

**COOK COUNTY  
MULTI-JURISDICTIONAL  
HAZARD MITIGATION PLAN  
VOLUME 2 - Municipal Annexes**

**Oak Forest Annex**

**FINAL**

July 2019

Prepared for:



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## Hazard Mitigation Point of Contact

Primary Point of Contact	Alternate Point of Contact
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## Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1947
- **Current Population:** 27,406 as of 2018 US Census population estimate.
- **Population Growth:** Oak Forest experienced dramatic growth in the 1960s with urban sprawl and residential developments. The population jumped from 3,724 in 1960 to 17,870 in 1970. It then leveled off after the population reached 26,096 in 1980. Population peaked at 28,051 with the 2000 census. The population has remained relatively unchanged since 2000, with slight declines.
- **Location and Description:** Oak Forest is a suburban city about 24 miles south/southwest of downtown Chicago. It is surrounded by Cook County Forest Preserves. Neighboring communities include Crestwood to the north, Midlothian to the northeast, Markham to the east, Country Club Hills to the southeast, Tinley Park to the southwest, Orland Park to the west and Palos Heights to the northwest. According to the U.S. Census Bureau, Oak Forest has a total land area of 5.95 square miles.
- **Brief History:** Oak Forest is most widely known as the former home of the Cook County Oak Forest Hospital, an institution that played a major role in the growth of the community. In 1906, the original Oak Forest train station was primarily a milk stop used by farmers of Bremen Township. Oak Forest grew rapidly as a suburb on the urban fringe in the 1960s and 70s. The 1980s and 90s saw the residential population stabilize as land available for large tract development diminished. In 2011, the county Board voted to close the 600 bed Oak Forest hospital. Cook County opened a 24-hour immediate care center on the former hospital grounds to continue to offer vital services as part of the county's health care system. Expansion of the Oak Forest Hospital initially fostered growth of the community. The decision to locate a poor farm in the area was made in 1907 in response to the overcrowded conditions at the County Poor Farm in Dunning on the Northwest Side of Chicago. Significant commercial and clean light industrial development accompanied population growth. Shopping centers, strip malls, professional offices, and specialized auto service businesses opened along the Cicero Avenue and 159th Street corridors. Mixed use industrial and office parks were established in the 1980s and 90s on the northwest and southeast sides of town. Residential development in the 90s and 2000s diversified from single family homes to townhome and condominiums. Mixed-use redevelopment began to occur along the 159th Street and Cicero area corridors with office/storefronts on first floors with condos on upper floors. Transit oriented development was encouraged near the intersection of 159th Street and Cicero Avenue with the City's Gateway Project and construction of a new train station & commuter parking facilities. Residentially, the community is mostly built out with most large tract development completed. The commercial corridors are redeveloping with ongoing economic development in the wake of the 2009-2012 recessions.
- **Climate:** The climate in the Greater Chicago region is classified as humid continental with all four seasons distinctly represented: wet springs; hot and often humid summers; pleasant autumns;

and cold winters. Annual precipitation averages about 37.0” and reaches its lowest points in the months of January and February, and peaks in the months of May and June.

- **Governing Body Format:** The City of Oak Forest is a home rule community governed by a Mayor and seven-member City Council. This body of Government will assume the responsibility for the adoption and implementation of this plan. The City consists of eight departments: Building & Code Enforcement, Community Development, Emergency Management, Finance, Fire, Police, Public Works, and the City Administrator’s Office. The City has multiple Committees and Commissions which advise the City Council.
- **Development Trends:** In 2016 the City of Oak Forest announced that three national retailers would open stores in Oak Forest in 2016. The retailers are Family Dollar at 5400 W. 159th Street, Ace Hardware at 15426 S. Cicero Avenue, and Starbucks at the northwest corner of 159th and Cicero Avenue. Starbucks will be joined in the Gateway Development by ATI, a nationally-recognized physical therapy provider. In 2019, Oak Forest remains a strong family based community with good schools, tremendous recreational and leisure opportunities in the adjacent forest preserves, and ease of access to the Greater Chicago region via the METRA commuter rail and Interstates I-57 and I-80.

## Capability Assessment

The assessment of the jurisdiction’s legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction’s fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction’s administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community’s National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

<b>TABLE: LEGAL AND REGULATORY CAPABILITY</b>					
	<b>Local Authority</b>	<b>State or Federal Prohibitions</b>	<b>Other Jurisdictional Authority</b>	<b>State Mandated</b>	<b>Comments</b>
<b>Codes, Ordinances &amp; Requirements</b>					
Building Code	Yes	No	No	Yes	In accordance with Public Act 096-0704, Illinois has adopted the IBC as its state Building Code Municipal code adopted: 2018
Zonings	Yes	No	No	Yes	(65 ILCS 5/) Illinois Municipal Code.
Subdivisions	Yes	No	No	No	Municipal code adopted: 2014 Municipal code adopted: 2014
Stormwater Management	Yes	No	No	Yes	State regulates industrial activity from Construction sites 1 acre or larger under section 402 CWA. Municipal code adopted: 2006
Post Disaster Recovery	No	No	No	No	

Real Estate Disclosure	No	No	No	Yes	(765 ILCS 77/) Residential Real Property Disclosure Act
Growth Management	No	No	No	No	
Site Plan Review	Yes	No	No	No	Municipal code adopted: 2018
Public Health and Safety	Yes	No	Yes	Yes	Health Inspector on staff
Environmental Protection	No	No	No	No	
<b>Planning Documents</b>					
General or Comprehensive Plan	Yes	No	No	No	2008
<i>Is the plan equipped to provide linkage to this mitigation plan?</i>					Yes. Plan includes land use and redevelopment elements
Floodplain or Basin Plan	No	No	No	No	2008
Stormwater Plan	Yes	No	Yes	No	Regional stormwater impacts are managed by MWRD. The City lies within the Cal-Sag and Little Calumet River Watershed planning areas of MWRD's comprehensive Stormwater Master Planning Program
Capital Improvement Plan	Yes	No	No	No	
<i>What types of capital facilities does the plan address?</i>					All city facilities/public infrastructure

<i>How often is the plan revised/updated?</i>					Annually
Habitat Conservation Plan	No	No	No	No	
Economic Development Plan	Yes	No	Yes	Yes	The Economic Development Commission is charged with reviewing all economic development related programs and incentives including tax incentives offered through the Cook County 6b program
Shoreline Management Plan	No	No	No	No	
<b>Response/Recovery Planning</b>					
Comprehensive Emergency Management Plan	Yes	No	Yes	Yes	Cook County DHSEM
Threat and Hazard Identification and Risk Assessment	No	No	Yes	No	Cook County DHSEM Preparing THIRA
Terrorism Plan	No	No	Yes	Yes	Cook County DHSEM
Post-Disaster Recovery Plan	No	No	No	No	Cook County DHSEM
Continuity of Operations Plan	Yes	No	Yes	No	Cook County DHSEM
Public Health Plans	No	No	Yes	No	Cook County DPH

