# COOK COUNTY
# MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

## VOLUME 1—PLANNING-AREA-WIDE ELEMENTS

**FINAL**

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# EXECUTIVE SUMMARY

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Hazard mitigation is the use of long-term and short-term policies, programs, projects, and other activities to alleviate the death, injury, and property damage that can result from a disaster. Cook County and a coalition of 114 planning partners (115 partners total) prepared the Cook County Multi-Jurisdictional Hazard Mitigation Plan in order to identify the risks posed by hazards and find ways to reduce their impacts. The plan reduces risk for those who live in, work in, and visit the County.

## COOK COUNTY OVERVIEW

Cook County is located in northeast Illinois on the western shore of Lake Michigan (see Figure 2-1). It is the most populous of Illinois' 102 counties, with a 2013 estimated population of 5.24 million. It is the sixth largest county in the state by area, covering 946 square miles. Cook County makes up approximately 40 percent of the population of Illinois. The surrounding counties are Lake and McHenry to the north, Kane and DuPage to the west, and Will to the southwest. Lake Michigan is the county's eastern border.

Cook County is the second most populous county in the United States, after Los Angeles County. The county contains 134 municipalities, covering about 85 percent of the area of the county. The remaining unincorporated areas are under the jurisdiction of the Cook County Board of Commissioners, a 17-member board elected by district.

The planning area's economy is strongly based in the educational services, health care, and social assistance industry, followed by the professional, scientific, management, administrative, and waste management industries. Major businesses include the U.S. Government, Jewel-Osco, United Airlines, Motorola, Abbot Laboratories, Target Corporation, Walgreens, Bank One, and Sears, Roebuck and Company. Major educational and research institutions in the county include Northwestern University, Loyola University, DePaul University, the University of Chicago, and the University of Illinois at Chicago.

Cook County has experienced 19 hazard events since 1967 for which federal disaster declarations were issued. The Spatial Hazard Events and Losses Database for the United States (SHELDUS), maintained by the University of South Carolina, includes many more hazard events. For Cook County, SHELDUS lists 748 instances of monetary or human loss due to a hazard event.

## PARTICIPATING PARTNERS AND THE PLANNING AREA

The responsibility for hazard mitigation lies with many, including private property owners; business and industry; and local, state, and federal government. Through multi-jurisdictional partnerships, local jurisdictions within an area that has uniform risk exposure can pool resources and eliminate redundant planning activities. Cook County opened this planning effort to all municipalities within the County. Table ES-1 lists the planning partners that participated in the planning process and are covered under this plan. The planning area was defined as all incorporated and unincorporated areas of Cook County as well as the incorporated areas of cities that cross county boundaries. The planning area boundary is shown on Figure 2-1.

