



Oklahoma County Hazard Mitigation Plan 2024 Update





Jurisdictions include:

Oklahoma County
Town of Arcadia
City of Bethany
City of Choctaw
City of Del City
City of Edmond
Town of Forest Park
City of Harrah
Town of Luther
City of Midwest City
City of Nichols Hills
City of Nicoma Park
City of Spencer
City of The Village
City of Warr Acres

SECTION 1: INTRODUCTION

BACKGROUND

Organizations Involved in the Mitigation Planning Effort

The following jurisdictions within the County have participated in the planning process:

Table 1-1. Participating Jurisdictions

Participating Jurisdictions		
Oklahoma County	City of Edmond	City of Nichols Hills
Town of Arcadia	Town of Forest Park	City of Nicoma Park
City of Bethany	City of Harrah	City of Spencer
City of Choctaw	Town of Luther	City of The Village
City of Del City	City of Midwest City	City of Warr Acres

IMPLEMENTATION OF THE PLANNING PROCESS

Table 1-2 summarizes the requirements outlined in the DMA 2000 Interim Final Rule, CFR 201.6, FP206-21-0002 (Local Mitigation Planning Policy Guide) and where each of these requirements is addressed in this Plan.

Table 1-2. FEMA Local Mitigation Plan Review Tool

FEMA Local Mitigation Plan Review Tool	
Plan Criteria	**Primary Location in Plan**
Prerequisites	
Adoption by the Local Governing Body: §201.6(c)(5)	Section 2.0; Appendix B
Planning Process	
Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Section 3.0
Risk Assessment	
Identifying Hazards: §201.6(c)(2)(i)	Sections 5.2 and 5.3
Profiling Hazards: §201.6(c)(2)(i)	Section 5.3
Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Section 5.3
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)	Sections 4.0
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Section 5.3
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Section 4.0 and 5.3
Mitigation Strategy	
Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Sections 6.0 and 9
Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Sections 6.0 and 9
Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Sections 6.0 and 9
Plan Maintenance Process	

FEMA Local Mitigation Plan Review Tool	
Plan Criteria	**Primary Location in Plan**
Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Section 7.0
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Section 7.0
Continued Public Involvement: §201.6(c)(4)(iii)	Section 7.0

SECTION 2: PLAN ADOPTION

OVERVIEW

This section contains information regarding adoption of the Plan by Oklahoma County and each participating jurisdiction.

Plan Adoption by Local Governing Bodies

Adoption by the local governing bodies demonstrates the commitment of Oklahoma County and each participating jurisdiction to fulfill the mitigation goals and objectives outlined in the Plan. Adoption legitimizes the Plan and authorizes responsible agencies to execute their responsibilities. In order for the multi-jurisdictional plan to be approved, each jurisdiction included in the Plan must have its governing body adopt the Plan, even when a cross-jurisdiction agency has the authority to prepare such plans in the name of the respective jurisdictions.

Each participating jurisdiction will proceed with formal adoption proceedings when FEMA provides conditional approval of this Plan. Each participating jurisdiction understands that a conditional approval of the Plan will be provided for those municipalities that meet the planning requirements with the exception of the adoption requirement as stated above. Following adoption or formal action on the Plan, each participating jurisdiction must submit a copy of the resolution or other legal instrument showing formal adoption (acceptance) of the Plan to Oklahoma Department of Emergency Management (OEM). Each participating jurisdiction understands that FEMA will transmit acknowledgement of verification of formal plan adoption and the official approval of the Plan to the mitigation plan coordinator.

The resolutions issued to support adoption of the Plan by each jurisdiction are included below.

OKLAHOMA COUNTY BOARD OF COUNTY COMMISSIONERS
RESOLUTION NO. 2025-0745

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and,

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post-disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

WHEREAS, the Oklahoma County Board of County Commissioners has provided oversight in the development, revision, and completion of the Oklahoma County Hazard Mitigation Plan Revision of 2024 through the Oklahoma County Office of Emergency Management;

NOW, THEREFORE, BE IT RESOLVED, WE, the Board of County Commissioners of Oklahoma County, by virtue of the authority vested in us by the Laws of Oklahoma County, do hereby adopt in its entirety the 2024 Update of the Oklahoma County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

APPROVED as to form and legality this 21 day of Feb, 2025.

Assistant District Attorney

APPROVED AND AGREED TO BY THE Board this 26th day of February, 2025.

BOARD OF COUNTY COMMISSIONERS
OF OKLAHOMA COUNTY, OKLAHOMA

Joe Blough, Member

Brian Maughan, Member

Myles Davidson, Member

ATTEST:

Maressa Treat, County Clerk

RESOLUTION NO. 2025-01-02

A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF ARCADIA AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grand Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriated Plan, and,

NOW, THEREFORE, BE IT RESOLVED, WE, the Town of Arcadia, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 18th day of March 2025, by the following vote:

AYES: 3

NOES: 0

ABSTAIN: 0

Marcy L Woodard

Mayor, Town of Arcadia

ATTEST: Shawna Beutler

Clerk, Town of Arcadia

RESOLUTION NO. 1713
A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BETHANY AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Bethany, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 4th day of February, 2025, by the following vote:

AYES: Plank, German, Falkner, Ford, Larsen, Magitowsky, Smart, Powell, Sandoval
NOES: NONE
ABSENT: NONE
ABSTAIN: NONE

Mayor, City of Bethany

ATTEST:

Clerk, City of Bethany

CITY OF BETHANY CORPORATE SEAL OKLAHOMA

RESOLUTION NO. 25-07
A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CHOCTAW AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Choctaw, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 18th day of March, 2025, by the following vote:

AYES: 5
NAYS:
AbSENT: Morris, Pendergraft
ABSTAIN:

Mayor, City of Choctaw

CITY OF CHOCTAW
SEAL
OKLAHOMA

ATTEST:

Amanda Williams

Clerk, City of Choctaw

RESOLUTION NO. 03-17-2025A

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF DEL CITY AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE.

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Del City, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED by the City Council on March 17, 2025.

Mayor, City of Del City

ATTEST:

Clerk, City of Del City

Reviewed for legality by:

City Attorney

Resolution No. 12-25

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF EDMOND AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN 2024 UPDATE; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan;

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF EDMOND, OKLAHOMA, THAT:

Section 1. The City of Edmond, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the Oklahoma County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

Section 2. EFFECTIVE DATE. This resolution shall take effect immediately.

PASSED AND APPROVED in an open meeting of the City Council by an affirmative majority vote of the governing body on the 24th day of March, 2025.

Darrell A. Davis
Mayor

Attest:

CITY OF EDMOND SEAL EDMOND, OKLAHOMA

Kory Atcuson-Coley
City Clerk

Approved as to form and legality this 24th day of March, 2025.

Madeline Sawyer
City Attorney

RESOLUTION NO. 2025-001

A RESOLUTION OF THE TRUSTEE BOARD OF

THE TOWN OF FOREST PARK

AUTHORIZING THE ADOPTION OF THE

TOWN OF FOREST PARK, OK , OKLAHOMA COUNTY

HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the Town of Forest Park, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 25th day of March, 2025, by the following vote:

AYES: 4 NOES: Ø ABSENT: Ø 1 ABSTAIN: Ø

Mayor George H. Smith 03.25.2025

Mayor, Town of Forest Park, OK Date

ATTEST:

Minnie Vickers-Johnson

Minnie Vickers-Johnson Town Clerk

RESOLUTION NO. 03202025
A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HARRAH AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Harrah, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 20th day of March, 2025, by the following vote:

AYES: Danny Trent, Steve Scalzo, Bernadette Klimkowski, Tim Rudek, Jeff Brzozowski
NOES:
ABSENT:
ABSTAIN:

Danny Trent, Mayor, City of Harrah

ATTEST:

Tina Rodriguez, Clerk, City of Harrah

INCORPORATED CITY OF HARRAH OKLAHOMA CORPORATE SEAL OKLAHOMA

RESOLUTION NO. 2025-01R

A RESOLUTION OF THE BOARD OF TRUSTEES OF THE TOWN OF LUTHER AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the Town of Luther Board of Trustees, by virtue of the authority vested in us, do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 27th day of February, 2025, by the following vote:

AYES: 4
NOES: 0
ABSENT: 0
ABSTAIN: 0

Mayor, Town of Luther

ATTEST: Cherrie Pidcock
Clerk, Town of Luther

TOWN OF LUTHER OFFICIAL SEAL OKLAHOMA COUNTY

RESOLUTION NO. 2025-11

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MIDWEST CITY AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS; Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS; pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Midwest City, by virtue of the authority vested in us do hereby:

1) Adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.
2) Resolve to execute the actions identified in the Plan that pertain to this jurisdiction.
3) Will use the adopted and approved portions of the Plan to guide pre- and post-disaster mitigation of the hazards identified.
4) Will coordinate the strategies identified in the Plan with other planning programs and mechanisms under its jurisdictional authority.
5) Will continue its support of the Mitigation Planning Committee as described within the Plan.
6) Will help to promote and support the mitigation successes of all participants in this Plan.
7) Will incorporate mitigation planning as an integral component of government and partner operations.
8) Will provide an update of the Plan in conjunction with the planning partnership no less than every five years.

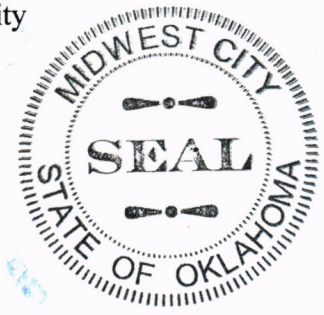
PASSED AND ADOPTED on this 25th day of March 2025, by the following vote:

AYES: Eads, Byrne, Maxwell, Thompson, Bana, Dukes
NOES: —
ABSENT: Favors
ABSTAIN: —

Mayor, City of Midwest City

ATTEST: Sara Hancock

Clerk, City of Midwest City



RESOLUTION NO. 1578

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF NICHOLS HILLS, OKLAHOMA, AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and,

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS; the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Nichols Hills, Oklahoma:

1. Adopts in its entirety, the 2024 Update of the Oklahoma County Mitigation Plan (the "Plan") as tentatively approved by FEMA (pending local adoption) on February 11, 2025;

2. Will use the adopted and approved portions of the Plan to guide pre- and post-disaster mitigation of the hazards identified.

3. Will coordinate the strategies identified in the Plan with other planning programs and mechanisms under its jurisdictional authority.

4. Will continue its support of the Mitigation Planning Committee as described within the Plan.

5. Will help to promote and support the mitigation successes of all participants in this Plan.

6. Will incorporate mitigation planning as an integral component of government and partner operations.

7. Will provide an update of the Plan in conjunction with the planning partnership no less than every five years.

PASSED by the Council of the City of Nichols Hills, Oklahoma, on the 8th day of April, 2025.

APPROVED by the Mayor of the City of Nichols Hills, Oklahoma, on the 8th day of April, 2025.

ATTEST:

Amanda Copeland
City Clerk [Seal]

Mayor

CITY OF NICHOLS HILLS OFFICIAL SEAL NICHOLS HILLS, OKLAHOMA

Reviewed as to Form and Legality:

City Attorney

RESOLUTION NO. 2025-03
A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF NICOMA PARK AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Nicoma Park, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 11th day of March, 2025, by the following vote:

AYES: 6
NOES: 0
ABSENT: 1
ABSTAIN: 0

Mayor, City of Nicoma Park

ATTEST:
Clerk, City of Nicoma Park

CITY OF NICOMA PARK NICOMA PARK, OKLA.

RESOLUTION NO. 03-20-2025

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SPENCER AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and,

NOW, THEREFORE, BE IT RESOLVED, WE, the City of Spencer, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on February 11, 2025.

PASSED AND ADOPTED on this 20 day of March, 2025 by the following vote:

AYES: 5
NOES: 0
ABSENT: 0
ABSTAIN: 0

Mayor, City of Spencer

ATTEST: Cecilia Taft
Clerk, City of Spencer

RESOLUTION 04-21-2025 (B)

A RESOLUTION AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN- 2024 UPDATE.

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390), established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency Management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and,

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriate Plan; and

WHEREAS, the plan is available on the Oklahoma County website and at this direct link: https://www.oklahomacounty.org/Portals/0/Images/Emergency%20Management/OK%20CO%20HMP%202024%20Web.pdf?ver=QYVjez-PWbr-0g73bMBaKg%3d%3d

NOW, THEREFORE, BE IT RESOLVED, by the Mayor and City Council of the City of The Village, by virtue of the authority vested in us do hereby adopt in its entirety the 2024 Update of the County Hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on April 21, 2025.

APPROVED AND ADOPTED by the City Council of the City of The Village this 21st day of April 2025, by the following vote:

AYES: Banks, Allen, Symes, Moore, Bennett

NOES: N/A

ABSENT: N/A

ABSTAIN: N/A

David Bennett, Mayor, City of The Village

ATTEST:

Dave Slezickey, City Clerk, City of The Village

CITY OF THE VILLAGE OFFICIAL SEAL CORPORATE OKLAHOMA COUNTY, OKLA.

RESOLUTION NO. 595

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WARR ACRES AUTHORIZING THE ADOPTION OF THE OKLAHOMA COUNTY HAZARD MITIGATION PLAN – 2024 UPDATE.

WHEREAS, Unincorporated Oklahoma County and its incorporated municipalities have exposure to natural hazards that increase the risk to life, property, environment and the economy; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs and the Federal Emergency management Agency (FEMA) requires local governments to have an "All-Hazards" Hazard Mitigation Plan, approved by FEMA and adopted by each participating jurisdiction, to remain eligible for funding from the Hazard Mitigation Grant Program and the Building Resilient Infrastructure and Communities (BRIC) program; and

WHEREAS, the participating governments in the Oklahoma County Hazard Mitigation Plan have completed all steps in the development of an appropriated Plan; and

NOW THEREFORE, be it resolved by the Warr Acres City Council, by virtue of the authority vested in us to hear by adopt in its entirety the 2024 Update of the County hazard Mitigation Plan, as tentatively approved by FEMA (pending local adoption) on March 18, 2025.

PASSED and ADOPTED by the City Council of the City of Warr Acres, Oklahoma, this 18th day of March, 2025, after full compliance with the Oklahoma Open Meeting Act.

YEAS: Morris, Worley, Fairchild, Myers, Schmidt, Evans, and Douglas

NAYS:

ABSENT: Al-Mosawy

ABSTAIN:

Mayor Vickie Douglas

CITY OF WARR ACRES CORPORATE SEAL OKLAHOMA

ATTEST:

City Clerk Pamela McDowell-Ramirez

SECTION 3: PLANNING PROCESS

INTRODUCTION

This section includes a description of the planning process used to develop the Plan Update, including how it was prepared, who was involved in the process, and how the public was involved.

PLANNING PARTNERSHIP - ORGANIZATION AND ACTIVITY

Organization of Planning Partnership

The 2024 planning process was led by Oklahoma County Emergency Management, which has remained the key to the County hazard mitigation "management team" for overseeing plan implementation, review and updating. The Oklahoma County Emergency Management Resource Specialist serves as the primary hazard mitigation planner.

In December 2021, Oklahoma County Emergency Management began the formal process of updating the plan with development of a timeline, reviewing new FEMA HMP guidance, and noting sections of the plan needing update. Hazard occurrences were updated through mid-2023 and then after as events occurred. The incorporated municipalities within the County were invited to participate in the plan update process via email, and in multiple fire chiefs meetings. Formal open-meetings to invite stakeholders to interact with participating jurisdictions occurred on August 3 and 14, 2023. Thirteen (13) jurisdictions were represented during these initial meetings. Most jurisdictions held individual jurisdictional local support meetings to assist in finalizing the plan.

The Planning Committee consisted of representatives from the various Unincorporated County departments and agencies, and representatives from each of the participating municipalities. County Emergency Management led the meetings and was charged with helping the jurisdictions with the following:

- Represent their jurisdiction throughout the planning process
- Establish Plan revision goals
- Establish a timeline for completion of the Plan
- Ensure that the Plan meets the requirements of DMA 2000 and FEMA and OEM guidance
- Solicit and encourage the participation of regional agencies, a range of stakeholders, and citizens in the Plan development process
- Assist in gathering information for inclusion in the Plan, including the use of previously developed reports and data
- Organize and oversee the public involvement process
- Assist with updating of "Hazards of Concern"
- Review, confirm and update the hazard mitigation planning Goals and Objectives
- Assist with the review of a broad range of potential mitigation initiatives
- Identify, develop and reprioritize appropriate mitigation initiatives
- Update the jurisdictional annex for their jurisdiction
- Review, amend and approve all sections of the Plan
- Revise, adopt, and maintain the Plan

Table 3-1 identifies the Planning Committee and other county and municipal representatives that provided input to the Plan Update process. Points of contact for each jurisdiction are identified with an asterisk.

Table 3-1. County and Municipal Planning Partnership

Jurisdiction or Agency	Name, Title, Department
Unincorporated Oklahoma County	Stacy Trumbo, County Engineer, Oklahoma County Planning & Engineering Eric Brandt, County Planner, Oklahoma County Department of Planning David Barnes, Emergency Management Director, Oklahoma County Emergency Management Greg Whitworth, Oklahoma County Emergency Management* Cody Compton, Oklahoma County Highway District 1 Deputy to the Commissioner Charles Dodson, Oklahoma County Highway District 2 Deputy to the Commissioner Brian Jasper, Roads Superintendent, Oklahoma County Highway District 1 Ken Wallace, Roads Superintendent, Oklahoma County Highway District 2 Bill McClung, Roads Superintendent, Oklahoma County Highway District 3
Deer Creek Fire Protection District (NW Unincorporated OK County)	Cory Beagles, Fire Chief
Town of Arcadia	Robert Davis, Fire Chief & Emergency Manager (no longer with the Town)* Marcus Woodard, Town Trustee Felicia Bennett, Town Trustee David Franklin, Town Trustee
City of Bethany	Brian Murray, Fire Chief & Emergency Manager* Matthew Biswell, Deputy Fire Chief Brendan Summerville, Community Development Associate
City of Choctaw	Kerry Williams, Fire Chief & Emergency Manager* Allen (Jade) Riddle, Stormwater and Floodplain Management Specialist
City of Del City	Brandon Pursell, Fire Chief, Del City Fire Department (no longer with the City, now with Edmond EM) Kellie Wilbanks, Community Development Director* JD Hock, City Manager Brittany Parrott, Asst. City Manager Kraig Fryar, Deputy Public Works Director
City of Edmond	TJ Menzer, Emergency Management Resource Specialist (no longer with the City) Brook Pintens, Emergency Management Coordinator* Keith Beatty, Senior Stormwater Engineer
Town of Forest Park	Wesley “Chuck” Blair, Fire Chief/Emergency Manager* (Forest Park-Spencer combined FD)
City of Harrah	Levi Dean, Fire Chief & Emergency Manager* Matthew Mears, City Manager Gary Bolling, City Planner

Jurisdiction or Agency	Name, Title, Department
Town of Luther	Terry Arps, Mayor Joseph Figueroa, Fire Chief & Emergency Manager* Johnny Leafty, Police Chief Scherrie Pidcock, Town Manager/Floodplain Administrator
City of Midwest City	Debi Wagner, Emergency Manager* Patrick Menefee, City Engineer, NFIP Floodplain Administrator Petya Stefanoff, Comprehensive Planner Bert Norton, Fire Chief (now retired)
City of Nichols Hills	Kevin Boydston, Fire Chief & Emergency Manager* Randy Lawrence, Director of Public Works Dennis Albert, Asst. Director of Public Works Dillion Thompson, Building Inspector & Floodplain Manager Michael Taylor, Asst. City Manager
City of Nicoma Park	Eric Flowers, Fire Chief/Emergency Manager/Floodplain Manager*
City of Spencer	Dale Griffith, Fire Chief* Wesley "Chuck" Blair, Spencer Emergency Manager (Forest Park-Spencer combined FD)
City of The Village	Brent Hodges, Emergency Manager* Ken Nelson, Inspector, Building and Code Enforcement
City of Warr Acres	Stephen Coy, Fire Chief & Emergency Manager* Roger Godwin, Mayor Marc Long, City Planner Mike Turman, Public Works Director, NFIP Floodplain Administrator

Notes: * Denotes Point of Contact for each jurisdiction. Various other regional, county and local agencies, departments, stakeholders and the public have participated in and contributed to the development of this Plan, as identified later in this Section.

To help facilitate the plan update process, Oklahoma County worked internally with:

- Developing a plan update strategy and schedule
- Assisting with the development and implementation of public and stakeholder outreach
- Data collection
- Facilitation and attendance at meetings (planning committee, stakeholder, public and other)
- Updating the hazards of concern, hazard profiling and risk assessment
- Reviewing and updating the mitigation planning goals and objectives
- Assistance with the screening of mitigation actions and the identification of appropriate actions
- Assistance with the prioritization of mitigation actions
- Authoring of the Plan update documents

Planning Partnership Activities:

Municipal participation in the plan update process included the following activities:

Just a few weeks prior to the public planning committee meetings and subsequent individual jurisdiction meetings, all municipalities were provided with electronic copies of the 2019 Plan via email. During the meetings, all municipalities were provided with worksheets (electronic or paper) to facilitate municipal input on hazard events and losses since the 2019 Plan. The meetings and documentation covered review of the goals and objectives, local capability assessment, identification of new hazard areas and specific vulnerabilities in their community, incorporation of existing plans and documents, and updating past, ongoing and potential mitigation activities.

Implementation and ongoing maintenance will continue to be a function of the Planning Committee, with most plan maintenance conducted by County Emergency Management. The Planning Committee will review the Plan and accept public comment as part of as part of the five-year mitigation plan update. Periodic review will be conducted at monthly fire chiefs meetings which are widely attended by fire and occasionally other jurisdictional representatives (technological schools, EMS providers, police, sheriff's office, and neighboring jurisdiction fire departments).

Table 3-2 presents a summary of the planning partnership efforts implemented during the development process for this Plan, as well as key milestones in the Plan's development. The persons listed above attended for each jurisdiction.

Table 3-2. Summary of Planning Partnership Activities and Project Milestones

Date	Description of Activity	Participants
December 2021	Oklahoma County Emergency Management begins the plan update process by identifying sections of the plan needing revision and gathering updated maps.	Greg Whitworth, OK County Emergency Management
April 2022	Review of new FEMA planning guidance effective April 2023.	Greg Whitworth, OK County Emergency Management
September 2022	Updates to all local hazard history to current date.	Greg Whitworth, OK County Emergency Management
March – June 2023	Oklahoma County Planning provides updated maps for the plan with several revisions.	Scott March, Oklahoma County Planning, GIS
June 2023	Emergency Management administrative assistant reviews the plan for outdated information and provides additional mapping updates.	Miranda Fryer, Oklahoma County Emergency Management
July 2023	County EM provides each jurisdiction a copy of their annex with detailed forms, a link to the plan and invites municipalities to participate in the plan update process.	OK Planning Department; all incorporated municipalities in the plan
July 19, 2023	A poll was sent asking their availability for hazard mitigation introductory public meetings.	Plan participants (including floodplain managers, public works, emergency managers, fire chiefs, city managers, councilpersons)
July 26, 2023	Public meeting notice and signage sent to local jurisdictions; meeting dates set via email. The meetings were held at the Association of Central OK Governments, located adjacent to a socially vulnerable underserved area just north of the Capitol. A link to the planning meetings date/location was posted on the front page of the Oklahoma County website.	Notice sent to plan participants (including floodplain managers, public works, emergency managers, fire chiefs, city managers, councilpersons), neighboring jurisdictions, businesses, academia, non-profits, agencies working with underserved and socially vulnerable persons, Additional details are below.
August 3, 2023	First public meeting held. 28 in attendance. The presentation discussed the definition of hazard mitigation, who should participate, what hazards are in the plan, contents of the plan and annex, what actions are fundable, actions vs. preparedness, sources of funding, what sections need updating, how to format an action item, and new planning requirements for 2023.	**Oklahoma County** – Commissioner Deputy, Floodplain Administrator/Planner, four (4) EM staff **Arcadia** – Three (2) Councilpersons, (1) Councilperson/Floodplain Manager **Del City** – Fire Chief/EM, Two (2) City Planners/Floodplain Administrator **Forest Park –** Fire Chief/EM

Date	Description of Activity	Participants
		Luther – Fire Chief/EM **Nichols Hills –** Fire Chief/EM, City Manager, Project Inspector, Building Inspector **Nicoma Park –** Fire Chief/EM, Public Works Director **Midwest City** – EM, City Engineer/Floodplain Administrator, Comprehensive Planner **Spencer -** EM **The Village –** EM **Warr Acres –** Fire Chief/EM **Neighbors -** Oklahoma City Public Schools EM, Canadian County EM **Non-Profit -** Catholic Charities which assists socially vulnerable and underserved populations.
August-December 2023	Acceptance of local jurisdiction annexes for review. These jurisdictions revised their annexes and submitted through their primary planning committee member listed to the right. Oklahoma County reviewed each annex and worked with the jurisdictions through emails and phone calls to obtain any incomplete information.	Jurisdictions and positions listed above in Table 3-1.
August 8, 2023	Local planning meeting with the Town of Luther.	**Luther –** Mayor, Police Chief, Fire Chief/EM, Town Manager/Floodplain Manager **Oklahoma County –** EM Mitigation Planner
August 14, 2023	Second public meeting held. 30 in attendance. The presentation discussed the definition of hazard mitigation, who should participate, portions of the plan that require update, hazards in the plan, priorities for mitigation and changing hazards, project challenges (STAPLEE), changes to the plan and annexes for 2023, how disasters create HM funding and how to apply for HM grants.	**Oklahoma County** – Floodplain Administrator/Planner, Highway District 2 Superintendent, four (4) EM staff, Unincorporated Deer Creek Fire Chief, Deer Creek Fire Admin. **Bethany –** Fire Chief/EM, Director of Planning & Community Development **Choctaw –** Fire Chief/EM, Asst. Fire Chief, Stormwater & Floodplain Admin, Development Services **Del City** – Fire Chief/EM, City Planner/Floodplain Admin. **Luther –** Mayor, Town Manager/Floodplain Admin, Fire Chief/EM **Nichols Hills –** Fire Chief/EM, City Manager **Nicoma Park –** Fire/EM, Public Works Director **Midwest City** – Comprehensive Planner **The Village –** City Inspector **Neighbors –** OKC Fire Liaison/EM, OKC EM Training & Exercise Coord., Moore EM, OK State Forestry Services Hazard Mitigation Planner, OK State Forestry Services Wildfire Mitigation Planner
September 20, 2023	Local planning meeting with the City of Nichols Hills	**Nichols Hills** – Fire Chief/EM, Floodplain Manager (via phone) **Oklahoma County –** EM Mitigation Planner
September 25, 2023	Local planning meeting with the City of Bethany.	**Bethany** – Fire Chief/EM, Deputy Fire Chief, Community Development Associate **Oklahoma County –** EM Mitigation Planner
November 1, 2023	Local planning meeting with the City of The Village	**The Village –** EM, Floodplain Manager **Oklahoma County –** EM Mitigation Planner
November 15, 2023	Local planning meeting with the City of Del City	**Del City** – City Manager, Assistant City Manager, Fire Chief/EM, Community Development Director, Deputy Public Works Director **Oklahoma County –** EM Mitigation Planner
November 30, 2023	Virtual local planning meeting with the City of Edmond. Edmond to follow up with various departments to provide input.	**Edmond** – EM Resource Specialist, Senior Stormwater Engineer **Oklahoma County –** EM Mitigation Planner
January 10, 2024	Local planning meeting with the Town of Forest Park	**Forest Park –** Fire Chief/EM **Oklahoma County –** EM Mitigation Planner, Deputy Director

Date	Description of Activity	Participants
February 1, 2024	Local planning meeting with the Town of Forest Park	**Forest Park –** Fire Chief/EM
February 13, 2024	Local planning meeting with the Town of Spencer	**Spencer –** Fire Chief, EM
March 12, 2024	Local planning meeting with the Town of Arcadia	**Arcadia –** Fire Chief/EM **Oklahoma County –** EM Mitigation Planner, EM Deputy Director
April 23, 2024	Local planning meeting with the City of Harrah	**Harrah** – Fire Chief/EM, City Manager, City Planner **Oklahoma County –** EM Mitigation Planner
April 29, 2024	Local planning meeting with the Town of Nicoma Park	**Nicoma Park** – Fire Chief/EM/Floodplain Manager **Oklahoma County –** EM Mitigation Planner, EM Deputy Director
May 16, 2024	Hazard Mitigation presentation to the Oklahoma County LEPC.	**Edmond –** EM Director, EM Deputy Director, ME Resource Specialist, EM Admin Assistant **Midwest City –** Fire Marshal/Building Code Professional, EM Director **Oklahoma County –** EM Director, EM Mitigation Planner, EM Project Specialist, EM Admin. Assistant, **City of OKC –** EM Deputy Director, EM Fire Liaison, Asst. Environmental Protection Supervisor, 2 Environmental Technicians **Tinker AFB –** EM Director, 2 EM Specialists **EMSA –** Regional Medical Response Coordinator, Asst. Coordinator **Inframark –** Business/Industry Rep **Oakwood Springs Hospital –** Business/Industry Rep **Energy Transfer Partners –** Business/Industry Rep **OKC-County Health Dept –** Emergency Preparedness and Response Administrator
June 18, 2024	Local planning meeting with unincorporated Oklahoma County representatives.	**Oklahoma County** – Floodplain Administrator/Planner, Highway District 1 Deputy, Highway District 2 Deputy, Highway District 1 Superintendent, Highway District 2 Superintendent, three (3) EM staff, Highway District 3 provided input via email

STAKEHOLDER OUTREACH AND INVOLVEMENT

Efforts were made throughout the plan update process to assure broad regional, county and local representation and participation. Stakeholder outreach was performed early on, and continually throughout, the planning process. A few stakeholders and neighboring jurisdictions attended planning committee meetings, or were engaged through existing meetings and forums of stakeholder groups.

The following is list of the various stakeholders that were invited to participate in the development of this Plan, along with a summary of how these stakeholders participated and contributed to the Plan. Invitations were sent via email.

FEMA Region VI: provided plan update guidance through OEM; indirectly provided local NFIP data; provided regulatory review and ultimately approval of the plan update documents.

Oklahoma Water Resources Board: provided flood loss NFIP data obtained from FEMA.

Oklahoma State Emergency Management: OEM mitigation planners provided plan update guidance; provided review and comment on the draft plan documents.

Oklahoma County Planning Department: provided county and local data and information including maps, future and ongoing project information, assisted with the update of county-level mitigation strategies, and reviewed draft and final plan sections. Planner Eric Brandt provided input. Scott March, GIS coordinator, provided new mapping.

Oklahoma County Emergency Management: managed and facilitated the plan update process, provided county and local data and information, assisted with the update of county-level mitigation strategies, reviewed and edited draft and final plan sections. The County EOP was re-written concurrently with the last plan update, and the hazards were re-reviewed for incorporation of data into each plan. Emergency Management Director David Barnes, and Resource Specialist Greg Whitworth were responsible for this effort.

Oklahoma County Engineering: through the Planning Department, provided County and local data and information. Stacy Trumbo, County Engineer, provided information to the Planning Department for the update of county-level mitigation strategies.

County Highway Districts: provided input to the plan update process via meetings held with Emergency Management, including information on vulnerable infrastructure and potential mitigation projects. Brian Jasper, District 1 Superintendent; Ken Wallace, District 2 Superintendent; and Bill McClung, District 3 Superintendent assisted with this process.

Oklahoma County Board of County Commissioners: The three County commissioners were invited to participate in the planning process, and have been notified of all formal meetings conducted as part of the plan update process. Deputy Commissioners from Highway Districts 1 & 2 attended the county annex planning meeting. The county commissioners have been variously involved in the process through outreach by the Planning Department, with respect to specific vulnerable areas and potential mitigation projects considered during the planning cycle. Our County Commissioners are Carrie Blumert (District 1), Brian Maughan (District 2), and Myles Davidson (District 3).

Eastern Oklahoma County Fire Chiefs: Updates on the planning process were presented at regular meetings of this group by OK County Emergency Management, encouraging local participation and input to the plan update. Most of the participating municipalities have had direct input from their local fire departments and fire chiefs among other key leaders. This group covers a wide geographic base, well outside of the County limits. Many of the Chiefs severe as the local jurisdiction Emergency Manager and are contact points for the plan listed in the annexes contained herein.

Oklahoma City Metro Fire Chiefs (Metro Chiefs): The project was presented at meetings of this group by OK County Emergency Management, encouraging local participation and input to the plan update process.

Deer Creek Fire Protection District: The fire chief provided project ideas for unincorporated northwest Oklahoma County.

United States Army Corps of Engineers: provided information during the original floodplain management planning effort. The Corps provided flood inundation mapping included in this plan.

In addition to the named parties above, the following entities were invited to attend the public meetings and be part of the planning process.

Neighboring Communities:

- City of OKC EM (attended), City of Yukon Floodplain Admin, City of Piedmont Floodplain Admin, Blaine County EM, Kingfisher County EM, Logan County EM, Canadian County EM (attended) and Floodplain Admin, Lincoln County EM, McClain County EM, Pottawatomie County EM, City of Norman EM, City of Moore EM (attended), Oklahoma City-County Health Department

Local and Regional Agencies Involved in Hazard Mitigation:

- Oklahoma Water Resources Board, Oklahoma Department of Agriculture and Forestry (attended), National Weather Service Norman, All of the communities named above including their floodplain administrators and city administrators

Agencies that have the authority to regulate development:

- Association of Central Oklahoma Governments, Oklahoma Turnpike Authority

Business, Academia and Non-Government organizations:

- OKC Public Schools EM (attended), University of Oklahoma, Devon Energy, Oklahoma County LEPC (Anheuser-Busch, Innospec Inc, Inframark, Energy Transfer, OSU Fire Service, Univar Solutions, Southern Star, EnerCon, Kratos Defense, Boomer Environmental, OKC MetroTech, Nortek, United Engines, Atlantic Aviation, Dolese, Phillips 66, Ben E. Keith Foods, others)
-

Private and non-profit organizations:

- Catholic Charities (attended), American Red Cross, United Way

PUBLIC OUTREACH AND PARTICIPATION

In order to facilitate coordination and communication between the Planning Committee and citizens, various methods of public outreach were conducted to inform the public of the Plan and encourage participation in the planning process. The following public outreach efforts were made during this plan update process:

- Notice was posted to the jurisdictions and on the front of the Oklahoma County website prior to the two major Hazard Mitigation meetings. Given the widespread availability of mobile phones including to underserved and impoverished communities, this method of notification was used to notify the public of the meeting. According to the National Center for Education Statistics, 80.5% of households living in poverty with a child age 3-18 in Oklahoma have a desktop, laptop, tablet or other portable wireless device in the home. Over 98% of Oklahomans have a computer or smartphone (NCES, 2021).
- All jurisdictions and stakeholders were emailed on July 26, 2023 with the dates of the group meetings.
- The plan's hazards and mitigation planning concepts were presented at a quarterly meeting of Oklahoma County Emergency Management volunteers on March 15, 2022. A reminder notice of this quarterly meeting was emailed on March 9th. These citizens have varying levels of knowledge of Emergency Management. The process helped them understand Hazard Mitigation planning and the need for improved resiliency. A survey was completed by most of the volunteers indicating which hazards impact their community. A few offered mitigation project concepts. These concepts were reviewed during the jurisdictional annex updates.
- The 2019 plan, a draft of the new plan and ultimately final versions of the Plan have been posted to the County public website for public review and comment. No relevant planning suggestions been

obtained from the posting, despite a banner having been displayed for several weeks on the front page of the county website.

- Unincorporated Oklahoma County and all participating jurisdictions have identified continued public outreach as a high priority mitigation initiative (see Section 9.1). The COVID-19 pandemic greatly reduced outreach efforts. Normally, the County attends various public events during the year which are opportunities to gather ongoing input. The Emergency Management staff and volunteers usually host a display booth at the National Weather Festival each fall and talk about weather hazards. This resumed in 2022. A typical event attracts more than 700 persons to the display booth, where they are engaged with information about mitigation, resiliency and preparedness for weather hazards. Among the attendees are vulnerable populations, functional needs persons and some bi-lingual speakers.
- Underserved communities and vulnerable populations are represented by the various non-profits and health departments invited to the planning meetings, with some attendance by organization representatives as detailed in Table 3-2.

INTEGRATION/COORDINATION WITH EXISTING PLANS AND PROGRAMS

Each jurisdictional annex includes a Capability Assessment subsection which provides a summary and description of the existing plans, programs and regulatory mechanisms in Oklahoma County that support hazard mitigation. This section documents how these existing plans and programs have been integrated into this updated plan, and how this plan will continue to promote and effect that coordination.

The integration of existing data, plans and programs is further documented in the "Data and Methodology" sections of the hazard profiles (Section 5).

National Flood Insurance Program (NFIP)

Table 3-3 identifies the local NFIP Floodplain Administrators for the participating municipalities during this plan update process. These persons are responsible for implementation and enforcement of local floodplain management regulations to regulate and permit development in Special Flood Hazard Areas (SFHAs) and implement the addressed commitments and requirements of the NFIP. Several floodplain administrators have been involved in this planning process, at minimum providing specific flood-related information and mitigation initiatives, as well as providing review and input on the planning documents.

Community Rating System (CRS)

CRS is a voluntary program designed to reward participating jurisdictions for their efforts to create more disaster-resistant communities using the principles of sustainable development and management. Of the communities participating in this Plan, currently only the City of Edmond (CRS Class 6) and the City of Del City (also class 6) participate in CRS; a few of the municipalities have included a mitigation initiative to join the CRS program.

Table 3-3. Municipal Floodplain Administrators (2023)

Jurisdiction	Name	Title
Town of Arcadia	David Franklin	Floodplain Administrator
City of Bethany	Steve Manek	City Engineer
City of Choctaw	Jade Riddle	City Building Official by Code
City of Del City	Kellie Wilbanks	Designated by City Manager (currently Community Services Director and City Planner)
City of Edmond	Keith Beatty	Senior Stormwater Engineer
Town of Forest Park	Delton Brown	Floodplain Administrator

Jurisdiction	Name	Title
City of Harrah	Rodney Sheets	Code Enforcement / Building Inspector
Town of Luther	Scherrie Pidcock	Town Manager
City of Midwest City	Patrick Menefee	City Engineer
City of Nichols Hills	Dillion Thompson	Code Enforcement Officer
City of Nicoma Park	Eric Flowers	Fire Chief Emergency Manager Floodplain Administrator City Building Official per city code
Oklahoma County	Erik Brandt	County Planner
City of Spencer	Takisha Jacobs	Code Enforcement Officer
City of The Village	Ken Nelson	Building Inspector
City of Warr Acres	Michael Turman	Public Works Director

Source: As identified by municipalities, or within their municipal code

Floodplain Management Plans and Other Flood Studies

Flood studies and other floodplain management planning efforts have been ongoing in the planning area. In June 2017, the City of Edmond hosted a Discovery Meeting for the Deep Fork Watershed RiskMAP program. The FEMA Discovery Report of June 26, 2017 was reviewed for the previous version of this plan. Areas of high average annualized loss associated with the Deep Fork Watershed are located in Edmond and Luther. New preliminary flood maps for the Edmond area (including Arcadia and parts of north-central unincorporated Oklahoma County) were published in June 2023 and are available on the FEMA Flood Map Changes website.

Each jurisdiction has adopted minimum floodplain management criteria via local regulation. Citations are included in each jurisdiction's annex toward the end of the plan. Implementation and enforcement of local floodplain management regulations is handled by the Floodplain Administrator for each jurisdiction, identified in table 3-3. This designee addresses the commitments and requirements of the NFIP. In the annexes are descriptions of how each participant implements the substantial improvement/substantial damage provision of the floodplain management regulations after an event, adoption of the most recent Flood Insurance Rate Map (FIRM).

Comprehensive / Master Planning

Information from the County Comprehensive Plan and available local comprehensive plans were incorporated into the regional profile (Section 4), hazard profiles (Section 5), and used to develop the updated vulnerability assessments (Section 5).

INTEGRATION OF EXISTING DATA AND PLANS INTO MITIGATION PLAN

The mitigation plan integrates local and federal data as discussed below.

Local Data

The Planning Committee reviewed and incorporated existing data and plans to support the mitigation plan. A number of electronic and hard copy documents were made available to support the planning process. These documents are too numerous to list below; therefore, a summary is provided. References

are provided through the plan. Additional documents are listed in the annexes, Section 9 of this document.

- Oklahoma County Geographic Information System (GIS) data
- Documentation of past mitigation actions and grant applications
- Historic maps
- Oklahoma County Comprehensive, and Emergency Management Plans

Cross-referencing this Plan when such documents are updated will need to occur and has been included in the jurisdictional annexes in Section 9.

Federal and State Data

Federal and State data was collected and used throughout the mitigation process including:

- US Census data
- Data from the National Weather Service
- Data from the Oklahoma Climatological Survey
- Data from the Oklahoma Geological Survey
- Data from the US Geological Survey (USGS)
- Data from the Natural Resource Conservation Service (NRCS)
- Data from FEMA
- Public laws and other programs such as the NFIP were examined to complete this Plan.

CONTINUED PUBLIC AND STAKEHOLDER INVOLVEMENT

Oklahoma County and the mitigation planning partnership are committed to the continued involvement of the public, as detailed in Section 7, “Plan Implementation, Maintenance and Update Procedures”. This detailed public involvement plan includes the following elements:

The Oklahoma County mitigation planning partnership has identified continued public outreach as a high priority mitigation initiative (see Section 9.1), with various projects listed. Additional outreach will be through the County website and jurisdictional websites.

The plan will continue to be posted on County website
(https://www.oklahomacounty.org/departments/emergency-management)
A printed copy of the Plan shall made available for review during normal business hours at the following location:

Oklahoma County Emergency Management
Oklahoma County Annex Building
320 Robert S. Kerr Avenue, Suite 101
Oklahoma City, OK 73102-3441

Municipal supervisors/mayors or clerks and the Oklahoma County HMP Coordinator will be responsible for receiving, tracking, and filing public comments regarding this HMP. Contact information for the County and all participating municipalities is included in the Point of Contact information in the jurisdictional annexes in Section 9 of this Plan.

The Oklahoma County Hazard Mitigation Planning Coordinator is responsible for collecting and maintaining public comment and input, as provided through the municipal mitigation planning representatives.

COMPLETION OF THE PLANNING PROCESS

All participating municipalities in the County completed the planning and annex-preparation process. Completed jurisdictional annexes are presented in Section 9.

SECTION 4: REGIONAL PROFILE

This section offers a profile of the study area, detailing its economic, structural, and population assets at risk, and highlighting specific concerns related to the hazards analyzed later in this plan (such as areas prone to flooding or regions with a high percentage of vulnerable individuals). The profile includes general information about the Planning Area, including its physical setting, population and demographics, building stock, and land use and population trends, within the Oklahoma County Planning Area.

Location

Oklahoma County is located in the center of the State, encompassing about 720 square miles. Oklahoma City is the county seat, as well as the state capital (Figure 4-1, next page).

Government and Political Subdivisions

There are 20 cities and towns located in Oklahoma County, as well as unincorporated Oklahoma County. Oklahoma County has a constitutional form of government composed of eight elected officials. There are three County Commissioners forming the Board of County Commissioners. Other officials are the County Assessor, County Clerk, Court Clerk, Sheriff, and County Treasurer.

Oklahoma County is divided into three districts: District 1, District 2, and District 3. Of the 720 total square miles in Oklahoma County, 578 square miles are located within incorporated cities and 142 square miles are unincorporated. There are scattered unincorporated areas within the three County Districts, that is, relatively small parcels surrounded by incorporated lands.

Geographically speaking, the unincorporated areas of Oklahoma County can be separated into three areas that will be used throughout this document: 1) Northeast Oklahoma County is primarily composed of District 3 with District 1 having a small section of the east-central unincorporated county, 2) Southeast Oklahoma County area is primarily composed of District 2, 3) Northwest Oklahoma County is primarily composed of District 3.

Physical Setting

This section presents the physical setting of the Oklahoma County Planning Area, including: hydrography and hydrology, topography and geology, climate, and land use/land cover.

Hydrography and Hydrology

Creeks, rivers, riparian and floodplain areas are prevalent throughout the unincorporated areas of Oklahoma County (see Figure 4-2) (OK COUNTY CP, 2007). The major stream systems include Deer Creek, Deep Fork, Coffee Creek, Crutcho Creek, Cherry Creek, and Soldier Creek, which are all small tributaries to the Canadian and Cimarron Rivers (OK COUNTY HMP, 2006).

There are three major lakes: Overholser, Hefner, and Arcadia. Lake Overholser is located in Central Oklahoma along the Canadian County/Oklahoma County line. Arcadia Lake is located on the Deep Fork River in the eastern city limits of the City of Edmond with Highway 66 on the north, Post Road on the east, I-35 on the west and Memorial Road on the south. Lake Hefner is located in northwest Oklahoma City with Hefner Parkway (Hwy 74) on the east, Wilshire Blvd. on the south, MacArthur Blvd. on the west and Hefner Road (108th St) on the north.

Figure 4-1. Oklahoma County, Oklahoma with urbanized and unincorporated areas (Source: Oklahoma County Planning, 2023)

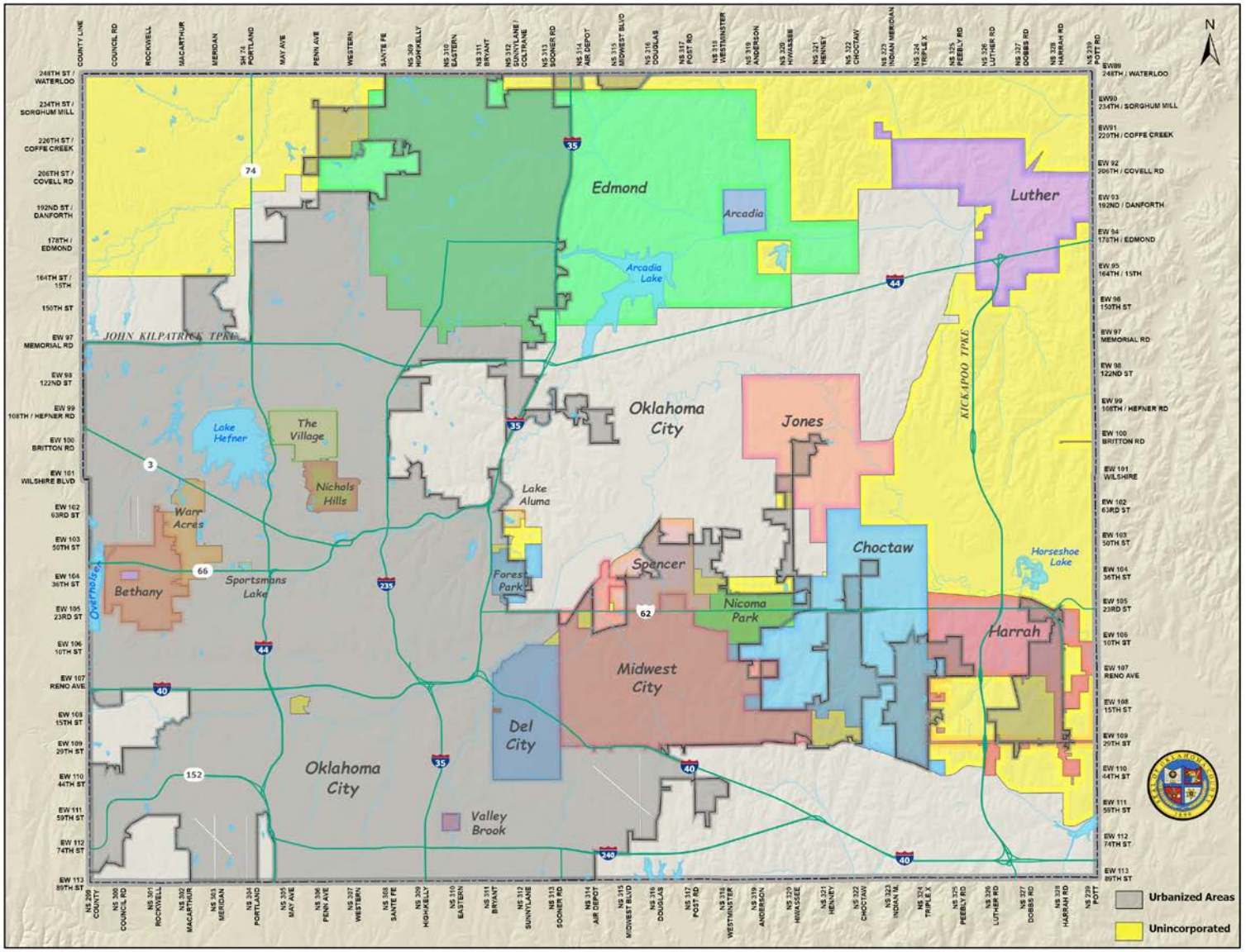
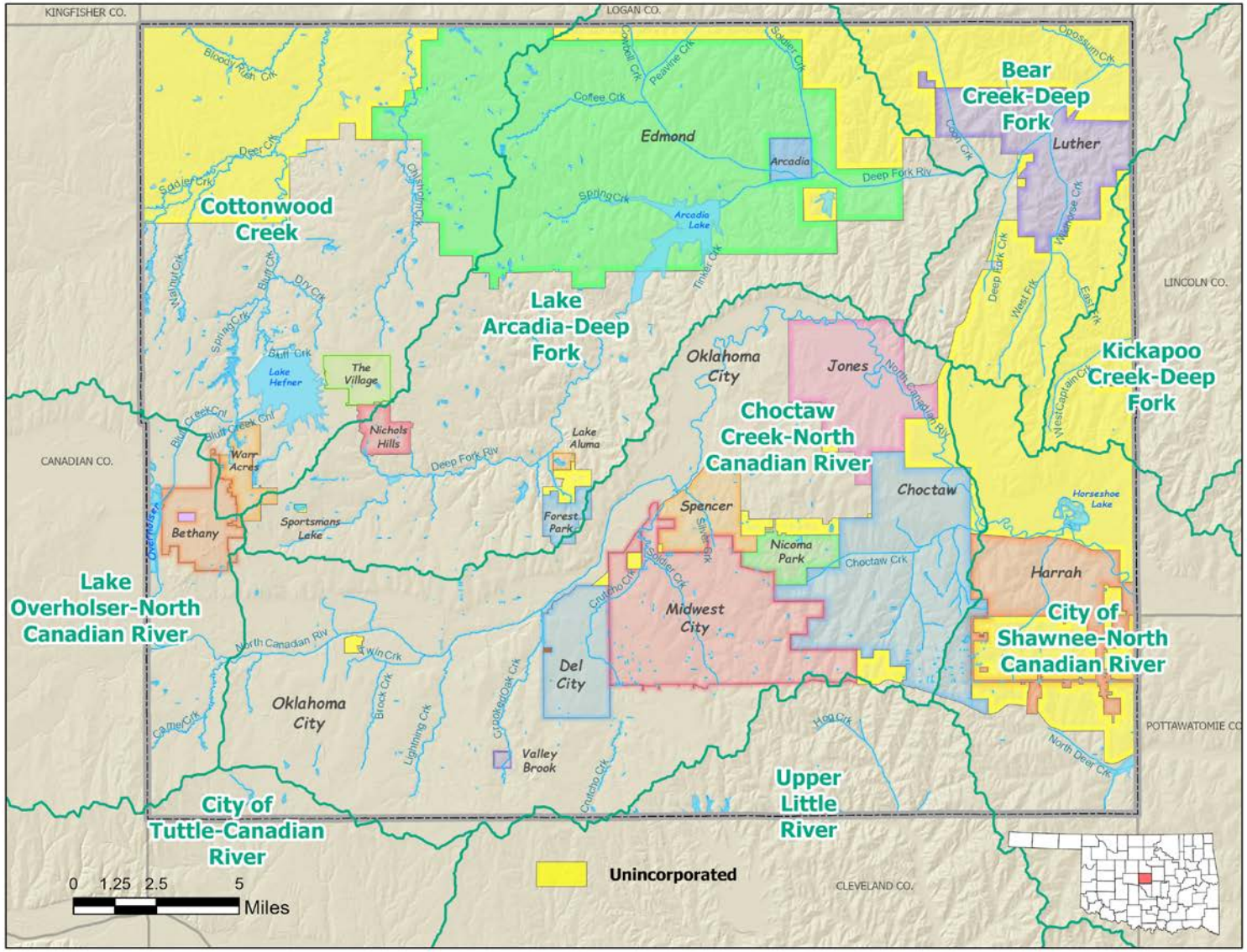


Figure 4-2. Oklahoma County Waterbodies and Hydrologic Unit Code (HUC) 10 Watershed Boundaries



Topography

The topography of Oklahoma County is a mixture of low rolling hills and level plains. Elevations range from approximately 1,100 to 1,300 feet above the National Geodetic Vertical Datum of 1929 (NGVD). Slopes range from 1 percent on the uplands to 12 percent near streams.

The topography of the county is generally divided by I-35 running North and South through the center of the county. West of I-35, the topography is basically flat with trees, and mostly urban. East of I-35, the topography consists of rolling hills, wooded areas and pasture lands (OK COUNTY HMP, 2006).

Geology

Oklahoma County has predominately clay and sandy loam soils (Soil Survey of OK County, NRCS). The presence of clay in these soils results in expansive soil conditions being common in the western part of the County.

Climate

Oklahoma County's climate is variable with pronounced, but gradual, seasonal changes. Spring and fall seasons are mild with warm, humid days and cool nights, but summers are long and hot, and winters are usually mild and short. Snowfall is typically light in winter months. The average length of the growing season is 213 days.

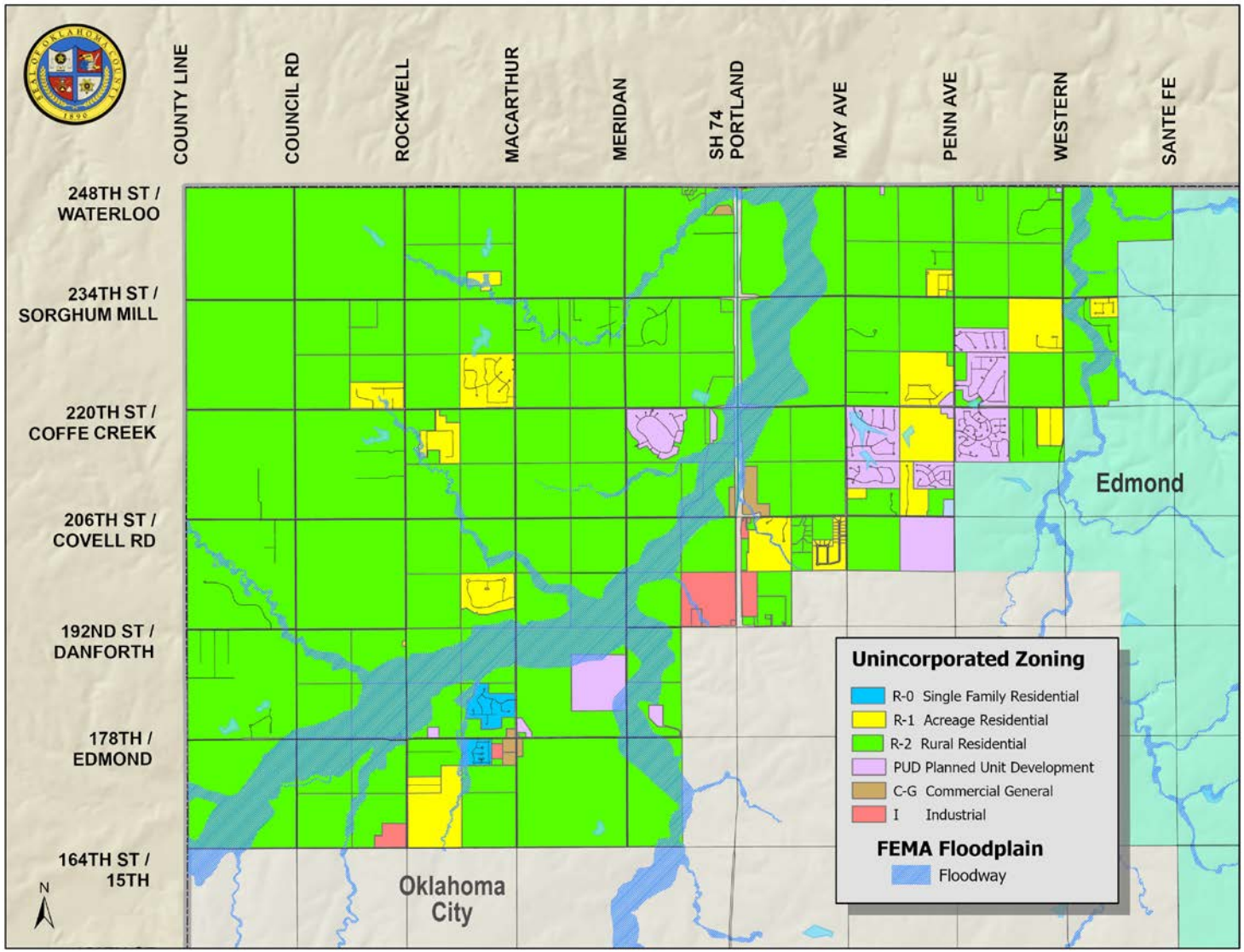
Temperatures range from below freezing in winter to more than 100 degrees Fahrenheit in the summer. Average daily maximum temperatures vary from 49 degrees Fahrenheit in January to 93 degrees Fahrenheit in July and August, while daily minimum temperatures average 27 degrees Fahrenheit in January and 70 degrees Fahrenheit in July and August. In some years, more than 13 consecutive days of temperatures higher than 100 degrees Fahrenheit have been recorded in July and August. Winter temperatures below freezing occur an average of 72 days, with the temperature dropping below 0 degree Fahrenheit averaging a couple of times per decade. Wind is out of the south or south-southeast nearly a third of the year (OK Climate Survey, 2023).

The average annual precipitation is 36 inches with accumulations varying throughout the year. Winter is the driest season, receiving 12 percent of the total annual precipitation, with an average of 1.8 inches of snow each month from December through February. Spring into early summer season is the wettest time of year, with March through June receiving 47 percent of the annual precipitation. After a typically dry and hot summer, fall is the second wet season, averaging 24 percent of annual precipitation (NWS NOWData, 1991-2020). Locally intense and scattered thunderstorms are the source of precipitation in the spring, summer and fall, which sometimes results in extensive flooding.

Land Use and Land Cover

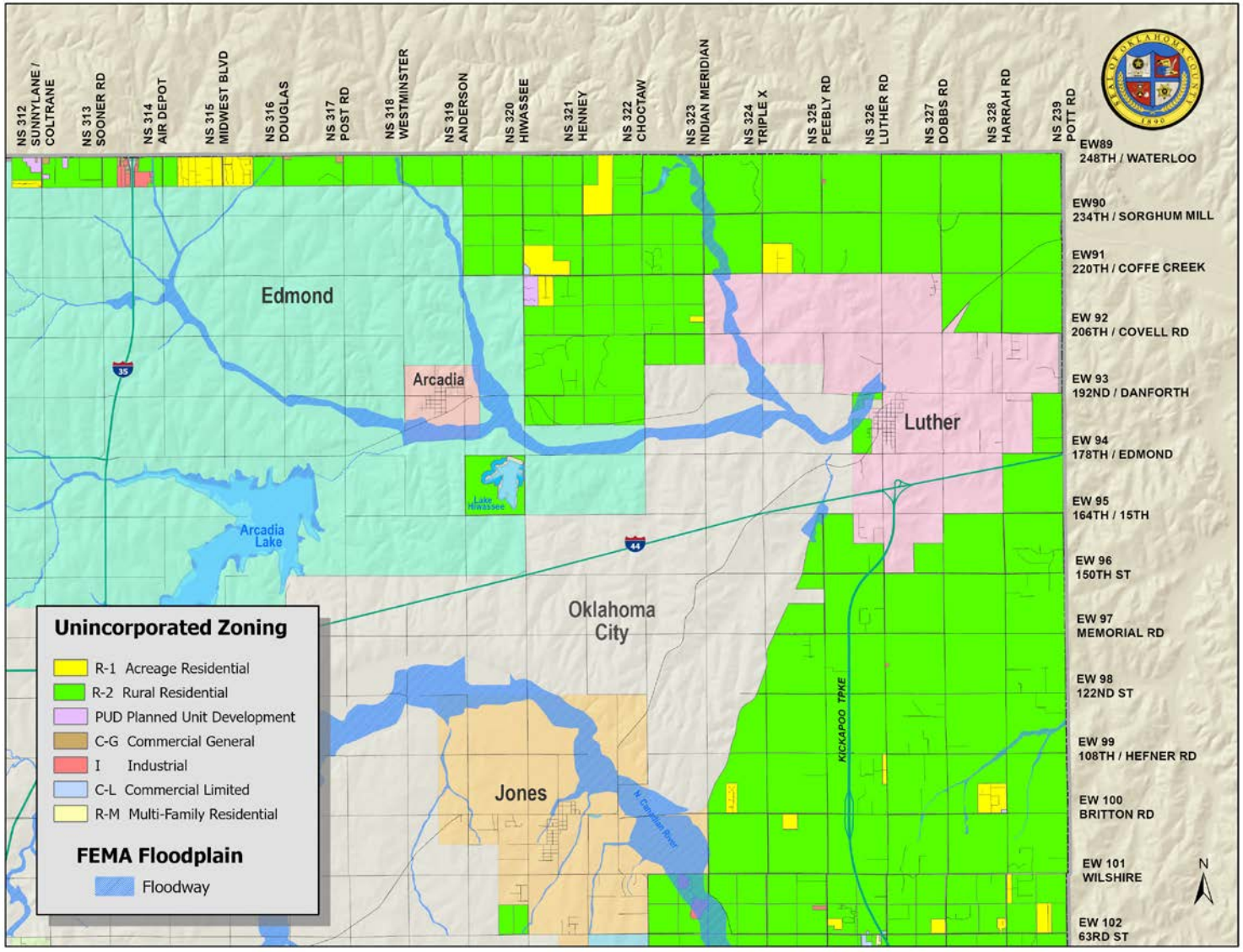
Oklahoma County currently has a land area of approximately 720 square miles, with approximately 142 square miles located in the unincorporated area. Historically, the land use in the majority of the unincorporated areas of Oklahoma County has been agricultural. Although the trend in recent years has been toward residential development, currently over 131 square miles remain zoned for agricultural uses (OK COUNTY CP, 2018). Refer to Figures 4-3 through 4-6 for land use in the unincorporated areas of Oklahoma County and Figure 4-7 for urbanized areas in the County. Details on changes in land use are located in the Wildfire section of this plan, Section 5.3.9.

Figure 4-3. Northwest Oklahoma County Current Land Use Map



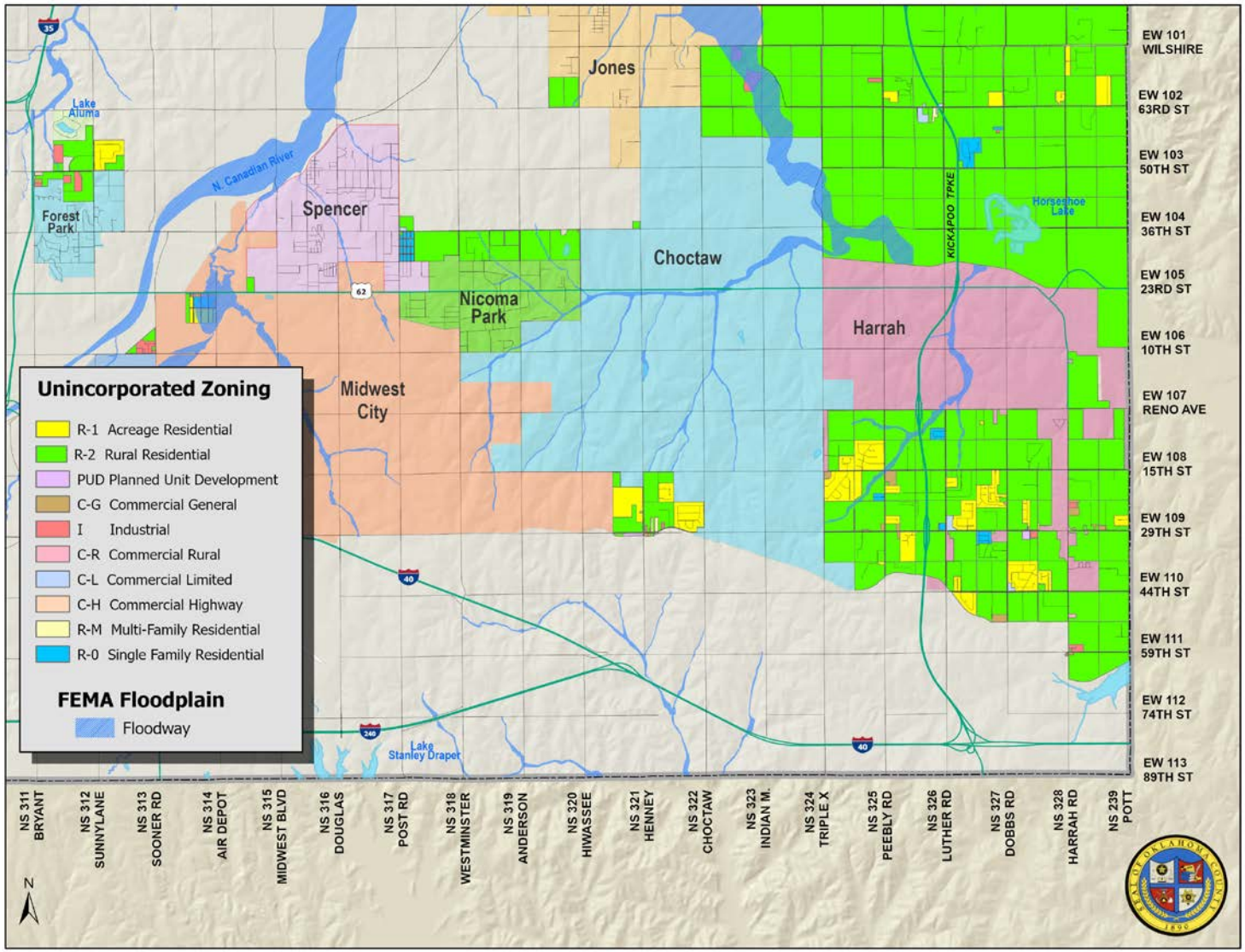
Source: Oklahoma County, 2023

Figure 4-4. Northeast Oklahoma County Current Land Use Map



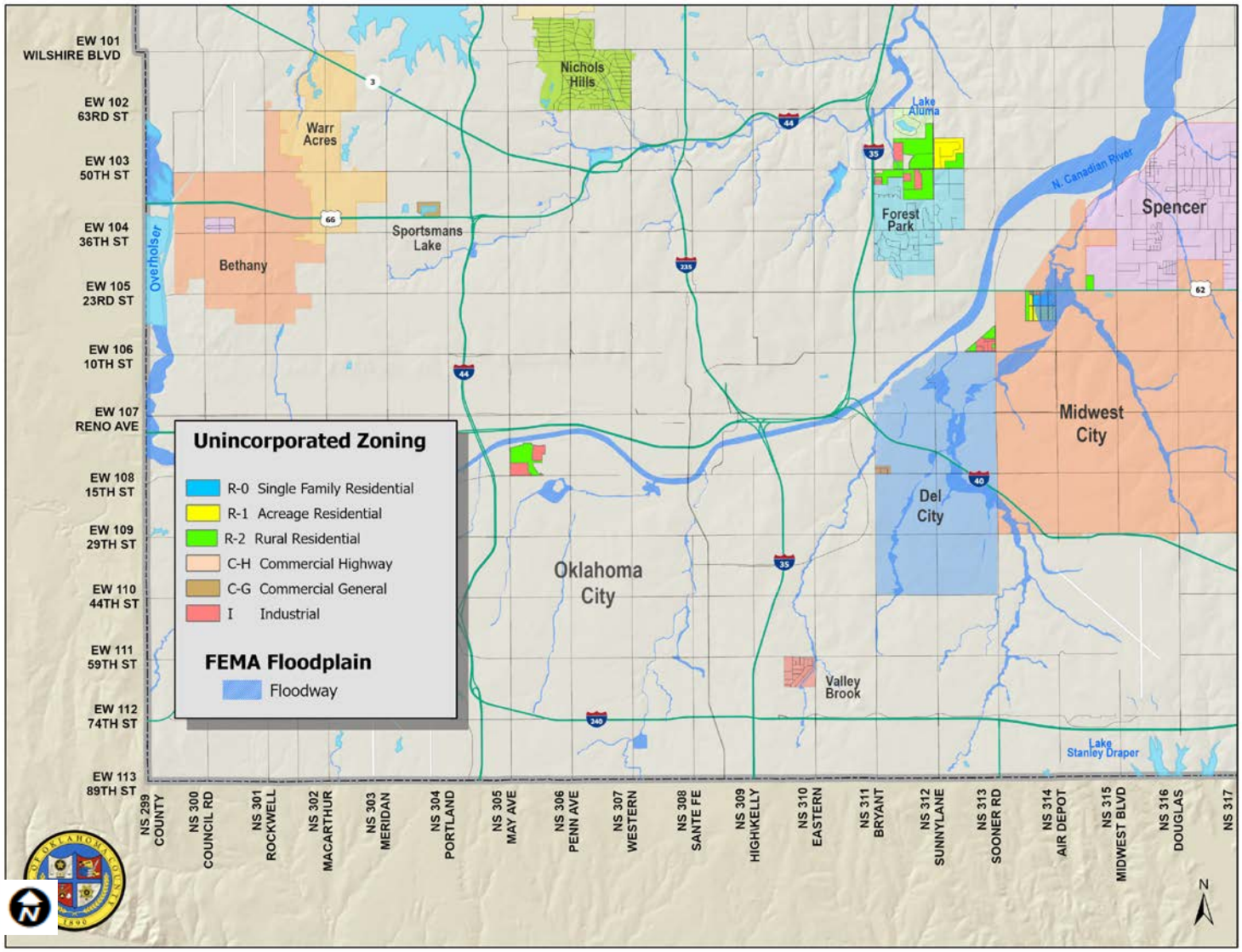
Source: Oklahoma County, 2023

Figure 4-5. Southeast Oklahoma County Current Land Use Map



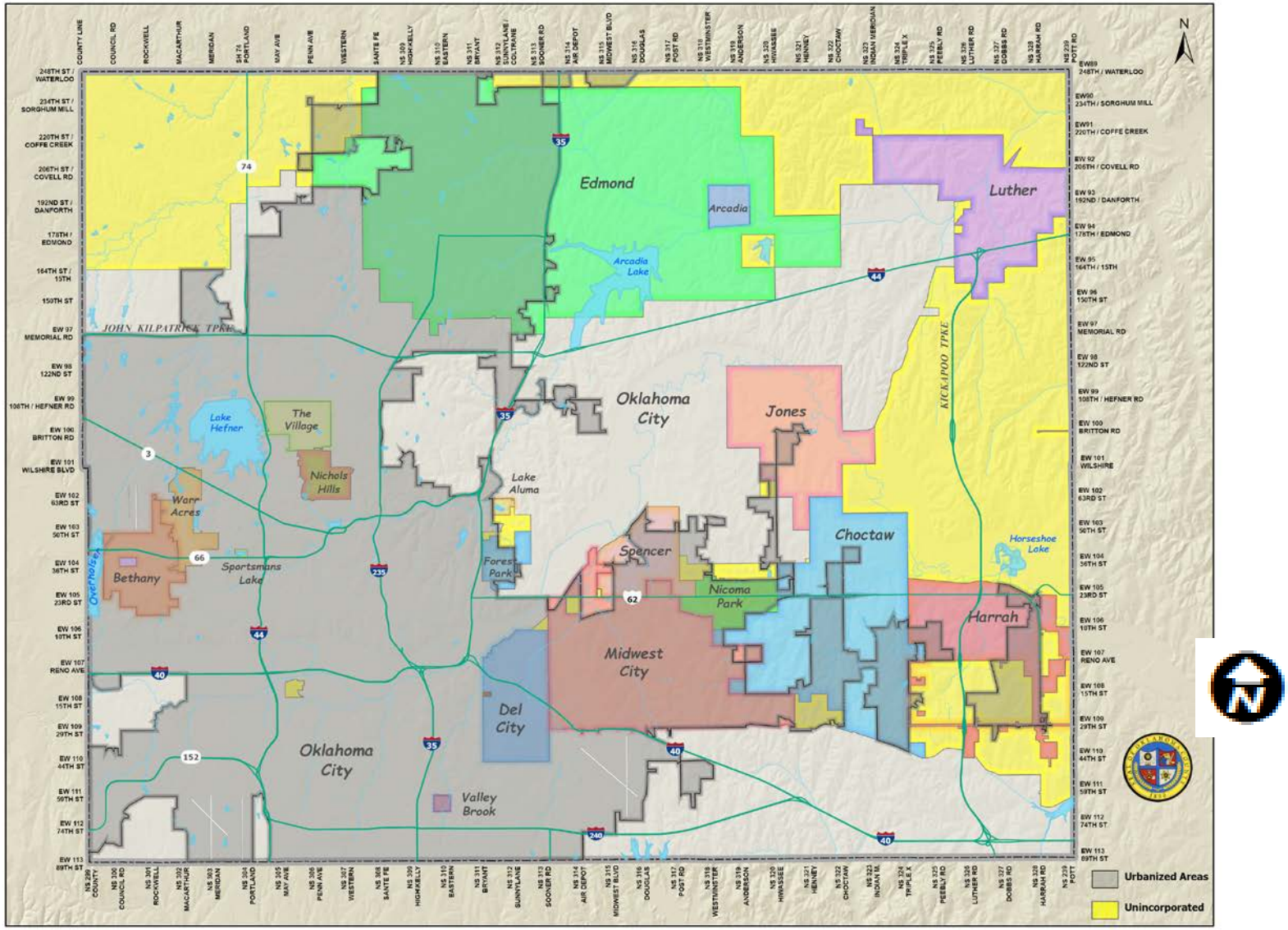
Source: Oklahoma County, 2023

Figure 4-6. Southwest Oklahoma County Current Land Use Map



Source: OK COUNTY CP, 2023

Figure 4-7. Urbanized Area in Oklahoma County.



Source: OK COUNTY CP, 2023

POPULATION AND DEMOGRAPHICS

According to 2020 U.S. Census figures, the Oklahoma County Planning Area had a population of 264,750. DMA 2000 and the subsequent 2023 planning requirements desire HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. For the purposes of this study, vulnerable populations shall include (1) the elderly (persons aged 65 and over) and (2) those living in low-income households. Further, non-English speaking populations are important to consider as communication issues are important when addressing emergency preparedness, response and mitigation.

The population and demographic data currently available for direct processing is based on the 2020 U.S. Census. According to U.S. Census figures, the planning area experienced approximately an eight (8) percent increase in population from 228,699 in 2000 to 246,655 in 2010. From 2010 to 2020, the increase is approximately seven (7) percent. The change in population and demographics since 2000 has not been consistent across the planning area. Table 4-1 presents these general and socially-vulnerable population statistics for the Oklahoma County Planning Area based on the 2000 and 2010 U.S. Census.

Table 4-1. Oklahoma County Plan Participants Population Statistics

Municipality	Census 2020 Pop.	Percent of Pop. Over 65*	Persons in Poverty **	Language Other than English Spoken at Home
Arcadia (T)	169	32.1%	8.5%	7.8%
Bethany (C)	20,831	15.1%	16.5%	17.8%
Choctaw (C)	12,182	17.4%	6.5%	3.8%
Del City (C)	21,822	15.5%	20.6%	8.9%
Edmond (C)	94,428	17.5%	6.0%	7.8%
Forest Park (T)	1,049	47.2%	1.4%	5.9%
Harrah (C)	6,245	16.9%	13.6%	7.1%
Luther (T)	1,492	19.6%	3.2%	1.6%
Midwest City (C)	58,409	16.8%	15.2%	5.6%
Nichols Hills (C)	3,870	20.2%	4.1%	4.8%
Nicoma Park (C)	2,313	13.6%	14.8%	3.3%
Spencer (C)	3,978	20.1%	17.0%	12.8%
The Village (C)	9,538	19.3%	12.7%	4.2%
Unincorporated County	17,972			
Warr Acres (C)	10,452	16.2%	10.0	32.8%

Sources: Census 2020 (U.S. Census Bureau), American Community Survey 2021-2022
Note: Pop. = population
* Individuals over the age of 65. Percentage is calculated out of total population of municipality.
** As determined by Census Bureau. Percentage is calculated out of total population of municipality. This statistic may be underreported due to recent inflation.

It is noted the primary language other than English in all jurisdictions listed is Spanish, with 3% Asian and Pacific Islander languages in Warr Acres. The average population in Oklahoma over age 65 is 16.5% and the average percentage in poverty is 15.7%.

Development Trends and New Development

A steady rise in residential development has occurred primarily in the northwest corner of the County. The availability of public water (Deer Creek Rural Water District) has played a primary role in this trend. Public sanitary sewer from Oklahoma City is also available in limited locations in the northwest area of the County (County District 3).

Known and anticipated development, along with their proximity to hazard risk zones, is identified for each municipality in their municipal annexes (Section 9) of this Plan Update. As development continues across the county, the jurisdictions with identified areas of growth each have additional buildings and infrastructure susceptible to drought, earthquake, hail, lightning, wind, and winter storm due to their being additional buildings and infrastructure that could potentially be impacted by any given event. Unique and varied risks and associated increases or decreases in vulnerability are identified in the jurisdictional annexes.

High-Potential Loss Facilities

High-potential loss facilities include dams, levees, nuclear power plants, military installations and hazardous materials (HAZMAT) facilities. No levees or nuclear power plants were identified in the Planning Area.

There are multiple dams within Oklahoma County. The “Dam Failure” section of the plan, (5.3.1) handles all critical dams and the extent of potential damage due to a failure. It is worth noting that none of the “High Hazard” dams within the county are owned/managed by any of the jurisdictions found in this plan, therefore the High Hazard dam specific section of the FEMA planning tool is not applicable.

5.1 METHODOLOGY AND TOOLS

Methodology

This process identifies and profiles the hazards of concern while assessing the vulnerability of community assets, including population, infrastructure, and the economy. The risk assessment serves as a foundation for decision-makers to evaluate and implement mitigation measures aimed at reducing the impacts of hazards when they occur (see Sections 6 and 9 of this plan).

Step 1: The first step of the risk assessment process is to identify the hazards of concern. Natural hazards are natural events that threaten lives, property, and many other assets. Often, natural hazards can be predicted, where they tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area.

Step 2: The next step of the risk assessment is to prepare a profile for each hazard of concern. These profiles assist communities in evaluating and comparing the hazards that can impact their area. Each type of hazard has unique characteristics that vary from event to event. That is, the impacts associated with a specific hazard can vary depending on the magnitude and location of each event (a hazard event is a specific, uninterrupted occurrence of a particular type of hazard). Further, the probability of occurrence of a hazard in a given location impacts the priority assigned to that hazard. Finally, each hazard will impact different communities in different ways, based on geography, local development, population distribution, age of buildings, and mitigation measures already implemented.

Steps 3 and 4: To understand risk, a community must assess its assets and determine which are exposed or vulnerable to identified hazards. By combining hazard profile information with data on population, demographics, and at-risk infrastructure, the community can better develop risk scenarios and formulate mitigation strategies for each hazard.

Tools

To address the mitigation planning requirements and better understand potential vulnerability and losses associated with hazards of concern, Oklahoma County used standardized tools, combined with local, state, and federal data and expertise to conduct the risk assessment. Our standardized tools used to support the risk assessment are described below.

For this risk assessment, hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties result from the following:

1) Approximations and simplifications necessary to conduct such a study in HAZUS.
2) Incomplete or dated inventory, demographic, or economic parameter data
3) The unique nature, geographic extent, and severity of each hazard
4) Mitigation measures already employed by the participating municipalities and the amount of advance notice residents have to prepare for a specific hazard event

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Committee members determined the HAZUS data from the original plan was grossly inaccurate. Therefore, HAZUS potential exposure and loss estimates have not been included in this update of the hazard mitigation plan.

5.2 IDENTIFICATION OF NATURAL HAZARDS OF CONCERN

Hazards of Concern is defined as those hazards that are considered most likely to impact a community. These are identified using available data and local knowledge.