<b>TABLE: FISCAL CAPABILITY</b>	
<b>Financial Resources</b>	<b>Accessible or Eligible to Use?</b>



Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Yes

**TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY**

<b>Staff/Personnel Resources</b>	<b>Available?</b>	<b>Department/Agency/Position</b>
Planners or engineers with knowledge of land development and land management practices	Yes	Oak Forest Community Development Director, Community Planner, Public Works Director, Assistant Public Works Director/City Engineer
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works Director, Assistant Public Works Director/City Engineer
Planners or engineers with an understanding of natural hazards	Yes	Oak Forest Community Development Director, Public Works Director, Assistant Public Works Director/City Engineer
Staff with training in benefit/cost analysis	Yes	Oak Forest Community Development Director, Community Planner, Public Works Director, Assistant Public Works Director/City Engineer
Surveyors	No	
Personnel skilled or trained in GIS applications	Yes	Oak Forest Community Development Director, Community Planner, Public Works Director, Assistant Public Works Director/City Engineer
Scientist familiar with natural hazards in local area	Yes	Public Works Director
Emergency manager	Yes	Emergency Management Director

Grant writers	Yes	Public Works Director
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TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Building Department
Who is your jurisdiction’s floodplain administrator? (department/position)	Building Commissioner
Are any certified floodplain managers on staff in your jurisdiction?	No – contracted consulting engineer
What is the date of adoption of your flood damage prevention ordinance?	2008
When was the most recent Community Assistance Visit or Community Assistance Contact?	6/25/2009
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No, yes

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	Classification	Date Classified
Community Rating System	No	N/A	N/A
Building Code Effectiveness Grading Schedule	Yes	Unknown	Unknown
Public Protection/ISO	Yes	10	2010
StormReady	No	NA	2019-2020
Tree City USA	Yes	N/A	2008

## Jurisdiction-Specific Natural Hazard Event

The information provided below was solicited from the jurisdiction and supported by NOAA and other relevant data sources.

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 9
- Number of FEMA-Identified Severe Repetitive Loss Properties:
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0

<b>Type of Event</b>	<b>FEMA Disaster Number (if applicable)</b>	<b>Date</b>	<b>Preliminary Damage Assessment</b>
Severe Winter Storms	-	2019	-
Severe Winter Storms	-	2019	-
Severe Winter Storms	-	2019	-
Severe Winter Storms	-	2015	-
Severe Storms	-	2014	-
Severe Storms	DR-4116	2013	-
Severe Winter Storms	DR-1960	2011	-
Severe storms/ Flooding	DR-1935	2010	-
Severe storms/ Flooding	DR-1800	2008	-
Severe storms/ Flooding	DR-1729	2007	-
Severe Winter Storms	EM-3161	2000	-
Winter Snow Storm	EM-3134	1999	-
Flooding	DR-1188	1997	-
Flooding	DR-1129	1996	-
Severe storms/ Flooding	DR-997	1993	-

Severe storms/ Flooding	DR-798	1987	-
Severe storms/ Flooding	DR-776	1986	-

### **Jurisdiction-Specific Hazards and Impacts**

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Cook County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

**Flood:** Four to five inches of standing water at 167th and Cicero.

**Dam/Levee Failure:** Street flooding at 15200 S. Oak Park Ave. City seeks to work with IDOT, Village of Oak Lawn, and Cook County Forest Preserve District to mitigate street flooding. Investigating drainage system improvements to prevent water ponding in ROW and endangering the motoring public.

**Severe Weather:** A powerful line of thunderstorms moved across northern Illinois during the evening hours of August 4th, 2008. Widespread and significant wind damage was reported along with several brief tornadoes on the leading edge of this line of storms.

**Drought, Extreme Heat:** Similarly, to the rest of Cook County, during the summer season the Village is at risk of severe droughts.

**Hail:** Nickel size hail was reported at 167th and Cicero.

**High Wind:** During the late afternoon and evening of June 24th 2004, a bow echo raced across northern Illinois causing widespread wind damage and spawning at least one tornado.

**Wide Spread Power Outage:** 8/23/2007 - The City of Chicago reported over 6,400 tree emergencies, over 200 damaged light poles, and over 350 downed power lines. A 40-inch diameter tree was blown down on West Waveland Street in Chicago. ComEd reported that a total of 615,000 customers lost power during the storms.

## Hazard Risk Ranking

The *Hazard Risk Ranking Table* below presents the ranking of the hazards of concern. Hazard area extent and location maps are included at the end of this chapter. These maps are based on the best available data at the time of the preparation of this plan, and are considered to be adequate for planning purposes.

<b>TABLE: HAZARD RISK RANKING</b>		
<b>Rank</b>	<b>Hazard Type</b>	<b>Risk Rating Score (Probability x Impact)</b>
1	Severe Weather	54
2	Severe Winter Weather	54
3	Flood	20
4	Tornado	30
5	Earthquake	18
6	Dam Failure	14
7	Drought	2

Note: The ranking of hazards was subjectively changed based on past experience

## Mitigation Strategies and Actions

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

The *Hazard Mitigation Action Plan Matrix Table* below lists the actions that make up the jurisdiction’s hazard mitigation plan. The *Mitigation Strategy Priority Schedule Table* identifies the priority for each action.

TABLE: HAZARD MITIGATION ACTION PLAN MATRIX						
Status	Hazards Mitigated	Objectives Met	Lead Agencies	Estimated Cost	Sources of Funding	Timeline/Projected Completion Date (a)
<b>Action O2.1</b> —Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.						
Ongoing	All	7, 13	City of Oak Forest	High	FEMA Hazard Mitigation Grants	Long-term (depending on funding)
<b>Action O2.2</b> —Continue to support the county-wide actions identified in this plan.						
Ongoing	All	All	City of Oak Forest	Low	General Fund	Short- and long-term
<b>Action O2.3</b> —Actively participate in the plan maintenance strategy identified in this plan.						
Ongoing	All	3, 4, 6	DHSEM City of Oak Forest	Low	General Fund	Short-term
<b>Action O2.4</b> —Consider participation in incentive-based programs such as the Community Rating System, Tree City, and StormReady.						