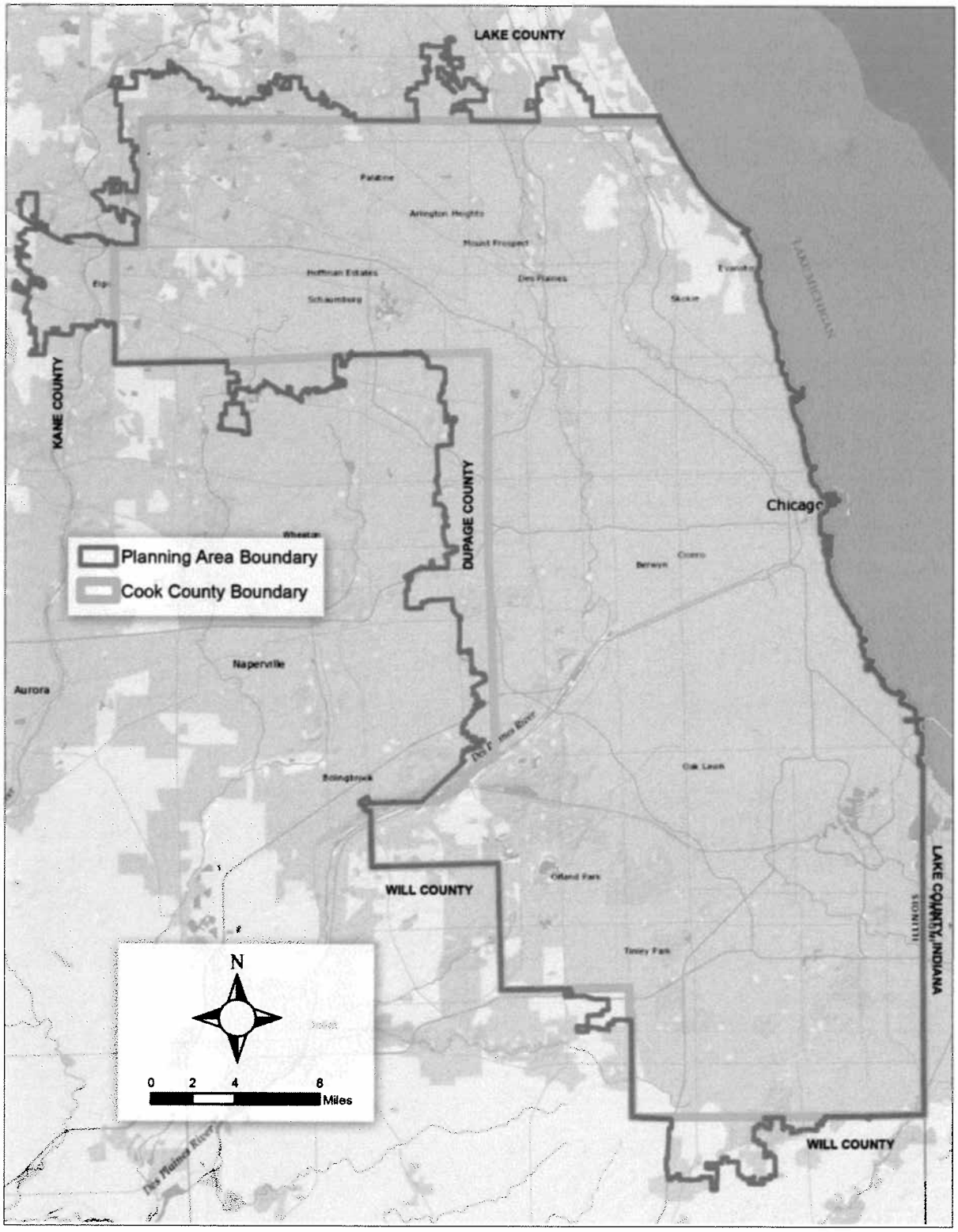


*Figure ES-1-1. Main Features of the Planning Area*

**TABLE ES-1.**
**PLANNING PARTNERS COVERED BY THIS HAZARD MITIGATION PLAN**

| | | | |
|---|---|---|---|
| Village of Alsip | Village of Arlington Heights | Village of Bedford Park | Village of Bellwood |
| Village of Berkeley | City of Berwyn | City of Blue Island | Village of Bridgeview |
| Village of Broadview | Village of Brookfield | City of Burbank | Village of Burnham |
| City of Calumet City | Village of Calumet Park | City of Chicago Heights | Village of Chicago Ridge |
| Town of Cicero | Cook County | City of Country Club Hills | City of Countryside |
| Village of Crestwood | Village of Dixmoor | Village of Dolton | Village of East Hazel Crest |
| Village of Elk Grove Village | Village of Elmwood Park | City of Evanston | Village of Evergreen Park |
| Village of Flossmoor | Village of Ford Heights | Village of Forest Park | Village of Forest View |
| Village of Franklin Park | Village of Glencoe | Village of Glenview | Village of Glenwood |
| Village of Golf | Village of Hanover Park | City of Harvey | Village of Harwood Heights |
| Village of Hazel Crest | City of Hickory Hills | Village of Hillside | Village of Hodgkins |
| Village of Hoffman Estates | Village of Homewood | Village of Indian Head Park | Village of Inverness |
| Village of Justice | Village of Kenilworth | Village of La Grange | Village of La Grange Park |
| Village of Lansing | Village of Lemont | Village of Lincolnwood | Village of Lynwood |
| Village of Lyons | City of Markham | Village of Matteson | Village of Maywood |
| Village of McCook | Village of Melrose Park | Village of Merrionette Park | Village of Midlothian |
| Village of Morton Grove | Village of Mount Prospect | Village of Niles | Village of Norridge |
| Village of North Riverside | Village of Northbrook | Village of Northfield | Village of Northlake |
| City of Oak Forest | City of Oak Lawn | Village of Oak Park | Village of Olympia Fields |
| Village of Orland Hills | Village of Orland Park | Village of Palatine | City of Palos Heights |
| City of Palos Hills | Village of Palos Park | City of Park Ridge | Village of Phoenix |
| Village of Posen | Village of Prospect Heights | Village of River Forest | Village of River Grove |
| Village of Riverdale | Village of Riverside | Village of Robbins | City of Rolling Meadows |
| Village of Rosemont | Village of Sauk Village | Village of Schaumburg | Village of Schiller Park |
| Village of Skokie | Village of South Barrington | Village of South Chicago Heights | Village of South Holland |
| Village of Steger | Village of Stickney | Village of Stone Park | Village of Streamwood |
| Village of Summit | Village of Thornton | Village of Tinley Park | Village of Westchester |
| Village of Western Springs | Village of Wheeling | Village of Willow Springs | Village of Wilmette |
| Village of Winnetka | Village of Worth | Metropolitan Water Reclamation District of Greater Chicago | |

