flood protection provisions, these regulations control new development and redevelopment within the Village, including any potential future areas of incorporation.

The Village's subdivision regulations are in Chapter 66 of the Municipal Code. The Municipal Code can be accessed at http://www.glenview.il.us/municipal_code.shtml.

CRS Credit: Up to 25 points are provided for requiring that new streets in a floodplain be elevated to no more than one foot below the flood elevation. There are no CRS credits for requirements for hazards other than flooding.

Building Code

General: Building codes provide one of the best methods of addressing all the hazards in this plan. They are the prime measure to protect new property from damage by floods, earthquakes, tornadoes, high winds, ice, and snow. When properly designed and constructed according to code, the average building can withstand the impacts of most of these forces.

Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Provisions that should be included are:

- Making sure roofing systems can handle high winds and expected snow loads,
- Providing special standards for tying the roof, walls and foundation together to resist the effects of wind,
- Including insulation standards that ensure protection from extreme heat and cold as well as energy efficiency,
- Regulating overhanging masonry elements that can fall during an earthquake,
- Ensuring that foundations are strong enough for earth movement and that all structural elements are properly connected to the foundation, and
- Mandating overhead sewers for all new basements to prevent sewer backup.

Most communities in Illinois with building codes adopted the National Building Code of the Building Officials and Code Administrators (BOCA) and/or the One and Two Family Dwelling Unit Code published by the Council of American Building Officials (CABO). These standard building codes provide the basis for good building safety programs, especially protection from fire and electrical hazards.

However, the BOCA and CABO codes are not "state of the art" when it comes to addressing natural hazards. They are being replaced by the new International Code series, which is highly recommended by FEMA because it has so many provisions for protection against the forces of natural hazards.

Just as important as the code standards is the enforcement of the code. There were many reports of buildings that lost their roofs during Hurricane Andrew because sloppy construction practices did not put enough nails in them. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly anchored requires site inspections at each step.

There is a national program that measures local building code natural hazard protection standards and code administration. The Building Code Effectiveness Grading Schedule (BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. It is similar to the 15-year old Community Rating System and the century-old fire insurance rating scheme: building permit programs are reviewed and scored, a class 1 community is the best, and a class 10 community has little or no program. BCEGS grading includes a review of the municipality's building codes, building plan approval process, and field inspection process. BCEGS classifications are used in insurance underwriting, so communities with a high BCEGS score are eligible for insurance rating credits.

The Village of Glenview's Regulations: Glenview has adopted the 2006 edition of the One and Two Family Dwelling Unit Code published by the Council of American Building Officials (CABO) and has incorporated it as Chapter 18: Building and Building Regulations, within the Glenview Code of Ordinances.

As of this plan development, the Village of Glenview has not undergone a BCEGS evaluation, but may want to consider an evaluation as a BCEGS score demonstrates to your citizens that the Village has well-enforced, up-to-date codes that are shown to minimize catastrophe-related damage. Additionally, this score translates into lowered insurance costs for its citizens and gives the Village an incentive to enforce their building codes.

CRS Credit: The CRS provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved. The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's BCEGS classification and points are awarded for adopting the International Code series. Up to 120 points are possible. The CRS also has a prerequisite for a community to attain a CRS Class 8 or better: the community must have a BCEGS class of 6 or better. To attain a CRS Class 4 or better, the community must have a BCEGS class of 5 or better. In other words, a strong building code program is a must to do well in the CRS.

Floodplain Regulations

General: Most flood prone communities participate in the National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA). As a

condition of making federally supported flood insurance available for their residents, the communities agree to regulate new construction in the base floodplain. These regulations must also meet additional requirements of the Illinois Department of Natural Resources (IDNR).

The Village of Glenview's Regulations: The Village has included Floodplain development requirements in their Subdivision Ordinances (Chapter 66, Article IV, Division 2). This ordinance places additional restrictions on any development within the base floodplain. These regulations require that the proposed developments, facilities, and utilities are located and constructed to minimize or eliminate flood damage and that adequate drainage is provided.

The Village's subdivision code requires detailed information to be furnished with the preliminary plans for each proposed subdivision which involves any portion of the base flood area. Furthermore, any land lying wholly or partially in the base flood area may be laid out and platted as building lots or parcels, provided, a building site not lower than the base flood elevation, plus one foot: 1) exists on the high part of the lot or parcel; 2) will be built up during execution of the subdivision improvement plan through general excavation or filling; or 3) can be provided with excavation taken from within the area of the lot or parcel.

Filling within the floodplain may be required to meet the above stipulations. Such filling is allowed as long as it is compensated for and balanced by at least 150% volume of excavation taken from below the high water elevation. Additionally, all streets within a floodplain should have a finished surface elevation not less than the BFE and all underground utilities shall be constructed in solid, compacted earth and located to minimize damage from a potential flood in the floodplain. All sanitary manholes within a floodplain shall have rim elevations at lest 1-foot above the BFE or must be provided with watertight, lock-type covers to minimize storm water intrusion.

The Village of Glenview's Regulatory Floodplain and Floodway: Only "appropriate uses" are allowed in the floodway. The floodway is the channel and central portion of the floodplain that is needed to convey the base flood. Appropriate uses include flood control structures, recreational facilities, detached garages and accessory structures, flood proofing activities, and other minor alterations. They do not include buildings, building additions, fences, or storage of materials.

Larger projects in the floodway (and projects undertaken by the Village) require a permit from IDNR in addition to a Village permit. The result of this requirement is that vacant floodways will essentially remain as open space, free of insurable buildings or other obstructions.

The volume of flood storage that fill or a structure will displace must be compensated by excavating and removing at least 150% of the volume displaced storage volume caused by that fill or structure.

New buildings must be protected from damage by the base flood. A residential building must be elevated so that its lowest floor is above the flood protection elevation, which is one foot above

the base flood. A non-residential building must be elevated or flood proofed to flood protection elevation.

When an addition exceeds 20% of the building's floor area or an addition, improvement or repair to an existing building is valued at more than 50% of the value of the original building, then it is considered a substantial improvement. Substantial improvements are treated as new buildings and the addition or the building must comply with the previous requirement. In the case of remodeling or repairs, the entire building must be elevated (non-residential buildings may be flood proofed).

The ordinance's regulatory standards are worthless if they are not properly enforced. FEMA and IEMA conduct periodic "community assistance visits" to determine how well a community is administering its obligation to the NFIP.

CRS Credit: CRS credit is provided for both higher regulatory standards in the floodplain and runoff management standards for new developments. Credit is based on how those standards exceed the minimum NFIP requirements.

Storm Water Management

General: Floodplain regulations address development in the path of flooding. Flooding can also be increased by development outside the floodplain. When an area is urbanized, i.e., converted from farms, forests and fields to buildings and streets, the ground surface becomes more impervious. More storm water runs off the land instead of soaking in.

At the same time, developers build gutters, sewers, and ditches to move surface water as fast as possible downhill to the river channels. Not only does this aggravate downstream flooding, it often overloads the community's drainage system. The alternative, a storm water management regulation, requires developers to incorporate retention or detention basins to ensure that the rate of runoff after development is no greater than under pre-development conditions.

Storm water management requirements for detention are generally found in ordinances governing subdivisions and larger new developments. Many developments utilize wet or dry basins as landscaping amenities. Larger detention basins are more effective than smaller ones, which drain relatively quickly. In some cases, advance community planning identifies the most effective location for a basin and requires developers to contribute funds for it in lieu of constructing on-site detention.

The Village's Storm Water Management: The Village's subdivision ordinance sets engineering construction standards for storm sewers and the use of streets for local drainage. Additional storm water management provisions can be found in the Village Storm Water Management and Flood Control Ordinances. These provisions require that for storm sewers that all flows resulting from the 10-yr rainfall event contained in pipe and that overland flow have a maximum (100-yr) depth of 9 inches. Detention, volume reductions, and runoff rate control provisions for new construction and redevelopment are contained within the Cook County Watershed Management Ordinance and the MWRD Development Ordinance.

The Cook County Watershed Management Ordinance: The Cook County Watershed Management Ordinance, pending at the time of report preparation, includes additional volume reduction and runoff rate control provisions including retaining 1 inch of runoff from impervious area for volume reduction purposes, and controlling the rate of runoff for the 2-year (0.04 cfs) and 100-year (0.15 cfs) storms.

Detention requirements are set by the Metropolitan Water Reclamation District of Greater Chicago (MWRD): MWRD is concerned about excess storm water overloading its combined sewers or flooding its wastewater treatment plants. It has had storm water regulations in effect since the early 1970's. Before a new development can connect to sewers that MWRD serves, it must apply for a permit and show that it meets MWRD's detention standards.

MWRD's regulations only affect single-family residential developments equal to or greater than ten acres and other developments equal to or greater than five acres. These developments must restrict the peak discharge from their sites during a base storm to that of a 3-year storm's release under pre-development conditions.

CRS Credit: CRS focuses on activities that directly affect flood damage to insurable buildings. There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as protected from development by ownership or local regulations.

Development Incentives

General: Regulatory approaches react to developers' proposals. They set limits on what private property owners can do, but they do not promote certain types of development. Development incentives are one way a community can take the initiative to encourage appropriate development of flood prone areas.

Various incentives have been devised around the country to encourage developers to settle in a community and/or to exceed minimum zoning ordinance requirements and development regulations. Incentives include tax credits and density trade-offs.

Alternate approaches to storm water regulations include fee-in-lieu-of detention with fees contributing to a regional or central detention facility. Incentives and alternate approaches can be developed in cooperation with landowners and developers to accomplish mutually supportive objectives.

The Village's Incentive Programs:

There are currently no development incentives related to storm water in the Village.

3.3- CONCLUSIONS

Preventive measures are designed to keep the problem from getting worse by ensuring that future development does not increase hazard damages. The Village utilizes most of the commonly used measures:

- Zoning
- Open space preservation
- Building code
- Floodplain ordinance
- Storm water management regulations

Further, the Village has developed the following tools that can help reduce the impacts from hazards:

- Comprehensive plan
- Capital improvements program
- A Nature Plan in Glenview (http://www.glenview.il.us/departments/public_works/natural_resources/natural_resources.shtml)

Because there is little vacant land available for development, the measures that would be most effective in a developed community such as the Village are building codes and floodplain regulations.

3.4 - RECOMMENDATIONS

- Adopt the latest international series of codes, the new national standard that is being adopted throughout the Country.
- Apply for Village's BCEGS rating.
- Incorporate open space provisions in the Village's comprehensive plan, land use plans and zoning ordinances that will protect properties from flooding and preserve natural areas such as wetlands.
- Ensure that design, construction or permitting for critical facilities accounts for natural hazards and adjacent land uses.
- Implement a development incentive program for storm water.

CHAPTER 4 – EMERGENCY MANAGEMENT AND RESPONSE

As used in this plan, the term "emergency management" means those measures that protect people and property during an emergency. Emergency service measures protect lives and property. Emergency services have been traditionally framed around the cycle of emergency preparedness, warning, response, and recovery. Mitigation has been added to this cycle for the purpose of reducing the impact of natural hazards and the recovery needs. The importance of preparedness, warning and response are emphasized through mitigation.

The Cook County Emergency Management Agency (CCEMA) coordinates emergency management services in Cook County. The Illinois Emergency Management Agency (IEMA) coordinates the state response to emergencies. The Glenview Emergency Management Agency coordinates the efforts in the Village.

The Village has an Emergency Operations Plan (EOP), based on the authority of the State of Illinois Emergency Management Act, that guides the Village's emergency management activities during and following an emergency. The EOP focuses on emergency management capable of operating in any type of emergency or disaster whether natural, technological or civil. Natural hazards identified in the EOP include floods, severe and excessive heat or cold, severe storms, tornadoes, winter storms, and earthquakes. The EOP is activated upon the declaration of a local emergency or disaster. As such, preparedness activities taken prior to the onset of an emergency or disaster are not addressed in the EOP.

The Village President or his emergency interim successor acts as the Principal Executive Officer and is responsible for all emergency operations within the Village. Department heads responsible to the Village President are responsible for providing direction to department personnel and mutual aid resources in accordance with the direction of the Village President.

Different departments are assigned primary and support responsibilities for different disaster response duties in the Emergency Operations Plan (TABLE 4-1). These assignments are shown in the table below for each of the main annexes to the plan.

TABLE 4-1: Responsibility Matrix (P – Primary Support; S – Support)

	VMO	Finance	EMA Coordinator	Police	Fire	911 Center	Public Works	Public Health	Building/ Zoning	Other Department/ Agencies	American Red Cross
EOC	--	--	S	P	--	S	--	--	--	--	--
EMA	--	--	P	--	S	--	--	--	--	--	--
Law Enforcement	--	--	--	P	--	--	--	--	--	--	--
Fire and EMS	--	--	--	--	P	--	--	--	--	--	--
Public Works	--	--	--	--	--	--	P	--	--	--	--
Communications	S	--	--	--	--	P	--	--	--	--	--
Warning/Emergency Information	--	--	S	S	S	P	--	--	--	S	--
Public Information	P	--	S	--	--	S	--	--	--	--	--

	VMO	Finance	EMA Coordinator	Police	Fire	911 Center	Public Works	Public Health	Building/ Zoning	Other Department/ Agencies	American Red Cross
Damage Assessment	--	--	--	S	S	--	S	--	P	--	--
Evacuation	--	--	--	P	S	--	S	--	--	--	--
Mass Care	--	--	--	--	--	--	--	P	--	--	S
Health and Medical	--	--	P	--	S	--	--	S	--	--	--
Animal Care and Relief	--	--	--	P	--	--	--	--	--	--	--
Mortuary	--	--	--	--	--	--	--	P	--	S	--
Resource Management	P	S	S	--	--	--	--	--	--	--	--
Volunteers	--	--	--	--	--	--	--	--	--	--	P
Donations	--	--	--	--	--	--	--	--	--	--	P
Hazardous Materials	--	--	--	--	P	--	--	--	--	--	--

A good emergency management program addresses natural hazards, and it involves all municipal departments (Table 4-1). This chapter reviews emergency management activities that relate to natural hazards and identifies how the Village addresses these activities. There are four basic parts to emergency management in response to a natural hazard: threat recognition, warning, response, and critical facilities protection.

4.1 - THREAT RECOGNITION

Planning resources and personnel are all important elements of preparedness. Threat recognition is also important. The first step in responding to a flood, tornado, storm or other natural hazard is the knowledge of when weather conditions are such that an event could occur. With a proper and timely threat recognitions system, adequate warnings can be disseminated.

Floods

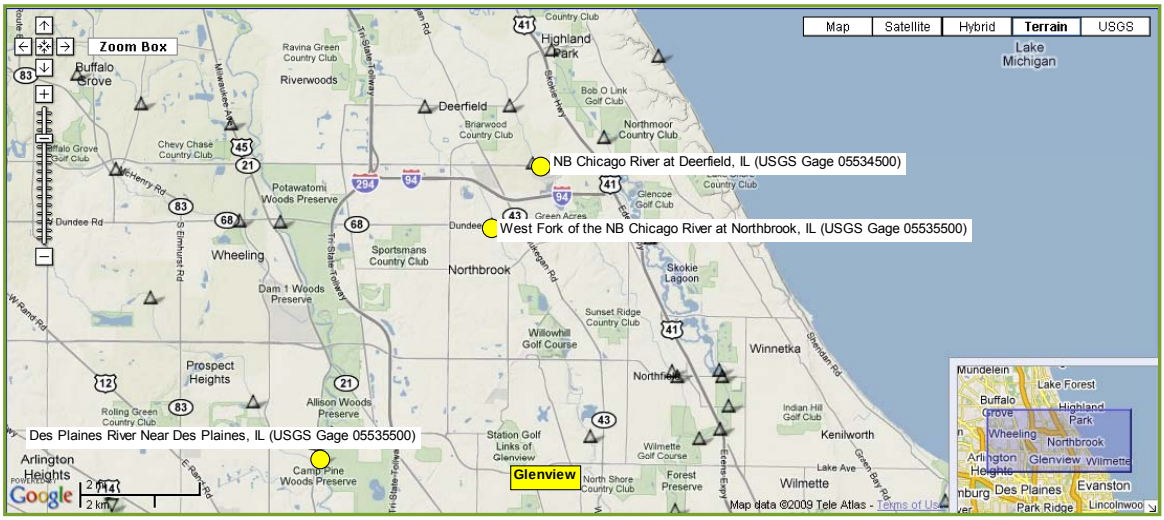
A flood threat recognition system predicts the time and height of the flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the Village and calculating subsequent flood levels. On rivers the measuring and calculating of flood events is done by the National Weather Service (NWS), which is in the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Support of NOAA's efforts is provided by the United States Geological Service (USGS), and the Illinois Department of Natural Resources (IDNR).

Forecasts of expected river stages are made through the Advanced Hydrologic Prediction Service (AHPS) of the NWS. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAAS Weather Radio is considered by the federal government to be the official source for weather information.

When weather conditions are right for potential flooding, the NWS is able to issue a specific prediction of when and how high the major rivers affecting the Village will peak. NWS can also issue more general flood statements on smaller streams. The NWS may issue a "flash flood watch". This means the amount of rain expected will cause standing water and flooding on small streams and digressional area. However, these events can be very localized and rapid so that a "flash flood warning" may not be issued.