Ongoing	All	3, 4, 5, 6, 7, 9, 10, 11, 13	City of Oak Forest	Low	General Fund	Long-term
<b>Action O2.5</b> —Maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.						
Ongoing	Flooding	4, 6, 9	City of Oak Forest	Low	General Fund	Short-term and ongoing
<b>Action O2.6</b> —Where feasible, implement a program to record high water marks following high-water events.						
Ongoing	Flooding, Severe Weather	3, 6, 9	City of Oak Forest	Medium	General Fund; FEMA Grant Funds (Public Assistance)	Long-term
<b>Action O2.7</b> —Integrate the hazard mitigation plan into other plans, programs, or resources that dictate land use or redevelopment.						
Ongoing	All	3, 4, 6, 10, 13	Oak Forest Building Department	Low	General Fund	Short-term
<b>Action O2.8</b> —Seek SAFER, or Assistance to Firefighters Grant funding for fire apparatus.						
Ongoing	Drought, Extreme Heat, Lightning, High Wind, Tornado, Widespread Power Outage	1	City of Oak Forest	TBD	Grants	Short-term
<b>Action O2.9</b> —Flood Control Project on Natalie Creek by Metropolitan Water Reclamation District (MWRD), City of Oak Forest, and Village of Midlothian to improve conveyance, stabilize shoreline, and provide additional retention.						
Ongoing	Flood	2, 3, 7, 8, 9, 13	MWRD	TBD	MWRD	Long-term
<b>Action O2.10</b> —Partnering with Cook County Department of Transportation and Highways (CDOTH) for 2020-21 culvert replacement and up-sizing of culvert crossings at 151st Street and Boca Rio Drive (Boca Rio Ditch-East Fork of Tinley Creek). Will reduce flooding directly impacting 28 structures.						

Ongoing	Dam/Levee Failure, Flood	2, 3, 7, 8, 9, 13	City of Oak Forest; CDOTH	TBD	CDOT	Short-term
<b>Action 02.11</b> —Street flooding at 15200 S. Oak Park Ave.						
Ongoing	Dam/Levee Failure, Flood	2, 3, 12	City of Oak Forest	TBD	TBD	Short-term
<b>Action 02.12</b> —Participate and assist Illinois Department of Transportation (IDOT) with capital project to replace and up-size IDOT culvert crossing on 147th Street west of Menard (Tributary C) to improve overland flow from the El Vista West subdivision and reduce the incidence of the overtopping of 147th Street.						
Ongoing	Dam/Levee Failure, Flood	2, 3, 7, 8, 9, 13	City of Oak Forest IDOT	TBD	IDOT	Short-term
<b>Action 02.13</b> —Participate and assist Illinois Department of Transportation (IDOT) with capital projects to replace and up-size IDOT culvert crossings for Midlothian Creek (159th Street and Cicero Ave.).						
Ongoing	Dam/Levee Failure, Flood	2, 3, 7, 8, 9, 13	City of Oak Forest; IDOT	TBD	IDOT	Short-term
<b>Action 02.14</b> —Participate and work with the Illinois State Water Survey (ISWS) to survey and update FEMA FIRM map panel up and downstream of 151st Street and Boca Rio Drive (Boca Rio Ditch-East Fork of Tinley Creek).						
Ongoing	All	2, 3, 8, 13	City of Oak Forest; ISWS	TBD	ISWS	Short-term
<b>Action 02.15</b> —Provide increased resiliency of first responders radio communication network.						
Ongoing	All	1, 5	City of Oak Forest	TBD	TBD	Short-term
<b>Action 02.16</b> —Participate in local and regional Mutual Aid Training Activities.						
Ongoing	All	1, 8	City of Oak Forest	TBD	TBD	Long-term
<b>Action 02.17</b> —Storm Drainage System Improvement on 151st Street at Boca Rio Ditch in City of Oak Forest. CCDOTH is working with MWRD and City of Oak Forest to replace deteriorating culvert with a larger one which will help to reduce the risk of local flooding.						
New	Flood	2, 3, 7, 9, 13	CCDOH	\$619,000; Low	MWRD Grant	2020
<b>Action 02.18</b> —Flood Control along Natalie Creek.						



New	Flood	2, 3, 7, 9, 13	MWRD	\$7,629,000; High	TBD	TBD
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**Action O2.19**—Culvert Upsizing and Channel Improvements on Boca Rio Ditch.

New	Flood	2, 3, 7, 9	MWRD	\$619,000; Low	TBD	TBD
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(a) Ongoing indicates continuation of an action that is already in place. Short-term indicates implementation within five years. Long-term indicates implementation after five years.

**TABLE: MITIGATION STRATEGY PRIORITY SCHEDULE**

Action Number	Number of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Priority (a)
1	2	High	High	Yes	Yes	No	Medium
2	13	Medium	Low	Yes	No	Yes	High
3	3	Medium	Low	Yes	Yes	Yes	High
4	9	Medium	Low	Yes	No	Yes	Medium
5	3	Medium	Low	Yes	No	Yes	High
6	3	Medium	Medium	Yes	Yes	No	Medium
7	5	Medium	Low	Yes	No	Yes	High
8	1	TBD	TBD	TBD	Yes	TBD	TBD
9	6	TBD	TBD	TBD	Yes	TBD	TBD
10	6	TBD	TBD	TBD	Yes	TBD	TBD
11	3	TBD	TBD	TBD	Yes	TBD	TBD
12	6	TBD	TBD	TBD	Yes	TBD	TBD
13	6	TBD	TBD	TBD	Yes	TBD	TBD
14	4	TBD	TBD	TBD	Yes	TBD	TBD
15	2	TBD	TBD	TBD	Yes	TBD	TBD
16	2	TBD	TBD	TBD	Yes	TBD	TBD
17	5	Medium	Low	Yes	Yes	TBD	Medium
18	4	TBD	High	Yes	TBD	TBD	TBD

19	5	TBD	Low	Yes	TBD	TBD	TBD
(a) See Chapter 1 for explanation of priorities.							

## New Mitigation Actions

The following are new mitigation actions created during the 2019 update.

**Action O2.17**

<b>Mitigation Action</b>	Storm Drainage System Improvement on 151st Street at Boca Rio Ditch in City of Oak Forest. CCDOTH is working with MWRD and City of Oak Forest to replace deteriorating culvert with a larger one which will help to reduce the risk of local flooding.
<b>Year Initiated</b>	2019
<b>Applicable Jurisdiction</b>	CCDOH/MWRD/City of Oak Forest
<b>Lead Agency/Organization</b>	CCDOH
<b>Supporting Agencies/Organizations</b>	MWRD
<b>Applicable Goal</b>	<ul style="list-style-type: none"> <li>• Develop and implement sustainable, cost-effective, and environmentally sound risk-reduction (mitigation) projects.</li> <li>• Protect the lives, health, safety, and property of the citizens of Cook County from the impacts of natural hazards.</li> <li>• Protect public services and critical facilities, including infrastructure, from loss of use during natural hazard events.</li> </ul>
<b>Applicable Objective</b>	<ul style="list-style-type: none"> <li>• Increase the resilience of (or protect and maintain) infrastructure and critical facilities.</li> <li>• Consider the impacts of natural hazards on future land uses in the planning area, including possible impacts from climate change.</li> <li>• Retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.</li> <li>• Provide or improve flood protection on a watershed basis with flood control structures and drainage maintenance plans.</li> <li>• Encourage hazard mitigation measures that result in the least adverse effect on the natural environment and that use natural processes.</li> </ul>
<b>Potential Funding Source</b>	MWRD Grant
<b>Estimated Cost</b>	\$619,000
<b>Benefits (loss avoided)</b>	Will reduce flood risk for up to 28 residential structures.