## PLAN DEVELOPMENT AND ORGANIZATION

The Cook County Multi-Jurisdictional Hazard Mitigation Plan was developed under a grant from the Illinois Emergency Management Agency by a planning team of Cook County Department of Homeland Security and Emergency Management staff and expert consultants, with guidance from a Steering Committee representing the planning partners and other local stakeholders. The key steps in developing the plan were as follows:

- **Coordination with Other Agencies**—Opportunities for involvement were provided to neighboring communities, local and regional agencies involved in hazard mitigation, agencies that regulate development, businesses, academia, and other private and nonprofit interests
- **Review of Existing Programs**—Existing local and state plans, studies, reports and technical information were reviewed and incorporated as appropriate.
- **Public Involvement**—Broad public participation in the planning process was provided through Steering Committee participation, use of a widely distributed questionnaire, media outreach, and public meetings.

The final plan consists of two volumes. Volume 1 includes all federally required elements of a disaster mitigation plan that apply to the entire planning area. Volume 2 includes all federally required jurisdiction-specific elements, in individual annexes for each participating jurisdiction.

## MISSION, GOALS AND OBJECTIVES

The defined mission for the Cook County Multi-Jurisdictional Hazard Mitigation Plan is to "Identify risks and sustainable cost-effective actions to mitigate the impact of natural hazards in order to protect the life, health, safety, welfare, and economy of the communities of Cook County." Mitigation goals were established as follows:

1. Develop and implement sustainable, cost-effective, and environmentally sound risk-reduction (mitigation) projects.
2. Protect the lives, health, safety, and property of the citizens of Cook County from the impacts of natural hazards.
3. Protect public services and critical facilities, including infrastructure, from loss of use during natural hazard events and potential damage from such events.
4. Involve stakeholders to enhance the local capacity to mitigate, prepare for, and respond to the impacts of natural hazards.
5. Develop, promote, and integrate mitigation action plans.
6. Promote public understanding of and support for hazard mitigation.

Thirteen objectives were established for the plan that meet multiple goals, serving as stand-alone measurements of the effectiveness of the mitigation action. Proposed mitigation actions were evaluated in part based on how many objectives they would help to fulfill.

## HAZARDS ADDRESSED

The Steering Committee considered the full range of natural hazards that could impact the planning area and identified the following hazards as presenting the greatest concern:

- Dam or levee failure

- Drought
- Earthquake
- Flood
- Severe weather
- Severe winter weather
- Tornado.

Detailed risk assessments were performed for each of these hazards of concern. In addition, a brief qualitative review was conducted of technological and human-caused hazards of interest, which were not considered as critical as the hazards of concern: epidemic or pandemic; nuclear power plant incident; mass influx of evacuees; widespread power outage; hazardous material incident. A separate qualitative review also was performed for climate change.

## RISK ASSESSMENT METHODOLOGY

The risk assessments of the identified hazards of concern describe the risks associated with each hazard. The following steps were used to define the risk of each hazard:

- Profile each hazard, describing the geographic area it affects, its frequency and severity, and the warning time provided before a hazard event occurs.
- Use maps of hazard impact areas to determine how many structures, facilities, and systems are exposed to each hazard.
- Assess the vulnerability of exposed structures and infrastructure based on exposure and the probability of occurrence of a hazard event. Tools such as the Federal Emergency Management Agency's (FEMA's) hazard-modeling program called Hazus-MH were used to perform this assessment for flood, dam failure, earthquake hazards, and tornado. Outputs similar to those from Hazus-MH were generated for other hazards, using maps generated by the Hazus-MH program.

A detailed inventory of critical facilities and infrastructure was developed for this plan using GIS applications. Over 6,000 facilities were inventoried and uploaded into the Hazus-MH model to support the risk assessment. Table 5-3 and Table 5-5 summarize the general types of critical facilities and infrastructure, respectively.

**TABLE ES-2.**
**CRITICAL FACILITIES BY JURISDICTION AND CATEGORY**

| Medical and Health | Government Functions | Protective Functions | Schools | Hazardous Materials | Other Critical Functions | **Total** |
|---|---|---|---|---|---|---|
| **696** | **79** | **495** | **2551** | **2476** | **221** | **6518** |

**TABLE ES-3.**
**CRITICAL INFRASTRUCTURE BY JURISDICTION AND CATEGORY**

| Bridges | Water Supply | Wastewater | Power | Communication | Transportation | Dams | **Total** |
|---|---|---|---|---|---|---|---|
| **1,499** | **102** | **143** | **244** | **209** | **639** | **31** | **2,867** |

# PROFILES OF COOK COUNTY HAZARDS OF CONCERN

## Dam and Levee Failure

There are 23 state regulated dams in the planning area. Ten of these dams are classified as "high hazard" which means they have significant downstream populations at risk if the dam should fail. Flooding as a result of a dam and levee failure would significantly impact properties and populations in the inundation zones. No records of dam failures in the planning area are available.