Local Implementation: Real-time stream gage readings for sites on the Des Plaines River and the North Branch of the Chicago River can be accessed on the Internet at the USGS National Water Information System website (http://waterdata.usgs.gov/il/nwis/rt). There are three real-time stream gages operating on the Des Plaines River and the NB of the Chicago River (Figure 4-1).

FIGURE 4-1: Real-time stream gages near Glenview, IL.



The NWS Weather Forecast Office at Chicago, IL (http://www.crh.noaa.gov/lot) monitors rainfall and stream gage information and issues river forecasts within 48 hours at the Des Plaines Gage at Des Plaines and further north on the Des Plaines River at Gurnee. Daily precipitation radar figures are also provided.

Winter Storms

NWS is the prime agency for predicting winter storms. Severe snowstorms can often be forecasted days in advance of the expected event, which allows time for warning and preparation. Though more difficult, the NWS can also forecast ice storms. (http://www.nws.noaa.gov/forecasts/graphical/sectors/uppermissvly.php)

Tornadoes and Thunderstorms

NWS is the prime agency for detecting meteorological threats, such as tornadoes and thunderstorms. Severe weather warnings are transmitted through the Illinois State Police Law Enforcement Agencies Data System (LEADS) and through the NOAA Weather Radio System.

As with floods, the Federal agency can only look at the large scale, e.g. whether conditions are appropriate for formation of a tornado. For tornadoes and thunderstorms, local emergency managers can provide more site-specific and timely recognition by sending out NWS trained spotters to watch skies when the NWS issues a watch or warning.

Glenview Village's System

The Village operates an E-9-1-1 Emergency Dispatch Center that monitors LEADS, weather bulletins, and flood watches and warnings. In the event that conditions are likely for a flood, the 911 Center informs appropriate offices, who monitor water heights on the Des Plain River and the NB of the Chicago River. Staff communicates with communities surrounding the Village during a potential flood situation. Trained spotters are sent to watch the sky when tornadoes threaten.

CRS Credit

Credit can be received for utilizing certain gages used for forecasting. The actual points are based on how much the Village's floodplain is subject to flooding by the gauged stream. This credit for flood threat recognition is a prerequisite for any other credit under Activity 610 (Flood Warning Program).

4.2 - WARNING

After the threat recognition system tells the Emergency Management Coordinator (EMC) for the Village that a flood, tornado, thunderstorm, winter storm or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities, as identified in the Village's EOP. The earlier and the more specific the warning, the greater the number of people who can implement protection measures.

The NWS issues notices to the public using two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
Warning: a flood, tornado, etc. has started or has been observed.

A more specific warning may be disseminated by the community in a variety of ways, the following are the common methods:

- Outdoor warning sirens
- Sirens on public safety vehicles
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Door-to-door contact
- Mobile public address systems

- E-mail notifications

Multiple or redundant systems are most effective − if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their radios or televisions, but not everyone has a Weather Radio.
- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television.
- Automated telephone notification services are also fast, but can be expensive and do not work when phones lines are down. Nor do they work for unlisted numbers and calling screener services, although individuals can sign up for notifications.
- Where a threat has a longer lead-time (e.g., flooding along the Little Calumet River), going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do. A warning program should have a public information aspect. People need to know the difference between a tornado warning (when they should seek shelter in a basement) and a flood warning (when they should stay out of basements).

StormReady

The National Weather Service established the Storm-Ready program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated as a StormReady community by the Weather Service is a good measure of a community's emergency warning program for weather hazards and is also credited by the Community Rating System.

Local Implementation

Depending on the type of emergency and the time available to make a warning, notifications may be made in several ways, including but not limited to:

- Village's Siren Warning System – used to warn residents when a tornado has been sighted or is approaching the Village
- Cable and local TV
- Public Radio
- Public address system of Police and Fire
- Door to door by police, fire, Public Works, EMA volunteers
- Village web site or email notification system
- Emergency Telephone Notification System (ETNS) – Designed to dial 60,000 numbers per hour, the system passes information along regarding evacuations and shelter locations, shelter-in-place orders, flood warnings, extended utility interruptions, public health incidents, and specific police operations.

The Emergency Management Coordinator Director or his designee issues the warning.

Residents are informed of "warning" activities in the Village of Glenview Resident Handbook (2008).

The Village has not applied for StormReady status. There are 47 StormReady communities in Illinois, seven of which are in Cook County. DuPage County, is a StormReady County. (www.nws.noaa.gov/stormready/)

CRS Credit

CRS points are based on the number and types of warning media that can reach the communities flood prone population. Depending on the location, communities can receive up to 25 points for the sirens and more points for additional measures. The CRS encourages redundant systems, so the points are additive, up to a maximum of 60 under Activity 610 (Flood Warning Program). However, the flood warning system must be described in a written and adopted flood response plan that relates predicted flood heights to specific warning actions.

The Village's EOP does not have the level of detail needed for CRS credit. For example, it does not mention monitoring National Weather Service predictions of flood heights, the purpose of the EOP is what to do AFTER the event has been declared.

4.3 - RESPONSE

The protection of life and property is the foremost important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency management)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Ordering an evacuation (chief elected official)
- Holding children at school/releasing children from school (school district)

- Opening evacuation shelters (Red Cross)
- Monitoring water levels (engineering)
- Security and other protection measures (police)

Local Implementation

Municipalities are responsible for warnings in their incorporated areas, and fire protection districts for their areas of service, until all of their resources are exhausted. If the severity or extent of an emergency were to exceed any municipality's capability, County emergency management will be able to provide additional resources and assistance.

The Villages EOP helps ensure appropriate response activities for expected threats. The EOP was developed in coordination with the local agencies and offices that with responsibilities during an event. The Village's EOP is updated annually to keep contact names and telephone numbers current and to make sure that supplies and equipment are available. The EOP should be critiqued and revised, if necessary, after disasters and drills to take advantage of lessons learned and changing conditions.

The Village's response activities involve Emergency Management, Police, Fire/EMS, and Public Works, with additional assistance provided by the County and State if necessary. Response activities include warning, evacuation, fire fighting and rescue, emergency medical services, and other similar operations addressed in the Village's EOP. The Village's responsibility matrix is given in TABLE 4-1.

The village's Emergency Operations Center (EOC) contains the most up to date maps, aerial photographs and diagrams detailing major village infrastructure. The village's master resource list is also located in the EOC. These resources would be used to assist planners, responders, and crisis managers as needed.

The Village's EOP does not provide specific response procedures to a specific natural disaster event, such as tornadoes, winter storms, and flooding.

CRS Credit

Credit of up to 50 points is available for a community's flood response efforts. Currently the Village's EOP does not include actions specific to flooding that would qualify for credit. Using a flood stage forecast map, the Village could determine what key flood activities need to be monitored at various river stages.

4.4 - CRITICAL FACILITIES PROTECTION

Protecting critical facilities during a disaster is the responsibility of the facility owner or operator. However, if they are not prepared for an emergency, the rest of the community could be impacted. If a critical facility is damaged, workers and resources may be unnecessarily drawn away from other disaster response efforts. If the owner or operator adequately prepares such a facility, it will be better able to support the community's emergency response efforts.

Many critical facilities have full-time professional managers or staff who are responsible for the facility during a disaster. Some have their own emergency response plans. Illinois state law requires hospitals, nursing homes, and other public health facilities to develop such plans. Many facilities would benefit from early warning, response planning, and coordination with community response efforts.

Local Implementation

The Village's critical facilities are discussed in Section 2.9 of this plan.

4.5 - RECOVERY AND MITIGATION

After a disaster, communities should undertake activities to protect public health and safety, facilitate recovery, and help prepare people and property for the next disaster. Throughout the recover phase, everyone wants to get "back to normal". The problem is, "normal" means the way they were before the disaster, exposed to repeated damage from future disasters.

Appropriate measures include the following:

Recover Actions

- Patrolling evacuated areas to prevent looting
- Providing safe drinking water
- Monitoring for diseases
- Vaccinating residents for tetanus
- Clearing streets
- Cleaning up debris and garbage
- Regulating reconstruction to ensure that it meets all code requirements

Mitigation Actions

- Conducting a public information effort to advise residents about mitigation measures they can incorporate into their reconstruction work
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs
- Acquiring substantially or repeatedly damaged properties from willing sellers
- Planning for long-term mitigation activities
- Applying for post-disaster mitigation funds

Local Implementation

Following activation of the Village's EOP, the process of developing a preliminary damage assessment, or CCSEMA Incident Flash Report, will begin. The assessment is designed to provide a geographic overview of the damaged/impacted area, makeup of the area (e.g. residential, commercial, industrial, etc.), and a foundation for the deployment of emergency response resources. This preliminary damage assessment is submitted to IEMA. Incident Flash Reports are submitted to the County Sheriff's Emergency Management Agency.

Following preliminary assessment, the Village will conduct a formal damage survey using The Village of Glenview Disaster Situation Report. During the damage assessment process the Village's Individual Assessment (IA) teams will conduct safety inspections to determine habitability of damaged structures. Residential properties will be inspected using the Village's Building Codes. Business properties will be inspected using the BOCA code.

Special requirements apply to buildings in the floodplain and the floodway, regardless of the type of disaster or cause of damage. The National Flood Insurance Program requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building in the floodplain must be elevated above the base flood elevation. State law prohibits the re-building of substantially damaged buildings in the floodway. The Village is responsible for floodplain regulations as a condition of their good standing with the NFIP.

4.6 - CONCLUSIONS

- Emergency management planning in the Village is ongoing and generally comprehensive.
- Flood stage and time predictions are available for the Des Plaines River, the West Fork of the NB of the Chicago River and the NB of the Chicago River. However, to be useful, the Village needs to be able to access the NWS predictions and convert the data to sites within the Village. NWS does not provide flood threat predictions on the NB of the Chicago River.
- Threat recognition in the County for severe weather hazards (tornadoes, thunderstorms, and winter storms) is relatively good.
- The Village has effective means to disseminate warnings to the general public.
- The Village has successfully responded to recent disasters, including floods. However, the EOP does not provide enough specific guidance to qualify for credit under the Community Rating System.

4.7 - RECOMMENDATIONS

- Continue to update the Village's EOP every year.
- A flood stage forecast map should be prepared for the Village to provide real-time capabilities. This map should form the basis for a flood-specific emergency response plan or annex to the Village's EOP that would qualify for CRS credit.
- The Village should qualify for, and apply to be, a StormReady community.

- The Village should work with flood prone critical facilities to develop hazard emergency response plans for each, coordinated with the Village's emergency operations.

CHAPTER 5 - MITIGATION STRATEGY

5.1 - MITIGATION GOALS

The Village Hazard Mitigation Planning Committee met to review the risk assessment and to discuss the goals and objectives of the Village's MHMP. The Village's goals are long-term general guidelines to establish and serve as the Village's vision and direction for hazard mitigation and loss reduction measures. The overriding goal is to reduce damages to people and property from natural hazards. The committee adopted the following goals:

- Goal 1: Protect the people of the Village of Glenview, their homes and their health, from the dangers of natural hazards.
- Goal 2: Place a priority on protecting public services, including critical facilities, utilities and schools.
- Goal 3: Increase public awareness about the hazards to facilitate support for and adoption of mitigation actions.
- Goal 4: Protect open space, wetlands and natural areas for the public to enjoy and to prevent inappropriate development in hazardous areas.

The goals will be obtained with the following objectives through mitigation strategies to

- Protect properties and critical facilities and infrastructure from damages from natural hazards;
- Protect public services;
- Encourage businesses and property owners to adopt appropriate mitigation actions to reduce storm water runoff;
- Develop education and outreach programs to reach all citizens regarding potential natural hazards;
- Establish preventive measures to reduce future impacts.

5.2 - MITIGATION MEASURE CATEGORIES

To assist in listing mitigation activities, the Planning Committee was provided with a list of the six mitigation measure categories from the *FEMA State and Local Mitigation Planning How to Guides* as follows:

- **Prevention**: Government, administrative, or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

- **Property Protection**: Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**: Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- **Natural Resource Protection**: Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services**: Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects**: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

The development of the MHMP is the first step in a multi-step process to implement projects and policies to mitigate hazards in the Village. The list of potential mitigation actions/projects identified by the committee to reduce or eliminate damages is summarized in the following sections.

5.3 - POTENTIAL MITIGATION MEASURES

Severe Storms

There are many mitigation measures that can be used to reduce or eliminate damages from severe storms. During severe storms property can be damaged by through electrical surges from lightning, hail, high winds and flash floods. Many retrofitting techniques can be applied to reduce potential damages. Community education and outreach and emergency response are discussed under separate sections.

TABLE 5-1: Hazard Mitigation Strategies – Severe Storm

Hazard	Mitigation Strategy
Lightning	Surge protection can be installed on critical electronic equipment.
	Lightning protection devices and methods, such as lightning rods and grounding, can be installed on a communities infrastructure and other critical facilities.
Hail	Public and private buildings can be designed with structural bracing, shutters, laminated glass in windowpanes, and hail-resistant roof shingles or flashing.
High Winds	Encourage wind engineering measures and construction techniques that may include structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles.
	Loose items like yard and patio furniture should be secured.
	Temporary debris disposal sites can be protected by fencing and/or located away from populated areas.
	Tree management through pruning near power lines can reduce the potential for trees falling on and breaking power lines.
	Designed-failure mode refers to power line design that allows for lines to fall or fail in small sections rather than as a complete system, so restoration can be done more quickly.
Flash Floods	Mitigation strategies discussed under “Flooding” also apply here, such as flood proofing, capital improvements, drainage control, etc.
General	Buried power lines offer the security of uninterrupted power during and after storms. However, consideration needs to be made for maintenance and repair, particularly in cold climates where soil freezes more readily.
	Backup power resources can enable critical facilities to continue basic services and can be used by businesses to ensure security and protect refrigerated goods.

5.3 Severe Winter Storms

There are many mitigation measures that can be used to reduce or eliminate damages from severe winter storms. During severe winter storms property can be damaged through ice covered power and utility lines, collapse of roofs from snow loads, and snow and ice covered roadways. Community education and outreach and emergency response are discussed under separate chapters.

TABLE 5-2: Hazard Mitigation Strategies – Sever Winter Storms

Hazard	Mitigation Strategy
Ice	Burying or otherwise protecting electric and other utility lines can prevent utility disruption by protecting lines from ice, wind or snow damage. Nevertheless, lines buried in frozen soil may be difficult to reach if repair is necessary.
	Home and public building maintenance should be encouraged in order to prevent roof and wall damage from "ice dams," particularly resulting from ice and sleet storms.
Snow	The Village can impact building/site design through building code enforcement of snow-related ordinances such as snow loads, roof slope, snow removal, and storage designed for local snow load limits.
	A single snow load weight capacity standard may not be adequate for all areas within a community. The Village building departments should determine the snow load limits for their communities based on local data. The Village building code can include snow load limits or weight capacity standards in an appendix.
	Existing support systems may be vulnerable to load stress. A community may wish to set up an inspection system and recommend repairs to building owners.
	Snow fences or "living snow fences" (rows of trees or other vegetation) can limit blowing and drifting snow over critical roadway segments.
General	Building owners should be educated and encouraged to inspect older buildings for deterioration and make subsequent repairs.
	Retrofits could include improved insulation to better withstand drops in temperature.

Floods

When a flood occurs, damage to property and critical facilities can be high. If flood damage cannot be fully prevented, there are mitigation measure techniques that can be implemented to lessen the damage.

Property damage can be eliminated in flood prone areas through land acquisition. The land is be purchased by and titled in the name of the Village, who then can remove the structures and enforce permanent restrictions on development by converting to open space. Structure relocation to a less hazardous location is another methodology that can be applied to reduce or eliminate the potential for damage. When acquisition and relocation are not options, a structure may be elevated (mechanically lifted) so that the lowest floor, including the basement, is raised above the base flood elevation. Utilities or other mechanical devices should also be raised.

Structures can be retrofitted through dry- or wet-flood proofing to reduce damages. Dry-flood proofing helps to keep water out by strengthening walls, sealing openings, or using waterproof compounds or plastic sheeting on walls. Dry-floodproofing is not recommended for residential construction but may be a reasonable alternative for non-residential structures—either in new construction, while making a substantial improvement, or while repairing a substantially damaged structure. Wet-Flood may be preferable to attempting to keep water out completely, because it allows for controlled flooding to balance exterior and interior water forces and discourage structural collapse. This is done by using water resistant paints or other materials that allow for easy cleanup after floodwater exposure in accessory structures or in a garage area below an elevated residential structure. In a basement, wet-flood proofing may not be used for in cases of new construction, substantial improvement, or substantial damage.

Levees, floodwalls and berms can be used keep floodwaters from reaching a building. They are useful only in areas subject to shallow flooding. They can surround the entire building, tie into high ground, or be as small as a low floodwall built around a stairwell to protect a basement or split-level home. Care must be taken in locating barriers. They must be placed so as not to create flooding or drainage problems on neighboring properties. All barriers must be kept out of the regulatory floodway.

Flood mitigation can involve installing, re-routing, or increasing the capacity of a storm drainage system that may involve detention and retention ponds, drainage easements, or creeks and streams. It can include separation of storm and sanitary sewerage systems as well as higher engineering standards for drain and sewer capacity. At most times, a drainage system will do its job and move water to intended areas. However, if a system is not maintained, erosion, material dumping, or deterioration of man-made reinforcement materials may reduce the carrying capacity of a stream. Therefore, regular maintenance, such as sediment and debris clearance, is needed so that the stream may carry out its design function. Also important is detection and prevention/discouragement of discharges into storm-water/sewer systems from home footing drains, downspouts or sump pumps.