<b>Projected Completion Date</b>	2020
<b>Priority and Level of Importance (Low, Medium, High)</b>	Medium Priority
<b>Benefit Analysis (Low, Medium, High)</b>	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
<b>Cost Analysis (Low, Medium, High)</b>	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.
<b>Actual Completion Date</b>	

<b>Recommended Mitigation Action/Implementation Plan and Project Description</b>	
<b>Action/Implementation Plan and Project Description:</b>	The main component of the project will be the replacement of the deteriorating culverts underneath 151st Street, which is under CCDOTH jurisdiction, with larger culverts. In addition, we anticipate additional improvements to promote improved water quality and reduce the potential for siltation and erosion through streambank stabilization and a naturalized channel section with sedimentation basins to reduce future migration of silt downstream of 151st Street.

<b>Mitigation Action and Project Maintenance</b>		
<b>Year</b>	<b>Status</b>	<b>Comments</b>
2019	New	
2020		
2021		
2022		
2023		

<b>Mitigated Hazards</b>	
	<b>All Hazards</b>
	Dam/Levee Failure
	Drought
	Earthquake
X	Flood
	Extreme Heat
	Lightning
	Hail
	Fog
	High Wind
	Snow

	Blizzard
	Extreme Cold
	Ice Storms
	Tornado
	Epidemic or pandemic
	Nuclear Power Plant Incident
	Widespread Power Outage
	Coastal Erosion
	Secondary Impacts from Mass Influx of Evacuees
	Hazardous Materials Incident

**Action O2.18**

<b>Mitigation Action</b>	Flood Control along Natalie Creek
<b>Year Initiated</b>	2019
<b>Applicable Jurisdiction</b>	City of Oak Forest
<b>Lead Agency/Organization</b>	MWRD
<b>Supporting Agencies/Organizations</b>	City of Oak Forest
<b>Applicable Goal</b>	<ul style="list-style-type: none"> <li>• Develop and implement sustainable, cost-effective, and environmentally sound risk-reduction (mitigation) projects.</li> <li>• Protect the lives, health, safety, and property of the citizens of Cook County from the impacts of natural hazards.</li> <li>• Protect public services and critical facilities, including infrastructure, from loss of use during natural hazard events.</li> </ul>
<b>Applicable Objective</b>	<ul style="list-style-type: none"> <li>• Increase the resilience of (or protect and maintain) infrastructure and critical facilities.</li> <li>• Consider the impacts of natural hazards on future land uses in the planning area, including possible impacts from climate change.</li> <li>• Retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.</li> <li>• Provide or improve flood protection on a watershed basis with flood control structures and drainage maintenance plans.</li> <li>• Encourage hazard mitigation measures that result in the least adverse effect on the natural environment and that use natural processes.</li> </ul>
<b>Potential Funding Source</b>	N/A
<b>Estimated Cost</b>	\$7,629,000
<b>Benefits (loss avoided)</b>	N/A
<b>Projected Completion Date</b>	TBD
<b>Priority and Level of Importance (Low, Medium, High)</b>	N/A
<b>Benefit Analysis (Low, Medium, High)</b>	N/A
<b>Cost Analysis (Low, Medium, High)</b>	High

<b>Actual Completion Date</b>	
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<b>Recommended Mitigation Action/Implementation Plan and Project Description</b>	
<b>Action/Implementation Plan and Project Description:</b>	ID: Midlothian 1 Contract: 14-252-5F Watershed: Little Cal River Location: Oak Forest; Midlothian, IL Installation of flood control measures for an estimated 15,800 linear feet along Natalie Creek from 157th and Central Park in Oak Forest to 146th and Pulaski in Midlothian. Flood control measures involve the upsizing of restrictive culverts, improving the channel at several locations and the installation of a stormwater detention basin. The project will reduce flood damages for over 230 structures.

<b>Mitigation Action and Project Maintenance</b>		
<b>Year</b>	<b>Status</b>	<b>Comments</b>
2019	New	Project under construction
2020		
2021		
2022		
2023		

<b>Mitigated Hazards</b>	
	<b>All Hazards</b>
	Dam/Levee Failure
	Drought
	Earthquake
X	Flood
	Extreme Heat
	Lightning
	Hail
	Fog
	High Wind
	Snow
	Blizzard
	Extreme Cold
	Ice Storms
	Tornado
	Epidemic or pandemic
	Nuclear Power Plant Incident



	Widespread Power Outage
	Coastal Erosion
	Secondary Impacts from Mass Influx of Evacuees
	Hazardous Materials Incident

**Action O2.19**

<b>Mitigation Action</b>	Culvert Upsizing and Channel Improvements on Boca Rio Ditch
<b>Year Initiated</b>	2019
<b>Applicable Jurisdiction</b>	City of Oak Forest
<b>Lead Agency/Organization</b>	MWRD
<b>Supporting Agencies/Organizations</b>	City of Oak Forest
<b>Applicable Goal</b>	<ul style="list-style-type: none"> <li>• Develop and implement sustainable, cost-effective, and environmentally sound risk-reduction (mitigation) projects.</li> <li>• Protect the lives, health, safety, and property of the citizens of Cook County from the impacts of natural hazards.</li> <li>• Protect public services and critical facilities, including infrastructure, from loss of use during natural hazard events.</li> </ul>
<b>Applicable Objective</b>	<ul style="list-style-type: none"> <li>• Increase the resilience of (or protect and maintain) infrastructure and critical facilities.</li> <li>• Consider the impacts of natural hazards on future land uses in the planning area, including possible impacts from climate change.</li> <li>• Retrofit, purchase, or relocate structures in high hazard areas, including those known to be repetitively damaged.</li> <li>• Provide or improve flood protection on a watershed basis with flood control structures and drainage maintenance plans.</li> <li>• Encourage hazard mitigation measures that result in the least adverse effect on the natural environment and that use natural processes.</li> </ul>
<b>Potential Funding Source</b>	N/A
<b>Estimated Cost</b>	\$619,000
<b>Benefits (loss avoided)</b>	N/A
<b>Projected Completion Date</b>	TBD
<b>Priority and Level of Importance (Low, Medium, High)</b>	N/A
<b>Benefit Analysis (Low, Medium, High)</b>	N/A

Cost Analysis (Low, Medium, High)	Low
Actual Completion Date	

Recommended Mitigation Action/Implementation Plan and Project Description	
Action/Implementation Plan and Project Description:	ID: CCDOTH Contract: 18-IGA-26 Watershed: Little Cal River Location: Oak Forest, IL Culvert upsizing and channel improvements.