Oklahoma County considered a full range of natural hazards that could impact the area, and then identified and ranked those hazards that presented the greatest concern. The natural hazard of concern identification and update process incorporated input from the County and participating jurisdictions review of the 2019 Oklahoma County HMP and previous hazard identification efforts. It also included updated local, state, and federal information on the frequency, magnitude (including a cursory review of the State of Oklahoma 2019 HMP), and costs associated with the various hazards that have previously affected the area. Table 5.2-1 documents the process of identifying and updating the natural hazards of concern for further profiling and evaluation.

The "Flood" hazard includes riverine, flash and urban flooding.

"High Winds" and "Tornados" are presented together in the "High Winds and Tornado" profile.

The "Severe Winter Storm" hazard includes heavy snowfall, blizzards, freezing rain/sleet, and ice storms.

Please note that technological (for example, hazardous material incidents) and man-made hazards (for example, terrorism) are not being addressed in this planning process. The DMA 2000 regulations do not require consideration of such hazards. Further, the risks of man-made and technological hazards are generally mitigated and/or managed through other regulatory programs and plans.

During the data gathering portion of the risk assessment, it was determined that many "events" listed in the NCDC storm database did not occur in the city listed. For example, an event listed as "3 SSW Edmond" is actually in Oklahoma City, which has their own separate Hazard Mitigation Plan. This situation was found to be true for many of the events listed in the NCDC database. These gross errors were propagated throughout the data incorporated into the Mitigation Plan prior to 2013, and this data has been subsequently purged. Use of other NOAA GIS databases (Weather Prediction Center and Storm Prediction Center storm event maps) resolved the actual jurisdiction location for many of the storm events.

In this plan, previous occurrence data is listed twice, once under each hazard and again in each jurisdictional annex where additional comments are added relevant to the affects in each jurisdiction.

Table 5.2-1. Identification of Natural Hazards of Concern for Oklahoma County, Oklahoma

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Oklahoma County?	If yes, does this hazard pose a significant threat to Oklahoma County?	Why was this determination made?	Source(s)
Dam Failure	Yes	Yes	• The OK HMP identifies this as a hazard of concern for the State of Oklahoma • The Planning Committee considers it as a risk for the planning area.	• OK HMP
Drought	Yes	Yes	• The OK HMP identifies drought as a hazard of concern for the State of Oklahoma. • Various sources indicated that many drought events or periods impacted large regions of the State, including Oklahoma County. Such events include: o 2000-2001 o August 2000 o 2005 – 2007 – Many counties in the State were affected, including Oklahoma County. Drought levels ranged from severe to exceptional. Wildfires became a serious problem during this time. o 2011-2012 o Winter-Spring of 2017 and again in 2018 o Summer 2021-2022	• OK HMP • NOAA-NCDC • Drought Impact Reporter • SHELDUS
Earthquake	Yes	Yes	• The OK HMP indicates earthquake as a hazard of concern for the State of Oklahoma. • According to the USGS online seismic hazard maps, the peak ground acceleration with a 10% probability of exceedance over 50 years for Oklahoma County is between 3 and 5% g. FEMA guidance recommends earthquakes are evaluated further if an area has a 3% g peak acceleration or more. • The following sizeable earthquake events affected Oklahoma County: o April 9, 1952 – the one of the largest earthquakes to ever strike Oklahoma; magnitude of 5.7; caused by slippage along the Nemaha fault line; damage was moderate in Oklahoma County. Damage included toppled chimneys and smokestacks, cracked and loosened bricks on buildings, and broken windows and dishes. o October 13, 2010 – mag. 4.7 - struck approximately eight miles southeast of Norman; USGS received reports of the earthquake being felt over the eastern two-thirds of the State; Oklahoma County reported having felt this earthquake. o November 6, 2011 – mag. 5.7 - the largest earthquake in the State in recent times, and possibly stronger than the 1952 quake, rattled Prague, OK and was felt from southwest Illinois to the Big Country area	• OK HMP • USGS

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Oklahoma County?	If yes, does this hazard pose a significant threat to Oklahoma County?	Why was this determination made?	Source(s)
			of West Texas. Walls cracked and plates fell. At St. Gregory's University in Shawnee, a spire on a building fell and three others were damaged. o September 3, 2016 – mag. 5.8 Pawnee earthquake felt strongly in the area with several reports of sheetrock and bricks cracking. o February 2, 2024 – mag. 5.1 Prague earthquake felt strongly in the area, cracking sheetrock in Harrah. Fourth largest in Oklahoma history.	
Expansive Soils	Yes	Isolated areas	• The OK HMP identifies expansive soils as a hazard of concern for the State of Oklahoma. NRCS mapping depicts parts of the county are vulnerable to expansive soils. • USGS indicated that Oklahoma County's soils consists of clay having slight to moderate swelling potential • The planning committee has indicated that expansive soils continue to be a hazard, particularly to subsurface infrastructure, in parts of the county.	• OK HMP • USGS • NRCS web soil survey
Extreme Temperature	Yes	Yes	• The OK HMP identifies extreme heat as a hazard of a concern for the State of Oklahoma. However, for the purpose of this Plan, extreme temperatures will include both heat and cold events for Oklahoma County. • NOAA's NCDC storm events database indicates that Oklahoma County was impacted by many extreme temperature events since 1950. These events are of a regional extent rather than localized to just one county or community, with similar impacts.	• OK HMP • NOAA-NCDC • National Atlas
Flood (Riverine, Flash and Urban Flooding)	Yes	Yes	• The OK HMP identifies flooding as the main hazard of concern for the State of Oklahoma. • Oklahoma County has been issued more than 45 FEMA Disaster Declarations for flood-related events, each event resulting in extensive damages. • NOAA's NCDC storm events database indicates that Oklahoma County was impacted by dozens of flood events since 1950. This includes flash flooding. • NFIP identifies that the planning area has made 442 flood claims since 1978 as of September 2023, totaling over $7.5 million in payments.	• OK HMP • OEM • FEMA • SHELDUS • NOAA-NCDC • NFIP
Hailstorm	Yes	Yes	• The OK HMP identifies hailstorms as a hazard of concern for the State of Oklahoma. • Oklahoma County has experienced numerous hailstorm events that have resulted in significant damage throughout the County.	• OK HMP • SHELDUS • NOAA-NCDC

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Oklahoma County?	If yes, does this hazard pose a significant threat to Oklahoma County?	Why was this determination made?	Source(s)
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Land Subsidence / Sinkholes	Yes	No	• The OK State HMP indicates that counties on the eastern side of the state are susceptible to sinkholes as a result of historic mining operations. Oklahoma County was not identified as a county particularly vulnerable to sinkhole hazards. • The Planning Committee does not consider land subsidence/sinkholes to be a significant risk for the planning area.	• OK HMP
Landslide	No	No	• The OK State HMP indicates "landslides may occur anywhere in Oklahoma but generally east of I-35. Most of the area west of I-35 is flat land where landslides are not an issue. Few counties in Oklahoma will consider that landslides are a hazard. • The Planning Committee does not consider landslide to be a significant risk for the planning area.	• OK HMP
Lightning	Yes	Yes	• The OK HMP identifies this as a hazard of concern for the State of Oklahoma • The Planning Committee considers it as a risk for the planning area.	• OK HMP
Severe Winter Storm (Heavy Snow, Blizzards, Freezing Rain/Sleet, and Ice Storms)	Yes	Yes	• The OK HMP identifies all types of severe winter storms as hazards of concern for the State of Oklahoma. • The FEMA, OK HMP and OEM indicate that Oklahoma County has been issued several FEMA Disaster Declarations for winter storm events. • NOAA's NCDC storm events database indicates that Oklahoma County was impacted b~~y~~ numerous winter storms in the past 10 years. Most events are of a regional extent rather then localized to just one county or community.	• OK HMP • OEM • FEMA • NOAA-NCDC • SHELDUS
Tornado	Yes	Yes	• The OK State HMP indicates that the entire State is vulnerable to the tornado hazard. • Oklahoma County has a history of tornado events that have resulted in significant property damage and loss of life. • The Planning Committee considers tornados to be a significant risk for the planning area.	• OK HMP
Wildfire	Yes	Yes	• The OK State HMP indicates that most of the counties in the State are vulnerable to the wildfire hazard. • Oklahoma County has a history of wildfire events that have resulted in significant damages, often during dry periods.	• OK HMP

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Oklahoma County?	If yes, does this hazard pose a significant threat to Oklahoma County?	Why was this determination made?	Source(s)
			• The Planning Committee considers wildfire to be a significant risk for the planning area.	
Windstorm	Yes	Yes	See “Tornado” hazard.	

CRREL	Cold Regions Research and Engineering Laboratory
DPC	Disaster Preparedness Commission
DR	Presidential Disaster Declaration Number
EM	Presidential Emergency Declaration
FEMA	Federal Emergency Management Agency
HMP	Hazard Mitigation Plan
NCDC	National Climatic Data Center
NOAA	National Oceanic and Atmospheric Administration
OK	Oklahoma
SHELDUS	Spatial Hazard Events and Losses Database for the United States
USACE	U.S. Army Corp of Engineers
USGS	U.S. Geologic Survey

According to input from Oklahoma County, and review of all available resources, a total of eleven (11) natural hazards of concern were identified as significant hazards affecting the County, to be addressed within this plan:

- Dam Failure
- Drought
- Earthquake
- Expansive Soils
- Extreme Temperatures
- Flooding (riverine, flash and urban)
- Hail
- Lightning
- Wildfire
- Wind (including tornado)
- Severe Winter Storms

Other natural hazards of concern have occurred within the County, but typically have a low potential to result in significant impacts. The County deemed other natural hazards as minor in comparison to those bulleted above; therefore, additional natural hazards will not be further addressed within this version of the Plan. However, if deemed necessary by the County, these hazards may be considered in future versions of the Plan.

5.3.1 DAM FAILURE

HAZARD PROFILE

Description

A dam is an artificial barrier usually constructed across a stream channel to impound water. Timber, rock, concrete, earth, steel or a combination of these materials may be used to build the dam. In Oklahoma County, most dams are constructed of earth or concrete. Dams must have spillway systems to safely convey normal stream and flood flows over, around, or through the dam. Spillways are commonly constructed of non-erosive materials such as concrete. Dams should also have a drain or other water-withdrawal facility for control of the pool or lake level and to lower or drain the lake for normal maintenance and emergency purposes. A dam that impounds water in the upstream area is referred to as a reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

Dams assigned the Low Hazard Potential classification are those dams where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Significant Hazard Potential classification are dams that are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure, and where failure or mis-operation results in no probable loss of human life but can cause serious economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. High Hazard Potential classifications are those dams where failure or mis-operation will probably cause loss of human life. For the purpose of this plan, only High Hazard dams are profiled.

Extent

Flood severity from a dam failure can be measured with a low, medium or high severity, which are further defined as follows:

- Minor Severity - This happens when water from a small breach or seepage stays within the downstream river channel. Minimal or no property damage likely, but possibly some public threat or inconvenience.
- Moderate Severity - A breach large enough to exceed the capacity of the river or creek channel and overflow. Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are likely.
- Major Severity - A breach large enough to exceed the capacity of the river or creek channel and overflow where extensive inundation of structures and roads happens. Significant evacuations of people and/or transfer of property to higher elevations are necessary.

Flood inundation depths (extents) for each jurisdiction are shown as elevation above sea level on the maps found in an Appendix A (restricted from public view). Zones of severity will vary based on distance from the dam and topography of the surrounding area.

Location

The Dam Incident Notification (DIN) system maintained by the National Performance of Dam Program (NPDP) maps the location of state and federally monitored dams throughout the state. The database shows 70 dams appearing to be located within Oklahoma County; 23 of those are categorized as High Hazard. Table 5.3.1-1 lists the High Hazard dams located and adjacent to Oklahoma County (OWRB, 2023).

Table 5.3.1-1: High Hazard Dams within and/or near Oklahoma County

Name	National / State ID #	Owner Type	Water Course	Year Built	Dam Type	Crest Length (ft)	Height (ft)	Storage Capacity (acre-ft)	Drainage Area (sq. mi.)	Affect Jurisdictions in Plan? (Y/N)*	Comments
Canton Lake	OK10316	Federal	N. Canadian River	1948	Earth	15140	68	383800	7600	Yes	Located two counties away in N. Blaine County
Lake Arcadia	OK22178	Federal	Deep Fork River	1986	Earth	5250	102	190700	105	Yes	
Ski Island Lake	OK02406	Private	Spring Creek	1957	Earth	2000	27	386	6.3	Yes	Unincorporated Oklahoma County bridges and roads along Deer Creek between Meridian Ave and May Ave., north of 164th St. The area is largely undeveloped.
Blue Stem	OK02412	Private	Spring Creek	1925	Earth	250	23	355	7.5	Yes	Immediately downstream from Ski Island Lake. Dam failure would flow into unincorporated OK County.
Regal	OK02418	Private	Tr – Spring Creek	1920	Earth	424	16	81	1.2	No	
American Fidelity	OK02422	Private	Tr - Deep Fork River	1965	Earth	950	14	99.3	0.63	No	
Northeast (Zoo Lake)	OK02424	Local Gvt.	Tr – Deep Fork River	1908	Earth	890	43	800	2.92	No	
Aluma	OK02425	Private	Tr – Deep Fork River	1921	Earth	745	38	260	N/A	No	
Sportsman Club	OK02426	Private	Tr – Deep Fork Creek	1948	Earth	330	15	313	0.3	No	
Hefner	OK02535	Local Gvt.	Bluff Creek	1943	Earth	1	112	107400	9.69	Yes	Unincorporated Oklahoma County bridges and roads along Deer Creek between Meridian Ave and May Ave., north of 164th St. Significant damage to bridges and roads around the area.
Overholser	OK02537	Local Gvt.	N. Canadian River	1919	Earth	1	61	31100	738	Yes	Inundation along North Canadian River. At risk: Choctaw, Del City, Harrah, Midwest City, Spencer, unincorporated County. See North Canadian River floodplain area in annex maps.
Brixton Heights Addition (St. Francis West Lake)	OK02543	Private	Tr – Spring Creek	1957	Earth	860	20	90	0.79	No	
Northwood Lake	OK10709	Private	Tr – Deer	1961	Earth	2665	42	2700	12	Yes	Located in Canadian County but

Name	National / State ID #	Owner Type	Water Course	Year Built	Dam Type	Crest Length (ft)	Height (ft)	Storage Capacity (acre-ft)	Drainage Area (sq. mi.)	Affect Jurisdictions in Plan? (Y/N)*	Comments
Dam			Creek/Spring Creek								drains into unincorporated OK Co
Twin Lakes East	OK11000	Private	Tr – Spring Creek	1930	Earth	500	23	65	0.34	Yes	Dam failure could flood homes north of NW 67th near and west of MacArthur Blvd. in Warr Acres
Knight (Lyrewood Lake)	OK11001	Private	Tr – Spring Creek	1962	Earth	300	15	75	0.51	No	
Twin Lakes West	OK11005	Private	Tr – Spring Creek	1930	Earth	345	20	60	1.54	Yes	Dam failure could flood homes north of NW 67th near and west of MacArthur Blvd in Warr Acres.
Pines West	OK11006	Private	Tr – Spring Creek	1925	Earth	120	17	51	1.75	Yes	Affects Warr Acres, between Brookside and Hammond Ave.
Pines East	OK11007	Private	Tr – Spring Creek	1925	Earth	304	17	63	0.41	Yes	Affects Warr Acres, Miles Ln , Ellen Ln and nearby streets, feeds into Pines West.
NW Oklahoma City Sludge Lagoon No 1	OK11051	Local Gvt.	Bluff Creek	1954	Earth	1265	30	403	0.15	No	
Dry Creek Detention	OK11061	Local Gvt.	Dry Creek	1978	Earth	1290	25	281	10.97	No	
Will Rogers Park Holding Pond	OK11069	Local Gvt.	Tr – Deep Fork	1967	Earth	1230	24	323	3.8	No	
Lightning Creek Holding Pond A	OK11070	Local Gvt.	Tr – Lightning Creek		Earth	4000	16	187	0.63	No	Located in Cleveland Co, affects Oklahoma City
Lightning Creek Holding Pond C	OK11071	Local Gvt.	Tr – Lightning Creek	1977	Earth	4000	16	187	0.63	No	
Masseys	OK12201	Private	Tr – Deep Fork	1970	Earth	650	21	122	N/A	No	
Dolese Youth Park	OK22001	Local Gvt.	Tr – Bluff Creek	1960	Earth	1	25	80	N/A	No	
Lakeside Dam	OK30068	Private	Tr – Deep Fork	2005	Earth	2000	24	245.8	0.53	No	

Source: National Performance of Dams Program (NPDP), 2023 and Oklahoma Water Resources Board (OWRB)
* Potential jurisdiction dam failures specified in Table 5.3.1-2 Note: TR = Tributary BR = Branch

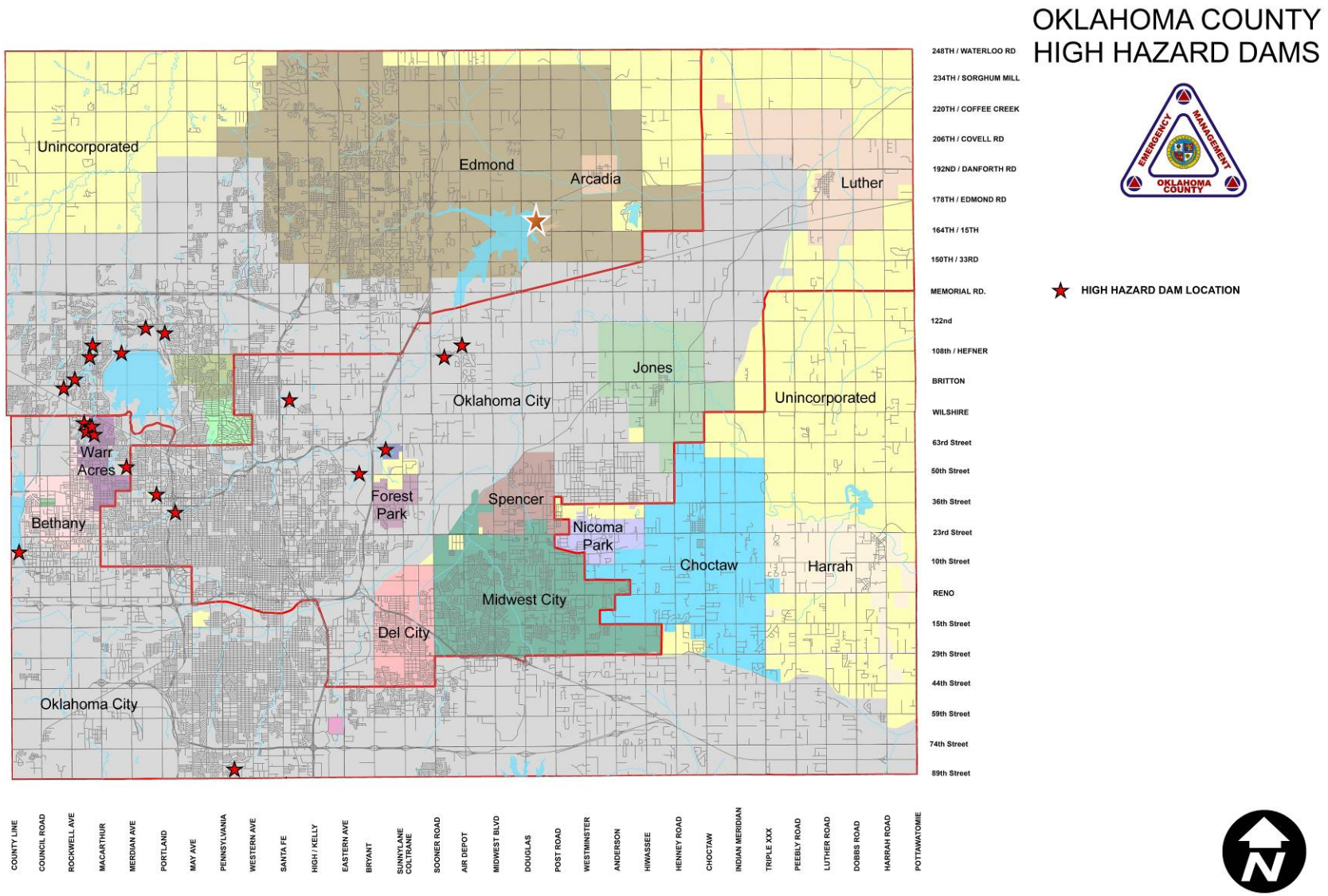

OKLAHOMA COUNTY
HIGH HAZARD DAMS
EMERGENCY MANAGEMENT
OKLAHOMA COUNTY
HIGH HAZARD DAM LOCATION
Unincorporated
Edmond
Arcadia
Luther
Jones
Unincorporated
Oklahoma City
Warr Acres
Bethany
Forest Park
Spencer
Nicoma Park
Choctaw
Harrah
Midwest City
Del City
Oklahoma City
248TH / WATERLOO RD
234TH / SORGHUM MILL
220TH / COFFEE CREEK
206TH / COVELL RD
192ND / DANFORTH RD
178TH / EDMOND RD
164TH / 15TH
150TH / 33RD
MEMORIAL RD.
122nd
108th / HEFNER
BRITTON
WILSHIRE
63rd Street
50th Street
36th Street
23rd Street
10th Street
RENO
15th Street
29th Street
44th Street
59th Street
74th Street
89th Street
COUNTY LINE
COUNCIL ROAD
ROCKWELL AVE
MACARTHUR
MERIDIAN AVE
PORTLAND
MAY AVE
PENNSYLVANIA
WESTERN AVE
SANTA FE
HIGH / KELLY
EASTERN AVE
BRYANT
SUNNYLANE COLTRANE
SOONER ROAD
AIR DEPOT
MIDWEST BLVD
DOUGLAS
POST ROAD
WESTMINSTER
ANDERSON
HWASSEE
HENNEY ROAD
CHOCTAW
INDIAN MERIDIAN
TRIPLE XXX
PEEBLY ROAD
LUTHER ROAD
DOBBS ROAD
HARRAH ROAD
POTTAWATOMIE

Figure 5.3.1-1

Figure 5.3.1-1 above shows Warr Acres is the only jurisdiction in the plan to contain high hazard dams (four) within its municipal boundary. Of the 23 high hazard dams in the county and 3 additional in the planning area (including dams affecting Oklahoma County in Canadian, Cleveland and Blaine counties), four dams detailed below are significant in size, purpose, and hazard potential in Oklahoma County. Digitized inundations are available for Arcadia and Canton Lake, but are not available for all at-risk jurisdictions or high hazard dams. Most high hazard dams in Oklahoma County are privately owned. As a result, inundation information is not available or deficient.

Arcadia Lake Dam

Arcadia Lake is located in northeast Oklahoma County, approximately 1.5 miles southwest of the town of Arcadia, in the metropolitan areas of Oklahoma City and Edmond. Arcadia Lake was formed in 1986 by impounding the Deep Fork arm of the Canadian River below its convergence with Spring Creek. Water released from Arcadia Lake flows east into the Deep Fork of the Canadian River until it reaches Lake Eufaula (OCWP, 2000 : http://www.owrb.ok.gov/studies/reports/arcadia/arcadia_e.php).

Arcadia Lake is a source of recreation for the Oklahoma City metropolitan area. The dam is federally owned and maintained, and located on the east side of the lake, which contains 1,820 acres of water. Should the lake experience a breach in its dam, the water release would affect the Deep Fork Creek upstream to Okmulgee, Oklahoma. The towns of Arcadia and Luther in Oklahoma County would be the primary areas affected, (Oklahoma County HMP, 2006) along with rural east Edmond.

This lake provides water supply, flood control and recreation opportunities along the Deep Fork River in Oklahoma County. The Lake provides 12,100 acre-feet per year of water supply. The entire available yield is allocated to the Edmond Public Works Authority (Oklahoma Water Resources Board, 1997).

Appendix A (restricted from public view) illustrates the inundation of a potential dam failure of Arcadia Lake Dam for Arcadia and Luther, respectively. Just downstream of the dam, a water treatment plant exists in Edmond City Limits. A convenience store, commercial restaurant and tourist stop in Arcadia is also in the direct path, and would be affected approximately 2 hours after a major failure according to the EOP. The main flow would travel south of Arcadia, however much of the southern half of Arcadia could receive some inundation should a total failure of the dam occur. The Soldier Creek bridge east of Arcadia in Edmond near Danforth and Anderson Rd would be inundated. Many miles of Historic Route 66 would be underwater through east Edmond and Unincorporated Oklahoma County. High tension electric lines east of Danforth and Hiwassee could be taken down if a highline stand is destroyed. The inundation area in unincorporated Oklahoma County is almost entirely regulatory floodplain with very few structures. A few homes and oil wells exist northeast Covell Rd. and Dobbs Rd. along Hogback Rd. along with a high tension line that crosses east to west. The Stillwater Central Railroad line travels along Hogback Rd. and would be inundated for several miles as the tracks follow the Deep Fork Creek to Wellston in Lincoln County just east of Oklahoma County.

Canton Lake Dam

Canton Lake Dam is located in Blaine County, approximately two miles north of the town of Canton. The dam is a 15,140-foot-long structure with a 640-foot gated, concrete spillway, which rises to a maximum height of 68 feet above the streambed. Completed in 1948, the Canton Lake stores 114,370 acre-feet of water and drains a total area of 12,483 square miles (including upstream projects). The dam provides flood control protection as well as water storage on the Canadian River in Oklahoma. State Highway 58-A extends across the dam embankment and spillway. Oklahoma City obtained water rights to Canton Lake so water from Canton flows to Oklahoma City's Lake Hefner and Lake Overholser (OK State HMP, 2014).

The stability of the Canton Dam spillway and the amount of floodwater the dam could safely hold was the subject of concern and discussion for over 30 years. Restrictions on the amount of water the dam could safely hold affected the dam's ability to provide flood protection to the level for which it was originally designed. Due to these restrictions, downstream flooding could occur. This potential flooding could impact areas in Oklahoma County including, but not limited to, downtown Oklahoma City (OK State HMP, 2014).

Canton Lake Dam has recently undergone construction of an auxiliary spillway to reduce seepage under the existing embankment and ensure the dam can pass the probable maximum flood requirements and to meet seismic requirements. This construction was completed in 2016, including an auxiliary spillway 720 feet long. This includes a 670 foot long cut off wall to reduce upstream erosion (www.swt.usace.army.mil and www.swd.usace.army.mil).

Bethany would be inundated in a small area near the corner of NW 23rd and Eagle Ln. In addition, most of two mile sections north of NW 36th St. Expressway and west of Council would be inundated. This includes a heavily residential area south of NW 39th St. and two city Parks north of NW 39th St., a mobile home park, residences, and the city water treatment plant.

The inundation of a potential dam failure of Canton Lake Dam for northwest parts of Del City is mostly undeveloped or abutting an industrial area. A few homes may be at risk east of Burk Way and south of Reno Ave along with an industrial park near Bryant Pl. In addition, a few buildings on Tinker Diagonal north of Delmar Rd. may be at risk. A tank battery farm in the industrial area may be at risk in a complete failure.

In Midwest City, a train depot for loading of new automobiles may be at risk if a full failure occurs. A mobile home park northeast of the depot is at risk, along with homes in a small unincorporated area near Northeast 23rd and Air Depot. Oklahoma County has used multiple mitigation grant projects to remove homes in this area that flooded when Crutcho Creek overtops its bank. Floodwaters could back into Soldier Creek all the way to NE 10th and Midwest Blvd. In Spencer, a few homes near NE 46th and Spencer Rd. could be inundated in a worst case scenario. In Jones (not a plan participant in 2023), the area affected is east of NW 4th and primarily north of Main St and contains businesses and homes. In Harrah, NE 23rd could be inundated west of Peebly Rd and east of Luther Rd. Much of the inundation area is open floodplain in the rural unincorporated parts of eastern Oklahoma County.

Detailed inundation maps (with flood depths) are located in Appendix A (restricted from public view). The FEMA floodways in the North Canadian River cover much of the same area as the dam failure risk.

Hefner Dam

Lake Hefner Dam, owned and operated by Oklahoma City, was built in 1943 on Bluff Creek in northwest Oklahoma County for the purposes of water supply and recreation. The lake serves as terminal storage for diversions from the North Canadian River and releases from Canton Lake. Built on the highest point of land in Oklahoma City, it is only 5 miles north of downtown and contains 2,580 surface acres of water. The dam is located on the North side of the impoundment.

Since it was impounded in 1947, there has not been a breach of the Lake Hefner Dam. However, over time, extensive construction projects have occurred below the dam in Oklahoma City from NW 108th Street to NW 164th, including housing developments, a major hospital complex (Mercy Hospital and Oklahoma Heart) and several shopping centers. Should there be a breach of the Lake Hefner dam, the water from the lake would travel through these areas to the Deer Creek Watershed and spread northeast to the Cimarron River on the north side of Guthrie, OK (OK County HMP, 2006). See the information above in Table 5.3.1-1 and Appendix A (restricted from public view).

Overholser Dam

Lake Overholser is located in Central Oklahoma County along the Canadian County/Oklahoma County line. The Overholser Dam was built in 1917 and 1918 to impound water from the North Canadian River to satisfy the needs of future growth in Oklahoma City. The dam, located on the east side of the lake on the North Canadian River, is 62 feet high and 1,258 feet long. Today, Lake Overholser is a 'backup' reservoir, tapped during the summer to meet the increased seasonal demand. The dam was added to the National Register of Historic Places in 2007. The lake is owned by Oklahoma City and covers 1700 surface acres (OK County HMP, 2006).

Floods resulting from a breach in the Overholser Dam would affect the downtown Oklahoma City area, as well as all throughout the county along the North Canadian River (OK County HMP, 2006).

Lake Overholser is downstream of the Canton Lake Dam and would receive much of the water should a dam failure of Canton Lake Dam occur. Water from this dam can be channeled into Lake Hefner mentioned above. Otherwise, a failure of Overholser Dam would follow the same path as a Canton Lake Dam failure through Oklahoma City and into the jurisdictions in this plan east of Bethany as noted in the table below. See Appendix A (restricted from public view).

Small lakes and dams

There are other small impoundments throughout the County, ranging from farm ponds to small lakes such as Lake Aluma and Horseshoe Lake.

Lake Aluma, a private community, would have no impact. A failure would only affect Oklahoma City. Horseshoe Lake (not considered a high-hazard dam) would affect rural areas inside of Harrah city limits, north of 23rd St. Streets may be damaged and a bridge at Luther Rd N of 23rd and another on Whites Meadow Dr. In addition, a hydroelectric plant is present on the island in Horseshoe Lake and the loss of the lake may cause an electrical outage to the area which it supplies.

Jurisdictions potentially impacted by dam failure are found in Table 5.3.1-2 below:

Table 5.3.1-2: Potential Jurisdiction Dam Failures

Jurisdiction	Potential Dam Hazard
Arcadia	Arcadia Lake
Bethany	Canton Lake, Overholser
Choctaw	Canton Lake, Overholser
Del City	Canton Lake, Overholser
Edmond	Arcadia Lake
Forest Park	None
Harrah	Canton Lake, Overholser
Luther	Arcadia Lake
Midwest City	Canton Lake, Overholser
Nichols Hills	None
Nicoma Park	None
Spencer	Canton Lake, Overholser
The Village	None
Warr Acres	Twin Lakes East and West Pines Lakes East and West
Unincorporated	Hefner, Ski Island Lake, Arcadia Lake, Canton Lake, Overholser, Northwood Lake, Blue Stem

While the anticipated flood heights are known for several jurisdictions as indicated in Appendix A, flood inundation depth from privately owned dams such as Twin Lakes and Pine Lakes dams, Ski Island, Northwood Lake and Blue Stem were not available. Therefore, depths for Warr Acres and parts of Unincorporated Oklahoma County are not known. Action items to rectify these deficiencies will not be added as development of these plans for privately owned dams is outside the scope and responsibility of the jurisdictions.

Range of Magnitude

Two main factors which influence the potential severity of a full or partial dam failure include (1) The amount of water impounded; and (2) The density, type, and value of development and infrastructure located downstream (City of Sacramento Development Service Department, 2005). Failures of small dams, such as those created to form a pond or other small water body, may result in a flood of only a few hundred gallons of water, and may not impact any structures or other property. Failures of large dams, such as those created to form large water supply reservoirs or recreational lakes, may result in millions of gallons of water destroying hundreds of structures and potentially killing large numbers of people.

The environmental effects of dam failure can also be significant. Reservoirs held behind dams affect many ecological aspects of a river, and water releases from dams usually contain very little suspended sediment; this can lead to scouring of river beds and banks. The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways, resulting in potential destruction of downstream habitat and detrimental effects on many species of animals, especially endangered species-listed aquatic species (Contra Costa County, 2011).

Previous Occurrences and Losses

The Oklahoma Water Resources Board reports there have been two high hazard dams break in Oklahoma since 1950, although neither of those have occurred within Oklahoma County. While flood events frequently cause small earth dams on farm or ranch ponds to break, usually due to erosion caused by the heavy rains, these events are inconsistently recorded and most often do not have a significant impact.

A significant dam failure was recorded in Oklahoma City in 1923, when heavy rains caused Lake Overholser dam to fail resulting in the displacement of approximately 15,000 residents. Estimated damages, recovery costs, fatalities, and injuries are unknown. This historical failure of Lake Overholser is highly unlikely to occur with present day mitigation measures, spillway construction, and siting of structures. In the event that Lake Overholser was to fail in present day the impact would be minimal and at most a handful of homes would be impacted (OK City HMP, 2017).

In August 2007, water once again flowed over the Overholser Dam due to Tropical Storm Erin. Overtopping occurred even though the flood gates were fully opened (OK State HMP, 2014).

A potential dam failure occurred at the Dry Creek Detention Pond Dam on April 10, 2008. Heavy rains had occurred in the days prior to April 10, 2008. The Overflow Pipe that runs from the pond, under the dam, and into Dry Creek had failed and the leaking water had eroded the earthen dam above it causing two large holes, one on the back of the dam and one front of the dam. There was a potential for the remaining portions of the earthen dam to collapse and cause a sudden release of water from the pond resulting in a flash flood along Dry Creek north of the dam. Public Works took immediate mitigation actions and prevented any failure. Public safety personnel notified residents in the potential inundation zone of the hazard and provided information on protective actions they should take (OK City HMP, 2017).

On June 14, 2015 a privately owned and maintained stock pond dam on private property in Oklahoma City was breached releasing all of the water impounded behind it, near the 7700 block of S. Indian Meridian. No structures were damaged and the extent of the washout of two public roads in OKC was minor (OKC HMP, 2017).

No other dam failure events have been recorded in Oklahoma County.

Probability of Future Events

Predicting the likelihood of a dam failure in Oklahoma County is highly challenging. However, the risk does increase as dams age and if maintenance becomes less frequent. With the many impoundment structures spread across the county, it is probable that multiple jurisdictions could face risks from potential dam failures in the future. Nevertheless, if recommended repairs, regular maintenance, and routine inspections are consistently carried out, the chances of dam failures are lessened.

In Section 5.3, the identified hazards of concern for Oklahoma County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Committee, and the limited amount of recorded dam failures in the past 100 years in Oklahoma County, the probability of occurrence for dam failure affecting any of the jurisdictions participating in the Oklahoma County HMP that have a dam failure risk (Table 5.3.1-2) is considered '1 – Unlikely.' A dam failure event is possible within the next ten years. Event has a 1 in 10 chance of occurring.

Though an unlikely event, it is estimated that a dam and impoundment failure event may cause direct and indirect impacts in Oklahoma County. Some of the events may induce secondary hazards such as flooding and water quality and supply concerns. Residents may also experience evacuations, transportation delays/accidents/inconveniences and public health concerns.

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For dam failure events, the dam inundation zones are identified as the hazard areas. Therefore, all assets in the dam inundation zones (population, structures, critical facilities and lifelines), are exposed and considered vulnerable when there is a dam failure event.

Overview of Vulnerability

The dam failure hazard is a concern to Oklahoma County due to the 70 dams reported dams in the County, 23 of which are classified as high hazard. The potential for direct and indirect losses associated with dam failure events includes injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources.

Data and Methodology

The Oklahoma Water Resources Board (OWRB) coordinates the Oklahoma Dam Safety Program to ensure the safety of almost 5,000 dams in the State. The program requires inspections every five years for "low" hazard dams, three years for "significant" hazard dams, and annual for "high" hazard dams. In addition, owners of "high hazard" dams are required to have an OWRB-approved emergency action plan (EAP) (OWRB, 2012).

An EAP is a formal document to identify potential emergency conditions at a dam and specify actions to be followed to minimize property damage and loss of life. In general, EAPs contain six basic elements: 1) Notification Flowchart; 2) Emergency Detection, Evaluation, and Classification; 3) Responsibilities; 4) Preparedness; 5) Inundation Maps; and 6) Appendices. The inundation maps that are part of the EAP show emergency management authorities the critical areas for action in case of an emergency. As specified by OWRB, inundation mapping should include:

- North arrow and a bar scale
- Clearly delineated and labeled inundation areas. This is especially important if there are "sunny day" failure and PMF plus breach inundation limits shown on the inundation maps?
- A qualification statement that the inundation limits for an actual dam failure may vary from what is shown
- Clearly labeled local roads, drainages, and other landmarks
- Downstream limit of the inundation mapping
- Channel cross sections taken at critical downstream locations, such as at major road crossings, schools, major population centers, etc.
- Information at important downstream cross sections:
  - Peak flood stage
  - Flood wave arrival time
  - Maximum water surface elevation
  - Peak discharge (OWRB, 2012).

For dam failures of high hazard dams, inundation areas are likely to be similar to the 1% and 0.2% annual chance flood events downstream of each dam. Refer to Section 5.3.6 (Flood) for exposure and potential loss estimates associated with these flood events. A qualitative assessment of the dam failure hazard is provided below.

Impact on Life, Health and Safety

All population in a dam failure inundation zone is considered exposed and vulnerable. Of the population exposed, the most vulnerable include the economically disadvantaged and the population over the age of 65. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on the net economic impact to their family. The population over the age of 65 is also highly vulnerable because they are more likely to seek or need medical attention which may not be available to due isolation during a flood event and they may have more difficulty evacuating.

There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard.

Impact on General Building Stock, Critical Facilities and the Economy

All buildings and infrastructure located in the dam failure inundation zone are considered exposed and vulnerable. Property located closest to the dam inundation area has the greatest potential to experience the largest, most destructive surge of water. All transportation infrastructure in the dam failure inundation zone are vulnerable to damage and potentially cutting off evacuation routes, limiting emergency access and creating isolation issues. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Future Growth and Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the dam failure hazard if located within the dam failure inundation zones. Several of the communities have shown an increase in population as noted in the jurisdictional annexes. This could increase the number of persons exposed to the effects of a dam failure, even if simply traveling across a path where inundation could occur. Any areas of new development downstream of this hazard will be identified in the jurisdictional annexes.

Effect of Climate Change on Vulnerability

Increases in extreme rainfall (Easterling et al. 2017) may increase the likelihood of dam failure, however, this is highly dependent upon the quality of the structures. Most dams are at or near their 50 year design life, so the probability of failures increases with time. Dams that are not well maintained have an increased likelihood of failure. Washed out spillways, deteriorated primary spillway conduits, collapsed riser structures, and slope instability can lead to a dam breach. New development downstream of existing dams increase the potential consequences that would occur if a dam were to fail. Major dam failures across Oklahoma are few since owners are required to perform routine inspections and maintenance (OWRB 2019) [SCIPP, 2021].

Overall Vulnerability Assessment

According to data from the USGS, a breach in the Overholser Dam would cause flooding in part of downtown Oklahoma City, Spencer, part of Harrah, and unincorporated parts of the County. Flooding could continue as far as McLoud and Shawnee. The effects of a dam failure would be catastrophic to the area around Oklahoma City, whether it was from Canton Lake Dam or from Lake Overholser Dam (OK State HMP, 2014).

If a breach occurred in the Canton Lake Dam, several communities downstream would be affected and some possibly destroyed. Much of the area between Canton and Oklahoma City is agricultural and several highways and two railroads would be unusable so the economic loss would be huge. The Town of Canton is located only two miles below the Canton Dam and would likely be nearly totally inundated with floodwaters. Other towns that would be affected would include Greenfield, Watonga, parts of El Reno, parts of Yukon and parts of downtown Oklahoma City (OK State HMP, 2014).

Several unincorporated areas are threatened by a dam failure event. High hazards dams that pose such a threat to the unincorporated areas include Hefner, Ski Island Lake, Northwood Lake in Canadian County, Arcadia Lake, Canton Lake, and Overholser. Damages caused by a dam failure around these areas would largely be to bridges, roads, and undeveloped lands.

Existing and future mitigation efforts including personal and structural dam safety should continue to be developed and employed that will enable the study area to be prepared for these events when they occur and lower their risk.

5.3.2 DROUGHT

HAZARD PROFILE

Description

A drought is a period of drier-than-normal conditions that results in water-related problems. Precipitation (rain or snow) falls in uneven patterns across the country. When no rain or only a small amount of rain falls, soils can dry out and plants can die. When rainfall is less than normal for several weeks, months or years the flow of streams and rivers declines causing water levels in lakes and reservoirs to fall, and the depth of water in wells decreases. If dry weather persists and water supply problems develop, the dry period can become a drought.

Extent

The extent (e.g., magnitude or severity) of drought can depend on the duration, intensity, geographic extent, and the regional water supply demands made by human activities and vegetation. The intensity of the impact from drought could be minor to total damage in a localized area or regional damage affecting human health and the economy. All of Oklahoma County in the past has experienced exceptional droughts as defined in table 5.3.2-3 below and can experience any range on the Drought Severity Classification Table. All Oklahoma County jurisdictions participating in this plan are expected to experience exceptional drought in the future.

A variety of measures is used to predict the severity and impact of droughts:

Palmer Classifications	
4.0 or more	Extremely Wet
3.0 to 3.99	Very Wet
2.0 to 2.99	Moderately Wet
1.0 to 1.99	Slightly Wet
0.5 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.5 to -0.99	Incipient Dry Spell
-1.0 to -1.99	Mild Drought
-2.0 to -2.99	Moderate Drought
-3.0 to -3.99	Severe Drought
-4.0 or less	Extreme Drought

Table 5.3.2-1. Palmer Drought Severity Index (PDSI) Classifications
Source: US Drought Portal, 2018

Palmer Drought Severity Index

Palmer developed a formula for standardizing drought calculations for each individual location based on the variability of precipitation and temperature at that location. The advantage of the Palmer Index is that it is standardized to local climate, so it can be applied to any site for which sufficient precipitation and temperature data is available (NOAA, 2018). (Table 5.3.2-1)

Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies	-5.0 or less

Table 5.3.2-2. NDMC Drought Severity Classification Table
Source: NDMC, 2003

Drought Severity Classification Table

The National Drought Mitigation Center (NDMC) helps develop and implement measures to reduce societal vulnerability to drought, stressing preparedness and risk management rather than crisis management. (Table 5.3.2-2)

Location

All jurisdictional areas of this plan are susceptible to drought.

Previous Occurrences and Losses

Based on sources researched, known drought events that have affected Oklahoma County and its municipalities are identified in Table 5.3.2-3.

Table 5.3.2-3. Drought Events Between 2013 and 2023.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
July 2012-April 2013	Drought	N/A	N/A	Water storage at reservoirs at an all-time low. Oklahoma City implemented mandatory outdoor water rationing starting July 31, 2012 including cities that buy water from OKC. This includes Deer Creek Rural Water District (unincorporated county), Edmond, The Village and Warr Acres. January 17, 2013 odd/evening outdoor watering was re-implemented and by spring became a permanent program. August 4, 2012 fire near Luther consumed almost 60 homes and other structures.	NCDC, Drought Impact Reporter, NewsOK, UNL Drought Atlas
February 2014-July 2014	Drought	N/A	N/A	Drought and freezing weather destroyed the canola crop. Oklahoma County reached D3. Slight drought lingered until April 2015.	Drought Impact Reporter, UNL Drought Atlas
December 2016 - April 2017	Drought	N/A	N/A	Very dry conditions. Slight drought started July 2016. A break occurred with abundant rain in April 2017.	NCDC, UNL Drought Atlas
July-August 2017	Drought	N/A	N/A	Typical summer ridging high pressure prevented rain across the region.	NCDC, UNL Drought Atlas
January 2018-April 2018	Drought	N/A	N/A	Several local small wildfires. D2 drought in January and February. Massive wildfires in NW OK in April necessitated mutual aid task force response.	NCDC, UNL Drought Atlas, local knowledge
June 2020-July 2020	Drought	N/A	N/A	The northern third of the county experienced a moderate drought, including the Unincorporated county, The Village, Arcadia, Edmond and Luther.	UNL Drought Atlas
September 2021	Drought	N/A	N/A	La Nina weather pattern begins a period without significant rain. Relief was minimal and abnormally dry conditions persisted through November before a full drought resumed.	UNL Drought Atlas
December 2021-April 2022	Drought	N/A	N/A	Lack of a significant freeze delayed wildfire activity until December. Burn bans were in place for several weeks. Extreme drought was classified in the western part of the county February to mid-March. May rains broke the drought.	UNL Drought Atlas, local knowledge
July 2022-May 2023	Drought	N/A	N/A	A flash drought began in July 2022. By mid-August, most of the county was in an extreme drought. Fires became difficult to control despite lack of wind most days. Late August to early September scattered storms provided enough relief for some of the grass to green up. September ended overall for the state and was the driest since 1956, with the summer the driest ever. By early October, the county was entirely in D3 Extreme Drought. Rainfall on February 7 reduced drought in the southeast 2/3rds of the county. Additional weekly rains reduced the drought further across southeast OK county in March. The northwest 1/3 of the county remained in D3	UNL Drought Atlas, OK Mesonet, local knowledge

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
				while the southeast part of the county was in D0. In May 2023, further rains lessened the drought in the NW part of the county to D1. By early July, numerous mostly night time complexes of storms (MCS) out of the northwest eliminated all drought categories to the northern border of the county. By July, the 2023 rainfall total at the OKC airport was equivalent to the entire rainfall of 2022.	

OKS HMP Oklahoma State Hazard Mitigation Plan
OKC HMP Oklahoma County Hazard Mitigation Plan
NOAA National Oceanic and Atmospheric Administration
FEMA Federal Emergency Management Agency
N/A Not Applicable
NWS National Weather Service

Probability of Future Events

It is estimated that Oklahoma County will continue to experience direct and indirect impacts of drought and its impacts on occasion, with the secondary effects causing potential disruption or damage to agricultural activities and creating shortages in water supply within communities.

Based on historical records and input from the Planning Committee, the probability of occurrence for drought in all the jurisdictions participating in Oklahoma County HMP is considered "4 – Highly Likely" (Event is probable within the calendar year. Event has a 1 in 1 year chance of occurring).

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For the drought hazard, all of Oklahoma County has been identified as the hazard area. Therefore, all assets (population, structures, and lifelines), as described in the County Profile (Section 4), are vulnerable to a drought. Assets at particular risk would include any open land or structures located along the wildland/urban interface (WUI) that could become vulnerable to the wildfire hazard due to extended periods of low rain and high heat, usually associated with a drought. Assets outside of the WUI may also be at risk due to the secondary hazard of expansive soil. In addition, water supply resources could be impacted by extended periods of low rain. Finally, vulnerable populations could be particularly susceptible to the drought hazard and cascading impacts due to age, health conditions, and limited ability to mobilize to shelter, cooling and medical resources.

Overview of Vulnerability

All of Oklahoma County is vulnerable to drought. However, areas at particular risk are: areas used for agricultural purposes (farms and cropland), open/forested land vulnerable to the wildfire hazard, areas where communities rely on private water supply, and certain areas where elderly, impoverished or otherwise vulnerable populations are located.

Data and Methodology

Data was collected from Oklahoma State, the County, and Planning Committee sources. Available information and a preliminary assessment are provided below.

Impact on Life, Health and Safety

Any loss of life or immediate destruction of property during drought comes from secondary sources such as wildfires and heat related injuries due to extreme temperatures that usually coincide with drought in summer.

Droughts conditions can cause a shortage of water for human consumption and reduce local fire-fighting capabilities. The drought hazard is a concern because private water supply sources are used in Oklahoma County.

For the purposes of this HMP, the entire population in the County is vulnerable to drought events. Several communities have shown an increase in population over the past ten years as indicated in the jurisdictional annexes. This results in the need for additional water resources (wells, municipal lines, and storage) and without additional resources puts an increasing strain on the areas served by municipal water (all the jurisdictions in the plan except Arcadia) with the potential to decrease the groundwater level overall.

Impact on Economy

It is difficult to estimate financial damages as a result of a drought because droughts produce a complex web of impacts. A prolonged drought can have serious environmental and direct and indirect economic impacts on a community.

Droughts can directly impact municipal and private water supply sources (i.e., declining aquifers, reduced stream flows, etc). As noted, agricultural resources need ample water supplies for successful production, relying on natural precipitation and the supply and demand of groundwater resources, both of which become limited or compromised during times of drought. According to the U.S. Department of Agriculture (USDA) National Agricultural Statistics Service (NASS), there are 1,111 farms in Oklahoma County, occupying 102,861 acres of land in the County. Land is used to grow agricultural products as well as to raise livestock (USDA NASS, 2022). The number of farms continues to decrease with each five year update.

The entire agricultural industry in Oklahoma County is vulnerable to the drought hazard. The historic record may assist Oklahoma County in estimating potential future losses as a result of this hazard of concern.

Effect of Climate Change on Vulnerability

Droughts are projected to increase in severity and frequency due to climate change. Even if annual precipitation amounts do not change much, higher temperatures will increase evaporation from lakes, soils, and plants, stressing agricultural and natural systems. Models project that Oklahoma will experience a decrease in soil moisture across all seasons by the end of the century, with the greatest decrease in summer (Wehner et al. 2017). Further, rising temperatures will lead to increase demand for water and energy, which could stress natural resources (Shafer et al. 2014) [SCIPP, 2018].

Overall Vulnerability Assessment

Historic data available indicate that droughts can impact Oklahoma County. Drought events can cause significant impacts and losses to the County's water supply and economy. The cascade effects of drought include increased susceptibility to the wildfire hazard, increased and thus shortages on local resources (i.e., water supply). Losses associated with the wildfire hazard are discussed later in this section.

5.3.3 EARTHQUAKE

HAZARD PROFILE

Description

Most earthquakes occur as the result of slowly accumulating pressure that causes the ground to slip abruptly along a geological fault plane on or near a plate boundary. The resulting waves of vibration within the earth create ground motion at the surface that vibrates in a very complex manner.

Extent

Seismic waves are the vibrations from earthquakes that travel through the Earth and are recorded on instruments called seismographs. The magnitude or extent of an earthquake is a measured value of the earthquake size, or amplitude of the seismic waves, using a seismograph. The Richter magnitude scale (Richter Scale) was developed in 1932 as a mathematical device to compare the sizes of earthquakes (USGS, 1989). The Richter Scale is the most widely-known scale that measures the magnitude of earthquakes (Shedlock and Pakiser, 1997; USGS, 2004).

Table 5.3.3-1 presents the Richter Scale magnitudes and corresponding earthquake effects. The County and participating jurisdictions typically experience earthquakes scale of magnitude 4 or less. Approximately 1,200 years ago, an earthquake ruptured along the Meers Fault, near Meers, OK. The field investigations suggest the fault ruptured a sufficient amount to produce approximately a magnitude 7 earthquake. The fault is likely still active though it has a very long recurrence time. Based on previous occurrences, it may be possible for the fault to produce another magnitude 7 earthquake (Oklahoma State HMP 2024). The distance from Meers to Oklahoma County is greater than 65 miles. While it is impossible to accurately predict earthquakes, Oklahoma Geological Survey Director, Nick Hayman, does not believe Oklahoma is at high risk for a major destructive earthquake above a 6.0 magnitude. (AP news, Feb. 6, 2024).

Table 5.3.3-1. Richter Scale

Richter Magnitude	Earthquake Effects
2.5 or less	Usually not felt, but can be recorded by seismograph
2.5 to 5.4	Often felt, but only causes minor damage
5.5 to 6.0	Slight damage to buildings and other structures
6.1 to 6.9	May cause a lot of damage in very populated areas
7.0 to 7.9	Major earthquake; serious damage
8.0 or greater	Great earthquake; can totally destroy communities near the epicenter

Source: USGS, 2006

Seismic hazards are often expressed in terms of Peak Ground Acceleration (PGA) and Spectral Acceleration (SA).

The 2014 USGS seismic hazard data shows that Oklahoma County has a PGA between 12 and 20%. This data is based on peak ground acceleration (%g) with 2% probability of exceedance in 50 years.

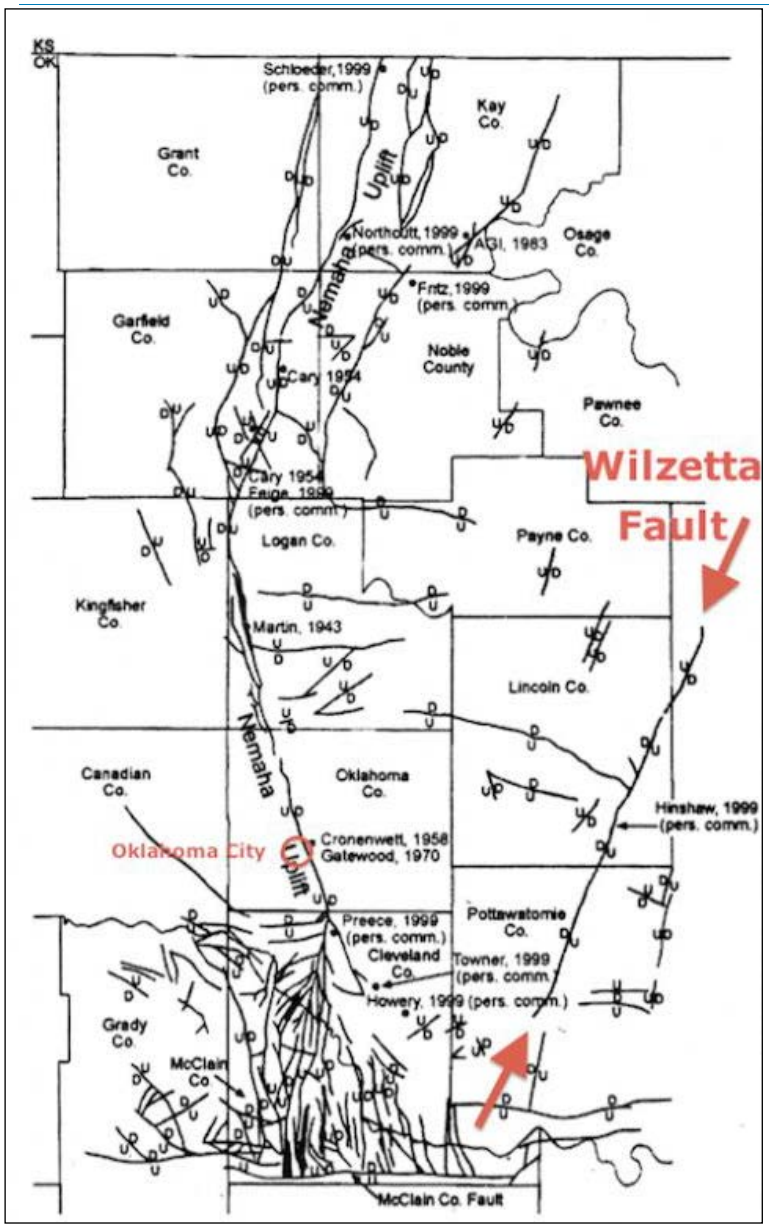


Figure 5.3.3-1. Location of the Wilzetta Fault
Source: Countywide & Sun, Date Unknown

- The El Reno-Mustang area in central Oklahoma;
- Love and Carter counties;
- An area in southeastern Oklahoma north of the Ouachita Mountains in the Arkoma Basin;
- The Meers fault, located near Meers on the eastern edge of the Anadarko Basin;
- The area around Lindsay in Garvin County;
- An area near Ada in Pontotoc County; and
- In eastern Oklahoma County near Jones (Memorial Rd. / Indian Meridian Rd.) (OK State HMP, 2014).

Location

The entire county is susceptible to the effects of earthquakes. The largest earthquakes felt in the United States were along the New Madrid fault in Missouri, where a three-month long series of quakes from 1811 to 1812 included three quakes larger than a magnitude of 8 on the Richter Scale (Oklahoma County Hazard Mitigation Plan, 2007). During 2016, a magnitude 5.8 earthquake, the largest event to hit Oklahoma County in modern times, was recorded during a period of increased seismic activity. From 2013 to 2016 the number of earthquakes spiked from 109 to 903 respectively. The State of Oklahoma averages rose sharply then declined due to better understanding of induced seismicity (OGS, 2018).
The State of Oklahoma has a great number of faults of different sizes, but very large earthquakes are not expected to occur in the State. The State is at moderate risk for an earthquake due to its close proximity to the New Madrid Seismic Zone. Seven main regions of earthquake activity exist in Oklahoma and include:

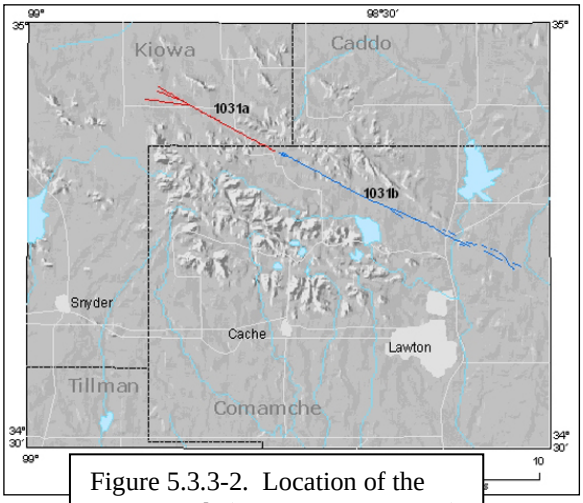


Figure 5.3.3-2. Location of the Meers Fault (Source:USGS, 2010)

Earthquakes that have been felt in the State tend to concern people the most. Figure 5.3.3-3 plots the locations of earthquakes, with a magnitude greater than 3.5, from 2013-2023. No earthquakes above 3.5 have occurred in Oklahoma County since November 2017. It is believed the overall reduction in the number of quakes in the state can be attributed to an effort to control the volume of well waste water injected into the ground at many sites where earthquakes occurred. The Meers Fault near Lawton has been quiet. From 2008 to 2010, eastern Oklahoma County, near the Town of Jones, had seen an increase in activity. Between 2009 and 2010, at least nine earthquakes of magnitude 3.5 occurred in this area. A magnitude 4.1 quake happened in southeast Lincoln County near Sparks on February 27, 2010. This was topped by a 4.7 earthquake, rated the second strongest in the history of Oklahoma, on October 13, 2010. This earthquake occurred just south of the aforementioned active area and was felt widely across much of the eastern two thirds of the State and into the Dallas-Fort Worth area (OK State HMP, 2014).
Increased quake activity occurred from 2013-2015 near NE 122nd and Midwest Boulevard in Oklahoma City, and from 2014-2018 in east Edmond near Danforth Rd and N Air Depot Blvd. A 5.1 quake centered in the southeast part of neighboring Lincoln County rattled the planning area on February 2, 2024 with at least one report of sheetrock cracking in Harrah.

Figure 5.3.3-3. Oklahoma Earthquakes of Magnitude 3.5 or Greater, 2013 – 2023. (Source: USGS 2023)
No earthquakes above 3.5 magnitude have occurred since 2018.

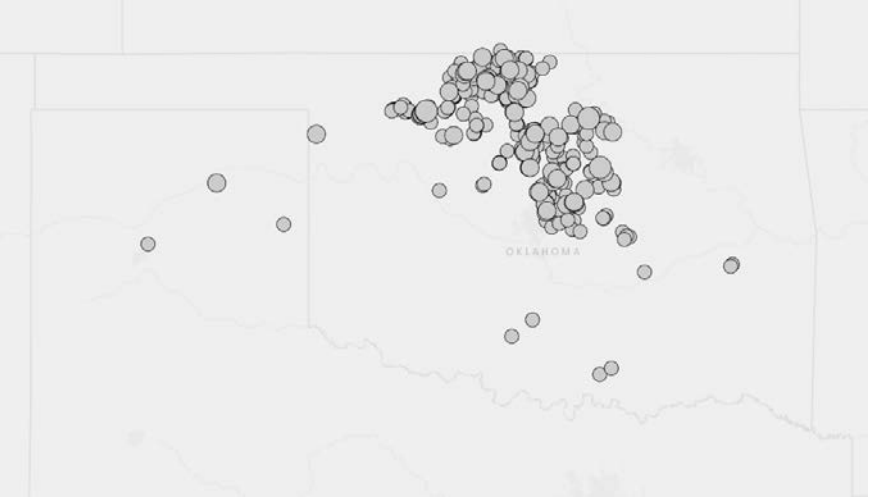
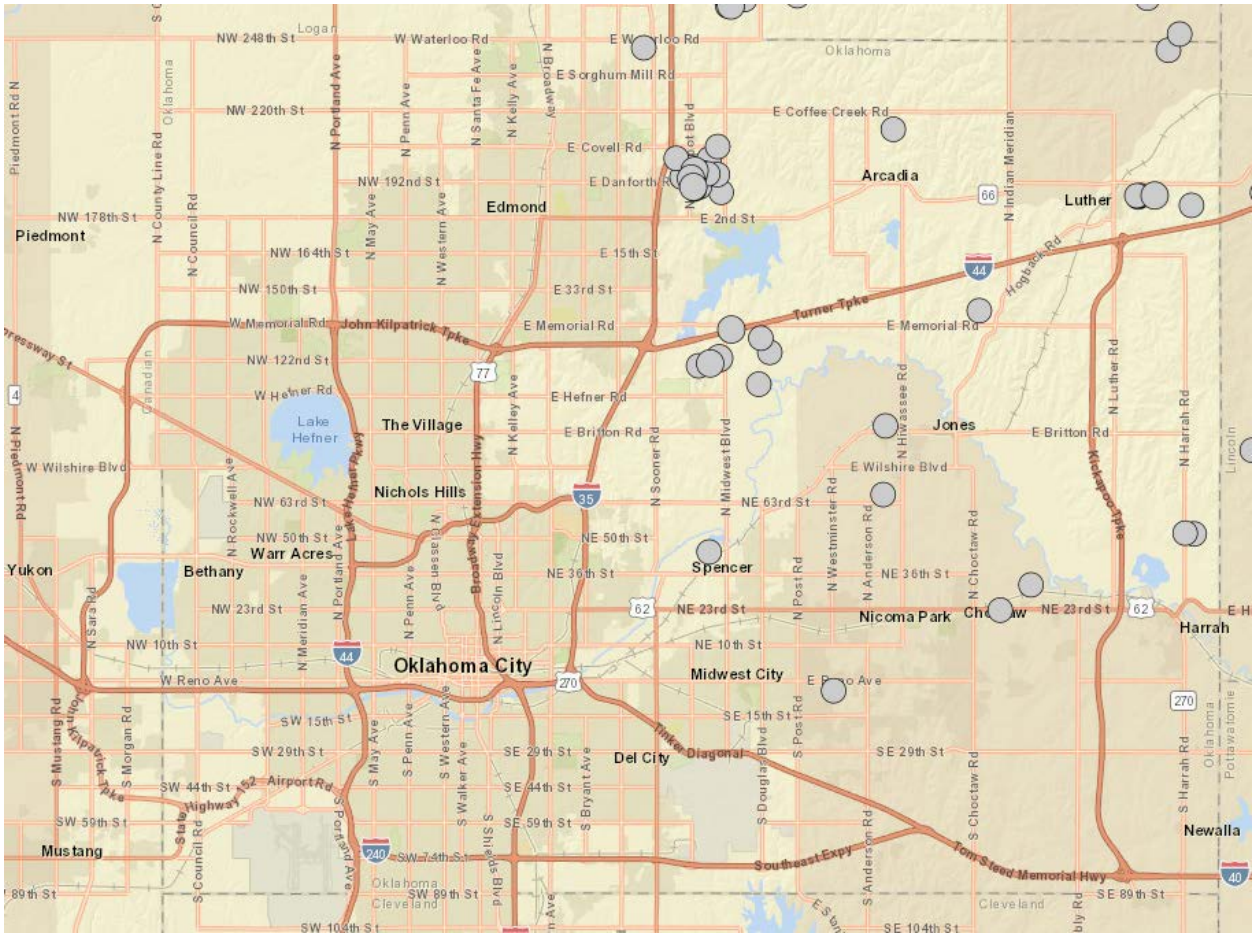


Figure 5.3.3-4. Oklahoma County Earthquakes of Magnitude 3.5 or Greater, 2013 - 2023 – Count: 606 (Source: USGS 2023)



Previous Occurrences and Losses

According to the USGS and OGS, over 700 earthquakes at M2.5 or above have occurred in Oklahoma County between 1974 and 2023.

Many sources provided historical information regarding previous occurrences and losses associated with earthquakes throughout the State of Oklahoma. Therefore, with so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the sources. Due to the increase in frequency of earthquakes in the mid-2010's, only earthquakes affecting Oklahoma County of 3.6 magnitude or above are documented below.

Table 5.3.3-2. Earthquake History in Oklahoma between 2013 and 2023

Event Date / Name	County	Town	Size / General Magnitude	Losses / Impacts	Source(s)
December 01, 2013	Oklahoma	Edmond	4.5	This earthquake near Arcadia Lake was 8.4 km in depth and was felt throughout the Oklahoma County area. There was reports of strong shaking and light damage reported.	USGS
June 16, 2014	Oklahoma	Spencer	4.3	At a depth of 5.0 km, this earthquake was felt throughout Oklahoma County and beyond. Reports of light to moderate shaking, with some very light damage were received.	USGS
June 18, 2014	Oklahoma	Spencer	4.1	USGS reports this quake is at a 5.0 km depth. Multiple reports throughout the county ranging from light to strong shaking. Some light damage was also reported.	USGS
December 29, 2015	Oklahoma	Edmond	4.3	In the county, this earthquake, at a depth of 6.5 km,multiple reports of light to moderate shaking with very light damage.	USGS
January 01, 2016	Oklahoma	Edmond	4.2	At a depth of 5.8 km, there were multiple reports of light to strong shaking with light damage reported with this quake.	USGS
April 07, 2016	Oklahoma	Luther	4.2	This quake registered at a depth of 6.1 km. Though most of the county felt shaking, the northeast side had multiple reports of strong shaking with light damage.	USGS
September 3, 2016	Pawnee	Pawnee	5.8	Largest earthquake in the state to date. Scattered reports of cracks in sheetrock and bricks in the county.	USGS/Multiple sources
August 03, 2017	Oklahoma	Edmond	4.2	All regions of the county felt this quake, per the USGS. Most areas were light with a few areas experiencing moderate shaking. Very light damage was also reported.	USGS
November 19, 2017	Oklahoma	Arcadia	3.6	With a depth of 4 km, this quake was felt through much of the northwest 2/3rds of the county. Some very light damage occurred around Arcadia.	USGS
March 4, 2018	Garfield	Breckenridge	4.2	Felt but no damage reported in Oklahoma County.	USGS
March 5, 2018	Garfield	Breckenridge	4.2	Felt but no damage reported in Oklahoma County.	USGS
March 6, 2018	Alfalfa	Byron	3.8	Felt but no damage reported in Oklahoma County.	USGS
April 7, 2018	Garfield	Lucien	4.6	Felt but no damage reported in Oklahoma County.	USGS
May 9, 2018	Garfield	Marshall	4.6	Felt but no damage reported in Oklahoma County.	USGS
May 14, 2018	Logan	Marshall	4.0	Felt but no damage reported in Oklahoma County.	USGS
May 15, 2018	Logan	Marshall	4.0	Felt but no damage reported in Oklahoma County.	USGS
June 9, 2018	Grant	Nescatunga	4.4	Felt but no damage reported in Oklahoma County.	USGS
June 15, 2018	Logan	Marshall	4.0	Felt but no damage reported in Oklahoma County.	USGS
May 17, 2019	Grant	Pond Creek	4.4	Felt but no damage reported in Oklahoma County.	USGS
July 25, 2019	Kingfisher	Kingfisher	3.9	Felt but no damage reported in Oklahoma County.	USGS
June 21, 2020	Noble	Perry	4.2	Felt but no damage reported in Oklahoma County.	USGS
February 19, 2021	Grant	Manchester	4.2	Felt but no damage reported in Oklahoma County.	USGS
May 25, 2021	Ellis	Shattuck	4.0	Felt but no damage reported in Oklahoma County.	USGS
September 19, 2021	Grant	Nescatunga	3.8	Felt but no damage reported in Oklahoma County.	USGS

Event Date / Name	County	Town	Size / General Magnitude	Losses / Impacts	Source(s)
January 31, 2022	Grant	Medford	4.5	Felt but no damage reported in Oklahoma County.	USGS
April 6, 2023	Lincoln	Carney	4.0	Felt but no damage reported in Oklahoma County.	USGS
January 12, 2024	Oklahoma	Edmond	4.3	Second in a series of several quakes, 9:46 pm, shallow 4.1 mile deep quake, knocked items off of shelves in northeast Edmond.	USGS, local knowledge
January 13, 2024	Oklahoma	Edmond	4.1	Shallow 4.1 miles deep quake, 6:36 am, rattled items from shelves in northeast Edmond	USGS, local knowledge
February 2. 2024	Lincoln	Prague	5.1	No significant damage reported. A photo from Harrah showed cracking of the seal between ceiling sheetrock and windows. 11:24 p.m. Fourth largest earthquake in Oklahoma history.	USGS, Multiple media and social media sources

Source(s): USGS 2023; Oklahoma Geological Survey 2023.

N/A Not Applicable/Not Available
OK HMP Oklahoma State Hazard Mitigation Plan
USGS U.S. Geological Survey

Historically, Oklahoma County has not experienced significant earthquakes. For this reason, buildings in the Oklahoma County area are not designed for major earthquakes and a major earthquake would result in heavy damage and casualties and would be devastating to the economy of the County and the State of Oklahoma. Increased seismic activity has broadened interest in researching the probability and severity of future events in the local area; however, there is currently not a sufficient amount of data to presume the probability of future earthquakes and the monetary damages produced by such an event.

Probability of Future Events

The risk of small earthquakes has changed significantly during the time this plan was last updated. Oklahoma began seeing a significant rise in quakes around 2008, peaking in 2015. Seismologists have documented the relationship between wastewater disposal and triggered seismic activity. The Oklahoma Geological Survey has determined that the majority of recent earthquakes in central and north-central Oklahoma are very likely triggered by the injection of produced water in disposal wells (OGS, 2018) related to the oil industry. Since 2016, there has been a decrease in the number and size of earthquakes in Oklahoma, apparently due to efforts by state regulators and the oil industry to control wastewater injection. According to the Oklahoma Geological Survey, the future seismic hazard will likely remain elevated, compared to background tectonic rates, for at least the next decade (OGS, 2017) [SCIPP, 2024].

According to the USGS, in 2017, Oklahoma County had a PGA of 12-20% for earthquakes with a two-percent probability of occurring within 50 years (latest available information in 2024). The highest concern for a significant earthquake in the state, as indicated by USGS, is from the Meers fault located near Lawton in Comanche County. The probability of a future event of any significance along the Meers fault is debated by scientists (OK State HMP, 2014).

The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the Planning Committee, the probability of occurrence for significant earthquakes in the Planning Area is considered “1 - Unlikely” (Event is possible within the next ten years. Event has a 1 in 10 year’s chance of occurring). It is anticipated that Oklahoma County will occasionally continue to experience minor impacts from small earthquakes that may affect a small portion of the general building stock.

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For the earthquake hazard, the entire County has been identified as the exposed hazard area. Therefore, all assets in Oklahoma County (population, structures, critical facilities and lifelines), as described in the Regional Profile (Section 4), are vulnerable.

Overview of Vulnerability

Earthquakes usually occur without warning and can impact areas a great distance from their point of origin. The extent of damage depends on the density of population and building and infrastructure construction in the area shaken by the quake. Some areas may be more vulnerable than others based on soil type, the age of the buildings and building codes in place.

In summary, the entire population and general building stock inventory of Oklahoma County is at risk of being damaged or experiencing losses due to impacts of an earthquake.

Impact on Life, Health and Safety

The entire population of Oklahoma County is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure is dependent on many factors, including the age and construction type of buildings and the soil type that buildings are constructed on. The impact of earthquakes on life, health and safety is dependent upon the severity of the event. Risk to public safety and loss of life from an earthquake in the County is minimal with higher risk occurring in buildings as a result of damage to the structure, or people walking below building ornamentation and chimneys that may be shaken loose and fall as a result of the quake. Business interruption may prevent people from working, road closures could isolate populations and loss of functions of utilities could impact populations that may not have suffered direct damage from the event itself.

Populations considered most vulnerable include the elderly (persons over the age of 65) and individuals living below the Census poverty threshold. These socially vulnerable populations are most susceptible, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing.

Impact on Economy

Strong earthquakes also have impacts on the economy, including: loss of business function, damage to inventory, relocation costs, wage loss and rental loss due to the repair/replacement of buildings. In a significant quake, the disruption of traffic flow will likely be impacted for residents as well as for critical services such as emergency police, fire and ambulance. Power and water outages and damages to buildings may cause critical and essential facilities to be closed for extended periods of time (OK State HMP, 2014).

Future Growth and Development

As discussed in Section 4, areas targeted for future growth and development have been identified across Oklahoma County. It is anticipated that the human exposure and vulnerability to earthquake impacts in newly developed areas will be similar to those that currently exist within the Planning Area. The State of Oklahoma has adopted the 2018 International Residential Code (IRC). The 2018 IRC is the minimum building code for one- and two-family and townhouse residential construction. The County may require additional modifications to the building code to further decrease the built environment's vulnerability to the hazard. As communities continue to grow as noted in the population statistics in the jurisdictional annexes, more persons and buildings are exposed to this hazard.

Effect of Climate Change on Vulnerability

Climatological changes in the planning area have not influenced earthquake impacts and no changes to the frequency or magnitude of earthquakes due to climatological changes in the planning area are expected to occur.

Additional Data and Next Steps

In terms of general building stock data, updated building age, construction type and current replacement value would further support the refined analysis. Additionally, un-reinforced masonry critical facilities and privately-owned buildings (i.e., residences) can be identified using local knowledge and/or pictometry/orthophotos. These buildings may not withstand earthquakes of certain magnitudes and plans to provide emergency response/recovery efforts for these properties can be set in place.

5.3.4 EXPANSIVE SOILS

HAZARD PROFILE

Description

Soils and soft rock that tend to swell or shrink due to changes in moisture content are known as expansive soils. Expansive soils are often referred to as swelling clays because clay materials are most susceptible to swelling and shrinking. Changes in soil volume present a hazard primarily to structures built on expansive soils. The most extensive damage occurs to highways and streets (FEMA, 1997).

Expansive soils are clay-rich shales, or soils from the weathering of shales, that may contain clay minerals, that swell up to 1.5 to two times their original dry volume after adding water. Soil saturation from rainfall, lawn watering, or sewer leakage may cause major damage by soils expanding under sidewalks, highways, utility lines, and foundations. If construction takes place on wet expanded soils, then shrinkage may occur after drying, resulting in severe cracking in structures (Luza and Johnson, 2009).

When water is added to these expansive clays, the water molecules are pulled into gaps between the clay plates. As more is absorbed, the plates are forced further apart, leading to an increase in soil pressure or an expansion of the soil's volume. Soils that contain expansive clays become very sticky when wet and usually are characterized by surface cracks or a "popcorn" texture when dry. Therefore, the presence of surface cracks is usually an indication of an expansive soil (Oklahoma State HMP, 2014).

The effects of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. Expansive soils can be recognized either by visual inspection in the field or by conducting laboratory analysis (Oklahoma County HMP, 2006).

Extent

The effects of expansive soils are typically experienced in regions of moderate to high precipitation, where periods of drought are followed by periods of rainfall. Damages from expansive soils also result from increases in moisture volume from broken or leaking water and sewer lines (Oklahoma County HMP, 2006).

Dry clays are capable of absorbing water and will increase in volume in an amount proportional to the amount of water absorbed. This soaking and subsequent swelling of dry clay is the Coefficient of Linear Extensibility (COLE). COLE correlates with the volume change of a soil upon wetting and drying.
Areas capable of these changes in soil volume present a hazard to buildings, slabs, concrete, asphalt, and other structures built over the soils and to pipelines buried in them. The greatest damage occurs when structures are constructed when clays are dry and then subsequent soaking rains swell the clay. Damage can be so severe that the cost of repair can exceed the value of the building (Oklahoma County HMP, 2006).

Volume expansion measures the free swelling of a disturbed soil on wetting from air dry to saturated. A volume expansion of 20-40% indicated a large potential expansion on wetting and subsequent shrinkage on drying.

The following tables illustrate the potential volume change of expansive soils. Please note that Oklahoma County and its municipalities would be considered within the "Arid to semi-arid climate." The areas in blue in Figure 5.3.4-1 may experience up to High Potential Volume Change (as defined in Table 5.3.4-1) during periods of extremely dry weather

Table 5.3.4-1 Potential Volume Change of Expansive Soils (Source: NRCS)

Potential Volume Change	Arid to semi-arid climate		Humid climate	
	Plasticity Index (%)	Linear Shrinkage (%)	Plasticity Index (%)	Linear shrinkage
Low	0-15	0-5	0-30	0-12
Medium	15-30	5-12	30-50	12-18
High	>30	>12	>50	>18

Location

The effects of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. The expansive soil hazard occurs mainly in the southern, central and western parts of the U.S. (FEMA, 1997).

Several Permian shales have been identified in Oklahoma County. These areas have been identified as having high shrink-swell potential. Figure 5.3.4-1 identifies the areas in Oklahoma County that have an abundance of shrink-swell soils from the National Resource Conservation Service (NRCS) survey of 2017. This includes parts of Edmond, Del City, Midwest City, Bethany, Warr Acres, The Village and Nichols Hills and the Deer Creek (northwest) part of Unincorporated Oklahoma County.

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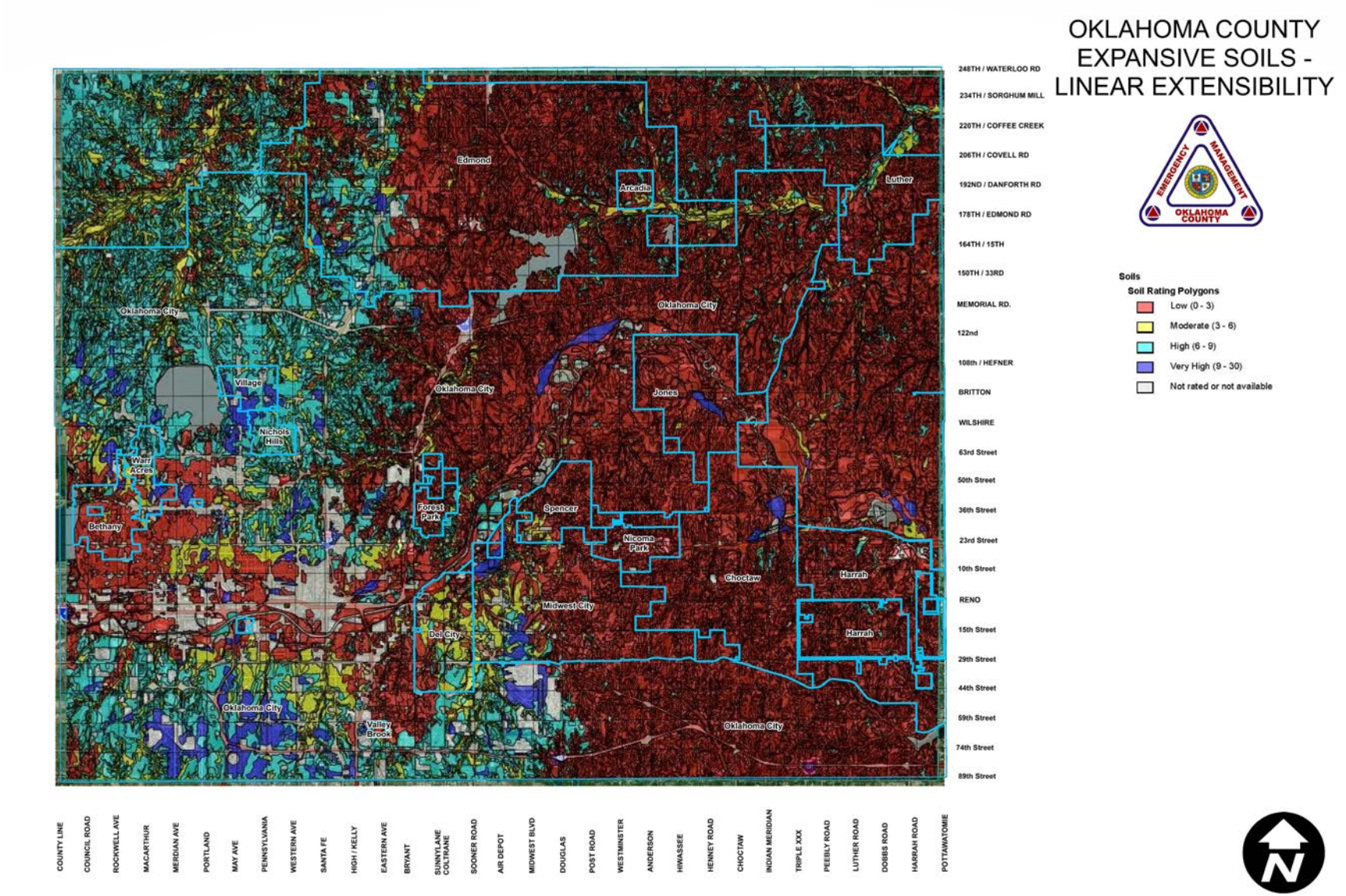


Figure 5.3.4-1. Linear Extensibility of expansive soils in Oklahoma County.
Source: NRCS, 2017

Previous Occurrences and Losses

Though the mapping survey does show potential in several areas of Oklahoma County, there are relatively few occurrences of expansive soils creating damage or loss to public buildings. Two exceptions should be noted: per the 2013 HMP, Nichols Hills found expansive soils at their Public Works site. Since 2013, the soil has been stabilized and the issue remediated. In Midwest City, a newly constructed fire station that was built within the Crutcho basin may not have had adequate soil stabilization and has shown evidence of soil shrink-swelling.