Roads are needed to get people and goods from place to place. In addition to planning for traffic control during floods, there are various construction and placement factors to consider when building roads. To maintain dry access, roads should be elevated above the base flood elevation. However, if a road creates a barrier it can cause water to pond. Where ponding is problematic, drainage and flow may be addressed by making changes to culvert size and placement. In situations where flood waters tend to wash roads out, construction, reconstruction, or repair can include not only attention to drainage but also stabilization or armoring of vulnerable shoulders or embankments.

A community may consider back-up generators for pumping and lift stations in sanitary sewer systems, along with other measures (e.g., alarms, meters, remote controls, and switchgear upgrades).

The SWTF has analyzed many mitigation measures through the course of their monthly meetings. Mitigation goals and measures that were discussed are outlined below.

TABLE 5-3: Hazard Mitigation Goals – Strategies

Potential Mitigation Goals	Discussed Mitigation Strategies
Lower flood levels	Reduce local discharge rates to rivers
	Promote regional reduction of flood flows
Isolate Glenview properties from flood waters	Levee/backflow prevention and pumping station
	Compensatory storage
Individual Property Solutions	Private floodproofing
	Property buy-outs
Control local discharge rates to rivers	Promote "green" infrastructure (reduce imperviousness)
	Evaluate options for increased retention/detention
Promote regional reduction of flood flows	Increased flood storage within watershed
	Potential diversion of flood flows
Potential flood protection systems	Area-specific assessments of feasibility, benefit/cost
Support private floodproofing efforts	Potential public/private cost share for projects

After an in-depth discussion of the above mitigation goals and strategies, the SWTF determined the following specific goals for flood mitigation:

The primary hazard mitigation goal is to reduce volume and rate of runoff through the following options:

1. Incentive-based program supported by public education
2. Required storm water volume and rate reduction elements (low impact design and/or stormwater treatment mechanisms) for all new development and redevelopment projects (public and private)
3. Comprehensive implementation plan with specific targets for volume and rate reduction

Extreme Heat

Extreme heat can cause roads to buckle. Design standards could be implanted to reduce the potential for road buckling on critical routes. Community education and outreach and emergency response are discussed under separate chapters.

Tornadoes

Like severe winds, tornadoes can cause extensive damage to structures. It may not be possible to entirely prevent damage, but damages can be minimized. Community education and outreach and emergency response are discussed under separate chapters. Other potential tornado mitigation strategies are discussed in Table 5.4 below.

TABLE 5-4: Tornado Mitigation Strategies

Hazard	Mitigation Strategy
Wind	To strengthen public and private structures against severe wind damage, the Village can require or encourage wind engineering measures and construction techniques that may include structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles.
	Architectural design can make roofs less susceptible to uplift.
Wind	Risk to lives can be improved through construction and use of concrete safe rooms in homes and shelter areas of mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas.
	Loose items like yard and patio furniture should be secured.
	Temporary debris disposal sites can be protected by fencing and/or located away from populated areas.
General	Buried power lines offer the security of uninterrupted power during and after storms. However, consideration needs to be made for maintenance and repair, particularly in cold climates where soil freezes more readily.
	Backup power resources can enable critical facilities to continue basic services and can be used by businesses to ensure security and protect refrigerated goods.

Drought

Drought conditions do have little to no impact on property damages within the Village, thus mitigation strategies to address drought conditions are not a priority of the Village at this time.

Earthquakes

Although high magnitude earthquakes have a low probability of occurring in the region, they are still likely. Homeowners and businesses can take simple measures to strengthen their buildings. While some of these measures are simple and inexpensive and may be cost effective for a home or business, they may not be sufficient for protection of critical facilities. Fire stations need to be sure that they can open their doors and hospitals must be strong enough to continue operating during the shocks and aftershocks. Community education and outreach and emergency response are discussed under separate chapters. Other potential earthquake mitigation strategies are discussed in Table 5.5 below.

TABLE 5-5: Earthquake Mitigation Strategies

Hazard	Mitigation Strategy
Earthquake	Tie down appliances, water heaters, bookcases and fragile furniture so they won't fall over during a quake.
Earthquake	Installing flexible utility connections may also minimize damages.
	Structural Retrofitting - Bracing walls and bolting sill plates to the foundation are examples. Non-reinforced masonry buildings and non-ductile concrete facilities are particularly vulnerable to ground shaking. These buildings should be strengthened and retrofitted against future seismic events.
	Identification and hardening of critical lifeline systems, i.e., critical public services such as utilities and roads, to meet "Seismic Design Guidelines and Standards for Lifelines," or equivalent standards, may distinguish a manageable earthquake from a social and economic catastrophe.
	State and local highway departments should review construction plans for all bridges to determine their susceptibility to collapse. Problem bridges should be retrofitted.

Sewer Backups

Sewer backups can cause extensive damage in basements. The Village Municipal Code includes wastewater ordinances that prohibit the discharge of storm water into the sanitary system. It has been determined that the main cause of sewer backups in the Village is from inflow and infiltration (I/I) of storm water into the sanitary sewer system and about 60% of the excess I/I entering the sanitary system originates from privately owned sources. To properly address basement backups, these sources need to be eliminated.

The Village has developed a plan, the Sanitary System Capital Improvement Program Addressing Sanitary Sewer Surcharging Events Fiscal Years 2009-2015 (SSCIP), to identify the sources of I/I, address storm flow from private residences, and address surface flooding

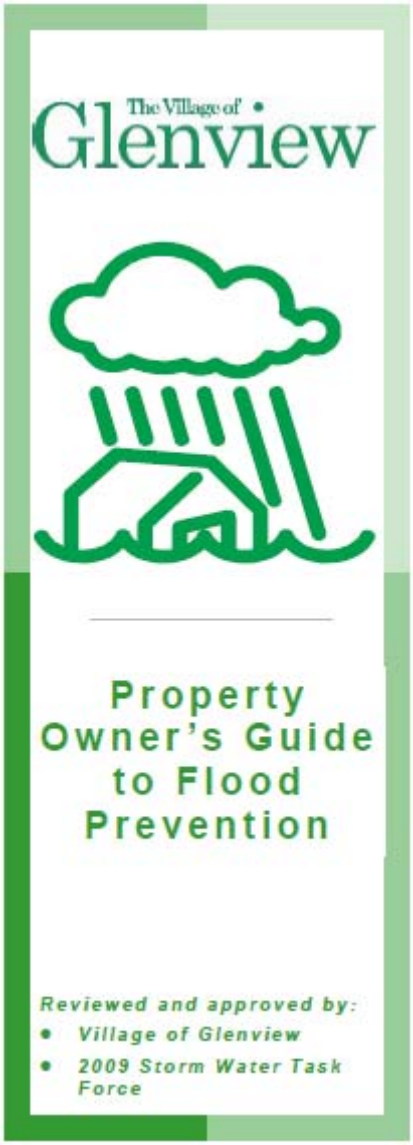
problems to reduce the volume of water able to enter the sanitary sewer system. In order to fully correct the problem, all categories must be addressed. Potential strategies for mitigation of sanitary sewer backups are discussed in Table 5-6 below.

TABLE 5-6: Mitigation Strategies for Sanitary Sewer Backups

Hazard	Mitigation Strategy
Identify System Defects	Flow metering to help identify amount if inflow and infiltration reduction required.
	Identify sewer defects and cross-connections through smoke testing.
	Conduct manhole inspections to identify sources of I/I.
Identify System Defects	Video sewer system in problem areas, including private service connections.
Sewer Rehabilitation	Conduct sewer rehabilitation and lining program where needed.
Eliminate Private Sources	Conduct inspections, with dye testing, of parcels in problem areas to confirm
Code Enforcement	All teardowns will require elimination of foundation drains and any other prohibited sources per new construction requirements and will include replacement of the services lateral, including connection to the receiving sewer.
	All home additions requiring an upgrade to the water service will require a home inspection for I/I sources and video of service lateral for Village review. The service lateral will then be replaced or lined pending condition.
	All storm sumps and downspouts that are connected to the sanitary sewer system identified during a building inspection are to be rerouted to an outside discharge or storm sewer. This was part of a previous Village program done in coordination with the MWRDGC.

Public Outreach

Hazard mitigation public information activities advise property owners, renters, business, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take steps necessary to protect themselves and others. A successful hazard mitigation program involves a public information strategy and involves both the public and private sectors.



Outreach Projects

Outreach projects are the first step in the process of orienting property owners to property protection and assisting them in taking appropriate steps or designing and implementing a project. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties. Sending notices to property owners can help introduce the idea of property protection and identify sources of assistance.

Numerous government agencies and non-profit organizations publish public information and guidance regarding hazards and hazard mitigation for outreach purposes. Providing technical assistance and library resources are other forms of outreach. The challenge is to have these efforts effectively reach their intended audience.

Community newsletters/direct mailings: One of the most effective types of outreach projects are mailed or distributed to everyone in the community or, in the case of floods, to floodplain property owners. Research has proven that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

News media: Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to whet their interest. After a tornado in another community, people and the media become interested in their tornado hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and cable may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach project approaches include:

- School programs,
- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to hazards (such as floods),
- Brochures available in municipal buildings and libraries, and
- Special meetings such as floodproofing open houses.

The Village of Glenview Report

www.glenview.il.us

March 2009

Storm Water Solutions:

Taking the Time to Do It Right

Why do we need more storm water studies? We know where the Village floods -- why can't we just move ahead and fix the problem? What are we waiting for? Good questions all -- and common ones from residents. To-date, the Storm Water Task Force has held two meetings (see page 2); here's an overview of the **major problem areas** -- some of which can be addressed locally, some regionally. Along the way, we'll try to shed a little light on the complexities involved in managing storm water effectively.

Major Problem Areas

- **Overland flow within Glenview's three regional and 48 local sub-watersheds.** This happens when storm water overwhelms local sewers and above ground flow routes (swales, ditches), or there is a lack of controlled storage. Solutions include more detention and capacity to store and convey water more effectively to our rivers. Detailed studies on where, precisely, the water flows are about 60 percent complete, Village-wide. A full study should be delivered to the Task Force within the next few months.
- **Sanitary surcharge into basements.** The goal here is to keep more storm water out of sanitary sewers with proactive maintenance by both the Village and private home owners. Problem areas have been mapped, and we're focusing on five of Glenview's hardest-hit areas. One is the area east of Harms, and this study relies on the cooperation of the Metropolitan Water Reclamation District (MWRD) and the Cook County Forest Preserve; the Village is working to facilitate those relationships.
- **Regional flood plain back up due to rising river elevations.** This is certainly a major issue -- but one that is regional, primarily to be coordinated by MWRD. As noted in our November issue, MWRD is in the midst of a North Branch of the Chicago River Watershed Study, projected for completion in 2010 and the Village will play a key role. This year, we'll be providing input on this study, proposing responses for areas within our borders, and partnering with MWRD on putting any solutions in place.

Several forks of the Chicago River's North Branch flow downstream into Glenview or its vicinity. The shaded area represents the watershed.

So Why All The Studies?

It's a fact: the Village has limited dollars -- and limited potential to receive State and Federal grants. Comprehensive, careful studies enable us to use these dollars wisely as we seek to address the Village's storm water issues.

First, **detailed studies improve the Village's chances of leveraging grant money** to implement solutions. This is more than speculation: in the Village's long history of seeking State and Federal dollars, approaching these funding sources with detailed information about the problem and implementation plans has always enhanced its chances for support. Such studies help us make our case effectively.

Second, the data gathered through these studies **helps the Village develop alternative solutions and assign implementation costs.** Because our resources *are* finite, developing a priority project list is critical -- we need to focus public spending on solutions that result in the biggest "bang for the buck."

The Storm Water Task Force is working to develop this priority project list; the goal is to complete it by fall. Once the list is complete, it will be presented to the Village Board for their review and decisions about financing the projects. Watch your *Village Report* -- and the Task Force webpage at *www.glenview.il.us* for updates.

Local implementation: The Village's has a monthly community newsletter called the "Village of Glenview Report" and has developed brochures to inform residents about flood prevention.

Various agencies such as FEMA, IEMA and the American Red Cross, offer a variety of brochures and publications on safety measures for floods, winter storms, heat, etc. The Red Cross also conducts specialized programs on topics such as "home alone safety," first aid and CPR, and what to do during a disaster. Information can be found at:

- www.redcross.org/pubs
- www.chicagoredcross.org
- www.fema.gov/help/publications.shtm
- www.state.il.us/iema

Library and Web Sites: The community library and local web sites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources. Books and pamphlets on hazard mitigation can be given to libraries, many of them obtained free from state and federal agencies. Libraries also have their own public information campaigns

with displays, lectures, and other projects, which can augment the activities of the local government.

In addition to on-line floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes, earthquakes and floods and a "FEMA for Kids" site. This website teaches children how to protect their home and what to have in a family disaster kit.

Technical Assistance: Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain.

Communities often supplement what is shown on the FIRM with maps that complement and clarify the FIRM and information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

Property protection assistance: While general information provided by outreach projects or the library helps, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

Building or public works department staff can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Provide advice on protecting windows and garage doors from high winds
- Explain when building permits are needed for home improvements

Real Estate Disclosure: Three regulations, on federal and two state, require that a potential buyer of a parcel be told of their exposure to a hazard. The *Illinois Residential Real Property Disclosure Act* requires a seller to tell a potential buyer if the seller is aware any problems or hazards. Illinois Compiled Statutes require that all subdivision plats show whether any part of the subdivision is located in the 100-year floodplain.

CRS Credit: The Community Rating System provides up to 290 points for outreach projects on flood topics. 100 of those points are for having a public information program strategy. CRS provides up to 30 points for having a variety of flood references in the local public library and up

to 36 more for similar material on municipal web sites. The CRS provides 140 points for providing map information to inquirers. Up to 71 points are available for providing one-on-one flood protection assistance to residents and businesses and making site visits. Both services must be publicized. Communities receive 10 points for the two state laws. More points are awarded for real estate agents who check for and provide flood hazard information.

Other Methods

Insurance

Insurance should not be considered an alternative to reducing damages for any type of hazard, but it does have the value of protecting oneself from financial devastation if damage were to occur. Local governments can work with insurance industry representatives to increase public awareness of the importance of additional insurance (e.g. for floods and earthquakes). Home structural improvements can be factored into the process of obtaining insurance coverage or reduced deductibles.

Technically speaking, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild and potentially afford to incorporate hazard mitigation measures. Insurance has the advantage that, as long as the policy is in force, the property is protected and no human intervention is needed for the measure to work. A standard homeowner's insurance policy will cover a property for the hazards of tornado, wind, hail, and winter storms. Separate endorsements are usually needed for earthquake and flood coverage.

Purchasing flood insurance does not prevent a flood from occurring, but it does mitigate a property owner's financial exposure to loss from flood damage. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. National Flood Insurance Program (NFIP) policies are available for residents in the Village because the Village participates in the program, which is administered by FEMA.

Some people are required to purchase flood insurance because the bank required it when they got a mortgage or home improvement loan. Usually these policies only cover the building's structure and not the contents. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building.

Insurance does not typically cover damage to items such as like the driveways and landscaping. Flood insurance does not cover contents in a basement or the finished structural parts of a basement, such as paneling and wall-to-wall carpeting.

Several insurance companies have sump pump failure or sewer backup coverage that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra and most exclude damage from surface flooding that would be covered by a National Flood Insurance policy.

Many insurance policies will only pay to repair the damage incurred. If damage is severe enough, the owner may have additional costs to bring the building up to current code. Flood insurance now covers these costs (up to $30,000) when there is a flood.

Incentives

Local or state governments can support financial incentives like low interest loans or tax breaks for home and business owners who retrofit their structures against damages from hazards. Sometimes only a little funding is needed to motivate a property owner to implement a retrofitting project.

For example, elevating a building above the base flood elevation will result in a reduction in the flood insurance premium for that building. Although the reduction may be minor when compared to the costs of elevating, it is an incentive that reassures property owners that they are doing the right thing. Other forms of flood proofing are not reflected in the flood insurance rates for residential properties, but they may help with the Community Rating System, which provides a premium reduction for all policies in the community.

Mandates are considered a last resort if information and incentives aren't enough to convince a property owner to take protective actions. One precedent for this is the program of mandatory inspections undertaken by most communities to assure disconnection of downspouts connected to sanitary sewer lines.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project is worth more than 50% of the value of the original building or increases the first floor area by more than 20%, it is considered a "substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive flood protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above flood level or the installation of separate ground fault interrupter circuits in the basement.

Another example is offering adjustments or credits to those who reduce impacts to the overall system. Some communities offer storm water utility rate credits for implementing Best Management Practices that reduce the amount of storm water entering the system through the reduction of impervious area.

Funding Mechanisms

Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are covered in Appendix A of this MHMP.

Communities can help owners by helping to pay for a retrofitting project, just like they pay for flood control projects. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups and other drainage problems that arose from an inadequate public sewer or drain system.

Less expensive community programs include low interest loans and rebates. These approaches do not fully fund the project but they cost the community treasury less and they increase the owner's commitment to a hazard protection project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The more common outside funding sources are listed below. Unfortunately the first five are only available after a hazard has been declared, not before, when damage could be prevented.