There are three levee systems in Cook County. There is no history of levee failures in the planning area. The State of Illinois experienced levee failures in 1993 and 2008. In 1993, 17 levee systems breached along the Mississippi River and the Illinois River just north of where it meets the Mississippi River. Over 237,000 acres along the rivers were flooded.

Warning time for dam or levee failure varies depending on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, there may be no warning time. Cook County and its planning partners have established protocols for flood warning and response to imminent dam failure in the flood warning portion of its adopted emergency operations plan. These protocols are tied to the emergency action plans created by the dam owners.

Important issues associated with dam and levee failure include the following:

- Federally regulated dams have an adequate level of oversight and sophistication in their emergency action plans. However, the protocol for notifying downstream citizens of imminent failure needs to be tied to local emergency response planning.
- Mapping that estimates inundation depths is needed for non-federal-regulated dams to better assess the risk associated with dam failure from these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood, which is a worst-case scenario and generally the event with the lowest probability of occurrence. For non-federal-regulated dams, mapping of dam failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence could better illustrate areas potentially impacted by more frequent events to support emergency response and preparedness.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.
- Not all levees are reflected in the current flood mapping, which makes delineation of the hazard area difficult.

## Drought

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered to be long-term. Drought generally affects large geographic areas, so drought descriptions in the hazard mitigation plan are generally for the entire State of Illinois rather than the immediate planning area of Cook County.

The most severe droughts in Illinois occurred in the summer of 1934, the summer of 1931 and 1954. All three of these events were categorized as extreme droughts. More recently, in September 1983, all 102 counties were declared state disaster areas because of high temperatures and insufficient precipitation. In 1988, 54 percent of the state was impacted by drought-like conditions, resulting in disaster relief payments to landowners and farmers exceeding $382 million. Historical drought data for the planning area indicate there have been seven significant droughts in the last 115 years. This equates to a drought every 16 years on average, or a 6.25-percent chance of a drought in any given year.

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to property, as do other natural disasters. The National Drought Mitigation Center describes likely drought impacts as those affecting agriculture, water supplies, and the risk of fire.

Scientists at this time do not know how to predict drought more than a month in advance for most locations. How long a drought lasts depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

Important issues associated with drought include the following:

- Identification and development of alternative water supplies
- Use of groundwater recharge techniques to stabilize the groundwater supply
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods.

## Earthquake

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. Earthquakes tend to occur along faults, which are zones of weakness in the crust. Earthquakes occur throughout Illinois, with most in the southern third of the state. Over 360 earthquakes have occurred in Illinois during the past 20 year, with 32 resulting in damage. Fifteen events have been recorded in Cook, DuPage, Kane, Kendall, and Will Counties since 1804. Cook County has experienced three earthquakes ranging from a magnitude of 3 (categorized as "minor") to 4.9 (categorized as "light").

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris, because the shocks shake, damage or demolish buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, or releases of hazardous material, compounding their effects. Any seismic activity of 6.0 or greater on faults within the planning area would have significant impacts throughout the county. Earthquakes of this magnitude or higher would lead to massive failure of structures built on loose soils. Levees and revetments built on such soils would likely fail, representing a loss of critical infrastructure. These events could cause secondary hazards, including mudslides that would further damage structures.

There is currently no reliable way to predict an earthquake at any given location with any significant advance warning time. Research is being done with warning systems that use the low energy waves that precede major earthquakes to give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short but it could allow for someone to get under a desk, step away from a hazardous material they are working with, or shut down a computer system.

Important issues associated with earthquakes include the following:

- The public perception of the earthquake risk within the planning area is low. It can be difficult to get the public to think about earthquake mitigation with little or no perceived risk.
- Most of the planning area's building stock was built prior to 1975, when seismic provisions became uniformly applied through building code applications. A building stock analysis that looks at the potential fragility of the older building stock constructed without building code influence would be beneficial in the identification of seismic mitigation projects.
- More earthquake mapping is needed for the planning area.
- Critical facility owners/operators should be encouraged to create or enhance continuity of operations plans using the information on risk and vulnerability contained in the Cook County hazard mitigation plan.
- Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.
- The County has over 6 miles of earthen levees and revetments on soft, unstable soil. These soils are prone to liquefaction, which would severely undermine the integrity of these facilities.
- There are a large number of earthen dams within the planning area. Dam failure warning and evacuation plans and procedures should be reviewed and updated to reflect the dams' risk potential associated with earthquake activity in the region.