Mitigation Action and Project Maintenance		
Year	Status	Comments
2019	New	Drafting intergovernmental agreement.
2020		
2021		
2022		
2023		

Mitigated Hazards	
	All Hazards
	Dam/Levee Failure
	Drought
	Earthquake
X	Flood
	Extreme Heat
	Lightning
	Hail
	Fog
	High Wind
	Snow
	Blizzard
	Extreme Cold
	Ice Storms
	Tornado
	Epidemic or pandemic
	Nuclear Power Plant Incident
	Widespread Power Outage
	Coastal Erosion
	Secondary Impacts from Mass Influx of Evacuees

	Hazardous Materials Incident
--	------------------------------

### Ongoing Mitigation Actions

The following are ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.

**Action O2.1**

TABLE: ACTION PLAN MATRIX		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.1	Where appropriate, support retrofitting, purchase, or relocation of structures in hazard-prone areas to prevent future structure damage. Give priority to properties with exposure to repetitive losses.	
Status Description: Yes	Outreach conducted and property owner located for 15115 LaCrosse (no longer occupied structure due to repetitive flooding). Will submit to Metropolitan Water Reclamation District (MWRD) and IEMA for buyout in upcoming cycle.	O
<p style="text-align: center;"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.2**

TABLE: ACTION PLAN MATRIX		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.2	Continue to support the county-wide actions identified in this plan.	
Status Description: Yes	Ongoing support of county-wide actions.	O
<p style="text-align: center;"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.3**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.3	Actively participate in the plan maintenance strategy identified in this plan.	
Status Description: Yes	Actively participating in HMP plan maintenance and reporting activities.	O
<b>Completion status legend:</b> <b>N = New    O = Action Ongoing toward Completion</b> <b>C = Project Completed    R = Want Removed from Annex    X = No Action Taken</b>		

**Action O2.4**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.4	Consider participation in incentive-based programs such as the Community Rating System, Tree City, and StormReady.	
Status Description: Yes	Reviewing Community Rating System and Storm Ready requirements and developing an implementation process.	O
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**Action O2.5**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.5	Maintain good standing under the National Flood Insurance Program by implementing programs that meet or exceed the minimum NFIP requirements. Such programs include enforcing an adopted flood damage prevention ordinance, participating in floodplain mapping updates, and providing public assistance and information on floodplain requirements and impacts.	
Status Description: Yes	Maintaining good standing under the NFIP.	O
<b>Completion status legend:</b> <b>N</b> = New <b>O</b> = Action Ongoing toward Completion <b>C</b> = Project Completed <b>R</b> = Want Removed from Annex <b>X</b> = No Action Taken		

**Action O2.6**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.6	Where feasible, implement a program to record high water marks following high-water events	
Status Description: Yes	Recording high water marks as flooding events occur.	O
<b>Completion status legend:</b> <b>N</b> = New <b>O</b> = Action Ongoing toward Completion <b>C</b> = Project Completed <b>R</b> = Want Removed from Annex <b>X</b> = No Action Taken		



**Action O2.7**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.7	Integrate the hazard mitigation plan into other plans, programs, or resources that dictate land use or redevelopment.	
Status Description: Yes	Public Works has begun reviewing its emergency operations SOPs with hazard mitigation plan. DPW emergency operations plans will be revised with City-wide goal to update City's emergency operations plans in FY2019/2020.	O
<p align="center"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.8**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.8	Seek SAFER, or Assistance to Firefighters Grant funding for fire apparatus.	
Status Description: Yes	Applied for and did not get apparatus grant. Will re-apply.	O
<p align="center"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.9**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.9	Flood Control Project on Natalie Creek by Metropolitan Water Reclamation District (MWRD), City of Oak Forest, and Village of Midlothian to improve conveyance, stabilize shoreline, and provide additional retention.	
Status Description: Yes	Project out to bid. Intergovernmental agreements in place, design work completed, and project out to bid. Construction anticipated 2019/2020.	O
<p align="center"><b>Completion status legend:</b>  <b>N</b> = New    <b>O</b> = Action Ongoing toward Completion  <b>C</b> = Project Completed    <b>R</b> = Want Removed from Annex    <b>X</b> = No Action Taken</p>		

**Action O2.10**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.10	Partnering with Cook County Department of Transportation and Highways (CDOTH) for 2020-21 culvert replacement and up-sizing of culvert crossings at 151st Street and Boca Rio Drive (Boca Rio Ditch-East Fork of Tinley Creek). Will reduce flooding directly impacting 28 structures.	
Status Description: Yes	On-going communications with Metropolitan Water Reclamation District (MWRD) and Cook County Department of Transportation and Highways (CDOTH) in planning and design of the project. A Phase II storm water project has been awarded to CDOTH and the City of Oak Forest by MWRD to partially fund the project. Construction anticipated 2020/2021.	O
<p align="center"><b>Completion status legend:</b>  <b>N</b> = New    <b>O</b> = Action Ongoing toward Completion  <b>C</b> = Project Completed    <b>R</b> = Want Removed from Annex    <b>X</b> = No Action Taken</p>		

**Action O2.11**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.11	Street flooding at 15200 S. Oak Park Ave	
Status Description: Yes	City seeks to work with IDOT, Village of Oak Lawn, and Cook County Forest Preserve District to mitigate street flooding. Investigating drainage system improvements to prevent water ponding in ROW and endangering the motoring public. Preliminary engineering investigation started to determine drainage improvements can be incorporated into new water transmission main slated to be built in ROW sometime between 2018-2024.	O
<p align="center"><b>Completion status legend:</b>  <b>N</b> = New    <b>O</b> = Action Ongoing toward Completion  <b>C</b> = Project Completed    <b>R</b> = Want Removed from Annex    <b>X</b> = No Action Taken</p>		

**Action O2.12**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.12	Participate and assist Illinois Department of Transportation (IDOT) with capital project to replace and up-size IDOT culvert crossing on 147th Street west of Menard (Tributary C) to improve overland flow from the El Vista West subdivision and reduce the incidence of the over topping of 147th Street.	
Status Description: Yes	On-going communications with IDOT and Cook County Forest Preserve in planning and design of the project. Construction anticipated 2019/2020.	N
<p align="center"><b>Completion status legend:</b>  <b>N</b> = New    <b>O</b> = Action Ongoing toward Completion  <b>C</b> = Project Completed    <b>R</b> = Want Removed from Annex    <b>X</b> = No Action Taken</p>		