- Flood insurance claims — The National Flood Insurance Program's Increased Cost of Compliance provision (which increases the claim payment to cover a flood protection project required by code as a condition to rebuild the flooded building)
- FEMA's disaster assistance (for public properties)
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program
- FEMA's Pre-Disaster Mitigation Program
- FEMA's Flood Mitigation Assistance Program
- Cook County's Community Development Block Grant
- Environmental Protection Agency programs (for sewer backup problems)

5.4 - MITIGATION STRATEGY AND ANALYSIS

Implementation of the mitigation plan is critical to the overall success of the mitigation planning process. The first step is to decide based upon many factors, which action will be undertaken initially. In order to pursue the top priority first, an analysis and prioritization of the actions is important. Some actions may occur before the top priority due to financial, engineering, environmental, permission, and/or site control issues. Public awareness and input of these mitigation actions can increase knowledge to capitalize on funding opportunities and monitoring the progress of an action.

The Planning Committee prioritized mitigation actions based on the Village's goals and objectives, hazard rating, cost benefits, implementation, and funding opportunities. While an official cost benefit review was not conducted for any of the mitigation actions, the estimated costs were discussed, and the overall benefits were considered. Prior to implementing specific projects to meet these various mitigation strategies, the Village will perform a benefit-cost analysis to determine the most cost- effective projects prior to implementation.

Specific Strategies to Reduce or Eliminate Flooding Damages

The Village conducted a detailed analysis to determine flood priority areas and needs and developed mitigation measures to specifically meet those needs. The overall goal of flood mitigation is to reduce volume and rate of runoff through. This goal will be satisfied through the following objectives:

- Incentive-based program supported by public education
- Required element of new development and/or redevelopment projects (public and private)
- Comprehensive implementation plan with specific targets for volume and rate reduction

Mitigation measures and strategies were identified to satisfy the above goals and were identified on a regional basis, local basis and homeowner basis as follows:

- Regional Projects
  - Village should promote projects with regional agencies
  - Modified operation of regional storage
  - Major expansion of regional storage
  - Major diversion of floodwater or conveyance improvement
- Local Projects
  - Isolation of areas from flood levels
- Homeowner Programs
  - Residential floodproofing
  - Potential buyouts of properties with repetitive damages

Village-wide flooding issues were grouped into Tiers. Specific mitigation strategies are discussed for each flood Tier below.

Tier #1 – Sanitary Sewer and Basement Flooding

Tier #2 – Property Damage Flooding of Structures

Tier #3 – Surface Flooding that Impacts Vehicle Access

Tier #4 – Other Localized Flooding

Tier #1 – Sanitary Sewer and Basement Flooding

This is a high priority for the Village. As discussed above, the Village developed the Village of Glenview Sanitary System Capital Improvement Program to address sanitary sewer surcharging events. Projects are prioritized from 2009 through 2015 and funding mechanisms are discussed (e.g. loans, grants, cost sharing program). Mitigation strategies for this program are summarized in Table 5.6. The total cost of the program over the planning period from 2009 through 2015 is projected to be $20.5 million. The Village's current priorities include:

- Completing new sanitary capital improvement projects in worst affected areas as noted in the 2009-20015 Sanitary Sewer Capital Improvement Program.

- Implement a cost-sharing program to retrofit at-risk gravity sanitary sewer systems (new funding will be needed to implement).
- Implement regulatory requirement changes
  - Require sanitary sewer service conversion to over-head system with permits that require a water service upgrade (cost burden will be on homeowner requesting permit).
  - Require ICAP compliance letters by a licensed plumber with permits that include any internal or external plumbing work noting that no cross-connections to the storm sewer system exist (cost burden will be on homeowner requesting permit).

Tier #2 – Property Damage Flooding of Structures

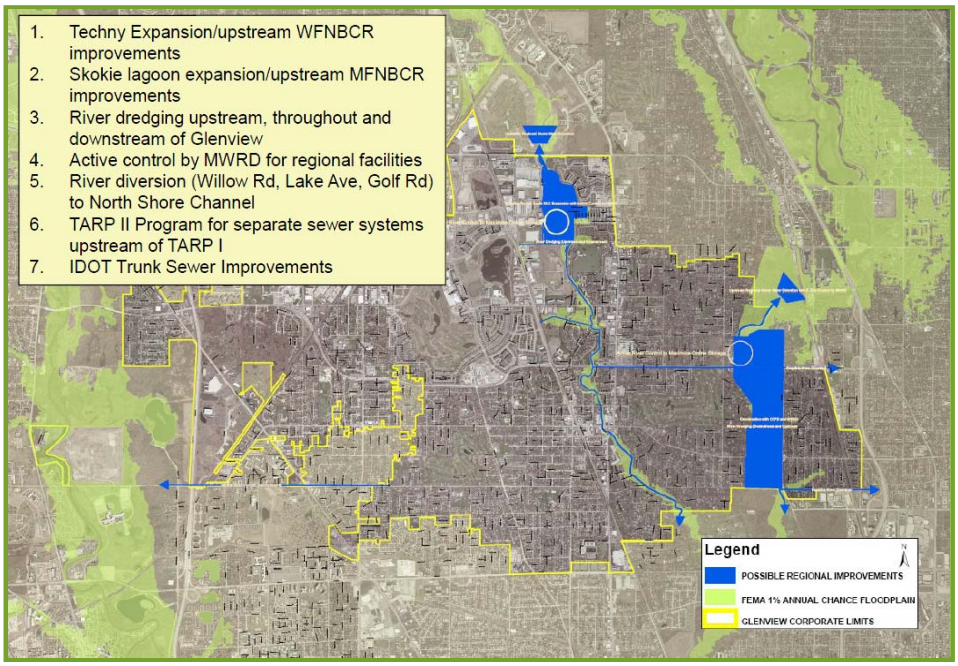
Over-foundation flooding can result from flooding along rivers or low-lying areas that lack adequate drainage and can have severe impacts on property. Mitigation strategies identified by the SWTF for Tier #2 are summarized in Table 5.7. New funding will be needed for Tier #2 strategies for storm water detention.

TABLE 5.7: Mitigation Strategies for Property Damage Flooding of Structures (Tier #2)

Name	Mitigation Strategies
Expand involvement in National Flood Insurance Program	Continue process for Community Rating System (CRS) participation – flood insurance rate reductions of 10-15% possible
	Support State and National Floodplain Mapping Updates
	Provide Elevation Certificate Support
	Provide Flood-proofing Guidance and Education
	Provide Flood Insurance Education
	Investigate Hazard Mitigation Grant Programs with FEMA
Support/Promote/Partner with MWRD and other jurisdictions on regional projects to lower river level during catastrophic events	September 17th – tentative – MWRD NBCR inundation maps
	November/December 2009 – tentative – "possible" projects list for local input
	Beyond – support and partner with MWRD on projects that are beneficial to Glenview (MWRD currently has $50,000,000 annual authority to complete regional improvements, local cost share unknown)
	Evaluate and possibly implement contingency studies for individual floodplain areas (possible buy-outs, partner with other agencies, special services areas)
Prioritize local projects with non-floodplain property	11 projects with total costs in the range of $35 Million (including storage to mitigate downstream flows)

Name	Mitigation Strategies
damage	mitigate downstream flows)
Identify regional flood mitigation to reduce north branch flood levels	See Figure 5–1 below

FIGURE 5-1: Potential regional flood mitigation projects to reduce North Branch Chicago River flood levels.



Tier #3 – Surface Flooding that Impacts Vehicle Access

Flooding of streets to a depth of 10 to 15 inches and beyond can impact the ability of private or emergency vehicles to pass. While this flooding type does not have direct property damage impacts, it can pose a threat to public health and safety. Mitigation strategies for Tier #3 are summarized in Table 5.8. New funding will be needed to implement Tier #3 strategies.

TABLE 5.8: Mitigation Strategies for Surface Flooding that Impacts Vehicle Access (Tier #3)

Name	Mitigation Strategies
Implement prioritized local projects for emergency (15") and local vehicle (10") access problem areas	21 projects with total costs in the range of $50 million
Support/promote/partner with outside agencies where appropriate	Roadways impacted by overbank flooding
	IDOT, Cook County Highway Dept., Township

Tier #4 – Other Localized Flooding

Areas where storm water ponds in streets (less than 10 inches), parks or open space, yards, or other areas without posing a risk to structures or public health and safety. Mitigation strategies for Tier #4 are summarized in Table 5.9. New funding will be needed to implement Tier #4 strategies.

TABLE 5.9: Mitigation Strategies for Other Localized Flooding (Tier #4)

Name	Mitigation Strategies
Maintain current funding to support existing storm sewer system to approved CIP standards	Maintain current funding to support existing storm sewer system to approved CIP standards • 2009 = $1,520,376 • 2010 = $1,581,191 • 2011 = $1,644,439 • 2012 = $1,710,217 • 2013 = $1,778,625 • 2014 = $1,849,770 TOTAL = $8,564,242 for 2010-2014 (goal exists to fund to Village's standard; however, uses general corporate fund)
Continued cost-sharing program for drainage improvements in un-sewered (SWAMP) areas	60%-Resident, 40%-Village • Budget dependent on petitions received and balloting • SWAMP project completed with next typical (20-year cycle) roadway improvement with Village funding for road, water and sanitary improvements necessary
Implement/revise regulatory requirements or Incentives	Draft MWRD volume reductions • Review tear-down/rebuild and substantial building addition permitting requirements • Pervious pavement use (driveways and parking lots) • Sump pump connection requirements • Use of native plantings • Permit fee reductions for rate or volume reduction projects beyond minimum requirements

Name	Mitigation Strategies
	• Sub-SWTF Group to advise staff and Board for long-term
Complete prioritized local projects (considering implementation opportunities)	Severity-extent factors and cost-benefit analysis to prioritize and select projects • 16 projects with total costs in the range of $25 million • New funding needed – How to implement? – Complete with adjacent roadway project (20-year cycle)? – Develop revised/updated SWAMP Program for cost-sharing? – Complete as special service area projects? • Paid for as line item on tax bill over 10, 15 or 20 years • Benefit of Village's AAA bond rating • Village completes design, bidding and project management
Coordination with Other Agencies	Promote coordinated development of multi-use storm water storage facilities at high benefit locations (contingency study underway) – budget = TBD Partner with the Park District to expand ROW rain garden program adjacent to Village parks (Indian Trail/Forest Drive 2008 pilot project) – budget = TBD Complete 2010 Highway Rain Garden pilot project along Waukegan Road (coordinate with Waukegan Corridor improvements) – budget = $20,000
Evaluation of high benefit detention sites	High benefit in terms of flood mitigation • Reduced discharge to area waterways • Reduced loading on trunk storm sewer systems Coordinated planning to maximize potential for multiple use facilities Contingency study underway to note areas where strong benefits for such exist All cost estimates will reflect below-ground storage until agreements for above-ground are reached
BMP Cost-sharing Programs	Continue Village's Rain Garden Grant Program - $15,000 per year (already funded in CIP) Develop Rain Barrel Program partnering with MWRD – nominal operating costs up to 40 barrels per year; $40 per barrel thereafter Develop a holistic drainage and home inspection process Rate or volume reduction project grant program

Other Mitigation Strategies

Strategies and priorities not solely specific to flooding are summarized in Table 5.10. Funding mechanisms will need to be established for all efforts. Hazard mitigation grant funding could be sought for some.

TABLE 5.10: Mitigation Strategies

Mitigation Action	Hazard Addressed	Priority	Responsibility	Comments
Provide website links to hazard information and hazard mitigation information	All	High	Glenview Capital Projects Department	The Village's website is an obvious place for residents to seek information regarding hazards and hazard protection. Cost of implementation should be minimal.
Develop public outreach program to inform residents of types of hazards, instruct residents on what to do during potential hazards, and inform residents of what they can do to minimize damages to their residences.	All	High	Glenview Capital Projects Department & SWTF	The Village has implemented some forms of this strategy. Additional funding could be sought from the Pre-Disaster Mitigation Program.
Amend zoning ordinances to improve floodplain regulations and preserve natural areas such as wetlands, incorporate open space provisions in the Village's comprehensive plan.	Floods, Sewer Backups	High	Glenview Development Department	The Village will review current ordinances. Funding has not been secured.
Conduct earthquake drills and training	Earthquake	Moderate	Glenview Emergency Management Department	Although the frequency of earthquakes is low, the Village is in the proximity of fault zones with the potential of damaging earthquakes.
Provide information on floodplain, flood insurance, etc.	Floods	Moderate	Glenview Capital Projects Department	The Village has implemented some forms of this strategy. Eligible for CRS credit.
Ensure that new construction meets IBC Codes.	Tornado, Storms, Flood, Earthquake	Moderate	Glenview Development Department	Establish stricter building codes.

Mitigation Action	Hazard Addressed	Priority	Responsibility	Comments
Adopt the latest international series of codes (IBC Codes).	Tornado, Storms, Flood, Earthquake	Moderate	Glenview Development Department	The new national standard is being adopted throughout the County.
Establish tree trimming program	Storms	Moderate	Glenview Public Works Department	Work with local utility companies to implement. Reduces potential damages during high wind events.
Harden existing shelters	Tornado, Storms, Flood	Moderate	Glenview Emergency Management Department	The Village will evaluate the cost benefit of shelters and define specific locations. Funding has not been secured as of 2009.
Purchase weather radios for schools and critical facilities	Tornado, Storm, Earthquake	Moderate	Glenview Emergency Management Department	The Village will evaluate facility needs and determine the cost/benefits of the radios. Funding has not been secured as of 2009.
Implement stream maintenance to improve floodplain management	Floods, Sewer Backups	Moderate	Glenview Capital Projects Department	The Village has a developed a "Plan For Nature in Glenview" with recommendations. Funding has not been secured.
Apply for BCEGS rating	Storms, Earthquake, Tornado	Moderate	Glenview Development Department	The Building Code Effectiveness Grading Schedule (BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards.
Join in the Community Rating System	Floods	Moderate	Glenview Capital Projects Department	This will save property owners money on flood insurance premiums and it is effective for implementation of storm water and floodplain management.

CHAPTER 6 – ACTION PLAN

6.1 - ACTION PLAN OVERVIEW

The findings, conclusions and recommendations presented in Chapters 1 through 5 of the Village's Multi-Hazard Mitigation Plan have been aggregated into this Action Plan. The Action Plan presented in this chapter establishes the overall direction of the Village's hazard mitigation program. Specific mitigation activities pursuant to the general direction are detailed in Section 6.2. Section 6.3 addresses plan maintenance.

Recommendations for this MHMP appear at the end of Chapters 3 and 5. This chapter converts those recommendations to specific action items. Action items have been developed for recommendations that are both a priority and feasible in the next few years. Feasibility has to do with current Village resources and the likelihood of grant funding from state and federal agencies. Recommendations not included in the Action Plan are no less important. Some recommendations act as "building blocks" to other recommendations. Some recommendations may not be fundable until mitigation funds are made available following a disaster declaration.

6.2 - MITIGATION ACTION ITEMS

MHMP Adoption

The final Village of Glenview Multi-Hazard Mitigation Plan should be formally adopted by resolution of the Village Board of Trustees. Adoption of the MHMP ensures that the Village is authorized to implement the action items with available resources. Adoption is also a requirement for recognition of the MHMP by mitigation funding programs, including the Disaster Mitigation Act of 2000, the FEMA Flood Mitigation Assistance Program, and the National Flood Insurance Program's community Rating System.

Responsible Agency: Village Board of Trustees

Continuation of Mitigation Planning Committee and SWTF

The Villages resolution to adopt this MHMP should convert the Planning Committee and SWTF to a permanent advisory group. It would:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Allow for continued public participation in the implementation and future revisions;
- Ensure incorporation of this MHMP's goals and guidelines into other planning documents;
- Monitor implementation of this Action Plan;
- Report on the progress and recommended changes to the Director of Capital Projects.

Responsible Agency: Village Capital Projects Department

MHMP Monitoring and Maintenance

A Planning Committee meeting will be held at LEAST once a year to evaluate and monitor progress on implementation. This meeting will be publicized in local newspapers and on the Villages website (the public will be invited to attend and comment). An evaluation report will be submitted to the Village President.

At the annual meeting, along with an assessment of the implementation efforts, the Planning Committee will determine if other mitigation issues or efforts, based on any natural hazard occurrences or input from agencies or the public, should be added to the MHMP.

The MHMP is required by FEMA to be updated every five years. Every five years, or if any substantial revisions to the MHMP are recommended to the Action Plan in any year, the MHMP must be adopted by the Village Board of Trustees.

Responsible Agency: Village Capital Projects Department and Hazard Mitigation Planning Committee/SWTF

Implementation Through Existing Programs

The results of this plan will be incorporated into ongoing planning efforts. Many of the mitigation projects identified as part of this planning process are ongoing. If necessary, the Village will update the planning documents, zoning plans, and ordinances as necessary and as part of regularly scheduled updates.