# Flood

## *Flood Types and History*

Two types of flooding are typical in Cook County: riverine flooding when water overflows the banks of a stream; and stormwater/urban drainage flooding, when storm runoff exceeds the capacity of local drainage systems in place to convey stormwater to a receiving body. Flood events of historical significance occurred in the Cook County region in 1849, 1855, 1885, 1938, 1952, 1954, 1957, 1961, 1973, 1979, 1986, 1987, 1996, 2001,2004, 2010 and 2013. Since 1972, 13 presidential-declared flood events in the County have caused in excess of $628.5 million in property damage.

In the past 20 years, stormwater/urban drainage flooding has become the principal cause of flood losses in the Cook County planning area. Urban portions of the county annually experience nuisance flooding related to drainage issues. After flooding in August 2010, FEMA provided more than $435 million in disaster recovery, response, and mitigation in Cook and DuPage Counties, and more than 75 percent of this went to individual homeowners, most of whom suffered sewer back-ups and basement flooding caused by stormwater/urban drainage flooding. The frequency and the magnitude of stormwater/urban drainage flooding in Cook County dictated the assignment of stormwater management within the County to a single entity—the Metropolitan Water Reclamation District of Greater Chicago.

Cook County experiences episodes of river flooding almost every winter. Large floods that can cause property damage typically occur every three to seven years.

## *Flood Mapping*

Flood studies use historical records to determine the probability of occurrence for different river discharge (flow) levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is

used as a regulatory boundary by many agencies. This boundary is a convenient tool for assessing risk in flood-prone communities. For most communities participating in the National Flood Insurance Program (NFIP), FEMA has prepared a detailed Flood Insurance Study that presents water surface elevations for the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). The boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps.

FEMA has mapped over 78 square miles of 100-year floodplain and 99 square miles of 500-year floodplain along 172 water courses in the Cook County planning area. Approximately 8 percent of the County is located within mapped 100-year floodplains.

### Flood Severity

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high-velocity flows and transporting debris and sediment.

The worst-case scenario for flooding in the Cook County planning area has happened numerous times in the past. It involves intense rain storms that stall over the planning area, dropping rainfall totals in excess 6 inches over a 48-hour period (this scenario is significantly exacerbated by the presence of snow pack on the ground). This leads to both riverine and stormwater/urban drainage flooding that can overwhelm flood response capabilities in the planning area. Major roads can be blocked, preventing critical access for many residents and critical functions. High in-channel flows can cause water courses to scour, possibly washing out roads and creating more isolation problems.

### Flood Warning

The Cook County flood threat system consists of a network of precipitation gages throughout the watershed and stream gages at strategic locations that constantly monitor and report stream levels. All of this information is analyzed by agencies such as Cook County Department of Homeland Security and Emergency Management (DHSEM) and Metropolitan Water Reclamation District to evaluate the flood threat and possible evacuation needs.

Floods are generally classed as either slow-rise or flash floods. Due to the sequential pattern of meteorological conditions needed to cause serious slow-rise flooding, it is unusual for a slow-rise flood to occur without warning. Slow-rise floods may be preceded by a warning time from several hours, to days, to possibly weeks. Evacuation and sandbagging for a slow-rise flood may lessen flood damage. Flash floods are more difficult to prepare for, due to the extremely short warning time given, if any. Flash flood warnings usually require evacuation within an hour. However, potential hazard areas can be warned in advance of potential flash flooding danger.

### Participation in Federal Flood Programs

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. Cook County entered the NFIP on April 15, 1981. The effective date for the current countywide Flood Insurance Rate Map is August 19, 2008. In addition to the County, most Cook County municipalities participate in the NFIP. The planning area has 17,807 flood insurance policies providing $3.464 billion in insurance coverage. According to FEMA statistics, 14,335 flood insurance claims were paid between January 1, 1978 and February 28, 2014, for a total of $157.7 million, an average of $10,970 per claim.

Twenty communities in the planning area also participate in the Community Rating System (CRS) a voluntary program that encourages floodplain management activities that exceed the NFIP requirements. The CRS requires participating communities to identify repetitive loss areas, where flood insurance claims have been paid multiple times for individual properties. FEMA identifies 1,571 such properties in the planning area as of January 31, 2014.

### Issues

Important issues associated with flooding include the following:

- The 2-D, unsteady-state modeling performed by the Metropolitan Water Reclamation District is considered to be the best available flood risk data for the planning are, but it is not the basis of FEMA's current effective Flood Insurance Rate Map. The District's flood hazard data should be formatted so that can be used to support risk assessment and thus validate best available data.
- The planning area has a large percentage of policies and losses outside a mapped hazard area.
- Basement flooding is a common problem.
- The stormwater/urban drainage flooding risk is not mapped, which makes it difficult to assess this hazard, other than looking at historical loss data.
- The risk associated with the flood hazard overlaps the risk associated with other hazards such as earthquake. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.
- There is no consistency of land-use practices and regulatory floodplain management within the planning area.
- It is unclear how potential climate change may impact flood conditions in the planning area.
- The concept of residual risk should be considered in the design of future capital flood control projects and should be communicated with residents living in the floodplain.
- More information is needed on flood risk to support the concept of risk-based analysis of capital projects.
- There needs to be a sustained effort to gather historical damage data, such as high water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in the county.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- The promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.
- The economy affects a jurisdiction's ability to manage its floodplains. Budget cuts and personnel losses can strain resources needed to support floodplain management.