**Action O2.13**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.13	Participate and assist Illinois Department of Transportation (IDOT) with capital projects to replace and up-size IDOT culvert crossings for Midlothian Creek (159th Street and Cicero Ave.).	
Status Description: Yes	Currently assisting IDOT with 2018-19 culvert replacement and up-sizing on Midlothian Creek at 159th Street and Cicero Ave. Construction in progress.	N
<p align="center"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.14**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.14	Participate and work with the Illinois State Water Survey (ISWS) to survey and update FEMA FIRM map panel up and downstream of 151st Street and Boca Rio Drive (Boca Rio Ditch-East Fork of Tinley Creek).	
Status Description: Yes	Preliminary FIRM map revisions have been published and going through FEMA approval process.	O
<p align="center"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.15**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.15	Provide increased resiliency of first responders radio communication network.	
Status Description: Yes	Completed infrastructure and radio surveys to improve and increase resiliency of first responders radio and data communicate network. Seeking grant funding for construction/implementation of improvements.	O
<p align="center"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

**Action O2.16**

<b>TABLE: ACTION PLAN MATRIX</b>		
Action Number Action Taken Y/N	Action Item Description	Status (X, O, C, R, N)
# O-2.16	Participate in local and regional Mutual Aid Training Activities	
Status Description: Yes	Public Works Mutual Aid Drill-Suburban Public Works Directors Association (SPWDA): 16 communities responded with 30 pieces of equipment & 62 employees to the Village of Homewood for a Level 2 Forestry Task Force Response (storm damage event) 10/26/17. Country Club Hills-Active Shooter Drill: Public Works/SPWDA 14 communities conducted Traffic Incident Management Training to control outer scene perimeter 4/20/2018	O
<p align="center"><b>Completion status legend:</b>                      N = New    O = Action Ongoing toward Completion                      C = Project Completed    R = Want Removed from Annex    X = No Action Taken</p>		

### Completed Mitigation Actions

Oak Forest has no completed actions at this time.

## Future Needs to Better Understand Risk/Vulnerability

No needs have been identified at this time.

## Additional Comments

No additional comments at this time



## HAZUS-MH Risk Assessment Results

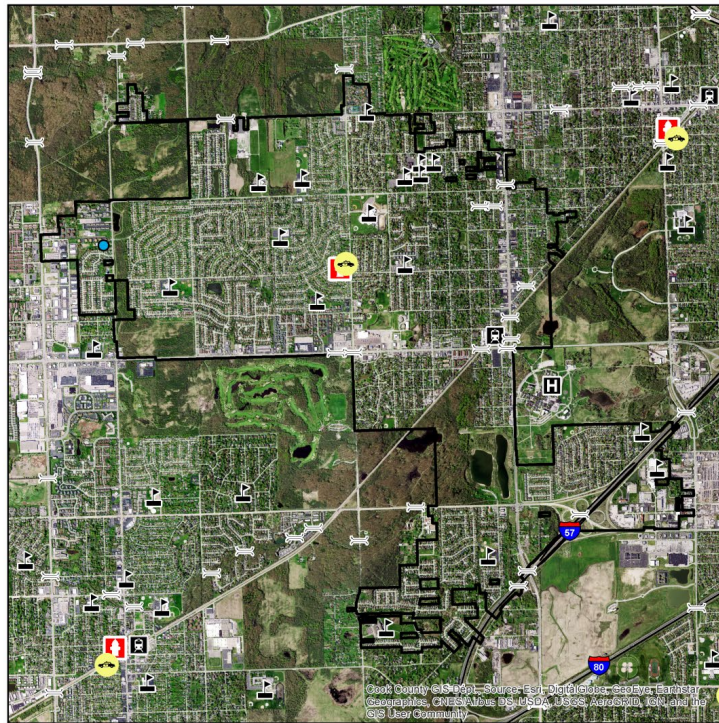
OAK FOREST EXISTING CONDITIONS	
2010 Population	27,962
Total Assessed Value of Structures and Contents	\$5,801,709,117
Area in 100-Year Floodplain	338.10 acres
Area in 500-Year Floodplain	412.25 acres
Number of Critical Facilities	37

HAZARD EXPOSURE IN OAK FOREST						
	Number Exposed		Value Exposed to Hazard		Total	% of Total Assessed Value Exposed
	Population	Buildings	Structure	Contents		
<b>Dam Failure</b>						
Boco Rio Ditch (East fork of Tinley Creek)	0	0	\$0	\$0	\$0	0.00%
Natalie Creek	0	0	\$0	\$0	\$0	0.00%
Midlothian Creek	0	0	\$0	\$0	\$0	0.00%
<b>Flood</b>						
100-Year	488	150	\$100,100,226	\$90,181,713	\$190,281,940	10.98%
500-Year	757	233	\$191,526,261	\$167,135,595	\$358,661,856	35.48%

<b>Tornado</b>						
100-Year	—	—	\$424,412,684	\$212,458,585	<b>\$636,871,269</b>	10.98%
500-Year	—	—	\$1,226,247,158	\$832,075,478	<b>\$2,058,322,636</b>	35.48%

<b>ESTIMATED PROPERTY DAMAGE VALUES IN OAK FOREST</b>				
	Estimated Damage Associated with Hazard			% of Total Assessed Value Damaged
	Building	Contents	Total	
<b>Dam Failure</b>				
Boco Rio Ditch (East fork of Tinley Creek)	\$0	\$0	<b>\$0</b>	0.00%
Natalie Creek	\$0	\$0	<b>\$0</b>	0.00%
Midlothian Creek	\$0	\$0	<b>\$0</b>	0.00%
<b>Flood</b>				
10-Year	\$195,748	\$192,864	<b>\$388,612</b>	0.01%
100-Year	\$1,373,325	\$840,885	<b>\$2,214,211</b>	0.04%
500-Year	\$13,078,60	\$28,281,421	<b>\$41,359,481</b>	0.71%
<b>Tornado</b>				
100-Year	\$42,441,268	\$21,245,858	<b>\$63,687,127</b>	1.10%
500-Year	\$179,032,085	\$121,483,020	<b>\$300,515,105</b>	5.18%