Probability of Future Events

The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the Planning Committee, the probability of occurrence for expansive soils in the Planning Area is considered "1 - Unlikely" (Event is possible within the next ten years. Event has a 1 in 10 year's chance of occurring). It is anticipated that Oklahoma County will continue to experience indirect impacts from expansive soils that may affect the general building stock and local economy.

VULNERABILITY ASSESSMENT

Overview of Vulnerability

Expansive soil hazards are slow to develop but can cause a range of structural impacts to the built environment. Damage to residential homes, commercial buildings, highways and streets can cause a financial drain on the local and regional economy.

Data and Methodology

Linear Extensibility to a depth of 72 inches was used in this study. Data sampled at a depth of 96 inches resulted in little change to the map above. Depth to sample was determined from data from the Advanced Engineering Geology & Geotechnics, Spring 2004 article "Various Aspects of Expansive Soils Relevant to Geoengineering Practice." Insufficient data is available to model the long-term potential impacts of expansive soils on Oklahoma County. Available information and a preliminary assessment are provided below.

Impact on Life, Health and Safety

Expansive soil hazards are slow and the hazard itself does not pose a risk to life, health and safety. Secondary hazards as a result of shifting soils such as potholes or broken pipes causing utility failures could cause inconvenience or at worst be life-threatening.

Impact on General Building Stock and Critical Facilities

Because of differences in building construction, residential structures and one-story commercial structures are more susceptible to damage by expansive soils compared to multi-story buildings. Multi-story buildings are heavier and can generally counter the swelling pressures. The exception is when multi-story buildings are built on wet clay, and may experience damage by shrinkage of the clay if moisture levels are substantially reduced (be evapotranspiration or by evaporation from under heated buildings) (FEMA, 1997).

Various types of structural damage to buildings include sticking doors; uneven flooring; and cracked foundations, floors, walls, ceilings and windows. Damage to small buildings is greatest when the structure is built on dry clay, such as during drought conditions, followed by rain which swells the soil. Human activities can also influence the moisture of the soils including an increase in moisture from broken or leaking water and sewer lines, watering the landscaping, and surface ponding (FEMA, 1997).

According to FEMA's *Multi Hazard Identification and Risk Assessment*, the best way to mitigate structural damage from expansive soils is to avoid building on them. However, when this is not possible, engineering practices can be applied including removal of the soil; application of heavy loads to offset the swelling pressure; preventing access to water; presetting and chemical stabilization (FEMA, 1997).

Property maintenance to prevent excessive moisture from entering the soil near foundations should be implemented for owners of buildings in areas of expansive soils. This would include proper grading and keeping gutters/downspouts clear of debris and not discharging adjacent to the foundation. In addition, inspection of the property after heavy rainfall to address drainage issues should also be put into practice.

Impact on Economy

As summarized by FEMA, the greatest damage from expansive soils is to highways and roads. Damages result from differential vertical movement that occurs as clay moisture content adjusts to the changed environment. For pavement, differential movement of 0.4 inches (or 1 centimeter) with a horizontal distance of 20 feet (6 meters) can pose an engineering problem for fast travel (FEMA, 1997). Infrastructure damage is costly and can impact the local and regional economy.

Impact on Future Development

As discussed and illustrated in Section 4 and the jurisdictional annexes, areas targeted for future growth and development have been identified across the County. Any new development in terms of structures and infrastructure (i.e., highways and streets) on known expansive soils could be potentially impacted. Proper grading and building regulations/code including proper slab design and emplacement procedures can mitigate structural damage to new development in areas where expansive soils exist. In most cases, structural damage due to expansive soils is not covered by insurance (FEMA, 1997). With an increasing population in most jurisdictions covered by this plan, areas of growth in the expansive soil areas of the county have the potential to result in additional structures exposed to this hazard.

Effect of Climate Change on Vulnerability

As drought and wetness is directly related to the shrink and swell of clay soils, and periods of drought are expected to increase in severity and frequency, Oklahoma County's vulnerability to expansive soils events may be affected. The result will be fewer periods of shrink and swell if drought persists, but greater opportunities for damage when the soil transitions from moist to exceptionally dry.

Additional Data and Next Steps

For future plan updates, Oklahoma County can continue to document damages to buildings and infrastructure. Future new development can be planned or avoided, soils stabilized prior to construction, and mitigation measures developed or refined for the built environmental already present on these soils.

5.3.5 EXTREME TEMPERATURES

HAZARD PROFILE

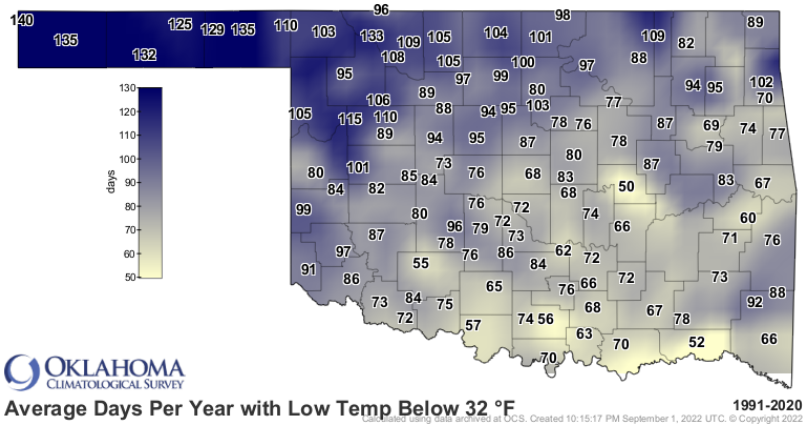
Description

As part of the Southern Great Plains, the State of Oklahoma is prone to wide swings of temperature. Summer temperatures typically climb above the 100 degree mark and during the winter, temperatures drop below zero.

Extreme temperatures include both cold and hot events, which can have a significant impact to human health, commercial/agricultural businesses and primary and secondary effects on infrastructure (e.g., burst pipes and power failure). What constitutes "extreme cold" or "extreme heat" can vary across different areas of the country, based on what the population is accustomed to.

Extreme Cold

The NWS issues a "Cold Weather Advisory" (previously a Wind Chill Advisory) when wind chill values reach -5°F to -19°F. From 2009-2023, the NWS averaged one advisory per year for Oklahoma County (NWS, Iowa State University data).



Extreme cold often accompanies a winter storm. What constitutes as extreme cold and its effects varies across different areas of the U.S. In areas unaccustomed to winter weather, near freezing temperatures are considered extreme cold. Freezing temperatures can cause severe damage to crops. Pipes may freeze and burst in homes that are poorly insulated.

Figure 5.3.5-1 illustrates the number of days per year with an average low below 32°F. Figure 5.3.5-2 illustrates the number of days per year with an average high below 32°F.

Figure 5.3.5-1. Annual Number of Days with a Low below 32°F Source: Oklahoma Climatological Survey
Note: Average based on 1991 – 2020 data. The black circle indicates the location of Oklahoma County. The County experiences between 60 to 80 days, each year, with a low below 32 degrees.

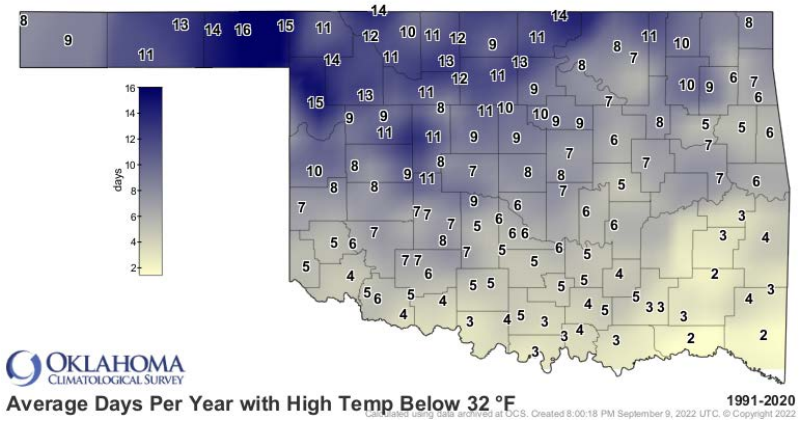


Figure 5.3.5-2. Annual Number of Days with a High below 32°F

Source: Oklahoma Climatological Survey
Note: Average based on 1981 – 2010 data. The County experiences between 6-10 days, each year, with a high below 32 degrees.

Extreme Heat

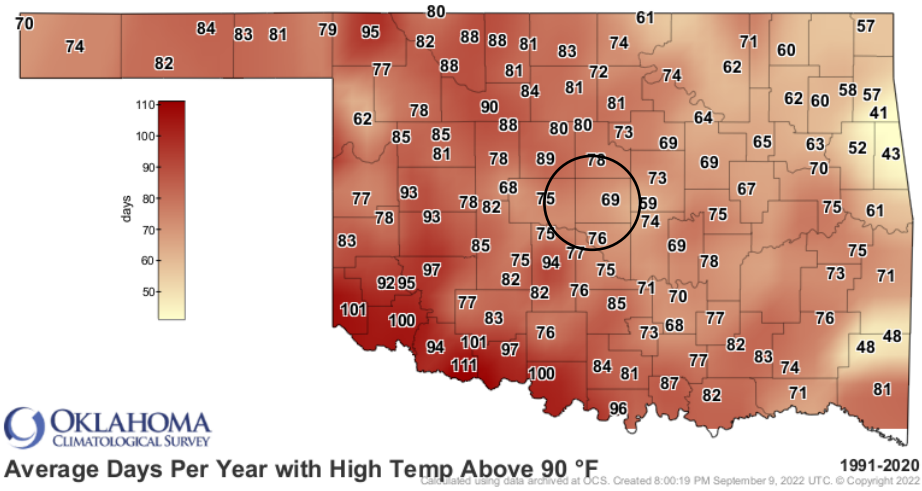


Figure 5.3.5-3. Annual Number of Days Exceeding 90°F
Source: *Oklahoma Climatological Survey*
Note: *Average based on 1991 – 2020 data. The black circle indicates the location of Oklahoma County. The County experiences between 65 to 75 days, each year, with temperatures over 90 degrees.*

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Given Oklahoma's disposition towards high average temperatures, extreme heat may also constitute any temperature over 100 degrees. Humid or muggy conditions occur when a ridge of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. Droughts occur when a long period passes without substantial rainfall and a heat wave combined with a drought is a very dangerous situation. An extreme heat event or heat wave is a period of excessive daytime and nighttime heat in association with high humidity relative to geographic location and time of year (Oklahoma City HMP, 2011).

In Oklahoma, the warmest period of summer extends from mid-July through mid-August. The gradually shortening days and the occasional arrival of cooler temperatures from the north bring some relief by late August. August is Oklahoma County's second hottest, eight driest and least windy month, with an average temperature in Oklahoma City between the low and high of 80.7°F (NWS NOWData, 1991-2020). Figure 5.3.5-3 illustrates the number of days per year with a daily temperature exceeding 90°F. Figure 5.3.5-4 illustrates the number of days per year with a daily temperature exceeding 100°F.

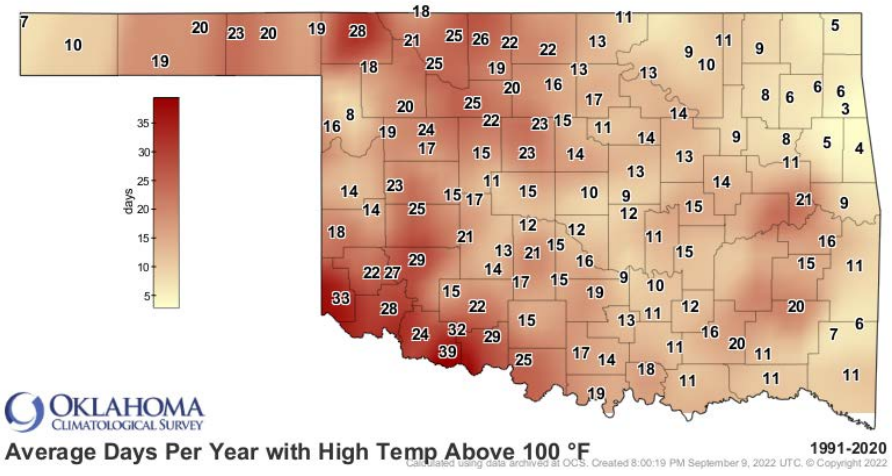


Figure 5.3.5-4. Annual Number of Days Exceeding 100°F

Source: Oklahoma Climatological Survey
Note: Average based on 1991 – 2020 data. The County experiences between 10 to 15 days, each year, with temperatures over 100 degrees.

Extreme heat is hazardous to livestock and agricultural crops. It can result in water shortages, exacerbate fire hazards, and prompt demands for energy. Roads, bridges and railroad tracks are susceptible to damages from extreme heat. In Oklahoma from 1998-2023, 29 children died of heatstroke after being left in a hot car, the third highest number per capita in the nation (www.noheatstroke.org).

Extent

The extent (severity or magnitude) of extreme temperatures are generally measured through the Wind Chill Temperature (WCT) Index for cold extremes, and the Heat Index (HI) for heat extremes. The coldest wind chill experienced in Oklahoma County, recorded at Will Rogers International Airport is -29 degrees Fahrenheit in 1947 and 2021. It is not uncommon in a typical winter for the County and all jurisdictions to see wind chills near zero. The highest heat index recorded at Will Rogers International Airport is 113 degrees Fahrenheit in 2010. The Mesonet site at Spencer recorded a heat index of 114 on July 13, 2023. It is not unusual for Oklahoma County jurisdictions to see heat indices around 100-105 degrees Fahrenheit in the peak of a typical sweltering summer.

Based on information provided by the Oklahoma Climatological Survey, Oklahoma County experienced a record high on August 3, 2012. On this day, the temperature reached 113 degrees Fahrenheit. The record low for Oklahoma County was experienced on February 12, 1899. On this day, temperatures in Edmond were recorded at -17°F. More recently, -16°F was recorded on February 16, 2021.

Wind Chill Temperature Index

Whenever temperatures drop well below normal and wind speed increases, heat can leave a person's body more rapidly (known by the National Weather Service (NWS) as the Wind Chill Temperature Index). The Wind Chill Temperature (WCT) Index is the temperature your body feels when the air temperature is combined with the wind speed. It is based on the rate of heat loss from exposed skin caused by the effects of wind and cold. As the speed of the wind increases, it can carry heat away from your body much more quickly, causing skin temperature to drop. When there are high winds, serious weather-related health problems are more likely, even when temperatures are only cool. The importance of the wind chill index is as an indicator of how to dress properly for winter weather to avoid extreme cold affects to human health. The Wind Chill Chart (Figure 5.3.5-5), which was improved from its original 1945 version, by NWS in November 2001, shows the difference between actual air temperature and perceived temperature, and amount of time until frostbite occurs.

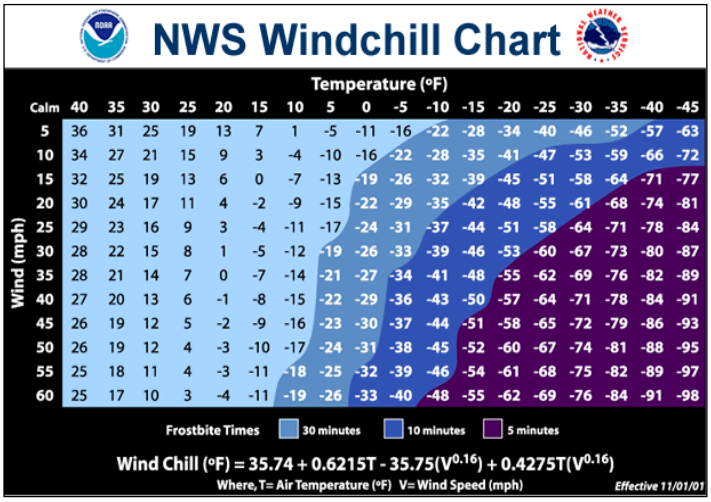


Figure 5.3.5-5. NWS 2001 Wind Chill Index
Source: NWS, 2006

Exposure to cold temperatures, whether indoors or outside, can lead to serious or life-threatening health problems such as hypothermia, cold stress, frostbite or freezing of the exposed extremities such as fingers, toes, nose and ear lobes [Centers for Disease Control and Prevention (CDC), 2005]. From 1999-2015, CDC U.S. data indicated every year except 2006 experienced more deaths from extreme cold than heat (Washington Post, 2016). Climate change is reversing this trend as noted at the end of this section.

The Heat Index

As identified by the NWS and the National Oceanic and Atmospheric Administration (NOAA), the Heat Index is the temperature the body feels when heat and humidity are combined. Higher humidity plus

higher temperatures often combine to make us feel a perceived temperature that is higher than the actual air temperature. As presented by the NWS, Figure 5.3.5-6 shows the Heat Index that corresponds to the actual air temperature and relative humidity.

Figure 5.3.5-6. Heat Index Chart

	Temperature (°F)																
Relative Humidity (%)		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
	55	81	84	86	89	93	97	101	106	112	117	124	130	137			
	60	82	84	88	91	95	100	105	110	116	123	129	137				
	65	82	85	89	93	98	103	108	114	121	128	136					
	70	83	86	90	95	100	105	112	119	126	134						
	75	84	88	92	97	103	109	116	124	132							
	80	84	89	94	100	106	113	121	129								
	85	85	90	96	102	110	117	126	135								
	90	86	91	98	105	113	122	131									
	95	86	93	100	108	117	127										
	100	87	95	103	112	121	132										

Heat Index	Notes
80-90	Caution - fatigue is possible with prolonged exposure and activity
90-105	Extreme caution - sunstroke, heat cramps, and heat exhaustion are possible
105-130	Danger - sunstroke, heat cramps, and heat exhaustion are likely; heat stroke is possible
over 130	Extreme danger - heat stroke or sunstroke are likely with continued exposure

Source: NWS, 2012

Location

The County averages around 13 days each year of daytime high temperatures greater than 100°F (Oklahoma Climatological Survey, 2024). Therefore, extreme heat and cold is likely to occur within and affect all of Oklahoma County.

Previous Occurrences and Losses

Many sources provided historical information regarding previous occurrences and losses associated with extreme temperature events throughout the State of Oklahoma and Oklahoma County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

According to NOAA's NCDC storm events database, Oklahoma County experienced 39 extreme temperature events between January 18, 1996 and September 8, 2023. These events include excessive/extreme heat, heat, cold/wind chill, and extreme cold. These events may also include other counties. According to the Hazard Research Lab at the University of South Carolina's Spatial Hazard

Events and Losses Database for the U.S. (SHELDUS) now housed at Arizona State University, for the same time period , 42 extreme temperature events occurred within the County.

Based on all sources researched, known extreme temperature events that have affected Oklahoma County and its municipalities are identified in Table 5.3.5-1. With temperature documentation for the State of Oklahoma being so extensive, not all sources have been identified or researched. Therefore, Table 5.3.5-1 may not include all events that have occurred throughout the County and region.

Table 5.3.5-1. Extreme Temperature Events between 2013 and 2023

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
March 5, 2015	Extreme Cold	N/A	N/A	This day saw a record low temperature of 10°F after 3" of snow and ice accumulated the previous day.	NWS-Norman
August 11-13 2016	Excessive Heat	N/A	N/A	With high pressure firmly over the area, heat indices ranged from 92°F to 111° between the 11th and the 13th. 911 agencies received multiple calls for heat related injuries over this period.	NOAA-NCDC
December 18, 2016	Extreme Cold	N/A	N/A	The day before brought freezing rain and snow into Oklahoma County. With the ice and now, the temperatures dipped to 4°F. This set a record low.	NWS-Norman
January 7, 2017	Extreme Cold	N/A	N/A	Freezing fog and the accumulation of nearly 2" of snow from days before forced temperatures to dive to a frigid -3°F. This set a record low.	NWS-Norman
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	EMSA (ambulance service) received 5 heat related emergency calls on June 27th (EMSA serves Arcadia, Edmond, Nichols Hills, The Village and unincorporated Oklahoma County). From July 2nd-25th an additional 185 heat related calls were received. Afternoon temperatures ranged from 90-110°F.	NOAA-NCDC
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	A nearly continuous period of excessive heat. July 1st – 12th – 87 heat related illnesses, mostly around the 4th of July; other days with several heat illnesses including 30 on August 6th.	NOAA-NCDC
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	A nearly continuous period of excessive heat, with a slight break of a few days. 79 heat related illnesses reported. One fatality occurred from an infant left in a car in Oklahoma City.	NOAA-NCDC
February 14 – 16, 2021	Extreme Cold	N/A	N/A	OKC recorded it's second coldest temperature on the 15th at minus 14°F. The Spencer Mesonet recorded -16F. Below zero wind chills were recorded for an extended period, up to -35 degrees. One fatality occurred, a homeless man in OKC.	NOAA-NCDC
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	More than 75 heat-related emergency calls were received in the OKC area.	NOAA-NCDC
July 25-September 4, 2021	Excessive Heat	N/A	N/A	Over 50 heat related illnesses reported the last week of July. Short breaks of a few days were seen in August with the worst heat from August 6 – 13 and August 20th – September 4th with numerous heat illnesses reported.	NOAA-NCDC
July 3-28, 2022	Excessive Heat	N/A	N/A	A record high of 110° was set on July 19th. Numerous heat advisory days were experienced. EMSA responded to 59 heat related illness calls by July 18th.	NWS Norman, FOX-25
August 2-16, 2022	Excessive Heat	N/A	N/A	A record high of 104° was set on August 3rd, with temperatures at or above 100 on the 2nd, 3rd, 5th, 6th, 8th, and 16th.	NOAA-NCDC, NOAA F6 Data

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
September 17-21, 2022	Excessive Heat	N/A	N/A	A record high of 97° was reached on September 21st, with temperatures of 8 to 12 degrees above the 30 year average during the period.	NOAA F6 Data
December 22-24, 2022	Extreme Cold	N/A	N/A	OKC lows ranged from 2° on December 22nd to 9 on December 24th; numerous water line breaks reported, many in businesses.	NOAA F6 Data, local knowledge
June 28-July 4, 2023	Excessive Heat	N/A	N/A	Afternoon heat index over 110°, highs from 91-98°.	NOAA F6 Data, NCDC
July 12-20, 2023	Excessive Heat	N/A	N/A	Abundant rain on the 11th lead to heat index over 110° the following days with a short break on the 15th.	NOAA F6 Data, NCDC
July 25-August 4, 2023	Excessive Heat	N/A	N/A	Afternoon highs from 98°- 103°.	NOAA F6 Data
August 17-26, 2023	Excessive Heat	N/A	N/A	OKC reached a record high of 107° on the 19th and 106° on the 20th, breaking each daily record by 1 degree.	OUN Record Report, NOAA F6 Data
January 12-17, 2024	Extreme Cold	N/A	N/A	Four days of temperatures below freezing, with a total around 114 hours. The coldest period was 1/14-1/15 when the low on the 14th was from 1 at Will Rogers Airport to 0F at Spencer with light snow, and 1 at Will Rogers to -1 at Spencer on the 15th.	OK Mesonet, local knowledge

Source: NOAA-NCDC Storm Query; Oklahoma County HMP, Local media

Probability of Future Events

Extreme temperature events occur each year throughout the State of Oklahoma and the County. It is estimated that Oklahoma County and all of its jurisdictions, will continue to experience extreme temperature events annually that may induce secondary hazards such as thunderstorms, drought, human health impacts, and utility failure, as well as many other anticipated impacts.

Based on historical records and input from the Planning Committee, the probability of occurrence for extreme temperature events in the County is considered 'Highly Likely' (Event is probable within the calendar year. Event has a 1 in 1 year chance of occurring).

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. Most extreme temperature events involve a large region; therefore, the entire County has been identified as the hazard area.

Overview of Vulnerability

Extreme temperatures generally occur for a short period of time but can cause a range of impacts, particularly to vulnerable populations that may not have access to adequate cooling or heating. This natural hazard can also cause impacts to agriculture (crops and animals), infrastructure (e.g., through pipe bursts associated with freezing, power failure) and the economy.

Data and Methodology

Available information and a preliminary assessment are provided below.

Impact on Life, Health and Safety

For the purposes of this HMP, the entire population in Oklahoma County is vulnerable to extreme temperature events. Extreme temperature events have potential health impacts including injury and death. The County Profile summarizes population of Plan participants in Oklahoma County over the age of 65, and population with an annual income below the poverty threshold. With an increasing aging population and an increase in the number of persons moving to the area in most of the jurisdictions as indicated in Section 9, more persons are being exposed to this hazard.

According to the CDC, populations most at risk to extreme cold and heat events include the following: 1) the elderly, who are less able to withstand temperatures extremes due to their age, health conditions and limited mobility to access shelters; 2) infants and children up to four years of age; 3) individuals who are physically ill (e.g., heart disease or high blood pressure), 4) low-income persons that cannot afford proper heating and cooling; and 5) the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events.

Between 1990 and 2001, Oklahoma County recorded the most heat-related deaths in the State (total of 55), while heat related deaths between 2010 and 2017 totaled 17 (or 2.8 per 1 million population). More than two-thirds of deaths occurred in July and August of each year. The Number of deaths were higher among people age 45 and older, while approximately 70% of heat-related deaths were among males according to Oklahoma State Public Health Department.

Impact on General Building Stock

All of the building stock in Oklahoma County is exposed to the extreme temperature hazard. Extreme temperatures may impact buildings through weathering of materials and additional heating and cooling costs. Losses may be associated with the overheating of HVAC systems. Extreme cold temperature events can damage buildings through freezing/bursting pipes and freeze/thaw cycles.

Impact on Critical Facilities

All critical facilities in Oklahoma County are exposed to the extreme temperature hazard. Impacts to critical facilities are the same as described for general building stock (above). Additionally, it is essential that critical facilities remain operational during natural hazard events. Extreme heat events can sometimes cause short periods of utility failure, commonly referred to as "brown-outs", due to increased usage from air conditioners, appliances, etc. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can cause power interruption as well. Backup power is recommended for critical facilities and infrastructure.

Impact on Economy

Extreme temperature events also have impacts on the economy, including loss of business function and damage/loss of inventory. Business-owners may be faced with increased financial burdens due to unexpected repairs caused to the building (e.g., pipes bursting), higher than normal utility bills or business interruption due to power failure (i.e., loss of electricity, telecommunications).

The agricultural industry is most at risk in terms of economic impact and damage due to extreme temperature events. Extreme heat events can result in drought and dry conditions and directly impact livestock, livestock products and crop production.

Impact on Future Development

Although the trend in recent years has been toward residential development, currently over 131 square miles remain zoned for agricultural uses in the County. With the loss of farmland, the overall impacts of extreme temperature on agriculture will likely decrease due to the decrease of the industry. With the population continuing to increase in most jurisdictions as shown by the statistics in Section 9 of this plan, more people, infrastructure and buildings will be exposed to the effects of extreme temperatures.

Effect of Climate Change on Vulnerability

For USA climate data since the 1930s, since the mid-1970s, record high maximum temperatures are 50% more common in the USA, and record low minimums are less than half of the pre-1990s (Forbes, 2018). This trend is also seen in Oklahoma (Frankson et. Al. 2017). Warmer winters signify a shorter cold season which will subsequently lead to a longer frost-free period and growing season. By mid-century, models are projecting that Oklahoma will see 10 to 30 fewer days below 32°F. Also by mid-century the coldest day of the year is projected to be 5°F warmer and the most intense cold wave 10°F warmer (Vose et al. 2017) An additional 20 to 27 days a year are projected to exceed the historical top 2% of hot days of the year (95°F-100°F) by mid-century. The top 2% of warmest nights (70°F-75°F) are expected to increase by 35 nights/year (Shafer et al. 2014) [SCIPP, 2018]. Between 2000 and 2019, annual deaths from heat exposure increased globally while cold-related mortality decreased. This trend is expected to continue. (Zhao et al., The Lancet Planetary Health, July 2021).

5.3.6 FLOOD

HAZARD PROFILE

Description

Flooding is a natural event for rivers and streams. River flooding is when a river rises to its flood stage and spills over the banks. The amount of flooding is usually a function of the amount of precipitation in an area, the amount of time it takes for rainfall to accumulate, previous saturation of local soils, and the terrain around the river system. For instance, a river located in a broad, flat floodplain will often overflow to create shallow and persistent flood waters in an area that do not recede for extended periods of time. The excess water can be from snowmelt or rainfall far upstream. Flood effects can be local, impacting a neighborhood or community; or very large, affecting entire river basins and multiple states. The two general types of flooding are flash flooding and river flooding.

Extent

In the case of riverine or flash flooding, once a river reaches flood stage, the flood extent or severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat:

- Minor Flooding - minimal or no property damage, but possibly some public threat or inconvenience.
- Moderate Flooding - some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations (NWS, 2008).

The Oklahoma County jurisdictions consider a rainfall of one inch per hour or a river rise that stays within the river's banks to be a minor severity. A major severity to the County jurisdictions is identified as a rainfall of three inches or more an hour, or more than one inch in three hours on saturated ground, or a river that overflows its bank. Current guidance on the probable amount of rain that may cause flooding to begin can be found on the National Weather Service Arkansas-Red Basin River Forecast Center page at https://www.weather.gov/abrfc/gffg.

Creeks, rivers, riparian and floodplain areas are common throughout the County (Oklahoma County Master Plan, 2007). The State of Oklahoma is divided into eight water planning areas. Oklahoma County is located within the Central Planning Area. Refer back to Figure 4-2 for the watershed map.

Flood plain studies have been completed for parts of the county and the level of detail varies widely within the areas studied. The Middle North Canadian watershed includes part of western Bethany and a tiny part of southwest Warr Acres. The study includes smaller tributaries not included in watershed studies in other parts of the county. The Lake Overholser North Canadian watershed includes parts of northern Bethany and northern Warr Acres, The Village, western Edmond and the Deer Creek area of the unincorporated county. The Deep Fork watershed includes the southeast part of Warr Acres, Nichols Hills, East Edmond, western Forest Park, far northern Jones, Arcadia, Luther and the northeast incorporated county. Studies for the Lower North Canadian River watershed including most of Jones (not a plan participant), Spencer, Del City, Midwest City, Nicoma Park, Choctaw, Harrah and the southeast unincorporated county are not complete and potential flood depths are not available for these areas.

Figure 5.3.6-1 Modeled 100 year flood for Northwest Oklahoma County. (Source: FEMA https://webapps.usgs.gov/infrm/estbfe)

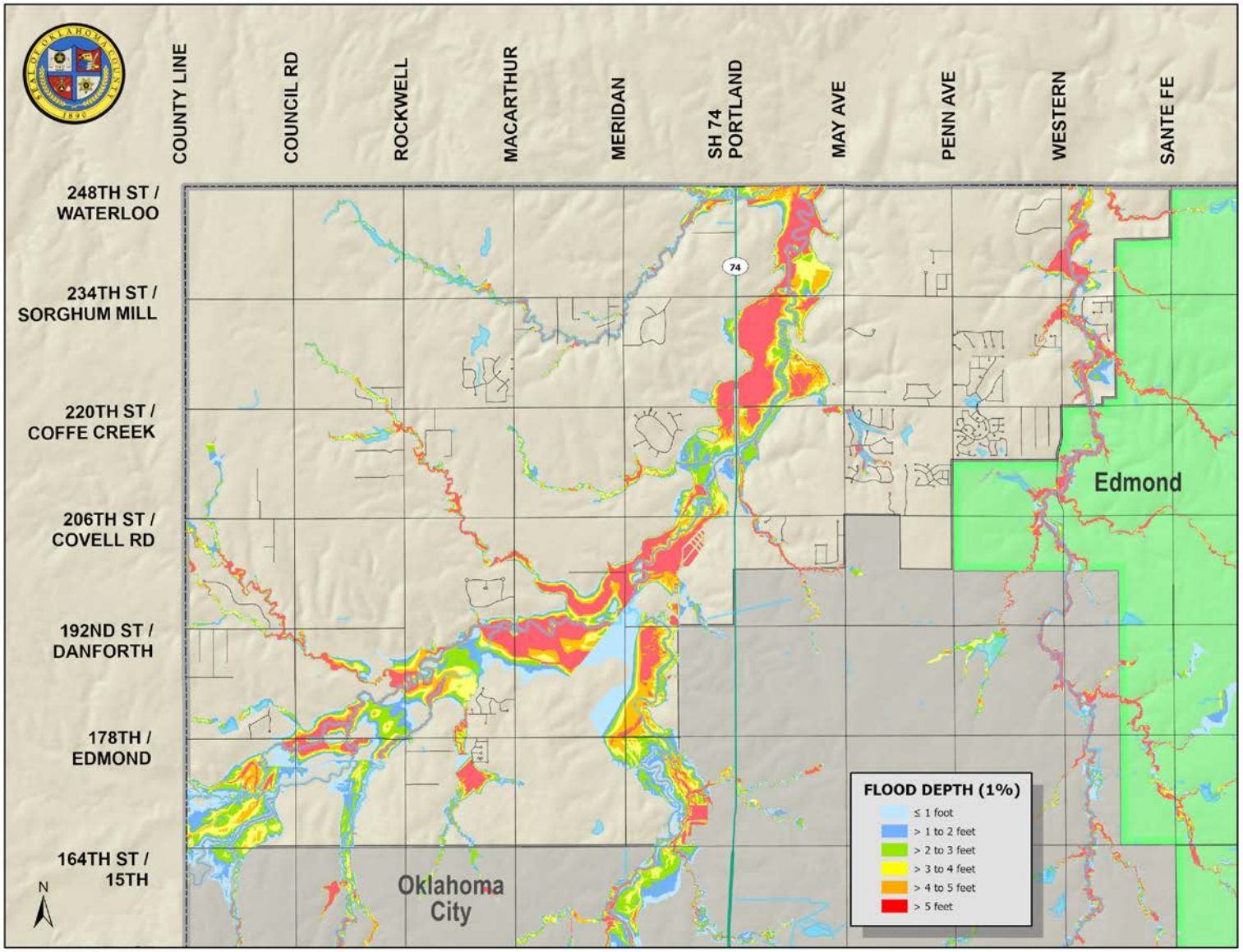


Figure 5.3.6-2 Modeled 100 year flood for Edmond, Arcadia and Luther. Data for the North Canadian watershed near Jones is not available.

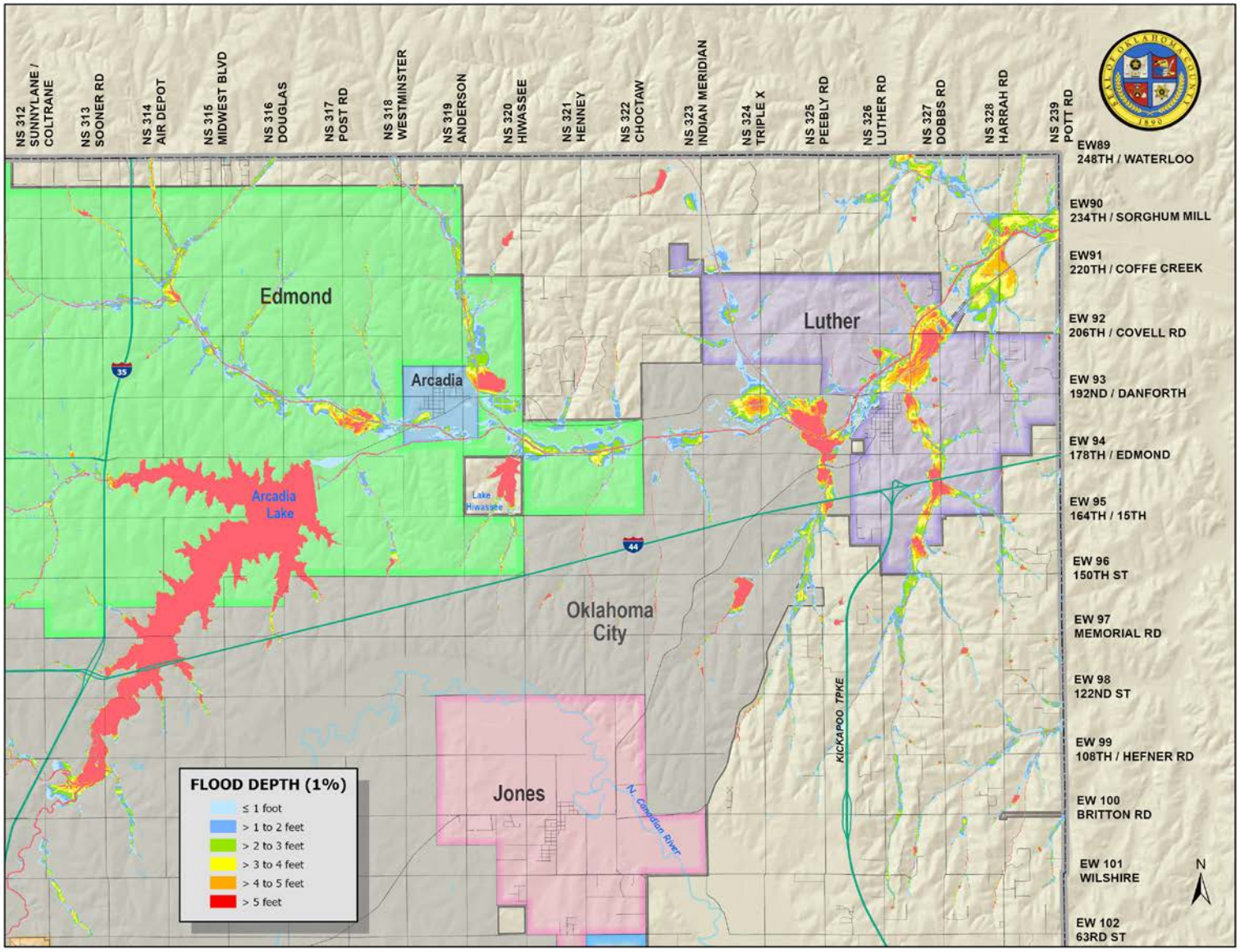
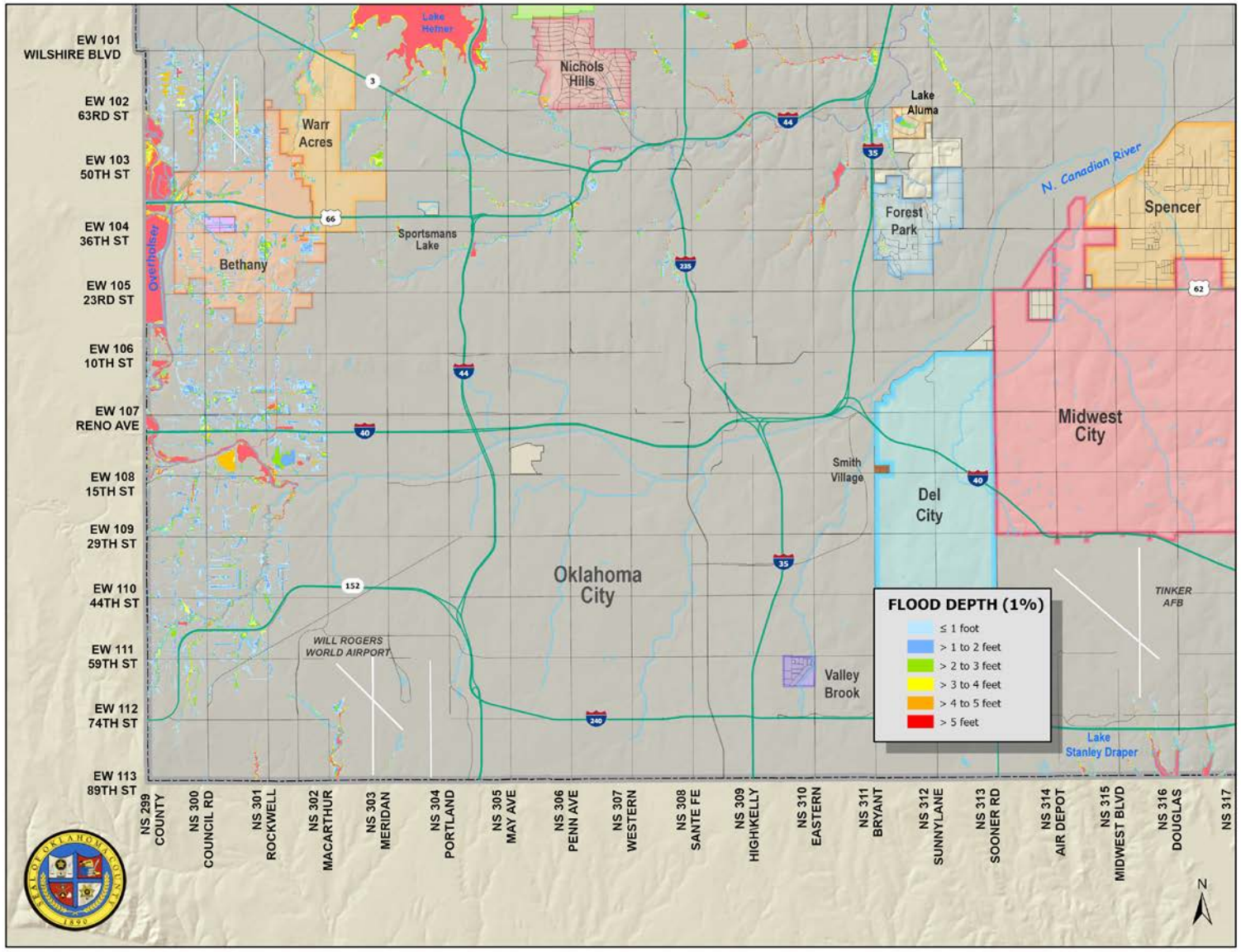


Figure 5.3.6-3 Modeled 100 year flood for Bethany, Warr Acres, Nichols Hills and Forest Park. Other areas southeast are not available.



Floodways (Zone AE) shown on the FIRM maps in the annexes are wider than the studied areas so the above maps may not represent all areas with at least shallow flooding in a 100 year flood. Within the County, there are several waterways that cause major flooding. These include the North Canadian River, Deep Fork Creek, Deer Creek, Crutcho Creek, Chisholm Creek, Bluff Creek and Lightning Creek.

The North Canadian River has its headwaters in New Mexico and flows in a southeasterly direction through western Oklahoma to Oklahoma City and then to Eufaula Reservoir in Eastern Oklahoma. The reach of the River that flows through the County is controlled at the very end of the Canton Reservoir which is approximately 75 miles upstream and the rest is affected by Lake Overholser. Major flooding has occurred within the County along the River. Oklahoma City and the City of Del City have experienced major flooding associated with this river (FEMA, 2009).

The Deep Fork basin headwaters are located within Oklahoma City and drain the areas immediately north of the City's business district. The Deep Fork flows northeasterly out of the County.
The Deer Creek basin is located in the unincorporated northwest part of the County and flows in a northeasterly direction out of the County. Most of the basin is located within a rural setting, except for one major tributary, Bluff Creek. Bluff Creek drains an extensive urban area, including several urban lakes (Lake Hefner), which is a major water supply lake for Oklahoma City.

FEMA Flood Hazard Areas

According to FEMA, flood hazard areas are defined as areas that are shown to be inundated by a flood of a given magnitude on a map. These areas are determined using statistical analyses of records of river-flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses.
A countywide Flood Insurance Study (FIS) for Oklahoma has been completed (December 2009). The 2009 FIS indicated the following principal flood problems, which continue to exist in 2023:

- City of Choctaw – The City has low-lying areas that are subject to periodic flooding caused by overflow of the Choctaw Creek and its tributaries, along with the North Canadian River. The most severe flooding occurs upstream from roadways that restrict the flow. Flooding along the Creek has not caused extensive property damage; however, future development could increase the threat of flood problems. For example, the Oakridge Manor subdivision (east of Reno Ave and Hiwassee Rd) has repeated structure flooding from one of the tributaries. A study with recommendations has been conducted by a city contractor. Further study has been contracted and construction plans to redirect the flow away from the subdivision and toward the creek just west along streetside drainage. Just south of this area along the tributary, along SE 15th St and Hiwassee Rd, repeated flooding occurs just west of the intersection, bordering Midwest City.
- City of Del City – Flooding in the City is mainly caused by the Crutcho and Cherry Creeks. Areas where natural and man-made obstructions exist in the floodplains have an increased severity of flooding.
- City of Edmond – Flooding in the City typically results from intense thunderstorms associated with squall line activity. The greatest potential for flood damage in the City exists along the upper portion of Spring Creek, west of Bryant Avenue. The main reasons why this area floods is due to increased urbanization, residential development along the floodplain, and inadequate bridge and culvert openings.

- City of Midwest City – Low-lying areas in the City are subject to periodic flooding caused by overflow of Crutcho, Soldier and Silver Creeks. Most flooding occurs upstream from roadways that restrict the flow. A tributary of Choctaw Creek (Tributary 4 East Branch) causes flooding near the border of Choctaw (and has associated mitigation projects in this plan in Choctaw and Midwest City). Urban expansion and future development in floodplains could increase the severity of flooding in the City.
- Town of Nicoma Park – Low-lying areas in the Town are subject to periodic flooding caused by overflow of Choctaw Creek and its tributaries. The most severe flooding occurs as a result of thunderstorms and intense rainfall. NE 23rd & Westminster is susceptible. Most flooding occurs upstream from roadways that restrict the flow.
- City of Spencer – Low-lying areas in the City are subject to periodic flooding caused by overflow from the North Canadian River, Crutcho Creek, Silver Creek and Tributary 9. The most severe flooding typically occurs after thunderstorms with intense rainfall. Most flooding occurs upstream from roadways that restrict the flow.
- City of The Village – Potential for flood damage exists within the City along the Chisholm Creek channel from Barclay Road downstream to Hefner Road. The potential for the greatest flood damage exists for the homes bordering Village Drive from Goldstone Terrace to Finley Drive and within the apartment complex along the floodplains from Finley Drive to Cavanaugh.
- City of Warr Acres – Low-lying areas in the City are subject to periodic flooding caused by overflow of Spring Creek. The most severe flooding occurs as a result of thunderstorms and intense rainfall. Most flooding occurs upstream from roadway and ponds that restrict the flow.

Previous Occurrences and Losses

Major flooding is not a significant concern to Oklahoma County; however, moderate flooding is considered a concern to County, as this could affect isolated areas and communities within the County. Many sources provided historical information regarding previous occurrences and losses associated with flooding events throughout the State of Oklahoma and Oklahoma County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

According to NOAA's NCDC storm events database, Oklahoma County experienced 86 flood events between July 11, 1996 and August 31, 2023. Between 1954 and 2023, FEMA declared Oklahoma County a disaster area as a result of 14 flood events (FEMA, 2023).

Based on all sources researched, known flooding events that have affected Oklahoma County and its municipalities over the past 10 years are identified in Table 5.3.6-1. With flood documentation for the State being so extensive, not all sources have been identified or researched. Therefore, Table 5.3.6-1 may not include all events that have occurred throughout the County and region.

Table 5.3.6-1. Flooding Events Between 2013 and 2023

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
May 31 – June 1, 2013	Tornado/Flood	N/A	No	A potent set of ingredients came together during this time that brought about a major severe weather episode over central Oklahoma. Several tornadoes occurred, including the El Reno tornado, which unfortunately claimed several lives. This flash flood event ranked as one of the worst in the area in history in terms of fatalities and damages to property.	NCDC, Media
May 5-10, 2015	Flood	DR-4222	Yes	A series of organized significant thunderstorms and flooding event happened during this time frame. Multiple tornados were reported during this event. Over this time, a total of 11.61" rain reported. May 6th broke the all-time May record for rainfall at Will Rogers Airport with 7.10". One fatality was reported during this time due to storm activity. Multiple stranded vehicles required high water rescue. Southern parts of Oklahoma County saw the greatest rainfall. Del City, The Village and Warr Acres experienced flooded roadways along with an unincorporated road south of Harrah being washed out.	NWS
May 23rd, 2015	Flood	DR-4222	Yes	Numerous flooded roadways all over the metro area. Most of the major flooding was in OKC, including a mall. Radar indicates the highest totals in the Deer Creek area, 4-5".	KFOR, KWTV, NWS Advanced Hydrologic Prediction Service
July 2nd, 2015	Flood	DR-4222	Yes	In Edmond, Santa Fe Rd washed out between Waterloo & Sorghum Mill Rd. Major flooding along Danforth and Covell Rd throughout Edmond. Minor flooding of buildings at Broadway & Hurd.	NewsOK
April 29, 2017	Flood	N/A	N/A	Numerous widespread showers and storms formed in the vicinity boundary started just after midnight on the 29th, continuing till mid-morning. Jurisdictions impacted included Edmond, Warr Acres, Arcadia & The Village. Flooding of roadways was widespread with depths of up to one (1) foot.	NOAA-NCDC
May 2, 2018	Flood	N/A	N/A	A line of thunderstorms produced localized flooding, closing route 66 in Bethany.	NOAA-NCDC
June 7, 2018	Flood	N/A	N/A	Widespread flooding across the north Metro. Reports of flooding including NW 234th and Rockwell, parts of The Village, Edmond and Nichols Hills stranding multiple cars and closing roadways. 2-2.5 inches of rain fell over 2-3 hours.	KFOR
September 5, 2018	Flood	N/A	N/A	A series of heavy rains and floods began that ended a drought. Edmond reported street flooding on Kelly between 15th and 33rd.	NOAA-NCDC

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
September 21, 2018	Flood	N/A	N/A	In Edmond, reports of high water at 15th and Kelly, also south of UCO, and on Broadway between 15th and 33rd. In Bethany, curb flooding and road closures at Hammon and MacArthur.	NOAA-NCDC
April 30, 2019	Flood	N/A	N/A	Street flooding reported in the northside of the OKC metro area from Reno to NW 133 and from Western to Council (includes Bethany, Warr Acres, The Village, Nichols Hills and Deer Creek area unincorporated OK County).	NOAA-WPC
May 18, 2019	Flood	N/A	N/A	Water reported almost up to windows of a vehicle in Warr Acres near NW 58th and MacArthur. Several reports in western OKC.	NOAA-NCDC
May 21, 2019	Flood	N/A	N/A	Several roads across northwest Oklahoma county closed due to flooding, including in far west Edmond near Edmond Rd and Santa Fe.	NOAA-NCDC
June 6, 2019	Flood	N/A	N/A	A stretch of Scott Street near I-40 was inundated with 6.5" of water in Del City. Other flooding occurred in western OKC.	NOAA-NCDC
June 9, 2019	Flood	N/A	N/A	Numerous reports of flooding and high water rescues in north OKC. A car was stranded in high water near Reno and Air Depot in MWC.	NOAA-NCDC
July 3, 2019	Flood	N/A	N/A	Several inches of water covered many roads along 2nd St near I-35 in East Edmond	NOAA-NCDC
August 26, 2019	Flood	N/A	N/A	Roads closed and vehicles stranded near Boulevard and 15th in Edmond.	NOAA-NCDC
July 10, 2020	Flood	N/A	N/A	Twitter social media photos of cars submerged in Bethany, lat/lon data indicates near NW 39th/Rockwell.	NOAA-NCDC
August 31, 2020	Flood	N/A	N/A	Several vehicles stranded in high water at NW 39th/MacArthur in Warr Acres.	NOAA-NCDC
May 27, 2021	Flood	N/A	N/A	Widespread flash flooding. In Edmond, 2 cars stalled at 33rd/Kelley, road closed. Cars stalled in deep water on 15th near Boulevard.	NOAA-NCDC
June 6, 2021	Flood	N/A	N/A	Motorist stranded in the area of Cherry Creek Bridge near SE 15th/Sunnylane in Del City.	NOAA-NCDC
June 27, 2021	Flood	N/A	N/A	In Midwest City, multiple intersections closed with one water rescue performed. Some apartments evacuated due to water.	NOAA-NCDC

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
May 24, 2022	Flood	N/A	N/A	4 to 6 inches of rain fell over two days north of Memorial Rd and north of the Turner Turnpike north of Luther. In Deer Creek, water crossed the road in several areas: NW 220th on both sides of Hwy 74/Portland, Waterloo between Hwy 74/Portland & May, and N Rockwell between 178th & 192nd and Covell/W Hwy 74.	Deer Creek FD, NSSL-MRMS, OK Co Engineering
June 5, 2022	Flood	N/A	N/A	2-3" of rain fell in an hour on saturated ground across Deer Creek, generally north of Edmond Rd to Coffee Creek from Council to I-35. Road damage occurred near Coffee Creek & Western. Water flowed across the road on NW 220th between May and Portland near Carlito's Way. NW 192nd between Portland and Meridian also saw flooding where the road narrows, and along Deer Creek W of Hwy 74. Water was flowing from higher fields to lower fields.	OK Co Highway Dist. 3, NWS radar
July 11, 2023	Flood	N/A	N/A	Overnight storms lead to flash flooding in a narrow strip mainly in Edmond and south to Tinker AFB. A creek west of 15th and Kelly came out of its banks and flooded the roadway. The heaviest rain was west of Broadway with over 5" of rain. 5.06" was reported northwest of E 33rd and Coltrane. Numerous low spots flooded. In Del City, 4-6" of standing water was reported on a roadway northeast of Reno & Sooner Rd.	NWS Storm Reports, NWS radar

Note (1): Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of increased U.S. Inflation Rates.

FEMA	Federal Emergency Management Agency
K	Thousand ($)
M	Million ($)
Mph	Miles Per Hour
N/A	Not applicable
NCDC	National Climate Data Center
NOAA	National Oceanic Atmospheric Administration
NWS	National Weather Service
SHELDUS	Spatial Hazard Events and Losses Database for the U.S.
TSTM	Thunderstorm

Probability of Future Events

Given the history of flood events that have impacted Oklahoma County, it is apparent that future flooding of varying degrees will occur. The fact that the elements required for flooding exist and that major flooding has occurred throughout the county in the past suggests that many people and properties are at risk from the flood hazard in the future.

It is estimated that Oklahoma County will continue to experience direct and indirect impacts of floods annually. Table 5.3.6-2 summarizes the occurrences of flood events.

Table 5.3.6-2. Occurrences of Flood Events in Oklahoma County, 1996 - 2023

Event Type	Number of Days with Occurrences*	Number of Days with Property Damage*
Flash Flood	71	25
Flood	21	4
Total:	**86***	**28***

Source: NOAA-NCDC, 2023. *Some days had both flash floods and areal slower floods, hence the total is lower than the number in each category. This includes the entire County, including other jurisdictions not in the plan.

Based on historical records and input from the Planning Committee, the probability of occurrence for flood in the County and all participating jurisdictions in this HMP is considered 'Highly Likely' (Event is probable within the calendar year. Event has a 1 in 1 year chance of occurring.). Although Forest Park and Nichols Hills do not currently have population in the 100 year or 500 year flood zone (see below), they are considered equally at risk of flooding of streets and culverts as Oklahoma County jurisdictions have experienced heavy rain events where cells stall or repeatedly train across the same area causing rainfall amounts sufficient enough to cause flash flooding of varying depths over widespread areas. Given recent occurrences in the County over the past 10 years, this is expected to continue to be a problem in the future.

VULNERABILITY ASSESSMENT

Overview of Vulnerability

All types of flooding can cause widespread damage throughout rural and urban areas, including but not limited to: water-related damage to the interior and exterior of buildings; destruction of electrical and other expensive and difficult-to-replace equipment; injury and loss of life; proliferation of disease vectors; disruption of utilities, including water, sewer, electricity, communications networks and facilities; loss of agricultural crops and livestock; placement of stress on emergency response and healthcare facilities and personnel; ability to respond to emergencies in a timely manner; loss of productivity; and displacement of persons from homes and places of employment (Foster, Date Unknown).

Data and Methodology

The 100-year and 500-year MRP flood events were examined to evaluate Oklahoma County's risk and vulnerability to the flood hazard. These MRP flood events are generally those considered by planners and evaluated under federal programs such as the NFIP.

Figure 5.3.6-1 illustrates the flood boundaries used for this vulnerability assessment.

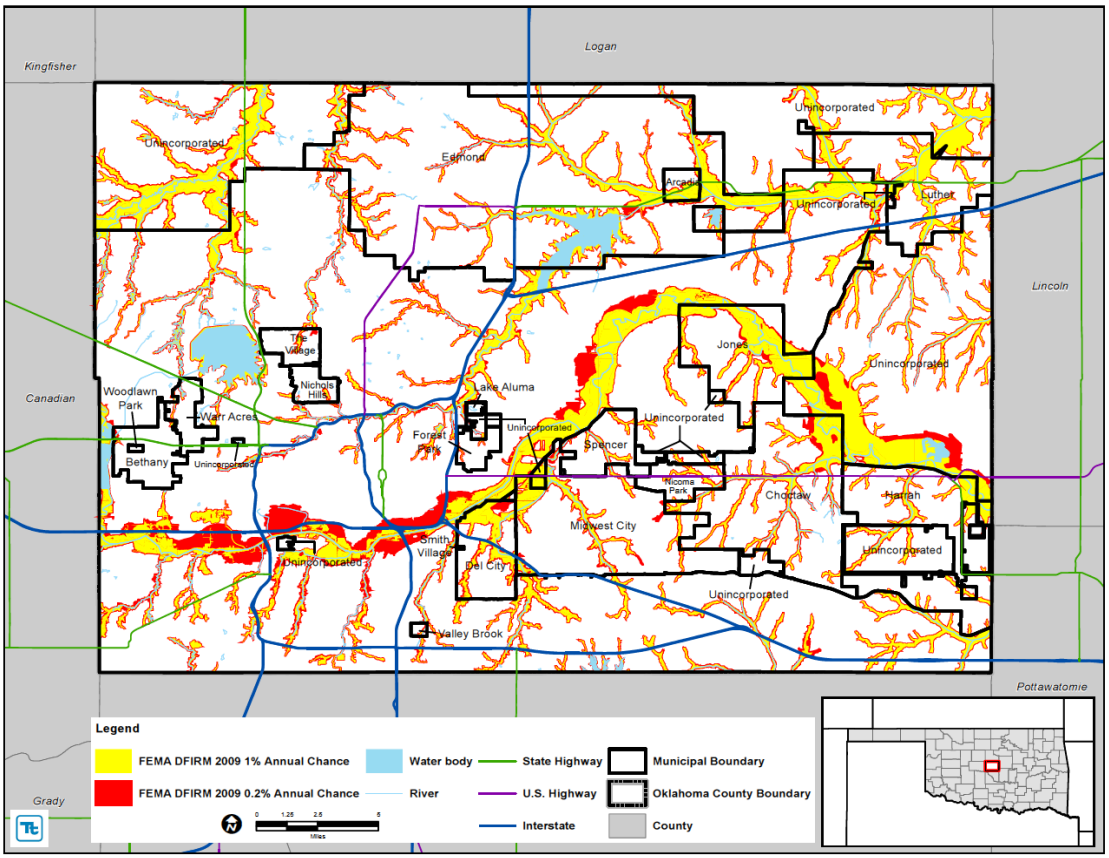


Figure 5.3.6-1. Floodplains in Oklahoma County
Source: FEMA

Impact on Life, Health and Safety

The impact of flooding on life, health and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time is provided to residents. Exposure represents the population living in or near floodplain areas that could be impacted should a flood event occur. Additionally, exposure should not be limited to only those who reside in a defined hazard zone, but everyone who may be affected by the effects of a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event). The degree of that impact will vary and is not measurable.

A previous update of this plan estimated the population exposed to the 100- and 500-year flood events, using the FEMA DFIRM floodplain boundaries overlaid upon the 2010 Census population data in GIS (U.S. Census 2010). Census blocks do not follow the boundaries of the floodplain. The Census blocks with their centroid in the flood boundaries were used to calculate the estimated population exposed to this hazard. This method appeared to have gross overestimates in some municipalities while underestimating the totals in others. Therefore, this data was discarded in a prior version of this plan. As previously mentioned, Forest Park and Nichols Hills do not have population in the 100 or 500 year flood zones, according to the prior study.

Impact on General Building Stock

There are approximately 42,570 and 44,626 acres of land in Oklahoma County located in the DFIRM 100-year and 500-year floodplains, respectively. Approximately 8- to 9-percent of the developed land in the County is located within the 100- and 500-year DFIRM floodplains and thus exposed to the flood hazard (FEMA, 2009 USGS, 2011). Repetitive Loss Properties (RLP) and Severe RLPs were examined in Oklahoma County.

Repetitive loss properties are those for which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. **Severe repetitive loss properties** are residential properties that have at least four NFIP payments over $5,000 each and the cumulative amount of such claims exceeds $20,000, or at least two separate claims payments with the cumulative amount exceeding the market value of the building.

Table 5.3.6-3 summarizes the NFIP policies, claims and repetitive loss statistics for Oklahoma County Plan participants. According to FEMA, there were 14 repetitive loss (RL) properties and zero severe repetitive loss (SRL) properties among the Plan participants in 2011 and 23 RL and 4 SRL in 2018. For this update, the number of RL's increased slightly in Choctaw, Del City, Edmond, Midwest City, Spencer and The Village while Warr Acres eliminated RL and SRL properties. Climate change may increase the number of flood events causing further RL properties. Edmond, Unincorporated Oklahoma County and Warr Acres reduced the total SRL's to zero. Most jurisdictions experienced a near 50% decrease in the number of policies (down from 996 to 529) since 2018, a decline continuing since the 2011 plan. 21 additional claims were added to this list. This information was provided through the Oklahoma Water Resources Board (OWRB) in September 2023.

Table 5.3.6-3. NFIP Policies, Claims and Repetitive Loss Statistics

Municipality	# Policies	# Claims (Losses)	Total Loss Payments	# Rep. Loss Prop.	# Severe Rep. Loss Prop.	Type of Rep. Loss Structure	
Arcadia (T)	1	0*	$0*	0	0	N/A	
Bethany (C)	8	11	$135,077	1	0	Residential	
Choctaw (C)	35	31	$534,605	1	0	Residential	
Del City (C)	121	75	$906,450	4	0	Residential	
Edmond (C)	162	121	$1,857,443	6	0	Residential 1 Commercial RL	
Forest Park (T)	0	1	$16,346	0	0	N/A	
Harrah (C)	10	1	$1,053	0	0	N/A	
Luther (T)	1	1	$0	0	0	N/A	
Midwest City (C)	123	66	$2,232,921	8	0	6 Residential, 2 Commercial	
Nichols Hills (C)	10	18	$83,032	2	0	Residential	
Nicoma Park (C)	2	4	$10,828	1	0	Commercial	
Spencer (C)	15	15	$427,870	3	0	Residential	
The Village (C)	12	6	$52,220	1	0	Residential	
Unincorporated County	21	60*	$821,858*	4	0	Residential	
Warr Acres (C)	8	6	$6,133	0	0	N/A	
Total	**529**	**356**	**$6,263,978**	**31**	**0**	**27- Residential**	**4- Commercial**

Source: FEMA, 2023

Notes: [1]Data provided by FEMA in September 2023. Statistics are totals using the "Community Name" field.

[2] C = City; Prop. = Property; T = Town

[3]In the 2018 plan, the FEMA NFIP Policy and Claims Report listed Arcadia with 5 claims totaling $169,600. Unincorporated Oklahoma County was listed as 64 claims totaling $827,960. It appears some of this data might have been attributed to the wrong jurisdiction(s) and subsequently corrected.

Impact on Economy

Direct building losses are the estimated costs to repair or replace the damage caused to the building. The potential damage estimated to the general building stock inventory associated with the 100-year flood is greater than $338 million. This estimated building damage represents approximately 1.3-percent of the County's overall total general building stock inventory exposed to this hazard. For the 500-year event, the potential damage estimate is nearly $465 million (structure and contents), or 1.7-percent of the total exposed building value. These dollar value losses to the County's total building inventory replacement value, in addition to damages to roadways and infrastructure, would greatly impact Oklahoma's tax base and the local economy. All jurisdictions have shown a continued decrease in the number of properties covered by flood insurance increasing the potential for local impacts which may include residents relocating to a different community and/or structures abandoned or not properly repaired or replaced.

When a flood occurs, the agricultural industry is at risk in terms of economic impact and damage (i.e., damaged crop, financial loss to the farmer). In 2022, according to the Census of Agriculture, the market value of all agricultural products sold from Oklahoma County was greater than $25.1 million with a majority of the value (68-percent) in crop sales including nursery and greenhouse sales. The number of farms and the amount of farmland in Oklahoma County continues to decrease (USDA NASS, 2022). Approximately 43 to 46-percent of the farmland in Oklahoma County is located in the 100- and 500-year floodplains.

Effect of Climate Change on Vulnerability

Heavy rainfall events in Oklahoma (top 1% of annual events) increased by 12% between 1958 and 2016. There is strong confidence that there will continue to be an increase in the frequency and intensity of heavy rainfall events over the 21st century (Easterling et al. 2017), which increases the chance of flooding (including in Oklahoma County). However, flooding is a locally complex phenomenon and can be exacerbated by human action (or inaction) as much as it can be caused by atmospheric conditions [SCIPP, 2023].

Future Growth and Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the flood hazard if located within the identified hazard areas. Specific areas of development vulnerable to the flood hazard are also indicated on hazard maps included in the jurisdictional annexes in Section 9 of this plan. If the population continues to increase in most jurisdictions as shown in the census statistics in the annexes, and the climate continues to change, the potential for greater exposure to buildings and people will grow.

5.3.7 HAIL

HAZARD PROFILE

Description

Hail is a form of solid precipitation that consists of balls or irregular lumps of ice, which are individually called hailstones. Hail formation requires an atmospheric environment of strong, upward moving air, called an updraft, within the subfreezing region of a thunderstorm cloud. Large hail stones greater than an inch in diameter (quarter size), can result from a severe thunderstorm and require a very powerful updraft to form. Most large hail is the product of supercell thunderstorms, which have a sustained rotating updraft that moves growing hailstones a long distance through the height of the cloud before falling to the ground.

Extent

Hail can be produced from many different types of storms. Typically, hail occurs with thunderstorm events. The size of hail is estimated by comparing it to a known object. Most hail storms are made up of a variety of sizes, and only the very largest hail stones pose serious risk to people, if exposed (NSSL, Date Unknown). Table 5.3.7-1 shows the different types of hail and the comparison to real-world objects.

Table 5.3.7-1. Hail Size & TORRO Damage Impacts

Description	Diameter (in inches)	Typical Damage Impacts
Pea	0.25	Slight general damage to plants, crops
Marble or mothball	0.50	Moderate damage to agriculture and vegetation
Penny or dime	0.75	Significant damage to fruit, crops, vegetation
Nickel	0.88	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Quarter	1.00	Damage to 14-18+ gauge metal on vehicles and structures
Half Dollar	1.25	Damage to composite roofing shingles
Walnut or Ping Pong Ball	1.50	Widespread glass damage, damage to tiled roofs, vehicle bodywork damage
Golf ball	1.75	Wholesale destruction of glass, significant risk of injuries
Lime or Hen's Egg	2.00	Bodywork of grounded aircraft dented, brick walls pitted
Tennis Ball	2.50	Severe roof damage, risk of serious injuries
Baseball	2.75	Widespread vehicle windshield damage
Tea Cup	3.00	Severe damage to aircraft bodywork
Grapefruit	4.00	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Softball	4.50	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: NWS, 2012

The peak periods for hailstorms, late spring and early summer, coincide with the Midwest's most critical agricultural season for wheat, grapes, corn, barley, oats, rye, and fruit trees. Unfortunately all jurisdictions in the county may experience the full range of the scale presented in Table 5.3.7-1.

Location

Hailstorms are more frequent in the southern and central plain states, where the climate produces violent thunderstorms. However, hailstorms have been observed in almost every location where thunderstorms occur (Federal Alliance for Safe Homes, Inc, 2006). The entire State of Oklahoma is susceptible to hailstorm events, include Oklahoma County. Figure 5.3.7-1 illustrates that Oklahoma County has a 60 to 80 percent chance of experiencing a 2" hail storm each year.

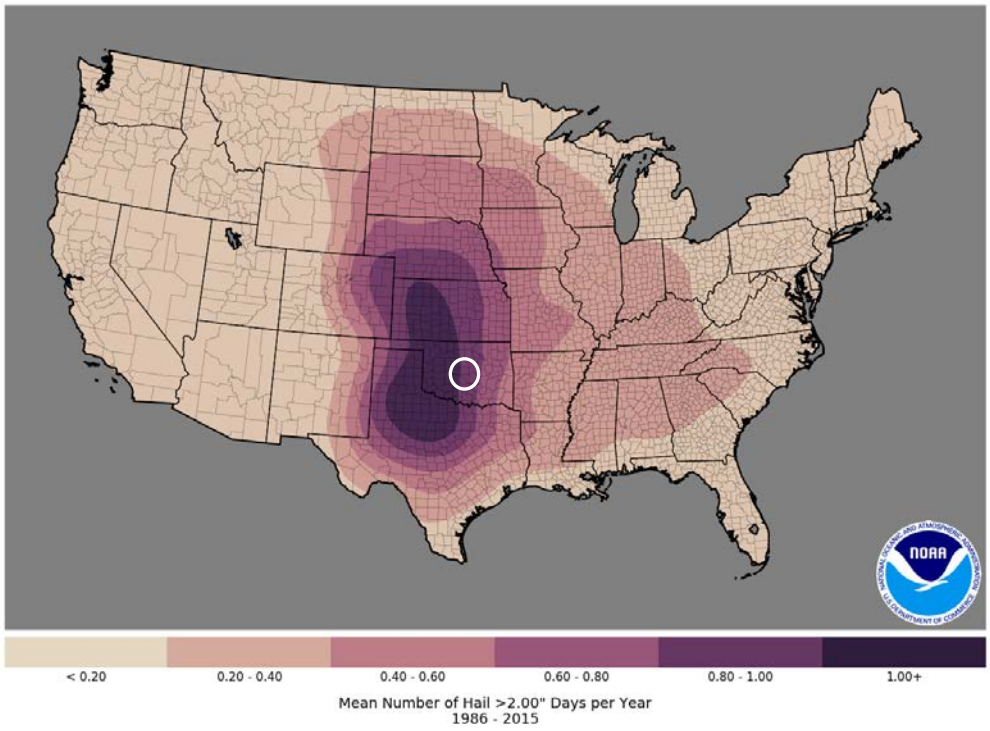


Figure 5.3.7-1. Mean number of 2" hail days per year.

Source: NOAA SPC
Note: The white circle indicates the approximate location of Oklahoma County.

Previous Occurrences and Losses

Many sources provided historical information regarding previous occurrences and losses associated with severe storm events throughout the State of Oklahoma and Oklahoma County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

According to NOAA's NCDC storm events database, Oklahoma County experienced 50 days with hail 2.00 inches or greater in diameter or greater between April 28, 1956 and July 9, 2023. Total property damages, as a result of these hail events, were estimated at $450.6 million experienced within Oklahoma County.

Based on all sources researched, known severe storm events with hail of golf ball size and above that have affected Oklahoma County and its municipalities in the plan are identified in Table 5.3.7-2. With severe storm documentation for the State of Oklahoma being so extensive, not all sources have been identified or researched. Table 5.3.7-2 does not include all events that have occurred throughout the County and region.

Table 5.3.7-2. Significant Hail Events of 1.75" or greater between 2013 and 2023

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
April 26, 2013	Hail	N/A	N/A	Scattered supercells developed and moved southeastward across Central Oklahoma including Edmond. Very large hail up to 2.50 inches were reported. Property Damage est. $400K.	NOAA-NCDC
May 19, 2013	Hail	N/A	N/A	Several supercells developed along the dryline during the mid and late afternoon hours, producing large hail. Edmond (Coffee Creek & I-35) & Luther saw hail ranging from to 2.60-2.75 inches.	NOAA-NCDC
May 25, 2015	Hail	N/A	N/A	Golf ball Hail 4 miles north of Luther near Waterloo Rd. (unincorporated). Damage mostly to farms and farm land, no estimate provided.	NOAA-NCDC
October 4, 2016	Hail	N/A	N/A	Golf ball hail in northwest Luther on Triple XXX Rd between Covell (NE 206th) & Coffee Creek Rd near the power plant. No damage estimate provided.	NOAA-NCDC
March 23, 2019	Hail	N/A	N/A	A swath of hail occurred from west to east near Memorial Rd from near the Canadian County line to southeast Edmond. Two inch diameter stones reported west of Memorial and I-35. YouTube videos show broken car windows. Golf ball size hail was reported at NW 164/County Line Rd (Deer Creek) and east of Hefner & May Ave (The Village). No damage estimate.	NOAA-NCDC, YouTube, NOAA WPC, KWTV-9
April 9, 2021	Hail	N/A	N/A	A storm intensified briefly between Luther and Arcadia, dumping golf ball size hail in Luther. No damage estimate provided.	NOAA-NCDC, NSSL-MRMS
April 19, 2023	Hail	N/A	N/A	Numerous reports of golf ball to 2" diameter size hail in western Edmond. Two inch hail also reported just northeast of Tinker AFB in Midwest City.	NOAA-NCDC, WPC

Sources: NOAA-NCDC, NWS, SHELDUS - Note: Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation. K = Thousand ($), M = Million ($), NCDC = National Climate Data Center, NOAA = National Oceanic Atmospheric Administration, NWS = National Weather Service
SHELDUS = Spatial Hazard Events and Losses Database for the U.S., TSTM = Thunderstorms, NSSL-MRMS = National Severe Storms Lab Multi-Radar Multi-Sensor website

Note: the latest entry in the list is the last occurrence of widespread hail damage in the jurisdictions.

Probability of Future Events

Based on recent historical events, it is likely that Oklahoma County will experience a day with golf ball (1.75") or larger hail every 2-3 years.

Based on historical records and input from the Planning Committee, the probability of occurrence for significant damaging severe hail events in the County and all the jurisdictions included in this plan is considered 'Likely' (Event is probable within the next three years).

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For hail events, the entire Oklahoma County has been identified as the hazard area. Therefore, all assets in the County (population, structures, critical facilities and lifelines), as described in the County section, are vulnerable.

Overview of Vulnerability

The hail hazard is a significant concern to Oklahoma County because of the geographic location and climate. Convective weather (lightning, thunderstorms, tornado and hail) frequents the State with peak season for hail events in the middle to late spring months. The direct and indirect losses associated with these events include injury, damage to structures, utilities and personal assets, agricultural losses, and stress on community resources. Once hail size approaches 2 inches, the County considers the incident severe due to an increase in reported damage.

Data and Methodology

National weather databases, the Oklahoma State Hazard Mitigation Plan and local resources were used to collect and analyze hazard impacts on Oklahoma County and the participating municipalities.

Impact on Life, Health and Safety

People located outdoors (i.e., recreational activities, farming) are considered most vulnerable to the hazard. This is because there is little to no warning and shelter may not be available. Moving to a lower risk location will decrease a person's vulnerability.

Impact on General Building Stock, Critical Facilities and the Economy

For the purposes of this HMP, the entire general building stock, critical facilities, utilities and personal assets in the County are considered exposed to the hail hazard. Mobile homes (locations identified in the wind section, Figure 5.3.10-4.7) and structures with vinyl siding are generally more vulnerable to damage than brick structures. Hail can be responsible for damages to buildings, roofs, windows and automobiles. Agricultural losses can also be devastating due to this hazard. Utility damage is mainly to power lines and communication towers (OKDEM, 2011).

Future Growth and Development

As discussed and illustrated in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the hail hazard because the entire planning area is exposed and vulnerable. Please refer to Section 4 (County Profile) for

a map that illustrates where potential new development is located. With most of the jurisdictions reporting growth in the 2020 Census, exposure to this hazard will continue to grow with new buildings, additional vehicles and infrastructure and the potential for more persons to be outdoors when an event arrives.

Effect of Climate Change on Vulnerability

Climate models project an increase in the frequency and intensity of severe thunderstorms, and events with large hail are projected to increase (Kossin et al. 2017) At the same time, models project an overall decrease in the number of days with hail per year (Briemlow et al. 2017). Confidence in the projections is currently low, however due to the isolated and sporadic nature of hail events and limited comprehensive datasets which make it difficult to track long-term trends (Wuebbles et al. 2017) [SCIPP, 2018].

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. The collection of additional/actual loss data specific to the Plan participants will further enhance Oklahoma County's vulnerability assessment.

5.3.8 LIGHTNING

HAZARD PROFILE

Description

Lightning is a discharge of intense atmospheric electricity, accompanied by a vivid flash of light, from one cloud to another, or from a cloud to the ground. Lightning is formed by the separation of positive and negative charges that occur when ice crystals collide high up in a thunderstorm cloud. As lightning passes through the atmosphere the air immediately surrounding it is heated, causing the air to expand rapidly. The resulting sound wave produces thunder.

Extent

All Oklahoma County jurisdictions in this plan can experience any level on the Lightning Activity Level scale presented in Table 5.3.8-1. LAL-5 occurs frequently with convective storms. Any lightning strike that causes death or property damage is considered a significant event.

Cloud-to-ground lightning peak currents and electric fields are dependent on the polarity of the lightning discharge. For negative cloud-to-ground lightning, first return strokes have an average peak current of 30 kA and an electric field peak of 6 V/m at 100 km. Peak currents and fields for negative subsequent strokes are, on average, half of the respective values for negative first strokes. For positive cloud-to-ground lightning the average peak fields and currents are roughly a factor of two greater than those for negative first strokes (http://www.vaisala.com).

The average areal density of cloud-to-ground lightning flashes in the U.S. has been measured by the National Lightning Detection Network (NLDN). Most lightning occurs during the afternoon or early evening (NWS, 2002).

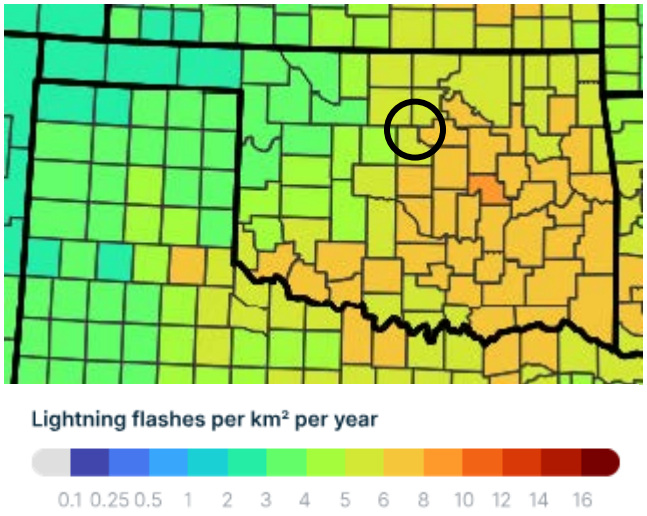
Table 5.3.8-1. Lightning Activity Levels. Source: NWS Roanoke, VA

Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater then 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Location

No place in the U.S. is free from a lightning threat. Lighting can occur anywhere at any time during the year; however, lightning activity has a strong annual cycle in the U.S. The lightning rate peaks during the summer months and begins to decrease during September (NWS, 2002). As can be seen in Figure 5.3.8.-1, Oklahoma County experiences an average of 6-8 lighting flashes per kilometer annually (3.7-5 strikes per mile).