## Severe Weather

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. It includes extreme heat, lightning, hail, fog, and high winds. Severe-weather events can happen anywhere in the planning area. Severe local storms are probably the most common widespread hazard. They affect large numbers of people throughout Cook County and the surrounding region when they occur. The heat wave of July 1995 was one of the worst disasters in Illinois history, with over 700 deaths statewide over five-days.

Records from the National Climatic Data Center and SHELDUS indicate approximately 500 severe weather events in the planning area between 1950 and 2013. The 169 severe weather events for the planning area from 1993 to 2013 represent an average of 8 events per year. According to the 2013 Illinois Natural Hazard Mitigation Plan, the planning area is designated as severely vulnerable to severe storms, with a high vulnerability to extreme heat.

The most common problems associated with severe storms are immobility and loss of utilities. Roads may become impassable due to flooding, downed trees, or a landslide. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Lightning can cause severe damage and injury. A worst-case severe-weather event would involve prolonged high winds during a thunderstorm. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds and downed tree obstructions. In more rural areas, some subdivisions could experience limited ingress and egress. Prolonged rain could produce flooding and overtopped culverts with ponded water on roads. Flooding could further obstruct roads and bridges, further isolating residents.

Meteorologists can often predict the likelihood of a severe storm or other severe weather event. This can give several days of warning time. The Chicago Office of the National Weather Service issues severe storm watches and warnings when appropriate to alert government agencies and the public of possible or impending weather events. The watches and warnings are broadcast over NOAA weather radio and are forwarded to the local media for retransmission using the Emergency Alert System.

Important issues associated with severe weather include the following:

- Redundancy of power supply throughout the planning area must be evaluated.
- The capacity for backup power generation is limited.
- Public education on dealing with the impacts of severe weather needs to be provided
- Debris management (downed trees, etc.) must be addressed.
- The effects of climate change may result in an increase in frequency of extreme heat events.

## Severe Winter Weather

The severe winter weather hazard encompasses snow, blizzards, ice storms and extreme cold temperatures and wind chill. Severe winter weather events can happen anywhere in the planning area. NOAA identifies nearly 100 severe winter weather events in the planning area since 1950, excluding snowstorms classified as less than major snowstorms. The planning area typically receives 36 inches of snow each year and can expect to experience exposure to some type of severe winter weather event at least annually.

Severe winter weather impacts can be significant. Roads may become impassable due to ice or snow. Power lines may be downed due to high winds or ice accumulation, and services such as water or phone

may not be able to operate without power. Physical damage to homes and facilities can occur from wind damage or accumulation of snow or ice. Freezing rain can cause the most dangerous conditions. Ice buildup can bring down trees, communication towers, and wires, creating hazards for property owners, motorists, and pedestrians alike. Many severe winter weather events in the planning area have resulted in the loss of life.

Meteorologists can often predict likely severe winter weather, giving several days of warning time. The National Weather Service provides public warnings on storm, snow and ice events as appropriate to alert government agencies and the public of possible or impending weather events. Watches and warnings are broadcast over NOAA weather radio and are forwarded to local media for retransmission using the Emergency Alert System.

Important issues associated with severe winter weather in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to severe winter weather events such as windstorms.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.
- Isolated population centers are at significant risk.

## Tornado

Tornadoes are the most violent of all atmospheric storms, and all of Illinois is susceptible to them, including Cook County. The tornado season runs March through August, although a tornado can occur in the state at any time. Many tornadoes have struck Cook County, including several within the Chicago city limits. Between 1955 and 2008, there were 92 significant tornadoes (tornadoes rated F2 or greater on a scale of F1 to F5, or that caused fatalities or injured at least 10 people). The F4-rated Oak Lawn tornado in April 1967 was the deadliest tornado in the planning area, with 33 fatalities. The only F5 tornado to ever strike the Chicago area was on August 28, 1990.

Tornadoes can cause fatalities and devastate a neighborhood in seconds. Winds can reach 300 mph and damage paths can be more than a mile wide and 50 miles long. If a major tornado were to strike within the populated areas of Cook County, damage could be widespread. Businesses could be forced to close for an extended period or permanently, fatalities could be high, many people could be homeless for an extended period, and routine services such as telephone or power could be disrupted. Buildings can be damaged or destroyed.