# Hazard Mapping



## CITY OF OAK FOREST

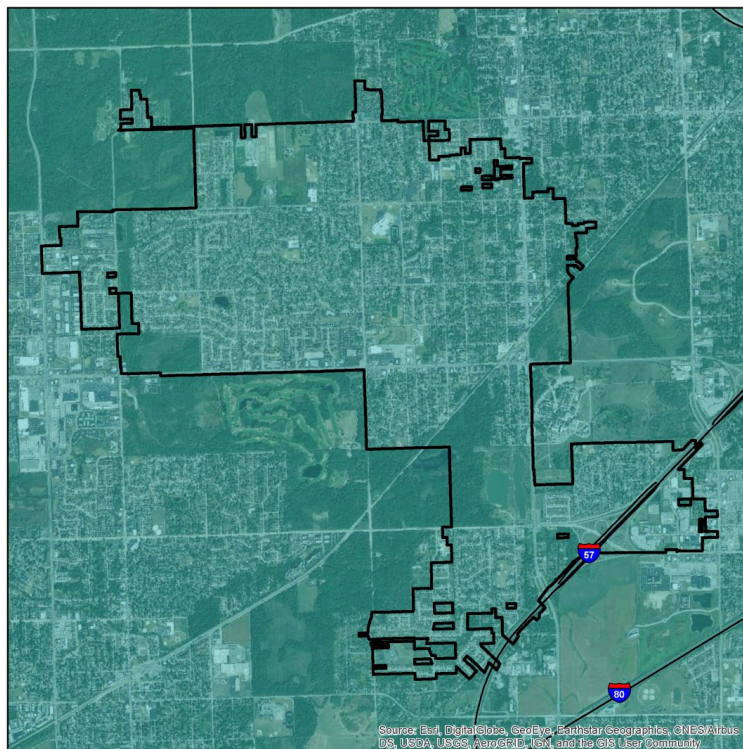
### CRITICAL INFRASTRUCTURE

- Oil Facilities
- Transit Centers
- Military Facilities
- Police Stations
- Fire Stations
- Hazardous Waste
- Airports
- Hospitals
- High Bridges
- Warming Centers
- Cooling Centers
- Schools
- Railroad Stations

Base Map Data Sources:  
Cook County, ESRI



Cook County GIS Dept., Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



## CITY OF OAK FOREST

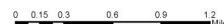
### PEAK GROUND ACCELERATION FOR A 100 YEAR EARTHQUAKE EVENT

Mercalli Scale, Potential Shaking  
II-III Weak

Data provided by the USGS Earthquake Hazards Program and Cook County

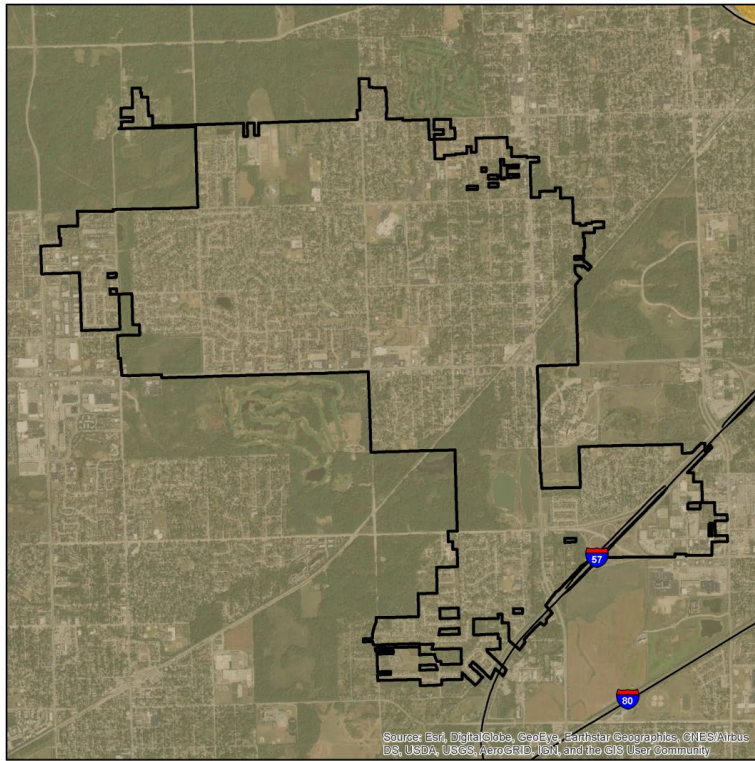
Probabilistic seismic hazard maps were prepared for the conterminous United States for 2014 portraying peak horizontal acceleration and horizontal spectral response acceleration for 0.2- and 1.0-second periods with probabilities of exceedance of 10 percent in 50 years and 2 percent in 50 years. All of the maps were prepared by combining the hazard derived from spatially smoothed historical seismicity with the hazard from fault-specific sources. The acceleration values contoured are the random horizontal component. The reference site condition is firm rock, defined as having an average shear-wave velocity of 760 m/s in the top 30 meters corresponding to the boundary between NEHRP (National Earthquake Hazards Reduction Program) site classes B and C.

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USGS, USGS, AeroGRID, IGN, and the GIS User Community





**CITY OF OAK FOREST**  
**NATIONAL EARTHQUAKE HAZARD REDUCTION PROGRAM (NEHRP) SOIL CLASSIFICATION**

- TYPE**
- C - Very Dense Soil, Soft Rock
  - D - Stiff Soil
  - F - Site Specific Evaluation

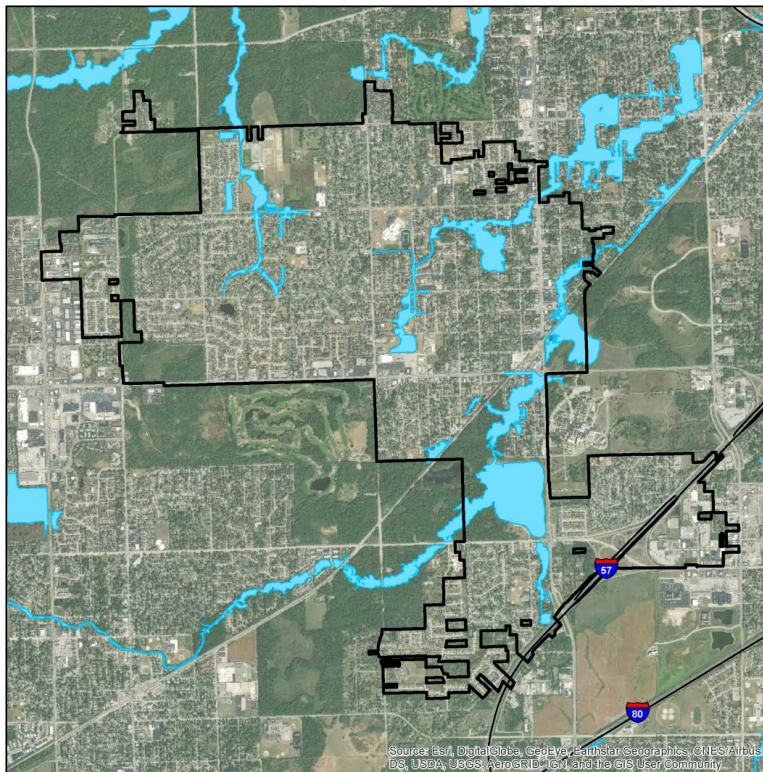
Data provided by the Illinois State Geological Survey and Cook County.