REFERENCES

- DuPage County Natural Hazards Mitigation Plan, October 2007.
- The Village of Glenview Resident Handbook, 2008.
- The Village of Glenview Emergency Operations Plan.
- Calumet City Natural Hazards Mitigation Plan, 2005 DRAFT.
- Information about the National Flood Insurance Program's Community Rating System can be found at http://www.fema.gov/business/nfip/crs.shtm
- Information on StormReady communities can be found on the NWS website at www.nws.noaa.gov/stormready/
- 2007 Illinois Natural Hazard Mitigation Plan
- Cook County Stormwater Management Plan, February 15, 2007
- Mitigation Ideas, FEMA-R5, 9/02
- Local Multi-Hazard Mitigation Planning Guidance, FEMA July 1, 2008
- State and Local Mitigation Planning how-to-guide: Getting Started, FEMA 386-1, September 2002
- State and Local Mitigation Planning how-to-guide: Understanding Your Risks, FEMA 386-2, August 2001
- State and Local Mitigation Planning how-to-guide: Developing the Mitigation Plan, FEMA 386-3, April 2003
- State and Local Mitigation Planning how-to-guide: Bringing the Plan to Life, FEMA 386-4, August 2003
- NCDC Storm Event Database (http://www4.ncdc.noaa.gov/)
- U.S. Geological Survey
- Illinois State Geological Survey
- NOAA - National Weather Service
- State of Illinois Emergency Management Agency
- Flood Insurance Study for the Village of Glenview (Community #170096), FEMA August 19, 2008
- A Plan for Nature in Glenview Summary Report, February 2009

APPENDIX A

PUBLIC INVOLVEMENT

STORMWATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room

7:00 PM, January 14, 2009

The first workshop commenced promptly at 7:00 PM on January 14, 2009 at the Police Department Community Room. Those in attendance consisted of 12 Committee Members, 4 Village Staff, and 3 MWH staff. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction

The workshop opened with introductions of Committee Members, Village and MWH Staff. Village Staff provided a presentation on the Village Stormwater Management General Background. MWH Staff gave an overview of workshop goals, framework, and committee member roles.

b. *Workshop Topic Discussion*

Sanitary sewer back-up into private residences was the main topic for discussion. Village staff provided a brief background on sanitary sewer surcharging and highlighted the areas most affected. The presentation provided short term solutions and the Village action plan.

c. Action Items Assigned

February's workshop topic discussion will cover flood protection goals and expected levels of service for the Village's Stormwater Management System. The purpose of this discussion is to provide Committee Members an introduction

to the ranking process with a quick overview of the Rating Matrix developed from the 2004 Phase I Drainage Study.

In preparation for the next workshop, tables containing the Stormwater management and Flooding Performance Rating Extent and Severity Factors Criteria Descriptions used in the 2004 Study were provided to Committee Members. The Committee was asked to review and comment on the descriptions. To help define the extent and severity factors, Committee Members were asked to bring in photos of flooding experienced recently.

d. Next Meeting Date

The next workshop date has been set for February 11, 2009.

2.0 Workshop Discussion Highlights

Committee Members would like to see the Village take a more proactive approach to open the lines of communication to residents. Committee members suggested that the Village look into residential surveys, flyers, e-mail and press releases.

Committee Members expressed that they hope that the outcome from these workshops does not produce just another report, but a "holistic" action plan that would be implemented. The outcome of the workshops needs to be action.

A Committee Member from Tall Trees Subdivision expressed concern about a 25-acre parcel that is proposed to be developed to the west of Tall Trees. He inquired if the proposed stormwater management system can provide some flood relief for his subdivision. He is also concerned that the proposed access road that will connect the development to his subdivision will cause further flooding problems in his neighborhood.

3.0 Recommendations to the Village Board

No recommendations to be presented.

PLEASE DIRECT ANY QUESTIONS OR COMMENTS FOR THE STORMWATER TASK FORCE TO:

Stormwater@glenview.il.us

STORMWATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room

7:00 PM, February 11, 2009

The workshop commenced promptly at 7:00 PM on February 11, 2009 at the Police Department Community Room. Those in attendance consisted of 15 Committee Members, 4 Village Staff, and 2 MWH staff with approximately 30 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction

The workshop opened with an address by Kerry Cummings, Village President, stressing the importance of this process and thanking the Committee Members for volunteering their time. Committee Members Susan Johns and Peter Stettler of the Tall Trees Neighborhood provided a brief presentation on historic and recent flooding experienced in their area. The Tall Trees area is a flood-prone area that experiences basement, over-foundation, and street flooding. The residents of Tall Trees want a viable solution to their flooding problems and are asking for the Village to look for opportunities for flood mitigation on the currently undeveloped site that is adjacent to the west of their neighborhood and elsewhere.

Guest Speakers, Greg Boysen of the Village of Buffalo Grove and Christopher Burke and Darren Olson of Christopher B. Burke Engineering gave a presentation on the Village of Buffalo Grove's Flood Risk Reduction Assessment completed in October 2008. The study was a result of the flooding that was experienced by the Village residents during the August 23, 2007 storm event in which they received 2.25 inches of rain on already saturated ground. Chris Burke highlighted the flood damage extent, the possible causes of the flooding,

and the solutions presented in the assessment. The assessment covered 12 study areas and identified five (5) different types of flooding; overland flow down reverse slope driveways, overland flows, seepage and sump failures, sanitary surcharge, and yard and street flooding. Chris noted that the cost of the recommended construction work (totaling $3,300,000) did not include the raising or flood-proofing of reverse slope driveways. Buffalo Grove is going to commence design and implementation of their plan in 2009.

b. *Workshop Topic Discussion*

Joe Johnson of MWH led the main workshop topic discussion on levels of service, expectations, and the ranking process. The purpose of this discussion was to provide an introduction to the ranking process, prioritization and expectations of the level of service and to obtain feedback on the extent and severity factors used in the 2004 Phase 1 Drainage Study. Joe briefly discussed the definition of a 100-year (1% Annual Risk) storm and provided a comparison of the Annual Risk per Event versus the Rainfall Depth to help Committee Members visualize the differences between the storms.

Committee Members agreed that public health and safety issues (e.g. sanitary sewer backup, emergency vehicle access, significant overland flooding) were first priority, followed closely by structural property damage. However, there was a consensus that minimal time should be spent on developing the criteria so that the Task Force could start focusing on solutions.

c. Action Items Assigned

Based on the feedback obtained during the Workshop Topic Discussion, MWH will revise the extent and severity criteria for review for the next workshop meeting. Additionally, MWH will draft a matrix to categorize the primary types of flooding with potential solutions.

d. Next Meeting Date

The next workshop date has been set for Wednesday, ***March 11, 2009***. The East of Harms Neighborhood will be giving a brief overview of the flooding experienced in their area. The Natural Resources Commission (NRC) will also be making a presentation to the committee.

2.0 Workshop Discussion Highlights

Joe Kenney noted that the Village of Northbrook will be hosting a public workshop on sanitary sewer backup on Tuesday, ***February 24, 2009***. It will be an informative workshop and suggested that those interested should attend.

Many Committee Members expressed a need for public education outreach, specifically, how homeowners can prepare themselves for future floods. Village staff will draft brochures for private flood-proofing and sanitary sewer backup for review at the March meeting.

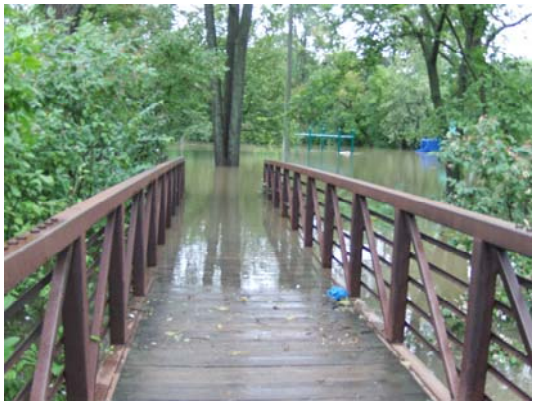
Committee members requested more background information on the regional stormwater management projects, such as the deep tunnel and the MWRD lock system, and affects of new and redevelopment on existing storm water management systems. A discussion on the MWRD deep tunnel and lock system will be included in the next workshop meeting. Other "Parking Lot" topics will be addressed at a later date.

3.0 Action Items Completed

Based on the input from the Task Force at the January Workshop, the Communication Plan developed by the Village's Communication's Director in December was shared. The Communication Plan includes an online survey that secures feedback from other Village residents. To date, the Village has received over 300 responses, and will keep the survey open until the end of February.

4.0 Recommendations to the Village Board

No recommendations to be presented.



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Stormwater@glenview.il.us

The Village of Glenview

STORMWATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room
7:00 PM, March 11, 2009

The workshop commenced promptly at 7:00 PM on March 11, 2009 at the Police Department Community Room. Those in attendance consisted of 12 Committee Members, 4 Village Staff, and 2 MWH staff with approximately 30 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction and Speakers

The workshop opened with a general introduction by Joe Kenney, Assistant Director of Capital Projects. He informed the Task Force of a Town Hall Meeting hosted by MWRD Commissioner Debra Shore at 2 PM on ***Sunday, March 22, 2009***. The meeting will focus on stormwater and environmental issues with MWRD staff on hand to answer questions and listen to concerns. Joe encouraged residents with flooding issues related to the MWRD system to attend.

Town Hall Meeting – 2:00 to 4:00 PM Sunday, March 22, 2009
Friendship Park Conservatory
395 W. Algonquin Road
Des Plaines, IL
www.mppd.org/conservatory.php

Guest Speakers, Kent Fuller and Robyn Flakne from the Natural Resources Commission (NRC), gave a presentation on the purpose of the NRC, discussed green infrastructure, the Forest Drive Rain Garden Pilot Project, and described the NRC's Implementation Plan for 2009. To find out more about the NRC, please go to the following website below:

Forest Drive Rain Garden Pilot Project

http://www.glenview.il.us/departments/public_works/natural_resources/natural_resources.shtml.

Sima Brown and Tim Spillane of the East of Harms Neighborhood provided a brief presentation on the recent flooding experienced in their area. The presentation highlighted the extent of damages, possible causes for flooding, and potential design challenges to future solutions. East of Harms is impacted by frequent storm and sanitary sewer flooding. Solutions to reduce the recurrence and extent of flooding will require local and regional coordination.

East of Harms Neighborhood (Sept. 2008)

Sima noted that she spoke to 73 residents from her neighborhood and reported that approximately 41% of the respondents had experienced sanitary sewer backups. During the public discussion period of the meeting, many East of Harms residents were present and voiced their concerns. A summation of what was said during the public discussion period is provided under Section 2.0 - Workshop Discussion Highlights.

Joe Johnson of MWH provided an overview of the Cook County regional water management systems and their relationships to the Village of Glenview. He provided the Task Force background information on the Chicago Area Waterway System, MWRD Deep Tunnel, and the MWRD Interceptor System. He highlighted the Chicago Area Waterway System, and in particular, the North Branch of the Chicago River and the Des Plaines River, as they are the only stormwater outlets for Glenview. He also discussed the reasons MWRD limits the amount of discharge from the River to Lake Michigan.

b. *Main Workshop Topic Discussion*

Joe Johnson led the main workshop topic discussion on flood mitigation solutions. This discussion introduced the Task Force to possible flood reduction solutions and relative implementation costs. Examples ranged from green infrastructure solutions (i.e. rain gardens, rain barrels) that could be easily implemented by residents to large flood control facilities that would be implemented on a village and/or regional level.

The purpose of this discussion was to prepare the Task Force for the next main workshop topic, which will be the review of previous study modeling results for three sample areas in the Village.

c. Action Items Assigned

In preparation for the next workshop meeting, the Task Force was asked to review the Village's Engineering Standards Manual and Single Family Residential Storm Water Management Requirements.

d. Next Meeting Date

The next workshop date has been set for Wednesday, ***April 22, 2009*** at 7 PM in the Police Department.

2.0 Workshop Discussion Highlights

The residents of East of Harms expressed concern over the current RJN study. They do not understand why the 2000 RJN Study was not implemented and are afraid that the current study will not be implemented either. They would like reassurance that the Village will push forward with the coordination efforts between MWRD and the Cook County Forest Preserve to implement the recommendations of the 2009 study. The residents noted that many households have had either their insurance premiums raised or cancelled due to frequent flood claims.

Task Force members would like the Village to look for cost-sharing opportunities to help residents fund the installation of sanitary back up prevention systems and green infrastructure systems (in addition to the rain garden program).

Task Force members believe that main flood mitigation solutions will be Village-driven solutions. Residents will be more receptive to implementing green infrastructure systems if they see the Village doing its part and moving ahead on larger projects. It was mentioned that the final solution should have a multi-pronged approach involving project sequencing with cost-sharing.

3.0 Action Items Completed

MWH passed out the revised extent and severity criteria for review. Additionally, Joe Kenney provided a draft copy of the Property Owner's Guide to Flood Prevention Brochure for review. The Task Force will finalize both items for Village Board approval at a later date.

Also, the public survey data was provided to the Task Force as requested. During February, 353 comments were received with approximately 90% noting flooding issues during 2007 and/or 2008 (this represents about 2% of all village households).

4.0 Recommendations to the Village Board

No recommendations to be presented.

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Stormwater@glenview.il.us

Additional Information

A lot of valuable information can be found on the internet. A few sources to check out include:

- www.floods.org
- www.illinoisfloods.org
- www.lakecountyil.gov/Stormwater/Publications/Floods.htm
- www.mwrd.org

Please remember to confirm if a building permit is required prior to commencing any work by contacting the Village's Development Department at (847) 904-4340.

Village of Glenview, Sept. 2008

The Village of Glenview

1225 Waukegan Road
Glenview, IL 60025
www.glenview.il.us

The Village of Glenview

Property Owner's Guide to Flood Prevention

Reviewed and approved by:

- *Village of Glenview*
- *2009 Storm Water Task Force*

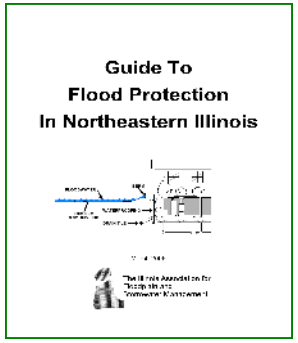
Flood Prevention Planning in Glenview

Currently (April 2009) there are two major processes underway locally and regionally to study storm water drainage:

1. Glenview's Storm Water Task Force - This group of sixteen residents appointed by the Village Board of Trustees are charged with reviewing Village-wide storm water studies with a consultant and staff to develop a short- and long-term master implementation plan with funding options to present to the Village Board (*due in late 2009*).
2. Metropolitan Water Reclamation District (MWRD) Watershed Studies - MWRD is studying the Village's two primary watersheds (North Branch of the Chicago River and the Des Plaines River) as part of its required analysis to determine long-term projects to prevent catastrophic flooding. MWRD is proposing to *review projects with municipalities in 2009 and finalize the plan in 2010.*

What can homeowners do?

As local and regional studies are being completed over the next two years, there are several resources that property owners can reference in order to start protecting their homes from some flooding concerns immediately, including:

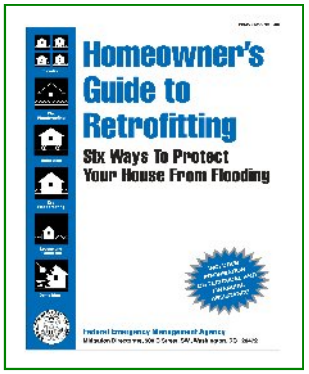


Guide to Flood Protection in Northeastern Illinois, IASFM (www.illinoisfloods.org)

The *Guide to Flood Protection in Northeastern Illinois*, published by the Illinois Association of Storm Water and Floodplain Managers in March 2006 is a good tool for homeowner's reference before (planning), during and after a storm event. Some items explained are:

- Dry/wet flood-proofing
- Basement flooding
- Sanitary sewer backup protection

An additional tool for homeowner's reference is the *Homeowner's Guide to Retrofitting (Six Ways to Protect Your House from Flooding)* published by FEMA in June 1998. This comprehensive guide is geared towards retrofitting floodplain properties.



Homeowner's Guide to Retrofitting, FEMA (www.fema.gov)

Quick Tips on Flood Prevention for Homeowners

◊ Extend downspouts away from foundation 5-10 feet
◊ Clean gutters and install gutter guards to prevent clogging
◊ Redefine and clear swales to ensure adequate drainage paths for storm water runoff
◊ Raise the low-entry elevation at which storm water can enter your home by berming (pumping equipment and additional storm water detention may be necessary)
◊ Raise the low-entry elevation at window wells and/or install drains in the window wells tying to external storm sewers (not piping tied to internal sump pumps)
◊ Install glass block windows in place of basement windows (except escape window) to prevent water inflow or infiltration
◊ Provide a relief outlet for sump pump outside of house that is safe distance from foundation in case of surcharging, freezing or blockage
◊ Verify existing sump pump and outlet pipe have capacity for discharging during intense events
◊ Install a backup source of power (and test annually) in case of electrical power failure and consider purchasing an emergency generator for extended outages
◊ Repair foundation cracks throughout basement to prevent seepage
◊ If a storm structure is adjacent to a lot, a storm under-drain system can be installed to collect excess runoff
◊ Consider scaling back use of lawn sprinklers, to solely as needed, to reduce soil saturation especially during rainy seasons

Village of Glenview
1225 Waukegan Road
Glenview, IL 60025
Phone: 847-724-1700
E-mail: stormwater@glenview.il.us

STORMWATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room

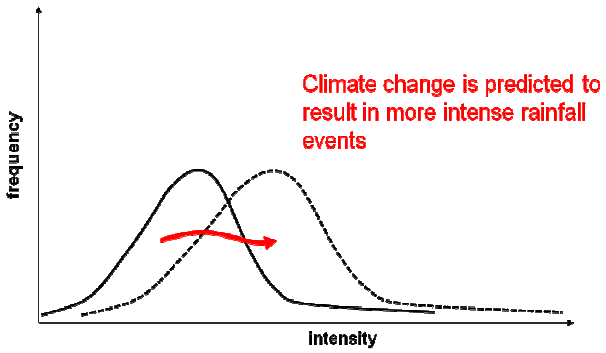
7:00 PM, April 22, 2009

The workshop commenced promptly at 7:00 PM on April 22, 2009 at the Police Department Community Room. Those in attendance consisted of 15 Committee Members, 4 Village Staff, and 4 MWH staff with approximately 25 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction and Speakers

The workshop opened with a general introduction by Joe Kenney, Assistant Director of Capital Projects. Guest Speaker Mark Wagstaff of MWH gave a presentation on the implications of climate change for stormwater management. He gave an overview on global and regional climate change initiatives, predictions for Northeastern Illinois, implications for stormwater management, and current adaptation practices. This topic was presented at the request of Task Force Members.