Figure 5.3.8-1. Cloud-to-Ground Lightning Flash Density, 2016-2022, Source: Vaisala Xweather Annual Lightning Report 2023



Previous Occurrences and Losses

Figure 5.3.8-1 displays the cloud-to-ground lightning density per kilometer in Oklahoma from 2016 to 2022. This figure shows the yearly mean of cloud to ground lightning that occurs in each county. According to this figure, Oklahoma County experiences approximately 3.7 to 5 strikes per mile a year. It is evident from high resolution data (Oklahoma Climatological Survey 2016) the amount of cloud-to-ground flashes in the densely populated high-rise buildings of the downtown Oklahoma City area play a significant role in the number of strikes. Within the jurisdictions included in the plan, it appears the southcentral part of the county (i.e. Del City to Midwest City) has a slightly higher density of strikes (likely due to terrain and infrastructure height) while the western side of the county seems to have a lower density of strikes.

Lightning strike damage costs are recorded by insurance companies and generally not publicly available. Occasionally event details are available through fire department responses. NOAA's NCDC storm events database has logged only 31 damaging lightning events in Oklahoma County since May 26, 1996. Total property damages, as a result of these severe storm events, were estimated at $8.8 million (NCDC).

Based on sources researched, known lightning damage events that have affected Oklahoma County and its municipalities are identified in Table 5.3.8-2. With lightning documentation for the State of Oklahoma mainly in the hands of private companies, not all sources have been identified or researched. Therefore, Table 5.3.8-2 does not include all damaging events that have occurred throughout the County and region.

Table 5.3.8-2. Lightning Events between 2013 and 2023

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
July 09, 2014	Lightning	N/A	N/A	Multiple storms produced numerous cloud to ground lightning flashes. At least three homes were damaged or destroyed in Nichols Hills. Property damages was estimated to be $2.80M	NOAA-NCDC
April 4, 2016	Lightning	N/A	N/A	Lightning caused a significant house fire on Avery Dr. in Midwest City.	Midwest City FD
July 3, 2017	Lightning	N/A	N/A	Lightning caused a significant house fire on Oola Ct. in Midwest City	Midwest City FD
August 6, 2017	Lightning	N/A	N/A	Lightning caused a significant house fire on Del Arbole Dr. in Midwest City.	Midwest City FD
Sept 04, 2021	Lightning	N/A	N/A	Lightning struck a house on Hillside Dr. in Harrah causing some smoke in the house.	Harrah FD
May 02, 2022	Lightning	N/A	N/A	Lightning struck a house in Luther, blowing out an electrical outlet.	OCSO Dispatch
July 28, 2022	Lightning	N/A	N/A	Lightning cause a significant house fire on Forest Oaks Dr. in Midwest City.	Midwest City FD
August 28, 2022	Lightning	N/A	N/A	Lightning struck a house in Edmond, blowing part of a switch off a wall and burning an electrical outlet.	KFOR-TV
October 25, 2023	Lightning	N/A	N/A	Lightning struck a house in Harrah on Wagon Trail Blvd near SE 15th and Dobbs Rd. Roof damage and plaster blown off the ceiling.	OK Co SO

Sources: FEMA, NOAA-NCDC, NWS, SHELDUS
Note: Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.
FEMA Federal Emergency Management Agency
K Thousand ($)
M Million ($)
NCDC National Climate Data Center
NOAA National Oceanic Atmospheric Administration
NWS National Weather Service
SHELDUS Spatial Hazard Events and Losses Database for the U.S.

Note: Several house fires from lightning have occurred in Oklahoma City outside of the planning area and are not included here.

Probability of Future Events

The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the Planning Committee, the probability of occurrence for lightning events in the County and all jurisdictions participating in this plan is considered '4 – Highly Likely' (Event is probable within the calendar year. Event has a 1 in 1 year chance of occurring).

It is estimated that Oklahoma County will continue to experience direct and indirect impacts of lightning events annually that may induce secondary hazards such as infrastructure deterioration or failure, utility failures, power outages, and fires.

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. All assets in the County (population, structures, critical facilities and lifelines), as described in the County section, are vulnerable.

Overview of Vulnerability

The lightning hazard is a significant concern to Oklahoma County because of their climate. Being located southeast of the Rocky Mountains which provide cool air masses; proximate to the Gulf of Mexico, a source of moisture; and northeast of the dry hot southwest brings frequent convective weather (lightning, thunderstorms, tornado and hail) to the State of Oklahoma. The peak lightning season is from April to June, which is also the State's major tornado season (OKDEM, 2011). The direct and indirect losses associated with these events include injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources.

Data and Methodology

National weather databases and local resources were used to collect and analyze lightning impacts on Oklahoma County and the participating municipalities. .

Impact on Life, Health and Safety

According to Vaisala and NOAA, in the State of Oklahoma there were 100 fatalities as a result of lightning events from 1959 to 2012. No deaths were reported between 2013-2022 and one was reported in 2023 in northeast Oklahoma (NOAA Storm Data 2023). The state is ranked #11 in number of deaths per million people (NOAA, May 2017).

The entire population of Oklahoma County is considered exposed to the lightning hazard. The peak lightning season in the State of Oklahoma is from April to June; however, the most fatalities occur in August. According to the State HMP, fatalities occur most often when people are outdoors and/or participating in some form of recreation. The following are considered vulnerable locations: 1) in water; 2) under a tree; 3) on the telephone; 4) outside in the open; 5) on a ball field; 6) golfing; 7) boating; 8) operating heavy equipment/construction; 9) camping and 10) proximate to antenna, towers, transmitters (OKDEM 2011; NOAA, 2012.) Population located outdoors is considered at risk and more vulnerable to a lightning strike compared to being inside a shelter. Moving to a lower risk location will decrease a person's vulnerability.

Impact on General Building Stock, Critical Facilities and the Economy

For the purposes of this HMP, the entire general building stock and all infrastructure of Oklahoma County are considered exposed to the lightning hazard. According to NOAA's Technical Paper on *Lightning Fatalities, Injuries, and Damage Reports in the United States from 1959 - 1994*, monetary losses for lightning events range from less than $50 to greater than $5 Million (larger losses associated with forest fires with homes destroyed and crops loss) (NOAA, 1997). Lightning can be responsible for damages to buildings; cause electrical, forest and/or wildfires; and damage infrastructure such as power transmission lines and communication towers. Agricultural losses can be devastating due to lightning and resulting fires.

Future Growth and Development

As discussed and illustrated in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the lightning hazard because the entire planning area is exposed and vulnerable. Please refer to Section 4 (County Profile) for a map that illustrates where potential new development is located. The Census projections from 2020 indicate additional exposure to this hazard is likely as most jurisdictions reported growth which is expected to continue. This brings the potential for more persons at outdoor sporting events and additional structures and infrastructure in the path of storms.

Effect of Climate Change on Vulnerability

While the number of days with severe thunderstorm events has decreased in recent years, the intensity of significant severe weather events has increased (Storm Prediction Center Data, 2018, others). Lightning occurrences are also projected to increase (Kossin et al. 2017).

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. The Emergency Management Department at Oklahoma County has been making attempts to collect lightning damage reports during storm events. The collection of additional/actual loss data specific to the Plan participants will further enhance Oklahoma County's vulnerability assessment.

Overall Vulnerability Assessment

Existing and future mitigation efforts including personal and structural lightning safety should continue to be developed and employed that will enable the study area to be prepared for these events when they occur and lower their risk.

5.3.9 WILDFIRE

HAZARD PROFILE

Description

A wildfire is an uncontrolled fire in a rural or wilderness area. The majority of wildfires in Oklahoma County occur in the late fall through winter and into early spring, which coincides with dormant vegetation and the time of the year the state receives the least amount of precipitation. A wildfire often begins unnoticed and can spread quickly, lighting brush, trees and even homes. It may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, lightning or arson. With very low humidity levels, idling vehicles on grass, or a spark from a dragging chain on a trailer can also cause an unnoticed fire start. There are three different classes of wildfires. A surface fire is common in grasslands or areas with open vegetation and can spread quickly. A ground fire is a dense, very hot fire that has a thick fuel source and significantly damages the soil health where it occurs. Crown fires are those that move by jumping along the tops of trees. Wildfires often begin unnoticed, but are usually signaled by dense smoke that fills the area for miles around.

Extent

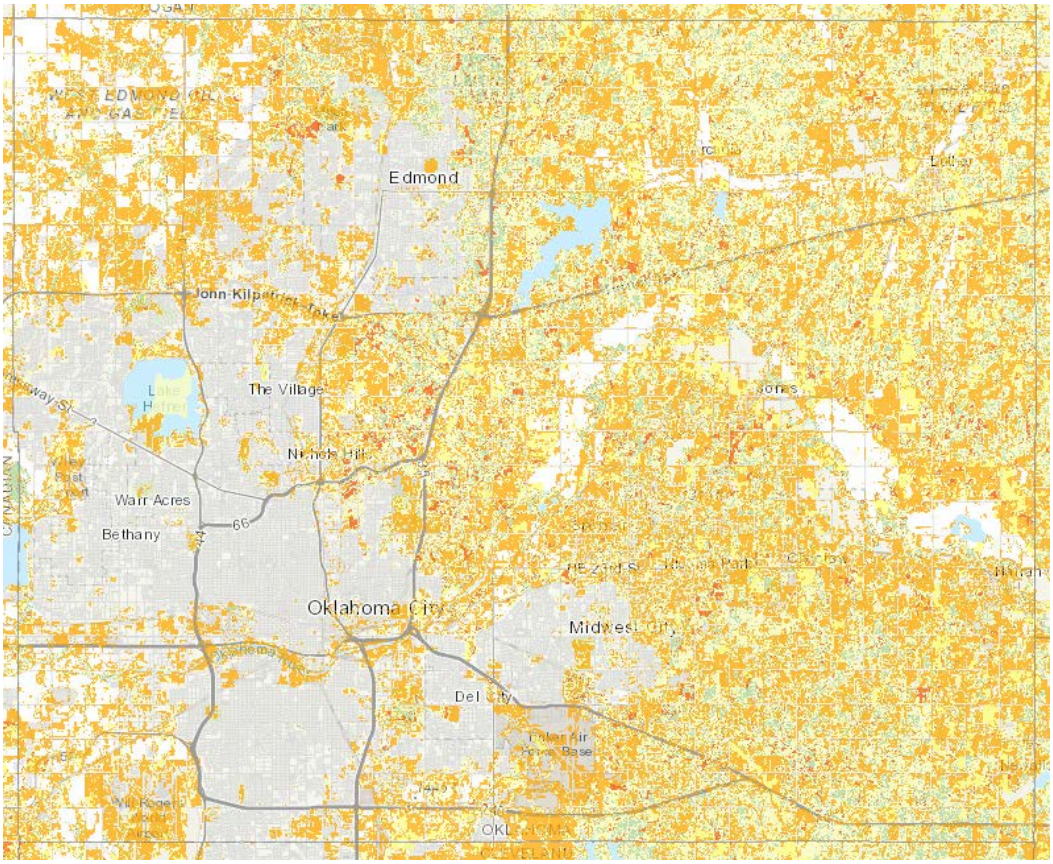
A scale was created according to fuels and terrain that are found across an area. This scale measures intensity of potential fires from Lowest to Highest. (See Figure 5.3.9-1) Per the Southern Wildfire Risk Assessment Portal, most of Oklahoma County's jurisdictional areas fall into the Moderate bracket, with flames up to 8 feet in length. However, Figure 5.3.9-2 shows there are multiple small areas where the intensity level is indicated as High, with up to 30 foot flames. These fires can create spot fires, and should be attacked with a variety of methods including highly trained firefighters, engines, and dozers for fast, effective suppression.

Figure 5.3.9-1 SouthWRAP Fire Intensity Scale (2018)

	1	Lowest Intensity	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
	1.5		
	2	Light Intensity	Small flames, usually less than two feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
	2.5		
	3	Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
	3.5		

	4	High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
	4.5		
	5	Highest	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Figure 5.3.9-2 South WRAP Potential Fire Intensity Map of Oklahoma County (2018)



Location

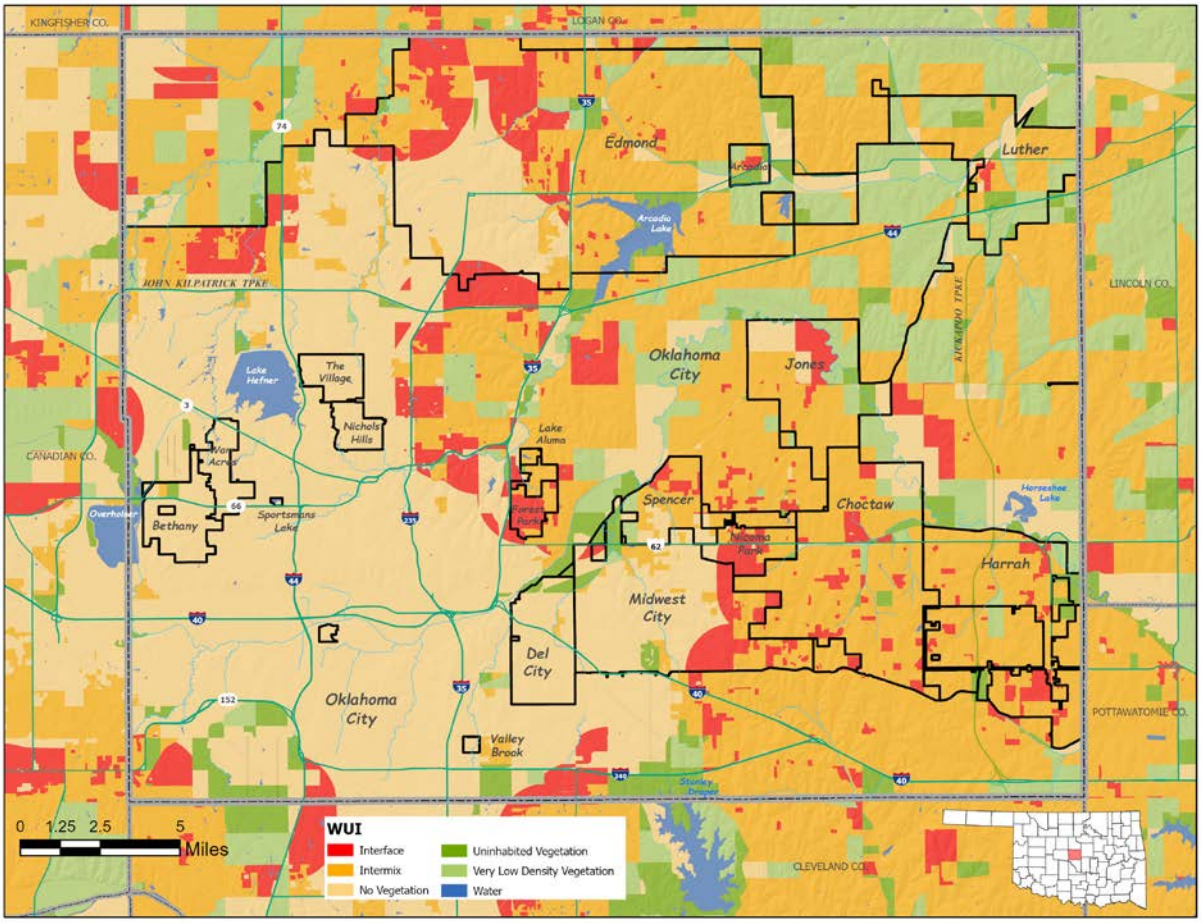
Wildland/Urban Interface (WUI) is the area where houses and wildland vegetation coincide. The WUI is divided into two categories: intermix and interface. Intermix WUI are areas where housing and vegetation 'intermingle'. Intermix areas have more than one house per 40 acres and have more than 50-percent vegetation. Interface WUI are areas with housing in the vicinity of contiguous wildland vegetation. Interface areas have more than one house per 40 acres, have less than 50-percent vegetation, and are within 1.5 miles of an area over 1,235 acres that is more than 75-percent vegetated (Spatial Analysis for Conservation and Sustainability [SILVIS Lab], Date Unknown).

The Geospatial Multi-Agency Coordination Group (GeoMAC) is an internet-based mapping application developed by various government agencies, designed for fire managers to access online maps of current or recent fire locations (ranging from 2002 to present) and perimeters in the conterminous 48 states and Alaska (GeoMAC, 2018). This mapping application identifies not only where fires have occurred during that time period, but also identifies the WUI within the states and counties of the U.S.

A more detailed WUI (interface and intermix) was obtained through the SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison which also defines the wildfire hazard area. The California Fire Alliance determined that areas within 1.5 miles of wildland vegetation

are the approximate distance that firebrands can be carried from a wildland fire to the roof of a house. Therefore, even structures not located within areas of thick trees are at risk to wildfire. This buffer distance, along with housing density and vegetation type were used to define the WUI illustrated in Figure 5.3.9-3 below (University of Wisconsin, date unknown). Using this WUI, approximately 287 square miles or approximately 40-percent of the County is located in the WUI (interface and intermix).

Figure 5.3.9-3. SILVIS Lab Wildland Urban Interface in Oklahoma County Source: Radeloff et al, 2020



Previous Occurrences and Losses

The short-term effects of wildfires can include destruction of timber, forest, wildlife habitats, scenic vistas, and watersheds. Business and transportation disruption can also occur in the short-term. Long-term effects can include reduced access to recreational areas, destruction of community infrastructure and cultural and economic resources (USGS, 2006).

Oklahoma County experiences frequent wildfires. Between 2007 and 2016, over 27,000 acres were burned within the jurisdictions incorporated within this report. Damages from these wildfires totaled over $737,600 (OK State Fire Marshal's Office). This data is no longer being collected at this granular level by the state. Each municipal annex in this plan reflects the latest available data. The most destructive fire year, 2011, burned nearly 12,000 acres for a total loss of over $400,000.

Table 5.3.9-1. Large Wildfire Events in this Oklahoma County Planning Area Between 2012 and 2023.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
August 03-10, 2012	Wildfire	FM-5001	Yes	Extreme temperatures coupled with a low humidity and increased winds lead to multiple fires including a large wildfire in Luther totaling 2,621 acres. The fire moved quickly and damaged or destroyed 38 structures in and around the Luther area. Damage estimates were unavailable.	NOAA-NCDC, OKOEM
March 31, 2023	Wildfire	N/A	(County declaration was for the Hefner fire not affecting jurisdictions in this plan)	This fire started while the Simpson Rd fire (Logan Co) and the Hefner Fire (in OKC) and others were already burning. This fire burned between NE 234th and Coffee Creek Rd, from ¼ mile west of Hiwassee to1/4 mile west of Choctaw Rd, in the unincorporated areas of Edmond and Luther's response district. 252.4 acres were burned according to a drone GIS mapping survey performed by Lincoln County EM. Winds were gusting over 50 mph, with 53 recorded at the Spencer and East OKC Mesonet.	OK Co EM Staff, Lincoln Co EM staff, OK Mesonet,

FEMA Federal Emergency Management Agency
FM Fire Management Assistance
HMP Hazard Mitigation Plan
OKC Oklahoma County
OKOEM Oklahoma County Office of Emergency Management
NOAA National Oceanic Atmospheric Administration

Although the Oklahoma County Wildland Task Force, consisting of fire apparatus from multiple departments of the county, has responded to multiple large fires outside of the county since 2012, only one F-MAG declared fire has occurred in the municipalities included in this plan in recent years. See the jurisdictional annexes for available wildland fire data by year.

Probability of Future Events

Historically, many wildfires in the County and its jurisdictions have been caused accidentally or incendiary. Therefore, based on historical records and input from the Planning Committee, the probability of occurrence for wildfire in the County and all jurisdictions that have a stated risk in this plan is considered '3 – Likely' (Event is probable within the next three years. Event has a 1 in 3 year's chance of occurring).

VULNERABILITY ASSESSMENT

Overview of Vulnerability

The State of Oklahoma's fire season is from July through April; therefore, the County is vulnerable 10 months of the year according to the Oklahoma Department of Emergency Management.

Impact on Life, Health and Safety, General Building Stock, Critical Facilities and the Economy

Wildfires can cost thousands of taxpayer dollars to suppress and control and involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that excuse volunteers from work to fight these fires (Central Pine Barrens, 2007).

According to 2021 land use/land cover data, approximately 27% of the land in Oklahoma County is grassland, nearly 22% forested and 42% is developed (Table 5.3.9-2). As shown in Figure 5.3.9-2 above, urban areas are located adjacent to wildland interface and intermix areas containing forest, grassland and farmlands. Both vegetation and structures serve as fuel for wildfire events.

Table 5.3.9-2. Land Use Summary for Oklahoma County

Land Use Category	Square Miles, 2021 data	Percent of Oklahoma County	Square Miles Gained or Lost since 2011
Barren	1.61	0.22%	+0.82
Developed	304.16	42.34%	+12.96
Farmland (Crops, Pasture)	45.75	6.37%	-3.62
Grassland	194.92	27.13%	-15.2
Forested	157.22	21.89%	+3.64 (mostly scrub)
Water	13.28	1.85%	+2.52
Wetlands	1.42	0.2%	-1.11
TOTAL	**718.36**	**100%**	

Source: 2021 NLCD Land Cover, courtesy MRLC

Buildings constructed of wood or vinyl siding or those with wood shingles are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete. According to HAZUS-MH's default general building stock database, compiled from Census 2000 data, approximately 65% of the buildings in the County are constructed of wood.

Wildfire can also severely impact roads and infrastructure. Of particular note, Interstates 35, 235, 40 and 44 are located in the wildfire hazard area. Major north-south and east-west corridors through the County are vulnerable to this hazard which should be considered for evacuation route purposes.

It is recognized that a number of critical facilities are located in the wildfire hazard area, and are also vulnerable to the threat of wildfire. Many of these facilities are the locations for vulnerable populations (i.e., schools, senior facilities) and responding agencies to wildfire events (i.e., fire, police). Table 5.3.9-3 summarizes critical facilities identified by the Oklahoma County plan participants that are located within the wildfire hazard area (interface or intermix) obtained through the SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison.

Table 5.3.9-3. Facilities in the WUI

Name	Municipality	Type
Arcadia City Hall	Arcadia (C)	Government Facility
Bethany Water Treatment Plant	Bethany (C)	Government Facility
Deaconess At Bethany Hospital	Bethany (C)	Medical
Choctaw Police Dept	Choctaw (C)	Police
Choctaw Police Dept	Choctaw (C)	Police
Choctaw Fire Department	Choctaw (C)	Fire
Choctaw City Hall	Choctaw (C)	Government Facility
Fire Station #4	Edmond (C)	Fire
Fire Station #3	Edmond (C)	Fire
Fire Station #5	Edmond (C)	Fire
Fire Dept Apparatus Storage Bdg	Edmond (C)	Fire
Edmond Medical Center	Edmond (C)	Medical
MAC - Senior Center	Edmond (C)	Shelter
PSC Admin Building	Edmond (C)	Government Facility
PSC OPs Building	Edmond (C)	Government Facility
PSC OPs Yard	Edmond (C)	Government Facility
XTimbers Animal Welfare	Edmond (C)	Government Facility
Forest Park City Hall	Forest Park (C)	Government Facility
Forest Park Police Dept	Forest Park (T)	Police
Town of Forest Park Fire Dept.	Forest Park (T)	Fire
Family Care Center	Harrah (C)	Medical
Luther City Hall/Police Station	Luther (C)	Police
Luther City Hall	Luther (C)	Government Facility
Luther Mill And Farm Supply	Luther (C)	Other
Hickory Hills Volunteer Fire Department	Luther (T)	Fire
Fire Station 5	Midwest City (C)	Fire
Midwest Regional Medical Center	Midwest City (C)	Medical
Renaissance Medical Center	Midwest City (C)	Medical
MWC Animal Shelter	Midwest City (C)	Municipal Government
MWC Water Treatment Plant	Midwest City (C)	Municipal Government
Nicoma Park City Hall	Nicoma Park C)	Government Facility
Nicoma Park Police Dept	Nicoma Park (C)	Police
Nicoma Park Fire Department	Nicoma Park (C)	Fire
U.S. Filter--Deer Creek Wwtp	Oklahoma County	HAZMAT storage area

Source: Radeloff et al, 2021; Oklahoma County HMP Committee

A loss of any of these facilities would be an impact on the residents in the listed community. A loss of a fire station may result in a delayed response. A water treatment plant loss could result in significant challenges to waste water disposal. A loss of a water treatment plant could hamper firefighting efforts and the availability of fresh clean water for drinking, sanitation and watering plants. Animal welfare buildings are often near capacity and loss of a facility would be additional stress on other animal rescue facilities and the potential loss of animal lives. Loss of a medical facility could result in delayed treatments and residents needing to drive further or be transported for care. Loss of administrative facilities would likely result in a loss of equipment and records, further challenging the community to maintain normal services.

Due to a lack of data regarding past structural and economic losses specific to Oklahoma County or its municipalities, it is not possible to estimate losses due to wildfire events at this time. All jurisdictions that are susceptible to wildfires in the plan have residences in the WUI. These homes, their occupants and animals, storage barns, some businesses, and infrastructure such as street signs, water wells, oil wells, power poles, and other utility infrastructure are vulnerable to this hazard.

Future Growth and Development

As discussed in Section 4, areas targeted for future growth and development have been identified across the County. Approximately 40 percent of the County is considered to lie within the WUI zone (University of Wisconsin, date unknown). Any areas of growth within this 40 percent could be potentially impacted by the wildfire hazard due to exposure and vulnerability. With continued growth in nearly all the communities as shown in the latest Census statistics in the annexes, additional structures, infrastructure and people are likely to become vulnerable to this hazard, with neighborhoods often developed in the wildland-urban interface. Areas of new development and known vulnerabilities to this hazard are identified in each jurisdictional annex.

Effect of Climate Change on Vulnerability

Projected increases in temperatures that can dry fine fuels such as grasses and enhanced wet/dry cycles that promote vegetation growth and drying or dormancy, coupled with population growth along the wildland-urban interface, suggests the risks of wildfires is likely to continue to increase [SCIPP, 2018].

Additional Data and Next Steps

Data regarding the construction of structures in the study area, such as roofing material, fire detection equipment, structure age, etc., and proximity to fast burning/high intensity vegetative communities should be identified for further evaluation. Development and availability of such data would permit a more detailed estimate of potential vulnerabilities, including loss of life and economic damages, based on the population and resources exposed to the hazard.

Historic wildfire extent maps were not readily available and will be required to identify the geographic locations where wildfires have taken place in the past and areas prone to wildfires. Such data can be developed over time; however, based on the frequency of past wildfire events in the County, collection of this data is a lower priority than data collection for more prevalent hazard categories.

A Community Wildfire Protection Plan (CWPP) to identify and target areas for potential wildfire mitigation is planned to supplement this document at a later date. This could potentially open additional funding mechanisms for wildfire risk reduction.

Overall Vulnerability Assessment

It is not possible to predict when and where a fire will start. Oklahoma County and its local fire departments are well-equipped and prepared to respond to moderate size fires as they arise. However, large F-MAG level fires can exceed the availability of manpower and equipment in the county.

The status of fire risk in the County will continue to be monitored and ongoing and new mitigation efforts to prevent fires and control them when they arise will continue to be developed.

5.3.10 TORNADO AND WIND

HAZARD PROFILE

Description

For the purpose of this HMP and as deemed appropriated by Oklahoma County, the wind hazard includes windstorms and tornadoes, which are defined below.

Windstorm: High winds can result from thunderstorms, strong cold front passages, or gradient winds between high and low pressure moving across Oklahoma County. High winds, sometimes referred to as "straight-line" winds, are speeds reaching 58 mph or greater, either sustaining or gusting. Wind is defined as the movement of air relative to the earth's surface. Downdraft winds are a small-scale column of air that rapidly sinks toward the ground, usually accompanied by precipitation as in a shower or thunderstorm. A downburst is the result of a strong downdraft associated with a thunderstorm that causes damaging winds near the ground. These winds can range from light breezes to sustained speeds of 80 to 100 mph.

Tornado: Tornadoes are traditionally defined as a violently rotating column of air that reaches from the bottom of a cumulonimbus cloud to the ground. Tornadoes are found in severe thunderstorms, but not all severe thunderstorms will contain tornadoes. While all tornadoes touch both the ground and the bottom of a cloud, it is possible for only part of the tornado to be visible. A tornado may be on the ground for only a few seconds, or last for over an hour. Tornadoes can appear in a variety of shapes and sizes ranging from thin ropelike circulations to large wedge shapes greater than one mile in width. However, a tornado's size is not necessarily related to its wind speed. The strongest tornadoes can have wind speeds in excess of 200mph and typically come from supercells, or individual storms not in a line. QLCS, or quasi-linear convective complexes are lines of storms sometimes capable of producing generally short-lived tornados along the leading edge of a line of storms. QLCS tornadoes have received more attention recently in our area, perhaps due to climate variation and better detection from dual-polarization radar technology, and awareness of weather environments capable of producing the phenomenon. Over 80% of Oklahoma tornadoes have struck between 3PM and 9PM, but can still occur anytime. Spring is the peak season for Oklahoma tornadoes, but they can form during any season when the necessary atmospheric conditions of wind shear, lift, instability, and moisture are present.

Extent

The extent (that is, magnitude or severity) of a severe storm is largely dependent upon sustained wind speed. Straight-line winds, winds that come out of a thunderstorm, in extreme cases, can cause wind gusts exceeding 100 mph. These winds are most responsible for hailstorm and thunderstorm wind damage and could happen in any jurisdiction in Oklahoma County in the future. One type of straight-line wind, the downburst, can cause damage equivalent to a strong tornado (NVRC, 2006).

Tornado

The magnitude or severity of a tornado was originally categorized using the Fujita Scale (F-Scale) or Pearson Fujita Scale introduced in 1971, based on a relationship between the Beaufort Wind Scales (B-Scales) (measure of wind intensity) and the Mach number scale (measure of relative speed). It is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure (Tornado Project, Date Unknown). The F-Scale categorizes each tornado by intensity and area. The scale is divided into six categories, F0 (Gale) to F5 (Incredible) (Edwards, 2011). Table 5.3.10-1 explains each of the six F-Scale categories.

Table 5.3.10-1. Fujita Damage Scale

Scale	Wind Estimate (MPH)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: SPC, Date Unknown

The strongest tornado experienced on the F scale was the Moore F5 tornado of May 3rd 1999 that reached Oklahoma County in the F4 stage, traveling through Tinker AFB and southwest Midwest City.

The Enhanced Fujita Scale (EF) Scale became operational on February 1, 2007. It is used to assign tornadoes a 'rating' based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of Damage Indicators (DIs) and Degree of Damage (DOD), which help better estimate the range of wind speeds produced by the tornado. From that, a rating is assigned, similar to that of the F-Scale, with six categories from EF0 to EF5, representing increasing degrees of damage. The EF Scale was revised from the original F-Scale to reflect better examinations of tornado damage surveys. This new scale has to do with how most structures are designed (NOAA, 2008). Table 5.3.10-2 displays the EF Scale and each of its six categories.

Table 5.3.10-2. Enhanced Fujita Damage Scale

F-Scale Number	Intensity Phrase	Wind Speed (mph)	Type of Damage Done
EF0	Light tornado	65–85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	Moderate tornado	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	Significant tornado	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	Severe tornado	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	Devastating tornado	166-200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	Incredible tornado	>200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Source: SPC, 2007

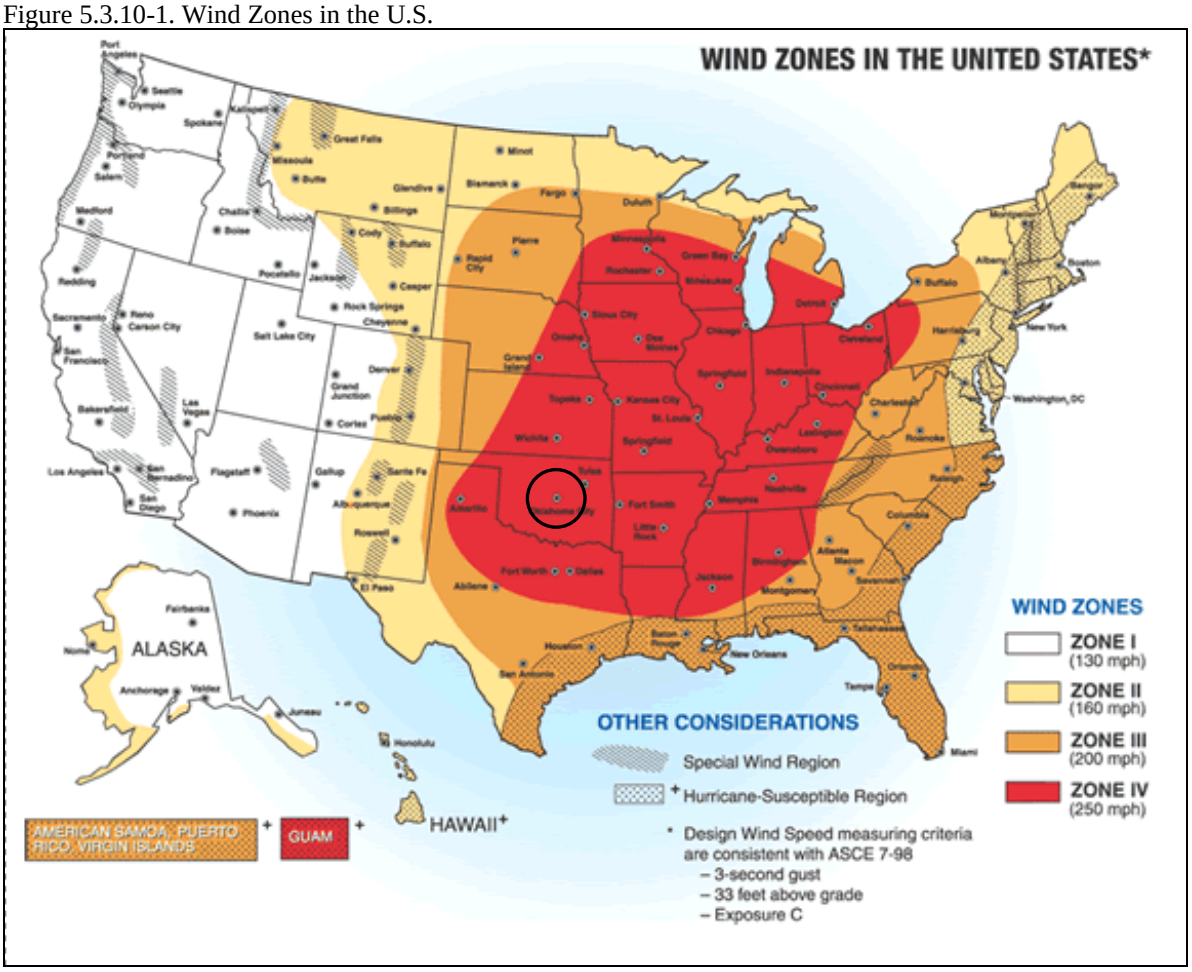
The strongest tornado experienced on the EF-Scale so far has been the EF4 Tornado of May 10, 2010 which traveled from Norman to 1.5 miles SSE of Harrah. The damage in unincorporated Oklahoma County and south Harrah was mostly EF2 and EF3. Oklahoma County and its jurisdictions could experience a tornado of any range on this scale in the future. History shows most tornadoes have been in the EF0-EF1 range.

Location

Windstorms

Oklahoma County is located in Wind Zone IV with speeds up to 250 miles per hour (FEMA, 2008) (Figure 5.3.10-1).

Figure 5.3.10-1. Wind Zones in the U.S.



Source: FEMA, 2010
Note: The black circle indicates the approximate location of Oklahoma County.

Tornado

The U.S. experiences more tornadoes than any other country. In a typical year, approximately 1,000 tornadoes affect the U.S. The peak of the tornado season is April through June, with the highest concentration of tornadoes in the central U.S. Figure 5.3.10-2 shows the total number of tornados in Oklahoma by County.

Figure 5.3.10-2. Total Number of Tornadoes in Oklahoma by County, 1950 to 2023

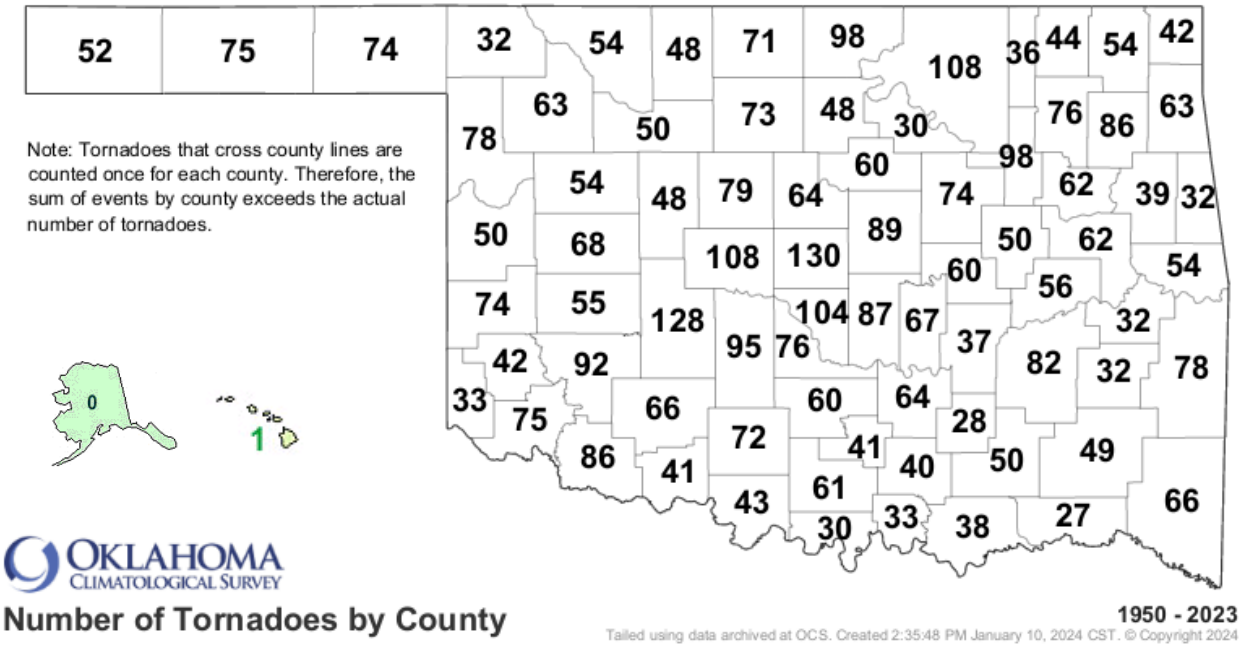


Figure 5.3.10-3. Tornadoes in Oklahoma County with path width data, 1950 to 2023. Image from NWS Norman

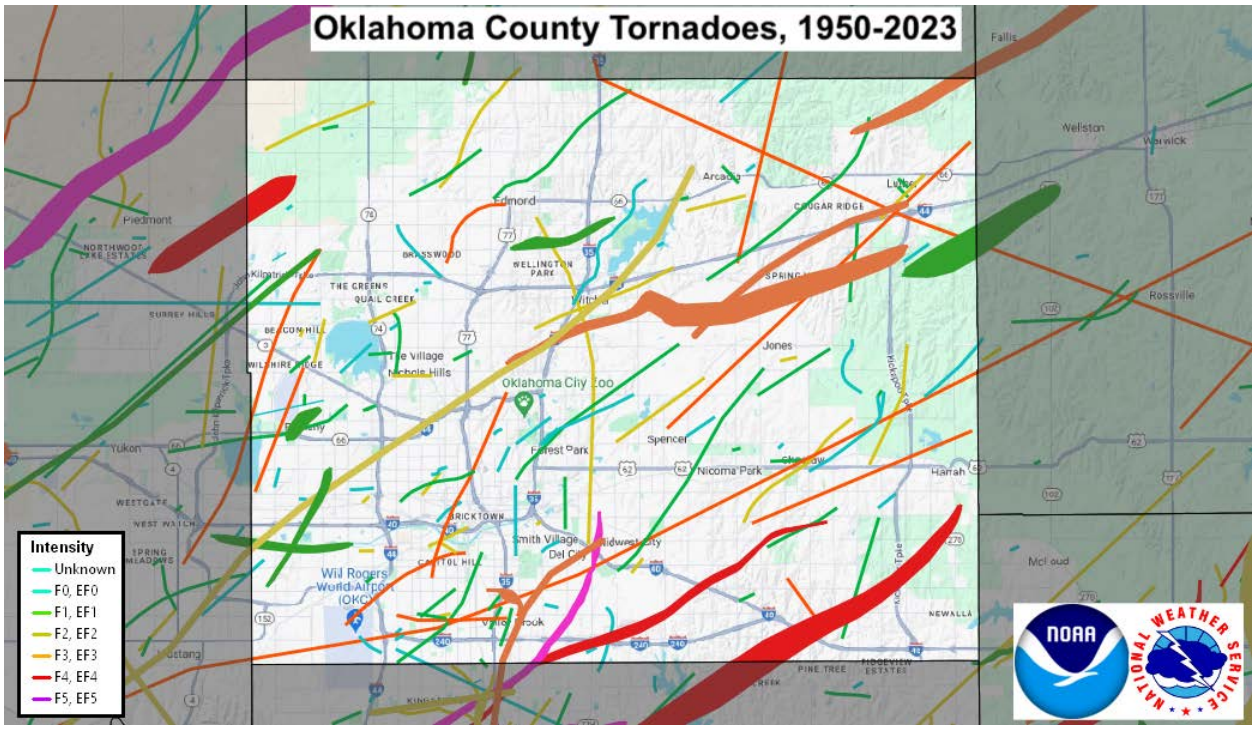
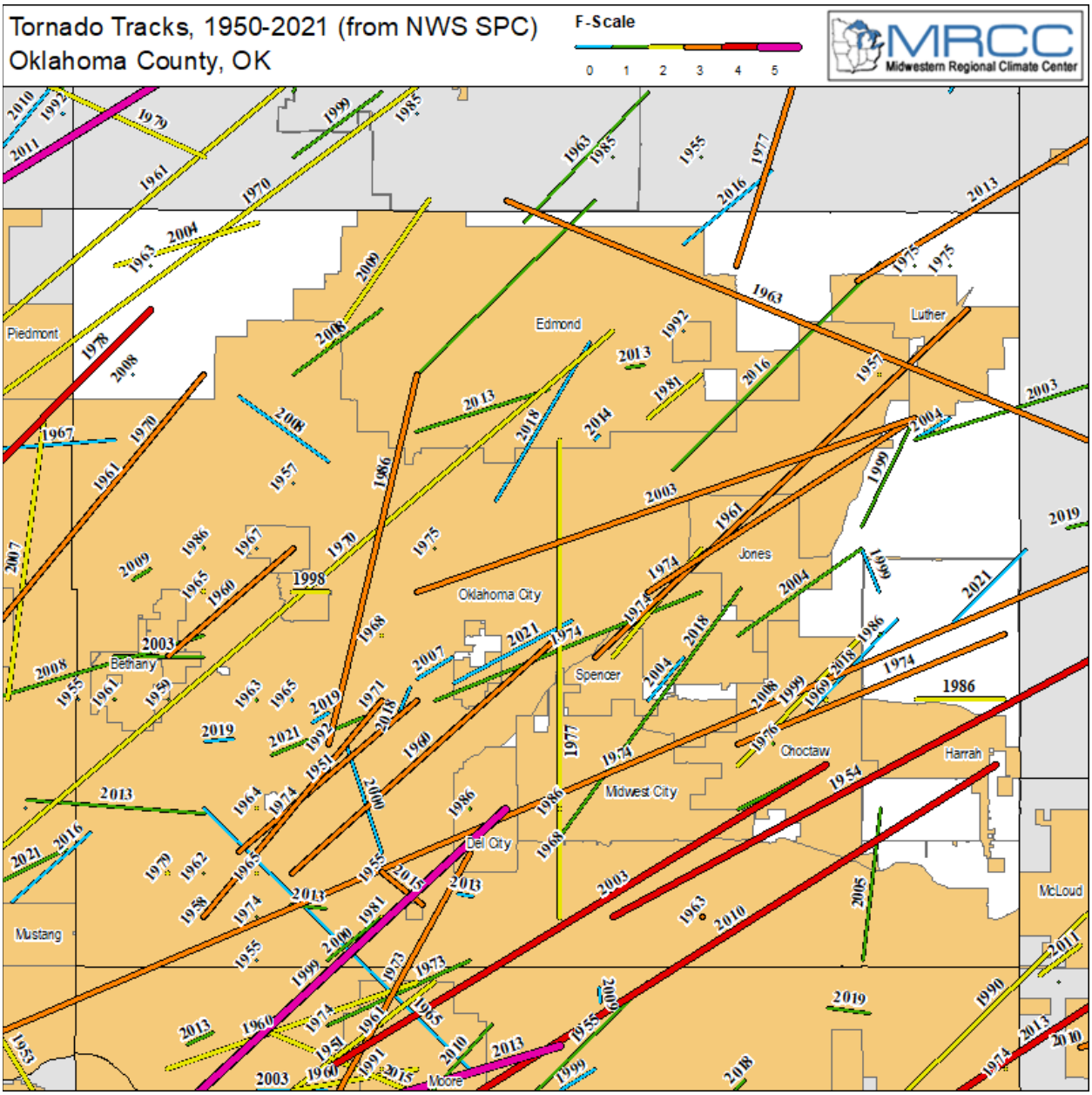


Figure 5.3.10-4.5. Tornadoes in Oklahoma County, 1950 to 2021. Image from MRCC at Purdue University.



Previous Occurrences and Losses

Between 1954 and 2023, FEMA declared that the State of Oklahoma experienced 42 wind-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: severe storms, tornadoes, straight-line winds, heavy rains, hail, and flooding. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations. Of those events, FEMA other sources indicate that Oklahoma County has been declared as a disaster area as a result of 12 wind and tornado events (FEMA, 2023).

Based on all sources researched, known tornado and severe wind events that have affected Oklahoma County and its municipalities are identified in Table 5.3.10-3. With wind event documentation for the State being so extensive, not all sources have been identified or researched. Therefore, Table 5.3.10-3 may not include all events that have occurred throughout the County and region.

Table 5.3.10-3. Tornado and Wind Events between 2013 and 2023

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
May 19, 2013	Tornado	DR-4117	Yes	. Multiple tornados touched down in Edmond, Arcadia Lake and Luther that was rated up to EF2 that created damage to buildings. An estimate of damages was not available.	NOAA-NCDC
December 14, 2014	Tornado	N/A	N/A	These storms occasionally exhibited supercell characteristics, producing large hail and funnel clouds. One very brief EF0 tornado occurred over northeastern Oklahoma county including Arcadia.	NOAA-NCDC
March 25, 2015	Tornado	N/A	N/A	A tornado was spotted in Bethany with multiple buildings sustaining severe damage.	NOAA-NCDC
May 06, 2015	Tornado	N/A	N/A	This tornado was a part of a larger strong system that lasted for several days that brought about much flooding. The tornado rated as a EF3 with a two mile path length located near I-35 and 44th St. One fatality was reported.	NWS
April 26, 2016	Tornado	N/A	N/A	An EF0 tornado was spotted just south of Lake Arcadia in Edmond that caused an estimated 4.00K damage. An EF1 tornado traveled from 4 NW Jones to 3 NNW Luther. An EF0 tornado started 3 N Arcadia and traveled to 7 SSW Meridian.	NOAA-NCDC
May 19, 2017	Wind	N/A	N/A	Many trees downed and power poles snapped in Luther.	NOAA-NCDC
October 9, 2018	Tornado	N/A	N/A	Several small “QLCS” tornados developed along the leading edge of a tropical-like line of storms. One tornado apparently started on Tinker AFB and traveled NNE through a shopping center east of Air Depot Blvd and I-40 (SE 29th & Town Center Dr.), damaging the roof of the JC Penny’s store and a few homes. Cars were flipped on Tinker AFB and in front of the JC Penny store. Two buildings suffered roof damage on Tinker AFB. Additional QLCS intermittent tornado damage around Spencer and Jones from the same circulation. A total of four areas of rotation crossed the county, with another QLCS tornado east of I-35 in Edmond. It traveled from SE of NE 122nd/I-35 to SE of Danforth/Midwest. Tree damage was seen in Edmond.. A separate tornado destroyed an outbuilding just south of NE 23rd and Choctaw Road and produced tree damage to NE 63rd and Peebly..	Local Media, Midwest City FD reports, Tinker AFB Fire Dept
March 13, 2019	Wind	N/A	N/A	Non-thunderstorm winds tore part of the roof off the Del City Fire Station #2 east of SE 15th & Sunnylane Rd.	NOAA-NCDC

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
April 18, 2019	Wind	N/A	N/A	A thunderstorm produced scattered wind damage, with a power pole down at 23rd & Draper in Nicoma Park and a tree down on the road near NE 36th and Henney in Choctaw.	NOAA-NCDC
June 9, 2019	Wind	N/A	N/A	Numerous power poles damaged around NW 178th and MacArthur in unincorporated Oklahoma County.	NOAA-NCDC
August 26, 2019	Wind, Tornado	N/A	N/A	In Del City, the Community Center's roof was peeled back and HVAC units moved. A church on SE 22nd had their roof collapse and the front of the Dollar Tree store collapsed near SE 15th & Sunnylane Rd In Choctaw, pieces of surface roof material were blown off a middle school gymnasium. Tinker AFB measured 81 mph and a gust to 84 near Rose State College. A large tree was uprooted near Putnam City HS in Warr Acres. Wiley Post Airport gusted to 69 mph. A tornado from Logan Co moved SSW barely crossing into OK County near Waterloo/Santa Fe producing minor tree damage.	KWTV-9, NOAA-NCDC, NWS Norman
July 11, 2020	Wind	N/A	N/A	Power lines reported downed in at least two locations in Midwest City. A gust to 64 mph was reported.	NOAA-NCDC
October 10, 2021	Tornado	N/A	N/A	An EF-0 tornado developed SW of 63rd/Dobbs Rd in unincorporated Oklahoma City and traveled NE to Britton/Pottawatomie Rd. One mobile home sustained roof damage, estimated $20K.	NOAA-NCDC, NWS Norman
October 13, 2021	Tornado	N/A	N/A	A QLCS storm system produced an EF0 tornado from NE 36th & Bryant Ave which moved northeast, dissipating NW of NW 63rd and Midwest Blvd. Damage was generally broken tree branches. This was the third tornado produced by this cell.	NOAA-NCDC
October 14, 2021	Wind	N/A	N/A	Sheet metal roofing peeled off a shopping center near SE 15th/Sunnylane Rd. in Del City with power poles leaning. Numerous large trees downed. 70 mph gust reported near SE 15th & Sooner Rd. Power lines down and trees uprooted along SE 15th between Air Depot and Sooner Rd.	NOAA-NCDC
April 23, 2022	Wind	N/A	N/A	Two EF-0 tornados produced tree damage in a path from 3 miles WSW Harrah north of Reno / Peebly to the Kickapoo Turnpike south of NE 10th within a much broader area of wind damage. This tornado moved northeast. A second tornado north of this location in the unincorporated area just southwest of 63rd / Peebly tracked south-southeast near Peebly to between 63rd and 50th St creating light tree damage.	NWS Norman

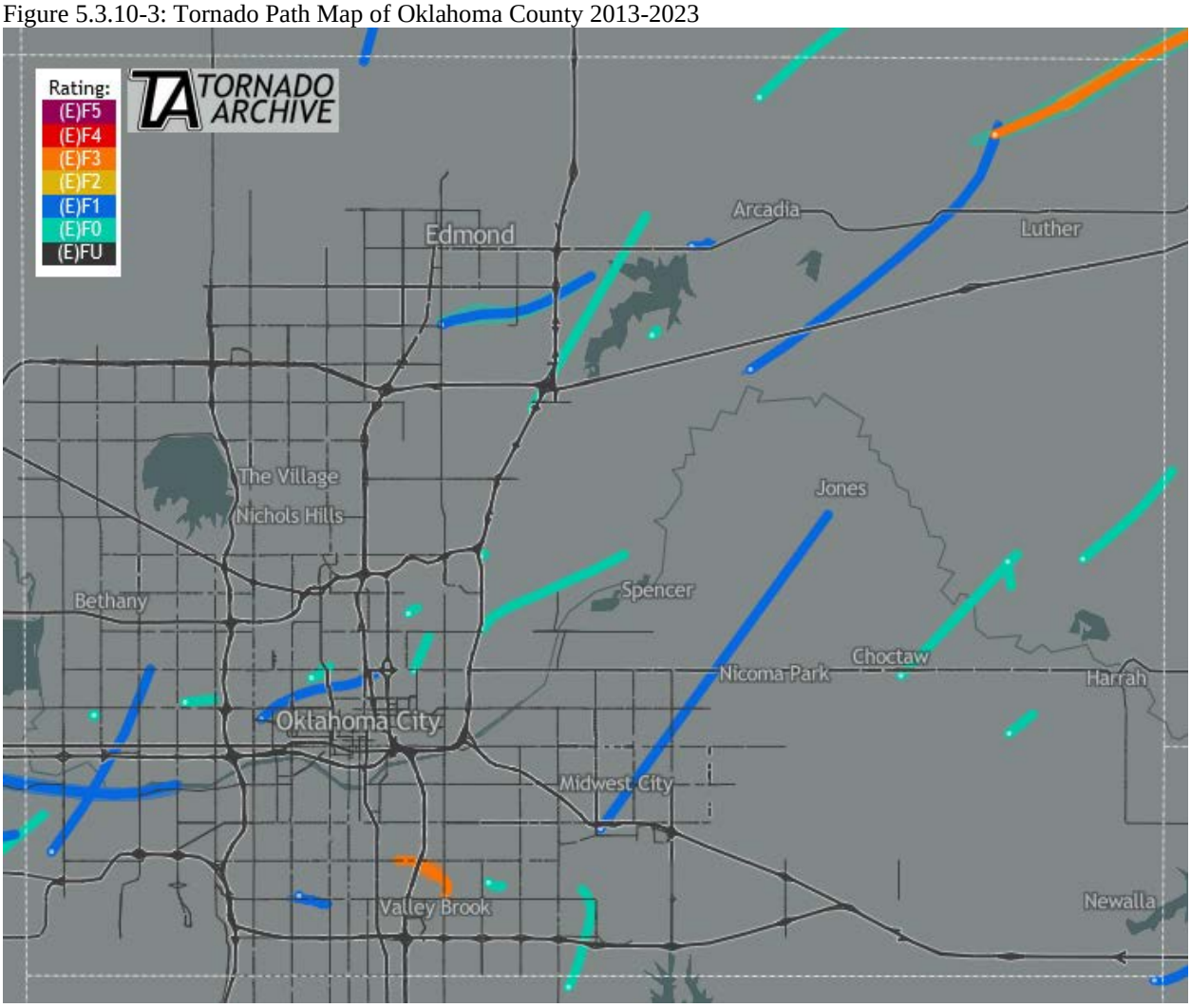
Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
August 28, 2022	Wind	N/A	N/A	Power poles snapped near Danforth & Bryant in Edmond.	NWS Norman
June 17, 2023	Wind	N/A	N/A	Numerous gusts around 60 mph widespread through the county. In Nicoma Park, numerous large tree limbs over 12" in diameter blown down. In Edmond, a 12-18" diameter tree snapped at the base in a neighborhood SW of Edmond Rd & Santa Fe Ave. A power pole was snapped in Luther.	NWS Norman
September 5, 2023	Wind	N/A	N/A	Storms developed behind a cold front with pre-frontal temperatures of 100F. Several power lines down on Britton Rd. east of Luther Rd to Moccasin Ln. Power lines down at 5255 N Peebly Rd. A powerline fell on a building at Tim Holt & Church in Harrah.	OCSO Dispatch

Sources: FEMA, NOAA-NCDC, NWS, SHELDUS
Note: Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

DR	Federal Disaster Declaration
EM	Federal Emergency Declaration
FEMA	Federal Emergency Management Agency
K	Thousand ($)
M	Million ($)
Mph	Miles Per Hour
NCDC	National Climate Data Center
NOAA	National Oceanic Atmospheric Administration
NWS	National Weather Service
OKC HMP	Oklahoma County Hazard Mitigation Plan
SHELDUS	Spatial Hazard Events and Losses Database for the U.S.

Figure 5.3.10-3 illustrates the path of recent tornado events in Oklahoma County.

Figure 5.3.10-3: Tornado Path Map of Oklahoma County 2013-2023



Source: Tornado Archive, 2024

Probability of Future Events

Based on historical records and input from the Planning Committee, the probability of occurrence for wind or tornado events in the County is considered '4 – Highly Likely' (Event is probable within the calendar year. Event has a 1 in 1 year chance of occurring).

It is estimated that Oklahoma County will continue to experience direct and indirect impacts of wind events annually that may induce secondary hazards such as infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents and inconveniences.

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For wind events, the entire Oklahoma County has been identified as the hazard area. Therefore, all assets in the County (population, structures, critical facilities and lifelines), as described in the County section, are vulnerable.

Overview of Vulnerability

The high winds of a wind storm, thunderstorm, and tornado often result in power outages, disruptions to transportation corridors and equipment, loss of workplace access, significant property damage, injuries and loss of life, and the need to shelter and care for individuals impacted by the events. A large amount of damage can be inflicted by trees, branches, and other objects that fall onto power lines, buildings, roads, vehicles, and, in some cases, people. Additionally, some storm events can bring heavy rainfall causing flooding and related damages.

The entire inventory in Oklahoma County is at risk of being damaged or lost due to impacts of wind. Certain areas, infrastructure, and types of building are at greater risk than others due to proximity to falling hazards and manner of construction. The vulnerability of various structure types was exampled for high wind speed events for Oklahoma County. The potential impacts on population, existing structures and critical facilities are presented below, following a summary of the data and methodology used.

Impact on Life, Health and Safety

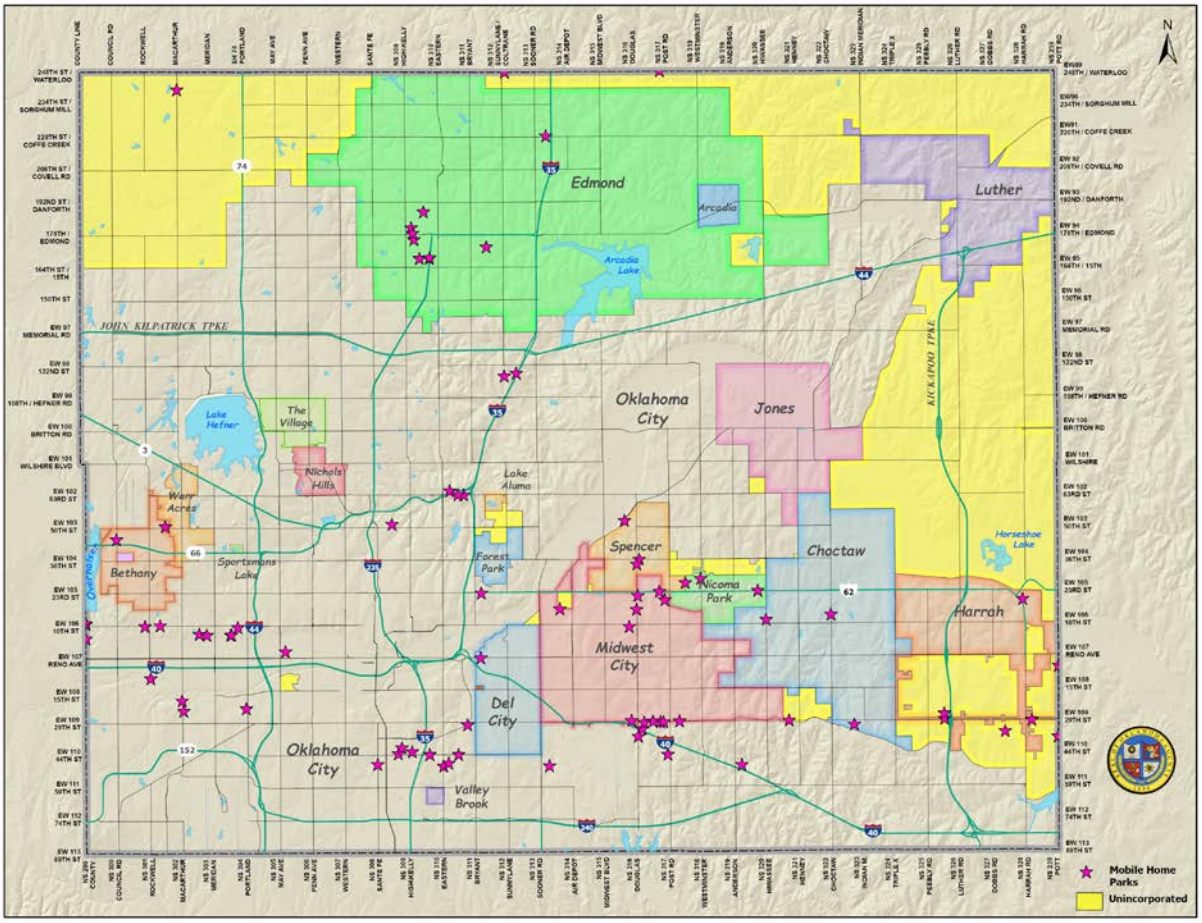
The impact of tornadoes and the wind hazard on life, health, and safety depends on factors such as the severity of the event and the adequacy of advance warning provided to residents. All residents of Oklahoma County are at risk from these events.

Unfortunately some tornadoes strike with little or no warning and residents must act quickly. The following populations are more vulnerable to a tornado and wind event: 1) population located in communities without or have ineffective early warning systems; 2) population with functional needs and/or over the age of 65 because they may have more difficulty evacuating or seeking shelter; 3) economically disadvantaged populations because they are likely to evaluate their risk and make decisions based on the major economic impact to their family and may not have funds to evacuate; 4) population with a language barrier unable to following warning messages; 5) population in mobile homes; and 5) population in automobiles at the time of a tornado. The elderly and functional needs populations are considered most vulnerable because they require extra time or outside assistance to seek shelter and are more likely to seek or need medical attention which may not be available due to isolation during and/or after an event.

Post-event residents should take extreme caution when returning home and walking through debris. Residents should not re-enter damaged buildings or homes until authorities say it is safe.

Additionally, flying debris (or windborne missiles) can cause much damage. On occasions where wind speeds are high enough, missiles can be thrown at buildings, with enough force to penetrate windows, walls, or the roof. This can be seen through an example of a 15 pound object being carried by a 250 mph wind at speeds of an excess of 100 mph. This is enough force to penetrate most common building materials used in houses today. Due to the ability that these missiles have to penetrate walls and roofs, not only do they pose a threat to the buildings, but the occupants as well.

Figure 5.3.10-4.6. Mobile Home Parks in Oklahoma County, 2023



Source: Oklahoma County, 2023

Impact on General Building Stock and Critical Facilities

After considering the population exposed to the wind hazard the vulnerability of the built environment was examined. The entire study area is considered at risk to the wind hazard.

Damage to buildings is dependent upon several factors including wind speed, storm duration, path of the tornado, distance from the tornado funnel and building construction. Because of differences in building construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Wood and masonry buildings in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. High-rise buildings are also very vulnerable structures. Mobile homes are the most vulnerable to damage, even if tied down, and offer little protection to people inside.

Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage and impacts can result in the loss of power, which can impact business operations and can impact heating or cooling provision to citizens (including the young and elderly, who are particularly vulnerable to temperature-related health impacts). Post-event, there is a risk of fire, electrocution or an explosion.

Impact on Economy

Wind events and tornadoes can greatly impact the economy, including: loss of business function, damage to inventory, relocation costs, wage loss and rental loss due to the repair/replacement of buildings. Recovery and clean-up costs can also be costly and impact the economy as well. In addition, smaller jurisdictions may fall upon economic hardship due to the destruction caused by a tornado/high wind event due to a lack of funding resources needed to repair or replace destroyed infrastructure.

Future Growth and Development

As discussed and illustrated in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the wind hazard because the entire planning area is exposed and vulnerable. Please refer to Section 4 (County Profile) for a map that illustrates where potential new development is located. With most of the jurisdictions reporting growth in the 2020 Census, exposure to this hazard will continue to grow with new buildings, trees planted as landscape, additional vehicles and infrastructure all vulnerable.

Effect of Climate Change on Vulnerability

More favorable environments for severe thunderstorms are expected and increases in severe wind occurrences are projected. Climate models project an increase in the frequency and intensity of severe thunderstorms over the Southern Great Plains (including the planning area), especially during the peak storm season (March, April, May). Uncertainty remains, however, in the assumption that the favorable environments will reach their potential of producing damaging winds. Records from the past 40 years indicate that while the number of days with tornadoes has decreased, the frequency of days with multiple tornadoes, or tornado outbreaks, has increased. In other words, when tornadoes do occur, they are now more likely to happen in the context of a tornado outbreak (Kossin et al. 2017).

Overall Vulnerability Assessment

Oklahoma County is highly vulnerable to tornado and wind events which can cause significant impacts and losses to the area's structures, facilities, utilities, and population. Existing and future mitigation efforts should continue to be developed and employed that will enable the study area to be prepared for these events when they occur.

5.3.11 SEVERE WINTER STORM

HAZARD PROFILE

Description

Winter Storm can refer to a combination of winter precipitation, including snow, sleet and freezing rain. A severe winter storm can range from freezing rain or sleet to moderate snow over a few hours to blizzard conditions and extremely cold temperatures that lasts several days.

Severe snow storm is one that drops 4 or more inches of snow during a 12–hour period, or 6 or more inches during a 24- hour span.

Blowing snow is wind-driven snow that reduces visibility and causes significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground and picked up by the wind.

Blizzards occur when falling and blowing snow combine with high winds of 35 mph or greater reducing visibility to near zero.

Sleet is frozen precipitation that has melted by falling through a warm layer of the atmosphere and then refreezes into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not immediately stick to objects. However, it can accumulate like snow and cause a hazard to motorists.

Freezing rain is rain that falls as liquid onto a surface with a temperature below freezing. This causes the drops to freeze on contact onto surfaces like trees, utility lines, cars, and roads, forming a coating or glaze of ice. Even small accumulations of ice can cause a significant hazard.

Ice storms are extended freezing rain events, lasting several hours to sometimes days, when the freezing rain accumulates a thick enough glaze on surfaces to damage trees, utility lines, and cause major travel hazards. Ice storms can result in a heavy glaze an inch thick or more, but even a quarter inch ice accumulation can cause problems under windy conditions.

Extent

The magnitude or severity of a severe winter storm depends on several factors including a region's climatologically susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and time of occurrence during the day (e.g., weekday versus weekend), and time of season.

The NWS issues advisories to potential severe winter storms. The criteria for these advisories can vary from place to place. Those advisories include:

- Winter Storm Watch – A winter storm watch is issued by the NWS when there is a potential for heavy snow or significant ice accumulations, usually at least 24 to 36 hours in advance.
- Winter Storm Warning – A winter storm warning is issued when a winter storm is producing or is forecast to produce heavy snow or significant ice accumulations.
- Winter Weather Advisory – A winter weather advisory is issued when a low pressure system produces a combination of winter weather (snow, freezing rain, sleet) that present a hazard, but not does meet warning criteria.

- Blizzard Warning – A blizzard warning is issued for winter storms with sustained or frequent winds of 35 mph or greater with a considerable falling and/or blowing snow that reduces visibility to one-quarter of a mile or less. These conditions are expected to prevail for at least three hours.
- Frost Advisory – A frost advisory is issued during the growing season when widespread frost formation is expected over an extensive area. Surface temperatures are usually in the mid 30°Fs.
- Freeze Warning – A freeze warning is issued during the growing season when surface temperatures are expected to drop below freezing over a large area for an extended period of time, regardless whether or not frost develops (NWS, 2009).

This plan utilizes a range of physical intensities for winter storm events. These intensities are displayed in Table 5.3.11-1 and include potential effect for each intensity to Oklahoma County.

Table 5.3.11-1. Range of Physical Intensities for Winter Storm Events

Level	Type of Event	Effect
Level 1 – Nuisance Event No major impact	Little snow/ice accumulation. Roads not hazardous.	Little to no effect.
Level 2 – Minor Event Caution advised	Dusting to three inches of snow. No measurable ice. Winter weather advisory	Untreated roadways may be hazardous and slick. Livestock may need additional supplemental feed.
Level 3 – Major Event	Significant snow accumulation of four to eight inches. Ice accumulations of ¼ to ½ inch. Reduced visibility. Wind causing drifting snow. Winter storm warning.	Widespread hazardous road conditions. Travel discouraged. Areas isolated because of drifting snow. Isolated power outages because of down power lines from ice accumulation. Tree damage. Livestock loss potential increases, supplemental feed necessary.
Level 4 – Extreme Event	Crippling event. Snow accumulations over eight inches; winds over 35 mph. Drifting snow, little to no visibility. Ice accumulations of more than ½ inch. Blizzard warning.	Road conditions hazardous to impassable. People and livestock isolated. Widespread power and utility outages. Infrastructure damage. High potential for loss of livestock. Structures threatened from accumulating snow and ice. Communications infrastructure lost from ice accumulation. May be a long lasting event.

Source: Oklahoma State HMP, 2011

The largest snowfall ever recorded in a day in Oklahoma County was 13.5" on December 24, 2009. The greatest seasonal snowfall (September – April) was 24.4" in the winter of 1967-1968. The annual average snowfall is 6.9". Ice storms in Oklahoma County are sometimes mixed with sleet and snow. A typical minor icing event is a glaze of ice. Historic ice storms in Oklahoma have produced 1-3" of ice and therefore a future event of this magnitude is possible in the planning area based on historic data.

Location

The entire County and State of Oklahoma is susceptible to winter storms.

Previous Occurrences and Losses

Many sources provided historical information regarding previous occurrences and losses associated with severe winter storm events throughout the State of Oklahoma and Oklahoma County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

According to NOAA's NCDC storm events database, Oklahoma County experienced 71 days of severe winter weather events between 1996 and 2023. The accumulation of property damages are underestimated at over $154 million (NCDC, 2024). Due to much of the claim data held by private insurance agencies, the actual total is likely significantly higher.

Between 1954 and 2023, FEMA declared that the State of Oklahoma experienced 21 winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: snowstorm, severe winter storm, snow, ice storm, and flooding. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations. Of those events, Oklahoma County has been included in 11 winter storm-related disaster and/or emergency declarations (FEMA, 2023).

Based on all sources researched, known winter storm events that have affected Oklahoma County and its municipalities are identified in Table 5.3.11-2. With winter storm documentation for the State being so extensive, not all sources have been identified or researched. Therefore, Table 5.3.11-2 may not include all events that have occurred throughout the County and region.

Table 5.3.11-2. Winter Storm Events Between 2013 and 2023.

Incident Period	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
November 27-28, 2015	Winter Storm	DR-4247	Yes	An ice storm warning was in effect that included Oklahoma County. Precipitation was measured at 2.2 inches during this time frame at Will Rogers Airport. Multiple power lines were downed, and large swaths of the county were affected with power outages during this time. This ice storm created approx. ¾" of ice in the west metro from Bethany and Warr Acres to Nichols Hills and The Village.	OEM, FEMA, AccuWeather, Corps of Engineers
December 27-28, 2015	Winter Storm	DR-4256	No	Due to freezing temperatures and precipitation, Oklahoma County saw an ice storm exactly one month from the previous event. Roads & bridges were icy with multiple incidents seeming from the event. Power outages were widespread in parts of the county due to 40 mph wind gusts with the ice. At least one fatality was reportedly due to the severe weather.	OEM, FEMA, OK Office of Chief Medical Examiner, Corps of Engineers
January 13-15, 2017	Ice Storm	N/A		Heaviest ice amounts fell in the far west metro. .1" reported in Edmond near Covell/I-35, .15" reported in Warr Acres near NW 63rd/MacArthur. A glaze in the east metro.	NOAA-NCDC, NOAA-WPC
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused several trees to fall on power lines in Jones. Snowfall amounts ranged from ½" in Edmond to 6 inches at I-240 & Anderson Rd in OKC with 5" in Midwest City and 5.5" at Choctaw. Heaviest snow totals were in the southern 1/3rd of the county.	NOAA-NCDC, NOAA-WPC
February 5, 2020	Heavy Snow	N/A	N/A	3 to 6 inches of snow fell across the county. 5.4" in Edmond, 4.8" in Deer Creek (Unincorporated), 4" in Warr Acres, 4" in Harrah and 2.5" in Midwest City.	NOAA-NCDC, NOAA-WPC
October 26-29, 2020	Ice Storm	4575-DR	Yes	Over 60% of the county was without power by October 27th. The worst icing occurred just west of the metro, with parts of the Deer Creek area (unincorporated) receiving 0.75" of ice along with Lake Overholser just west of Bethany. Near 63rd & Peebly Rd, 0.6" of ice. Power pole snapped in The Village. Warr Acres had .5" of ice along with Nichols Hills where a large pine tree was uprooted. Harrah reported 0.4" of ice and lots of tree damage. Additional structure fires resulted from alternative heating sources. Substantial debris clean-up projects resulted in all jurisdictions. This is the only October ice storm on record.	NWS Norman, NOAA-WPC
December 13, 2020	Heavy Snow	N/A	N/A	A general 3 to 5 inches fell across the county, with a maximum of 5.5 inches reported near the Deer Creek High School (unincorporated). 3.8" fell near 2nd/Broadway in Edmond, 4" in Midwest City and Del City, 4.5" in Jones, and 5" in Choctaw.	NOAA-NCDC, NOAA-WPC

Incident Period	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts	Source(s)
December 15, 2020	Winter Storm	N/A	N/A	Generally, 3-4 inches of snowfall accumulation was reported across the county.	NOAA-NCDC, NOAA-WPC
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain accretion of 0.25" to 0.35" was reported across the county. Wiley Post airport at Bethany reported 0.34" of ice, and 8" of snow was reported in Bethany. Heavy snow reported during the early morning Jan 1st with 8" in Choctaw, 6" in Deer Creek at NW 206/May, 6" in Jones and Midwest City near Reno /Midwest Blvd, 5.5" near 2nd/Broadway in Edmond, up to 5 inches falling 1 mile SSW Choctaw.	NOAA-NCDC
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Numerous traffic accidents reported due to light icing on bridges.	NOAA WPC
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	4 to 7.5 inches of snow fell across the county, with the highest reported in Edmond. 5.6" was reported near Lake Arcadia. 6" was reported on the north side of Lake Hefner near The Village, 6.5" at the TV stations near Nichols Hills, 6" north of Wiley Post airport near Warr Acres, and 4" in Midwest City.	NOAA-NCDC
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	An additional 2 to 5 ½ inches across the county with a maximum of 5.6 inches reported 5 mi. ESE Edmond. 4.5" was reported in eastern Deer Creek (unincorporated), Choctaw had 4" and Warr Acres 3".	NOAA-NCDC
February 2-3, 2022	Heavy Snow	N/A	N/A	Snowfall amounts ranged from 3 to almost 5 inches across the county, with the heaviest in southwest OKC. Midwest City had 4.5", Nichols Hills 3.2", Nicoma Park 4", Choctaw 5.8", and Jones 5".	NOAA-NCDC
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county. 4" fell in eastern Deer Creek (unincorported).	NOAA-NCDC
March 11, 2022	Winter Storm	N/A	N/A	2-3" of snow fell across the county. 3" of snow fell at Harrah, and 2.4" at Midwest City. 2" at Choctaw, 1" at Nichols Hills, 2.5" near Bethany.	KOCO

Sources: NOAA-NCDC, NOAA-WPC, FEMA, NWS, SHELDUS, OEM, local TV stations, others as listed

Note: Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

DR	Disaster Declaration	N/A	Not Applicable
EM	Emergency Declaration	NCDC	National Climatic Data Center
FEMA	Federal Emergency Management Agency	NOAA	National Oceanic and Atmospheric Administration
K	Thousand ($)	NWS	National Weather Service
M	Million ($)	OEM	Oklahoma Department of Emergency Management
Mph	Miles per hour	SHELDUS	Spatial Hazard Events and Losses Database for the United States

Probability of Future Events

Winter storm hazards in Oklahoma are typically mild in comparison with other states because these events are not as frequent and regular. Winter weather tends to magnify the effects on the population when it does occur. Based on historical data, Oklahoma County will experience another winter storm in the near future and should expect similar characteristics and effects from winter storms.

In Section 5.3, the identified hazards of concern for Oklahoma County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Due to the lack of large geographical elevation changes and based on historical records and input from the Planning Committee, the probability of occurrence for severe winter storms in the County and all plan participating jurisdictions is the same and is considered '3 - Likely' (Event is probable within the next three years. Event has a 1 in 3 year's chance of occurring).

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For severe winter storm events, the entire County has been identified as the hazard area. Therefore, all assets in Oklahoma County (population, structures, critical facilities and lifelines) are vulnerable. The unhoused are particularly vulnerable to winter weather.

Overview of Vulnerability

Severe winter storms are of significant concern due to the direct and indirect costs associated with these events; delays caused by the storms; and impacts on the people and facilities of the region related to snow and ice removal, health problems, cascade effects such as utility failure (power outages) and traffic accidents, and stress on community resources.

Data and Methodology

National weather databases and local resources were used to collect and analyze severe winter storm impacts on Oklahoma County and the participating municipalities.

Impact on Life, Health and Safety

For the purposes of this HMP, the entire population of Oklahoma County is exposed to severe winter storm events. Snow accumulation and frozen/slippery road surfaces increase the frequency and impact of traffic accidents for the general population, resulting in personal injuries. The elderly are considered most susceptible to this hazard due to their increased risk of injuries and death from falls and overexertion and/or hypothermia from attempts to clear snow and ice. In addition, severe winter storm events can reduce the ability of these populations to access emergency services. Residents with low incomes may not have access to housing or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply). Refer to Table 4-1 in the County Profile for population statistics for each participating municipality and a summary of the more vulnerable populations (over the age of 65 and individuals living below the Census poverty threshold). Some residents have been known to run generators inside their structure, risking carbon monoxide poisoning.

Impact on General Building Stock

The entire general building stock inventory in Oklahoma County is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content.

Impact on Critical Facilities

Full functionality of critical facilities such as police, fire and medical facilities is essential for response during and after a severe winter storm event. Because power interruption can occur, backup power is recommended for critical facilities and infrastructure. Infrastructure at risk for this hazard includes roadways that could be damaged due to the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires infrastructure to clear roadways, alert citizens to dangerous conditions, and following the winter requires resources for road maintenance and repair. Additionally, freezing rain and ice storms impact utilities (i.e., power lines and overhead utility wires) causing power outages for hundreds to thousands of residents. This can precipitate a cascading event of sheltering, even though some or most of the sheltering options within the community are impacted by the event.

Impact on Economy

The cost of snow and ice removal and repair of roads from the freeze/thaw process can drain local financial resources. The potential secondary impacts from severe winter storms also impact the local economy including loss of utilities; interruption of transportation corridors; loss of business function, etc.

Future Growth and Development

As discussed and illustrated in Section 4, areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the severe winter storm hazard because the entire planning area is exposed and vulnerable. For the severe winter storm hazard, the entire County has been identified as the hazard area. With additional people moving to the area as shown by the Census statistics in Section 9, most jurisdictions will continue to grow, therefore increasing the number of persons and amount of infrastructure exposed to the hazard. Please refer to Section 4 (County Profile) for land use maps that illustrate where planned unit development (PUD) is located.

Effect of Climate Change on Vulnerability

Models suggest although the number of snowfall events will likely continue to decrease, when snow [or other precipitation] does occur, accumulations will be greater due to increases in atmospheric moisture (Krasting et al. 2013; Easterling et al. 2017) [SCIPP, 2018].

Overall Vulnerability Assessment

Existing and future mitigation efforts should continue to be developed and employed that will enable the study area to be prepared for these events when they occur. The cascade effects of severe winter storm events include utility losses and transportation accidents and flooding. Losses associated with the flood hazard are discussed in Section 5.3.11. Particular areas of vulnerability include low-income and elderly populations, mobile homes, and infrastructure such as roadways and utilities that can be damaged by such storms and the low-lying areas that can be impacted by flooding related to rapid snow melt.

SECTION 6: MITIGATION STRATEGIES

This section describes the process by which the Oklahoma County Planning Committee performed the update to the county and local mitigation strategies. This section includes:

(1) Review and Update Mitigation Goals and Objectives and Update of capability Assessment
(2) Review of Progress on 2019 Mitigation Strategy
(3) Identification, analysis, and implementation of potential mitigation actions

Initial Planning Committee Meeting (Meeting #1)

The process for this update was a bit different than past updates. The initial meetings were to familiarize the participants with the process and provide knowledge of the contents of the plan. Possible project ideas were presented for consideration, and sources of funding. The new 2023 hazard mitigation planning requirements were presented.