The Central United States Earthquake Consortium (CUSCEC) State Geologists produced a regional Soil Site Class map (NEHRP Soil Profile Type Map), a Liquefaction Susceptibility Map and a Soil Response Map for the 8 states to be used in the FEMA New Madrid Catastrophic Planning Initiative Phase II work. The USGS Geologic Investigation Series I-2789 Map of Surficial Deposits and Materials in the Eastern and Central United States (East of 102 degrees West Longitude) by David S. Fullerton, Charles A. Bush and Jean H. Pennell (2003) was the base map used for this work. Each State Geological Survey produced its own state map version of the Soil Site Class and Liquefaction Susceptibility maps. The procedures outlined in the NEHRP provisions (Building Seismic Safety Council, 2004) and the 2003 International Building Codes (International Code Council, 2002) were followed to produce the soil site class maps. CUSCEC State Geologists used the entire column of soils material down to bedrock and did not include any bedrock in the calculation of the average shear wave velocity for the column, since it is the soil column and the difference in shear wave velocity of the soils in comparison to the bedrock which influences much of the amplification.

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



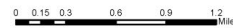
**CITY OF OAK FOREST**  
**COOK COUNTY MWRDGC 100-YEAR INUNDATION AREA**

- 100-year Inundation Area

MWRDGC Data provided by Metropolitan Water Reclamation District of Greater Chicago and Cook County.

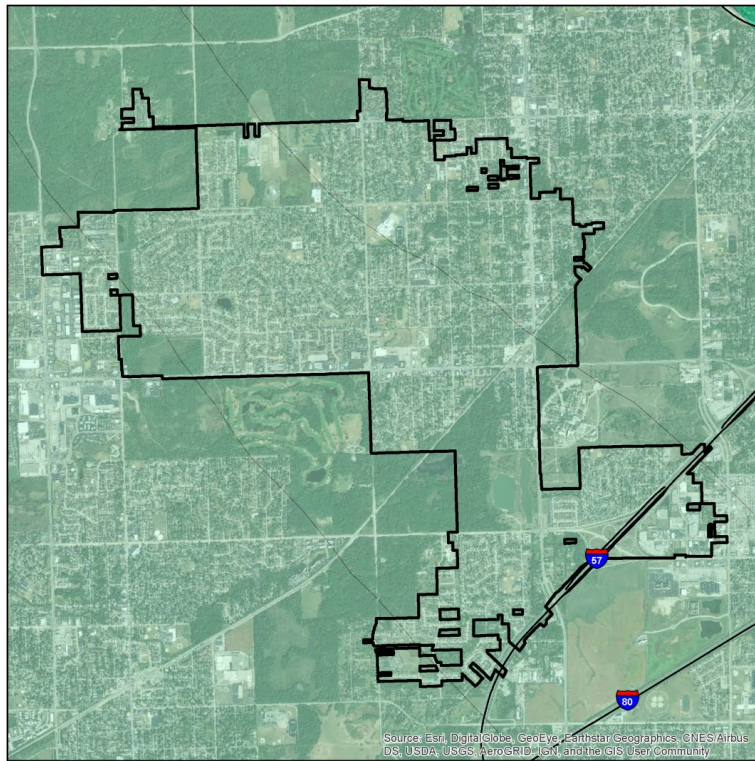
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**DISCLAIMER:** The Cook County MWRDGC 100-year Inundation Map is provided to show general flood risk information regarding floodplains and inundation areas. This map is not regulatory. Official FEMA Flood Insurance Study information and regulatory maps can be obtained from <http://www.fema.gov>.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





### CITY OF OAK FOREST

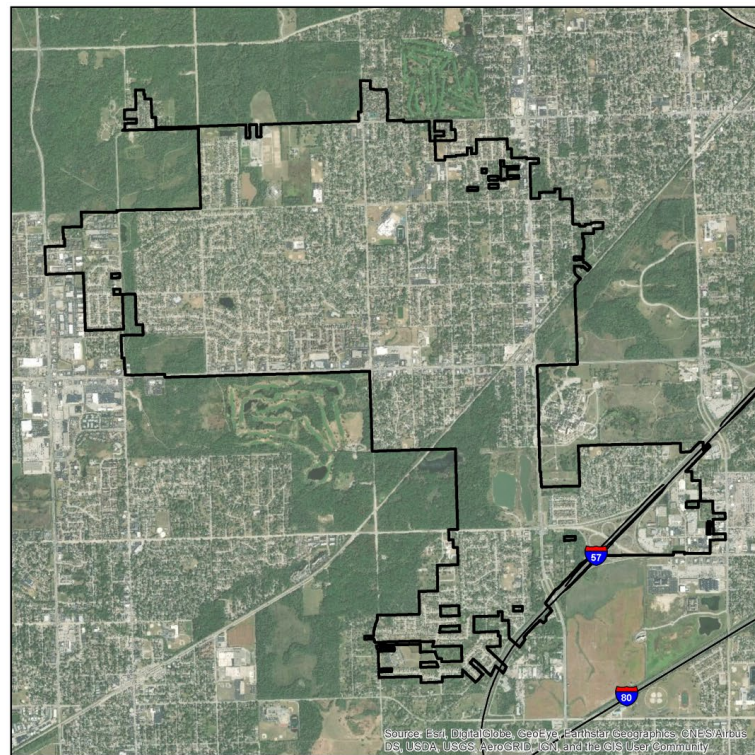
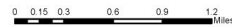
#### LIQUEFACTION SUSCEPTIBILITY

- LIQUEFACTION SUSCEPTIBILITY**
- high
  - low
  - very low

Data provided by the Illinois State Geological Survey and Cook County.

The Central United States Earthquake Consortium (CUSEC) State Geologists produced a regional Soil Site Class map (NEHRP Soil Profile Type Map), a Liquefaction Susceptibility Map and a Soil Response Map for the 8 states to be used in the FEMA New Madrid Catastrophic Planning Initiative Phase II work. The USGS Geologic Investigation Series I-2789 Map of Surficial Deposits and Materials in the Eastern and Central United States (East of 102 degrees West Longitude) by David S. Fullerton, Charles A. Bush and Jean N. Pernel (2003) was the base map used for this work. Each State Geological Survey produced its own state map version of the Soil Site Class and Liquefaction Susceptibility maps. The procedures outlined in the NEHRP provisions (Building Seismic Safety Council, 2004) and the 2003 International Building Codes (International Code Council, 2002) were followed to produce the soil site class maps. CUSEC State Geologists used the entire column of soils material down to bedrock and did not include any bedrock in the calculation of the average shear wave velocity for the column, since it is the soil column and the difference in shear wave velocity of the soils in comparison to the bedrock which influences much of the amplification.

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### CITY OF OAK FOREST

#### 100- AND 500- YEAR TORNADO EVENTS

- Magnitude**
- 4 (100 year event)
  - 5 (500 year event)

Historic tornado data provided by NOAA/NWS showing the initial points and paths of all F4 and F5 events observed from 1950 to 2017.