The local NWS office issues a tornado watch when tornadoes are possible in an area and a tornado warning when a tornado has been sighted or indicated by weather radar. The current average lead time for tornado warnings is 13 minutes. The National Weather Service has established a goal of 15 minutes in its strategic plan. Occasionally, tornadoes develop so rapidly that little, if any, advance warning is possible.

Important issues associated with tornadoes in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to tornadoes.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.

- The amount of the tornado zone that contains vacant, developable land is not known. This would be valuable information for gauging the future development potential of the tornado zone.
- Declining growth rate makes it difficult for code standards to have impacts on new development.
- The planning area has insufficient suitable tornado shelters.
- Public awareness of tornado response protocols is a concern, given the area's many visitors.

## QUALITATIVE REVIEW OF HAZARDS OF INTEREST

Though risk assessments were not conducted for hazards identified as hazards of interest rather than hazards of concern, each was reviewed for the hazard mitigation plan. Key findings are as follows:

- Climate Change— Climate change impacts on hazard events could include an increased risk for extreme events such as drought, storms and flooding, as well as more heat-related stress. In many cases, communities are already facing these problems to some degree. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis.
- Epidemic or Pandemic—Health hazards that affect the residents of Cook County may arise in a variety of situations, such as during a communicable disease outbreak, after a natural disaster, or as the result of a bioterrorism incident. All populations in Cook County are susceptible to such events. According to national projections by the Centers for Disease Control and Prevention, a pandemic flu with a 15- to 35-percent attack rate could cause 2 to 4.5 million cases in Illinois with up to 9,000 deaths.
- Nuclear Power Plant Incidents—There are no nuclear power plants in Cook County. The only site within 50 miles of Cook County is the Dresden Nuclear Power Plant in Grundy County. Locations that are 10 to 50 miles from a nuclear plant are not considered to be at risk for direct radiological contamination, but could be impacted by indirect contamination entering the region via waterways, vegetation, or animals originating from within 10 miles of the plant. The Nuclear Regulatory Commission's estimate of the risk each year of an earthquake intense enough to cause core damage to the reactor at Dresden is 1 in 52,632.
- Secondary Impacts from Incoming Evacuees—People evacuated to the planning area from a hazard event outside the planning area can have great impacts if local receiving jurisdictions lack the capacity to handle them. The IL-IN-WI Regional Catastrophic Grant Program's 2012 Regional Hub Reception Center Plan, which includes Cook County, outlines ways to process, track, and care for evacuees and spread them out to a larger area for long-term shelter.
- Widespread Power Outage—Utilities that use aboveground wiring are vulnerable to damage from high wind, heavy snow, ice, rain, and vehicular accidents. All facilities considered critical infrastructure are vulnerable to utility interruptions, especially loss of power. Establishment of reliable backup power at these facilities is extremely important to continue to provide for the health, safety, and well-being of the population.
- Hazardous Material Incident—A hazardous material is any substance that can adversely affect safety and health. In 2013, the City of Chicago undertook a risk assessment of hazardous material transportation routes to assess risks to the city and its inhabitants in the shipment of hazardous materials through its borders. Local jurisdictions should consider conducting a risk assessment to profile the potential hazardous concerns within their jurisdiction and to further assess health and safety impacts on their population, potential economic impacts, consequences, and the overall probably or frequency of incident.

## PLANNING AREA RISK RANKING

Risk rankings were performed by each planning partner to compare the probable impacts of the hazards of concern. For each community, the rankings assessed the probability of each hazard's occurrence as well as its likely impact on people, property, and the economy. A separate ranking to assess probable impacts countywide was conducted via facilitated brainstorming sessions with the Steering Committee. The results of the countywide ranking, which were are used in establishing mitigation action and priorities, are summarized in Table 15-6.

**TABLE ES-4.**
**HAZARD RISK RANKING**

| Hazard Ranking | Hazard Event | Category |
|---|---|---|
| 1 | Severe Weather | High |
| 1 | Severe Winter Weather | High |
| 2 | Flood | High |
| 3 | Tornado | High |
| 4 | Earthquake | Medium |
| 5 | Dam Failure | Low |
| 6 | Drought | Low |

## AREA-WIDE MITIGATION ACTIONS

Recommended hazard mitigation actions were selected from among alternatives presented in catalogs of hazard mitigation alternatives. The catalogs provided a baseline of alternatives that are backed by a planning process, are consistent with the planning partners' goals and objectives, and are within the capabilities of the partners to implement. One catalog was developed for each hazard of concern evaluated in this plan. Each planning partner selected its own set of recommended mitigation actions.