Plan Progress Meeting (Meeting #2)

At the second meeting of the Planning Committee, the discussion took on a greater detailed approach. Sections of the plan requiring update were identified. Priorities for mitigation were discussed based on hazard frequency trends. The mitigation planning goals and objectives identified in the 2019 plan remained unchanged. A disaster's role in hazard mitigation funding was explained and information provided on how to apply for grants.

Review and Update Mitigation Goals and Objectives and Update of Capability Assessment

All participating jurisdictions were emailed an electronic copy of their annex with a detailed list of items to consider for update. The request asked for updated contact info, updated mitigation capabilities and a request to review their mitigation actions from the 2019 plan and determine if their initiatives priorities were to change and which projects would be deleted/added. Additionally, participants were asked about ongoing project initiatives and/or any completed projects from the 2019 plan.

It was discovered during the previous planning update it is more efficient to hold meetings with the jurisdictions separately to update the local annexes. Two of the jurisdictions chose to handle the update via electronic communications.

During the meetings and through the forms provided, the following questions and talking points were asked and discussed:

- What changes in population patterns (migration, density or the makeup of social vulnerable populations) are you seeing in your jurisdiction?
- What changes in land use are occurring if any?
- What areas are developing, if any, and is it commercial or residential?
- How have changes in development, if any, altered vulnerabilities? This includes shifts in the needs of underserved communities and gaps in social equity and changes in codes and regulations.
- Have any risks changed within the individual jurisdictions within the past five years (i.e. increases or decreases to flooding risks and the wildland urban interface)?

- Does the jurisdiction have any assets outside of the municipality (i.e. water wells) and what hazards are they vulnerable to?
- What plans were updated to include information from the mitigation plan?
- How will the jurisdiction continue to participate in the plan maintenance process?
- Have any risks changed within the individual jurisdictions within the past five years (i.e. increases or decreases to flooding risks and the wildland urban interface)?

The recent spike in inflation has affected all our jurisdictions in similar ways, reducing how far the dollar will fund mitigation efforts. This was mentioned by several participants in individual jurisdiction meetings. Some jurisdictions experienced minor changes in priorities as reflected by deleted projects noted in the jurisdictional annexes. A few projects were adjusted in priority.

Throughout the planning process, the relevance of the original goals and objectives continued to be evaluated for possible amendment based on the risk assessment results, discussions, research, and input from the committee, existing authorities, polices, programs, resources, and stakeholders within the planning area. The committee considered whether these goals and objectives complemented and supported other related planning documents and mechanisms including:

- County and Local Comprehensive/Master Plans
- Other county and municipal planning and land use documents

The goals and objectives from the original Plan were retained as they were found to embody the overarching needs and concerns of the planning partnership in addressing natural hazard risk reduction, and are in-line with the State mitigation goals.

The Oklahoma State HMP goals and objectives are:

1. Protect Life
2. Protect Property
3. Protect the Environment
4. Increase Public Preparedness for Disasters

The following are the mitigation goals and objectives for the ongoing Oklahoma County HMP:

Goal 1: Emergency Services

Goal Description: Improve the ability of the emergency services providers to respond to events and to aid in the overall recovery of the community. Promote interoperable communications between departments responsible for emergency operations and integrate the mitigation planning process into the overall emergency planning program for the community.

Objective 1. Set clear policy with high-level approval for the continued advancement of the community emergency management program.

Objective 2. Establish mutual aid programs and improve the ability for these various departments to communicate effectively in adverse conditions.

Objective 3. Establish mitigation projects to help ensure that critical emergency response facilities can continue operations during and after large-scale events.

Goal 2: Prevention

Goal Description: Prevention measures are intended to keep a hazard risk problem from occurring or getting worse. They help ensure that future development does not increase hazard losses. Communities can achieve significant progress toward hazard resistance through prevention measures. This is particularly true in areas that have not been developed or where capital investment has not been substantial. Using prevention measures, future development can be guided away from hazards, while maintaining other community goals such as economic development and quality of life.

Objective 1. Consider 'best-practices' mitigation measures when updating the comprehensive community land use and economic development plans.

Objective 2. Modify local codes to regulate the placement and construction of new facilities when the natural hazard risk is high for the specific area.

Objective 3. Integrate overall mitigation strategies into the community's current and future capital improvements program to help ensure that new projects have a minimal associated risk.

Goal 3: Protecting Critical Facilities

Goal Description: There are many locations throughout the community that are considered critical for any emergency response and others that are necessary for the recovery process. These locations must be protected in order to ensure that loss of life and additional damages can be avoided.

Objective 1. Avoid locating new facilities in high risk areas and work to make improvements to existing locations to aid in the mitigation of potential losses.

Objective 2. Implement voluntary and regulated programs to help ensure continued improvement to building structures, locations and on-going emergency planning initiatives.

Goal 4: Protection of Life and Property

Goal Description: This goal is associated with the implementation of activities that protect citizen life and property by making critical facilities, homes and businesses more resistant to damage from natural events. The goal is to reduce existing risk as much as possible and keep the community stable and capable of continuity when hazards strike.

Objective 1. Identify repetitive loss locations and reduce this impact on the public by convincing the individuals choosing to remain in high risk areas to accept responsibility for their choice. Promoting private insurance coverage, acquisition and relocation are ideal ways to achieve this objective.

Objective 2. Promote voluntary property improvements by individuals to reduce property vulnerability and related economic impacts.

Objective 3. Research funding opportunities to support increased mitigation activities.

Objective 4. Update and improve hazard assessment information in order to make better decisions about mitigation strategies.

Goal 5: Public Awareness and Partnerships

Goal Description: Promote coordination and communication between individual citizens, private businesses, public agencies and non-profit organizations to improve the overall ability of the community to respond to and recover from a natural disaster. From these partnerships, encourage leadership to prioritize and undertake specific projects for mitigation.

Objective 1. Educate the public about the risks associated with natural hazards and the steps they can take to be prepared.

Objective 2. Initiate programs to promote on-going partnerships within the community to address mitigation and emergency management.

Objective 3. Establish public programs and regulations for community involvement in emergency planning, including regular open forum meetings and an on-going public awareness campaign.

Goal 6: Structural Projects

Goal Description: Implement public works projects that improve the protection of important developed areas in the community.

Objective 1. Continually assess and evaluate the requirements for new structural projects that aid in the reduction of community risk.

Objective 2. Maintain these structural projects properly and regularly.

Identification, Prioritization, Analysis, and Implementation of Mitigation Actions

The update of the county and municipal mitigation strategies included a review of past mitigation activities, progress on the mitigation strategies identified in the 2019 Plan, and identification of new mitigation actions to be included in this update. The following section describes how the county and local mitigation strategies were updated.

Throughout the planning process, the County and municipalities were encouraged to consider their natural hazard risks and vulnerabilities, as identified specifically by the jurisdiction based on past and recent experience, through the results of the updated risk assessment, and based on stakeholder input, and to identify appropriate projects or initiatives to help mitigate those risks.

Proposed Mitigation Actions

All proposed mitigation actions were identified in relation to the goals and objectives presented above. The mitigation actions include a range of options in line with the six types of mitigation actions described in FEMA guidance, including:

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

2. **Property Protection:** Actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples

include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.

3. **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

4. **Natural Resource Protection:** Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

5. **Emergency Services:** Actions that protect people and property, during and immediately following, a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.

6. **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.

Mitigation Actions

The mitigation actions are the key element of the natural hazards mitigation plan. It is through the implementation of these actions that Oklahoma County and the participating jurisdictions can strive to become disaster-resistant through sustainable hazard mitigation. For the purposes of this Plan, mitigation actions are defined as follows:

Mitigation actions are activities designed to reduce or eliminate losses resulting from natural hazards.

Although one of the driving influences for preparing this Plan was grant funding eligibility, its purpose is more than just access to federal funding. It was important to the Planning Committee to look at mitigation actions that will work through all phases of emergency management. Some of the actions outlined in this Plan may not be grant eligible as grant eligibility was not the focus of the selection. Rather, the focus was the actions' effectiveness in achieving the goals of the Plan and whether they are within the County or each jurisdiction's capabilities.

A series of mitigation actions were identified by the County and each participating jurisdiction. These actions are summarized in Section 9 of this Plan. Along with the hazards mitigated, goals and objectives met, lead agency, estimated cost, potential funding sources and the proposed timeline are identified. The parameters for the timeline are as follows:

- Short Term = To be completed in 1 to 5 years
- Long Term = To be completed in greater than 5 years
- Ongoing = Currently being funded and implemented under existing programs. If the item has a planned completion, an estimated end month and year was provided.

Prioritization

Section 201.c.3.iii of 44 CFR requires an action plan describing how the actions identified will be prioritized. Oklahoma County and the planning committee developed a prioritization methodology for the Plan that meets the needs of the County and participating jurisdictions while at the same time meeting the requirements of Section 201.6 of 44 CFR. The mitigation actions identified were prioritized according to the criteria defined below.

- **High Priority:** A project that meets multiple plan goals and objectives, benefits exceed cost, has funding secured under existing programs or authorizations, or is grant-eligible, and can be completed in 1 to 5 years (short-term project) once the project is funded.
- **Medium Priority:** A project that meets at least one plan goal and objective, benefits exceed costs, funding has not been secured and would require a special funding authorization under existing programs, grant eligibility is questionable, and could be completed in 1 to 5 years once the project is funded.
- **Low Priority:** A project that will mitigate the risk of a hazard, benefits exceed costs, funding has not been secured, and project is not grant-eligible and/or timeline for completion is considered long-term (5 to 10 years).

The 2020 pandemic affected the ability to perform mitigation in the municipal jurisdictions as the focus became procuring personal protective supplies and distribution and social distancing was the norm through 2021 and after during COVID surges. Increased costs of materials with post-pandemic inflation has also contributed to a slight reduction in mitigation activities. The current Plan's standings in priorities has been reflected in the prioritization of the mitigation projects, at least in part, by economic factors. Many projects that had previously labeled "short termed" remain on the initiatives for the next five years due to the aforementioned pandemic, inability to meet matching funds required of grants or benefit vs. cost. None of the jurisdictions identified significant political or legal challenges to mitigation and all jurisdictions opted to use the same prioritization parameters that were used in the original HM Plan as outlined in the Benefit/Cost Review section found below.

Benefit/Cost Review

Section 201.6.c.3iii of 44CFR requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost/benefit review of the proposed projects and their associated costs. The Planning Committee members conducted a review of benefits and costs to determine if each project appears to be cost-effective and to assist the municipality with prioritizing their mitigation actions. This exercise allows the community to select the most cost-effective actions for implementation first, not only to use resources efficiently, but to make a realistic start toward mitigating risks. The same parameters were used by each of the participating jurisdictions as outlined in this Plan.

Please note that this benefit/cost review did not include the level of detail required by FEMA for project grant eligibility under the Hazard Mitigation Assistance (HMA) grant programs. This qualitative approach was used because projects may not be implemented for up to 10 years, and the associated costs and benefits could change dramatically in that time.

Mitigation benefits are future damages and losses that would be eliminated and/or reduced by implementing the proposed mitigation project. Where actual project benefits could be identified per FEMA's benefit calculation methodology (e.g., physical damages, loss of service or function, emergency management costs, etc.), the benefits were noted in Table F of each annex (Section 9) and the appropriate

rating as defined in Table 6-1 was assigned. When project benefits could not be reasonably established, a subjective rating was assigned based on the parameters outlined below.

Where the project cost for each mitigation initiative was reasonably estimated (including preliminary engineering, engineering, design, and construction) the appropriate rating as outlined in Table 6-1 was assigned in Table F of each annex (Section 9). Where actual project costs could not be reasonably established at this time, a best estimate was provided and a subjective rating was assigned as defined below.

Table 6-1. Cost and Benefit Definitions

Costs	
High	Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (for example, bonds, grants, and fee increases) or project costs are greater than approximately $100,000.
Medium	The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years or project costs are between approximately $10,000 and $100,000.
Low	The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program or project costs are less than approximately $10,000.
Benefits	
High	Project will have an immediate impact on the reduction of risk exposure to life and property or benefits are greater than approximately $100,000.
Medium	Project will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property or benefits are between approximately $10,000 and $100,000.
Low	Long-term benefits of the project are difficult to quantify in the short term or benefits are less than approximately $10,000.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly. For many of the initiatives identified, Oklahoma County and participating jurisdictions may seek financial assistance under FEMA's HMGP, BRIC, or FMA programs. These programs require detailed benefit/cost analysis as part of the application process. These analyses will be performed when funding applications are prepared, using the FEMA model process. The Planning Committee is committed to implementing mitigation strategies with benefits that exceed costs. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Committee reserves the right to define "benefits" according to parameters that meet its needs and the goals and objectives of this plan.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

The annexes presented in Section 9 present the results of applying the prioritization methodology presented to the set of mitigation actions identified by the County and each participating jurisdiction, and includes the following prioritization parameters:

- Number of objectives met by the initiative
- Benefits of the project (high, medium, or low)

- Cost of the project (high, medium, or low)
- Do the benefits equal or exceed the costs?
- Is the project grant-eligible?
- Can the project be funded under existing programs and budgets?
- Priority (high, medium, or low)

The annexes in Section 9 of this Plan present the County's and each participating jurisdiction's mitigation action implementation strategy including:

- Mitigation actions for individual and multiple hazards
- Mitigation goals and objectives supported by each action.
- Implementation priority
- Potential funding sources for the mitigation action (grant programs, current operating budgets or funding, or the agency or jurisdiction that will supply the funding; additional potential funding resources are identified)
- Estimated budget for the mitigation action (financial requirements for new funding or indication that the action is addressed under current operating budgets)
- Time estimated to implement and complete the mitigation action
- Existing policies, programs, and resources to support implementation of the mitigation action (additional policies, programs, and resources identified)

Specific mitigation actions were identified to prevent future losses; however, current funding is not identified for all of these actions at present. Oklahoma County and the participating jurisdictions have limited resources to take on new responsibilities or projects. The implementation of these mitigation actions is dependent on the approval of the local elected governing body and the ability of the community to obtain funding from local or outside sources.
In general, mitigation actions ranked as high priorities will be addressed first. However, medium or even low priority mitigation actions will be considered for concurrent implementation. Therefore, the ranking levels should be considered as a first-cut, preliminary ranking and will evolve based on input from planning area departments and representatives, the public, OEM, and FEMA as the Plan is implemented.

SECTION 7: PLAN MAINTENANCE PROCEDURES

This section describes the system that Oklahoma County and all participating jurisdictions have established to monitor, evaluate, and update the mitigation plan; implement the mitigation plan through existing programs; and solicit continued public involvement for plan maintenance.

MONITORING, EVALUATING AND UPDATING THE PLAN

This section presents the procedures for monitoring, evaluating, and updating the plan.

The Oklahoma County Hazard Mitigation Planning Committee ("Planning Committee") intends to remain intact as the organization responsible for monitoring, evaluating and updating this Plan. The Oklahoma County Hazard Mitigation Planning Coordinator, Mr. Greg Whitworth (Oklahoma County Emergency Management) shall continue to act as the coordinator for the planning committee. Each participating jurisdiction is expected to maintain a municipal hazard mitigation representative to support their jurisdiction's input to the monitoring, evaluation and updating responsibilities identified in this Section. For most jurisdictions, the representative is the Emergency Manager or Fire Chief. Table 7-1 identifies the representation of the County Hazard Mitigation Team as of the date of this Plan. Ongoing municipal hazard mitigation planning points-of-contact are identified in each jurisdiction's annex (Section 9).

Oklahoma County will continue to include representatives from several departments and work groups to assist with in-house monitoring, work planning and follow-through for the Oklahoma County Hazard Mitigation Plan. Represented groups and departments include:

- Emergency Management
- Planning
- Engineering
- Floodplain Management
- Highway Districts (1, 2, 3)

It is recognized that individual commitments change over time, and it shall be the responsibility of each jurisdiction and its representatives to inform the County HMP Coordinator of any changes in representation by formal letter. The County HMP Coordinator shall maintain the current membership of the planning committee and municipal representatives on the Oklahoma County Hazard Mitigation Plan public website at https://www.oklahomacounty.org/departments/emergency-management.

Monitoring and Evaluating:

The County HMP Coordinator shall be responsible for monitoring progress on, and evaluating the effectiveness of the Plan, and documenting this with Oklahoma Department of Emergency Management (OEM) and FEMA. The evaluation of the mitigation plan is an assessment of whether the planning process and actions have been effective, if the Plan goals are being reached, and whether changes are needed. These evaluations will assess whether:

- Goals and objectives address current and expected conditions.
- The nature or magnitude of the risks have changed.
- Current resources are appropriate for implementing the HMP and if different or additional resources are now available.

- The actions were cost effective.
- Schedules and budgets are feasible.
- Implementation problems, such as technical, political, legal or coordination issues with other agencies exist.
- Outcomes have occurred as expected.
- Changes in municipal resources impacted plan implementation (for example, funding, personnel, and equipment)
- New agencies/departments/staff should be included, including other local governments as defined under 44 CFR 201.6.
- Documentation for hazards that occurred during the last five years.

Finally, the planning committee will evaluate how other programs and policies have conflicted with or augmented planned or implemented measures, and shall identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions (see the "Implementation of Mitigation Plan through Existing Programs" subsection later in this Section).

Plan Review:

For the purpose of the Emergency Management Performance Grant Program, the plan will be reviewed annually by stakeholders in the jurisdictions found in this plan. These reviews are generally cursory with minor updates. Outside of times post-disaster, full evaluation begins in the third year of the life of the plan and continues through the update process. Copies of the plan are emailed to each jurisdiction by the County Hazard Mitigation Plan Coordinator. The stakeholders are responsible for meeting with their jurisdictional representatives and reviewing information needed to update the plan. Often a meeting is held with the jurisdiction representative(s) in year four to assist with the review and update process.

Post-Disaster:

After a declared disaster or major hazard event in the County, the County HMP Coordinator and ongoing County Hazard Mitigation Team may elect to meet with the planning partnership to:

- Discuss ongoing recovery and public assistance efforts.
- Discuss data and information collection on the disaster/event.
- Evaluate the effectiveness of mitigation projects completed in the county and participating municipalities.
- Identify specific areas of vulnerability evident in the wake of the disaster/event.
- Identify potential mitigation actions and opportunities to address new areas of vulnerability.
- Discuss current or anticipated grant opportunities (e.g., HMGP) in the wake of the disaster/event.

Plan Maintenance and Updating

44 CFR 201.6.d.3 requires that local hazard mitigation plans be reviewed, revised as appropriate, and resubmitted for approval to remain eligible for benefits awarded under DMA 2000. It is the intent of the Oklahoma County Hazard Mitigation Team to update this Plan on a five-year cycle from the date of initial plan adoption. Ongoing maintenance and updating of the Plan shall be the responsibility of the County HM Coordinator. The Hazard Mitigation Plan is discussed regularly at meetings of the Eastern Oklahoma County Fire Chiefs, which many of the jurisdictions attend. It is also mentioned at the Metro Fire Chiefs meeting during the update process. The jurisdictions are encouraged to send the County HM

Coordinator updates and project ideas for inclusion in the plan throughout the year. The local municipalities in the plan hold staff meetings when updating the plan and its related content, along with open public forums at planning commission and city council meetings. The process to update the plan is identified from the events in Table 3-2 of Section 3 and is a general guide for future processes. This process begins late in the second year of the plan's life cycle with the creation of a timeline for updating the plan followed by collection of the latest FEMA planning documentation. A list of items needing updates is sent to the location jurisdiction and a presentation is created for public meetings. It includes two opportunities to meet as a group with all jurisdictions to review what needs to be updated in the plan, followed by individual meetings with most jurisdictions at later dates to answer questions and complete missing information. The jurisdictions are expected to meeting internally with their representatives prior to the final meeting to collect information for the plan update.

IMPLEMENTATION OF MITIGATION PLAN THROUGH EXISTING PROGRAMS

Participating jurisdictions have provided a detailed listing of related programs, through which mitigation planning may be implemented, in the local capability assessments provided in each jurisdictional annex (Section 9). In addition, a full discussion on relevant county and regional programs is provided in Section 3, "Planning Process".

It is the intention of the County Hazard Mitigation Team and participating jurisdictions to incorporate mitigation planning as an integral component of daily government operations. County Hazard Mitigation Team members will work with local government officials to integrate the adopted hazard mitigation goals and actions into the general operations of government and partner organizations. For all plan participants, the officials responsible for updating each document are identified in Section 9, Table D.1 of each jurisdiction annex. These individuals are responsible for reviewing and integrating information from the mitigation strategy into their identified planning mechanisms and coordination with other departments as appropriate, especially during major updates. Further, the standard adoption resolution includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the County Hazard Mitigation Team anticipates that:

1) Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts;
2) This Hazard Mitigation Plan and other planning documents and programs will become mutually supportive efforts that work in concert to meet the goals and needs of the county and municipalities; and
3) Duplication of effort can be minimized.

The information on hazard, risk, vulnerability and mitigation contained in this Plan is based on the best science and technology available at the time of the Plan's preparation. It is recognized by all participating jurisdictions that this information can be invaluable in making decisions under other planning programs, such as comprehensive, long-term community recovery plans, watershed management plans, capital improvement, and emergency management plans. Table 7-1 below includes existing processes and programs through which the mitigation plan should be implemented.

Table 7-1. Existing Processes and Programs for Mitigation Plan Implementation

Process	Action	Implementation of Plan
Administrative	Departmental or organizational work plans, policies, and procedural changes	• Planning Department • Public Works Department • Department of Emergency Management • Engineering • Environmental Health and Safety • Soil and Water Conservation District • Economic Development • Social Services
Administrative	Other organizations' plans	• Include reference to this plan in: o Comprehensive Emergency Management Plans o Comprehensive / Master Plans o Drought Management Plans o Other county and local plans as appropriate
Administrative	Job/Job Descriptions	• Unpaid internships to assist in hazard mitigation plan maintenance
Budgetary	Capital and operational budgets	• Continue to include mitigation related projects in annual Capital Improvement Program. • Leverage mitigation grant funding to support local funding for such mitigation projects.
Regulatory	Executive Orders, ordinances, policies and other directives	• Comprehensive Planning - Institutionalize hazard mitigation for new construction and land use. • Zoning and Ordinances • Building Codes-enforcement of codes or higher standard in hazard areas • Capital Improvements Plan - Ensure that the person responsible for projects under this plan evaluates if the new construction is in a high hazard area, floodplain, etc. so the construction is designed to mitigate the risk. Revise requirements for this plan to include hazard mitigation in the design of new construction. • National Flood Insurance Program – Continue participation in this program. • Prior to formal changes (amendments) to comprehensive plans, zoning, ordinances, capital improvement plans, or other mechanisms that control development must be reviewed to ensure they are consistent with the hazard mitigation plan

Process	Action	Implementation of Plan
Funding	Secure traditional sources of financing	• Apply for grants from federal (including FEMA Hazard Mitigation Assistance (HMA) and HMGP funding programs), state government, nonprofit organizations, foundations, and private sources. • Continue to make use of grant opportunities through U.S. Department of Housing and Urban Development's Community Development Block Grant (CDBG) • Other potential federal, state and regional funding sources include: o Stafford Act, Section 406 – Public Assistance Program Mitigation Grants o Federal Highway Administration o Catalog of Federal Domestic Assistance o United States Fire Administration – Assistance to Firefighter Grants o United States Small Business Administration Pre and Post Disaster Mitigation Loans o United States Department of Economic Development Administration Grants o United States Army Corps of Engineers o United States Department of Interior, Bureau of Land Management o Other sources as yet to be defined • See Appendix G for additional funding sources
Partnerships	Develop creative partnerships, funding and incentives	• Public-Private Partnerships • State Cooperation • In-kind resources
Partnerships	Existing Committees and Councils	• Local Government Committees: o Planning Boards o Zoning Board of Appeals • Climate Change Task Force(s) • Chambers of Commerce • Property Owners Associations
Partnership	Working with other federal, state, and local agencies	• Army Corps of Engineers (USACE) • American Red Cross • Department of Homeland Security (DHS) • Federal Emergency Management Agency (FEMA) • National Oceanic and Atmospheric Administration (NOAA) • National Weather Service (NWS) • National Fire Protection Association (NFPA) • National Park Service • Oklahoma Department of Emergency Management (OEM) • United States Department of Agriculture (USDA) • United States Department of Transportation (USDOT) • United States Geological Survey (USGS) • United Way of Central Oklahoma • Other Non-Profit and NGO Partners

During the annual plan evaluation process, the County Hazard Mitigation Team will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions.

CONTINUED PUBLIC INVOLVEMENT

The Oklahoma County mitigation planning partnership has identified continued public outreach as a high priority mitigation initiative (see Section 9.1). Under this initiative, the partnership will continue to maintain and provide links to the Plan's hazard mitigation webpage, continue to provide public notifications regarding where the public can review the Plan and provide ongoing input, and may include public meetings to further promote awareness of the Plan.

The public will have an opportunity to comment on the Plan during the 5-year plan update. The Oklahoma County HMP Coordinator is responsible for coordinating the Plan evaluation portion of the meeting, soliciting feedback, collecting and reviewing the comments, and ensuring their incorporation in the 5-year plan update as appropriate. Additional meetings may also be held as deemed necessary by the planning group. The purpose of these meetings would be to provide the public with an opportunity to express concerns, opinions, and ideas about the mitigation plan.

Municipal representatives shall be responsible to assure that:

- Public comments and input on the Plan, and hazard mitigation in general, are recorded and addressed, as appropriate. Opportunity to comment on the plan will be provided directly on the project web site. Provisions for public comment in writing will also be made. All public comments shall be addressed to:

  Oklahoma County Hazard Mitigation Coordinator
  Oklahoma County Emergency Management
  320 Robert S. Kerr Avenue, Suite 101
  Oklahoma City, OK 73102-3441
- Copies of the latest approved Plan (or draft in the case that the five-year update effort is underway) are available for review at the locations identified above along with forms and instructions to facilitate public input and comment on the Plan.
- Appropriate local links to the Oklahoma County Hazard Mitigation Plan website are maintained by participating jurisdictions. The web site will be maintained throughout the course of the project, and during the plan implementation phase.
- Public notices are made as appropriate to inform the public of the availability of the Plan, particularly during Plan update cycles.

The Oklahoma County HMP Coordinator shall be responsible to assure that:

- Public comments and input on the Plan, and hazard mitigation in general, are recorded and addressed, as appropriate.
- The Oklahoma County Planning Area HMP website is maintained and updated as appropriate.
- All public and stakeholder comments received are documented and maintained.
- Copies of the latest approved Plan (or draft in the case that the five year update effort is underway) are available for review at the locations identified above, along with instructions to facilitate public input and comment on the Plan.
- Public notices are made as appropriate to inform the public of the availability of the Plan, particularly during Plan update cycles.

SECTION 8: PLANNING PARTNERSHIP

BACKGROUND

A Planning Committee was assembled consisting of representatives from the various Unincorporated County departments and agencies, and representatives from each of the participating municipalities. The Planning Committee was charged with the following:

- Represent their jurisdiction throughout the planning process;
- Ensure that the Plan meets the requirements of DMA 2000 and the latest FEMA and OEM guidance through documents provided by the County Emergency Management staff;
- Assist in gathering information for inclusion in the Plan, including the use of previously developed reports and data;
- Assist with the update of the hazard mitigation planning Goals and Objectives
- Assist with the review of a broad range of potential mitigation initiatives
- Identify, develop and prioritize appropriate mitigation initiatives.
- Develop, revise, adopt, and maintain the Plan in its entirety and their local jurisdictional annex.

JURISDICTION ANNEXES

Jurisdictional annex templates were created to help the plan participants prepare their jurisdiction-specific annexes and ensure all criteria of Section 201.6 of 44CFR would be met, based on the partners' capabilities and mode of operation. A template and detailed instructions were designed to lead each partner through a series of steps that would generate the DMA-required elements that are specific for each partner. Each participating jurisdiction was tasked with completing the template according to detailed instructions, with guidance and technical assistance from the County.

Plan introduction workshops were held in the summer of 2023 followed by local support meetings through June of 2024 for plan participants. Technical support to complete the annexes was available to all plan participants through plan finalization in August of 2024.

The jurisdictional annexes include the following sections/elements:

Section A: Local Mitigation Points-of-Contact

This section identifies the local hazard mitigation planning points-of-contact who provided the primary local support for the plan update (see Section 3, "Planning Process"), and for ongoing plan implementation and maintenance as described in Section 7.

Section B: Municipal Profile

This section provides a profile description of the municipality, and further identifies:

- Any known or anticipated growth and development as provided by the municipality;
- Specific hazard vulnerabilities;
- Completed or ongoing mitigation projects and activities in the municipality, including progress on any local initiatives in the 2019 Plan.

Section C: Natural Hazard Event History Specific to the Municipality

This section allows for each municipality to identify local damages and losses from specific hazard events. The hazard profiles/vulnerability assessments in Section 5 provide further event information on the county and regional level.

Section D: Capability Assessment

This section allows for each municipality to identify their local mitigation capabilities organized as:
Table D.1 – Legal and Regulatory Capabilities
Table D.2 – Administrative and Technical Capabilities
Table D.3 – Fiscal Capabilities
Table D4 – Community Classifications

Section E: Proposed Hazard Mitigation Initiatives

The section provides each jurisdiction's updated local mitigation strategy, including those initiatives that have been carried forward from the 2019 plan, as well as new initiatives. Section 6, "Mitigation Strategy", provides full details on the process by which the county and each municipality updated their mitigation strategy.

Section F: Future Needs to Better Understand Risk/Vulnerability

This section is independent to each jurisdiction's risks and may rely on climate trends and future risks, or data deficiencies.

Section G: Hazard Area Extent and Location

This section maps provides additional geographic detail on the wildland-urban interface and flood inundation risks .

BENEFIT/COST REVIEW

Each jurisdiction's annex includes an action plan of prioritized initiatives to mitigate natural hazards. Section 201.6.c.3iii of 44CFR requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost/benefit review of the proposed projects and their associated costs. In addition, the County and each jurisdiction was requested to provide a project status for each of the projects included in the 2019 HMP as well as summarizing how the 2019 plan was integrated into their planning process.

As part of jurisdiction annex template completion, the Planning Committee was asked to weigh the estimated benefits of a project versus the estimated costs to establish a parameter to be used in the prioritization of a project. The Social, Technical, Administrative, Political, Legal, Economic & Environmental (S.T.A.P.L.E.E.) method was given to all participating jurisdictions as an additional guide for project prioritization. This benefit/cost review was qualitative; that is, it did not include the level of detail required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resistant Communities and Infrastructure (BRIC) grant program. This qualitative approach was used because projects may not be implemented for up to 10 years, and the associated costs

and benefits could change dramatically in that time. Each project was assessed by assigning subjective ratings (high, medium, and low) to its costs and benefits, as follows:

Table 8-2. Benefit/Cost Review

Costs	
High	Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (e.g., bonds, grants, and fee increases).
Medium	The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
Low	The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program.
Benefits	
High	Project will have an immediate impact on the reduction of risk exposure to life and property.
Medium	Project will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.
Low	Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly. For many of the initiatives identified in the action plans, participating jurisdictions may seek financial assistance under FEMA's HMGP, FMA or BRIC programs. These programs may require detailed benefit/cost analysis as part of the application process depending on the type of financial assistance requested. These analyses will be performed when funding applications are prepared, using the FEMA model process. The Planning Committee is committed to implementing mitigation strategies with benefits that exceed costs. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Committee reserves the right to define "benefits" according to parameters that meet its needs and the goals and objectives of this plan.

9.1 COUNTY OF OKLAHOMA

This section presents the jurisdictional annex for Unincorporated Oklahoma County.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
David Barnes, Director Oklahoma County Emergency Management 320 Robert S. Kerr, Suite 101 Oklahoma City, OK 73102 (405) 713-1369 DBarnes@oklahomacounty.org	Greg Whitworth, Resource Specialist Oklahoma County Emergency Management 320 Robert S. Kerr, Suite 101 Oklahoma City, OK 73102 (405) 713-1365 gwhitworth@oklahomacounty.org

B.) COUNTY PROFILE

Please refer to Section 4 of this Plan for details on Oklahoma County's population, location, climate, history, growth and development. Please refer to the hazard profiles in Section 5 for information on identified hazard vulnerabilities throughout the County.

Growth/Development Trends

Over the past five years, there has been some growth in the northwest part of the unincorporated portion of the county, with a total of approximately 500 new residential structures under development. Some development is starting along the new Kickapoo Turnpike, mainly on the north end. The Deer Creek area and Waterloo Rd. area north of Edmond have seen a minor increase in flooding and wildfire risk due to small pockets of development. Meanwhile, the Crutcho Creek project continues to reduce the risk of flooding due to voluntary property acquisitions that have taken place near NE 23rd and Air Depot.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.

The following table summarizes progress on the mitigation strategy identified by Oklahoma County in the 2019 plan.

Completed Initiatives from 2019 plan	Comments
Crooked Oak Creek Drainage Improvement	This was completed as maintenance and may need to be repeated. It will remain in the plan.
North Canadian River Erosion Control Project - Erosion control and channelization at the North Canadian River bridge structure at NE 36th to NE 50th. Stabilize a bend located NW of the river bridge; and stabilize the bank along the east side of Triple X Road	Pending closeout as of 2024. This project was listed twice in the previous plan with different wording.
Install anti-shatter protective film on windows of County Courthouse and Annex buildings.	Added hail resistance and reduces cooling costs.
Backup Generator at the Deer Creek Fire Protection District Station #2	This is expected to be complete in 2025.

Abandoned Initiatives from 2019 plan	Comments
Retrofit roadway structures located in hazard-prone areas in Unincorporated Oklahoma County to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority.	The action lacks specific details about the work being performed, making it insufficient for grant requests.
Purchase, or relocate structures located in hazard-prone areas in Unincorporated Oklahoma County to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority.	This initiative does not define a specific location and therefore was deleted as it is not specific enough for a grant request
Build or procure a structure to protect County EM assets (including vehicles and trailers).	The county is retrofitting and adding on to an existing building that will accomplish this task in 2026.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE COUNTY

Please refer to the Previous Occurrences and Losses section of the appropriate hazard profiles in Section 5.3 of this Plan. A summary of losses within the County to major hazard events is provided below in the table below.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	2011-2012 was the fourth driest two-year period on record and left water storage at reservoirs at an all-time low. An August 4, 2012 fire near Luther consumed almost 60 homes and other structures.
May 18 to Jun. 2, 2013	Tornadoes, Severe Storms, Wind, Flooding	DR-4117	Yes	Major flooding, especially May 31-June 1. One of the worst in the metro's history. Damage includes property loss around NE 36/Triple X Rd. At NE 108/Dobbs, a tinhorn washed out resulting in a fatality accident.
February 2014-July 2014	Drought	N/A	N/A	Drought and freezing weather destroyed the canola crop. Oklahoma County reached D3. Slight drought lingered until April 2015.
May 5-10, 2015	Severe Storms, Flooding	DR-4222	Yes	Major flooding, especially May 6th. Damage includes property loss around NE 36/Triple X Rd. Dobbs Rd washed out between SE 15th & 29th. Crutcho Creek flooded around NE 23rd.
May 23rd 2015	Flooding	DR-4222	Yes	Radar indicates 4-5" fell across the Deer Creek unincorporated area. Numerous roads flooded.
May 25th, 2015	Hail	N/A	N/A	Golf ball hail 4 miles north of Luther near Waterloo Rd. Damage mostly to farms and farm land. No damage estimate provided.
November 27-30, 2015	Winter Storm	DR-4247	Yes	An ice storm warning was in effect that included Oklahoma County. Precipitation was measured at 2.2 inches during this time frame. Multiple power lines were downed and large swaths of the county were affected with power outages during this time.
December 27, 2015 - January 5, 2016	Winter Storm	DR-4256	No	Due to freezing temperatures and precipitation, Oklahoma County saw an ice storm move through its jurisdiction. Roads & bridges were icy with multiple incidents seeming from the event. At least one fatality was reportedly due to the severe weather.
April 26, 2016	Tornado	N/A	N/A	An EF1 tornado traveled from 4 NW Jones to 3 NNW Luther skirting the edge of the

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
				unincorporated county. An EF0 tornado traveled from 3 N Arcadia - 7 SSW Meridian.
July-August 2017	Drought	N/A	N/A	Typical summer ridging high pressure prevented rain across the region.
December 2016 - April 2017	Drought	N/A	N/A	Very dry conditions. Slight drought started July 2016. A break occurred with abundant rain in April 2017.
January 2018-April 2018	Drought	N/A	N/A	Several local small wildfires. D2 drought in January and February. Massive wildfires in NW OK in April necessitated mutual aid task force response.
June 7, 2018	Flood	N/A	N/A	Widespread flooding across the north Metro. Reports of flooding including NW 234th and Rockwell (unincorporated). 2-2.5 inches of rain fell over 2-3 hours.
October 9, 2018	Tornado	N/A	N/A	An outbuilding was destroyed just south of NE 23rd and Choctaw Road with a weak QLCS tornado that produced tree damage to NE 63rd and Peebly.
March 23, 2019	Hail	N/A	N/A	Golf ball size hail was reported at NW 164/County Line Rd (Deer Creek). Damage estimates not provided.
April 30, 2019	Flood	N/A	N/A	Street flooding reported in the northside of the OKC metro area from Reno to NW 133 and from Western to Council (includes Deer Creek unincorporated OK County).
May 21, 2019	Flood	N/A	N/A	Several roads across northwest Oklahoma county closed due to flooding.
June 9, 2019	Wind	N/A	N/A	Numerous power poles damaged around NW 178th and MacArthur in unincorporated Oklahoma County.
June 2020-July 2020	Drought	N/A	N/A	The northern third of the county experienced a moderate drought, including unincorporated areas of the county, The Village, Arcadia, Edmond and Luther.
September 2021	Drought	N/A	N/A	La Nina weather pattern begins a period without significant rain. Relief was minimal and abnormally dry conditions persisted through November before a full drought resumed.
October 10, 2021	Tornado	N/A	N/A	An EF-0 tornado developed SW of 63rd/Dobbs Rd in unincorporated Oklahoma County and traveled NE to Britton/Pottawatomie Rd. One mobile home sustained roof damage, estimated $20K.
December 2021-April 2022	Drought	N/A	N/A	Lack of a significant freeze delayed wildfire activity until December. Burn bans were in place for several weeks. Extreme drought was classified in the western part of the county February to mid-March. May rains broke the drought.
April 23, 2022	Tornado/Wind	N/A	N/A	An EF-0 tornado produced light tree damage in a path from just southwest of 63rd / Peebly south-southeast near Peebly to between 63rd and 50th St.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
May 24, 2022	Flood	N/A	N/A	4 to 6 inches of rain fell over two days north of Memorial Rd and north of the Turner Turnpike north of Luther. In Deer Creek, water crossed the road in several areas, some including NW 220th on both sides of Hwy 74/Portland, Waterloo between Hwy 74/Portland & May, and N Rockwell between 178th & 192nd and Covell/W Hwy 74.
June 5, 2022	Flood	N/A	N/A	2-3" of rain fell in an hour on saturated ground across Deer Creek, generally north of Edmond Rd to Coffee Creek from Council to I-35. Road damage occurred near Coffee Creek & Western. Water flowed across the road on NW 220th between May and Portland near Carlito's Way. NW 192nd between Portland and Meridian also saw flooding where the road narrows, and along Deer Creek on Covell W. of Hwy 74. Water was flowing from higher fields across the road to lower fields in numerous places.
July 2022-May 2023-	Drought	N/A	N/A	A flash drought began in July 2022. By mid-August, most of the county was in an extreme drought. Fires became difficult to control despite lack of wind most days. Late August to early September scattered storms provided enough relief for some of the grass to green up. September ended overall for the state as the driest since 1956, with the summer the driest ever. By early October, the county was entirely in D3 Extreme Drought. Rainfall on February 7 reduced drought in the southeast 2/3rds of the county. Additional weekly rains reduced the drought further across southeast OK county in March. The northwest 1/3 of the county remained in D3 while the southeast part of the county was in D0. In May 2023, further rains lessened the drought in the NW part of the county to D1. By early July, numerous mostly night time complexes of storms (MCS) out of the northwest eliminated all drought categories to the northern border of the county. By July, the 2023 rainfall total at the OKC airport was equivalent to the entire rainfall of 2022.
March 31, 2023	Wildfire	N/A	FMAG but – not for this fire	250 acres of grass and forest were burned. One outbuilding and one house were lost. Fire was in the unincorporated area in Luther and Edmond's fire response areas.
September 5, 2023	Wind	N/A	N/A	Storms developed behind a cold front with pre-frontal temperatures of 100F. Several power lines down on Britton Rd. east of Luther Rd to Moccasin Ln.
January 12-17, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.1 quake knocked items from shelves near northeast Edmond.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
January 13, 2024	Earthquake	N/A	N/A	4.3 quake knocked items from shelves near northeast Edmond.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Notes: TSTM = Thunderstorm; QLCS=Quasi-Linear Convective System

Number of FEMA Identified Repetitive Flood Loss Properties: 4 residential

Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Unincorporated Oklahoma County, by Fire District

Northwest Oklahoma County
Deer Creek Fire Protection District

Deer Creek	Loss	Acres
2021	$24,000	145.65
2020	$0	62.9
2019	$0	170.85
2018	$500	21.3
2017	$0	204.0
2016	$400	711.0
2015	$0	688.5
2014	$41,000	124.1
2013	$0	176.0
2012	$30,000	97.0
TOTAL LOSS	**$95,900**	**3,710.65**

East-Central Oklahoma County
Hickory Hills Fire Protection Dist.

Hickory Hills	Loss	Acres
2021	N/A	N/A
2020	$5,000	35.0
2019	$3,000	18.0
2018	N/A	11.0
2017	N/A	8.0
2016	N/A	90.0
2015	N/A	27.0
2014	N/A	111.0
2013	N/A	20.0
2012	N/A	8.0
TOTAL LOSS	**$8,000***	**328.0***

Southeast Oklahoma County
Newalla Fire Protection Dist

Newalla	Loss	Acres
2021	$0	0
2020	N/A	N/A
2019	N/A	N/A
2018	N/A	N/A
2017	N/A	4.7
2016	N/A	0.0
2015	N/A	7.5
2014	N/A	19.6
2013	N/A	6.8
2012	N/A	11.1
TOTAL LOSS	**N/A**	**49.7**

Source: Oklahoma State Fire Marshal's office
*Some data not available due to lack of record availability from the State Fire Marshal's office.

Hickory Hills and Newalla do not report dollar loss. Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires. Several jurisdictions cover smaller portions of the unincorporated County, especially in Highway District 1. In this dataset, it is not possible to separate unincorporated fires covered by incorporated municipal fire departments. These fires are not included here and are instead included in the overall report for each jurisdiction.

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	Regulated at local and state levels. The County adopts the most recent adoption by the state.		As needed and required by the State	Planning Commission with Commissioners
Comprehensive / Master Plan	Y	Oklahoma County Master Plan (Sept. 2007) – 2024 beginning the process of official update.	No	As financial resources allow. Typically, 5 – 10 years	Planning Commission with Commissioners
Zoning Ordinance	Y	Zoning Regulations (June 2021)		As needed	Planning Commission with Commissioners
Subdivision Ordinance	Y	Subdivision Regulations (June 2021)		As needed	Planning Commission with Commissioners
Site Plan Review Requirements	Y	Zoning Regulations (June 2021) & Subdivision Regulations (June 2021)		As needed	Planning Commission with Commissioners
NFIP Flood Damage Prevention Ordinance	Y	For unincorporated County. Updated in March 2024.		As needed	Planning Commission with Commissioners
Floodplain Management Plan	N	Integrated in OK All Hazard Mitigation Plan, not a stand-alone plan, only a regulation	Yes	Regulation – no schedule; HMP – 5 Years	Emergency Management, HM Committee
Stormwater Management Plan / Ordinance	Y	Stormwater Quality and Erosion Control Regulations	No	5-10 Years	Planning Dept, Floodplain Mgr.
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	Y	Stormwater Quality and Erosion Control Regulations		5 Years, Updated when the State permit is updated.	Planning Commission with Commissioners

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Capital Improvements Plan	Y		No	No Scheduled Update	Each Highway District
Open Space Plan	N				
Economic Development Plan	N				
Comprehensive Emergency Management Plan	Y	COOP, Hazardous Weather Operations Guide, Communications Guide, EOC Ops Guide, Damage Assessment Guide, Debris Management Plan	No	COOP - Annual Review; Others Periodic	Emergency Managers
Emergency Response Plan	Y	Oklahoma County EOP, October 3, 2022	Yes	Annual Review	Emergency Management Director w/ input from Emergency Support Function (ESF) personnel
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	Y	Pavement Condition Index (PCI) - 2016	No	No Scheduled Update	Each Highway District
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happen at the behest of local government bodies, state legislation or court actions and are not a reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

A table of the hazards listed in this plan have been incorporated into the EOP. The frequency, extent, dispersion (areal coverage) and risk level of each hazard was compared and coordinated with this plan and were updated in 2022.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	County Engineering (incl. County Planning)
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	County Engineering (incl. County Planning)
Planners or engineers with an understanding of natural hazards	Y	County Engineering (incl. County Planning)
NFIP Floodplain Administrator	Y	County Engineering; NFIP Floodplain Administrators are also local assignments
Surveyor(s)	Y	Highway Districts; Engineering
Personnel skilled or trained in “GIS” applications	Y	County Planning
Scientist(s) familiar with natural hazards in the County.	N	Numerous outside local resources available
Emergency Manager	Y	County Emergency Management
Grant Writer(s)	Y	Varies, multiple departments
Staff with expertise or training in benefit/cost analysis	Y	County Engineering (incl. County Planning)

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don’t know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	No
Impact Fees for homebuyers or developers of new development/homes	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other	Permit fees (building, stormwater)

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	No	N/A
Public Protection	9 or less	varies
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances Oklahoma County will continue to improve their mitigation practical approach. Also, by employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

By continuing training with jurisdictions within its boundaries, the County can better understand how to assist in times of response as well as understand the needs for mitigation. Working with public safety agencies within the county, in partnership the County Highway Districts, the County helps identity and procure funding for mitigation initiatives.

The County also enters into Annual Fire Equipment Agreements with many of the jurisdictions within the county. These agreements help bolster the available response equipment that agencies have at their disposal while providing fire/rescue response in the unincorporated areas of the county. Through annual audits the County is able to continuously track such equipment.

The County understands the necessity for intrajurisdictional communication. Thus, the County works tirelessly to build an interoperability communication with licensing of interoperability and mutual aid frequencies. In 2023 the Oklahoma County Sheriff's Office, along with the police and fire departments across the eastern half of Oklahoma County joined Oklahoma City's radio system, which also hosts Bethany and Warr Acres. This will allow opportunities for greater regional fire mutual and automatic aid, better law enforcement officer safety and new opportunities to monitor and communicate directly with neighboring jurisdictions, along with better radio coverage across much of the area. Using tools such as these, jurisdictions can get timely updates during events with less indirect relayed communication, increasing safety to responding personnel while also reducing response times.

Floodplain management abilities can be expanded on and improved through continuing education, involvement with professional organizations and annual review of flood prone areas for potential mitigation solutions.

Oklahoma County has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in the table are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Crooked Oak Creek Drainage Improvement. Silt has built up in the creek from a neighboring landfill and shopping mall causing flooding problems within the Town of Valley Brook (not a plan participant).									
See above.	N/A	Flood	Completed 2024 but recurring as needed	Town of Valley Brook w/ Ok Co. Hwy District #2	Medium	Medium - $50,000	County funds would be used for this project.	Short	Medium
Earthquake Preparedness - Basic measures are included in addressing All-Hazards, and the necessity for personal planning and preparedness. Basic knowledge of personal safety, utility cut-off locations and capabilities, "Go-Kit" development, etc., are included. Commercial and industrial venues and operations may have additional factors such as pipelines, service provision and restoration, hazardous materials release and containment, etc.									
See above.	All- inclusive	Earthquake	Occurs at civic group presentations and other public events	Oklahoma County EM with other ESF support	Low	Low- $500	OK County funding comes from the OK County General Fund with additional sources and support from other partner organizations	Annual / Fall	Medium
Northwest County Flood Control – Install tinhorns, CGMPs and raising multiple roadway segments to provide a "flood-resistant" access corridor in Hwy Dist. #3 west of Hwy. 74 (Portland) between Waterloo Rd (NW 248th) & Covell Rd (NW 206th). (This is a combination of existing projects from the previous mitigation plan.)									
See above.	Existing	Flood	New	OK Co. Hwy District #3	High	High - $5 Million (Initial phase <$200,000)	HMGP, REAP, County Capital Funds	Long term - Waiting on the identification and provision of adequate funding.	Medium
NW 234th Flood Control - Installation of CGMP's and raising roadway. OK County Hwy Dist. #3 plans to raise and install tinhorns near NW 234th and MacArthur. Currently planning to elevate one roadway segment, providing a "flood-resistant" access corridor. This is a multi-phase project with several key areas to be addressed.									
See above.	Existing	Flood	Planned	OK Co. Hwy District #3	High	High - $250,000	Ok Co. Hwy District #3	Short (Continuous)	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Crutcho Flood Control - Improve drainage of rainwater out of the Crutcho area during times of high volumes of rain within a short time. Install tinhorns and clean out bar ditches for better drainage.									
See above.	Existing	Flood	Ongoing, short recurrence as cleanouts and replacements are needed	OK Co. Hwy District #1	High	Medium	Primary funding from District 1, Oklahoma County. Additional grant opportunities and other funds as identified and available would be utilized.	Short	Medium
Public Awareness of Building Codes - Building codes and related enforcement activities are routinely reviewed and implemented through the Oklahoma County Planning Commission, with recommendations made to the Oklahoma County Board of County Commissioners for final approval. Oklahoma County currently utilizes the Oklahoma adopted edition of the International Building Code (in part to maintain continuity with the State of Oklahoma), and routinely receives input from in-house inspectors, contractors, builders, residents and other building officials, with subsequent review by the County Engineering and Planning Department.									
See above.	New	Flood, Wind (incl. Tornado)	As updated by the state and continuous by Building Inspectors	OK Co. Planning	High	Low - $500	The funding for this project is minimal and would come directly from county general funds.	Ongoing through the year (no end)	High
Public Education & Planning - Canton Dam Failure. Potential dam failure could arise from multiple impoundments, all of which are included in on-going public education efforts and All-Hazards planning. The US Army Corp of Engineers (USACE) provides periodically updated Emergency Action Plans for structures under their oversight, as well as exercise opportunities and expert consultation. Updated threat/risk analysis activities include high-risk dams and associated locations. The Canton Lake dam structure has recently undergone extensive updating and upgrading, including spillway and overflow modifications, and actual earthen reinforcement. On-going structural monitoring and early warning/notification measures are routinely reinforced. Jurisdictions and communities located in potential inundation areas are included in planning discussions, exercises and public education activities, should catastrophic dam failure occur.									
See above.	Existing	Dam Failure, Flood	As exercises and activities are developed	OK Co. Emergency Management with support from Planning	High	Low	Oklahoma County - Funding will likely come from Oklahoma	Long term DOF	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
							County general funds, although additional resources may be available from the Corp of Engineers, or through other funding sources.		
Severe Thunderstorm (flood, hail, high wind and tornado) Education in Oklahoma County - Severe Thunderstorm and "weather extremes" training and education are among the highest priority due to the frequency of weather-related events. Preparedness planning and related public education presentations routinely include severe thunderstorm-related information, including but not limited to tornadic threat/risk information. All-hazards public education efforts encourage recipients to consider all potential threats and to prepare for related challenges and difficulties. Severe weather-related threats continue to be high-risk factors in overall preparedness within our region, and are included in a wide range of informational deliveries.									
See above.	N/A	Hail, Lightning, Wind (incl. tornado), Flood	At scheduled public events and civic presentations	OK Co. Emergency Management	Medium - High	Low	County general funds and any possible grant opportunities or sponsorships from public or private sources as identified.	Long / Ongoing, Spring and Fall emphasis	Medium
Extreme Temperatures - Public Education. Distribute literature throughout the county (i.e., public library, city halls, local/county schools, etc.) informing the citizens on procedures to implement prior to onset of extreme temperatures. Continued All-Hazard public efforts are addressing the awareness side of this issue and they will continue indefinitely.									
See above.	N/A	Extreme Temperatures	As requested	OK Co. EM in cooperation with local jurisdictions	Medium	Low - $1,000 (2006 cost)	Oklahoma County General Fund	Ongoing, Spring and Fall emphasis	Low
Drought Education. Education related to water conservation and avoidance of irresponsible use and subsequent waste. Additional factors include water contamination and storage considerations, landscaping, and plants that support reduced water use, conservation, etc.									
See above.	N/A	Drought	During Droughts	OK Co. Emergency	Medium	Low	County general funds,	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
				Management			HMGP		
Extreme Temperatures - Community Program. Significant weather-related factors for seasonal extremes, most-likely extreme heat or extreme cold. Common All-Hazards-related education factors include "awareness," sheltering, pet/animal considerations, utility services (electric, gas/LP, water), redundant sources of heating or cooling, personal preparedness strategies, care for those unable to care for themselves, etc.									
See above.	N/A	Extreme Temperatures	At scheduled public events and civic presentations	OK Co. EM	Medium	Low - $1,000 (2006 cost)	Oklahoma County	Ongoing, Spring emphasis (continuous)	High
Wildfire - Fire Awareness Program. Areas of Rural/Urban Interface within Oklahoma County are at significant risk from this threat. Previous experience, particularly during periods of extended drought and/or high winds have proven extremely problematic, presenting significant threats in regard to life safety and property protection. Oklahoma County EM cooperates with all jurisdictions in the provision of firefighting-related resources and the coordination of essential resources during wildfire events. Regionalized response planning and coordination are critical elements. Preparedness information is supported and provided during public education events and will continue indefinitely.									
See above.	N/A	Wildfire	At scheduled public events and civic presentations	OK Co. EM working with local fire departments	Medium	Low	Oklahoma County General Fund	Ongoing, Fall and Winter emphasis (continuous)	High
Winter Storm Education in Oklahoma County – Winter storms present various threats, including travel issues, hypothermia, death, and fires from heating sources. Public education efforts on all hazards encourage individuals to consider all potential risks and prepare for associated challenges. Information about winter weather-related threats is included in a broad range of educational materials.									
See above.	N/A	Winter Storm	At scheduled public events and civic presentations	OK Co. EM	Medium	Low	Oklahoma County General Fund	Ongoing, Fall Emphasis (continuous)	Low
Crutcho Creek – Ongoing acquisition program of properties in floodplains. This is an on-going, repetitive loss area with the most cost effective results to be obtained through property buy-out. Voluntary property acquisition continues under a Federal Hazard Mitigation Grant..									
See Above.	Existing	Flood	Several phases completed, reapplication depending on benefit vs cost analysis and fund availability	OK Co. Hwy District #1	High	High	County District #1 budget, FEMA HMGP, other grants	Long	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.									
See above.	NA	Flood	Crutcho Creek project	OK Co. Planning Department	Low - Medium	Low - Medium	County General Funds	Short	High
Identify, prioritize and implement fixed site and portable generator projects as funding is secured. Targeted facilities include county office building and courthouse, county commissioner highway districts, 911 centers, public safety facilities, designated shelters, etc. Install “shore connections” where necessary.	N/A	All hazards that result in power failure (Dam Failure, Earthquake, Extreme Temperatures, Flooding, Lightning, Hail Wind (incl. tornado), Severe Winter Storm), Wildfire, rolling blackouts	Planned	OK Co. EM, Facilities Management	Medium (continuity of operations and government)	Medium	Available grant programs (EMPG, HMPG 5% initiative), HMGP, County General Funds	Short - DOF	Medium
Install extendable / expandable “road closed” barriers or gates to posts at roadway locations that frequently flood, especially in the NW part of the County. These barriers will have accompanying reflective signage, possibly with flashing lights.	N/A	Flooding	Multiple installed, additional possible	OK Co Hwy District #3	High	Medium	HMGP, County Capital Funds	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	(NFIP Compliance)	Ongoing	County (via County Engineer /NFIP Floodplain Administrator)	High	Low - Medium	County General Funds	Ongoing (no end)	High
Participate in the Community Rating System (CRS) to further manage flood risk and reduce flood insurance premiums for NFIP policyholders. This shall start with the submission to FEMA-DHS of a Letter of Intent to join CRS, followed by the completion and submission of an application to the program.	NA	(NFIP Compliance)	Planned	NFIP Floodplain Administrator	Low	Low	County General Funds	Long	Low
Archive elevation certificates	NA	(NFIP Compliance)	Ongoing	NFIP Floodplain Administrator	Low	Low	County General Funds	Ongoing (no end)	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Distribute NOAA All-hazard radios to multiple occupancy sites, including schools, nursing homes, assisted living centers and daycares.	N/A	Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	At civic presentations and as needed; replenished periodically when supplies are low	OK Co. EM	High	Low	HMGP Grant, EM Budget County Capital	Spring emphasis, Short	Medium
Upgrade outdoor warning devices and/or add sirens	Existing	Wind (incl. Tornado)	Continued expansion as development occurs and as replacements are needed	Oklahoma Co. EM, Deer Creek Fire Protection District	High	Medium	BRIC, HMGP, County EM Capital Funds	Short	High
Wildland fuel reduction (including Red Cedar trees) in WUI areas	Existing	Wildfire	Planned	Oklahoma Co. EM, Deer Creek Fire Protection District	High	Medium	BRIC, HMGP, OK Forestry Grant, County Capital Funds	Long	Medium
Install a mass notification system for the unincorporated area and possibly in conjunction with incorporated municipalities	N/A	Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Planned	OK Co. EM	High	Medium	HMGP, EMPG, County EM Capital	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Research expansive soil data further to determine if problem exists on county property, and if it does, perform soil stabilization prior to any new building.	New	Expansive Soil	Prior to building construction	OK Co. Planning	Low	Low	County Capital Funds	Short	Low
Create an expansive soils public education mitigation page on the public County website to inform the public how to prevent expansive clay soil damage to their homes before a home is built and after. The county Engineer and Planning can refer citizens and builders to the page.		Expansive Soil	Planned	OK Co EM w/ OK County IT	Medium	Low	County General Funds	Short	Medium
Collect high hazard dam inundation maps from Oklahoma City if they are ever created.	Existing	Dam Failure	As private owners have maps developed	Oklahoma City EM	High	Low	(Free – Oklahoma City provides)	Long	Low
Mitigate property flooding and protect road access at SE 44th / West of Pott. County Line	Existing	Flooding	In Progress during this planning cycle	Highway District 2	High	High	CIRB funds, Highway Cash, County Capital Funds	Short	Medium
Mitigate erosion of bank & possible bridge and road damage at Canadian River on Wilshire Blvd. west of Indian Meridian	Existing	Flooding	In Progress, during this planning cycle, completion DOF	Highway District 1 w/ Planning & Eng	High	High	HMGP, BRIC, County Capital Funds	Long	High
Create a Master Drainage Plan for the unincorporated County	New & Existing	Flooding & Dam Failure	New	Planning & Engineering	High	High	County Capital Improvements, HMGP or BRIC	Long	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Status	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Incorporate flood plain models into GIS to show rainfall correlated to road flooding.	Existing	Flooding	New	Highway District 3 w/ Assessor's office	High	Low	County M&O	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

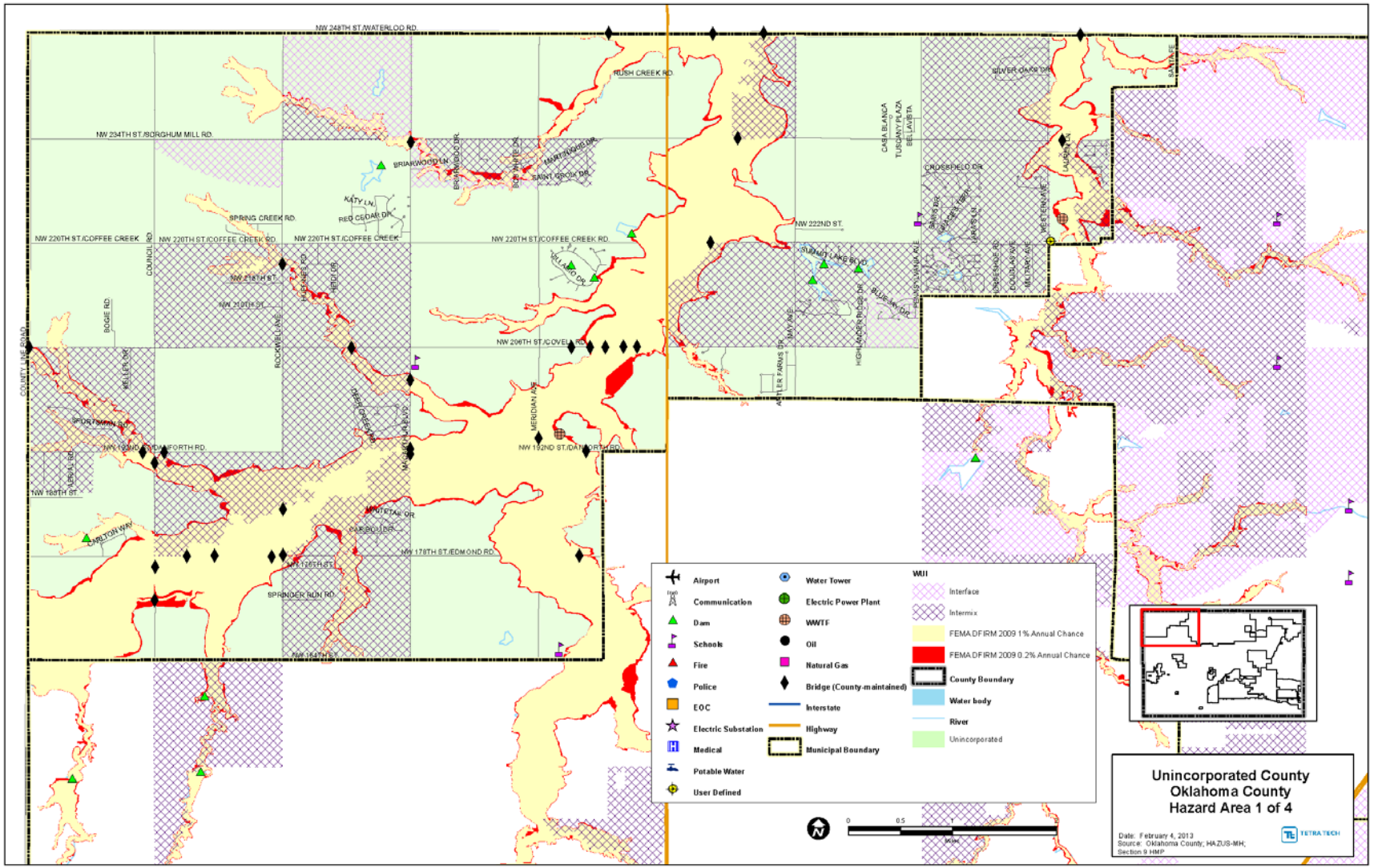
None at this time.

G.) HAZARD AREA EXTENT LOCATION

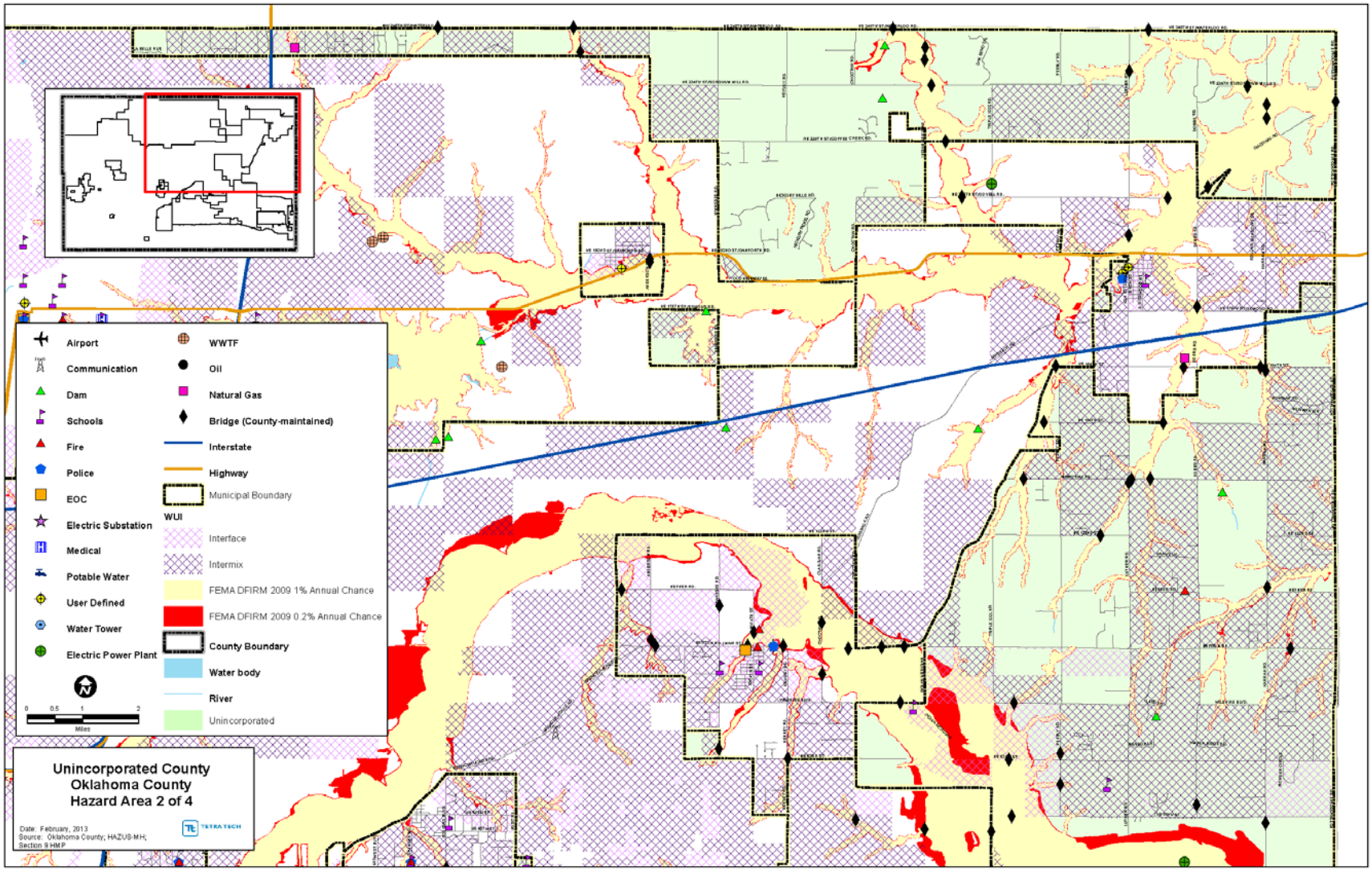
A hazard area extent and location map has been generated and is provided below for Oklahoma County to illustrate the probable areas impacted within the County. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the County has significant exposure.

H.) ADDITIONAL COMMENTS

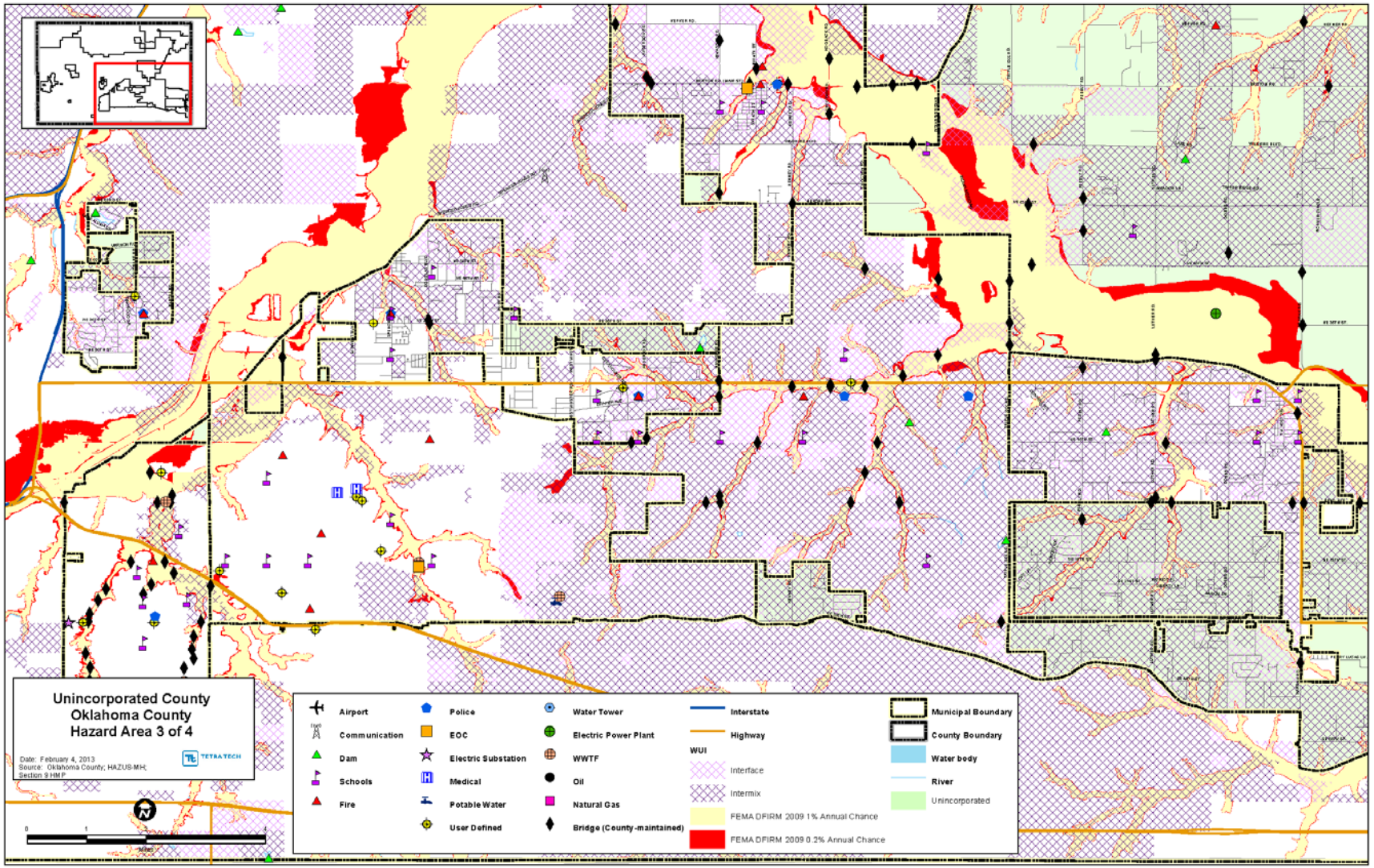
No additional comments at this time.



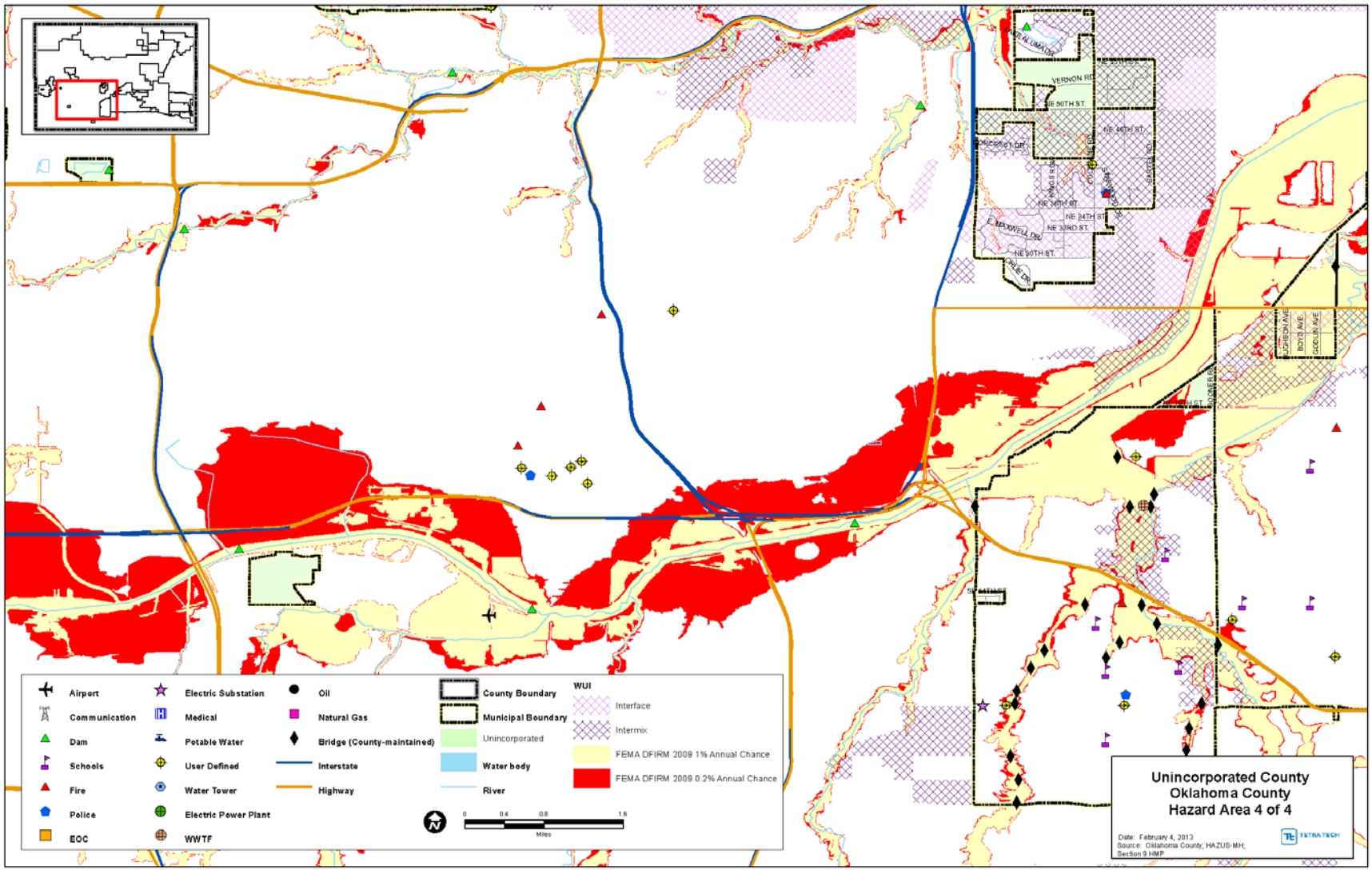
Northwest Oklahoma County



Northeast Oklahoma County



Southeast Oklahoma County



Southwest Oklahoma County

9.2 TOWN OF ARCADIA

This section presents the jurisdictional annex for the Town of Arcadia.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Kristopher Fullingim Acting Fire Chief / Emergency Manager 217 Main Street Arcadia, OK 73007 (405) 239-8456 firedept@townofarcadia.com	Marcus Woodard Vice Mayor 217 Main Street Arcadia, OK 73007 (405) 396-2899 marcuslwoodard@yahoo.com

B.) MUNICIPAL PROFILE

The Town of Arcadia is located in northern Oklahoma County. The Town is located along Route 66, 15 miles north of Oklahoma City. The Town of Arcadia has a total land area of 1.5 square miles, all of it land. The Town is governed by a mayor and two member Town Board. The 2020 U.S. Census population for the Town of Arcadia was 169 (-28% from 2010).

Growth/Development Trends

Rapid development is occurring through the town. Over 50 new homes have been developed since 2021. The north side of the town is seeing the most development. The town has welcomed a new veterinarian as the most recent commercial development along Route 66. All development is occurring outside of the SFHA.

Past Mitigation Activity/Efforts

The previous mitigation actions are carried forward for this update.

2019 Completed Initiative Description	Comments
Install permanent backup generator at Town Hall.	This completed project was part of the initiative to install generators at Town Hall & the Fire Station.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the Town of Arcadia is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Arcadia Lake - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	No	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section

Hazard	Local Vulnerability	Comments
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the Town of Arcadia, the following have been identified as specific hazard vulnerabilities in the Town:

A few businesses and few homes near the intersection of Highway 66 and S. Odor St. are shown to be in FEMA's 1% SFHA. A convenience store in the southwest part of town is on elevated ground but is in the Arcadia lake dam failure swash zone.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE TOWN

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
December 01, 2013	Earthquake	N/A	N/A	4.5 magnitude earthquake near Arcadia Lake; depth of 8.4 km.
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	4.3 magnitude earthquake near Spencer; depth of 5.0 km.
June 18, 2014	Earthquake	N/A	N/A	4.1 magnitude earthquake near Spencer; depth 5.0 km
March 5, 2015	Extreme Cold	N/A	N/A	
May 2015	Flooding	N/A	N/A	Flooding accrued across the eastern side of the city. Multiple private residents sustained water damage during this time.
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm with widespread power outages, including the Arcadia area.
December 29, 2015	Earthquake	N/A	N/A	4.3 magnitude earthquake at Edmond; depth 6.5 km
January 01, 2016	Earthquake	N/A	N/A	4.2 magnitude Earthquake at Edmond; depth 5.8 km

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
April 07, 2016	Earthquake	N/A	N/A	4.2 magnitude earthquake at Luther; depth of 6.1 km
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km.
December 2016 – April 2017	Drought	N/A	N/A	
December 18, 2016	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	Icing of .1" reported in Edmond near Covell/I-35 a few miles west of Arcadia.
January 7, 2017	Extreme Cold	N/A	N/A	
July – August 2017	Drought	N/A	N/A	
August 03, 2017	Earthquake	N/A	N/A	4.2 magnitude earthquake at Edmond; depth of 5.0 km
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused tree damage. Snowfall amounts in town were generally light with ½" in Edmond. Heaviest snow totals were in the southern 1/3rd of the county.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	4 to 6 inches of snow fell across the county. 5.4" in Edmond.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
June 2020-July 2020	Drought	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Nearly ½" of ice with lots of tree damage.
December 13, 2020	Heavy Snow	N/A	N/A	Around 4" of snow fell.
December 15, 2020	Winter Storm	N/A	N/A	Generally 3-4 inches of snowfall accumulation was reported across the county.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain accretion of 0.25" to 0.35" was reported across the county. Heavy snow reported during the early morning Jan 1st with 6" in Jones and Midwest City near Reno /Midwest Blvd and 5.5" near 2nd/Broadway in Edmond
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on elevated surfaces.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	4 to 7.5 inches of snow fell across the county, with the highest reported in Edmond.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Reports from across the county generally ranged from 4 to 5 ½ inches with a maximum of 5.6 inches reported 5 mi. ESE Edmond.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	Snowfall amounts ranged from 3 to almost 5 inches across the county, with the heaviest in southwest OKC.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county.
March 11, 2022	Winter Storm	N/A	N/A	2-3" of snow fell across the county.
July 3-28, 2022	Excessive Heat	N/A	N/A	
July 2022-May 2023	Drought	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
January 12-17, 2024	Extreme Cold	N/A	N/A	Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.1 quake knocked items from shelves.
January 13, 2024	Earthquake	N/A	N/A	4.3 quake knocked items from shelves.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 0
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0
Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Arcadia

Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires. The City of Edmond surrounds and provides mutual aid to the jurisdiction.

	Loss	Acres
2023	N/A	N/A
2022	N/A	N/A
2021	$0	2.0
2020	$0	7.0
2019	N/A	N/A
2018	$0	2.0
2017	$0	3.0
2016	$0	0.0
2015	$0	0.0
2014	$0	0.0
2013	$0	0.0
2012	$0	0.0
TOTAL LOSS	**$0***	**14.0**

Source: Oklahoma State Fire Marshal's office
*Data for 2019, 2022 and 2023 not available.