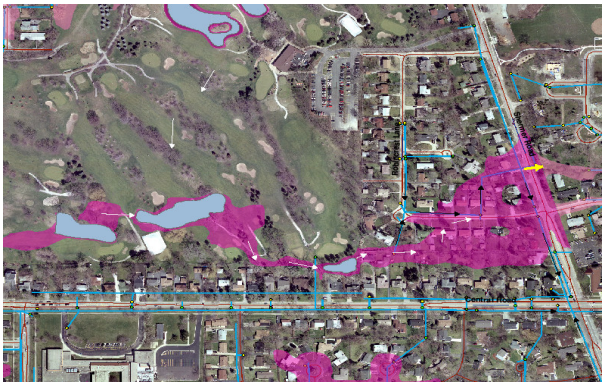
Implications of Climate Change for Stormwater Management

Joe Johnson of MWH provided an overview on the current Village Stormwater Management Requirements. He provided background information on the current Village engineering standards with a comparison of the pending MWRDGC's Cook County Watershed Management Ordinance. As part of the discussion, he identified resident and Village responsibilities and stressed that a successful Stormwater Management Program relies on resident and Village participation.

b. *Main Workshop Topic Discussion*

Joe Johnson led the main workshop topic discussion on the review of previous study results of sample areas throughout the Village. The following three sample areas were discussed:

- Study Area 1 – Cariann Lane and Mark Drive
- Study Area 2 – Dewes Street and Harlem Avenue
- Study Area 3 – Shermer Road and Robincrest Lane



Modeling results with an inundation map were presented for each study area. Task Force Members and residents who live in these areas were asked if the results were consistent with the flooding they had experienced. Residents and Task Force Members from the East of Harms and Dewes Street/Harlem Avenue areas agreed that the results were generally consistent with their experience. However, residents from the Shermer Road/Robincrest Lane area stated that they regularly experience move severe flooding then that predicted by the modeling. MWH staff will revisit the modeling results in the Shermer/Robincrest area.

For each study area different types of reported flooding, potential causes for the flooding, possible solutions, and associated costs were discussed. As part of the discussion, Task Force Members were briefly introduced to the benefit/cost analysis approach.

The next main workshop topic will be the review of three additional sample areas in the Village.

c. *Action Items Assigned*

No action items were assigned.

d. *Next Meeting Date*

The next workshop date has been set for Wednesday, ***May 13, 2009*** at 7:00 PM. The meeting will be held at the Police Department Building.

2.0 Workshop Discussion Highlights

On Sunday, March 22, 2009 MWRDGC Commissioner Debra Shore, along with other local elected officials, hosted a Town Hall Meeting at the Friendship Park Conservancy in Des Plaines, Illinois, that focused on stormwater and environmental

issues. MWRD staff was on hand to answer questions and listen to concerns. A few Task Force Members, Village staff and consultants were in attendance. They reported that the Commissioners are sensitive to the Village's flooding problems. They are looking forward to the recommendations coming out of the RJN Sanitary Surcharging Study and with working with the Village on finding a solution to regional flooding problems. MWRD plans to come to one of the Workshop meetings when the modeling and recommendations for the North Branch are completed this summer.

Task Force Members provided possible flood solutions for Village consideration. Solutions included retrofitting existing detention basins to adjustable gates on the Techny Reservoir. Flood mitigation options such as a strategic buyout of flood-prone homes were also suggested. Also noted was the need for more regional detention storage facilities to safely store runoff during larger rain events (possibly using existing open land).

3.0 Action Items Completed

Joe Kenney presented the final draft of the Property's Owners Guide to Flood Prevention for comment and Task Force approval. The purpose of the brochure is to provide homeowners a useful guide to sources on flood prevention. Task force members suggested supplemental brochures and requested that the brochures and noted information be available at the Village Hall. Also, the first GVTV Update was shown for review by the Task Force before running on TV.

4.0 Recommendations to the Village Board

No recommendations to be presented.

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http://www.glenview.il.us/departments/capital/swtaskforce/index.shtml

PLEASE DIRECT ANY QUESTIONS OR COMMENTS FOR THE STORMWATER TASK FORCE TO:

Stormwater@glenview.il.us

STORM WATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room
7:00 PM, May 13, 2009

The workshop commenced promptly at 7:00 PM on May 13, 2009 at the Police Department Community Room. Those in attendance consisted of 14 Committee Members, 5 Village Staff, and 2 MWH staff with 4 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction and Speakers

The workshop opened with a general introduction by Joe Kenney, Assistant Director of Capital Projects. He informed the Task Force that they will be increasing the frequency of the workshops, with two scheduled next month and an open house in early July. Task Force Members who had scheduling conflicts were encouraged to contact Joe. Russ Jensen also reviewed adjustments made to the meeting agenda to increase the effectiveness of the Task Force review of main workshop topics while still providing an opportunity for public comment.

b. *Main Workshop Topic Discussion*

Joe Johnson led the main workshop topic discussion on the review of previous study results of three additional sample areas throughout the Village. The following three sample areas were discussed:

- Study Area 1 – Fontana Drive and Bel Air Drive
- Study Area 2 – Bonnie Glen Subdivision
- Study Area 3 – Tall Trees Subdivision

Modeling results with an inundation map were presented for each study area. Task Force Members and residents who live in these areas were asked if the results were consistent with the flooding they had experienced. The results appeared to be generally consistent with the experience of those in attendance.

For each study area different types of reported flooding, potential causes for the flooding, possible solutions, and associated costs were discussed.

c. Action Items Assigned

Task Force members asked that MWH review the available capacity of the West Fork of the North Branch of the Chicago River relative to the area within Glenview that drains to the river. MWH was also asked to report back on the design release rate to the river from the North and South Navy Ditches. Village staff was asked to give consideration to the approach that should be used in evaluating the potential for development of detention storage at open space sites within the community.

d. Next Meeting Date

The next workshop date has been set for Wednesday, ***June 10, 2009*** at 7:00 PM. The meeting will be held at the Police Department Building. The main workshop topic will be on the Village's proposed Sanitary Sewer Surcharge Implementation Plan. Mike Young, P.E. of the RJN Group, Inc. will present results from the updated East of Harms Road Sanitary Study.

The second June workshop date has been set for Wednesday, ***June 24, 2009***, with the main workshop topic covering the village-wide problem area assessment.

2.0 Workshop Discussion Highlights

Task Force Members were asked if the current modeling goals were acceptable. Most felt the goal of eliminating flooding for a 10-year storm (or 2.6 inches in 2 hours) and reducing the flooding for a 100-year storm (or 4.5 inches in 2 hours) on streets was acceptable, depending on the duration of flooding. However, Task Force Members feel they cannot decide a final level of service until the solution costs for all possible projects are known.

For areas severely affected by riverine (overbank) flooding, Task Force Members requested that the Village still implement improvements in these areas while regional flood solutions are being drafted. Task Force Members inquired what political channels could they utilize to apply pressure to regional agencies that would provide the most benefit to Glenview. A Task Force Member suggested that the Village's letter to MWRD be sent to state and local representatives.

Ultimately, Task Force Members believe that the flooding in Glenview cannot be solved by simply piping runoff to the river. The solution needs to be comprehensive and will require coordination with local and regional entities.

3.0 Action Items Completed

A Storm Water Typical Question and Answer Fact Sheet prepared by the Task Force, was distributed to visitors to provide general storm water information on topics discussed in previous workshops. Topics included the purpose of the Storm Water Task Force, the Chicago Area Waterway System, and TARP.

4.0 Recommendations to the Village Board

No recommendations to be presented.

Presentations and supplemental information discussed in this Meeting Summary Fact Sheet may be downloaded at:

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Stormwater@glenview.il.us

The Village of Glenview

STORM WATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room
7:00 PM, June 10, 2009

The workshop commenced promptly at 7:00 PM on June 10, 2009 at the Police Department Community Room. Those in attendance consisted of 16 Committee Members, 5 Village Staff, and 2 MWH staff with 5 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction and Speakers

The workshop opened with a general introduction by Joe Kenney, Assistant Director of Capital Projects. He provided the Task Force Members an update on the North Branch of the Chicago River (NBCR) modeling efforts. MWRDGC has tentatively set Thursday, ***August 6, 2009***, as the release date for the NBCR inundation mapping. Though this meeting is geared towards municipalities, MWRDGC has opened the invitation to some Task Force Members. Additional information will be provided as it's received from MWRDGC.

b. *Main Workshop Topic Discussion*

Guest Speakers, Mike Young and Catherine Morley of RJN Group, gave a presentation on the proposed Sanitary Sewer Surcharging Implementation Plan. The presentation provided general background information on sanitary sewers, inflow, infiltration, and identified the following three high priority areas:

- Priority Area #1 – East of Harms
- Priority Area #2 – Park Manor
- Priority Area #3 – Winnetka/Shermer

The solution steps to reduce the sanitary sewer surcharging in these areas were identified as system separation (not required for Priority Areas #2 and #3), surface

flooding reduction, the identification and reduction of inflow and infiltration (I/I) sources through rehabilitation plans and public and private partnerships, and the implementation of a private source control program. Recommendations included the removal of low cost sources, elimination of I/I sources from tear downs and new water service connections, and a voluntary cost-sharing program.

Task Force Members were asked if it would be appropriate to implement a cost-sharing program for overhead sewer conversion in Glenview. It was the consensus of the Task Force that more information will be required before making a final determination. They asked to see more Glenview specific flow information and the available funding opportunities. Other local municipality cost-sharing programs were distributed to Task Force Members for future discussion.

Task Force Members were informed of a meeting with MWRDGC scheduled for June 11, 2009, to discuss the proposed East of Harms Separation/Pumping/Storage Project. The purpose of this meeting is to discuss and negotiate a proposed pumping rate to the MWRDGC interceptor. An update from this meeting will be provided at the next workshop.

c. Action Items Assigned

MWH will provide the Village's Inflow Infiltration Corrective Action Plan (ICAP) at the next workshop meeting. The Village will look into options for financing potential loan programs for overhead sewer conversion.

d. Next Meeting Date

The next workshop date has been set for Wednesday, ***June 24, 2009*** at 7:00 PM. The meeting will be held at the Police Department Building. The main workshop topic will be on the village-wide problem area assessment.

2.0 Workshop Discussion Highlights

The Task Force agrees that I/I removal is important, but the Village's plan needs to be more accommodating with cost-sharing to make it a more attractive incentive to residents. Suggestions included increasing the cost-sharing percentage to the creation of a lottery system where the overhead sewer conversion is fully funded for an allotted amount of homes per year.

Task Force Member Judy Beck suggested that the Village look into supplementing the program to include behavior modification such as implementing a water conservation program.

3.0 Action Items Completed

A draft of the Village's Sanitary System Capital Improvement Program Addressing Sanitary Sewer Surcharging Events for Fiscal Years 2009 – 2015 was distributed to Task Force Members for review.

4.0 Recommendations to the Village Board

No recommendations to be presented.

Presentations and supplemental information discussed in this Meeting Summary Fact Sheet may be downloaded at:

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Stormwater@glenview.il.us

The Village of Glenview

STORM WATER TASK FORCE
MEETING SUMMARY FACT SHEET

Police Department Community Room
7:00 PM, June 24, 2009

The workshop commenced just after 7:00 PM on June 24, 2009 at the Police Department Community Room. Those in attendance consisted of 13 Committee Members, 4 Village Staff, and 2 MWH staff with 7 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction and Speakers

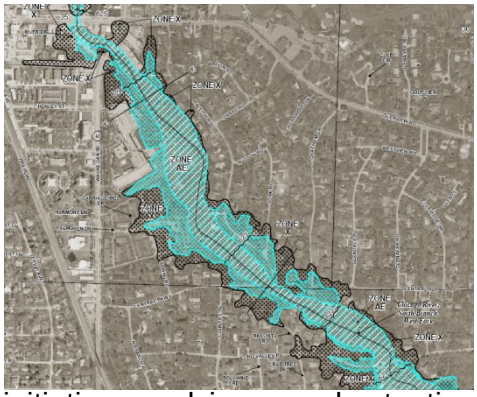
Joe Kenney, Assistant Director of Capital Projects, provided a follow-up to the storm event Glenview experienced last Friday, June 19th. It was reported that the Village received approximately 3.7 inches of total rainfall and that the Techny Reservoir 32-C, which provides regional upstream detention storage along the West Fork of the North Branch of the Chicago River, reached 60% capacity. The Village's Public Works Department processed over 100 flooding work orders primarily focusing on street flooding.

Later, Joe also provided an update on the North Branch of the Chicago River (NBCR) modeling efforts. MWRDGC has moved back the tentative release date for the NBCR inundation mapping to ***September 17, 2009***. The release of the preliminary project list has been tentatively set for ***October 28, 2009***. Any further changes in schedule or additional information will be provided to Task Force Members as it is received from MWRDGC.

Also, dates have been set for the next two SWTF workshops. The next workshop meetings will be held on ***July 8, 2009*** and ***August 12, 2009***. Task Force Members were asked to contact Joe with any scheduling conflicts.

b. *Main Workshop Topic Discussion*

Joe Johnson of MWH led the main workshop discussion on a comprehensive review of the Village flooding assessment. The objectives of this workshop were to present and review the surface flooding results and review the assessment of overbank flooding issues.



The overbank flooding assessment discussion included the identification of several impacted areas along the West and Middle Forks of the North Branch of the Chicago River (NBCR), mitigation options, and potential implementation strategies. Mitigation options included lowering flood levels, area isolation, and individual property flood-proofing solutions. Potential implementation strategies presented for Task Force consideration included the control of local discharge rates through green infrastructure initiatives and increased retention/detention, promoting regional reduction of flood flows, the evaluation of potential flood protection systems, and support for private flood-proofing efforts through a potential public/private cost-share arrangement.

The surface flooding modeling and problem area assessment discussion highlighted the objectives and current status of the modeling efforts, background information on model development, and problem area assessment. Task Force Members were provided a village-wide flood inundation map showing the flood inundation limits resulting from 2.6-inch (10% Annual Chance) and 4.5-inch (1% Annual Chance) 2-hour duration storms. Each flood inundation area was labeled with a dot that reflects the level of severity and extent of flooding predicted. The color of the dot reflects the level of severity and the size of the dot reflects the extent of flooding.

c. Action Items Assigned

MWH will compile a “quick wins” solution list that will identify projects that are relatively inexpensive and can be designed and constructed quickly, with an emphasis on projects that could still be completed before the Spring of 2010.

Task Force Members requested background information on the subsurface geology and aquifer system below Glenview and the potential cost-benefit associated with buyouts of flood-prone properties.

d. Next Meeting Date

The next workshop date has been set for Wednesday, ***July 8, 2009*** at 7:00 PM. The meeting will be held at the Police Department Building. The main workshop topic will be solutions to surface flooding.

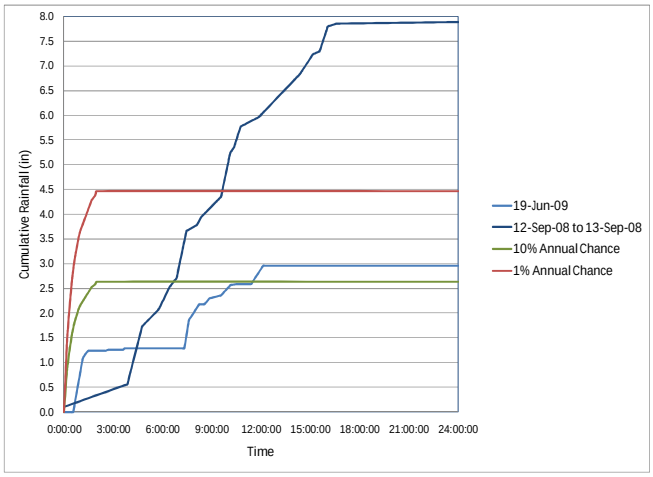
2.0 Workshop Discussion Highlights

Task Force Members reiterated that the Village needs to continue its efforts to raise awareness of the flooding problems experienced in Glenview with various elected officials. Task Force Member Bill Anderson asked that the Village add consideration of active control of the Techny Basin and other flood control facilities on the North Branch of the Chicago River to the list of options suggested for evaluation by the MWRD and its North Branch Watershed consultant team.