Cook County and the Steering Committee determined that some actions from the mitigation catalogs could provide hazard mitigation benefits countywide. Table 17-3 lists these recommended countywide mitigation actions and the priority of each action. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives, has benefits that exceed its cost, meets eligibility requirements for a federal hazard grant program, and has funding secured or is an ongoing project. High priority projects can be completed in the short term (1 to 5 years).
- **Medium Priority**—A project that meets at least one objective, that has benefits that exceed its cost, that is grant eligible under federal hazard or other grant programs, but for which funding has not been secured. Medium priority projects become high priority projects and can be completed in the short term once funding is secured.
- **Low Priority**—A project that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for federal hazard grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for grant funding from other programs.

**TABLE ES-5.**
**PRIORITIZATION OF COUNTYWIDE MITIGATION ACTIONS**

| Action Number and Description | Priority |
|---|---|
| CW-1—Cook County DHSEM will develop its disaster intelligence capabilities in order to provide comprehensive support to the planning area for preparedness, mitigation, response, and recovery. | High |
| CW-2—Continue to support the success of the Public Safety Consortium in the following areas: mission, guidance, scope, structure, and training. | High |
| CW-3—Complete the countywide mass notification system project. | High |
| CW-4—Integrate the WebEOC into countywide operations and partner agencies. | High |
| CW-5—Enhance the current Cook County evacuation plan. | High |
| CW-6—Review the Cook County sheltering inventory (type, location, and future development based on population models). | High |
| CW-7—Expand the Cook County Mobile Response Team capabilities for emergency and disaster response. | High |
| CW-8—Create a template to promote uniformity in Emergency Operations Plans within the planning area. | High |
| CW-9—Develop and implement a countywide critical infrastructure security program. | High |
| CW-10—Develop a Cook County Community Emergency Response Team Program that is interoperable with local Community Emergency Response Team programs. | Medium |
| CW-11—Review outreach strategies for populations with access or functional needs to expand countywide support capabilities in all phases of the disaster cycle. | High |
| CW-12—Continue to promote the core competencies of the StormReady Program for increased countywide severe weather preparedness. | High |
| CW-13—Revisit and review all existing mutual aid agreements and memorandums of understanding and determine how new action items should be incorporated. | High |
| CW-14—Develop a countywide hazards task force to create a collective approach to natural hazard mitigation through the unification of plans, actions, and data. | High |
| CW-15—Identify and promote local, state, and federal funding sources for local flood mitigation projects. | Medium |
| CW-16—Consider the development of a countywide green infrastructure plan. | Medium |
| CW-17—Consider the development of a countywide climate adaptation strategy committee. | High |
| CW-18—Maintain a hazard mitigation plan website where this final plan will be housed and planning partners as well as members of the public will be able to monitor plan implementation. | High |
| CW-19—Support planning partner education by requesting mobile training courses covering National Flood Insurance Program and Community Rating System information during the period of this plan. | High |
| CW-20—Work with the Illinois Department of Natural Resources (IDNR), U.S. Army Corps of Engineers (USACE), and the Metropolitan Water Reclamation District of Greater Chicago (MWRD) to study and assess in greater detail the risk associated with stormwater/urban drainage flooding. | Medium |

# IMPLEMENTATION

## Plan Adoption

The hazard mitigation plan will be submitted for a pre-adoption review to the Illinois Emergency Management Agency and FEMA prior to adoption by Cook County. Once pre-adoption approval has been provided, all planning partners will formally adopt the plan.

## Plan Maintenance Strategy

The hazard mitigation plan includes a formal process to ensure that the Cook County Multi-Jurisdictional All Hazards Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant. The strategy for ongoing maintenance of the plan includes the following components:

- Plan Implementation—Plan implementation and evaluation will be a shared responsibility among all planning partners and agencies identified as lead agencies in the mitigation action plans. Cook County DHSEM will assume lead responsibility for implementing the plan maintenance strategy.
- Steering Committee—It is recommended that a steering committee remain a viable body involved in key elements of the plan maintenance strategy. The new steering committee should strive to include representation from the planning partners, as well as other stakeholders in the planning area.
- Annual Progress Report—The steering committee will convene to perform annual reviews. DHSEM will then prepare a formal annual report on the progress of the plan.
- Plan Update—The planning partnership intends to update the hazard mitigation plan on a five-year cycle from the date of initial plan adoption.
- Continuing Public Involvement—The public will continue to be apprised of the plan's progress through the Cook County hazard mitigation website and by copies of annual progress reports provided to the media. DHSEM has agreed to maintain the hazard mitigation plan website, and each planning partner has agreed to provide links to the website on their individual jurisdictional websites.
- Incorporation into Other Planning Mechanisms—All municipal planning partners are committed to creating a linkage between the hazard mitigation plan and their individual comprehensive plans by identifying a mitigation action as such and giving that action a high priority. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.