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances, Plans)	**Do you have this?** (Y or N)	**Code Citation** (Section, Paragraph, Page Number, Date of adoption)	**HM Plan integration into plan**	**Update cycle**	**Party(s) responsible for updating document**
Building Code	Y	2015 – Part 5, Chapter 1		No update cycle	Building Inspector
Comprehensive / Master Plan	N				
Zoning Management Ordinance	Y	1987 – Part 13, Chapter 15			
Subdivision Management Ordinance	N				
Site Plan Review Requirements	Y	1992 – Part 5, Chapter 1			Building Inspector
NFIP Flood Damage Prevention Ordinance (if you are in the NFIP, you must have this!)	Y	2005			
NFIP Elevation Certificates Maintained	Y				
Floodplain Management Plan	Y		Yes	Not Scheduled	County Floodplain Manager, Town Council
Stormwater Management Plan / Ordinance	N				
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	N				
Capital Improvements Plan	Y	2003	Yes	3 Month Review	Planning and Zoning Committee
Open Space Plan	N				
Economic Development Plan	N				

Regulatory Tools (Codes, Ordinances, Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Emergency Response Plan	Y		No	No schedule	Fire Chief / Emergency Manager
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)	N				

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Building Inspector
Planners or engineers with an understanding of natural hazards	N	
NFIP Floodplain Administrator	Y	
Surveyor(s)	N	
Personnel skilled or trained in “GIS” applications	N	
Scientist familiar with natural hazards	N	
Emergency Manager	Y	Fire Chief

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Grant Writer(s)	Y	Treasurer
Staff with expertise or training in benefit/cost analysis	Y	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't Know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact Fees for homebuyers or developers of new development/homes	Yes
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	
Incur debt through private activity bonds	
Withhold public expenditures in hazard-prone areas	
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection (ISO)	9	-
Storm Ready	County*	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined
*The county sounds the outdoor warning devices for Arcadia.

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Furthermore, employing experts in land management and construction practices, in coordination with the NFIP flood plain manager, the overall stratagem will continue to advance.

Floodplain management abilities can be expanded on and improved through additional training, joining professional organizations and periodic review of flood prone areas for potential mitigation solutions.

Arcadia has adopted NFIP floodplain management criteria and the most recent FIRM map of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in the table are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	Local Budget	Ongoing (no end)	High
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.									
See above.	NA	Flood	Emphasis in Spring	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	General M&O Budget	Short	High
Participate in the Community Rating System (CRS) to further manage flood risk and reduce flood	NA	NFIP Compliance	Planned	NFIP Floodplain Administrator with support	Low	Low	General M&O Budget	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
insurance premiums for NFIP policyholders. This shall start with the submission to FEMA-DHS of a Letter of Intent to join CRS, followed by the completion and submission of an application to the program once the community's current compliance with the NFIP is established.				from OEM, FEMA					
Archive elevation certificates	NA	NFIP Compliance	Ongoing	NFIP Floodplain Administrator	Low	Low	General M&O Budget	Ongoing (no end)	High
Purchase Weather Radios to warn workers in city buildings		Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wind (incl. Tornado), Wildfire, Winter Storm	Planned	Police w/ Fire Dept.	High	Low	General M&O Budget	Short	Medium
Create or obtain mitigation education brochures and distribute to residents, public city venues and through the town website.		Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storms	Periodic, as public events are scheduled	Fire Dept.	High	Low	General M&O Budget	Short	Medium
Install permanent backup generator at Fire Station.	Existing	Dam Failure, Earthquake,	Planned	Town office manager w/	High	Low	HMGP with town	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Generators can be used to power items after a dam failure takes down poles, an earthquake shakes lines down, rolling blackouts during extreme temps, outages caused by floods, lightning, hail destroying power insulators, wildfires burning up poles, and ice taking down lines in winter storms.		Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storms		contractor			capital match		

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program

FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

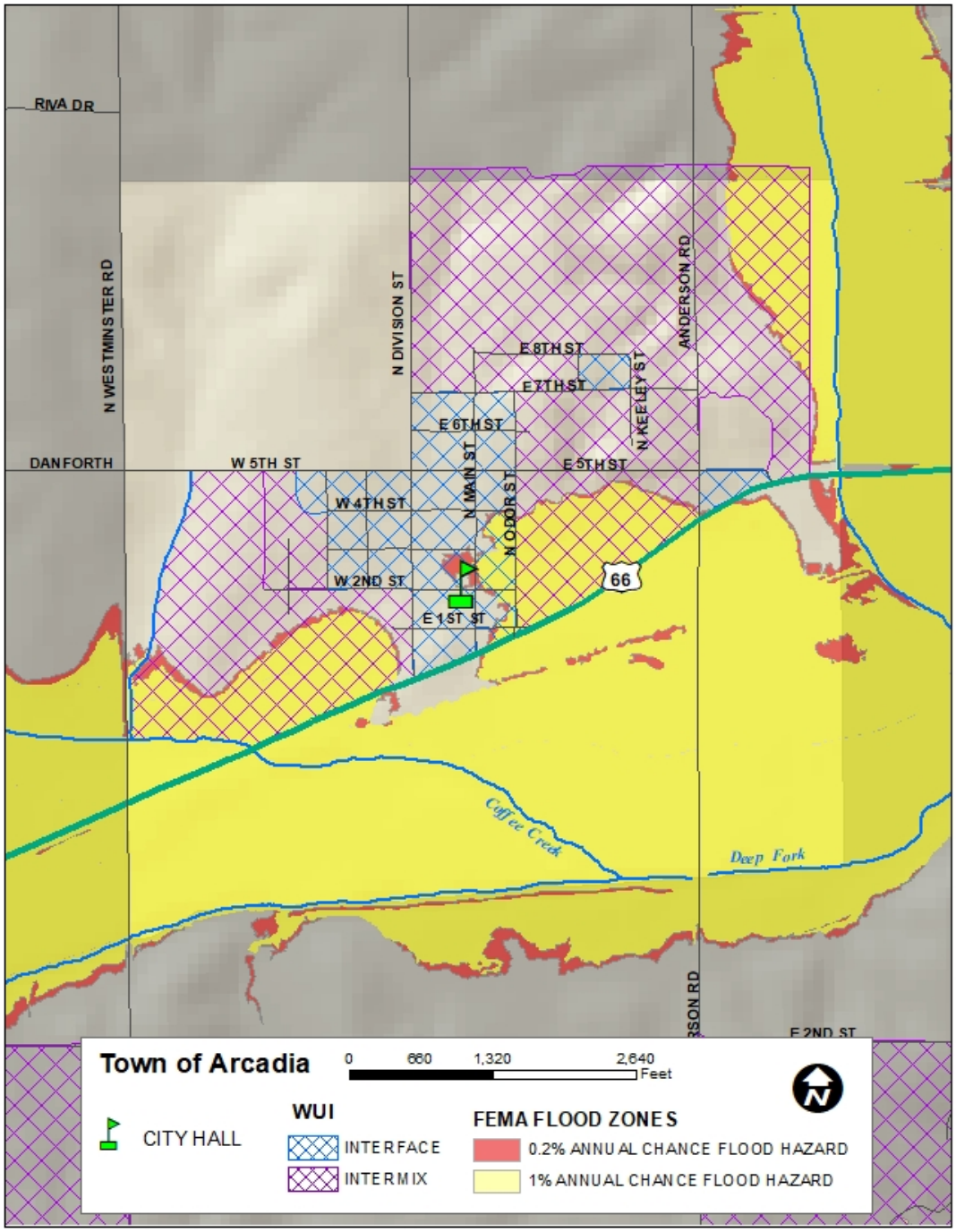
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the Town of Arcadia to illustrate the probable areas impacted within the Town of Arcadia. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the Town of Arcadia has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


RIVA DR
N WESTMINSTER RD
N DIVISION ST
ANDERSON RD
E 8TH ST
E 7TH ST
E 6TH ST
N KEELEY ST
DANFORTH
W 5TH ST
E 5TH ST
W 4TH ST
N MAIN ST
N DOOR ST
W 2ND ST
E 1ST ST
66
Coffee Creek
Deep Fork
E 2ND ST
Town of Arcadia
0
660
1,320
2,640
Feet
CITY HALL
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.3 CITY OF BETHANY

This section presents the jurisdictional annex for the City of Bethany.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Brian Murray, Fire Chief, Emergency Manager 3919 N Rockwell, Bethany, OK 73008 (405) 789-2218 brian.murray@bethanyok.org	Amanda McCellon, Director of Planning and Community Development 6700 NW 36th St., Bethany, OK 73008 (405) 789-6005 amanda.mccellon@bethanyok.org

B.) MUNICIPAL PROFILE

The City of Bethany is located in western Oklahoma County. The City is bordered to the north, south and west by Oklahoma City and to the east by City of Warr Acres. The City of Bethany has a total land area of about 5.2 square miles, all of it land. The City is governed by a Council – Manager form of government. The 2020 U.S. Census population for the City of Bethany was 20,708 (+8% from 2010).

Growth/Development Trends

Property Name	Type (Residential or Commercial)	Number of Structures	Address	Known Hazard Zone	Description/Status
Retirement Community	Commercial Industrial Park	16	NE 23rd & Wilburn	No	Under development
Commercial Industrial Park	Commercial Industrial Park	5	NW 23rd & Rockwellth	No	Under development
Bethany Village	Residential	20+	NW 37th & Divis	No	Under development
Bethany Business Park	Commercial	8	4701 N Council	No	Under Development
Residential Development	Residential	6	NW 23rd & Tompkins	No	Under Development

A small residential development, Bethany Village, is being developed at the NW corner of NW 36th and Divis Ave. Minor commercial development is taking place on the northeast corner of NW 23rd and Wilburn Ave and a second area just south of NW 39th Expressway and Council.

Due to the above development being a redeveloped area, there has been no significant change to the hazard vulnerabilities (except in the area mentioned below) and possibly a slight decrease in flood vulnerability due to increased code requirements. NW 23rd & Wilburn is less susceptible to wildfire with the recent redevelopment requiring detention ponds and landscaping.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.

The following table summarizes progress on the mitigation strategy identified by the City of Bethany in the 2019 plan.

Completed 2019 Initiatives	Comments
Install generators where critical city communication infrastructure exists (i.e. Police and Fire Dept.).	Generators can be used to power items after a dam failure takes down poles, an earthquake shakes lines down, rolling blackouts during extreme temps, outages caused by floods, lightning, hail destroying power insulators, high winds, wildfires burning up poles, and ice taking down lines in winter storms.
Establish and maintain an agreement with OKC and establish and maintain connections to obtain water during drought.	Bethany also plans to drill additional water wells.
Maintain a water rationing regulation for use during periods of drought.	Required by OKC when using OKC water.
Enact a regulation to require a check for expansive soils prior to building a city building and perform soil stabilization if expansive soils are found.	Required by municipal building code.
Purchase trailered generator that can be used as needed at critical city facilities.	Several were purchased for city wells.

Abandoned 2019 Initiatives	Comments
Purchase trailer park located in the SFHA at NW 50th St. and Peniel Ave. to ensure land becomes green space.	City has no plans to pursue this.
Revise a regulation to limit height of structures to reduce likelihood of neighboring structural damage in an earthquake.	Structures are already limited to 90 feet due to Wiley Post airport requirements.
Install and/or Provide alternate fuel source for generators where critical city communication infrastructure exists (i.e. Police and Fire Dept.)	Communications center uses natural gas; Public Works uses diesel.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Bethany is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Canton Lake - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	

Hazard	Local Vulnerability	Comments
Severe Winter Storm	Yes	

According to the City of Bethany, the following have been identified as specific hazard vulnerabilities in the City:

- Bethany has a dam failure risk from Canton Lake but not Overholser since it is upstream from the dam.
- A trailer park exists in a floodplain north of 50th St. and Peniel Ave. It is privately owned. This area is identified as being in the FEMA 1% annual chance SFHA.
- Road flooding occurs north of 25th St. and Peniel Ave. after heavy rains. No notable road damage has occurred.
- NW 39th St. and Rockwell is impassable at times after heavy rains.
- NW 35th and Hammond floods during heavy rains but drains fairly quickly.
- A wildfire risk exists in the McMillian Park and Riverside Park areas north of NW 39th near Council Rd where numerous trees exist.
- The water plant has vulnerability to wildfire due to trees that are on nearby private property, however there is a water canal between the trees and the facility so the vulnerability is low.

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3):

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
APOLLO ES	Bethany (C)	School			9.0	62.9	10.1	68.1
BETHANY CHRISTIAN ACADEMY	Bethany (C)	School			9.0	62.9	10.1	68.1

Source: FEMA, 2009

Utilities Located in the Preliminary DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss	
			100 Year	500 Year	100 Year Damage %	500 Year Damage %
Bethany Water Plant	Bethany (C)	Potable Water			40.0	40.0

Source: FEMA, 2009

Notes:

(1) 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
February 2014-July 2014	Drought	N/A	N/A	
March 5, 2015	Extreme Cold	N/A	N/A	
March 25, 2015	Tornado	N/A	N/A	A tornado was spotted in Bethany with multiple buildings sustaining severe damage.
November 27-28, 2015	Winter Storm	DR-4247	Yes	Multiple power lines were downed and large swaths of the county were affected with power outages during this time. This ice storm created approx. ¾" of ice in the west metro.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice Storm.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A		Heaviest ice amounts fell in the far west metro. .15" reported in Warr Acres near NW 63rd/MacArthur.
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
May 2, 2018	Flood	N/A	N/A	A line of thunderstorms produced localized flooding, closing route 66 in Bethany.
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
September 21, 2018	Flood	N/A	N/A	A series of heavy rainfall events led to flash flooding and road closures at Hammon and MacArthur.
January 3, 2019	Ice Storm & Snow	N/A	N/A	Freezing rain caused tree damage. Snowfall of around 2" in Bethany.
April 30, 2019	Flood	N/A	N/A	Street flooding reported in the northside of the OKC metro area from Reno to NW 133 and from Western to Council (includes Bethany).

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
May 18, 2019	Flood	N/A	N/A	No specific details recorded – widespread significant flooding within two miles north and east of Bethany.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
August 26, 2019	Wind	N/A	N/A	Wiley Post Airport ½ mile west of the northern part of the city gusted to 69 mph.
February 5, 2020	Heavy Snow	N/A	N/A	Around 4" of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
July 10, 2020	Flood	N/A	N/A	Twitter social media photos of cars submerged in Bethany, lat/lon data indicates near NW 39th/Rockwell.
October 26-29, 2020	Ice Storm	4575-DR	Yes	Over 60% of the county was without power by October 27th. The worst icing occurred just west of the metro, with Lake Overholser just west of Bethany receiving 3/4". Many trees were damaged.
December 13, 2020	Heavy Snow	N/A	N/A	A general 3 to 5 inches fell across the county, with a maximum of 5.5 inches reported near the Deer Creek High School (unincorporated).
December 15, 2020	Winter Storm	N/A	N/A	Generally 3-4 inches of snowfall accumulation was reported across the county.
September 2021	Drought	N/A	N/A	
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain accretion of 0.25" to 0.35" was reported across the county. Wiley Post airport at Bethany reported 0.34" of ice, and 8" of snow was reported in Bethany.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on elevated surfaces.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 6" of snow fell.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Reports from across the county generally ranged from 4 to 5 ½ inches.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 2-3, 2022	Heavy Snow	N/A	N/A	Snowfall amounts ranged from 3 to almost 5 inches across the county, with the heaviest in southwest OKC.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county.
March 11, 2022	Winter Storm	N/A	N/A	2-3" of snow fell across the county.
July 2022-May 2023-	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, felt but no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 1 residential*
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB), Bethany Floodplain Manager
*Note: The Bethany Floodplain manager indicated that this property flooded in the 1980s from clogged drainage that has been consistently maintained since then.

Wildfire History for Bethany

Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.

	Loss	Acres
2023	N/A	N/A
2022	$0	0.0
2021	$0	0.0
2020	$0	0.0
2019	$0	0.0
2018	$100	0.1
2017	$0	0.5
2016	$2,150	3.0
2015	$0	0.0
2014	$0	1.5
2013	$0	1.0
TOTAL LOSS	**$2,250**	**6.1**

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances, Plans)	**Do you have this?** (Y or N)	**Code Citation** (Section, Paragraph, Page Number, Date of adoption)	**HM Plan integration into plan**	**Update cycle**	**Party(s) responsible for updating document**
Building Code	Y	2018 IBC			
Comprehensive / Master Plan	Y	Developed in 2016	No	5 Year Cycle	Community Development and Zoning Commission
Zoning Management Ordinance	Y	Updated 2019	No	10 Year Cycle	Community Development Dept.
Subdivision Management Ordinance	Y	Updated 2019	No	No schedule	Engineers
Site Plan Review Requirements	Y	Updated 2019	No	No schedule	Engineers & Community Dev. Dir.

Regulatory Tools (Codes, Ordinances, Plans)	**Do you have this?** (Y or N)	**Code Citation** (Section, Paragraph, Page Number, Date of adoption)	**HM Plan integration into plan**	**Update cycle**	**Party(s) responsible for updating document**
NFIP Flood Damage Prevention Ordinance (if you are in the NFIP, you must have this!)	Y	Title XV, Chapter 156, Updated 2019	Yes	10 Year Cycle	Engineers & City Inspector
NFIP Elevation Certificates Maintained	Y		No	As needed	Engineers / City Inspector
Floodplain Management Plan	N				
Stormwater Management Plan / Ordinance	Y	Updated July 2023	No	5 Year Cycle	Stormwater Program Manager
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	Y	Post-Construction Management Best Practices	No	5 Year Cycle	City Inspector / Engineer
Capital Improvements Plan	Y		No	No Update Scheduled	City Engineer/Public Works Dept.
Open Space Plan	N				
Economic Development Plan	N				
Emergency Response Plan	Y	Updated 2021	No	5 Years	Emergency Manager
Post Disaster Recovery Plan / Ordinance					
Real Estate Disclosure Requirements					
Highway Management Plan	N				
COOP/COG Plan	Y	Included in EOP	No	5 Years	Emergency Manager
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

Since the last mitigation plan update, none of the planning mechanisms above were integrated with new information from this plan.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Community Development Dept.
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	City Inspector & City Engineers
Planners or engineers with an understanding of natural hazards	Y	Community Development Dept.
NFIP Floodplain Administrator	Y	Appointed by City Council
Surveyor(s)	N	
Personnel skilled or trained in “GIS” applications	N	
Scientist familiar with natural hazards	N	
Emergency Manager	Y	Fire Chief
Grant Writer(s)	Y	City Manager
Staff with expertise or training in benefit/cost analysis	Y	Finance Director

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don’t know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact Fees for homebuyers or developers of new development/homes	Yes (for utilities for new construction)
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	
Withhold public expenditures in hazard-prone areas	
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection	ISO 3	2020
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation strategy. Furthermore, employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Floodplain management

The most recent FIRM maps adoption was 12/19/2009 and are the most recent FIRMs. The only area containing structures in the floodplain are in a mobile home park at Douglas Circle and N Peniel Ave.
After a flood event, the City Inspector conducts a site visit, inspects property against county records, and makes a determination as to whether the property meets the substantial improvement/substantial damage provision of the floodplain management regulations. The process could be improved on and expanded through GIS technology.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in the table are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing as needed	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	City General Fund	Ongoing (no end)	High
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation									

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
grant funding.									
See above.	NA	Flood	Ongoing, emphasis in spring	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	City General Fund; HMGP 5% initiative	Short	High
Archive elevation certificates	NA	NFIP Compliance	As certificates are provided	NFIP Floodplain Administrator	Low	Low	City General Fund	Ongoing (no end)	High
Increase the size of open channels to upgrade capacity at NW 39th St. and Rockwell Ave. to eliminate the likelihood of impassable streets after heavy rains		Flood	Planned	Community Development	High	High	HMGP, Bonds, City Capital	Long term DOF	Medium
Create and distribute dam failure, flood, drought, earthquake, expansive soil, extreme temperature, hail, lightning, wildfire, winter storm mitigation educational newsletters to		Dam Failure, Drought, Earthquake, Expansive Soil, Extreme Temps, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Through the year	Community Development Director	High	Low	Storm water Mgmt. Fee	Ongoing, Seasonal depending on Hazard	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
include in resident utility bills, on city website and public access TV graphics.									
Obtain a mass notification system with text message, phone and email capability to warn residents prior to hazards and actions to take/avoid after an incident.		Dam Failure, Drought, Earthquake, Extreme Temps, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Planned	Fire Dept.	High	Medium (Annual renewal)	Utility Fee, HMGP 5% initiative	Long	Medium
Construct two new raw water wells and rehabilitate well houses	Existing	Drought, Wildfire	New/Planned	City Manager, Contractor	High	Medium	Capital Improvement Fund	Short	High

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000

Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

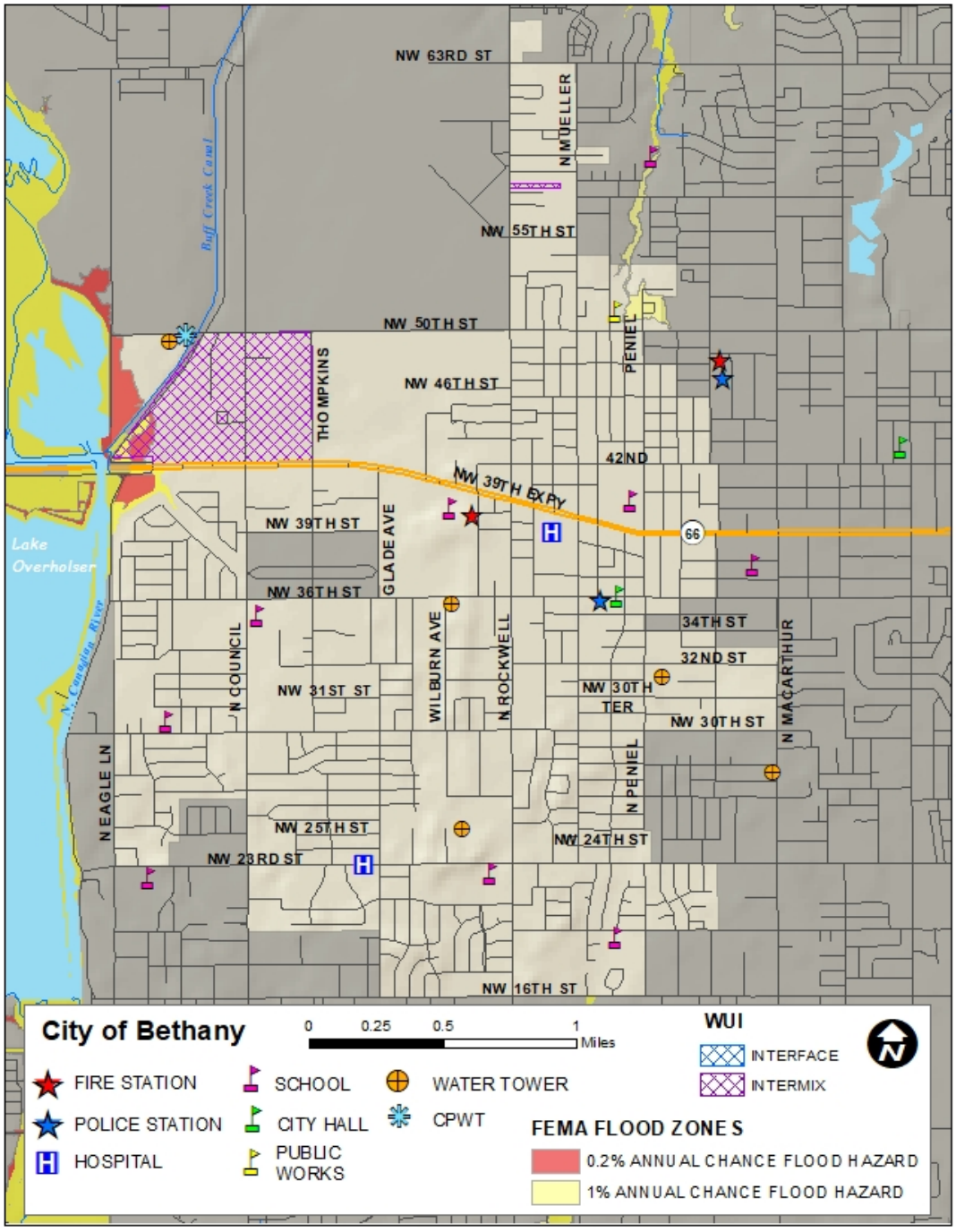
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Bethany to illustrate the probable areas impacted within the City of Bethany. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Bethany has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NW 63RD ST
N MUELLER
NW 55TH ST
NW 50TH ST
PENIEL
THOMPKINS
NW 46TH ST
42ND
NW 39TH EXPY
66
NW 39TH ST
GLADE AVE
Lake Overholser
NW 36TH ST
34TH ST
32ND ST
N COUNCIL
WILBURN AVE
N ROCKWELL
NW 31ST ST
NW 30TH TER
NW 30TH ST
N MACARTHUR
N EAGLE LN
N PENIEL
NW 25TH ST
NW 24TH ST
NW 23RD ST
NW 16TH ST
City of Bethany
0 0.25 0.5 1 Miles
FIRE STATION
POLICE STATION
HOSPITAL
SCHOOL
CITY HALL
PUBLIC WORKS
WATER TOWER
CPWT
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.4 CITY OF CHOCTAW

This section presents the jurisdictional annex for the City of Choctaw.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Kerry Williams, Fire Chief P.O. Box 567, Choctaw, OK 73020 (405) 390-8300 kwilliamsr@choctawcity.org	Brian Linley, City Manager PO Box 567, Choctaw, OK 73020 (405) 390-8918 citymanager@choctawcity.org

B.) MUNICIPAL PROFILE

The City of Choctaw is located in the southeastern section of Oklahoma County. The City of Oklahoma City and the Town of Jones border the City to the north; the City of Harrah to the east; the City of Oklahoma City to the south; and the City of Midwest City to the west. The City of Choctaw has a total land area of 27.1 square miles, of which, 27.1 square miles is land and 0.04 square miles is water. The City is governed by a mayor and six member City Council. The 2020 U.S. Census population for the City of Choctaw was 12,218 (+9% from 2010).

Growth/Development Trends

Property Name	Type (Residential or Commercial)	Number of Structures	Address	Known Hazard Zone	Description/Status
Westfall	Residential	184	NE 10th and Hiwassee	No	Under development
Henney Ridge	Residential	85	Henney Road between NE 23rd and NE 36th	No	Under development
Brookside	Residential	12	Maupin and Tye Brumley	No	Planned
Choctaw Pointe	Residential	116	NE 10th (1/2 mile east of Choctaw Road)	Yes	Under Development
Canyon Oaks	Residential	36	McDonald Road (1/2 mile north of NE 36th)	Yes	Planned
R and R (Willow Springs)	Residential	210	North Choctaw Road (between NE 36th and NE 50th)	Yes	Planned
The Villas at Choctaw Creek	Residential	59	NE 23rd and Triple X to the south	No	Planned
Wentworth	Residential	35	North Hiwassee and East Reno	Yes	Planned
Fox Pointe Apartments	Residential	526	SE 15th and Anderson	Yes	Planned
Highland Estates	Residential	42	16255 NE 10th	Yes	Planned
The Reserve	Residential	95	2700 N. Hiwassee	Yes (Regulated Floodway)	Planned

The City of Choctaw is seeing an increase in new residential neighborhoods, which is the only change to land use. The increase of residential development has increased wildland urban interface challenges. Some development has also increased the potential for flooding.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section. Some mitigation actions were re-prioritized in this update.

Completed 2019 Initiative	Comments
None.	Several are in various states of progress.
Abandoned 2019 Initiative	**Comments**
Prepare and distribute newsletters and use email notification systems to better educate the public on flood insurance and work with neighborhood associations, civic and business groups to disseminate information on flood insurance.	Similar to other mitigation actions already in the plan. The jurisdiction already has a project to distribute mitigation information at booths during large public events and at public city venues.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Choctaw is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Canton Lake, Overholser - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	No	Per NRCS map, no expansive soils present in this jurisdiction
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of Choctaw, the following have been identified as specific hazards:

- Choctaw Creek runs through a major area of the City. State Highway 62, or NE 23rd, is a four lane highway with commercial and residential areas that runs along the Creek. Choctaw Creek floods two to three times in a year, which the highway has to be shut down and some occupants have to be evacuated. The cause is the Creek fills with debris such as trees, brush, and sediment from other areas. There are additional low-lying areas that are subject to periodic flooding caused by overflow of the Choctaw Creek and its tributaries, along with the North Canadian River. The

most severe flooding occurs upstream from roadways that restrict the flow. Flooding along the Creek has not caused extensive property damage; however, future development could increase the threat of flood problems. For example, the Oakridge Manor subdivision (east of Reno Ave and Hiwassee Rd) has repeated structure flooding from a tributary. A study with recommendations has been conducted by a city contractor. Further study has been contracted and construction plans to redirect the flow away from the subdivision and toward the creek just west along streetside drainage. Just south of this area, along SE 15th St and Hiwassee Rd, repeated flooding occurs just west of the intersection, bordering Midwest City. While a grant has been awarded to Midwest City for their portion and this Plan has associated potential projects listed in both jurisdictions, Choctaw continues to submit grant applications for assistance as the cost of this project and a downstream project which far exceed the city's financial capabilities.

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3):

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
Choctaw City Hall	Choctaw (C)	User Defined		X	14.0	83.5	13.1	74.9

Source: FEMA, 2009;

Notes:

(1) 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE TOWN

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
May 18 to Jun. 2, 2013	Severe Storms, Flooding	DR-4117	Yes	Major flooding, especially May 31-June 1. One of the worst in the metro's history.
December 01, 2013	Earthquake	N/A	N/A	4.5 magnitude earthquake near Arcadia Lake; depth of 8.4 km.
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	4.3 magnitude earthquake near Spencer; depth of 5.0 km.
June 18, 2014	Earthquake	N/A	N/A	4.1 magnitude earthquake near Spencer; depth 5.0 km
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
October 9, 2018	Tornado	N/A	N/A	An outbuilding was destroyed just south of NE 23rd and Choctaw Road with a weak QLCS tornado that produced tree damage to NE 63rd and Peebly.
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused some icing, followed by 5.5” of snow at Choctaw.
April 18, 2019	Wind	N/A	N/A	A thunderstorm produced scattered wind damage, with a tree down on the road near NE 36th and Henney.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
August 26, 2019	Wind	N/A	N/A	In Choctaw, pieces of surface roof material were blown off a middle school gymnasium.
February 5, 2020	Heavy Snow	N/A	N/A	Around 4” of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Around 0.4” of ice and lots of tree damage.
December 13, 2020	Heavy Snow	N/A	N/A	5” in Choctaw.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
December 15, 2020	Winter Storm	N/A	N/A	Generally 3-4 inches of snowfall accumulation was reported across the county.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain accretion of 0.25” to 0.35” was reported across the county. 8” of snow in Choctaw, and up to 5 inches falling 1 mile SSW Choctaw.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	5” of snow.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	An additional 4” of snow.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
July 2022-May 2023-	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	

Number of FEMA Identified Repetitive Flood Loss Properties: 1 Residential
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Choctaw

Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.

	Loss	Acres
2023	N/A	N/A
2022	N/A	34.0
2021	N/A	5.0
2020	N/A	23.9
2019	N/A	1.0
2018	$1,700	10.2
2017	$322,500	14.8
2016	$0	15.5
2015	$0	34.3
2014	$0	28.7
2013	$0	1.1
TOTAL LOSS	**$324,200**	**168.5**

Sources: Oklahoma State Fire Marshal's office & Choctaw Fire Dept.

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	Adopted 2018 IBC		Approx every 5 years	Development Services/City Council
Comprehensive / Master Plan	Y	Approved by council 2015	Yes	Annual	City Council/Manager
Zoning Management Ordinance	Y	Section 12, Chapters 2 and 3		Continuous	Development Services/City Council
Subdivision Management Ordinance	Y	Section 19, Ordinance 19-103		Continuous	Development Services/City Council
Site Plan Review Requirements	Y	Section 5, Ordinance 5-107		Continuous	Development Services
NFIP Flood Damage Prevention Ordinance	Y	Section 18, Chapter 2, Ordinance 18-101		Not Scheduled	Floodplain Admin/City Council
NFIP Elevation Certificates Maintained	Y	Section 18, Ordinance 18-222		Not Scheduled	Floodplain Admin
Floodplain Management Plan	Y	Drainage Manual	Yes	Not scheduled, revisions 2023	Floodplain Admin/City Manager
Stormwater Management Plan / Ordinance	Y	Section 17, Chapter 3		Not scheduled, revisions 2023	Floodplain Admin
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	Y	Section 18, Ordinance 18-414		Not Scheduled	Development Services/City Council
Capital Improvements Plan	Y			Annual	City Manager
Open Space Plan	N				
Economic Development Plan	Y	CEDP	Yes	Not	Development

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
				scheduled	services committee
Emergency Response Plan	Y	County Plan		Not scheduled	
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	Y	Members of ACOG	No	Not scheduled	City Manager & City Council
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	1 City Engineer, 1 City Planner
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	1 City Engineer
Planners or engineers with an understanding of natural hazards	Y	1 City Engineer, 1 City Planner
NFIP Floodplain Administrator	Y	1 City Engineer
Surveyor(s)	N	
Personnel skilled or trained in “GIS” applications	Y	1 City Engineer, 1 City Planner
Scientist(s) familiar with natural hazards in the County.	N	

Emergency Manager	Y	1 Emergency Director
Grant Writer(s)	Y	
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes (one cent sales tax)
Authority to Levy Taxes for specific purposes	Yes (City Council)
User fees for water, sewer, gas or electric service	Yes (Water and Sewer)
Impact Fees for homebuyers or developers of new development/homes	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	No
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS, ISO)	TBD	TBD
Public Protection (ISO)	4	2018
Storm Ready	County	3/4/2024
Firewise	Y	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Furthermore, employing experts in land management and construction

practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Moreover, this jurisdiction participates in Wildland Automatic Response (or WAR – an automatic mutual aid agreement during high wildland hazard days). This ensures a greater response to wildland fires.

Although there is a city-wide flood study ongoing, the ability for floodplain management to be expanded on and improved is limited by a deficiency in general maintenance and city staff ability. The city lacks funds for a separate municipal storm sewer system (ms4). Additional training and cross-training of job duties, joining professional organizations and annual review of flood prone areas for potential mitigation solutions.

Choctaw has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the floodplain manager has the authority, via Choctaw City Code of Ordinances, to assess substantial damages and require that no substantial improvements are made until it has been demonstrated via engineering that development will be compliant with the floodplain regulations.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in the table are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures *	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Removal of debris (trees, brush, trash and sediment) from miles of Choctaw Creek. This will allow the Creek to flow better. This project will be implemented as part of anticipated commercial development plans. This project may be done in conjunction with Oklahoma County to reduce or eliminate flooding over a larger area.	N/A	(Non-Mitigation, Maintenance)	In Progress, as time allows	DPW, with County Support	Medium (reduced or eliminated local flooding)	High	Capital Improvement Funds	Short	High
Archive elevation certificates	NA	NFIP Compliance	Continuous	NFIP Floodplain Administrator	Low	Low	City Operating Budget	As provided (no end)	High
Working with MWC to mitigate the flooding at SE 15th & Hiwassee at Choctaw Creek Tributary 4 East Branch. The culvert needs to be replaced and enlarged. Areas downstream will need to be addressed.	Existing	Flood	Planned	City Engineering, ODOT, Storm Water Management	High	High	HMGP, FMA, Capital Improvement Funding	Long	High

Mitigation Initiative	Applies to New and/or Existing Structures *	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Choctaw Creek from Hiwassee to Triple X floods (including Hwy 62) and needs to be maintained to include cleaning of debris, rip-rap put in place on bridges and wash out areas. Recent commercial development in the area may add to the flooding.	Existing	Flood	Planned	City Engineering, ODOT, Storm Water Management, Army Corps.	High	High	HMGP, FMA, Capital Improvement Funding	Short	High
Replacement of culvert with box culvert at 400 block of Choctaw Rd.	Existing	Flood	Planned	City Engineering, ODOT, Storm Water Management	High	High	HMGP, City Operating Budget	Long	Low
Distribute All-Hazard Weather Radios to senior centers, and high-risk residents		Dam Failure, Drought, Earthquake, Extreme Temperature, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storms	As needed	Emergency Management	High	Medium (updated)	HMGP, City Operating Budget	Long	Low
Create mitigation education pamphlets and distribute at booths during large public events and at public city venues.		Dam Failure, Drought, Earthquake, Extreme Temperatures , Flood, Hail, Lightning, Wildfire, Wind	As public events occur, reorder as needed	Emergency Management	High	Low	HMGP, City Operating Budget	Long	Low

Mitigation Initiative	Applies to New and/or Existing Structures *	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
		(incl. Tornado), Winter Storms							
Educate students at schools on how to mitigate against flooding, hail, high winds (including tornadoes) and lightning and be better prepared for storm season.		Flood, Hail, Lightning, Wind (incl. Tornado)	During school year	Emergency Management	Medium	Low	City Operating Budget	Long	Low

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:

PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

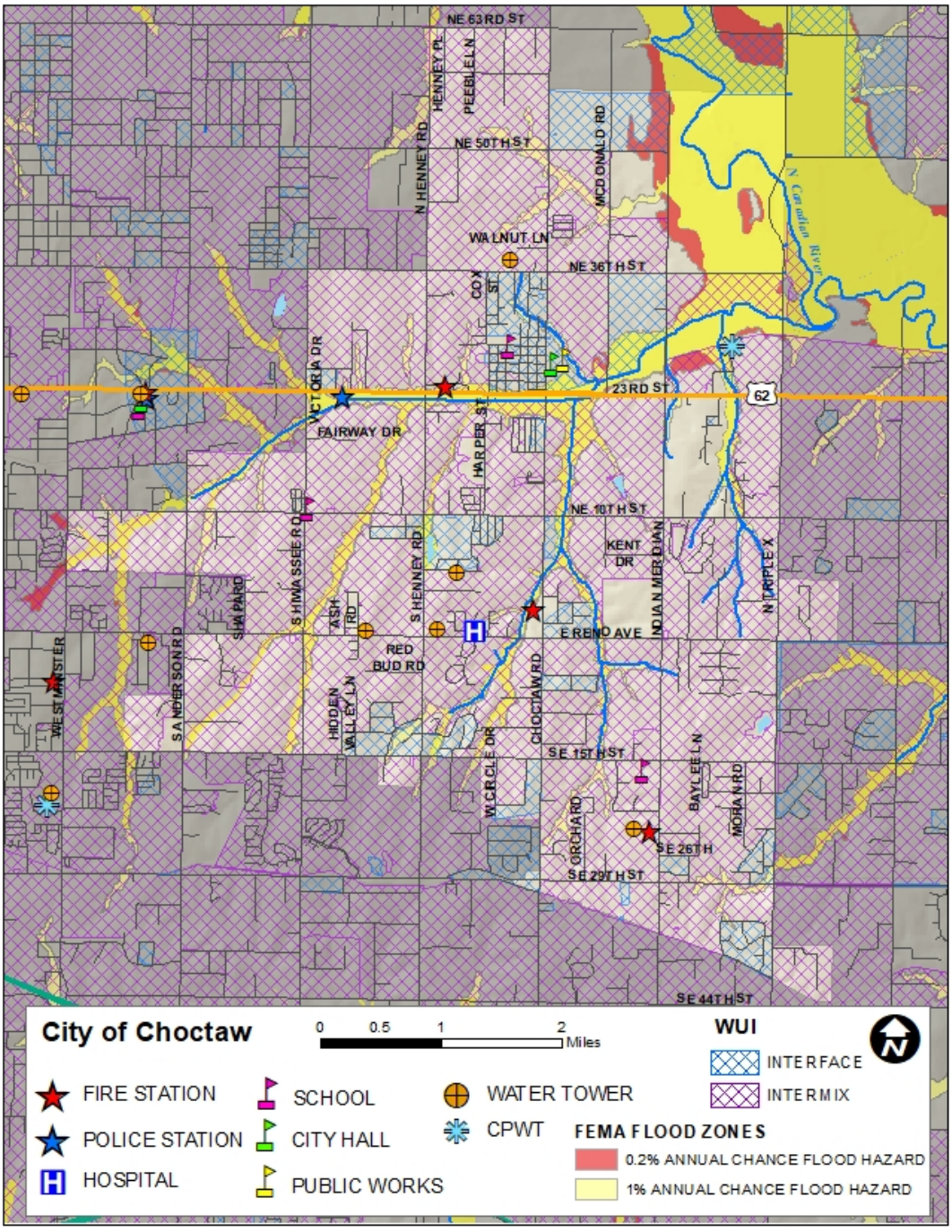
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Choctaw to illustrate the probable areas impacted within the City of Choctaw. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Choctaw has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NE 63RD ST
HENNEY PL
PEEBLE LN
N HENNEY RD
NE 50TH ST
MCDONALD RD
N Canadian River
WALNUT LN
NE 36TH ST
COX ST
VICTORIA DR
23RD ST
62
FAIRWAY DR
HARPER ST
NE 10TH ST
KENT DR
INDIAN MERIDIAN
N TRIPLE X
S HIWASSEE RD
S HENNEY RD
ASH RD
SHA PARD
E REND AVE
RED BUD RD
WEST MINSTER
SANDERSON RD
HIDDEN VALLEY LN
CHOCTAW RD
W CIRCLE DR
SE 15TH ST
BAYLEE LN
MORA RD
ORCHARD
SE 26TH
SE 29TH ST
SE 44TH ST
City of Choctaw
0 0.5 1 2 Miles
WUI
INTERFACE
INTERMIX
FIRE STATION
POLICE STATION
HOSPITAL
SCHOOL
CITY HALL
PUBLIC WORKS
WATER TOWER
CPWT
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.5 CITY OF DEL CITY

This section presents the jurisdictional annex for the City of Del City.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Kellie Wilbanks Community Development Director 3701 SE 15th Street, Del City, OK 73115 (405) 670-7303 kwilbanks@cityofdelcity.org	JD Hock City Manager 3701 SE 15th St, Del City, OK 73115 (405) 670-7301 jhock@cityofdelcity.org

B.) MUNICIPAL PROFILE

The City of Del City is located in the southwestern section of Oklahoma County and is part of the Oklahoma City metropolitan area. The City is bordered to the north, south and west by Oklahoma City, and to the east Midwest City. The City of Del City has a total land area of 7.5 square miles, all of it land. The City is governed by a mayor and a four member City Council. The 2020 U.S. Census population for the City of Del City was 21,828 (+2% from 2010). An increase in the transient population has been noted in the past 5 years.

Del City is situated at the bottom of two major drainage basins. A large amount of stormwater conveyed through the City originates in areas outside of the City's control. The City has 1,354 parcels in the NFIP Special Flood Hazard Area, with 4 NFIP Repetitive Loss properties. Flooding in the City is mainly caused by the Crutcho and Cherry Creeks. Areas where natural and man-made obstructions in the floodplains have an increased severity of flooding. (FEMA FIS - 2009)

Known or Anticipated Future Development

The following table summarizes major residential/commercial development and major infrastructure development that are identified for the next five (5) years in the City. Refer to the map at the end of this annex which illustrates the hazard areas along with the location of potential new development.

Property Name	Type (Residential or Commercial)	Number of Structures	Address	Known Hazard Zone	Description/Status
I-40 and Sooner	Commercial	2-5	5300-5500 Main Street	Flooding	Crutcho Creek and Crutcho Creek Tributary B: Remediated Using Public Funding and LOMR Approved
SE 15th & Sooner	Commercial	2-3	5200-5500 SE 15th St	Flooding	Preliminary, potential for flooding from runoff
John Smith Sports Complex	Public	0	4500 Reno	Flooding	Potential recreation area
Cherry Creek	Residential	2	1900 Cherry Lane	Flooding	Potential source of flooding: Cherry Creek
I-40 and Scott	Commercial	Unknown	Tinker Diagonal St & S. Scott Street	Flooding	Potential from flooding from Crooked Oak Creek

Property Name	Type (Residential or Commercial)	Number of Structures	Address	Known Hazard Zone	Description/Status
Large Home Residential	Residential & Commercial	300	South of SE 29th Street between S Sunnylane Rd and Bryant Ave.	Flooding	Cherry Creek

Though some of these future development sites are being developed within known hazard zones, due to infrastructure augmentation and up-to-date NFIP & floodplain code enforcement, these developments do not impact the overall flooding potential within Del City. A slight decrease to the WUI is expected as it will cover an undeveloped urban area.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The following table summarizes progress on the mitigation strategy identified by the City of Del City in the 2019 plan.

Completed 2019 Initiative Description	Status
Brookdale Channel – Repair channel north of SE 15th	Completed
Installed lightning protection at WWTP	Completed
Installed a generator at the new Fire Station 1	Completed
The city refurbished water wells and replaced the supply line from Lake Thunderbird to the Water Treatment Plant	Completed
The city installed covers for vehicles at City Hall.	Completed at City Hall

Abandoned 2019 Initiative Description	Status
Remove an apparently faulty flap gate on Crutcho Creek under SE 29th Street.	Responsibility of a neighboring jurisdiction
Address flooding issues in the area of NE 10th and Sunnylane, which may involve acquisition.	Not feasible
Address flooding issues in the area of NE 10th and Sunnylane, which may involve construction of stormwater detention.	Not feasible
Create a Residential Safe Room Rebate Program	State has a rebate program
Drill new water wells	The city refurbished existing wells
Public education on the dangers associated with lightning and how to increase resiliency in the home and office	Abandoned initiative

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Del City is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Canton Lake, Overholser - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of Del City, the following have been identified as specific hazard vulnerabilities in the City:

Repetitive street flooding on Del View Drive and Hampton Drive.
SE 28th street between Vickie and Linda Lane can flood up to porches of homes.
The Oakbrook channel can flood from Woodview to SE 29th.
The Brookdale channel can flood north of SE 15th St.
Street and residential flooding can occur on NE Sooner Rd to E Reno Ave in the Hidden Creek Estates.
Street and residential flooding can occur on SE 15th St to Mallard Dr.
The Cherry Creek channel in the Hartsdel Addition is subject to backup and flooding after heavy rain.
Flooding on Lariet Lane occurs due to lack of sufficient drainage.
Crutcho Creek appears to have a faulty gate under SE 29th St.
Street and residential flooding can occur at NE 4th and Sunnylane after heavy rains.
Street and industrial flooding can occur at NE 10th and Vickie.
Commercial flooding can occur at SE 29th St and Epperly Dr.
Commercial flooding can occur at the 1900 block of Vickie Dr.
A few residents and businesses are in the SFHA near the North Canadian River.

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
Del City Fire Department #2	Del City (C)	Fire	X	X	-	-	0.1	0.1

Source: FEMA, 2009

Utilities Located in the Preliminary DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss	
			100 Year	500 Year	100 Year Damage %	500 Year Damage %
Wastewater Treatment Complex*	Del City (C)	WWTF	X	X	23.2	29.9

*Facility has no history of flooding.
Source: FEMA, 2009;
Notes:
(1) 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
May 31, 2013	Wind/Flood	DR-4117	Yes	Minor flooding to residential and apartment buildings. Tributary backed up into private property causing minor damage.
February 2014-July 2014	Drought	N/A	N/A	
March 5, 2015	Extreme Cold	N/A	N/A	
May 5-10, 2015	Flood	DR-4222	Yes	Over this time, a total of 11.61" rain reported at Will Rogers Airport. Southern parts of Oklahoma County saw the greatest rainfall. Del City experienced flooded roadways.
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice Storm with widespread power outages, including the Del City area.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Around 5" of snow.
June 6, 2019	Flood	N/A	N/A	A stretch of Scott Street near I-40 was inundated with 6.5" of water in Del City.
June 9, 2019	Wind	N/A	N/A	Non-thunderstorm winds tore part of the roof off the Del City Fire Station #2 east of SE 15th & Sunnylane Rd.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
August 26, 2019	Wind	N/A	N/A	In Del City, the Community Center's roof was peeled back and HVAC units moved. A church on SE 22nd had their roof collapse and the front of the Dollar Tree store collapsed near SE 15th & Sunnylane Rd.
February 5, 2020	Heavy Snow	N/A	N/A	Around 3" of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Near ½" of ice with lots of tree damage.
December 13, 2020	Heavy Snow	N/A	N/A	4" of snow in Del City.
December 15, 2020	Winter Storm	N/A	N/A	Generally 3-4 inches of snowfall accumulation was reported across the county.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	¼" of ice and near 6" of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Traffic accidents reported due to light icing on bridges.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
June 6, 2021	Flood	N/A	N/A	Motorist stranded in the area of Cherry Creek bridge near SE 15th/Sunnylane in Del City.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
September 2021	Drought	N/A	N/A	
October 14, 2021	Wind	N/A	N/A	Sheet metal roofing peeled off a shopping center near SE 15th/Sunnylane Rd. in Del City with power poles leaning. Numerous large trees downed.
December 2021-April 2022	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 2022-May 2023	Drought	N/A	N/A	
July 11, 2023	Flood	N/A	N/A	4-6” inches of water on a roadway northeast of Reno & Sooner.
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 4 residential
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0
Source: Repetitive Loss info from City of Del City Community Services

Wildfire History for Del City

Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.
*A significant fire occurred in neighboring Midwest City in 2009, with mutual aid costs not listed here.

	Loss	Acres
2023	N/A	N/A
2022	$0	4.0
2021	$48	5.0
2020	$0	0.0
2019	$0	2.0
2018	N/A	N/A
2017	$20	2.6
2016	$85	1.1
2015	$0	1.0
2014	$257	101.1
2013	$0	0.0
TOTAL LOSS	**$410**	**116.8**

Source: Oklahoma State Fire Marshal's office, Del City FD

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Yes	2015		3 Years	Community Development & Fire Marshal
Comprehensive / Master Plan	Yes	December 2023	Yes	Annual	Community Development
Zoning Management Ordinance	Yes	Appendix A- Del City Code, to be updated in 2024		5 Years	Community Development
Subdivision Management Ordinance	Yes	Included in the Zoning Ordinance		5 Years	Community Development
Site Plan Review Requirements	Yes	Included in the Zoning Ordinance		3 Years	Community Development, Fire Marshal, Public Works
NFIP Flood Damage Prevention Ordinance	Yes	Higher Standards Ordinance 2009		Annual	Floodplain Administrator
NFIP Elevation Certificates Maintained	Yes			Annual	Floodplain Administrator
Floodplain Management Plan	Yes			Annual, October 15th	Floodplain Administrator
Stormwater Management Plan / Ordinance	Yes	2011 - Ordinance 1344		Annual, June 30th	Stormwater Quality Manager
Stream Corridor Management or Protection Plan	No				
Erosion Management Ordinance	Yes	2011 - Ordinance 1344		Annual, June 30th	Stormwater Quality Manager
Capital Improvements Plan	Yes	Yes		Annual, May 30th	City Administrator
Open Space Plan	No				
Economic Development Plan	Yes			Bi-annual, December 31st	Economic Development Director

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Emergency Response Plan	Yes			Annual, December 31st	Emergency Manager
Post Disaster Recovery Plan / Ordinance	Yes			5 Years, by December 31st	Community Development, Emergency Manager
Real Estate Disclosure Requirements	Yes	State Requirements		As the State requires	
Highway Management Plan	No				
COOP/COG Plan	Yes	Included in Disaster Plan		Annual, December 31st	Emergency Manager
Other (Special Purpose Ordinances such as critical or sensitive areas)	Yes	Drainage/Detention Ordinance/Airport Overlays/Accident Protection Zones		As per Federal guidance	Community Development, Fire, City Administration

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

Del City reports minimal integration of the HM Plan with the above documents. During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Yes	Economic Development Director, Community Development Director, City Planner
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Yes	Economic Development Director, Community Development Director, City Planner, Chief Building Inspector, Fire Marshal
Planners or engineers with an understanding of natural hazards	Yes	Economic Development Director, Community Development Director, City Planner
NFIP Floodplain Administrator	Yes	City Planner
Surveyor(s)	No	

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Personnel skilled or trained in “GIS” applications	Yes	Contracted Position
Scientist(s) familiar with natural hazards in the County.	No	
Emergency Manager	Yes	Fire Chief
Grant Writer(s)	Yes	Economic Development Director, Community Development Director, Fire Department, Police Department, City Administration
Staff with expertise or training in benefit/cost analysis	Yes	Economic Development Director, Community Development Director, Fire Department, Police Department, City Administration

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don’t know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes, Stormwater Utility
Impact Fees for homebuyers or developers of new development/homes	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	Yes - TIF
Withhold public expenditures in hazard-prone areas	No
Other	Development Grants

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	6	5/1/2017
Building Code Effectiveness Grading Schedule (BCEGS)	4	2016
Public Protection	2	2019
Storm Ready	City and County	12/2022
Firewise	N/A	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Furthermore, employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Floodplain management abilities can be expanded on and improved through additional training and cross-training of job duties, joining professional organizations and annual review of flood prone areas for potential mitigation solutions.

Del City has adopted NFIP floodplain management criteria and the most recent FIRM map of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
City Wide Flood Prevention – Replace broken drop boxes and channel lining city wide	Existing	Flood	Planned	Public Works	High – reduced local flooding due to improved conveyance	High (est. $1 million)	City General Fund	Ongoing as funding becomes available	High (critical)
Oakbrook Channel – Streambank Stabilization		Flood	Planned	Public Works	Reduced Flooding Potential	High	HMGP and City Capital	Long	Medium
Install backup generators at the following facilities: • Police Department • City Hall • Wells (portable gen.) • Fire Department Station 2/Community Center	Existing	Flooding, Earthquake, Extreme Temps, Flooding, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Planned	City EM / Fire Department	Essential City Functions maintained	High	HMGP, Capital Improve-ment Funds, General Funds	Long	High
Purchase, or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss and severe repetitive loss properties as priority. Specifically identified are the following: Properties along the North Canadian River	Existing	Flood	Planned	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, FEMA	High	High	FEMA Flood Mitigation Grant Program, Neighbor-hood enhance-ment funds	Long-term DOF	Medium -High*

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Phase 1: Identify appropriate candidates for relocation based on cost-effectiveness versus retrofitting. Phase 2: Where relocation is determined to be a viable option, work with property owners toward implementation of that action based on available funding from FEMA and local match availability.									
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	General Fund	Ongoing (no end)	High
Enact a city code to perform soil stabilization when expansive soils are found during engineering studies and compaction tests on fill land.	New	Expansive Soil	Planned	Community Development	Medium	Medium	General Fund	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
When citizens apply for building and remodel permits, provide a pamphlet with expansive soil mitigation information.	New & Existing	Expansive Soil	Planned	Community Development	Medium	Low	Donated	Continuous	Low
Educate citizens on water conservation by providing information through the utility bill and social media		Drought	Ongoing (no end)	Stormwater Manager	Reduce water use in city	Low	DC MSA	Ongoing, through the year	Medium
Increase earthquake risk awareness – through public education pamphlets distributed at community gatherings (fire dept. open house, police dept. open house, pool safety day, etc.)		Earthquake	As public events are scheduled	EM / Fire Department	Reduce loss of life through education – residents should have a plan - and reduce damage to buildings	Low	EM General Fund	Short	Medium
Public education on the dangers associated with extreme temperature events prior to the onset of extremes		Extreme Temps	Typically Spring and Fall	EM / Fire Department	Reduce loss of life	Low	EM General Fund	Short	Medium
Establish heating and cooling stations to protect citizens from extreme temperatures, and provide a location with electricity and water during winter storms and after high winds		Extreme Temps, Wind (incl. Tornado), Winter Storm	As events occur year around	EM / Fire Departments	Reduce loss of life	Medium	General Fund, DC MSA	Ongoing, as events occur	Low
Provide shelters for jurisdiction owned emergency vehicles to protect from hail		Hail	As buildings are built and	Various City Depts as needed	Reduction in losses of vehicles	High	Capital Improve-ment Funds	Long	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
damage citywide			refurbished						
Install lightning protection and suppression systems protecting radios, computers, and other essential equipment at critical facilities throughout the jurisdiction	Existing	Lightning	Planned and ongoing	Coordinated through City Administration	Reduction in loss of electronic equipment	High	General Fund	Ongoing as funds allow and new equipment is procured	High
Public education on finding the best nearby shelter (city newsletter)	Existing	Wind (incl. Tornadoes)	New	EM / Fire Department	Reduce loss of life	Low	General Fund	Annual, in Spring	Medium
Create fire breaks along fence rows to thwart road jumping of wildland fires	Existing	Wildfire	Ongoing, each summer	Fire Department	Reduced structure loss	Low	General Fund	Annual, as vegetation grows	High
Public education on creating fire breaks around the home and reducing wildfire risk	Existing	Wildfire	New	EM / Fire Department	Reduce loss of life	Low	General Fund	Annual, as needed	Medium
Purchase All Hazard Weather Radios for schools and other public facilities		Dam Failure, Drought, Earthquake, Extreme Temp, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	As needed	EM / Fire Department	Reduced loss of life	Low	HMGP w/ EM General Fund	Short	High

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000

Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

I.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

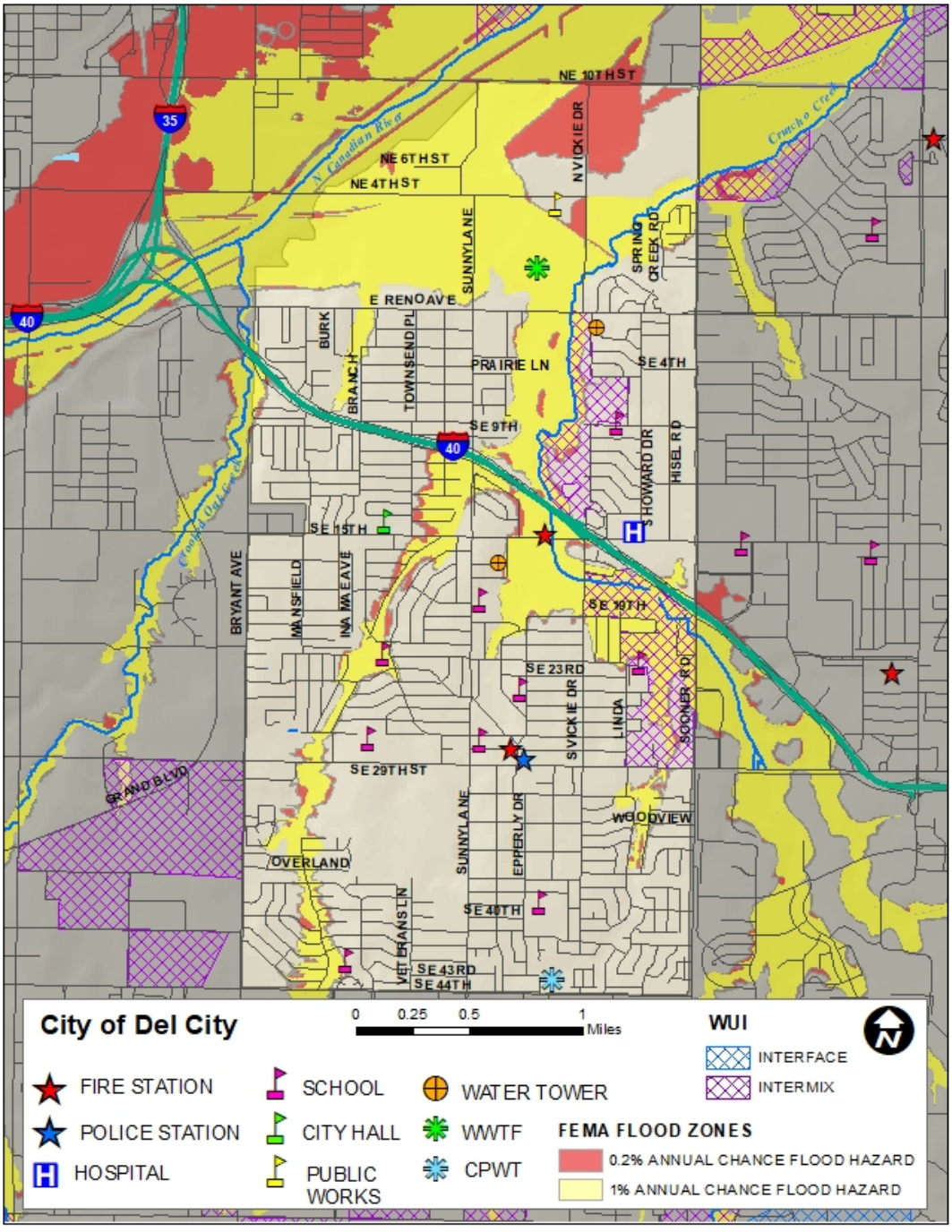
None at this time.

J.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Del City to illustrate the probable areas impacted within the City of Del City. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Del City has significant exposure.

K.) ADDITIONAL COMMENTS

No additional comments at this time.


City of Del City
0 0.25 0.5 1 Miles
FIRE STATION
POLICE STATION
HOSPITAL
SCHOOL
CITY HALL
PUBLIC WORKS
WATER TOWER
WWTF
CPWT
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD
NE 10TH ST
NE 6TH ST
NE 4TH ST
E RENO AVE
SE 4TH
SE 9TH
SE 15TH
SE 19TH
SE 23RD
SE 29TH ST
SE 40TH
SE 43RD
SE 44TH
PRAIRIE LN
WOODVIEW
OVERLAND
SUNNYLANE
N VICKIE DR
S VICKIE DR
SPRING CREEK RD
HOWARD DR
HISEL RD
LINDA
SOONER RD
BRYANT AVE
MANSFIELD
INA MAE AVE
BURK
BRANCH
TOWNSEND PL
EPPERLY DR
VETERANS LN
GRAND BLVD
35
40
N Canadian River
Crutcho Creek
Crutcho Creek

9.6 CITY OF EDMOND

This section presents the jurisdictional annex for the City of Edmond.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Brook Pintens Emergency Management Coordinator P.O. Box 2970, Edmond, OK 73083 (405) 359-4378 brook.pintens@edmondok.com	Brandon Pursell Emergency Management Resource Specialist P.O. Box 2970, Edmond, OK 73083 (405) 359-4564 brandon.pursell@edmondok.com

B.) MUNICIPAL PROFILE

The City of Edmond is located in the northcentral section of Oklahoma County and is part of the Oklahoma City metropolitan area. The City is bordered to the south, east and west by Oklahoma City. The City has a total land area of 87.9 square miles; with 85.1 square miles of it is land and 2.8 square miles of water. The City is governed by a mayor and a five member City Council. The 2020 U.S. Census population for the City of Edmond was 94,740 (+14% from 2010).

Flooding in the City typically results from intense thunderstorms associated with squall line activity. The greatest potential for flood damage in the City exists along the upper portion of Spring Creek, west of Bryant Avenue. The main reasons why this area floods is due to increased urbanization, residential development along the floodplain, and inadequate bridge and culvert openings. (FEMA FIS – 2009)

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.

Completed 2019 Initiatives	Comments
Added a voice announcement lightning warning system to the outdoor warning system at the Kickingbird golf course	Completed in 2023
Spring Creek Tributary 2 - From E 33rd St. to S Coltrane Rd. existing earthen lined channel sediments were removed to restore flow capacity	Decreased flood risk
Acquire and install high-powered voice warning devices for city parks and high density public areas.	

Abandoned Initiatives	Comments
Bury overhead power lines in areas of older infrastructure where the system is vulnerable to adverse weather conditions.	The city has pursued funds under the federal GRIP grant program but has been turned down as of early 2024. Without the funding, it may be reconsidered as a future project but not within the next 5 years.
Establish cooling and heating (warming) stations to protect the public from extreme temperatures.	Most seek neighbors and family in extreme temperature events.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Edmond is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Arcadia Lake - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of Edmond, the following have been identified as specific hazard vulnerabilities in the City:

- Flooding has damaged public infrastructure, such as waterlines, sanitary sewers, buildings, streets and bridges
- Drought increases the threat of wildfires
- Hail has damaged City vehicles and roofs
- High winds have damaged street signs and lights, as well as interrupting power when trees damage electrical lines
- Severe thunderstorms produce high winds, hail and sudden rain; all causing damage to City property
- Tornadoes have impacted the City many times, causing significant damage to private and public property
- Wildfires have significantly impacted the City, causing significant damage to private and public property, as well as impacting the City's operations and provision of services, including emergency services
- Winter storms have led to the City effectively 'shutting down,' resulting in road closures, stranded motorists, the opening of shelters, service interruptions, and the closure of businesses.
- The City notes that an average of 45 trains/day move through Edmond on the Burlington Northern Santa Fe (BNSF) railway with unknown and potentially hazardous materials

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3.6):

Utilities Located in the Preliminary DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss	
			100 Year	500 Year	100 Year Damage %	500 Year Damage %
Oak Tree Lift Station	Edmond (C)	WW Pump	X	X	40.0	40.0
Well #34	Edmond (C)	Potable Water	X	X	5.2	40.0
Well #30	Edmond (C)	Potable Water	X	X	-	0.7
Well #56	Edmond (C)	Potable Water	X	X	40.0	40.0
Well #44	Edmond (C)	Potable Water	X	X	2.8	30.3
Williams Gas Pipeline / Compressor Station	Edmond (C)	Natural Gas	X	X	-	40.0
Garber Substation	Edmond (C)	Electric Substation		X	-	-
Fairfield Substation*	Edmond (C)	Electric Substation	X	X	-	-

Source: FEMA, 2009;
Notes:
(1) 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

Growth/Development Trends

The following major residential/commercial development and major infrastructure development are currently known or anticipated in the City of Edmond.

New Development/Potential Development in Municipality			
Property Name	Type Residential or Commercial	Number of Structures	Address
Fox Lake Commercial	Commercial	1	851 W I-35 Frontage Rd
PUD North of Bancfirst	Commercial	1	North of 1100 S. Bryant
Edmond Town Center Development	Commercial	1	South of Danforth and Kelly
Ranken Energy commercial spaces	Commercial	1	457 W. 18th Street

Recent and anticipated growth is in existing urban areas, with only small increases to the WUI and flood risk.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	2011-2012 was the fourth driest two-year period on record and left water storage at reservoirs at an all-time low. Oklahoma City implemented mandatory outdoor water rationing starting July 31, 2012

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
				including cities that buy water from OKC. This includes Deer Creek Rural Water District (unincorporated county), Edmond, The Village and Warr Acres. January 17, 2013 odd/evening outdoor watering was re-implemented and by spring became a permanent program.
April 26, 2013	Hail	N/A	N/A	Very large hail up to 2.50 inches was reported. Property Damage estimated grew to $400K.
May 19, 2013	Tornado, Hail	N/A	N/A	A tornado touched down in Edmond, that was rated up to EF1 that created damage to buildings. An estimate of damages was not available. Hail up to 2.6" was reported near Coffee Creek & I-35.
December 01, 2013	Earthquake	N/A	N/A	This earthquake was 8.4km in depth and was felt throughout the Oklahoma County area. There was reports of strong shaking and light damage reported. This originated in Edmond at a magnitude of 4.5
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	4.3 magnitude earthquake near Spencer; depth of 5.0 km.
June 18, 2014	Earthquake	N/A	N/A	4.1 magnitude earthquake near Spencer; depth 5.0 km
December 14, 2014	Tornado	N/A	N/A	One very brief EF0 tornado was videoed by KWTV over northeastern Oklahoma County south of Lake Arcadia in Edmond. No damage occurred.
March 5, 2015	Extreme Cold	N/A	N/A	
July 2, 2015	Flood	N/A	N/A	This was the largest rain event damage recorded locally. Multiple residential and commercial flooding occurred, no substantial damage reported. Some street repair was necessary on Santa Fe Ave.
November 27, 2015	Ice Storm	DR-4247	Yes	Edmond sustained significant tree damage that necessitated debris pickup. Edmond Electric suffered infrastructure damage, too. Edmond's total cost was $1.2M
December 29, 2015	Earthquake	N/A	N/A	In the county, this earthquake, at a depth of 6.5km, there were multiple reports of light to moderate shaking with very light damage. This earthquake originated in Edmond and was measured at 4.3.
January 01, 2016	Earthquake	N/A	N/A	At a depth of 5.8 feet, there were multiple reports of light to strong shaking with light damage reported with this quake.
April 07, 2016	Earthquake	N/A	N/A	4.2 magnitude earthquake at Luther; depth of 6.1 km

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
April 26, 2016	Tornado	N/A	N/A	An EF0 tornado was spotted just south of Lake Arcadia in Edmond that caused an estimated 4.00K damage. An EF0 also began in the city limits 3 N of Arcadia and moved NE.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A		1/10” reported in Edmond near Covell/I-35.
January 7, 2017	Extreme Cold	N/A	N/A	
July-August 2017	Drought	N/A	N/A	
August 03, 2017	Earthquake	N/A	N/A	All regions of the county felt this quake, per the USGS. Most areas were light with a few areas experiencing moderate shaking. Very light damage was also reported.
January 2018-April 2018	Drought	N/A	N/A	
June 7, 2018	Flood	N/A	N/A	Widespread flooding across the north Metro. Reports of flooding including NW 234th and Rockwell, parts of The Village, Edmond and Nichols Hills stranding multiple cars and closing roads. 2-2.5” of rain fell over 2-3 hours.
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
September 21, 2018	Flood	N/A	N/A	A series of heavy rainfall events lead to flooding. In Edmond, reports of high water at 15th and Kelly, also south of UCO, and on Broadway between 15th and 33rd.
October 9, 2018	Tornado	N/A	N/A	A weak QLCS tornado traveled from SE of NE 122nd/I-35 to SE of Danforth/Midwest. Tree damage was seen in Edmond.
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused tree damage. Snowfall of ½” in Edmond.
March 23, 2019	Hail	N/A	N/A	Two inch diameter stones reported west of Memorial and I-35. YouTube videos show broken car windows. Damage estimate not provided.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 3, 2019	Flood	N/A	N/A	Several inches of water covered many roads along 2nd St near I-35 in East Edmond.
August 26, 2019	Flood, Tornado	N/A	N/A	Roads closed and vehicles stranded near Boulevard and 15th St. A tornado from Logan Co moved SSW barely crossing into OK County near Waterloo/Santa Fe producing minor tree damage.
February 5, 2020	Heavy Snow	N/A	N/A	5.4" in Edmond.
June 2020-July 2020	Drought	N/A	N/A	
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Over ½" of ice.
December 13, 2020	Heavy Snow	N/A	N/A	3.8" fell near 2nd/Broadway in Edmond.
December 15, 2020	Winter Storm	N/A	N/A	Generally, 3-4 inches of snowfall accumulation was reported across the county.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain accretion of 0.25" to 0.35" was reported across the county and 5.5" of snow near 2nd/Broadway in Edmond.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Traffic accidents due to light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	7.5 inches of snow fell in Edmond.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Reports from across the county generally ranged from 4 to 5 ½ inches with a maximum of 5.6 inches reported 5 mi. ESE Edmond.
May 27, 2021	Flood	N/A	N/A	Widespread flash flooding. In Edmond, 2 cars stalled at 33rd/Kelley, road closed. Cars stalled in deep water on 15th near Boulevard.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 2-3, 2022	Heavy Snow	N/A	N/A	Around 3" of snow.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county.
March 11, 2022	Winter Storm	N/A	N/A	Around 2" of snow.
July 3-28, 2022	Excessive Heat	N/A	N/A	
July 2022-May 2023	Drought	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
August 28, 2022	Wind	N/A	N/A	Power poles snapped near Danforth & Bryant in Edmond.
August 28, 2022	Lightning	N/A	N/A	Lightning struck a house in Edmond, blowing part of a switch off a wall and burning an electrical outlet.
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
April 19, 2023	Hail	N/A	N/A	Numerous reports of golf ball to 2" hail in western Edmond.
June 17, 2023	Wind	N/A	N/A	Widespread reports of wind gusts around 60 mph. A 12-18" diameter tree snapped at the base in a neighborhood SW of Edmond Rd & Santa Fe Ave.
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 11, 2023	Flood	N/A	N/A	A creek west of 15th and Kelly came out of its banks and flooded the roadway. The heaviest rain was west of Broadway with over 5" of rain. 5.06" was reported northwest of E 33rd and Coltrane. Numerous low spots flooded.
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-17, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
January 12, 2024	Earthquake	N/A	N/A	4.1 quake knocked items from shelves in east Edmond.
January 13, 2024	Earthquake	N/A	N/A	4.3 quake knocked items from shelves in east Edmond.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 5 residential, 1 commercial
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: OWRB, FEMA, Edmond Emergency Management

Wildfire History for Edmond
Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.

	Loss	Acres
2023	N/A	N/A
2022	N/A	N/A
2021	N/A	N/A
2020	$0	23.2
2019	N/A	N/A
2018	$0	242.1
2017	$0	302.3
2016	$3,800	116.1
2015	$0	25.4
2014	$3,000	54.5
2013	$500	13.8
TOTAL LOSS	**$7,300**	**777.4**

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	Title 16 & 17, latest revision 2018			
Comprehensive / Master Plan	Y	The Edmond Plan, 2019	No		
Zoning Management Ordinance	Y	March 1, 2007			
Subdivision Management Ordinance	Y	Title 21, latest revision March 8, 2021			
Site Plan Review Requirements	Y	January 25, 2021			
NFIP Flood Damage Prevention Ordinance	Y	Title 23 Stormwater Drainage Latest Revision 09/21/16 The City requires 2' freeboard. The City does not allow any building in the floodplain, and requires that all new construction projects identify floodplains and inundated areas and designate such as open space.		As needed, last updated 2023	Floodplain Administrator
NFIP Elevation Certificates Maintained	Y	Title 23 Stormwater Drainage Latest Revision		Continuous	Floodplain Administrator
Floodplain Management Plan and Additional Master Floodplain Studies	Y	Title 23 Stormwater Drainage Latest Revision	No	As needed, last updated 2023	Floodplain Administrator
Stormwater Management Plan	Y	Title 23 Stormwater	No	As needed,	Floodplain

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
/ Ordinance		Drainage Latest Revision		last updated 2023	Administrator
Stream Corridor Management or Protection Plan	Y	Title 23 Stormwater Drainage Latest Revision	No	As needed, not scheduled	Floodplain Administrator
Erosion Management Ordinance	Y	Title 23 Stormwater Drainage Latest Revision		As needed, not scheduled	Floodplain Administrator
Capital Improvements Plan	Y	Updated 2019	No		Director of Engineering
Open Space Plan	Y	Title 23 and STD-400 (06-12-17); For development regulations – All areas lying below 100 year WSL must be in HOA common area.		As needed, not scheduled	Floodplain Administrator
Economic Development Plan	N				
Emergency Response Plan	Y	Emergency Operations Plan	Yes	Quarterly	Emergency Management w/ City Departments
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Transportation Plan	Y	EdmondShift Transportation Plan 10/24/22		As needed	Planning & Zoning Director
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Engineering/Public Works Engineer Engineering/Director of Engineering Engineering/Stormwater Engineer Planning Director
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Engineering/Public Works Engineer Engineering/Director of Engineering Engineering/Capital Projects Engineer Engineering/Stormwater Engineer Building Inspector Emergency Management – Public Works Department
Planners or engineers with an understanding of natural hazards	Y	Engineering/Stormwater Engineer Hydrologist, Floodplain Administrator
NFIP Floodplain Administrator	Y	Senior Stormwater Engineer
Surveyor(s)	Y	Senior Stormwater Engineer
Personnel skilled or trained in “GIS” applications	Y	GIS Department
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Emergency Management Dept.
Grant Writer(s)	Y	
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don’t know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes. Had a capital improvements project committee, and a sales tax for funding.
Authority to Levy Taxes for specific purposes	No
User fees for water, sewer, electric service, sanitation, stormwater	Drainage utility fee, electrical service fees
Impact fees for builders and commercial structures	No
Incur debt through general obligation bonds	Eligible, not in effect
Incur debt through special tax bonds	No
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	Class 6	10-01-2021
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection	Class 1	11-01-2021
Storm Ready	County and City	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Furthermore, employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities.