Task Force Member Judy Beck noted that the Land and Water Conservation Fund will be funded extensively through 2010. She indicated that this may be a potential source of funding for Village flooding/stormwater management projects.

3.0 Action Items Completed

A simplified capacity analysis of the West Fork of the NBCR was presented to Task Force Members as part of the overbank flooding assessment discussion. Also included in the discussion were the results of a historic rainfall analysis based on rainfall data at O'Hare Airport for water years extending from April 1958 to April 2009.



4.0 Recommendations to the Village Board

No recommendations to be presented.

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Stormwater@glenview.il.us

The Village of Glenview

STORM WATER TASK FORCE
MEETING SUMMARY FACT SHEET

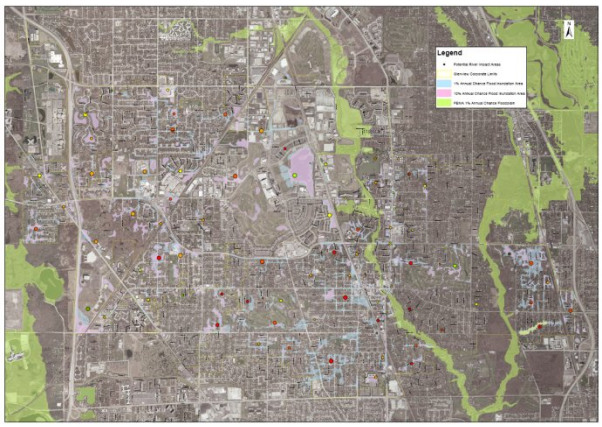
Police Department Community Room

7:00 PM, July 8, 2009

The workshop commenced promptly at 7:00 PM on July 8, 2009 at the Police Department Community Room. Those in attendance consisted of 10 Committee Members, 5 Village Staff, and 2 MWH staff with 2 members of the general public. This report has been prepared to provide an informational summary of workshop discussion, action assignments, guest speakers, items for Board attention and recommendations to the Board.

1.0 Workshop Meeting Summary

a. Introduction and Speakers



The workshop opened with a general introduction by Joe Kenney, Assistant Director of Capital Projects. Joe Johnson of MWH provided the Task Force Members the opportunity to review and comment on the final draft of the Flood Inundation Assessment Maps. The maps provide an indication of where surface flooding occurs for the 2.6-inch (10% Annual Chance) and the 4.5-inch (1% Annual Chance) 2-hour duration storms.

b. *Main Workshop Topic Discussion*

Joe Johnson led the main workshop discussion on the flooding assessment and improvement project review. A draft summary of the Surface Flooding Problem Assessment was made available to Task Force Members for review. The assessment ranked only those areas affected by surface flooding based on a calculated problem score. The completed assessment identified 89 potential problem areas throughout the village, with 41 problem areas identified as sensitive to very high (1% Annual Chance) river levels and 14 problem areas affected by significant sanitary basement backups.

The second portion of the workshop discussion was on improvement project review. Joe highlighted possible improvement strategies for Task Force consideration such as a comprehensive green infrastructure plan, overbank flood mitigation projects, and surface drainage improvements. As part of this discussion, Joe walked the Task Force through the top ranked problem areas to discuss conceptual projects, costs, and implementation time.

Area 6 – Keenan Lane and Pfingsten Road

c. Action Items Assigned

MWH will amend the Surface Flooding Problem Assessment based on the feedback received from the Task Force. The amendments will include weighting severity more than extent, the inclusion of sanitary sewer backup and river sensitivity in the problem score calculation, scoring areas that experience only riverine flooding, identification of SWAMP areas, and cost/benefit determinations.

MWH will redevelop the priorities as directed by the Task Force. The previously highlighted priorities will be broken out into the following four levels:

- Priority #1 – Sanitary Sewer Surcharging in Homes/Businesses
- Priority #2 – Storm Property Damage (over-foundation flooding)
- Priority #3 – Limited Vehicle Access
- Priority #4 – Other Localized Flooding Issues

MWH will produce maps for each Task Force priority showing the impacted areas and develop strategies for addressing each.

d. Next Meeting Date

The next workshop date has been set for Wednesday, ***August 12, 2009*** at 7:00 PM. The meeting will be held at the Police Department in the Community Room. The main workshop topic will be further development of the Village-wide Implementation Plan.

2.0 Workshop Discussion Highlights

Task Force Members reiterated that they would like the Village to add consideration of active control to flood control facilities along the West and Middle Forks of the North Branch of the Chicago River to the list of options suggested for evaluation by MWRD.

3.0 Action Items Completed

Several action ("parking lot") items will be addressed as part of the Village-wide Implementation Plan to be presented at the August workshop.

4.0 Recommendations to the Village Board

No recommendations to be presented.

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Village of Glenview
Stormwater Task Force

Stormwater Task Force
Project Implementation Plan

MWH
BUILDING A BETTER WORLD

August 12, 2009

August 12, 2009 Workshop Objectives

- Review and Discuss Flooding Areas
  - Tiered approach with strategies discussed to-date
- Review Initial Draft Implementation Strategy

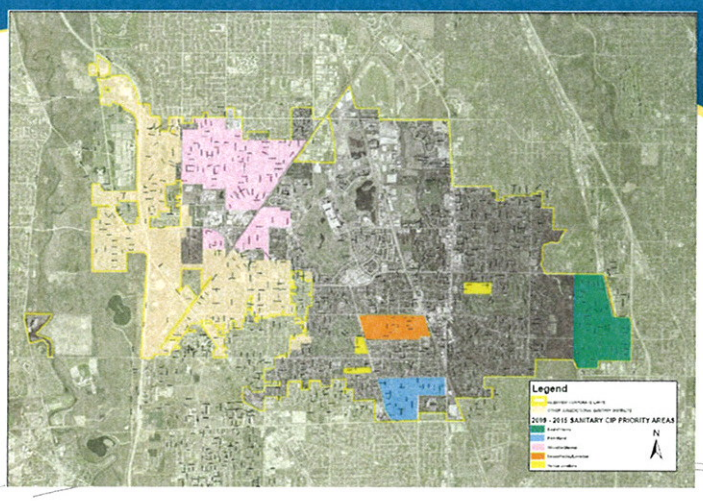
Review of Flooding Areas and Strategies

August 12, 2009

Tiered Approach to Flood Mitigation

Sanitary Sewer Basement Flooding	Tier #1 – Sanitary sewer backup into homes with direct impacts on public health and structures
Property Damage Flooding of Structures	Tier #2 - Over-foundation flooding that can result from overbank flooding from rivers or surface flooding
Surface Flooding that Impacts Vehicle Access	Tier #3 – Surface flooding of streets to depths of that impair vehicle access
Other Localized Flooding	Tier #4 – Other areas impacted by street or property flooding

Tier #1 - Sanitary Sewer Surcharging



Strategies to Address Tier #1 Issues

<u>Sanitary Sewer Surcharging Strategies</u>

- Maintain current funding to support existing sanitary system to approved CIP standards
- Implement regulatory changes
- Complete SSES studies and resulting design for worst impacted areas (No. 1, 2 and 3)
- Implement cost-sharing program for at-risk sanitary sewer services

Strategies to Address Tier #1 Issues Maintain Existing Sanitary CIP

- Maintain current funding to support existing sanitary system to approved CIP standards:
  - *2009 = $1,340,022*
  - 2010 = $1,393,623
  - 2011 = $1,449,368
  - 2012 = $1,507,343
  - 2013 = $1,567,636
  - 2014 = $1,630,342

  TOTAL = $7,548,312 for 2010-2014

  (supported by current sanitary sewer rate – i.e. no new Village funding necessary)

Strategies to Address Tier #1 Issues Complete SSES Studies and Project Design

- Complete SSES studies and resulting design for worst impacted areas (No. 1, 2 and 3)
  - *2009 = $170,000*
  - 2010 = $110,000
  - 2011 = $210,000
  - 2012 = $340,000
  - 2013 = $260,000
  - 2014 = $0

  TOTAL = $1,090,000 for 2010-2014

  (supported by current sanitary sewer rate – i.e. no new Village funding necessary)

Strategies to Address Tier #1 Issues Regulatory Revisions

- Implement regulatory changes:
  - Require sanitary sewer conversion to over-head system with permits that require a water service upgrade (based upon the Illinois Plumbing Code) – **Village cost = $0**
  - Require ICAP compliance letters from a licensed plumber with permits when any internal or external plumbing work is required – **Village cost = $0**

Strategies to Address Tier #1 Issues Complete New CIP Improvements

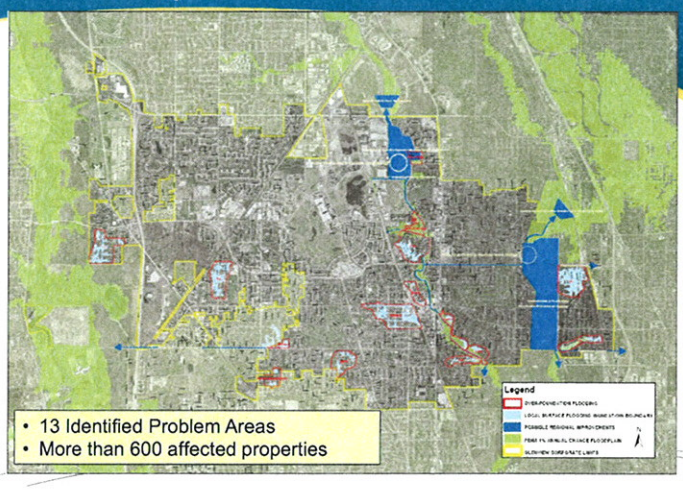
- Complete new sanitary CIP projects in worst affected areas (No. 1, 2 and 3) between 2010 and 2015:
  - *2009 = $0*
  - 2010 = $1,834,000 – East of Harms ($250K State Grant)
  - 2011 = $1,600,000 – East of Harms Ph II
  - 2012 = $800,000 – Park Manor
  - 2013 = $0
  - 2014 = $1,900,000 - Park Manor Ph II & Winn-Shermer
  - 2015 = $900,000 – Winnetka-Shermer Ph II

  TOTAL = $7,034,000 (new funding need = $6,784,000)

Strategies to Address Tier #1 Issues Cost-sharing Program

- Implement cost-sharing program for at-risk sanitary sewer services
  - Establish fund to share in private cost to retrofit existing sanitary sewer services from gravity to over-head systems
  - Questions:
    - SWTF general support?
    - Fund to what percent (50% typical; matches NB example)?
    - Cap projects at what total (e.g., Northbrook = $10,000)?
    - Cap total grants per year ($200,000-year one and $50,000-beyond as briefed on June 10th; program/funding could be evaluated annually)
  - Village cost would depend on program structure

Tier #2 – Property Damage Flooding (over-foundation)



- 13 Identified Problem Areas
- More than 600 affected properties

Strategies to Address Tier #2 Issues

- Expand involvement in National Flood Insurance Program
- Support/Promote/Partner with MWRD and other jurisdictions on regional projects to lower river level during catastrophic events
- Prioritize local projects with non-floodplain property damage

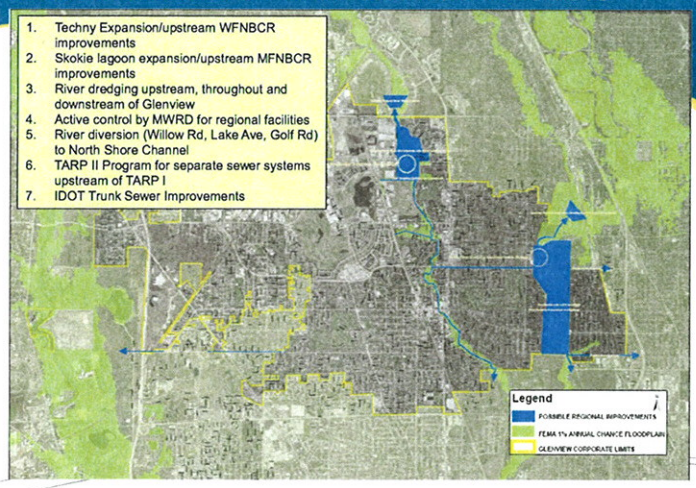
Strategies to Address Tier #2 Issues Expand Community Involvement in the NFIP

- Apply for Community Rating System (CRS) – flood insurance rate reductions of 10-15% possible
- Support State and National Floodplain Mapping Updates
- Provide Elevation Certificate Support
- Provide Flood-proofing Guidance and Education
- Provide Flood Insurance Education
- Investigate Hazard Mitigation Grant Programs with Army Corp of Engineers and FEMA
- Minimal cost to Village

Strategies to Address Tier #2 Issues Partner on Regional Projects

- Support/Promote/Partner with MWRD and other jurisdictions on regional projects to lower river level during catastrophic events
  - September 17th – *tentative* – MWRD NBCR inundation maps
  - October 28th – *tentative* – "possible" projects list for local input
  - Beyond – support and partner with MWRD on projects that are beneficial to Glenview (local cost share=?; MWRD currently has **$50,000,000** annual authority to complete regional improvements)
  - Evaluate and possibly implement contingency studies for individual floodplain areas (possible buy-outs, partner with other agencies, special services areas)
    - Tall Trees
    - Pine Street
    - South Circles
    - East of Harms

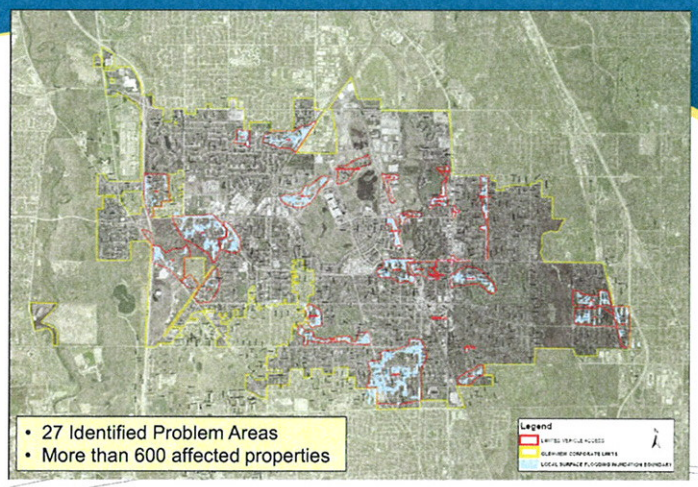
Potential Regional Flood Mitigation Projects to Reduce North Branch Flood Levels



Strategies to Address Tier #2 Issues Local Projects

- Prioritize local projects with non-floodplain property damage:
  - 11 projects with total costs in the range of $35 million (including storage to mitigate downstream flows)
  - New local funding needed
    - How to implement?