Floodplain management abilities can be expanded on and improved by continued training and looking for opportunities to gain CRS credit. Edmond has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009.
After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by coordinating with OFMA (Oklahoma Floodplain Managers Association) in the rebuilding process.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities. Changes from the 2019 plan projects include status updates, reprioritization of a few items and minor description clarifications.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Continue to enforce local requirements that all new roadway construction must manage the 100-year flood	New	NFIP Continued Compliance	Ongoing	Engineering / Plan Review	Reduced roadway closures and road infrastructure damage	Medium	City General Budget	Continuous (no end)	Medium
Continue to manage and implement the City's storm water improvement / retrofit program – providing periodic review and prioritization of drainage problem area for mitigation	Existing	NFIP Continued Compliance	Ongoing	Drainage Utility	Reduced risk to structures and roadway	Medium - High	Storm Water Fees, CDGB grant or HMGP	Continuous (no end)	Medium
Maintain enforcement of Title 23 which incorporates specific higher regulatory standards for managing flood risk, including no new development in the SFHA, 2' freeboard.	New & Existing	NFIP Continued Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OWRB, FEMA	High	Low	City General Budget	Continuous (no end)	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Provide dam failure risk information with inundation depth and times for residents downstream of Lake Arcadia.	NA	Dam Failure	As requested	Corps of Engineers	High	Low - Medium	Corps of Engineers	Short	Low
Purchase All-Hazard (NOAA) Weather Radios and distribute	(Neither)	Dam Failure, Drought, Earthquake, Extreme Temperatures, Floods, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Ongoing (no end)	Emergency Management	Alert citizens before disaster to save lives and after earthquakes to advise of life protective measures	Low	EM General Funds	As supplies are needed	High
Drill Additional Water Wells	Neither	Drought	Planned	Water Resources	Drill additional water wells ensuring that an adequate water supply is available.	High	Water Resources Utility Fund, OWRB Revolving Water Fund	Short	Medium
Conduct a public education campaign to increase efficiency of outdoor watering devices.	Neither	Drought	Planned	Water Resources	Conserves water	Low	City M&O Funds	Short	Low
Enhance local water supply through treatment plant upgrades and indirect potable reuse for	Neither	Drought	Planned	Water Resources	Conserves water	High	Capital Improvement Funds	Long	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Arcadia Lake.									
Conduct a public education campaign; advise citizens regarding protecting their homes and private property against the consequences of earthquakes.	New	Earthquake	During EM public events	Emergency Management	Decreases the damage caused by earthquakes.	Low	FEMA HM 5% initiative Grant, EM Budget	Short	Low
Research expansive soil data further to determine if problem exists on municipal property and stabilize soil prior to new building, making buildings less resistant to shifting during earthquakes.	New	Earthquake, Expansive Soil	Planned	Engineering	Low	Low	City Capital Funds	Short	Low
Educate citizens and developers regarding how to mitigate Expansive Soil risks.	Existing	Expansive Soils	Planned	Engineering	Decreases property damage.	Low	FEMA HM 5% initiative Grant, City General Budget	Short	Low
Provide public education on the dangers associated with extreme temperature events.	Neither	Extreme Temperatures	Recurring, during Summer	Emergency Management	Causes people to take personal responsibility and take appropriate actions.	Low	EM General Fund	Ongoing, May to August	Low
Conduct and		Flood	Ongoing	Drainage	Low -	High	Stormwater	Ongoing	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
facilitate community and public education and outreach for residents and businesses to promote and effect flood risk reduction				Utility with other city departments assisting	Medium		Fees	through year	
Update the City of Edmond's Chisholm Creek Basin Drainage Study	New and Existing	Flood	Planned	Drainage Utility	Medium	High	Stormwater Fees, HMGP 7% funds, City Capital Funds	Long	Low
Add warning signs for low water crossings on trails at city parks.	N/A	Flood	New	Parks	High	Low	Parks General Funds	Short	Low
Construct shelters for city owned vehicles to protect those vehicles from damaging hail.	New	Hail	As facilities are built or upgraded	Facility Maintenance	Protect vehicles and people from hail.	Medium	FEMA HM Grant, City Capital Funds	Long	Medium
Post warning signs at parks and other outdoor public areas warning people of the hazards of hail and other severe weather threats.	New	Hail	Planned	Parks	Educate citizens about the threats of hail.	Low	City budget, FEMA HM Grant	Short	Low
Purchase lightning prediction/warning system for Mitch and Hafer city	New	Lightning	Planned	Emergency Management	Will warn people of impending lightning in recreation	Medium	City Capital Funds	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
parks.					areas allowing them to seek shelter.				
Purchase lightning suppressions systems for city real property.	New and Existing	Lightning	Planned	Parks	Will minimize the destructive effects of lightning strikes.	Medium	FEMA HM Grant, City Capital Funds	Long	Medium
Create wildfire buffers around public buildings	New and Existing	Wildfire	Ongoing and as new facilities are created	Parks	Will minimize the destructive effects of wildfires.	Medium	FEMA HM Grant, City Capital Funds	Long	High
Install hail and wind shelters in public parks and other outdoor areas.	Neither	Hail, Wind (incl. Tornado)	As facilities are built or upgraded	Parks	This will provide shelter to the public during these types of events.	High	FEMA HM Grant, City Capital Funds	High	Medium
Acquire and install carbon monoxide monitors and alarms in concert with a public education campaign.	New and Existing	Winter Storms	Ongoing through each year (no end)	Fire Department	This will provide warnings to citizens during times they use alternative heating sources.	Low	Fire General Fund	Short	Low

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

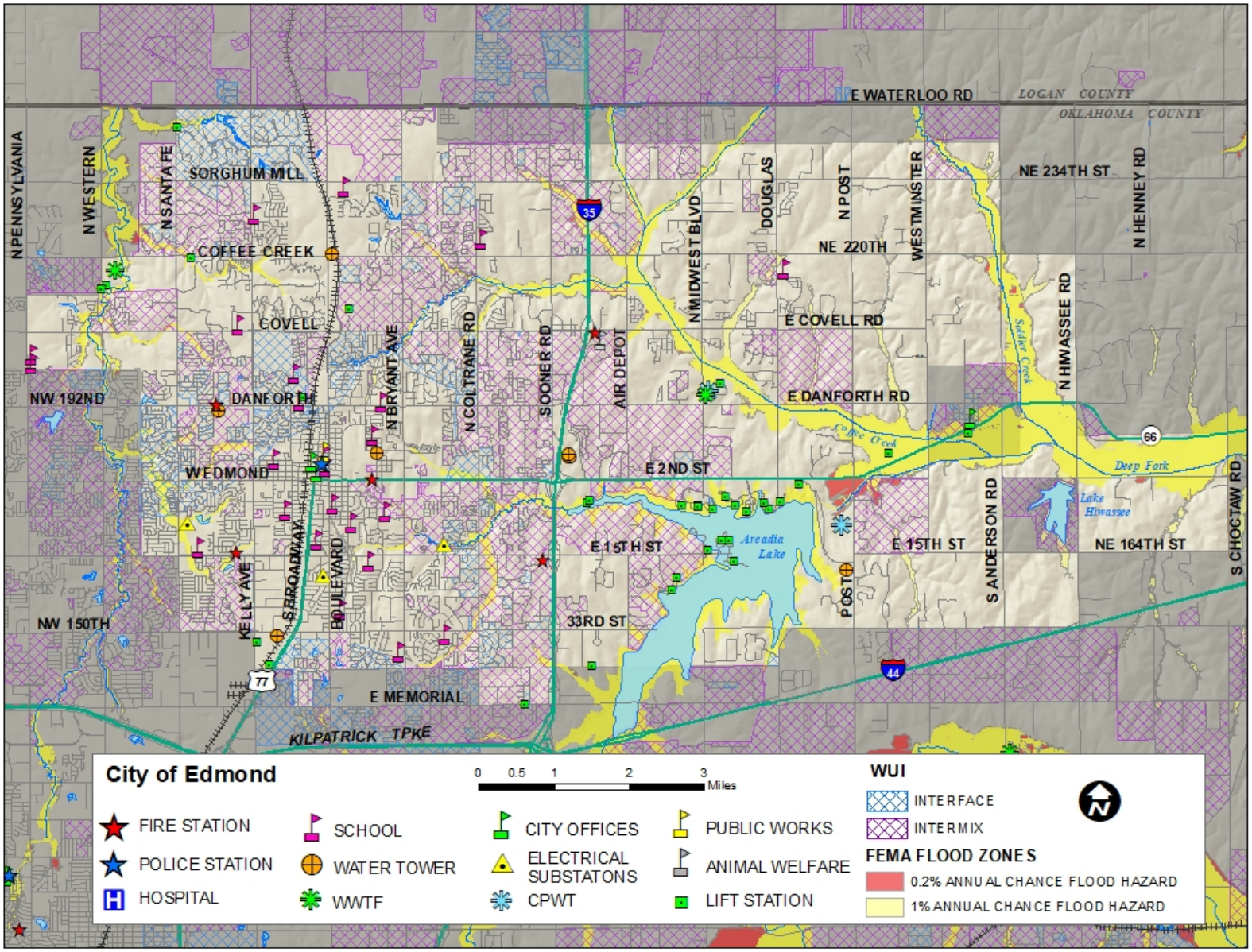
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Edmond to illustrate the probable areas impacted within the City of Edmond. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Edmond has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


E WATERLOO RD
LOGAN COUNTY
OKLAHOMA COUNTY
N PENNSYLVANIA
N WESTERN
N SANTA FE
SORGHUM MILL
COFFEE CREEK
COVELL
NW 192ND
DANFORTH
WEDMOND
NW 150TH
KELLY AVE
S BROADWAY
BOULEVARD
N BRYANT AVE
N COLTRANE RD
SOONER RD
AIR DEPOT
N MIDWEST BLVD
DOUGLAS
N POST
WESTMINSTER
NE 234TH ST
N HENNEY RD
NE 220TH
E COVELL RD
N HIWASSEE RD
Soldier Creek
E DANFORTH RD
Coffee Creek
Deep Fork
Lake Hiwassee
E 2ND ST
E 15TH ST
Arcadia Lake
E 15TH ST
S ANDERSON RD
NE 164TH ST
S CHOCTAW RD
POST
33RD ST
E MEMORIAL
KILPATRICK TPKE
35
66
77
44
City of Edmond
0 0.5 1 2 3 Miles
FIRE STATION
POLICE STATION
HOSPITAL
SCHOOL
WATER TOWER
WWTF
CITY OFFICES
ELECTRICAL SUBSTATONS
CPWT
PUBLIC WORKS
ANIMAL WELFARE
LIFT STATION
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD
N

9.7 TOWN OF FOREST PARK

This section presents the jurisdictional annex for the Town of Forest Park.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Wesley "Chuck" Blair Fire Chief / Emergency Manager Town of Forest Park 4203 N. Coltrane, Forest Park, OK 73121 (405) 424-1212 webgbs@aol.com	

B.) MUNICIPAL PROFILE

The Town of Forest Park is located in central Oklahoma County. The Town is bordered to the north by the Town of Lake Alma, to the south, east and west by Oklahoma City. The Town of Forest Park has a total land area of 2.1 square miles, all of it land. The 2020 U.S. Census population for the Town of Forest Park was 1,052 (+5% from 2010).

Growth/Development Trends

The town recently annexed property from its previous northwest boundary to NE 50th and Bryant Ave. This may result in new economic development in that area.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.

Completed 2019 Initiatives	Comments
City has installed several surge suppression UPS's on computers in the municipal complex.	This was part of a lightning mitigation project listed below.
Add generator(s) at critical infrastructure (i.e. Emergency Operations Center, Town Hall, other infrastructure as needed)	Mitigates against Flood, Earthquake, Extreme Temps, Lightning, Wind (incl. Tornado), Wildfire, and Winter Storm.

Further details on mitigation activities completed or ongoing in the Town include:

Abandoned Initiatives	Comments
Enact a building code requiring hail resistant materials for roofing and siding on residential and commercial structures	The city has no plans to pursue this action at this time.
Manage a residential safe room installation program to reduce the risk of injury and/or loss of life	State Emergency Management has a rebate program; a local program would require additional staff that are presently not available.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the Town of Forest Park is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	No	
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the Town of Forest Park, the following have been identified as specific hazard vulnerabilities in the City:

- Forest Park is a moderately wooded community; as such ice accumulations on trees can cause considerable damage disruption of essential services and monetary losses.
- The large quantity of old growth trees, egress issues and lack of fire hydrants make the town vulnerable to devastating wild fires. Large fast moving fires have threatened the town.
- During periods of heavy rain low areas of the town flood disrupting emergency response and causing infrastructural damage. Flooding has occurred on NE 50th between Bryant and Coltrane. Besides being a traffic hazard, it has caused minor washout of the roadway.
- Forest Park has high-impact occupancy that poses a mass casualty threat in the event of a significant weather event (tornado in particular). We have a public school and a highly populated golf course. High winds, hail and lightning have caused damage in Forest Park.
- Forest Park currently has no Repetitive Loss (RL) or Severe Repetitive Loss (SRL) properties.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE TOWN

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
May 31-June 1st, 2013	Severe Storms, Flooding	DR-4117	Yes	Much of the County received 5-8” of rain.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
December 01, 2013	Earthquake	N/A	N/A	4.5 magnitude earthquake near Arcadia Lake; depth of 8.4 km.
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	4.3 magnitude earthquake near Spencer; depth of 5.0 km.
June 18, 2014	Earthquake	N/A	N/A	4.1 magnitude earthquake near Spencer; depth 5.0 km
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm with widespread power outages in the Forest Park area.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A		Heaviest ice amounts fell in the far west metro. .1" reported in Edmond near Covell/I-35, .15" reported in Warr Acres near NW 63rd/MacArthur.
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused tree damage, followed by a few inches of snow.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	Around 4" of snow.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Over 60% of the county was without power by October 27th. The worst icing occurred just west of the metro, with parts of the Deer Creek area (unincorporated) receiving 0.75" of ice along with Lake Overholser just west of Bethany. Near 63rd & Peebly Rd, 0.6" of ice. Power pole snapped in The Village. Nichols Hills had near .5" of ice. where a large pine tree was uprooted. Harrah reported 0.4" of ice and lots of tree damage.
December 13, 2020	Heavy Snow	N/A	N/A	A general 3 to 5 inches fell across the county, with a maximum of 5.5 inches reported near the Deer Creek High School (unincorporated). 3.8" fell near 2nd/Broadway in Edmond, 4" in Midwest City and Del City, 4.5" in Jones, and 5" in Choctaw.
December 15, 2020	Winter Storm	N/A	N/A	Generally, 3-4 inches of snowfall accumulation was reported across the county.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain accretion of over ¼", followed by near 6" of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	4 to 7.5 inches of snow fell across the county.
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Reports from across the county generally ranged from 4 to 5 ½".
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
October 13, 2021	Tornado	N/A	N/A	A QLCS storm system produced an EF0 tornado from NE 36th & Bryant Ave which moved northeast, dissipating NW of NW 63rd and Midwest Blvd. Damage was generally broken tree branches. This was the third tornado produced by this cell.
December 2021-April 2022	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 2-3, 2022	Heavy Snow	N/A	N/A	Snowfall amounts ranged from 3 to almost 5 inches across the county.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain.
March 11, 2022	Winter Storm	N/A	N/A	Around 2" of snow.
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
July 2022-May 2023	Drought	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 0
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0
Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Forest Park
Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.

	Loss	Acres
2023	N/A	N/A
2022	$0	20.0
2021	N/A	N/A
2020	$0	5.0
2019	$0	0.0
2018	$0	0.0
2017	$0	0.0
2016	$0	3.0
2015	$0	20.0
2014	$0	0.0
2013	$0	0.0
TOTAL LOSS	**$0**	**45.0**

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update Cycle	Party(s) responsible for updating document
Building Code	Y	IBC 2018, Follows the State adoption		Follows the State	Contracted Consultant (Nubine)
Comprehensive / Master Plan	Y		Yes	Not Scheduled	Emergency Manager and Mayor
Zoning Management Ordinance	Y			As needed	Zoning Dept. Chairman
Subdivision Management Ordinance	Y			As needed	Zoning Dept. Chairman
Site Plan Review Requirements	Y			As needed	Zoning Dept. Chairman

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update Cycle	Party(s) responsible for updating document
NFIP Flood Damage Prevention Ordinance	Y			As needed	Floodplain Manager
NFIP Elevation Certificates Maintained	Y			As needed	Floodplain Manager
Floodplain Management Plan	Y		Yes	Not Scheduled	Floodplain Manager
Stormwater Management Plan / Ordinance	N				
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	N				
Capital Improvements Plan	Y		Yes	Bi-annual	Zoning Dept. Chairman
Open Space Plan	N				
Economic Development Plan	N				
Emergency Response Plan	Y		No	Annual	Using Oklahoma County's EOP
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N/A				
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)	N				

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Contracted position - Nubine
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Contracted position - Nubine
Planners or engineers with an understanding of natural hazards	Y	Contracted position - Nubine
NFIP Floodplain Administrator	Y	Town Floodplain Administrator
Surveyor(s)	N	
Personnel skilled or trained in “GIS” applications	N	
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Fire Chief
Grant Writer(s)	Y	Fire Chief
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don’t know)
Community Development Block Grants (CDBG)	TBD
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	No
Impact Fees for homebuyers or developers of new development/homes	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	TBD
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	Yes
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection (ISO)	4	2019
Storm Ready	County*	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined
*The County sounds the outdoor warning devices for Forest Park.

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing a grant writer, leveraging available monies will continue to improve mitigation program capabilities.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Moreover, this jurisdiction participates in Wildland Automatic Response (or WAR – an automatic mutual aid agreement during high wildland hazard days). This ensures a greater response to wildland fires.

Floodplain management abilities are somewhat limited by the number of available staff. Fortunately the only flood zones are Zone A on a golf course with another Zone A in a wooded area with only an outbuilding affected.

Forest Park has adopted NFIP floodplain management criteria and the most recent FIRM map of 12/18/2009.
The jurisdiction has not experienced a need to implement a substantial improvement/substantial damage provision of the flood plain management regulations. Should there ever been a need, the jurisdiction will follow FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Expand the existing outdoor warning system with additional devices to improve public threat warnings / notifications.		Wind (incl. Tornado)	Planned	Forest Park Emergency Management working with Town DPW	High (life safety)	Medium-High	REAP grant, HMGP, Municipal general fund	Short	Medium
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Monthly	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	Municipal general fund	Ongoing (no end)	High
Begin the process to adopt higher regulatory standards to manage flood risk (i.e. increased freeboard, cumulative substantial	New & Existing	NFIP Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM,	Low	Low	Municipal general fund	Short	Low

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
damage/improvements).				FEMA					
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.									
See above.	NA	Flood	Ongoing	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	Municipal Budget; HMA programs with local or county match	Short	Medium
Archive elevation certificates	NA	NFIP Compliance	As needed	NFIP Floodplain Administrator	Low	Low	Local Budget	Ongoing (no end)	High
Widen the drainage ditches at NE 36th and NE 50th between Bryant and Coltrane to prevent road damage		Flood	Planned	EM	High	Medium	HMGP, FMA, Municipal Capital Fund	Short	Medium
Distribute All-Hazards Weather Radios to elderly and special needs citizens and others		Drought, Flood, Earthquake, Extreme Temps, Hail, Lightning, Wind (incl. Tornado), Wildfire, Winter Storm	Ongoing, primarily prior to spring storm season	EM	High	Low	HMGP, Fire Dept General Fund	Short	High
Distribute mitigation information materials at schools to students		Earthquake, Extreme Temps,	During Fall	EM	High	Low	Fire Dept General Budget	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
		Flood, Hail, Lightning, Wind (incl. Tornado), Wildfire, Winter Storm							
Enact a regulation to require a check for expansive soils prior to building a city building and perform soil stabilization if expansive soils are found.	New	Expansive Soil	Planned	City Inspector	High	Low	Municipal general fund	Short	Medium
Install lightning protection and suppression systems protecting radios, computers, and other essential equipment at critical facilities.	Existing	Lightning	In progress – 90% complete 2024	IT Staff	High	Low	Local budget	Short	Low
Install dry hydrant in city pond for additional wildfire suppression support	Existing	Wildfire	Planned	Fire Chief	High	Medium	HMGP or Local budget	Long	Medium
Adopt ordinances regulating defensible space around structures in the Wildland-Urban Interface zone	New and Existing	Wildfire	Planned	Code Officer	High	Low	Local budget	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:

Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:

Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:

PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:

Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program. DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

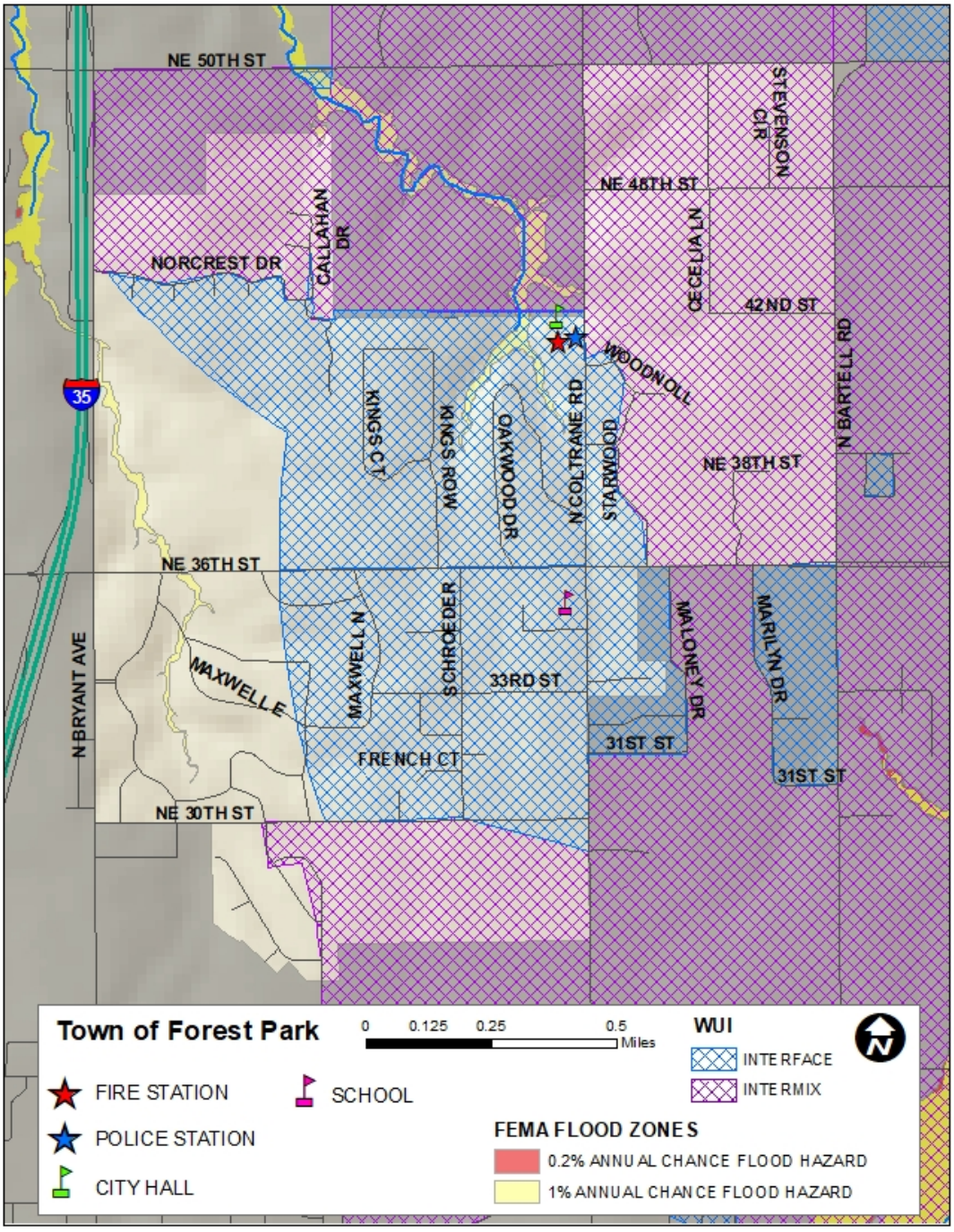
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the Town of Forest Park to illustrate the probable areas impacted within the Town of Forest Park. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the Town of Forest Park has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NE 50TH ST
NORCREST DR
CALLAHAN DR
NE 48TH ST
STEVENSON CIR
CECELIA LN
42ND ST
WOODNOLL
N BARTELL RD
35
KINGS CT
KINGS ROW
OAKWOOD DR
N COLTRANE RD
STARWOOD
NE 38TH ST
NE 36TH ST
N BRYANT AVE
MAXWELL N
SCHROEDER
MAXWELL E
33RD ST
MALONEY DR
MARILYN DR
31ST ST
FRENCH CT
NE 30TH ST
Town of Forest Park
0 0.125 0.25 0.5 Miles
WUI
INTERFACE
INTERMIX
FIRE STATION
SCHOOL
POLICE STATION
CITY HALL
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.8 CITY OF HARRAH

This section presents the jurisdictional annex for the City of Harrah.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Levi Dean, Fire Chief 19625 NE 23rd, P.O. Box 636, Harrah, OK 73045 (405) 454-2111 Levi.dean@cityofharrah.com	Matt Mears, City Manager 19625 NE 23rd, P.O. Box 636, Harrah, OK 73045 (405) 454-2951 citymanager@cityofharrah.com

B.) MUNICIPAL PROFILE

The City of Harrah is located in the southeast corner Oklahoma County. The City is bordered to the north by Oklahoma City, to the south by Oklahoma City, to the east by Lincoln County and to the west by the City of Choctaw. The City of Harrah has a total land area of 11.9 square miles, all of it land. The City is governed by a mayor and four member city council. The 2020 U.S. Census population for the City of Harrah was 6,280 (+19% from 2010).

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2023 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The following tables summarizes progress on the mitigation strategy identified by the City of Harrah in the 2019 plan.

Completed 2019 Initiative Description	Comments
Have designated NFIP Floodplain Administrator (FPA) become a Certified Floodplain Manager through the ASFPM, and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	NFIP Compliance Related

Abandoned 2019 Initiative Description	
Distribute All-Hazard Weather Radios to senior centers and other high risk residents	
Volunteer acquisition of homes in flooding areas within jurisdiction.	

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Harrah is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Canton Lake, Overholser - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	No	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of Harrah, the following have been identified as specific hazard vulnerabilities in the City:

- Flood Zone Areas around North Canadian River
- The city has a few areas with mobile homes, with one high density mobile home park downtown.

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3.6):

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events. Note the schools are an independent district not in this plan.

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
HARRAH MS	Harrah (C)	School	X	X	-	-	-	-
VIRGINIA SMITH ES	Harrah (C)	School	X	X	-	-	-	-
CLARA REYNOLDS ES	Harrah (C)	School	X	X	-	-	-	-
HARRAH JHS	Harrah (C)	School	X	X	-	-	-	-

Source: FEMA, 2009;
Notes: 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

Growth/Development Trends

The following major residential/commercial development and major infrastructure development are currently known or anticipated in the City of Harrah:						
Property Name	**Type Residential or Commercial**	**Number of Structures**	**Address**	**Block and Lot**	**Known Hazard Zone**	**Description/Status**
Piper Glenn	Residential	18	¼ mile north of Reno and Peebly		Wildland Fire	In Progress
Lincoln Landing	Residential	29	SE 44th & Harrah Rd, just east		Wildland Fire	Planned
River Mist Phase II	Residential	89	SE 29th and Harrah Rd, N side of the Rd east of intersection		Wildland Fire, 1% annual flood*	Planned
Harrah Point	Residential	53	SE 29th and Harrah just east		Wildland Fire	Planned
Persimmon Valley	Residential	268	Luther & SE 29th at Turnpike		Wildland Fire	Planned
Woodland Section IV	Residential	47	N Reno & Dobbs		Wildland Fire	In Progress
Anderson Farms	Residential	Approx. 225	Dobbs & NE 23rd		Wildland Fire	Planned

*Harrah is working with FEMA on a flood map revision for River Mist II.

Development in the City of Harrah has resulted in an increase in WUI fire risk. Flood risk has been slightly reduced by improved drainage in the areas of development due to floodplain and building code enforcement.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
May 31-June 1st, 2013	Severe Storms, Flooding	DR-4117	Yes	The area received 7-8” of rain.
February 2014-July 2014	Drought	N/A	N/A	
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm with widespread power outages.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A		Glaze of ice.
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused tree damage. Snowfall around 5”.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	4” in Harrah.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Harrah reported 0.4” of ice and lots of tree damage.
December 13, 2020	Heavy Snow	N/A	N/A	Around 5” of snow.
December 15, 2020	Winter Storm	N/A	N/A	Generally, 3-4 inches of snowfall accumulation was reported across the county.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain of over ¼” followed by around 5-7” of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Over 4” of snow.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 4” of snow.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
Sept 4, 2021	Lightning	N/A	N/A	Lightning struck a house on Hillside Dr. in Harrah causing some smoke in the house.
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	Snowfall amounts ranged from 3 to almost 5 inches across the county, with the heaviest in southwest OKC.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county.
March 11, 2022	Winter Storm	N/A	N/A	3” of snow fell at Harrah.
April 23, 2022	Tornado/Wind	N/A	N/A	An EF-0 tornado produced tree damage in a path from 3 miles WSW Harrah north of Reno / Peebly to the Kickapoo Turnpike south of NE 10th within a much broader area of wind damage.
July 3-28, 2022	Excessive Heat	N/A	N/A	
July 2022-May 2023	Drought	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
August 17-26, 2023	Excessive Heat	N/A	N/A	
September 5, 2023	Wind	N/A	N/A	Power lines down at 5255 N Peebly Rd. A power pole snapped and leaned on a building at Tim Holt & Church in Harrah.
October 25, 2023	Lightning	NA/	N/A	Lightning struck a house in Harrah on Wagon Trail Blvd near SE 15th and Dobbs Rd. Roof damaged and plaster blown off the ceiling.
January 12-17, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 0
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Harrah

Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires. Harrah's fire district includes several miles of Unincorporated Oklahoma County either side of the incorporated city, from NE 63rd St to SE 29th St.

	Loss	Acres
2023	N/A	N/A
2022	N/A	N/A
2021	N/A	N/A
2020	$0	0.0
2019	N/A	N/A
2018	$0	14.0
2017	$0	5.0
2016	$200	135.0
2015	$38,400	180.0
2014	$300	10.0
2013	$500	17.0
TOTAL LOSS	**$39,400**	**361.0**

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	2018 IBC		As the state updates	N/A
Comprehensive / Master Plan	N	Updated 2017	No	10 years	City Planner
Zoning Management Ordinance	Y	12-215, 1986		None	City Planner
Subdivision Management Ordinance	Y	12-215, 1986		None	City Planner
Site Plan Review Requirements	Y	In-house requirements			
NFIP Flood Damage Prevention Ordinance (if you are in the NFIP, you must have this!)	Y	12-215.5 Ord 1991-13, August 1, 1991 Ord 2002-08-114		None	City Planner
NFIP Elevation Certificates Maintained	Y	12-215, 1986			Public Works/Floodplain Manager
Floodplain Management Plan	Y	12-215, 1986	Yes	Irregular/as needed	Floodplain Manager
Stormwater Management Plan / Ordinance	Y	12-215, 1986	No	None	Public Works
Stream Corridor Management or Protection Plan	Y	12-215, 1986	No	None	Public Works
Erosion Management Ordinance	Y	12-215, 1986		None	Public Works
Capital Improvements Plan	N				
Open Space Plan	N				
Economic Development Plan	Y	Industrial Trust	No		City Manager
Emergency Response Plan	Y		No	None	Fire Chief

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Post Disaster Recovery Plan / Ordinance	N	Hazard Mitigation Plan		5 years	County Emergency Management
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Myers Engineering City Planner
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Myers Engineering City Planner
Planners or engineers with an understanding of natural hazards	Y	Myers Engineering City Planner
NFIP Floodplain Administrator (if you are in the NFIP, you must have this person designated – often your code official)	Y	Floodplain Manager Code Enforcement / Building Inspector
Surveyor(s)	Y	Surveyor
Personnel skilled or trained in “GIS” applications	Y	City Planner
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Fire Chief
Grant Writer(s)	Y	City Planner

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Staff with expertise or training in benefit/cost analysis	Y	Finance / HR Director

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes, previously used
Capital Improvements Project Funding	Yes, previously used
Authority to Levy Taxes for specific purposes	Yes, previously used
User fees for water, sewer, gas or electric service	Yes, previously used
Impact Fees for homebuyers or developers of new development/homes	Yes, previously used
Incur debt through general obligation bonds	Yes, previously used
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	Don't Know
Withhold public expenditures in hazard-prone areas	Don't Know
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	7 Residential 6 Commercial	3/5/2024
Public Protection (ISO)	3/4/10	2022
Storm Ready	County*	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined
*The county sounds the outdoor warning devices for Harrah.

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Furthermore, employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Moreover, this jurisdiction participates in Wildland Automatic Response (or WAR – an automatic mutual aid agreement during high wildland hazard days). This ensures a greater response to wildland fires.

Floodplain management abilities can be expanded on and improved through continuing education, involvement with professional organizations and annual review of flood prone areas for potential mitigation solutions.

The City of Harrah has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
AC/DC Emergency Storm Sirens –to alert the citizens of Harrah and surrounding areas of severe weather conditions, wildfires, floods, and hazardous chemical spills and other types of emergencies	N/A	Flood, Wind (incl. Tornado), Wildfire	Planned, Some progress	City Fire Department	High (life safety)	Medium $35,000 each	City Capital Improvements Funds, HMGP, other grants, land developers	Long Term	High
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low – Medium	City M&O Funds	Ongoing (no end)	High
Begin the process to adopt higher regulatory standards to manage flood risk (i.e. increased freeboard, cumulative substantial damage/improvements).	New & Existing	NFIP Compliance	Planned	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM,	Low	Low	City M&O Funds	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
				FEMA					
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.									
See above.	NA	Flood	Ongoing	Municipality with support from Planning Partners, OEM, FEMA	Low – Medium	Low – Medium	City M&O Funds; HMA programs with local or county match	Short	High
Archive elevation certificates	NA	NFIP Compliance	Ongoing	NFIP Floodplain Administrator	Low	Low	City M&O Funds	Ongoing (no end)	High
Conduct All-Hazard mitigation classes through town hall meetings and senior centers		Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wind (incl. Tornado), Wildfire, Winter Storms	Typically before Spring – no specific timeline	Fire Department	High	$6,000	City budget	Ongoing, Last in 2024 (no end)	Low
Install Generators on Lift Stations and Water Wells	Existing	Earthquake, Flood, Lightning, Wind, Wildfire, Winter Storm	New	Public Works Director	High	High	City Capital Funds, FEMA HM Grant	Short	Medium
Install Generator at Wastewater Treatment Plant	Exiting	Earthquake, Flood, Lightning, Wind, Wildfire,	New	Myers Engineering, Public Works Director	High	High	City Capital Funds, FEMA HM Grant	Long	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
		Winter Storm							
Install Generator at City Hall	Existing	Earthquake, Flood, Lightning, Wind, Wildfire, Winter Storm	New	Myers Engineering, Public Works Director	High	High	City Capital Funds, FEMA HM Grant	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

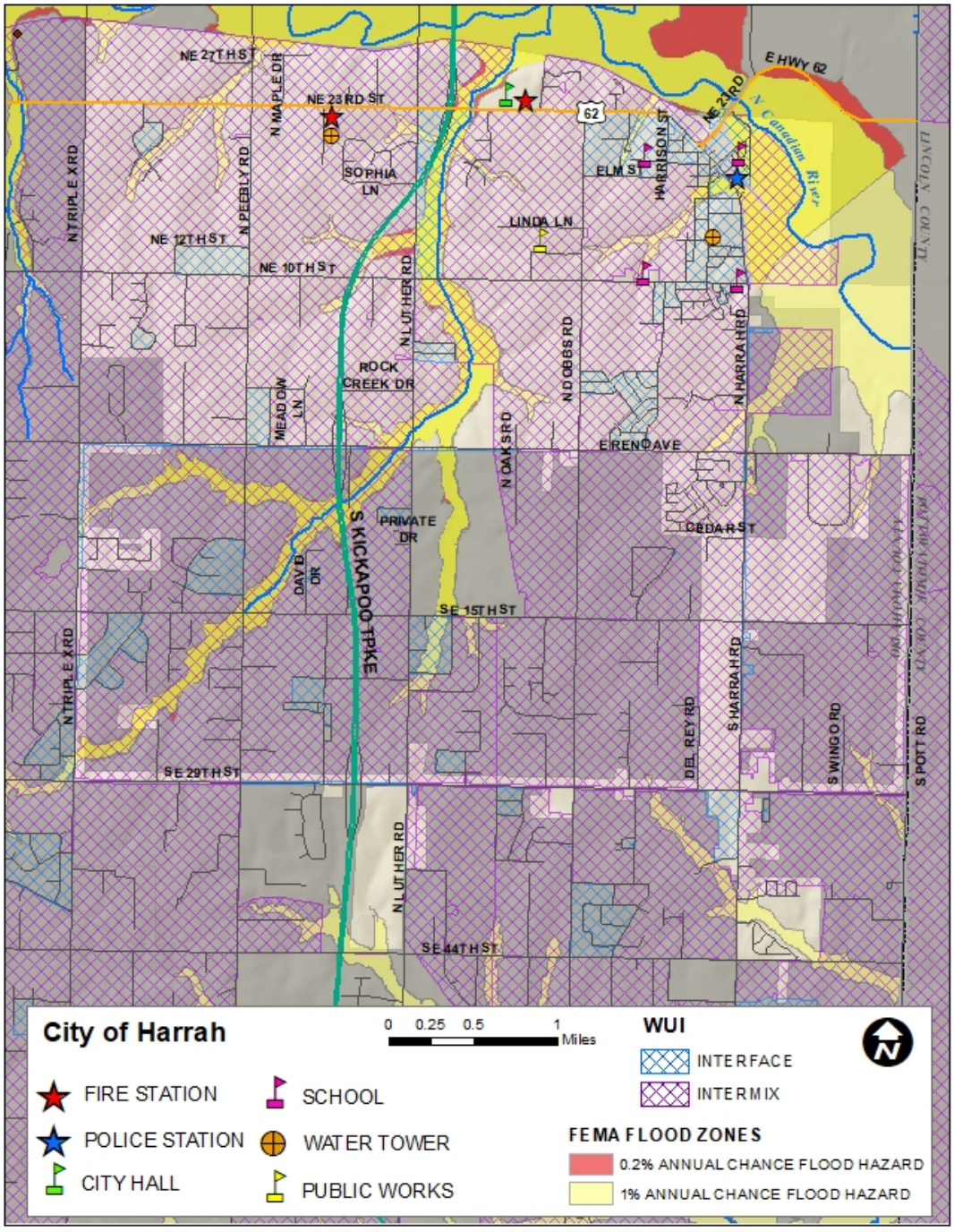
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Harrah to illustrate the probable areas impacted within the City of Harrah. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Harrah has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NE 27TH ST
N MAPLE DR
NE 23RD ST
E HWY 62
62
NE 23RD
N Canadian River
LINCOLN COUNTY
N TRIPLE X RD
N PEBBLY RD
SOPHIA LN
ELM ST
HARRISON ST
LINDA LN
NE 12TH ST
NE 10TH ST
N LUTHER RD
N DOBBS RD
N HARRAH RD
ROCK CREEK DR
MEADOW LN
N OAKS RD
E REN AVE
PRIVATE DR
CEDAR ST
S KICKAPOO TPKE
DAVID DR
SE 15TH ST
S HARRAH RD
DEL REY RD
S WINGO RD
S POTT RD
SE 29TH ST
SE 44TH ST
City of Harrah
0 0.25 0.5 1 Miles
WUI
INTERFACE
INTERMIX
FIRE STATION
POLICE STATION
CITY HALL
SCHOOL
WATER TOWER
PUBLIC WORKS
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.9 TOWN OF LUTHER

This section presents the jurisdictional annex for the Town of Luther.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Joseph Figueroa, Fire Chief, Emergency Manager 110 S. Ash St., Luther, OK 73054 (405) 277-3883 firechief@townoflutherok.com	Johhny Leafty, Police Chief 108 S. Ash St., Luther, OK 73054 (405) 277-3500 johnny.leafty@lutherpolice.org

B.) MUNICIPAL PROFILE

The Town of Luther is located in northeastern Oklahoma County. The Town is bordered to the north and south by Oklahoma City, to the east by Lincoln County and to the west by the Town of Edmond and Oklahoma City. The Town of Luther has a total land area of 4.5 square miles, all of it land. The 2010 U.S. Census population for the Town of Luther was 1,501 (+19% from 2010).

Growth/Development Trends

Modest residential development is anticipated on the north side of Route 66.
A non-profit foster housing community was recently developed around NE 206 (Covell Rd) and ½ mile east of Luther Rd, near the river.
The development around NE 206 (Covell Rd) resulted in a slight increase to the WUI fire risk. Building codes and NFIP requirements negated an increased risk of flooding.

The Oklahoma Turnpike Authority constructed a turnpike from I-44 to I-40 that cuts through the southwest part of Luther from east of Luther Rd and I-44, crossing NE 150th St. west of Luther Rd. Residential building permits are being issued for areas near the turnpike. One small commercial business is moving into the area.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2023 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The following table summarizes progress on the mitigation strategy identified by the Town of Luther in the 2019 plan.

Completed 2019 Initiative Description	Comments
Install backup power at Town Hall/Police	Relocated to a different facility with an existing generator.

Abandoned 2019 Initiative Description	Comments
Replace Tin Horns at several intersections	Changed project to installing catch basins

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the Town of Luther is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Arcadia Lake - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	No	No significant areas
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the Town of Luther, the following have been identified as specific hazard vulnerabilities:

- Wastewater lift stations are vulnerable to flooding (but could be supplied with a portable generator).
- Potable water system is vulnerable to lightning
- Residences outside the core city and potential new development on the north side of Route 66 lack fire hydrants
- Warning systems are marginal to the north with a lack of sirens
- Many residents lack storm sheltering

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3.6):

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
Luther Mill And Farm Supply	Luther (T)	User Defined	X	X	-	-	-	-

Source: FEMA, 2009;

Utilities Located in the Preliminary DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss	
			100 Year	500 Year	100 Year Damage %	500 Year Damage %
Octagon Resources / Dynamic Booster Station	Luther (T)	Natural Gas	X	X	-	40.0

Source: FEMA, 2009; Updated 2023
Notes:
(1) 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE TOWN

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	As a result of the drought, an August 4, 2012 fire near Luther consumed almost 60 homes and other structures.
May 19, 2013	Tornado	N/A	N/A	A tornado touched down in Luther that was rated up to EF2 that created damage to buildings. An estimate of damages was not available.
May 29, 2013	Hail	N/A	N/A	Luther saw hail up to 2.75 inches.
February 2014-July 2014	Drought	N/A	N/A	
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm.
April 07, 2016	Earthquake	N/A	N/A	This 4.2 magnitude quake at Luther registered at a depth of 6.1 km. Though most of the county felt shaking, the northeast side had multiple reports of strong shaking with light damage.
April 26, 2016	Tornado	N/A	N/A	An EF1 tornado traveled from 4 NW Jones to 3 NNW Luther, damaging a few homes in far NW Luther.
April 07, 2016	Earthquake	N/A	N/A	This quake registered at a depth of 6.1km. Though most of the county felt shaking, the northeast side had multiple reports of strong shaking with light damage. This quake originated in Luther and was Magnitude 4.2

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	Magnitude 5.8 near Pawnee
October 4, 2016	Hail	N/A	N/A	Golf ball hail in northwest Luther on Triple XXX Rd between Covell (NE 206th) & Coffee Creek Rd near the power plant. No damage estimate provided.
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	Near 1/10th of an inch of ice.
May 19, 2017	Wind	N/A	N/A	Many trees downed and power poles snapped in Luther.
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Snow	N/A	N/A	Freezing rain caused tree damage. Snow totals were generally under an inch.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	Around 4” of snow.
June 2020-July 2020	Drought	N/A	N/A	The northern third of the county experienced a moderate drought, including Luther.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Tree damage. Around 1/2” of ice.
December 13, 2020	Heavy Snow	N/A	N/A	Around 4” of snow.
December 15, 2020	Winter Storm	N/A	N/A	Generally, 3-4 inches of snowfall accumulation.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	¼” of ice followed by 6” of snow.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 6” of snow.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Over 4” of snow.
April 9, 2021	Hail	N/A	N/A	A storm intensified briefly between Luther and Arcadia, dumping golf ball size hail in Luther. No damage estimate provided.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	Over 3” of snow.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain.
March 11, 2022	Winter Storm	N/A	N/A	2-3” of snow.
May 2, 2022	Lightning	N/A	N/A	Lightning struck a house in Luther, blowing out an electrical outlet.
July 2022-May 2023	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 17, 2023	Wind	N/A	N/A	Widespread reports of gusts around 60 mph. A power pole was snapped in Luther.
June 28-July 4, 2023	Excessive Heat	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 0
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0
Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Luther

Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires. Luther's fire district includes a large part of unincorporated Oklahoma County east of Henny Rd and north of ½ mile north of NE 122nd St.

	Loss	Acres
2023	N/A	N/A
2022	N/A	N/A
2021	N/A	N/A
2020	$0	230.0
2019	N/A	N/A
2018	$0	32.0
2017	$5,000	50.0
2016	$0	96.6
2015	$0	46.5
2014	$0	28.0
2013	$0	2.7
TOTAL LOSS	**$5,000**	**485.8**

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	IRC 2009; State IBC 2021		Biannual	Town council adoption
Comprehensive / Master Plan	Y		N	Biannual	Town Manager
Zoning Management Ordinance	Y	12-101			
Subdivision Management Ordinance	Y	12-301			

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Site Plan Review Requirements	Y	5-101			
NFIP Flood Damage Prevention Ordinance	Y	12-401; pre-1980 community			
NFIP Elevation Certificates Maintained	Y	Per OWRD, since July 2011			
Floodplain Management Plan	Y	12-401; also through All Hazards Plan (2012)	N	As needed	Floodplain Manager
Stormwater Management Plan / Ordinance	N				
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	N				
Capital Improvements Plan	Y	August 2010 completed	N	As needed	Town Council
Open Space Plan	N				
Economic Development Plan	Y	Formed Economic Development Authority for the town in Spring 2011	N	Annual – May/June	Planning Commission w/ Town Council
Emergency Response Plan	N	EOP 2019	N	Annual – May/June	Fire Chief/EM
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)	N				

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Building Official
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Building Official
Planners or engineers with an understanding of natural hazards	Y	Building Official and NFIP FPA
NFIP Floodplain Administrator	Y	Building Official and NFIP FPA
Surveyor(s)	Y	Contracted
Personnel skilled or trained in "GIS" applications	Y	Building Official and private contractor
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Fire Chief
Grant Writer(s)	Y	Town Manager & Administrative Assistant
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes. ACOG REAP grants.
Authority to Levy Taxes for specific purposes	No
User fees for water, sewer, gas or electric service	Yes. Water, sewer, solid waste.
Impact Fees for homebuyers or developers of new development/homes	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other	No

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection	7/9	TBD
Storm Ready	County*	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined
*The County sounds the outdoor warning devices for Luther.

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Moreover, this jurisdiction participates in Wildland Automatic Response (or WAR – an automatic mutual aid agreement during high wildland hazard days). This ensures a greater response to wildland fires.

Floodplain management abilities can be expanded on and improved through continuing education, joining professional organizations and periodic review of flood prone areas for potential mitigation solutions.

Luther has adopted NFIP floodplain management criteria and the most recent FIRM map of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the flood plain management provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Install floodwalls (approx. 20' x 20') for two (2) wastewater lift stations	Existing	Flood	Floodplain Study needed	Engineering; DPW	High (protection of critical infrastructure)	$65K each station	HMGP; General municipal fund	Long	Low
Provide backup power for three (3) wastewater lift stations through acquisition of portable generators	New & Existing	Dam Failure, Flood, Earthquake, Extreme Temps, Hail, Lightning, Wildfire, Wind, Winter Storm	Planned	Engineering; DPW	High (protection of critical infrastructure)	High	HMGP; General municipal fund	Short	High
Provide lightning protection for three potable water wells	Existing	Lightning	Planned	Engineering; DPW	High (protection of critical infrastructure)	Medium	HMGP; General municipal fund	Short	Medium
Provide backup power for four potable water wells		Dam Failure, Flood, Earthquake, Extreme Temps, Hail, Lightning, Wildfire, Wind, Winter Storm	Planned	Engineering; DPW	High (protection of critical infrastructure)	$20K each well for backup power	HMGP; General municipal fund	Short	High
Install a storm siren on the north side of town	Existing	Wind (incl. Tornado)	Planned	Engineering; DPW	High (protection of critical infrastructure)	Medium	HMGP; General municipal fund	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Upgrade early warning system(s) including adding a mass notification system	N/A	Dam Failure, Drought, Flood, Earthquake, Extreme Temps, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Planned	Local EM	High (life safety)	Medium	HMGP; general municipal fund	Long	Medium
Distribute All-Hazards Weather Radios to elderly and special needs citizens	N/A	Dam Failure, Drought, Flood, Earthquake, Extreme Temps, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	As needed	Fire / EM	High (life safety)	Low	HMGP; general municipal fund	Long	Low
Relocate sewer lines through the main drainage in the Special Flood Hazard Area.	Existing	Flood	Planned	Engineering; DPW	High (protection of critical infrastructure)	$25k	HMGP; general municipal fund	Short	High
Raise required manholes above Base Flood Elevation	Existing	Flood	Planned	Engineering; DPW	High (protection of critical infrastructure – including lift stations and possibly sewage lagoons)	$4-5k each	HMGP; general municipal fund	Short	High
Relocate equipment and hazardous materials	Was existing – new facility	Flood	2024 - might be complete by time of	Engineering; DPW	Medium	$300,000	REAP Grant; capital improvement	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
associated with public works, that are currently located adjacent to the floodplain	being built.		plan publication				municipal fund		
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing / Continuous	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	Local Budget	Ongoing (no end)	High
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the municipal homepage(s) referencing the HMP webpages. • Use social media to better educate the public on flood insurance and personal natural hazard risk reduction measures. • Work with civic and business groups to disseminate information on flood insurance. • Participate in regional public awareness and education initiatives through the LEPC.									
See above.	NA	Flood	Annual notifications	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	General Budget	Long	Low
Obtain mitigation education		Dam Failure, Drought,	Ongoing	Fire / EM	High	Low	Local budget	Short	Low

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
pamphlets and distribute at booths during large public events and at public city venues.		Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storms							
Install covered catch basins to prevent busses from destroying tin horns on sharp corners		Flood	New/Planned	Oklahoma County District 3 with Luther PW	High	High	TBD by Oklahoma County w/ Luther Capital Fund	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

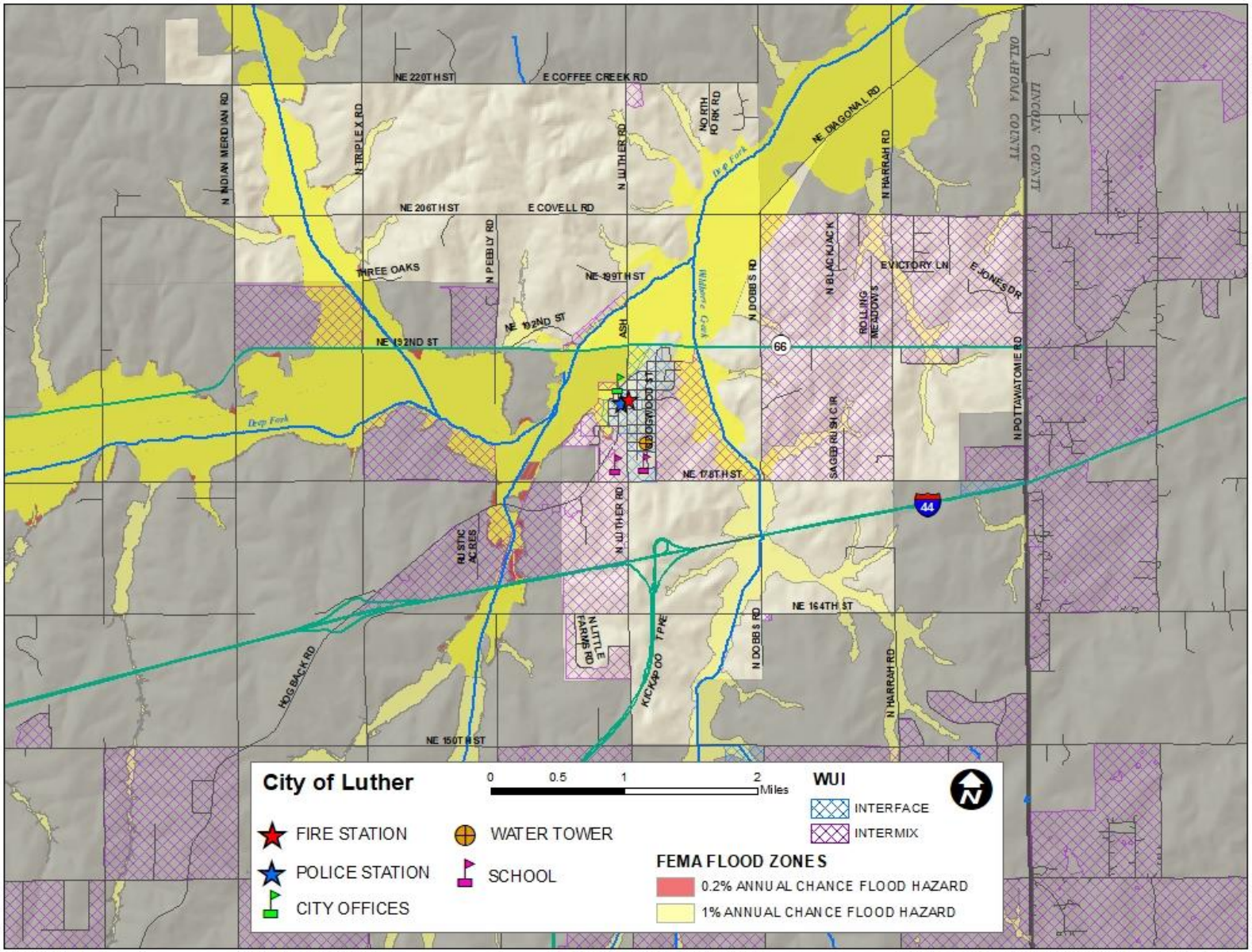
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the Town of Luther to illustrate the probable areas impacted within the Town of Luther. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the Town of Luther has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NE 220TH ST
E COFFEE CREEK RD
N INDIAN MERIDIAN RD
N TRIPLE X RD
N LUTHER RD
NORTH FORK RD
NE DIAGONAL RD
N HARRAH RD
LINCOLN COUNTY
OKLAHOMA COUNTY
NE 206TH ST
E COVELL RD
N PEBBLY RD
THREE OAKS
NE 199TH ST
Deep Fork
Wilkerson Creek
N DOBBS RD
N BLACKJACK
VICTORY LN
E JONES DR
ROLLING MEADOWS
NE 192ND ST
ASH
66
N POTTAWATOMIE RD
DOGWOOD ST
SAGEBRUSH CIR
NE 178TH ST
44
RUSTIC ACRES
N LUTHER RD
NE 164TH ST
N LITTLE FARMS RD
KICKAPOO TPKE
HOG BACK RD
NE 150TH ST
City of Luther
0 0.5 1 2 Miles
FIRE STATION
POLICE STATION
CITY OFFICES
WATER TOWER
SCHOOL
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD
N

9.10 CITY OF MIDWEST CITY

This section presents the jurisdictional annex for the City of Midwest City.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Debra Wagner Emergency Management 100 North Midwest Boulevard, Midwest City, OK 73110 (405) 739-1386 dwagner@midwestcityok.org	Patrick Menefee, PE City Engineer 100 North Midwest Boulevard, Midwest City, OK 73110 (405) 739-1220 pmenefee@midwestcityok.org

B.) MUNICIPAL PROFILE

The City of Midwest City is located in southern Oklahoma County. It is bordered to the north by the Town of Spencer, to the south by Oklahoma City, to the east by the City of Choctaw, and to the west by the City of Del City. The City of Midwest City has a total land area of 24.6 square miles, all of it land. The City is governed by a mayor and six member City Council. The 2020 U.S. Census population for the City of Midwest City was 58,466 (+7% from 2010). From 2018-2020, the non-English speaking population has increased significantly by nearly 70%. The population over 65 continues to increase, along with those with disabilities.

Low-lying areas in the City are subject to periodic flooding caused by overflow of Crutcho, Soldier and Silver Creeks. Most flooding occurs upstream from roadways that restrict the flow. A tributary of Choctaw Creek (Tributary 4 East Branch) causes flooding near the border of Choctaw (and has an associated mitigation project below). Urban expansion and future development in floodplains could increase the severity of flooding in the City. (FEMA NFIP FIS – 2009)

Known or Anticipated Future Development

The following table summarizes major residential/commercial development and major infrastructure development that are identified for the next five (5) years in the City. Refer to the map at the end of this annex which illustrates the hazard areas along with the location of potential new development.

Property Name	Type (Residential or Commercial)	Number of Structures	Address	Known Hazard Zone	Description/Status
Soldier Creek Industrial Park	Commercial	8	7500 blk of NE 23rd St.	No SFHA Wildfire	Under development
29TH St. Apartment Development	Commercial	12 Units	9309 SE 29th	Flood Wildfire	Under development
Centrillium Meat Processing	Commercial	1	7000 blk NE 36th	Flood	Under development

Although there has been small areas of development within the City of Midwest City, there has not been a significant change to the hazard vulnerabilities for the city. Midwest City does restrict the development and/or land use in the flood areas.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The following table summarizes progress on the mitigation strategy identified by the City of Midwest City in the 2019 plan.

2019 Initiative Description	Comments
Install new underground drainage with drop inlets at the 300 block of Post Road to reduce or eliminate flooding of three residences.	Completed

Further details on mitigation activities completed or ongoing in the City include:

- Channel improvements and tributary 6 along Soldier Creek
- Crutcho tributary D improvements.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Midwest City is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Canton Lake, Overholser - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

Additional vulnerabilities noted by the City of Midwest City include:
An apartment complex on NE 10th has repeat flood problems.
Three residences have flooded near the 300 block of Post Rd.
Residents desire additional safe rooms.

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3.6):

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
Crutcho Elementary School (Independent School District)	Midwest City (C)	School	X	X	-	-	-	-
Old STEED ES Building (Unoccupied)	Midwest City (C)	School	X	X	9.1	-	9.0	-
Fairfax Apartments	Midwest City (C)	User Defined	X	X	-	-	-	-
Parkview Apartments	Midwest City (C)	User Defined		X	29.9	37.9	33.5	42.1
YMCA	Midwest City (C)	User Defined	X	X	-	-	-	-
Boeing Aero Space	Midwest City (C)	User Defined	X	X	-	-	-	-
Midwest Square Office Park	Midwest City (C)	User Defined		X	20.7	32.9	38.6	52.6
Concord Apartments	Midwest City (C)	User Defined			22.8	27.7	22.8	27.7

Source: FEMA, 2009; Updated 2023

Utilities Located in the Preliminary DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss	
			100 Year	500 Year	100 Year Damage %	500 Year Damage %
Wastewater Treatment Plant	Midwest City (C)	WWTF	X	X	20.2	10.9

Source: FEMA, 2009;
Notes:
(1) 'X' indicates the facility location as provided by Oklahoma County's Planning Committee is located in the DFIRM flood zone.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
May 31 – June 01, 2013	Flood	N/A	N/A	Crutcho school flooded along with military armory, mobile home park southeast of 23rd/Air Depot. Mid-Del Youth Home flooded. Part of NE 23rd washed out just west of Air Depot.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
December 01, 2013	Earthquake	N/A	N/A	4.5 magnitude earthquake near Arcadia Lake; depth of 8.4 km.
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	4.3 magnitude earthquake near Spencer; depth of 5.0 km.
June 18, 2014	Earthquake	N/A	N/A	4.1 magnitude earthquake near Spencer; depth 5.0 km
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
March 5, 2015	Extreme Cold	N/A	N/A	
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm with widespread power outages.
April 4, 2016	Lightning	N/A	N/A	Lightning caused a significant house fire on Avery Dr. in Midwest City.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	Near 1/10th of an inch.
July 3, 2017	Lightning	N/A	N/A	Lightning caused a significant house fire on Oola Ct. in Midwest City
July-August 2017	Drought	N/A	N/A	
August 6, 2017	Lightning	N/A	N/A	Lightning caused a significant house fire on Del Arbole Dr. in Midwest City.
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
August 2018	Expansive Soils	N/A	N/A	Station 2 has had over the last six months cracks in the driveway, roof leaks and

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
				underground gas lines break due to shifting ground. This is at a concentrated area of expansive soils.
October 9, 2018	Wind	N/A	N/A	A small "QLCS" tornado developed along the leading edge of a tropical-like line of storms. The tornado apparently started on Tinker AFB and traveled north through a shopping center east of Air Depot Blvd and I-40 (SE 29th & Town Center Dr.), damaging the roof of the JC Penny's store and a few homes. Cars were flipped on Tinker AFB and in front of the JC Penny store. Two buildings suffered roof damage on Tinker AFB.
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused tree damage. Snowfall of 5" in Midwest City.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Winter Storm	N/A	N/A	2.5" of snow in Midwest City.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
July 11, 2020	Wind	N/A	N/A	Power lines reported downed in at least two locations in Midwest City. A gust to 64 mph was reported.
October 26-29, 2020	Ice Storm	4575-DR	Yes	Scattered power outages and near ½" of ice. Widespread tree damage.
December 13, 2020	Heavy Snow	N/A	N/A	4" of snow in Midwest City
December 15, 2020	Winter Storm	N/A	N/A	Generally, 3-4 inches of snowfall accumulation was reported across the county.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Numerous traffic accidents reported due to light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	4" of snow in Midwest City near Reno/Midwest Blvd.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	An additional 4" of snow.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
June 27, 2021	Flood	N/A	N/A	In Midwest City, multiple intersections closed with one water rescue performed. Some apartments evacuated due to water.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
October 14, 2021	Wind	N/A	N/A	70 mph gust reported near SE 15th & Sooner Rd. Power lines down and trees uprooted along SE 15th between Air Depot and Sooner Rd.
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	4.5” at Reno/Midwest Blvd.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county.
March 11, 2022	Winter Storm	N/A	N/A	2.4” of snow at Midwest City.
July 2022-May 2023-	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
July 28, 2022	Lightning	N/A	N/A	Lightning cause a significant house fire on Forest Oaks Dr. in Midwest City.
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
April 19, 2023	Hail	N/A	N/A	2” Hail reported just northeast of Tinker AFB.
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 6 residential, 2 commercial
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Midwest City
Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.
*Loss of eleven homes in 2009 not included in this dataset.

	Loss	Acres
2023	N/A	N/A
2022	$1,500	11.5
2021	$0	2.0
2020	$0	11.1
2019	$0	10.0
2018	$0	44.0
2017	$0	10.5
2016	$11,000	20.0
2015	$0	16.0
2014	$0	19.0
2013	$0	1.0
TOTAL LOSS	**$12,500**	**145.1**

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following capabilities of the local jurisdiction:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	2020 IBC	No	As new IBCs are published	Building Advisory Board w/ City Mgmt.
Comprehensive / Master Plan	Y	Midwest City Comprehensive Plan – being updated 2023-2024	Yes	10 Years	Planning Dept. Comprehensive Planner
Zoning Management Ordinance	Y	Midwest City Zoning Ordinance – 2010	No	None	Planning Dept
Subdivision Management Ordinance	Y	Midwest City Zoning Ordinance – 2022	No	Annual	Planning Dept
Site Plan Review Requirements	Y	Midwest City Zoning Ordinance – 2022	No	Annual	Planning Dept
NFIP Flood Damage Prevention Ordinance	Y	Midwest City Floodplain Regulations – 2009	Yes	As NFIP data becomes available	Planning Dept
NFIP Elevation Certificates Maintained	Y	Since 1983	N/A	Continuous	Engineering Dept
Floodplain Management Plan	Y	Part of All Hazards Mitigation Plan – relevant portion last updated 2012	Yes	As NFIP data becomes available	Engineering Dept
Stormwater Management Plan / Ordinance	Y	Oklahoma County Storm Water Quality & Erosion Control Regulations – 2016	Yes	No Specific Cycle	City Staff and Emergency Manager
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	Y	Oklahoma County Storm Water Quality	No	No Specific Update Cycle	County Planning

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
		& Erosion Control Regulations – 20016			
Capital Improvements Plan	Y	C.I.P. Fund Committee	Yes	No Specific Cycle	City Staff/Economic Development
Open Space Plan	Y	Comprehensive Plan (above)	No	10 Years	Planning Dept. Comprehensive Planner
Economic Development Plan	Y	Comprehensive Plan (above)	Yes	10 Years	Economic Development Director
Emergency Response Plan	Y	Emergency Operations Plan 2023	Yes	Annual	Emergency Manager w/ Whole Community Planning Group
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	N	Draft Plan 2023	No	In progress	City Staff and Emergency Manager
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, the Midwest City Emergency Operations Plan (EOP) incorporated a hazard analysis chart from the 2019 version of this Hazard Mitigation Plan.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Engineering Department – two engineers; three planners
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	One Chief Building Official; two building inspectors
Planners or engineers with an understanding of natural hazards	Y	Engineering Department – two engineers; three planners
NFIP Floodplain Administrator	Y	Engineering Department – planner and floodplain administrator; two CFMs
Surveyor(s)	N	
Personnel skilled or trained in "GIS" applications	Y	GIS Supervisor
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Emergency Management Director
Grant Writer(s)	Y	Grants Manager
Staff with expertise or training in benefit/cost analysis	Y	Emergency Manager, Grants and Planning staff

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	No
User fees for water, sewer, gas or electric service	No
Impact Fees for homebuyers or developers of new development/homes	Yes
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	Yes
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	N/A	N/A
Public Protection (ISO)	1	Nov. 2017
Storm Ready	Yes	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Floodplain management abilities can be expanded on and improved additional training and cross-training of job duties, joining professional organizations and annual review of flood prone areas for potential mitigation solutions.

Midwest City has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Replace and enlarge the existing culvert at SE 15th Street and Choctaw Creek Tributary 4 East Branch (just West of Hiwassee Road). Project will reduce road overtopping	Existing	Flood	Planned	City Engineering with ODOT	Reduced local flooding	High	BRIC, FMA, HMGP, EPA, Municipal capital outlet	Long	DOF (Dependent of Funding)
Soldier Creek Industrial Park – 7900 Block of NE 23rd Street. FEMA LOMR and CLOMR applications will be filed updating the flood area and model for the property	Existing	Flood	Planned	City Engineering	Improved floodplain delineation	Medium to High	BRIC, FMA, HMGP, Economic Development Authority Grant	Long	High
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and	New & Existing	NFIP Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	Municipal general fund	Ongoing (no end)	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
flood insurance outreach to the community.									
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood and other hazard vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and monthly newsletters (water bills) to better educate the public on flood insurance, the availability of mitigation grant funding, personal natural hazard risk reduction measures, and the household hazardous waste program. • Leverage strong public outreach resources and channels of the stormwater quality division. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding. • Participate in regional public awareness and education initiatives through the LEPCs.									
See above.	NA	Flood	Ongoing, mostly Springtime	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	Municipal M&O fund	Short	High
Participate in the Community Rating System (CRS) to further manage flood risk and reduce flood insurance premiums for NFIP policyholders.	NA	NFIP Compliance	Planned	NFIP Floodplain Administrator with support from OEM, FEMA	Low	Low	Municipal M&O fund	Short	Medium
Continue to archive elevation certificates	NA	NFIP Compliance	Continuous	NFIP Floodplain Administrator	Low	Low	Municipal M&O fund	Ongoing (no end)	High
Purchase structures in the area of 7801 NE 10th (Fairfax apartments) that are repeatedly flooded by heavy rains and convert the area to green space.	Existing	Flood	Planned	NFIP Coordinator with City Engineer	High	High	HMGP with municipal capital outlet	Long	Medium
Create mitigation		Dam Failure,	As events	Emergency	High	Low	Municipal	Long	Low

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
education pamphlets and distribute at booths during large public events and at public city venues.		Drought, Earthquake, Expansive Soils, Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storms	occur, new pamphlets created 2024	Management			capital outlet		
Distribute All-Hazard Weather Radios to senior centers, and high-risk residents		Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storms	As needed	Emergency Management	High	Low	Municipal capital outlet	Short	Low
Require a check for expansive soils prior to building in the city and perform soil stabilization if expansive soils are found.		Expansive Soil	As construction projects are planned	City Engineer	High	Medium	Municipal general fund	Short	Medium
Add storm sirens to the deficient areas within the jurisdiction.		Wind (incl. Tornado)	Planned	Emergency Management	High	High	HMGP, Bond	Long	Medium
Build an underground drainage system to remediate flooding at Rose & Key Blvd railroad crossing.		Flooding	New	Public Works with Engineering & Construction	High	High	HMGP, FMA, BRIC, Municipal capital outlet	Short	Medium
Construct gabion baskets N of Reno Ave	Existing	Flooding	New	Public Works with	High	High	HMGP, BRIC, FMA,	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
on Soldier Creek to remediate flooding of pedestrian bridge and elevated utilities and potentially the animal shelter.				Engineering & Construction			Municipal Capital outlet		
Purchase and remove structures in the floodplain of Crutcho Creek.	Existing	Flooding	New	Public Works with Engineering & Construction	High	High	BRIC, FMA, HMGP, Municipal capital outlet	Long	Medium
Replace antiquated generators at fire stations.	Existing	Winter Storm	New	Fire Dept	Medium	High	HMGP, Municipal capital outlet	Short	Medium
Install generators at several wastewater lift stations.	New & Existing	Flood	New	Public Works	Medium	High	HMGP, Municipal Capital outlet	Short	High
Vegetation clearing or removal out of utility easements.		Winter Storm	New	Public Works w/ OG&E	Medium	Medium	Muncipal M&O budget w/ assistance from OG&E	Short	Medium
Install new underground drainage with drop inlets at the 300 block of Post Road to reduce or eliminate flooding of three residences.	Existing	Flood	New	NFIP Coordinator with City Engineer	High	High	HMGP, FMA, BRIC and/or Municipal capital outlet	Short	Medium
Provide a rebate program for citizens who are installing new FEMA P-361 safe rooms.	New & Existing	Wind (inc. Tornado)	New	Emergency Management	High	High	HMGP with citizen match	Short	High

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000

High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

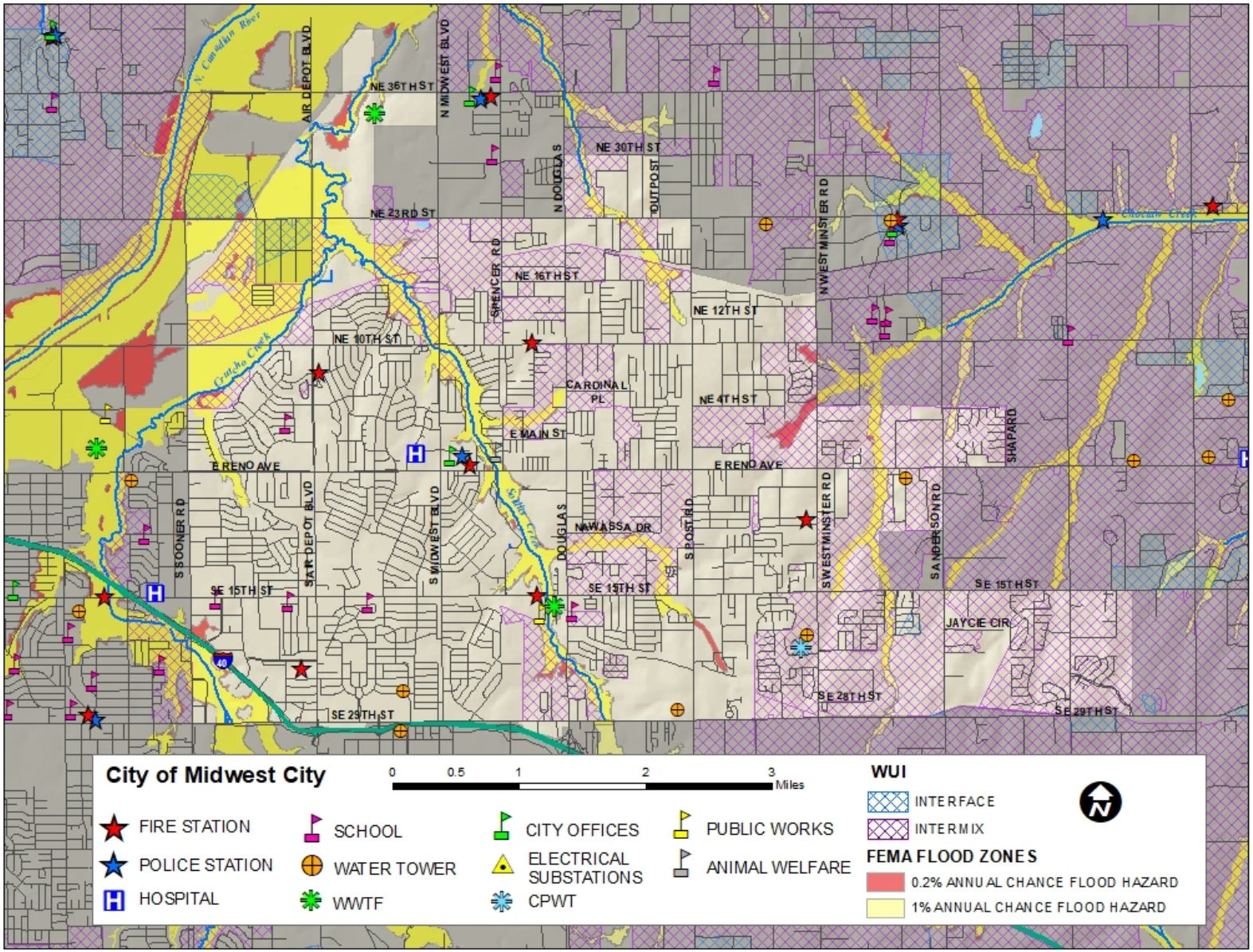
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Midwest City to illustrate the probable areas impacted within the City of Midwest City. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Midwest City has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


City of Midwest City
0 0.5 1 2 3 Miles
FIRE STATION
POLICE STATION
HOSPITAL
SCHOOL
WATER TOWER
WWTF
CITY OFFICES
ELECTRICAL SUBSTATIONS
CPWT
PUBLIC WORKS
ANIMAL WELFARE
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD
N
NE 36TH ST
NE 30TH ST
NE 23RD ST
NE 16TH ST
NE 12TH ST
NE 10TH ST
NE 4TH ST
E MAIN ST
E RENO AVE
SE 15TH ST
SE 29TH ST
SE 28TH ST
CARDINAL PL
NAWASSA DR
JAYCIE CIR
AIR DEPOT BLVD
N MIDWEST BLVD
S MIDWEST BLVD
N DOUGLAS
S DOUGLAS
OUTPOST
SPENCER RD
S POST RD
NWESTMINSTER RD
SWESTMINSTER RD
SHAPARD
SANDERSON RD
S SOONER RD
Crutcho Creek
Salter Creek
N. Canadian River
40

9.11 CITY OF NICHOLS HILLS

This section presents the jurisdictional annex for the City of Nichols Hills.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Kevin Boydston, Fire Chief City of Nichols Hills Fire Department 6407 Avondale Drive, Nichols Hills, OK 73116 (405) 843-8526 kboydston@nicholshills.net	Randy Lawrence, Director Nichols Hills Public Works 1009 NW 75th Street, Nichols Hills, OK 73116 (405) 843-5222 pworks@nicholshills.net

B.) MUNICIPAL PROFILE

The City of Nichols Hills is located in western Oklahoma County. It is bordered to the east, south and west by Oklahoma City and to the north by the City of The Village. The City has a total land area of 2.5 square miles, all of it land. The City is governed by a mayor and three member City Council. The 2020 U.S. Census population for the City of Nichols Hills was 3,875 (+4% from 2010).

Known or Anticipated New Development

The following major residential/commercial development and/or major infrastructure development are currently known or anticipated in the City of Nichols Hills:

Property Name	Type Residential or Commercial	Number of Structures	Address	Known Hazard Zone(s)	Description/Status
The Glenbrook Park, LLC	Res.	14 Units	1500 Block Glenbrook		Ongoing
Washington Prime	Commercial	3 or more	1100 Block NW 63rd		Burned during construction, rebuilding in progress. New Commercial Structures
Cumberland Court	Res.	23 Units	1100 Block Cumberland		New Houses

Although there has been small areas of development within the City of Nichols Hills, there has not been a significant change to the hazard vulnerabilities for the city.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The following table summarizes progress on the mitigation strategy identified by the City of Nichols Hills in the 2019 plan.

Completed 2019 Initiative	Comments
Along Grand Boulevard, the City has boxed in an additional 200+ feet of the Grand Canal to mitigate bank scouring when it overflows.	
Drainage Canal Improvements along Grand Blvd from Huntington Ave to Bedford	
Flood Control Drainage installed on west Grand 6700 Blk to 6800 Blk	
Add Generator to well 10 & 23	
Refurbish outdoor warning sirens	
Indoor information devices installed in City Hall, Police, & Public Works building.	

In addition, the City of Nichols Hills received a donated water well that will be connected to the municipal system by the end of 2023.

Abandoned Initiatives	Comments
Distribute mitigation information materials at schools and during Earth Day events	
Publish heat/cold prevention /mitigation newsletters in utility bills prior to extreme heat and cold	
Map expansive soil risk areas with greater detail	
Distribute All-Hazards Weather Radios to elderly and special needs citizens	

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Nichols Hills is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	No	
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes*	*The City owns water wells outside of the municipality in the city of OKC. Vegetation in the city itself is limited to residential and business landscaping/lawns, some are large.
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
February 2014-July 2014	Drought	N/A	N/A	
July 19, 2014	Lightning			Multiple storms produced numerous cloud to ground lightning flashes. At least three homes were damaged or destroyed in Nichols Hills. Property damages was estimated to be $2.80M
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm. Widespread power outages and tree damage.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm with widespread power outages.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	Very dry conditions. Slight drought started July 2016. A break occurred with abundant rain in April 2017.
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	Over 1/10th of an inch of ice.
July-August 2017	Drought	N/A	N/A	Typical summer ridging high pressure prevented rain across the region.
January 2018-April 2018	Drought	N/A	N/A	
June 7, 2018	Flood	N/A	N/A	Widespread flooding across the north Metro. Reports of flooding including NW 234th and Rockwell, parts of The Village, Edmond and Nichols Hill stranding multiple cars and closing roadways. 2-2.5 inches of rain fell over 2-3 hours.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Snow	N/A	N/A	Freezing rain caused some tree damage, followed by a couple of inches of snow.
April 30, 2019	Flood	N/A	N/A	Street flooding reported in the northside of the OKC metro area from Reno to NW 133 and from Western to Council (includes Nichols Hills).
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	Around 3” of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Scattered power outages. Nichols Hills had near .5” of ice where a large pine tree was uprooted.
December 13, 2020	Heavy Snow	N/A	N/A	Around 3.5” of snow.
December 15, 2020	Winter Storm	N/A	N/A	3” of snow.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	1/3” of ice followed by about 6” of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Numerous traffic accidents reported due to light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	6.5” at a TV station near Nichols Hills.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Reports from across the county generally ranged from 4 to 5 ½ inches with a maximum of 5.6 inches reported 5 mi. ESE Edmond. 4.5” was reported in eastern Deer Creek (unincorporated), Choctaw had 4” and Warr Acres 3”.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	July 7, 2021-July 10, 2021	
July 25-September 4, 2021	Excessive Heat	N/A	July 25-September 4, 2021	
September 2021	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	Around 3.5" of snow.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain was reported across the county.
March 11, 2022	Winter Storm	N/A	N/A	1" of snow at Nichols Hills..
July 2022-May 2023-	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 2 residential
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan Mitigation Integrated into other plans	Update Cycle	Party(s) Responsible for updating document
Building Code	Y	IBC 2018, IRC: 09, D.C., M.C, NEC 2017			
Comprehensive / Master Plan	Y	Last four years	Yes	Annual	City Manager/Council
Zoning Management Ordinance	Y				
Subdivision Management Ordinance					
Site Plan Review Requirements	Y				
NFIP Flood Damage Prevention Ordinance	Y	Chapter 12			
NFIP Elevation Certificates Maintained	Y				
Floodplain Management Plan	Y		Yes	Irregular	Floodplain Manager
Stormwater Management Plan / Ordinance	Y		Yes	Annual	Public Works Director
Stream Corridor Management or Protection Plan					
Erosion Management Ordinance					
Capital Improvements Plan	Y	Annually budgeted	Yes	Annual	Dept. Heads, City Manager, & Engineering Committee
Open Space Plan					
Economic Development Plan					

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan Mitigation Integrated into other plans	Update Cycle	Party(s) Responsible for updating document
Emergency Response Plan	Y	2022	No	Every 3 Years	Emergency Management
Post Disaster Recovery Plan / Ordinance					
Real Estate Disclosure Requirements					
Highway Management Plan					
COOP/COG Plan					
Sustainability Plan	Y	N/A	Yes	3 Years	City Planner

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Contract planner and engineer
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	
Planners or engineers with an understanding of natural hazards	Y	
NFIP Floodplain Administrator	Y	Code Enforcement Officer (designated by City Council per City code)
Surveyor(s)	Y	Through engineering contractor
Personnel skilled or trained in “GIS” applications	Y	
Scientist(s) familiar with natural hazards in the County.	Y	
Emergency Manager	Y	Fire Chief
Grant Writer(s)	N	
Staff with expertise or training in benefit/cost analysis		

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes, annually budgeted
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes, water/sewer
Impact Fees for homebuyers or developers of new development/homes	Yes
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	
Incur debt through private activity bonds	
Withhold public expenditures in hazard-prone areas	
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	5	2/3/2018
Public Protection (ISO)	2	2023
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Floodplain management abilities can be expanded on and improved through continuing education, involvement with professional organizations and annual review of flood prone areas for potential mitigation solutions.

Nichols Hills has adopted NFIP floodplain management criteria and the most recent FIRM map of 12/18/2009 (City code section 20-208). After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Replace ductile iron piping with PVC in potable water system as resources permit to reduce main breaks (est. nearly 20 miles still need retrofitting).	Existing	Expansive Soils	Planned	Public Works	Eliminate water main breaks due to shifting soils	High	GEO Bond	Long-term (for complete system retrofit)	Med – Low
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	Municipal General Fund	Ongoing, (no end)	High
Participate in the Community Rating System (CRS) to further manage flood risk and reduce flood insurance premiums for NFIP policyholders. This shall start with the submission to FEMA-DHS of a Letter of Intent to join CRS, followed by the completion and submission of an application to the program once the community's current compliance with the NFIP is established.	New & Existing	NFIP Compliance	Planned	NFIP Floodplain Administrator with support from OEM, FEMA	Low	Low	Municipal General Fund	Short	Medium
Archive elevation certificates	NA	NFIP Compliance	Ongoing	NFIP Floodplain Administrator	Low	Low	Municipal General Fund	Ongoing, (no end)	High
Build a retention pond at Grand and Sherwood to eliminate road flooding damage	NA	Flood	Anticipated completion near end of 2024	Public Works	High	High	Bonds, Donation	Short	Medium
Drill two new water wells to increase	New &	Drought	Planned	Public Works	More reliable	High	Bonds,	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
water supply	Existing		2025-2030		pressure		HMGP		
Adopt and enforce 2018 Building Codes, which include provisions for building to earthquake standards	New	Earthquake, Wind	Ongoing	Code Inspector	Reduce earthquake damage	Low	Municipal General Fund	Short	Medium
Post educational materials on the City of Nichols Hills website	NA	Extreme Temperatures, Hail	New	Fire Dept.	High (life safety)	Low	HMGP; Municipal General Fund	Short	Low
Add more generators to water wells (19 more)	New & Existing	Winter Storms, Lightning, Wind (incl. Tornado), Earthquake Wildfire	Ongoing	Public Works		High	HMGP; GO Bonds	Long Term	Low

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program. DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

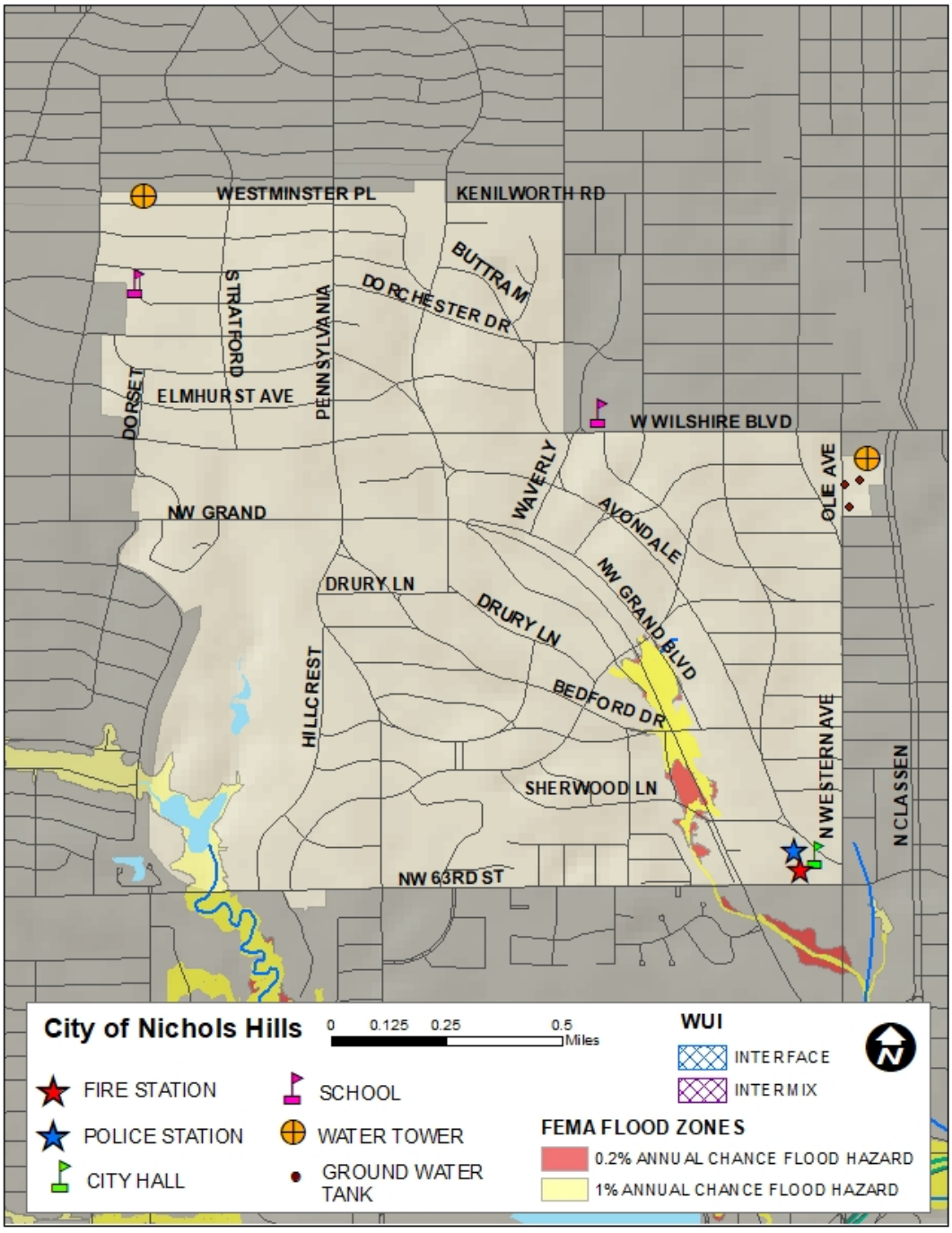
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Nichols Hills to illustrate the probable areas impacted within the City of Nichols Hills. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Nichols Hills has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


WESTMINSTER PL
KENILWORTH RD
BUTTRAM
DORCHESTER DR
STRATFORD
PENNSYLVANIA
DORSET
ELMHURST AVE
W WILSHIRE BLVD
WAVERLY
AVONDALE
OLIE AVE
NW GRAND
DRURY LN
DRURY LN
NW GRAND BLVD
HILLCREST
BEDFORD DR
NW WESTERN AVE
N CLASSEN
SHERWOOD LN
NW 63RD ST
City of Nichols Hills
0 0.125 0.25 0.5 Miles
FIRE STATION
POLICE STATION
CITY HALL
SCHOOL
WATER TOWER
GROUND WATER TANK
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.12 CITY OF NICOMA PARK

This section presents the jurisdictional annex for the City of Nicoma Park.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Eric Flowers, Fire Chief P.O. Box 250, Nicoma Park, OK 73066 (405) 259-8821 npfirechief@nicompark.net	

B.) MUNICIPAL PROFILE

The City of Nicoma Park is located in western Oklahoma County. It is bordered to the north by Oklahoma City, to the south and east by the City of Choctaw, to the west by the City of Midwest City. The City of Nicoma Park has a total land area of 3.7 square miles, all of it land. The City is governed by a mayor and six member City Council. The 2020 U.S. Census population for the City of Nicoma Park was 2317 (-3% from 2010).

Low-lying areas in the City are subject to periodic flooding caused by overflow of Choctaw Creek and its tributaries. The most severe flooding occurs as a result of thunderstorms and intense rainfall. Most flooding occurs upstream from roadways that restrict the flow. (NFIP FIS – 2009) NE 23rd and Draper floods frequently onto the state highway, occasionally to six inches.

Growth/Development Trends

The following major residential/commercial development and major infrastructure development are currently known or anticipated in the City of Nicoma Park:						
Property Name	**Type Residential or Commercial**	**Number of Structures**	**Address**	**Block and Lot**	**Known Hazard Zone**	**Description/Status**
Sierra Villa	Residential	120-127	2700 N Westminster		Wildland Fire	Planned
Irwin Septic	Commercial	1	10220 NE 23rd		Wildland Fire	In Progress

Past Mitigation Activity/Efforts

Each initiative from the 2013 plan was reviewed going forward into this 2019 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The following table summarizes progress on the mitigation strategy identified by the City of Nicoma Park in the 2013 plan.

Completed 2019 Initiative	Comments
Installed Lightning arrestors at Fire Station	Completed in 2023, part of a larger project with other facilities.
Created new drainage channels and widen culverts around 17th & Avery Ave.	

Completed 2019 Initiative	Comments
Provided flood protection for Hiwassee lift station. Provided rip raff and sod to mitigate the flooding and redirect the small channel.	In conjunction with Oklahoma County.

Additionally, the below table identifies the initiatives that were abandoned:

Abandoned 2019 Initiatives	Comments
Retrofit Community Center to serve as a warming/cooling center, including oxygen and a small triage station.	Populations around the state tend to rely on neighbors and family.
Establish regular public notification system via website when drought conditions exist by using 3-tiered warning system from low to high risk, with a request to conserve water.	Limited viewership.
Utilize city website to provide public warning system to take during severe lightning storms.	Limited viewership and not timely enough.

Further details on mitigation activities completed or ongoing in the City include:

The addition of a large municipal water tower with new service lines and hydrants has reduced the wildfire risk in several areas of the city. In addition, the city has recently obtained a 5,000 gallon water tender to assist with wildfire suppression.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Nicoma Park is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	No	
Drought	Yes	
Earthquake	Yes	
Expansive Soils	No	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of Nicoma Park, the following have been identified as specific hazards:

- Ice storm – damage to dwellings – accessory buildings and electrical lines and equipment
- Fires, drought, severe storms – hail, floods, tornado, straight-line winds, snow, ice storm
- Floods – business and residential damage

A flood risk exists around the 2000 Block of N. Westminster and around the 2600 block of N. Ives Way.

Some creek beds are silted in with debris and need cleanup from the 2500 Block of Nichols Drive west to NE 23rd St.

The city has two mobile home parks, one at 2900 N Westminster and the other located at 12713 NE 23rd. These are susceptible to high winds.

It is estimated that in Nicoma Park, 148 residents live within the 1% annual chance flood area (NFIP Special Flood Hazard Area). $36,504,000 (12.2%) of the municipality's general building stock replacement cost value (structure and contents) is located within the 1% annual chance flood area. There are 2 NFIP policies in the community, 1 Repetitive Loss (RL) and 0 Severe Repetitive Loss (SRL) properties.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
December 01, 2013	Earthquake	N/A	N/A	4.5 magnitude earthquake near Arcadia Lake; depth of 8.4 km.
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	4.3 magnitude earthquake near Spencer; depth of 5.0 km.
June 18, 2014	Earthquake	N/A	N/A	4.1 magnitude earthquake near Spencer; depth 5.0 km
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm.
August 11-13 2016	Excessive Heat	N/A	N/A	
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
January 13-15, 2017	Ice Storm	N/A		Heaviest ice amounts fell in the far west metro. .1" reported in Edmond near Covell/I-35, .15" reported in Warr Acres near NW 63rd/MacArthur.
January 7, 2017	Extreme Cold	N/A	N/A	
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
June 7, 2018	Flooding	N/A	N/A	Water entered garage of a residence in the 1900 block of Avery Ave.
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
July 14, 2018	Flooding	N/A	N/A	Flooding caused erosion to sewer main in the 2600 block of Ives Way.
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused some tree damage. Snowfall of around 3"
April 26, 2019	Wind	N/A	N/A	A thunderstorm produced scattered wind damage, with a power pole down at 23rd & Draper.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	Around 3" of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Power outages with around ½" of ice.
December 13, 2020	Heavy Snow	N/A	N/A	Around 4" of snow.
December 15, 2020	Winter Storm	N/A	N/A	Around 2" of snow.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain of ¼" followed by around 7" of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 4" of snow.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 4” of snow.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	Nicoma Park measured 4”.
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain.
March 11, 2022	Winter Storm	N/A	N/A	2” of snow.
July 2022-May 2023	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 17, 2023	Wind	N/A	N/A	Widespread reports of wind gusts around 60 mph. Numerous large tree limbs over 12” in diameter blown down.
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-17, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 1 commercial
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

Wildfire History for Nicoma Park
Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.

	Loss	Acres
2023	0	0.9
2022	0	1.6
2021	0	2.5
2020	$0	5.0
2019	$0	2.6
2018	N/A	N/A
2017	$0	1.6
2016	$0	0.2
2015	$0	3.1
2014	$20,500	108.0
2013	$0	6.0
TOTAL LOSS	$20,500	131.5

Source: Oklahoma State Fire Marshal's office

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) LEGAL AND REGULATORY CAPABILITY

Regulatory Tools (Codes, Ordinances., Plans)	**Do you have this?** (Y or N)	**Code Citation** (Section, Paragraph, Page Number, Date of adoption)	**HM Plan integration into plan**	**Update Cycle**	**Party(s) responsible for updating document**
Building Code	Y	2018 International Building Code		As State Updates	N/A
Comprehensive / Master Plan	Y	June 2018	No	Bi-annual	City Clerk
Zoning Management Ordinance	Y	Ord. 1973 2.1		As needed	City Clerk
Subdivision Management Ordinance	Y	Ord. 1973		As needed	City Clerk
Site Plan Review Requirements	Y	2018 International Building Code		As needed	City Clerk
NFIP Flood Damage Prevention Ordinance	Y	Ord. 387 – November 3, 2009		As needed	Fire Chief/EM
NFIP Elevation Certificates Maintained	Y	Ord. 387 – November 3, 2009		As needed	Fire Chief/EM
Floodplain Management Plan	Y	Ord. 387 – November 3, 2009; repeated 233 – April 7, 1987	Yes	Annual	Fire Chief/EM
Stormwater Management Plan / Ordinance	Y	Ord. 373 – March 4, 2008		As needed	Fire Chief/EM
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	Y	Ord. 373 – March 4, 2008		As needed	Fire Chief/EM
Capital Improvements Plan	Y	Resolution Sept. 12, 2007 – May	Yes	As needed	ACOG, City Council, City Clerk, Dept.

Regulatory Tools (Codes, Ordinances., Plans)	**Do you have this?** (Y or N)	**Code Citation** (Section, Paragraph, Page Number, Date of adoption)	**HM Plan integration into plan**	**Update Cycle**	**Party(s) responsible for updating document**
		2007			Heads, Mayor,
Open Space Plan	N				
Economic Development Plan	N				
Emergency Response Plan	N				
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) ADMINISTRATIVE AND TECHNICAL CAPABILITY

Staff/ Personnel Resources	**Available (Y or N)**	**Department/ Agency/ Position**
Planner(s) or Engineer(s) with knowledge of land development and land management practices	N	
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Building Inspector
Planners or engineers with an understanding of natural hazards	Y	Fire Chief/Emergency Manager
NFIP Floodplain Administrator	Y	Fire Chief/Emergency Manager
Surveyor(s)	N	
Personnel skilled or trained in “GIS” applications	N	

Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Fire Chief
Grant Writer(s)	Y	Fire Chief/Emergency Manager
Staff with expertise or training in benefit/cost analysis	N	

D.3) FISCAL CAPABILITY

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	ACOG
Capital Improvements Project Funding	ACOG
Authority to Levy Taxes for specific purposes	No
User fees for water, sewer, gas or electric service	Sewer fees
Impact Fees for homebuyers or developers of new development/homes	No
Incur debt through general obligation bonds	No
Incur debt through special tax bonds	No
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other	

D.4) COMMUNITY CLASSIFICATIONS

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	3,4	2004
Public Protection	4/6	2014
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Moreover, this jurisdiction participates in Wildland Automatic Response (or WAR – an automatic mutual aid agreement during high wildland hazard days). This ensures a greater response to wildland fires.

Floodplain management is somewhat limited by lack of staff. Currently the Fire Chief is responsible for floodplain management. Abilities may be expanded on and improved by training a key fire department volunteer in floodplain management.

Nicoma Park has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following the established FEMA guidelines outlined in FEMA P-758. The city does not have regulations beyond FEMA requirements. Substantial damage/substantial improvement is referenced in City ordinance 387, Sec. 42-48 paragraph 12 and 42-49.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Clean and widen the drainage channel between Ives Way and NE 23rd	Existing	Flooding	New	Emergency Management	High	Medium	City Capital Funds	Short	Medium
Address overflow problems in and along city creeks. Request OK County D1 for assistance in clearing creeks of debris, silt and ensure water channels are open.	Existing	(Non mitigation maintenance)	As needed	Public Works with OK Co District 1	High	Medium	OK Co D1, City Capital Funds	Short	Medium
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements, floodplain identification and mapping, and flood outreach to the community.	New & Existing	NFIP Compliance	Ongoing	Municipal Engineer/NFIP Floodplain Administrator with support from OEM, ISO FEMA	High	Low - Medium	Local Budget	Ongoing (no end)	Medium
Educate public on water and soil conservation as well as climate conditions.		Drought	Planned	Emergency Management	High	Low to Medium	City M&O Funds	Short	Low
Monitor state, county and local drought conditions and prohibit any outdoor burning when conditions prohibit such activity.		Drought, Wildfire	As drought sets in	Fire Dept.	High	Low to Medium	City M&O Funds	Short	Low
Enact an ordinance for all future construction to require burial of utility lines. Lines may sway	New	Flood, Earthquake, Hail, Lightning,	Planned	Code Enforcement	High	Low to Medium	City M&O Funds	Short	Low

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
and come down in an earthquake, be taken down in a winter storm, poles burned in a wildfire, insulators destroyed by hail, equipment damaged by lightning, and be taken down by high wind or floods.		Wind (incl. Tornado), Wildfire, Winter Storm							
Adopt and enforce International Building Codes related to soil conditions.	New	Earthquake	Updated as new codes become available	Code Enforcement	High	Low to Medium	Local Budget	Short	Low
Educate public about the potential hazards associated with extreme temperature conditions via newsletters and social media.		Extreme Temp	Typically Summer & Winter	Emergency Management	High	Low to Medium	City M&O Funds	Short	Low
Using demographics, identify highest vulnerable group of citizens such as seniors and children and develop strategy to assist those with the highest need of either fans and or heaters.		Extreme Temp	Each Summer	City Planning with Fire Dept.	High	Low to Medium	City M&O Funds	Short	Low
Educate public through social media about the potential material and human damage from hail. Including insurance coverage for home, auto and crops.		Hail	Each Spring	Fire Dept.	High	Low to Medium	City M&O Funds	Short	High
Retrofit municipal facilities with lightning detection and arrestor systems.	Existing	Lightning	Planned	Public Works	High	Medium	City Capital Funds	Long-Term DOF	Medium
Educate public about the		Hail,	Planned	Code	High	Low to	FEMA	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
potential material and human damage from hail, wind and lightning. Item 1. Insurance coverage for home, auto and crops against lightning, wind and hail. Item 2. Encourage adoption of lightning arresters for businesses and residences.		Lightning, Wind (incl. Tornado)		Enforcement with Fire Dept.		Medium	Grant programs and matching local funds.		
Locate safe areas or safe harbors from high winds and earthquakes in city facilities and retrofit facilities deemed as not having a safe area for municipal employees.	Existing	Earthquake, Wind (incl. Tornado)	Planned	Code Enforcement with Public Works	High	High	FEMA HMGP with City Capital Funds	Long	Low
Replace antiquated storm sirens		Wind (incl. Tornado)	Planned	Emergency Management	High	Medium	FEMA HMGP with City Capital Funds	Short	High
Educate public about the potential dangers of severe winter storms and develop an outreach program to assist citizens isolated or stranded without power during winter storms.		Winter Storms	Each Fall going into Winter	Emergency Management	High	Low to Medium	FEMA Grant programs and matching local funds	Short	Medium
Host a class at the community center to educate the public on making their home less vulnerable to wildfires.	Existing	Wildfire	Ongoing, Spring & Fall	Fire Department	High	Low	No cost – NFA provided materials	Short	Medium
Provide weather radios to citizens		Flood, Earthquake, Hail,	Planned	Fire Department	High	Medium	FEMA HMGP and City	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
		Lightning, Wind (incl. Tornado), Wildfire, Winter Storm					Capital Funds		
Install a generator at the new City Water Tower	Existing	Earthquake, Lightning, Wind, Wildfire, Winter Storm	New	Fire Department	High	Medium	FEMA HMGP and City Capital Funds	Short	High
Install a generator at the City Maintenance building to be able to operate in emergency situations (i.e. winter storms)		Earthquake, Lightning, Wind, Wildfire, Winter Storm	New	Fire Department	High	Medium	FEMA HMGP and City Capital	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

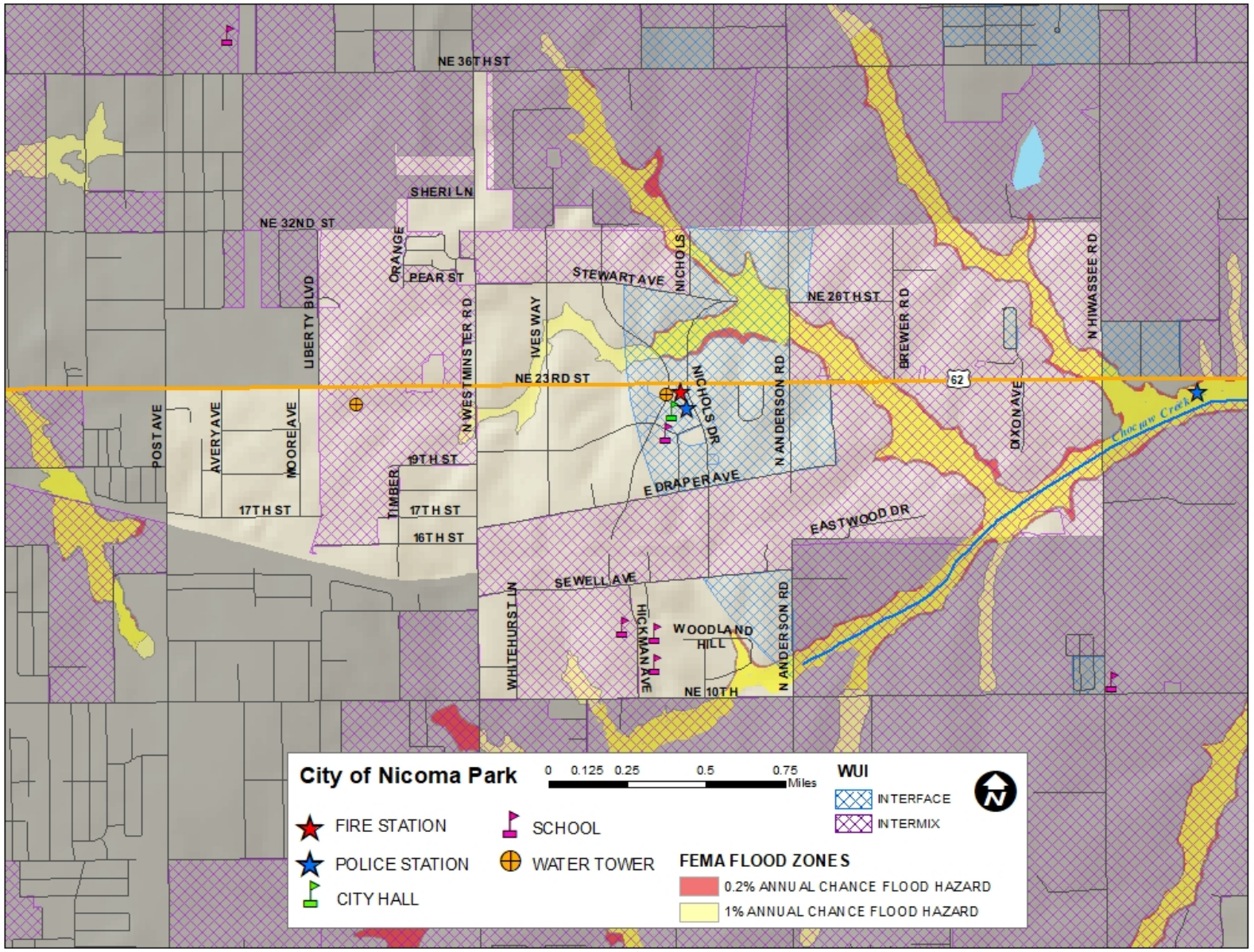
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Nicoma Park to illustrate the probable areas impacted within the City of Nicoma Park. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Nicoma Park has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NE 36TH ST
SHERI LN
NE 32ND ST
ORANGE
PEAR ST
STEWART AVE
NICHOLS
NE 26TH ST
BREWER RD
N HIWASSEE RD
LIBERTY BLVD
N WESTMINSTER RD
IVES WAY
NE 23RD ST
62
NICHOLS DR
N ANDERSON RD
DIXON AVE
POST AVE
AVERY AVE
MOORE AVE
19TH ST
TIMBER
17TH ST
17TH ST
16TH ST
E DRAPER AVE
EASTWOOD DR
Choctaw Creek
SEWELL AVE
WHITEHURST LN
HICKMAN AVE
WOODLAND HILL
N ANDERSON RD
NE 10TH
City of Nicoma Park
0 0.125 0.25 0.5 0.75 Miles
WUI
INTERFACE
INTERMIX
N
FIRE STATION
POLICE STATION
CITY HALL
SCHOOL
WATER TOWER
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.13 CITY OF SPENCER

This section presents the jurisdictional annex for the City of Spencer.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Dale Griffith, Fire Chief 8310 NE 36th St., Spencer, OK 73084 (405) 771-3621 spencerfdchief@sbcglobal.net	Chuck Blair, Emergency Management Director 4203 N. Coaltrane, Forest Park, OK 73121 (405) 823-2728 chuckblair801@gmail.com

B.) MUNICIPAL PROFILE

The City of Spencer is located in central Oklahoma County. The City is bordered to the north and west by Oklahoma City, to the south by the City of Midwest City, and to the east by the City of Nicoma Park. The City has a total land area of 5.3 square miles, all of it land. The City is governed by a mayor and four member City Council. The 2020 U.S. Census population for the City of Spencer was 3,972 (+2% from 2010).

Low-lying areas in the City are subject to periodic flooding caused by overflow from the North Canadian River, Crutcho Creek, Silver Creek and Tributary 9. The most severe flooding typically occurs after thunderstorms with intense rainfall. Most flooding occurs upstream from roadways that restrict the flow. (FEMA NFIP FIS – 2009)

Growth/Development Trends

The City of Spencer has had only small growth over the past few years. Some growth is anticipated over the next few years.

New Development/Potential Development in the City of Spencer						
Property Name	**Type Residential or Commercial**	**Number of Structures**	**Address**	**Block and Lot**	**Known Hazard Zone**	**Description/Status**
SE Corner of NE 36th / Midwest Blvd	Residential	Approx. 200	Variable		Wildland Urban Interface	Planned

Although there has been small areas of development within the City of Spencer, there has not been a significant change to the hazard vulnerabilities for the city.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.

The following table summarizes progress on the mitigation strategy identified by the City of Spencer in the 2019 plan.

Abandoned 2019 Initiative Description	Comments
Purchase, or relocate structures located in hazard-prone areas	Flooding has been reduced; residents unlikely to desire to move and may not meet FEMA benefit-cost
Develop a location listing or map that identifies buildings and critical facilities within the Lake Overholser and Canton Lake inundation area (with a greater detail than Corps of Engineers maps)	Digital mapping of flood zones is available.
Develop detailed fault maps to determine areas most likely to be affected by earthquakes and at risk structures.	Not feasible / digital fault maps are available and online through OGS.
Develop a mitigation educational program and present it to farmers and ranchers explaining the need for crop insurance and how to make buildings more resistant to hail through improved roofing materials.	Minimal cropland exists in the jurisdiction.
Purchase and install lightning detection systems with alarms for city parks and public areas.	Smartphone apps provide this service.
Completed 2019 Initiative Description	**Comments**
Purchase and install generators for city police, fire departments and EOC facilities.	Power outage mitigation for multiple hazards.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Spencer is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Canton Lake, Overholser - See local hazard map end of section
Drought	Yes	
Earthquake	Yes	
Expansive Soils	No	NRCS Map shows no significant expansive soils in jurisdiction.
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	Yes	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of Spencer, the following have been identified as specific hazards:

Approximately 8 to 10 homes flood in the Silver Creek area every time heavy amounts of rain occur. Some flood mitigation has occurred by improvements to a culvert, reducing the frequency of flooding.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	
May 31-June 1st, 2013	Severe Storms, Flooding	DR-4117	Yes	Nearby mesonet station reported a 2 day total of 6.73” of rain.
December 01, 2013	Earthquake	N/A	N/A	4.5 magnitude earthquake near Arcadia Lake; depth of 8.4 km.
February 2014-July 2014	Drought	N/A	N/A	
June 16, 2014	Earthquake	N/A	N/A	At a depth of 5.0km, this earthquake was felt throughout Oklahoma County and beyond. Reports of light to moderate shaking, with some very light damage were received. This quake originated in Spencer and was measured at 4.3
June 18, 2014	Earthquake	N/A	N/A	USGS reports this quake is at a 5.0km depth. Multiple reports throughout the county ranging from light to strong shaking. Some light damage was also reported. This quake originated in Spencer and was measured at 4.1
March 5, 2015	Extreme Cold	N/A	N/A	
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A	N/A	Glaze of ice
July-August 2017	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused tree damage followed by around 3” of snow.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	Around 3” of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	½” of ice caused tree damage and power outages
December 13, 2020	Heavy Snow	N/A	N/A	Around 4” of snow.
December 15, 2020	Winter Storm	N/A	N/A	Around 3” of snow.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	¼” of ice followed by around 6” of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Numerous traffic accidents reported due to light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 5” of snow.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	Around 4” of snow.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 2-3, 2022	Heavy Snow	N/A	N/A	Around 4.5" of snow
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain.
March 11, 2022	Winter Storm	N/A	N/A	About 1 ½" of snow.
July 3-28, 2022	Excessive Heat	N/A	N/A	
July 2022-May 2023	Drought	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Temperatures	N/A	N/A	City of Spencer Community Center water line broke, flooding the entire building. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, felt but no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 3 residential
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Spencer Fire Department

Wildfire History for Spencer
Acres may include loss from wildland, grass, brush, crop, orchard and nursery fires.

	Loss	Acres
2023	$0	0.0
2022	$10,000	6.0
2021	$0	0.0
2020	$0	25.0
2019	$0	0.0
2018	$0	3.0
2017	$0	0.0
2016	$0	0.0
2015	$0	8.0
2014	$0	0.0
2013	$0	0.0
2012	$0	102.0
TOTAL LOSS	**$10,000**	**144.0**

Source: Oklahoma State Fire Marshal's office, Spencer Fire Dept.

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	2018 International Building Code	No	As the state adopts future revisions	City Council Adoption
Comprehensive / Master Plan					
Zoning Management Ordinance	Y		No	No cycle	Planning Committee
Subdivision Management Ordinance	Y		No	No cycle	Planning Committee
Site Plan Review	Y		No	No cycle	Planning Committee

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Requirements					
NFIP Flood Damage Prevention Ordinance (if you are in the NFIP, you must have this!)	Y		No	No cycle	Code Enforcement / Floodplain Administrator
NFIP Elevation Certificates Maintained	Y		No	As provided	Code Enforcement / Floodplain Administrator
Floodplain Management Plan	Y		Yes	No Update Scheduled	City Manager & Code Enforcements Officer
Stormwater Management Plan / Ordinance	N				
Stream Corridor Management or Protection Plan	N				
Erosion Management Ordinance	N				
Capital Improvements Plan	Y		No	Annual, Spring	City Manager
Open Space Plan	Y		No	No cycle	City Manager
Economic Development Plan	Y		Yes	No Update Scheduled	City Manager
Emergency Response Plan	Y	County plan used for jurisdiction	No	Annual	County Emergency Manager
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	N				
COOP/COG Plan	N				
Other (Special Purpose Ordinances such as critical or sensitive areas)	N				

Additionally, any change in ordinances happen at the behest of local government bodies, state legislation or court actions and are not a reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Planning Committee & City Engineer
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	City Engineer
Planners or engineers with an understanding of natural hazards	Y	City Engineer
NFIP Floodplain Administrator (if you are in the NFIP, you must have this person designated – often your code official)	Y	Code Enforcement
Surveyor(s)	N	
Personnel skilled or trained in "GIS" applications	N	
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Fire Department EM
Grant Writer(s)	N	
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact Fees for homebuyers or developers of new development/homes	No
Incur debt through general obligation bonds	No
Incur debt through special tax bonds	No
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other	No

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	TBD	TBD
Public Protection (ISO)	3	2021
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.
Moreover, this jurisdiction participates in Wildland Automatic Response (or WAR – an automatic mutual aid agreement during high wildland hazard days). This ensures a greater response to wildland fires.

Floodplain management abilities could be improved through working with the county on mitigation solutions. The city has limited staffing with multiple responsibilities.

The City of Spencer has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by coordinating with the County and following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Continuous	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	City M&O Budget	Ongoing (no end)	High
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood and dam failure vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding.									
See above.	NA	Dam Failure, Flood	As meetings are scheduled	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	City M&O Budget	Short	High
Archive elevation certificates	NA	NFIP Compliance	Continuous	NFIP Floodplain Administrator	Low	Low	City M&O Budget	Ongoing (no end)	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Enact a regulation to prevent structures from being built in swash zone areas and the Special Flood Hazard Area.	New	NFIP Compliance, Dam Failure, Flood	Planned	Municipal Engineer	High	Low	City M&O Budget	Short	Medium
Drill additional water wells ensuring that an adequate water supply is available.	Existing	Drought	Planned	Municipal Engineer	High	High	OWRB REAP Grant, City Capital Funds	Short	Medium
Conduct a public education campaign to inform the citizens how to conserve water and mitigate drought using Xeriscape.		Drought	Planned	Municipal Engineer	High	High	City M&O Budget	Short	High
Enact a regulation to require power lines to be buried in new housing developments.	New	Dam Failure, Earthquake, Flooding, Hail, Lightning, Wildfire, Wind (incl. Tornado), Winter Storm	Planned	Code Enforcement	High – insulators will not be destroyed by hail; lines not stretched during winter storms or taken down by swinging from an earthquake, lightning, flood, wildfires, or wind	High	City M&O Budget	Long	Medium
Provide public literature to high-risk populations on the dangers associated with extreme		Extreme Temperatures	Planned	Fire Department	High	Low	City M&O Budget	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
temperature events through distribution at public events and at public facilities.									
Plant trees in public areas around buildings and in parks to provide shade	Existing	Extreme Temperatures	Planned	Public Works	High	Low	OK Dept of Forestry, City M&O Budget	Short	Low
Widen and increase the drainage upstream from the repetitive loss properties, including installing tinhorns and possibly riprap	New and Existing	Flood	Recurring as needed/ DOF	Public Works	High	High	OWRB REAP Grant, HMGP, City Capital	Short, DOF	High
Replace bridge at Spencer Rd & Silver Creek to reduce flooding threat	New and Existing	Flood	Planned	Public Works	High	High	HMGP, City Capital	Long, DOF	Medium
Enact a building code requiring hail resistant materials for roofing and siding on all new homes.	New	Hail	Planned	Code Enforcement	High	Low	City M&O Budget	Short	Medium
Install lightning protection and suppression systems protecting radios, computers and other critical equipment at city owned facilities.	Existing	Lightning	Planned	Public Works	High	Medium	City Capital Funds	Short	Medium
Include lightning mitigation and safety brochures with monthly water bills	Existing	Lightning	Typically in Spring	Code Enforcement	High	Low	City Admin. General Fund	Short	Medium
Enact an ordinance to require the securing of mobile homes and other small structures helping reduce damage from high winds.	New and Existing	Wind (incl. Tornado)	Planned	Code Enforcement	High	Low	Code Enforcement General Fund	Short	High
Provide tie downs to	New and	Wind (incl.	Planned	Code	High	Low	HMGP, City	Short	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
secure mobile homes and other small structures from high winds	Existing	Tornado)		Enforcement			Capital		
Provide public education through pamphlets and business group meetings to inform individuals and companies how to mitigate against winter storms		Winter Storm	Typically in Fall	Fire Department	High	Low	City M&O funds	Short	High
Bolster drainage infrastructure on 36th St between Midwest Blvd and Spencer Rd to alleviate growing flooding issues that affects access to public safety facilities.	Existing	Flooding	New	Public Works	High	Medium	HMGP, City Capital, County Capital	Short	High
Upgrade exiting tornado sirens and add additional sirens in areas not currently covered.	Existing	Wind (incl. Tornado)	Planned	EM	High	Medium	HMGP, City Budget	Short	High

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.

Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000

High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

OWRB REAP = Oklahoma Water Resources Board, Rural Economic Action Plan
USDA REAP = U.S. Dept. of Ag Rural Energy for America Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

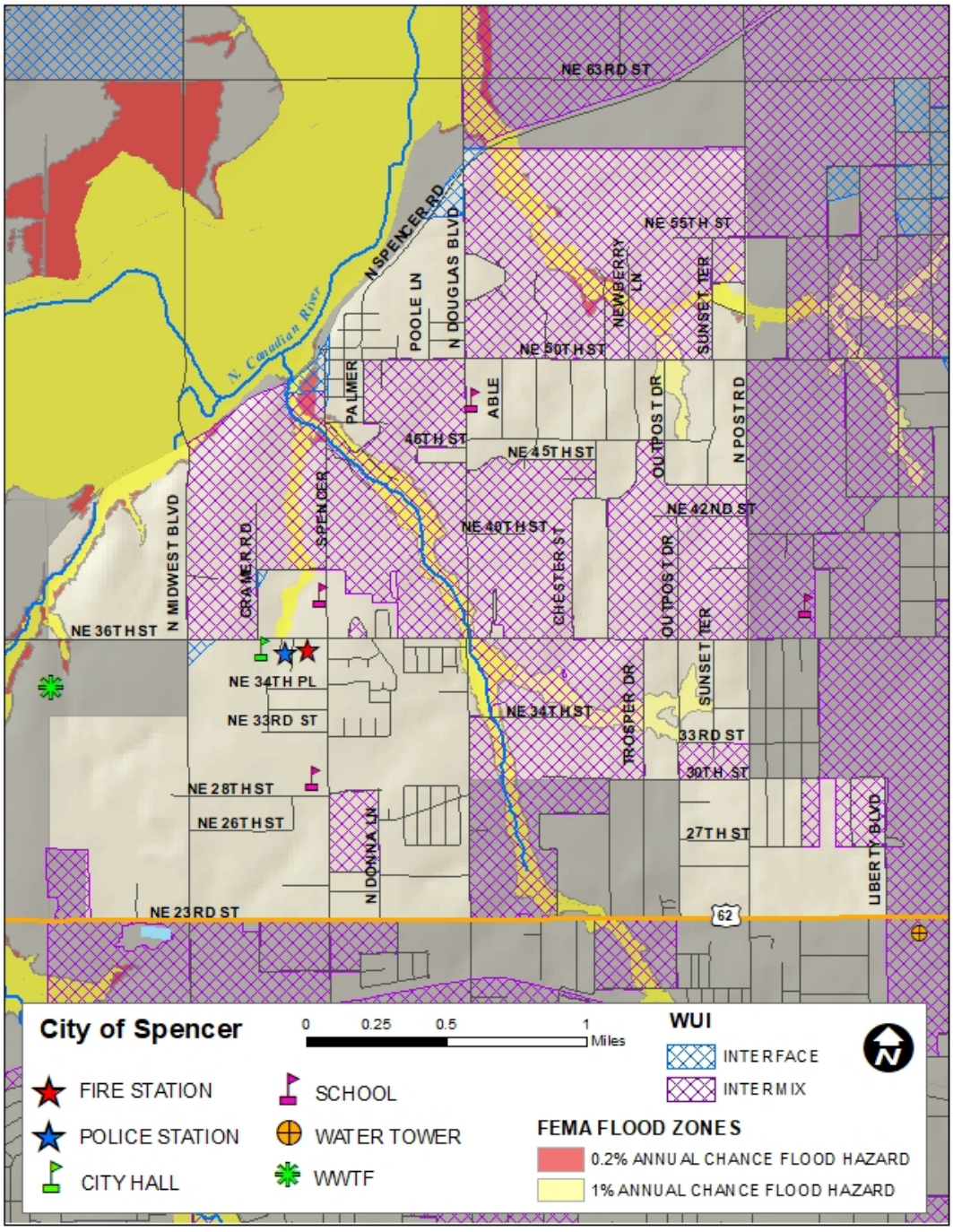
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Spencer to illustrate the probable areas impacted within the City of Spencer. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Spencer has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


NE 63RD ST
NE 55TH ST
NE 50TH ST
NE 46TH ST
NE 45TH ST
NE 42ND ST
NE 40TH ST
NE 36TH ST
NE 34TH PL
NE 33RD ST
NE 34TH ST
33RD ST
30TH ST
NE 28TH ST
NE 26TH ST
27TH ST
NE 23RD ST
N SPENCER RD
N DOUGLAS BLVD
POOLE LN
NEWBERRY LN
SUNSET TER
PALMER
ABLE
OUTPOST DR
N POST RD
N MIDWEST BLVD
CRAMER RD
SPENCER
CHESTER ST
TROSPER DR
N DONNA LN
UBERTY BLVD
N. Canadian River
62
City of Spencer
0 0.25 0.5 1 Miles
FIRE STATION
POLICE STATION
CITY HALL
SCHOOL
WATER TOWER
WWTF
WUI
INTERFACE
INTERMIX
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

9.14 CITY OF THE VILLAGE

This section presents the jurisdictional annex for the City of The Village.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Brent Hodges, Emergency Manager 2201 W. Britton Road, The Village, OK 73120 (405) 749-2056 bhodges@thevillageok.gov	Ken Nelson, Building Inspector 2304 Manchester Drive, The Village, OK 73120 (405) 751-8861 knelson@thevillageok.gov

B.) MUNICIPAL PROFILE

The City of The Village is located in western Oklahoma County. It is bordered to the north, east and west by Oklahoma City and to the south by the City of Nichols Hills. The City has a total land area of 2.5 square miles, all of it land. The City is governed by a mayor and five member City Council. The 2020 U.S. Census population for the City of The Village was 9,565 (+7% from 2010).

Growth/Development Trends

Most of the current growth is redevelopment of existing areas. Older structures are being replaced with new buildings. Although there has been small areas of development within the City of The Village, there has not been a significant change to the hazard vulnerabilities for the city.

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.
The city has completed several initiatives from the 2019 plan, and reduced flooding has been observed.

In addition, the city has replaced all but one of the storm sirens in the past few years with battery-backup sirens. The final siren replacement is scheduled for 2024. The City's 9-1-1 center has been completely remodeled with new dispatcher stations and updated technology.

Hazard Vulnerabilities Identified

Abandoned Initiatives from 2019 plan	Comments
Address shortfalls in public sheltering capacity by starting a city safe room rebate program.	The State has a Safe Room Program.
Adopt IBC 2012 building code with earthquake guidance	Newer IBC has been adopted; earthquakes have become less frequent
Enact a regulation to require a check for expansive soils prior to building a city building and perform soil stabilization if expansive soils are found.	No plans to go beyond State requirements.
Completed Initiatives from 2019 plan	**Comments**
Generator installed at the Fire Station	Completed in 2022.
Drainage improved just west of May at the Lutheran Church. In addition, the city improved drainage along Gladstone Terrace from Carlton Way to Village Drive.	Completed in 2022-2023

Hazard profiling, Section 5.3, has identified that the City of The Village is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	No	
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	No	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

According to the City of The Village, the following have been identified as specific hazards:

- Potential for flood damage exists within the City along the Chisholm Creek channel from Barclay Road downstream to Hefner Road. The potential for the greatest flood damage exists for the homes bordering Village Drive from Gladstone Terrace to Finley Drive and within the housing development along the floodplains from Finley Drive to Cavanaugh. (FEMA NFIP FIS – 2009)

Vulnerability assessment modeling has identified the following flood vulnerabilities (see Flood Hazard Profile in Section 5.3.6):

Critical Facilities Located in the DFIRM Flood Boundaries and Estimated Potential Damage from the 100- and 500-Year MRP Events

Name	Municipality	Type	Exposure		Potential Loss			
			100-Yr	500-Yr	100-Yr Structure Damage %	100-Yr Content Damage %	500-Yr Structure Damage %	500-Yr Content Damage %
Village Police Dept	The Village (C)	Police	X	X	9.7	18.6	11.3	43.5

Source: FEMA, 2009

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	2011-2012 was the fourth driest two-year period on record and left water storage at reservoirs at an all-time low. Oklahoma City implemented mandatory outdoor water rationing starting July 31, 2012 including cities that buy water from OKC. This includes Deer Creek Rural Water District (unincorporated

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
				county), Edmond, The Village and Warr Acres. January 17, 2013 odd/evening outdoor watering was re-implemented and by spring became a permanent program. August 4, 2012 fire near Luther consumed almost 60 homes and other structures.
February 2014-July 2014	Drought	N/A	N/A	
March 5, 2015	Extreme Cold	N/A	N/A	
May 5-10, 2015	Flood	DR-4222	Yes	A series of organized significant thunderstorms and flooding event happened during this time frame. Multiple tornados were reported during this event. Over this time, a total of 11.61" rain reported. One fatality was reported during this time due to storm activity. Multiple stranded vehicles required high water rescue. Southern parts of Oklahoma County saw the greatest rainfall. The Village experienced flooded roadways.
November 27-28, 2015	Winter Storm	DR-4247	Yes	Ice storm. Widespread tree damage and power outages.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm. Widespread tree damage.
August 11-13 2016	Excessive Heat	N/A	N/A	
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A		Around 1/10th of an inch of freezing rain.
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
June 7, 2018	Flood	N/A	N/A	Widespread flooding across the north Metro. Reports of flooding including NW 234th and Rockwell, parts of The Village, Edmond and Nichols Hill stranding multiple cars and closing roadways. 2-2.5 inches of rain fell over 2-3 hours.
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Ice Storm & Heavy Snow	N/A	N/A	Freezing rain caused some tree damage. Snowfall of around an inch.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
March 23, 2019	Hail	N/A	N/A	Golf ball size hail was reported east of Hefner & May Ave (The Village). Damage estimate not provided.
April 30, 2019	Flood	N/A	N/A	Street flooding reported in the northside of the OKC metro area from Reno to NW 133 and from Western to Council (includes The Village).
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
February 5, 2020	Heavy Snow	N/A	N/A	Around 3” of snow.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
October 26-29, 2020	Ice Storm	4575-DR	Yes	Tree damage and a power pole snapped in The Village. Numerous power outages. Over 0.4” of ice.
December 13, 2020	Heavy Snow	N/A	N/A	Around 4” of snow.
December 15, 2020	Winter Storm	N/A	N/A	Around 3” of snow.
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Over ¼” of freezing rain followed by around 6” of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Numerous traffic accidents reported due to light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	6” of snow.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	An additional 3” of snow.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
September 2021	Drought	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Heavy Snow	N/A	N/A	Around 3” of additional snow.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing).
March 11, 2022	Winter Storm	N/A	N/A	1" of snow.
July 2022-May 2023	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 1 residential
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0
Source: Oklahoma Water Resources Board (OWRB)

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability

- Administrative and technical capability
- Fiscal capability
- Community classification.

D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	2018 IBC		As State Updates	City Council
Comprehensive / Master Plan					
Zoning Management Ordinance	Y			As needed	City Council
Subdivision Management Ordinance					
Site Plan Review Requirements	Y			As needed	Planning/Zoning Dept
NFIP Flood Damage Prevention Ordinance	Y	Chapter 9		As needed	Floodplain Manager
NFIP Elevation Certificates Maintained	Y				Floodplain Manager
Floodplain Management Plan	Y		Yes	Annual	City Manager, City Council, and Floodplain Manager
Stormwater Management Plan / Ordinance	Y		Yes	Annual	City Manager, City Council, and Stormwater Inspector
Stream Corridor Management or Protection Plan	Y		Yes	Annual	City Manager, City Council, and Stormwater Inspector
Erosion Management Ordinance	Y				Floodplain Manager
Capital Improvements Plan	Y		No	No Scheduled Update	City Manager and City Council
Open Space Plan					
Economic Development Plan	Y		No	No Scheduled Update	City Manager and City Council
Emergency Response Plan	Y		No	No Scheduled Update	City Manager, City Council, and Emergency Manager

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Post Disaster Recovery Plan / Ordinance					
Real Estate Disclosure Requirements					
Highway Management Plan					
COOP/COG Plan					
Other (Special Purpose Ordinances such as critical or sensitive areas)					

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not a reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Contract Engineer
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Contract Engineer
Planners or engineers with an understanding of natural hazards		
NFIP Floodplain Administrator	Y	Floodplain Manager
Surveyor(s)	N	
Personnel skilled or trained in “GIS” applications	N	
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Fire Department EM
Grant Writer(s)	N	
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don’t know)
Community Development Block Grants (CDBG)	
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact Fees for homebuyers or developers of new development/homes	Yes
Incur debt through general obligation bonds	No
Incur debt through special tax bonds	No
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	4	2021
Fire Public Protection	4	2017
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule
- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in land management and construction practices, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Floodplain management abilities can be expanded on and improved through continuing education, involvement with professional organizations and annual review of flood prone areas for potential mitigation solutions.

The Village has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009. After a flood event, the jurisdiction implements the substantial improvement/substantial damage provision of the floodplain management regulations by following FEMA guidelines and best practices outlined in FEMA P-758. The city does not have specific regulations beyond FEMA requirements.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Install permanent generator at DPW building. Generators can be used to power items after an earthquake shakes lines down, rolling blackouts during extreme temps, outages caused by floods, lightning, hail destroying power insulators, wind and ice taking down lines in winter storms.	Existing	Earthquake, Extreme Temps, Flood, Hail, Lightning, Wind (incl. Tornado), Winter Storm	Planned	City EM, City DPW; working with State OEM/FEMA	High (protection of critical facilities and maintenance of emergency services)	Medium - High	FEMA Mitigation and/or Emergency Management grants; Municipal Capital Funds	Short	High
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Ongoing/ Continuous	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	Municipal General Fund	Ongoing (no end)	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Conduct and facilitate community and public education and outreach for residents and businesses to include, but not be limited to, the following to promote and effect natural hazard risk reduction: • Provide and maintain links to the HMP website, and regularly post notices on the County/municipal homepage(s) referencing the HMP webpages. • Prepare and distribute informational letters to flood vulnerable property owners and neighborhood associations, explaining the availability of mitigation grant funding to mitigate their properties, and instructing them on how they can learn more and implement mitigation. • Use email notification systems and newsletters to better educate the public on flood insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. • Work with neighborhood associations, civic and business groups to disseminate information on flood insurance and the availability of mitigation grant funding. • Participate in regional public awareness and education initiatives through the LEPCs.									
See above.	N/A	Flood	Ongoing, Monthly	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	Municipal General Fund; HMGP	Short	High
Archive elevation certificates	N/A	NFIP Compliance	Ongoing/ Continuous	NFIP Floodplain Administrator	Low	Low	Municipal General Fund	On-going (no end)	High
Conduct a public education campaign through newsletters in utility bills and website to inform residents how to mitigate against drought (using Xeriscape, low flow faucets), expansive soils (soil replacement), extreme temps (how to prevent frostbite, signs of heat exhaustion/stroke), hail (hail resistant roofing), lightning (using surge protectors), and winter storms (including the dangers of carbon monoxide). In addition, the City Hall has a public information “tower” with	N/A	Drought, Expansive Soils, Extreme Temps, Hail, Lightning, Winter Storm	Updated as materials become available	City Manager, Floodplain Manager, Emergency Manager	High	Low	Municipal General Fund	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
brochures on floodplain education.									
Establish water conservation regulations to enact during times of drought to align with OKC policy.	N/A	Drought	As droughts occur	City Manager	High	Low	Municipal General Fund	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

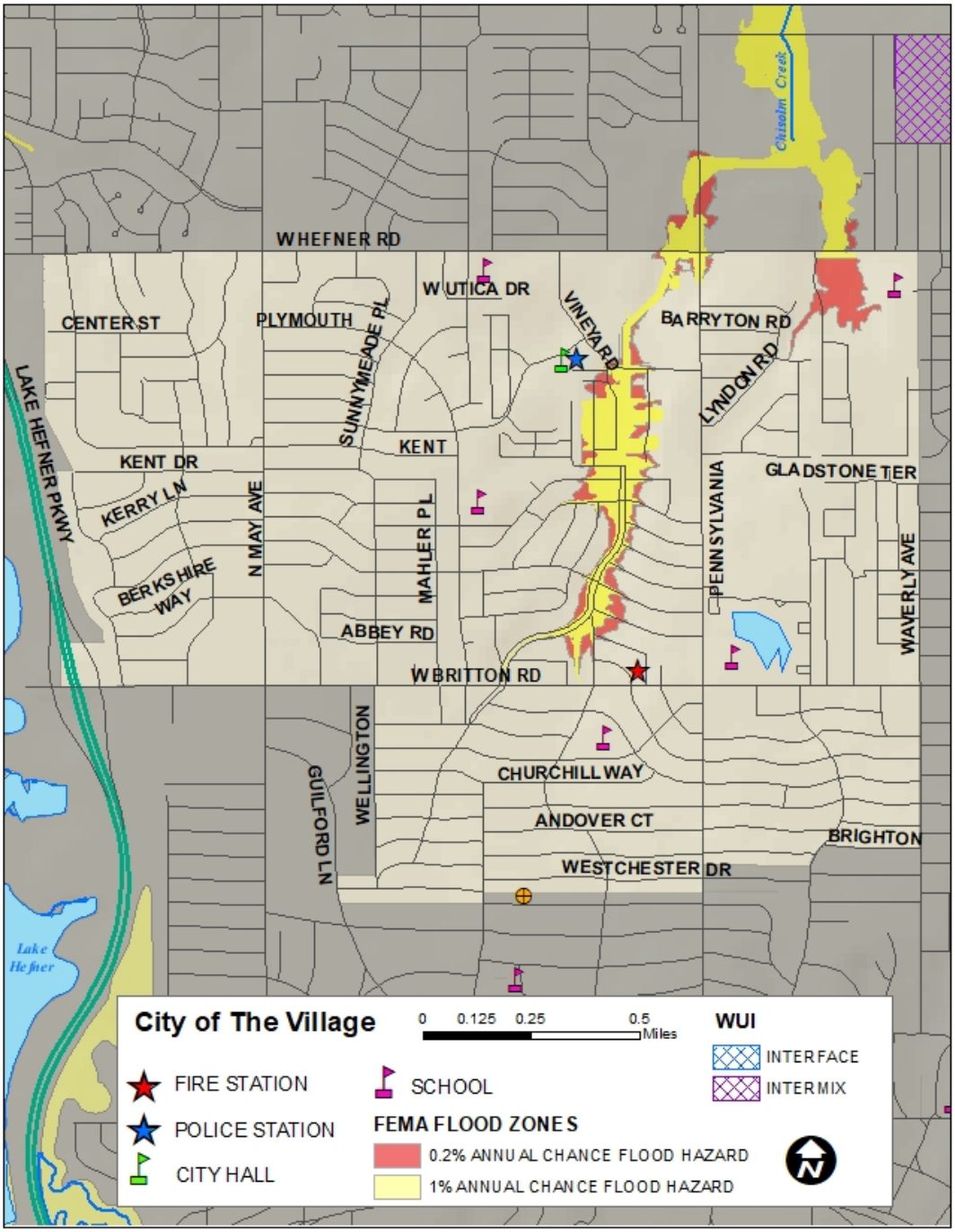
None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of The Village to illustrate the probable areas impacted within the City of The Village. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of The Village has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


WHEFNER RD
W UTICA DR
CENTER ST
PLYMOUTH
SUNNYMEADE PL
VINEYARD
BARRYTON RD
LYNDON RD
LAKE HEFNER PKWY
KENT
KENT DR
KERRY LN
N MAY AVE
MAHLER PL
PENNSYLVANIA
GLADSTONE TER
BERKSHIRE WAY
ABBEY RD
WAVERLY AVE
W BRITTON RD
WELLINGTON
GUILFORD LN
CHURCHILL WAY
ANDOVER CT
BRIGHTON
WESTCHESTER DR
Lake Hefner
Chisholm Creek
City of The Village
0 0.125 0.25 0.5 Miles
FIRE STATION
POLICE STATION
CITY HALL
SCHOOL
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD
WUI
INTERFACE
INTERMIX
N

9.15 CITY OF WARR ACRES

This section presents the jurisdictional annex for the City of Warr Acres.

A.) HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact	Alternate Point of Contact
Stephen Coy, Fire Chief 5940 NW 49th, Warr Acres, OK 73120 (405) 789-5912 scoy@fire.warr-acres-ok.gov	Mike Turman, Public Works Director 6045 NW 50th St., Warr Acres, OK 73120 (405) 470-7713 publicworks@warracres-ok.gov

B.) MUNICIPAL PROFILE

The City of Warr Acres is located in southern Oklahoma County. It is bordered to the north, east and south by Oklahoma City and to the west by the Town of Bethany. It is generally bounded by Wilshire Boulevard on the north, Mueller Avenue on the west, Thirty-Third Street on the south, and Meridian Avenue on the east. State Highway 3 (Northwest Expressway) and U.S. Highway 66 (Northwest Thirty-ninth Street Expressway) pass through the community. The Putnam City School District serves some parts of Oklahoma City and almost all of Warr Acres, although some residents live in the Oklahoma City School District.

The City has a total land area of 2.8 square miles, all of it land. The City is governed by a mayor and eight member city council. The 2020 U.S. Census population for the City was 10,451 (+4% from 2010).

Past Mitigation Activity/Efforts

Each initiative from the 2019 plan was reviewed going forward into this 2024 plan. Any initiatives that were completed or abandoned are stated below, while any new or ongoing initiatives will be found under the Proposed Hazard Mitigation Initiatives header of this section.

The following table summarizes progress on the mitigation strategy identified by the City of Warr Acres in the 2019 plan.

Completed Projects	Comments
Backup power at City Hall (Secondary EOC)	
Built a saferoom for 27-30 adults (city employees) at City Hall, fire station, and police station	
39th and MacArthur – supported ODOT project to rebuild MacArthur, which addressed drainage issues at this location	

Further details on mitigation activities completed or ongoing in the City include:

- OG&E has been upgrading service with new poles and wires to reduce power outages
- There are an estimated 150 private residential safe rooms in the City.
- In 2016 the city implemented an emergency notification/voice broadcasting system to alert all residents and businesses of tornado warnings and other significant events.
- The City recently reiterated their policies on audible tornado warnings – what, when and why

- The City built a First Responder/Fire Training facility and hosted a military Vigilant Guard exercise, as well as State urban search and rescue responders.
- The City distributed weather radios for high risk public, nursing home, and all schools and daycares in Warr Acres.
- Fire extinguisher classes for Putnam City employees and Nursing home employees, the City Center employees and volunteers, Valley Hope employees, and Warr Acres City Hall employees.
- Instituted necessary programs and measures to reduce the City ISO rating to a 2.
- Updated/enhanced/ and maintaining mutual aid agreements with neighboring communities for continuity of operations.
- Installed window film on Fire Department to reduce hail damage and reduce extreme temperatures.
- Created and distributed mitigation education pamphlets and at booths during large public events and at public city venues.

The following projects were completed since the 2019 revision of the plan:

- Storm siren upgraded at 5930 NW 49th street/ 4801 Reeves location
- Updated dam plans with Twin Lakes HOA and worked with Oklahoma Water Resource Board (OWRB) to add new data and information to dam plans and potential impacts to surrounding area
- Dispersing biological and chemical mosquito larvicide annually – funded by City/County Health

Deleted Projects	Comments
Create mitigation education pamphlets and distribute at booths during large public events and at public city venues.	Previously completed.

Hazard Vulnerabilities Identified

Hazard profiling, Section 5.3, has identified that the City of Warr Acres is vulnerable to the following hazards of concern:

Hazard	Local Vulnerability	Comments
Dam Failure	Yes	Twin Lakes East and West
Drought	Yes	
Earthquake	Yes	
Expansive Soils	Yes	
Extreme Temperatures	Yes	
Flooding	Yes	See local hazard map end of section
Hail	Yes	
Lightning	Yes	
Wildfire	No	See local hazard map end of section
Wind (incl. tornado)	Yes	
Severe Winter Storm	Yes	

Low-lying areas in the City are subject to periodic flooding caused by overflow of Spring Creek. The most severe flooding occurs as a result of thunderstorms and intense rainfall. Most flooding occurs upstream from roadway and ponds that restrict the flow (FEMA NFIP FIS - 2009)

According to the City of Warr Acres, the following have been identified as specific hazards:

The City has an area in the southern portion of the City that has very poor drainage. Several times a year, the City has several R-1 homes that flood. The most significant area is N. Hammond and NW 34th Street and portions of Hammond both north and south of the intersection. There are also several localized areas that experience flooding in high intensity rainfall events.

Warr Acres considers their overall risk for wildfire as near zero as they have no significant areas of WUI.

Growth/Development Trends

The following major residential/commercial development and major infrastructure development are currently known or anticipated in the City of Warr Acres:

New Development/Potential Development in the City of Warr Acres						
Property Name	**Type Residential or Commercial**	**Number of Structures**	**Address**	**Block and Lot**	**Known Hazard Zone**	**Description/Status**
Cherokee Crossings II	Residential	16-32	6900-7100 La Belle	Many	Not in NFIP floodplain. All utilities are being undergrounded, reducing the risk of power outages.	Under development
Putnam City Public Schools Centennial Complex	Commercial	1-3	5550 NW 40th St		Not in NFIP floodplain.	Planned

The City of Warr Acres previously passed a bond election providing money for widening MacArthur Blvd that will mitigate some of the flooding problems.

Additional homes are being constructed in the NE corner of the City of Warr Acres, adding to overall population. Town Center overlay in and around the area of NW 50th and MacArthur is adding density to area and changing some residential lots to commercial and allows for mixed use development.

C.) NATURAL HAZARD EVENT HISTORY SPECIFIC TO THE CITY

This information is repeated from the main plan to establish a history relevant to the jurisdiction.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
July 2012-April 2013	Drought	N/A	N/A	2011-2012 was the fourth driest two-year period on record and left water storage at reservoirs at an all-time low. Oklahoma City implemented mandatory outdoor water rationing starting July 31, 2012 including cities that buy water from OKC. This includes Warr Acres. January 17, 2013 odd/evening outdoor watering was re-implemented and by spring became a

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
				permanent program.
February 2014-July 2014	Drought	N/A	N/A	
March 5, 2015	Extreme Cold	N/A	N/A	
May 5-10, 2015	Flood	DR-4222	Yes	A series of organized significant thunderstorms and flooding event happened during this time frame. Multiple tornados were reported during this event. Over this time, a total of 11.61" rain reported. One fatality was reported during this time due to storm activity. Multiple stranded vehicles required high water rescue. Southern parts of Oklahoma County saw the greatest rainfall. Warr Acres experienced flooded roadways.
Nov 27-29, 2015	Severe Winter Storm	DR-4247	N/A	Nearly all Warr Acres businesses and homes affected with power outages and significant debris, including mainly downed trees or limbs.
December 27-28, 2015	Winter Storm	DR-4256	No	Ice storm.
August 11-13 2016	Excessive Heat	N/A	N/A	
September 3, 2016	Earthquake	N/A	N/A	5.8 magnitude earthquake at Pawnee; depth of 5.4 km
December 18, 2016	Extreme Cold	N/A	N/A	
December 2016 - April 2017	Drought	N/A	N/A	
January 7, 2017	Extreme Cold	N/A	N/A	
January 13-15, 2017	Ice Storm	N/A		Heaviest ice amounts fell in the far west metro.15" reported in Warr Acres near NW 63rd/MacArthur.
July-August 2017	Drought	N/A	N/A	
January 2018-April 2018	Drought	N/A	N/A	
June 27, 2018 – July 25, 2018	Excessive Heat	N/A	N/A	
January 3, 2019	Winter Storm			Some freezing rain followed by around an inch of snow.
April 30, 2019	Flood	N/A	N/A	Street flooding reported in the northside of the OKC metro area from Reno to NW 133 and from Western to Council (includes

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
				Warr Acres).
May 18, 2019	Flood	N/A	N/A	Water reported almost up to windows of a vehicle in Warr Acres near NW 58th and MacArthur.
June 27, 2019 – August 6, 2019	Excessive Heat	N/A	N/A	
August 26, 2019	Wind	N/A	N/A	A large tree was uprooted near Putnam City HS in Warr Acres. Wiley Post Airport gusted to 69 mph.
February 5, 2020	Heavy Snow	N/A	N/A	4” in Warr Acres.
June 30, 2020 – July 19, 2020	Excessive Heat	N/A	N/A	
August 31, 2020	Flood	N/A	N/A	Several vehicles stranded in high water at NW 39th/MacArthur in Warr Acres.
October 26-29, 2020	Ice Storm	4575-DR	Yes	Power outages and tree damage from 1/2” of ice.
December 13, 2020	Heavy Snow	N/A	N/A	Around 4” of snow.
December 15, 2020	Winter Storm	N/A	N/A	Around 3” of snow.
September 2021	Drought	N/A	N/A	
December 31, 2020-January 1, 2021	Ice Storm & Heavy Snow	N/A	N/A	Wiley Post airport nearby reported 0.34” of ice, which was followed by over 7” of snow.
February 8, 2021	Winter Storm	3555-EM 4587-DR	Yes	Traffic accidents reported due to light icing on bridges.
February 14, 2021	Heavy Snow	3555-EM 4587-DR	Yes	6” north of Wiley Post airport near Warr Acres.
February 14 – 16, 2021	Extreme Cold	N/A	N/A	
February 16-17, 2021	Heavy Snow	3555-EM 4587-DR	Yes	3” in Warr Acres.
July 7, 2021-July 10, 2021	Excessive Heat	N/A	N/A	
July 25-September 4, 2021	Excessive Heat	N/A	N/A	
December 2021-April 2022	Drought	N/A	N/A	
February 2-3, 2022	Winter Storm	N/A	N/A	Around 3” of snow.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Local Damages and Losses
February 23, 2022	Winter Storm	N/A	N/A	Up to an inch of sleet accumulation with a glaze of freezing rain.
March 11, 2022	Winter Storm	N/A	N/A	Around 2" of snow
July 2022-May 2023-	Drought	N/A	N/A	
July 3-28, 2022	Excessive Heat	N/A	N/A	
August 2-16, 2022	Excessive Heat	N/A	N/A	
September 17-21, 2022	Excessive Heat	N/A	N/A	
December 22-24, 2022	Extreme Cold	N/A	N/A	
June 28-July 4, 2023	Excessive Heat	N/A	N/A	
July 12-20, 2023	Excessive Heat	N/A	N/A	
July 25-August 4, 2023	Excessive Heat	N/A	N/A	
August 17-26, 2023	Excessive Heat	N/A	N/A	
January 12-16, 2024	Extreme Cold	N/A	N/A	Frozen pipes, water lines broken. Temperatures around 0F on the 14th & 15th.
January 12, 2024	Earthquake	N/A	N/A	4.3 in far east Edmond; felt but no significant damage reported.
January 13, 2024	Earthquake	N/A	N/A	4.1 in far east Edmond; felt but no significant damage reported.
February 2, 2024	Earthquake	N/A	N/A	5.1 near Prague, no significant damage reported.

Number of FEMA Identified Repetitive Flood Loss Properties: 0
Number of FEMA Identified Severe Repetitive Flood Loss Properties: 0

Source: Oklahoma Water Resources Board (OWRB)

D.) CAPABILITY ASSESSMENT

This section identifies the following mitigation capabilities within Unincorporated Oklahoma County:

- Legal and regulatory capability
- Administrative and technical capability

- Fiscal capability
- Community classification.
- D.1) Legal and Regulatory Capability

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Building Code	Y	IBC 2018 / Ord. 1221 § 3, 2022			
Comprehensive / Master Plan	Y	Warr Acres Comprehensive / Master Plan map	Yes	Annual review, as needed	Planning Commission
Zoning Management Ordinance	Y	Warr Acres Zoning in Title 19 / Ord. 1017§ 1, 2006			
Subdivision Management Ordinance	Y	Title 19 / Ord. 1017§ 1, 2006			
Site Plan Review Requirements	Y	Title 19 / Ord. 1017§ 1, 2006			
NFIP Flood Damage Prevention Ordinance (if you are in the NFIP, you must have this!)	Y	Title 16:20:180, updated 2009			
NFIP Elevation Certificates Maintained	Y	Title 16:20:180, updated 2009			
Floodplain Management Plan	Y	Title 16, Chapter 16.20	Yes	As needed	City Inspector w/ Floodplain Manager and Public Works Dir.
Stormwater Management Plan / Ordinance	Y	Title 13 and MS-4 / Ord. 1076§ 1, 2009	No		Public Works Dir.
Stream Corridor Management or Protection Plan	Y	National Flood Prevention NFIP form maps	No		Public Works Dir. with City Inspector
Erosion Management Ordinance	Y	Title 13 and MS-4 / Ord. 1076§ 1, 2009			
Capital Improvements Plan	Y	Mayor has a five-year plan	Yes	Annual	Mayor with City Council
Open Space Plan	N				
Economic Development Plan	Y	City has Economic Development Authority	No	Monthly	Mayor with City Council
Emergency Response Plan	Y	City has an Emergency Operations Plan	Yes	Annual	Fire Chief/EM

Regulatory Tools (Codes, Ordinances., Plans)	Do you have this? (Y or N)	Code Citation (Section, Paragraph, Page Number, Date of adoption)	HM Plan integration into plan	Update cycle	Party(s) responsible for updating document
Post Disaster Recovery Plan / Ordinance	N				
Real Estate Disclosure Requirements	N				
Highway Management Plan	Y	Five-year highway plan by each county commissioner district	No	5 Years / As needed	Public Works Director w/ Mayor
COOP/COG Plan	Y	City is a member of the Association of Central Oklahoma Governments (ACOG)	No	Monthly / As needed	Mayor w/ committee
Other (Special Purpose Ordinances such as critical or sensitive areas)	N				

Additionally, any change in ordinances happens at the behest of local government bodies, state legislation or court actions and are not on a scheduled reoccurring basis.

Incorporation of this Plan into Other Planning Mechanisms

During this planning cycle, no new information from the 2019 mitigation strategy was incorporated into other planning mechanisms.

D.2) Administrative and Technical Capability

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y	Warr Acres City Planner & City Engineer
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y	Warr Acres City Engineer / Smith Roberts Baldischwiler Engineering
Planners or engineers with an understanding of natural hazards	Y	Warr Acres Public Works Director / Engineer
NFIP Floodplain Administrator	Y	Warr Acres Public Works Director
Surveyor(s)	N/Y	Subcontracted to/ Smith Roberts Baldischwiler Engineering (City Engineering firm)
Personnel skilled or trained in “GIS” applications	Y	Warr Acres City Engineer / Smith Roberts

Staff/ Personnel Resources	Available (Y or N)	Department/ Agency/ Position
		Baldischwiler Engineering and LM Ross I.T. specialist
Scientist(s) familiar with natural hazards in the County.	N	
Emergency Manager	Y	Warr Acres Fire Chief
Grant Writer(s)	Y	Warr Acres City contract position
Staff with expertise or training in benefit/cost analysis	N	

D.3) Fiscal Capability

Financial Resources	Accessible or Eligible to use (Yes/No/Don't know)
Community Development Block Grants (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact Fees for homebuyers or developers of new development/homes	Don't Know
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	No
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	Don't Know
Other	

D.4) Community Classifications

Program	Classification	Date Classified
Community Rating System (CRS)	NP	N/A
Building Code Effectiveness Grading Schedule (BCEGS)	4	TBD
Public Protection	2	TBD
Storm Ready	County	3/4/2024
Firewise	NP	N/A

N/A = Not applicable. NP = Not participating. - = Unavailable. TBD = To Be Determined

Criteria for classification credits are outlined in the following documents:

- The Community Rating System Coordinators Manual
- The Building Code Effectiveness Grading Schedule

- The ISO Mitigation online ISO's Public Protection website at http://www.isomitigation.com/ppc/0000/ppc0001.html
- The National Weather Service Storm Ready website at http://www.weather.gov/stormready/howto.htm
- The National Firewise Communities website at http://firewise.org/

Expanding on and Improving Existing Policies and Programs

By adopting updated codes, including fire, building and NFIP ordinances this jurisdiction will continue to improve their mitigation approach. Also, by employing experts in land management and construction practices, in coordination with planners and engineers with understanding of natural hazards, the overall stratagem will continue to advance.

In addition, by participating in multi-jurisdictional training and radio interoperability, public safety agencies bolster their response capabilities. This, along with reinforcement from Annual Equipment Agreements with Oklahoma County, ensures continued improvement within the jurisdiction.

Floodplain management

The City of Warr Acres adopted Ordinance 1079 in 2009, (Chapter 16.20 Flood Damage Prevention) established a floodplain manager with powers to enforce the appropriate sections of 44 CFR and established an additional one foot of freeboard requirement above the standard required one foot of freeboard.

Warr Acres has adopted NFIP floodplain management criteria and the most recent FIRM maps of 12/18/2009.

As of 2023, the City of Warr Acres does not have any structures built in any of the Special Flood Hazard Areas or Floodway Areas in Zone AE as shown on the Warr Acres FIRM Maps 40109C0165H and 40109C0145H. Any new construction is reviewed by the designated floodplain manager for the City of Warr Acres by ordinance using these maps to confirm compliance with the cities and Federal floodplain regulations before any Building Permits are issued. This is also applicable after an event for cases where substantial damage is evident and substantial improvement is needed. Floodplain management abilities can be expanded on and improved through continued involvement with professional organizations and continued situational awareness with upstream and downstream jurisdictions.

E.) PROPOSED HAZARD MITIGATION INITIATIVES

Note some of the identified mitigation initiatives in Table F are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities. Details have been updated for this 2024 plan including revisions of priorities and estimated timelines for completion.

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Install a bigger drainage system at the intersection of NW 34th and Hammond. This intersection consistently floods during average-heavy rainfall. (2016 SRB Study).	Existing	Flood	Anticipated Completion 2030 – may include coordination with City of Bethany	Public Works working with Bethany	Some 20 residential structures flood here	$3,000,000 (2016)	Federal mitigation grant funding with local match/ with Bethany	Long	High
Acquisition of property in flood prone areas	New	Flooding, Dam failure – because of annual flooding problems	Anticipated completion in 2040	Municipality/Public Works	Medium	High	Federal mitigation grant funding with local match	Long	Medium
Maintain compliance with and good-standing in the NFIP including adoption and enforcement of floodplain management requirements (e.g. regulating all new and substantially improved construction in Special Hazard Flood Areas), floodplain identification and mapping, and flood insurance outreach to the community.	New & Existing	NFIP Compliance	Annual	Municipality (via Municipal Engineer/NFIP Floodplain Administrator) with support from OEM, ISO FEMA	High	Low - Medium	General City budget	Ongoing (no end)	High

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Conduct and facilitate community and public education and outreach for residents and businesses to support personal hazard preparedness and mitigation, including information on flood and other hazard insurance, the availability of mitigation grant funding, and personal natural hazard risk reduction measures. Specific methods for public outreach and education shall include: • Provide and maintain links to the HMP website, and regularly post notices on the City homepage(s) referencing the HMP website; • Information flyers in utility bills; • Information via the Bethany Tribune; • Work with neighborhood associations, civic and business groups to disseminate information on flood and other hazard insurance and the availability of mitigation grant funding; • Participate in regional public awareness and education initiatives through the LEPCs.									
See above.	NA	Flood	Annual	Municipality with support from Planning Partners, OEM, FEMA	Low - Medium	Low - Medium	Municipal Budget; HMA programs with local or county match	Short	High
Archive elevation certificates	NA	NFIP Compliance	Annual	NFIP Floodplain Administrator	Low	Low	City Budget	Ongoing (no end)	High
Offer low flow faucet adapters or change out toilets to small reservoir capacity	New	Drought	Planned	Municipality with OKC Water Dept	Low	Medium	Federal mitigation grant funding with building owner	Long	Low
Create/enhance/ maintain mutual aid agreements with neighboring communities for continuity of operations.	New & Existing	Non Mitigation	Annual	Municipality with support from Surrounding municipalities and County	Low	Low	General City budget	Ongoing (no end)	High
Install window film on city buildings	Existing	Extreme Temperatures, Hail	Anticipated by 2025	Civil Defense	Medium	Medium	HMGP, City budget	Short	Medium
Install a steel gable roof on a city building that has been replaced twice due to hail damage	Existing	Hail	Anticipated by 2030	Civil Defense	Medium	Medium	HMGP	Short	Medium

Mitigation Initiative	Applies to New and/or Existing Structures*	Hazard(s) Mitigated	Goals and Objectives Met	Lead and Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority
Install covered parking to protect city vehicles from hail and extreme heat damage at Fire station		Extreme Temperatures, Hail	Anticipated in 2024	Civil Defense	Medium-High	Medium	HMGP	Short	Medium
Conduct All-Hazard mitigation classes through town hall meetings		Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Temperatures, Flood, Hail, Lightning, Wind (incl. Tornado), Winter Storms	Annual	Civil Defense	High	Low	General City budget	Short	High
Distribute All-Hazard Weather Radios to senior centers, and high-risk residents		Dam Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hail, Lightning, Wind (incl. Tornado), Winter Storms	Anticipated completion by 2028	Civil Defense	High	Low	HMGP/ General City budget	Short	High
Enact a regulation to require a check for expansive soils prior to building a city building and perform soil stabilization if expansive soils are found.		Expansive Soil	Anticipated in 2024	Public Works	High	Medium	City Budget	Short	Medium

Notes:
*Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (NA) is inserted if this does not apply.
Costs:
Where actual project costs have been reasonably estimated:
Low = < $10,000

Medium = $10,000 to $100,000
High = > $100,000
Where actual project costs cannot reasonably be established at this time:
Low = Possible to fund under existing budget. Project is part of, or can be part of an existing on-going program.
Medium = Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High = Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Benefits:
Where possible, an estimate of project benefits (per FEMA's benefit calculation methodology) has been evaluated against the project costs, and is presented as:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000
Where numerical project benefits cannot reasonably be established at this time:
Low = Long term benefits of the project are difficult to quantify in the short term.
Medium = Project will have a long-term impact on the reduction of risk exposure to life and property, or project will provide an immediate reduction in the risk exposure to property.
High = Project will have an immediate impact on the reduction of risk exposure to life and property.

Potential FEMA HMA Funding Sources:
PDM = Pre-Disaster Mitigation Grant Program
FMA = Flood Mitigation Assistance Grant Program
RFC = Repetitive Flood Claims Grant Program
SRL = Severe Repetitive Loss Grant Program
HMGP = Hazard Mitigation Grant Program

Timeline:
Short = 1 to 5 years. Long Term= 5 years or greater. OG = On-going program.
DOF = Depending on funding.

Explanation of Priorities

- ***High Priority*** - A project that meets multiple objectives (i.e., multiple hazards), benefits exceeds cost, has funding secured or is an on-going project and project meets eligibility requirements for the Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. High priority projects can be completed in the short term (1 to 5 years).

- ***Medium Priority*** - A project that meets goals and objectives, benefits exceeds costs, funding has not been secured but project is grant eligible under, HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is completed. Medium priority projects will become high priority projects once funding is secured.

- ***Low Priority*** - Any project that will mitigate the risk of a hazard, benefits do not exceed the costs or are difficult to quantify, funding has not been secured and project is not eligible for HMGP or PDM grant funding, and time line for completion is considered long term (1 to 10 years). Low priority projects may be eligible other sources of grant funding from other programs. A low priority project could become a high priority project once funding is secured as long as it could be completed in the short term.

Prioritization of initiatives was based on above definitions: Yes

Prioritization of initiatives was based on parameters other than stated above: Not applicable.

F.) FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

None at this time.

G.) HAZARD AREA EXTENT AND LOCATION

A hazard area extent and location map has been generated and is provided below for the City of Warr Acres to illustrate the probable areas impacted within the City of Warr Acres. This map is based on the best available data at the time of the preparation of this Plan and is considered to be adequate for planning purposes. Maps have only been generated for those hazards that can be clearly identified using mapping techniques and technologies, and for which the City of Warr Acres has significant exposure.

H.) ADDITIONAL COMMENTS

No additional comments at this time.


W WILSHIRE BLVD
NW EXPRESSWAY
NW 72ND ST
71ST
66TH
65TH
GROVE
NW 63RD ST
61ST
N GROVE
N MUELLER AVE
REDMOND
NW 58TH ST
57TH ST
MACARTHUR
HARMON
54TH ST
52ND ST
NW 50TH ST
48TH ST
NW 47TH ST
ANN ARBOR
STANLEY
MERIDIAN
NW 42ND ST
HAMMOND
40TH ST
STATE
NW 39TH EXPY
NW 38TH ST
37TH ST
36TH ST
34TH
PENIEL
3
66
City of Warr Acres
0 0.125 0.25 0.5 0.75 1 Miles
WUI
INTERFACE
INTERMIX
FIRE STATION
SCHOOL
CITY HALL
POLICE STATION
WATER TOWER
HOSPITAL
WWTF
FEMA FLOOD ZONES
0.2% ANNUAL CHANCE FLOOD HAZARD
1% ANNUAL CHANCE FLOOD HAZARD

ACOG	Association of Central Oklahoma Governments
ASFPM	Association of State Floodplain Managers
BCA	Benefit Cost Analysis
BFE	Base Flood Elevation
BRIC	Building Resilient Infrastructure and Communities Program
CDC	Center of Disease Control
CFR	Code of Federal Regulations
CREC	Central Rural Electric Cooperative
CRREL	Cold Regions Research and Engineering Laboratory
CRS	Community Rating System
DEM	Digital Elevation Model
DFIRMs	Digital Flood Insurance Rate Maps
DIs	Damage Indicators
DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000
DOD	Degrees of Damage
EFS	Enhanced Fujita Scale
EMS	Emergency Medical Services
EOC	Emergency Operations Center
DPW	Department of Public Works
DR	Disaster Declarations
EM	Emergency Management
EMS	Emergency Management Services
EOC	Emergency Operation Center
EOP	Emergency Operation Plan
FAA	Federal Aviation Administration
FD	Fire Department
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance program
FY	Fiscal Year
GIS	Geographic Information System
HAZUS	Hazards U.S.

HAZUS-MH	Hazards U.S. Multi-Hazard
HAZMAT	Hazardous Materials
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUC	Hydrologic Unit Code
IT	Information Technology
Mi	Mile
Mph	Miles per Hour
MRP	Mean Return Period
N/A	Not Applicable
NA	Not Available
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NHC	National Hurricane Center
NID	National Inventory of Dams
NIMS	National Incident Management System
NLCD	National Land Cover Dataset
NOAA	National Oceanic and Atmospheric Administration
NPDP	National Performance of Dams Program
NRCS	Natural Resource Conservation Service
NSSL	National Severe Storms Library
NVRC	Northern Virginia Regional Commission
NWS	National Weather Service
ODOT	Oklahoma Department of Transportation
OEM	Oklahoma Emergency Management
OEC	Oklahoma Electric Cooperative
OG&E	Oklahoma Gas & Electric
OKC	Oklahoma City
OK CO EM	Oklahoma County Emergency Management
OKWB	Oklahoma Water Board
ONG	Oklahoma Natural Gas
OTA	Oklahoma Turnpike Authority
%	Percent
%g	Percent Acceleration Force of Gravity

PD	Police Department
PDM	Pre-Disaster Mitigation Program
PGA	Peak Ground Acceleration
Pop.	Population
RLP	Repetitive Loss of Property
SHELDUS	Spatial Hazard Events and Losses Database for United States
SPC	Storm Prediction Center
Sq. Mi.	Square mile
SRL	Severe Repetitive Loss
TBD	To Be Determined
TSTM	Thunderstorm
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USD	U.S. Dollar
USGS	U.S. Geological Survey
WCI	Wind Chill Index
WCT	Wind Chill Temperatures
WWTP	Wastewater Treatment Plant