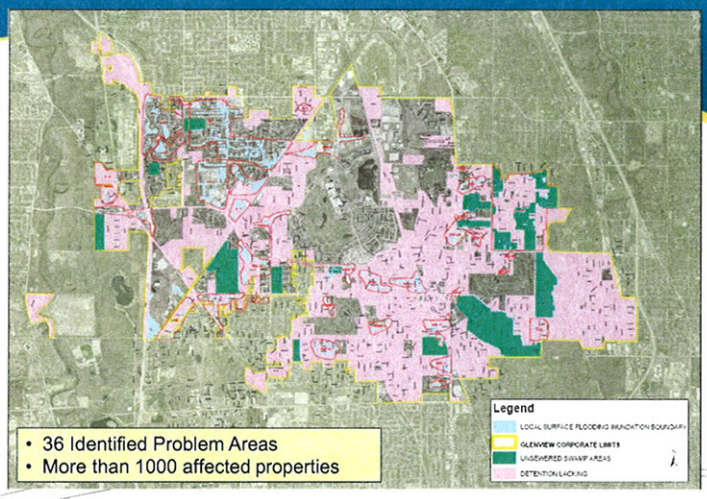
Tier #3 – Vehicle Access Impact Areas



Strategies to Address Tier #3 Issues Local Projects & Outside Agency Partnership

- Implement prioritized local projects for emergency (15") and local vehicle (10") access problem areas
  - 21 projects with total costs in the range of $50 million
  - New local funding needed
    - How to implement?
- Support/promote/partner with outside agencies where appropriate
  - Roadways impacted by overbank flooding
  - IDOT, Cook County Highway Dept., Township

Tier #4 – Other Localized Flooding



- 36 Identified Problem Areas
- More than 1000 affected properties

Strategies to Address Tier #4 Issues

- Maintain current funding to support existing storm sewer system to approved CIP standards
- Continued cost-sharing program for drainage improvements in un-sewered (SWAMP) areas
- Implement/revise regulatory requirements or incentives

Strategies to Address Tier #4 Issues (continued)

- Complete prioritized local projects (considering implementation opportunities)
- Develop win-win projects with other agencies
- Evaluation of high benefit detention sites
- BMP cost-sharing

Strategies to Address Tier #4 Issues Maintain Existing Storm Sewer CIP

- Maintain current funding to support existing storm sewer system to approved CIP standards
  - *2009 = $1,520,376*
  - 2010 = $1,581,191
  - 2011 = $1,644,439
  - 2012 = $1,710,217
  - 2013 = $1,778,625
  - 2014 = $1,849,770

  TOTAL = $8,564,242 for 2010-2014

(goal exists to fund to Village's standard; however, uses general corporate fund)

Strategies to Address Tier #4 Issues Cost-sharing for Un-sewered Areas

- Continued cost-sharing program for drainage improvements in un-sewered (SWAMP) areas
  - 60%-Resident, 40%-Village
  - Budget dependent on petitions received and balloting
  - SWAMP project completed with next typical (20-year cycle) roadway improvement with Village funding for road, water and sanitary improvements necessary

Strategies to Address Tier #4 Issues Revised Regulatory Requirements/Incentives

- Implement/revise regulatory requirements or incentives
  - Draft MWRD volume reductions
  - Review tear-down/rebuild and substantial building addition permitting requirements
  - Pervious pavement use (driveways and parking lots)
  - Sump pump connection requirements
  - Use of native plantings
  - Permit fee reductions for rate or volume reduction projects beyond minimum requirements
  - Sub-SWTF Group to advise staff and Board for long-term

Strategies to Address Tier #4 Issues Local Projects

- Complete prioritized local projects
  - Severity-extent factors and cost-benefit analysis to prioritize and select projects
  - 16 projects with total costs in the range of $25 million
  - New funding needed
    - How to implement?
    - Complete with adjacent roadway project (20-year cycle)?
    - Develop revised/updated SWAMP Program for cost-sharing?
    - Complete as special service area projects?
      - Paid for as line item on tax bill over 10, 15 or 20 years
      - Benefit of Village's AAA bond rating
      - Village completes design, bidding and project management

Strategies to Address Tier #4 Issues Coordination with Other Agencies

- Develop win-win projects with other agencies
  - Promote coordinated development of multi-use storm water storage facilities at high benefit locations (contingency study underway) – **budget = TBD**
  - Partner with the Park District to expand ROW rain garden program adjacent to Village parks (Indian Trail/Forest Drive 2008 pilot project) – **budget = TBD**
  - Complete 2010 Highway Rain Garden pilot project along Waukegan Road (coordinate with Waukegan Corridor improvements) – **budget = $20,000**

Strategies to Address Tier #4 Issues Evaluation of High Benefit Detention Sites

- High benefit in terms of flood mitigation
  - Reduced discharge to area waterways
  - Reduced loading on trunk storm sewer systems
- Coordinated planning to maximize potential for multiple use facilities
- Contingency study underway to note areas where strong benefits for such exist
- All cost estimates will reflect below-ground storage until agreements for above-ground are reached

Strategies to Address Tier #4 Issues BMP Cost-sharing Programs

- Continue and develop cost-sharing programs
  - Continue Village's Rain Garden Grant Program - $15,000 per year (already funded in CIP)
  - Develop Rain Barrel Program partnering with MWRD – nominal operating costs up to 40 barrels per year; $40 per barrel thereafter
  - Develop a holistic drainage and home inspection process (non-permit related) – SWTF input? (cap budget per year)
  - Rate or volume reduction project grant program – SWTF input? (cap budget per year)

Review of Draft Implementation Strategy

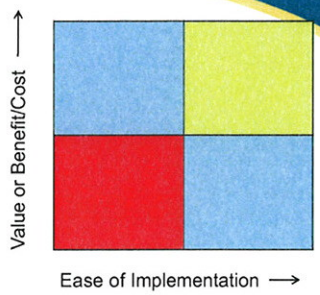
August 12, 2009

Draft Implementation Strategy

- Implementation Strategy must emphasize:
  - Need for action
  - Flooding as both a Regional and Village-wide issue
  - Areas where multiple flooding issues overlap
  - Complexity of issues
  - Relationship between cost and level of service
  - Use of opportunities/strategies to reduce costs

Draft Implementation Strategies

Tiered Approach to Issues
- Sanitary Sewer Surcharge
- Property Damage Flooding
- Vehicle Access Impacts
- Other Localized Flooding



Implementation Considerations

Draft Implementation Strategies

Timeframe Considerations

Strategy Type	6-12 months	12-24 months	> 24 months
Ongoing CIP/Maintenance Projects	X	X	X
Regulatory/Incentive Changes	X	X	
New Improvements – Local	X	X	X
New Improvements – Regional		X?	X
Opportunity Improvements	X	X	X
Cost-sharing Programs	X	X	X

Next Steps

- Select early win strategies for adoption
  - Continued maintenance projects
  - Localized, immediate improvements
  - Regulatory/incentive programs
  - Cost-sharing programs
- Refine prioritization for local improvements
- Formulate/implement strategy for aggressive promotion of regional projects

Manhard CONSULTING LTD

Civil Engineers
Surveyors
Water Resources Engineers
Water & Wastewater Engineers
Construction Managers
Environmental Scientists
Landscape Architects
Planners

MEMORANDUM

To: **Village of Glenview - Storm Water Task Force**

From: **Jeff House**
National Director of Water Resources/Vice-President

Date: **August 27, 2009**

Re: **Multi-Hazard Mitigation Planning**

The objective of this memorandum is to introduce the need and purpose of multi-hazard mitigation planning. We understand the Storm Water Task Force (SWTF) has been meeting for several months and have discussed flood hazards, proposed solutions, and priorities within the Village of Glenview. The Village intends to develop a Multi-Hazard Mitigation Plan (MHMP) to serve as the cornerstone of a long-term hazard mitigation strategy with the goal of reducing future disaster losses, and provide community eligibility for different sources of FEMA hazard mitigation grant funding.

Manhard Consulting Ltd. (Manhard) has been retained by the Village to develop its MHMP and evaluate potential FEMA hazard mitigation funding opportunities through benefit-cost analyses of proposed flood mitigation/drainage improvement projects. Based on these evaluations and recommendations by Manhard, the Village intends to seek FEMA hazard mitigation funding for recommended priority projects upon consideration of matching fund requirements and Village budgetary matters. However, in order to apply for FEMA funding this year, the Village must act quickly to develop its MHMP. The MHMP must be approved by IEMA/FEMA before hazard mitigation grant applications will be accepted. IEMA's deadline for submission of hazard mitigation grant applications is December 3, 2009. Accordingly, we have established a target date of October 31, 2009 to submit the MHMP to IEMA/FEMA. We have obtained a verbal commitment from IEMA/FEMA for an expedited MHMP review/approval process that will allow for the Village to submit hazard mitigation grant applications by the established deadline date.

Hazard mitigation is any action that reduces the effects of future disasters. The primary purpose of hazard mitigation planning is to identify community policies, actions, and tools for implementation over the long term that will result in a reduction in risk and potential for future hazard losses within the Village.

Manhard Consulting, Ltd.
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tel: (847) 634-5550 • fax: (847) 634-0095 • www.manhard.com
ARIZONA • CALIFORNIA • COLORADO • GEORGIA • ILLINOIS • INDIANA • NEVADA

FEMA has defined a 4-step process that needs to be implemented in the development of a MHMP:

1. **Organize Resources:** This process includes identifying and organizing interested members of the Village, as well as, technical expertise to oversee the planning process. Since severe storms and flooding are the prominent hazards in the Village, this step is already underway through the work already completed by the SWTF.

2. **Assess Risks:** The Village is required to identify potential hazards that could occur and their impacts on important community assets. Flooding issues have already been identified and are being prioritized within the Storm Water Master Plan process. Manhard will be preparing a risk assessment of other potential area hazards such as winter storms, tornados, earthquakes, extreme heat, and other hazards, and will be providing data to the Village and the SWTF in the upcoming weeks to complete this step of the process.

3. **Develop a Mitigation Plan:** As other potential hazards are discussed, Manhard will ask for input from the SWTF on priorities for minimizing the impacts of flooding and other hazards. Manhard will then summarize the Village risk assessment along with the Village's mitigation goals, objectives, and prioritized actions into a formal written plan that will be submitted to IEMA and FEMA.

4. **Plan Implementation:** Once the plan has been approved by IEMA/FEMA and adopted by the Village Board, the Village can begin implementation, and can seek FEMA grant funds to undertake priority projects.

Multi-hazard mitigation planning is a cyclical process, as the plan will need to be updated at least every 5 years to ensure the plan is relevant and effective.

Manhard will provide a brief presentation and Q&A at the next SWTF meeting on September 9, 2009 to discuss the overall MHMP process and hazards risk assessment. Additional information about the MHMP and the potential hazards identified will be provided to the SWTF prior to this meeting in an effort to streamline this presentation and keep the meeting on task with its existing agenda.

Ms. Katherine McLeod, PE, our FEMA Hazard Mitigation Planning/Funding Specialist, and I will be available at the next two SWTF meetings on September 9 and October 14 to answer any questions regarding multi-hazard mitigation planning and the FEMA hazard mitigation grant program.

Village of Glenview Storm Water Task Force

Hazard Mitigation Planning
&
FEMA Grant Program

Manhard CONSULTING LTD

Hazard Mitigation Planning

Hazard Mitigation is any action that reduces the effects of future disasters.

The primary purpose of hazard mitigation planning is to identify community policies, actions, and tools for implementation over the long term that will result in a reduction in risk and potential for future hazard losses within the Village.

Disaster Mitigation Act of 2000
(Public Law 106-390)

Amended the Robert T. Stafford Disaster Relief & Emergency Assistance Act
Public Law 100-707, Dated November 23, 1988
Which Amended the Disaster Relief Act of 1974 (Public Law 93-288)

Section 322 of the Act:

- Reinforced importance of mitigation planning.
- Provided emphasis on planning for disasters before they occur.
- Established new requirements for the post-disaster Hazard Mitigation Grant Program (HMGP).
- Established the pre-disaster hazard mitigation (PDM) program.

Hazard Mitigation Planning

FEMA has defined a 4-step process that needs to be implemented in the development of a MHMP:

Hazard Mitigation Planning

1. <u>Organize Resources</u>

This process includes identifying and organizing interested members of the Village, as well as, technical expertise to oversee the planning process.

- Since severe storms and flooding are the prominent hazards in the Village, this step is already underway through the work already completed by the SWTF.

Hazard Mitigation Planning

2. <u>Assess Risks</u>

The Village is required to identify potential hazards that could occur and their impacts on important community assets.

- Flooding issues have already been identified and are being prioritized within the Storm Water Master Plan process.
- Need to prepare a risk assessment of other potential area hazards such as winter storms, tornados, earthquakes, extreme heat, and other hazards.

KEY	
GUARDED = 13-24	LOW= 8-12
HIGH =37-48	ELEVATED = 25-36
	SEVERE =49-60

Illinois Hazard Rating
By County
Based on Criteria and
Methodology Established at
the Illinois Natural Hazard
Mitigation Planning
Committee Meeting on
March 10, 2004

County Name	Population	Severe Storms	Floods	Severe Winter Storms	Drought	Extreme Heat	Earth-quake	Tornado
Adams	68,277	High	Elevated	High	Guarded	High	Guarded	Elevated
Alexander	9,590	High	High	High	High	Elevated	Severe	Elevated
Bond	17,633	High	Guarded	High	Guarded	High	Elevated	Elevated
Boone	41,786	Severe	Guarded	Severe	Guarded	Elevated	Guarded	Elevated
Brown	6,950	High	Elevated	High	Guarded	High	Guarded	Elevated
Bureau	35,503	Severe	Guarded	High	Guarded	Elevated	Guarded	Elevated
Calhoun	5,084	High	High	High	Guarded	High	Elevated	Guarded
Carroll	16,674	Severe	Guarded	High	Guarded	Elevated	Guarded	Elevated
Cass	13,695	Severe	High	Severe	Guarded	High	Elevated	Elevated
Champaign	179,669	Severe	High	Severe	Guarded	Elevated	Elevated	High
Christian	35,372	High	High	Severe	Guarded	High	Elevated	Elevated
Clark	17,008	High	Elevated	Severe	Guarded	High	Elevated	Guarded
Clay	14,560	High	Elevated	Severe	Guarded	High	High	Elevated
Clinton	35,535	High	Elevated	High	Guarded	High	Elevated	Elevated
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cook	5,376,741	Severe	High	Severe	Guarded	High	Guarded	High

Hazard Mitigation Planning

3. Develop a Mitigation Plan

Determine priorities for minimizing the impacts of flooding and other hazards.

- Summarize the Village Storm Water Master Plan with risk assessment for other hazards
- Set Village's mitigation goals & objectives,
- Prioritize mitigation actions into a formal written plan that will be submitted to IEMA and FEMA.

Hazard Mitigation Planning

4. Plan Implementation

Once the plan has been approved by IEMA/FEMA and adopted by the Village Board, the Village can begin implementation, and can seek FEMA grant funds to undertake priority projects.

FEMA GRANT PROGRAMS

FEMA Hazard Mitigation Assistance Program

- FEMA offers 5 grant programs to fund flood mitigation projects:
  1. Pre-Disaster Mitigation (PDM)
  2. Flood Mitigation Assistance (FMA)
  3. Repetitive Flood Claim (RFC)
  4. Severe Repetitive Loss (SRL)
  5. Post-Disaster - Hazard Mitigation Grant Program (HMGP) (NEW...5% Initiative)

1. Pre-Disaster Mitigation (PDM)

- The PDM program provides funding to reduce the nation's disaster losses through mitigation planning and the implementation of feasible, effective, and cost-efficient mitigation measures to reduce loss of life, as well as damage and destruction to property from ANY natural hazards.

2. Flood Mitigation Assistance (FMA)

- Provides funding to implement cost-effective measures to reduce or eliminate the long-term risk of flood damage to NFIP insured structures.
- Applies to Flood Hazards ONLY.
- Goal is to reduce or eliminate claims under the NFIP.

3. Repetitive Flood Claims (RFC)

- Provides funding to reduce or eliminate the long-term risk of flood damage to insured structures that have ONE or more claim payments for flood damages.

4. Severe Repetitive Loss (SRL)

- The Severe Repetitive Loss (SRL) grant program provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).

SRL Properties

- Residential properties that have at least four NFIP claim payments over $5,000 each; or
- Residential properties that have at least two NFIP claims payments where the cumulative amount of the building portion exceeds the value of the property.

5. Post-Disaster Hazard Mitigation Grant Program (HMGP)

- HMGP provides funding to implement long-term hazard mitigation measures after Federal Declaration of a major disaster.
  - ✓ Funding only available after a disaster.
  - ✓ Projects only compete on a State level.
  - ✓ Funds any mitigation activity – correlation to disaster not required.

Hazard Mitigation Plan Requirement

- All sub-applicants must have or be a part of a FEMA-approved Hazard Mitigation Plan by the application deadline to be eligible to apply for project grant funding.

Next Steps.....

1. SWTF provide input on draft MHMP.
2. Present details of Risk Assessment and overall MHMP by October 14th.
3. Incorporate SWTF comments and finalize MHMP. Submit MHMP to IEMA/FEMA by October 31, 2009.
4. Evaluate Village priority projects for potential FEMA grants.
5. MHMP Approval.
6. Prepare and submit FEMA Grant applications for qualified projects by December 4, 2009.

QUESTIONS?

E-Glenview Report

www.glenview.il.us

October 16, 2009

Help Clean Up the River and Techny Basin!

Join the Village's Natural Resources Commission for its Fall Work Day on **Saturday, October 17** and help clean up the West Fork of the Chicago River's North Branch and Techny Basin! We'll pick up trash, cut brush and do some weeding. Meet at the Kohl's parking lot just off of Willow Road at 9 a.m.-- we'll provide the work gloves, trash bags, and even a free snack. Questions? Call (847) 904-4536.

Turning a Microscope on the Village Commercial Permit Process

Have you worked with the Village to obtain permits for your commercial property? If so, we'd like to hear about it! Join the Inspectional Services Division for this special feedback session on **Monday, October 19**, 4-6 p.m., at the Village Hall, 1225 Waukegan Road.

Board to Hold Budget Workshop

The next 2010 Budget Workshop is scheduled for **Wednesday, October 21** at 7 p.m. at the Police Station, 2500 East Lake Avenue. On the agenda: a presentation by the Storm Water Task Force regarding possible flooding solutions and associated costs.

State of the Village Dinner

Planning to attend the Glenview League of Women Voters Dinner on November 1? Don't wait -- the reservation deadline is **Friday, October 23.** Tickets are $36 ($8 is tax deductible); email cbw331@aol.com for information.

New Parking Machines In Place Next Week

This week the Village is installing new parking machines at the Downtown and Glen of North Glenview Stations. Next week, **October 19-23**, Total Parking Solutions (the Village's vendor) will be at both stations between 5:15 and 9:15 a.m. to help commuters. The new machines will take cash, Visa and MasterCard. However, they **will no longer take Village-issued debit cards.**

If you still have a balance on your old card, the Village will be providing reimbursement up to $60 through **December 1**. There are several ways to request a refund; check our website for details.

Planning for Hazard Mitigation

The Federal Emergency Management Agency (FEMA) recently began offering "pre-disaster mitigation grants," which **could help fund projects developed through the Village's Storm Water Task Force process.** To meet the grant application requirements, the Village has developed a draft Multi-Hazard Mitigation Document. The goal is to obtain Village Board approval by the end of the year, which would qualify the Village to apply for FEMA's next funding cycle. Click the link to review the draft.

Caregivers Bill of Rights

Caring for a loved one? Join the Senior Services Division on **Thursday, October 22** for this free seminar featuring Lauretta Hart, MA, LPC North Shore Senior Center Caregiver Specialist. Program time: 1 p.m. at

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