

Cleveland County Hazard Mitigation Plan 2026-2031

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THE BEGINNING OF CLEVELAND COUNTY

Although the Norman townsite was settled during the Land Run on April 22, 1889, Cleveland County did not exist for another year, and almost wasn't named Cleveland County. In fact, if not for the efforts of Norman's early citizens and civic leaders, Norman, Noble, Lexington, and Moore would now be part of Oklahoma County.

In 1890, the Fifty-First Congress of the United States began to draft the bill which would provide for a government in the newly settled Unassigned Lands. Early on, the location of county seats was limited to six towns: Oklahoma City, Guthrie, El Reno, Kingfisher, Stillwater, and Beaver (in No Man's Land).

The presence of a district court and courthouse was an asset to any town, and Norman Mayor D.W. Marquart and others began to lobby Congress to add a seventh county seat at Norman. Mayor Marquart sent several telegrams petitioning the House Committee in Washington; one telegram requested the county seat due to "Norman being centrally located and a town of importance commercially as well as in size and number of inhabitants."

The efforts were successful, and on May 2, 1890, President Benjamin Harrison signed the Oklahoma Organic Act, which created the Oklahoma Territory and established Norman as one of the county seats. George W. Steele was nominated by President Harrison to be the first Governor of the Oklahoma Territory and his first official act on May 24, 1890 involved setting boundaries for the new counties. The future Cleveland County was referred to only as the "Third County".

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Chapter I: Introduction (Element A)

1.1 Overview & Participating Jurisdictions (Element A1-a)

Cleveland County lies in central Oklahoma, and the county seat is the city of Norman. It is named for President Grover Cleveland. Cleveland County lies in an area with a long history that predates statehood. Cleveland County was originally designated as County 3 in the Land Run of 1889.

Cleveland County, Oklahoma covers 558.34 square miles; 539 square miles are land and 19 square miles are water. Cleveland County is surrounded by Oklahoma, Pottawatomie, McClain, and Canadian Counties. The Canadian River forms the boundary between Cleveland County and McClain County.

The overall population of Cleveland County is approximately 295,528 residents as of the 2020 Census. The current estimate at the time of writing is 301,193 residents. Cleveland County is the third most populated county in Oklahoma.

Based on 2020 Census Data, the populations of each participating jurisdiction within Cleveland County are:

The population of the City of Lexington is approximately 2,044 residents.

The population of the City of Noble is approximately 8,207 residents.

The population of the City of Norman is approximately 131,302 residents.

The population of the Town of Slaughterville is approximately 4,163 residents.

The school district of Lexington PS has approximately 1,017 students and 61 staff, teachers, and administration.

The school district of Little Axe PS has approximately 888 students and 66 staff, teachers, and administration.

The school district of Norman PS has approximately 15,451 students and 946 staff, teachers, and administration.

The Robin Hill PS has approximately 355 students and 23 teachers and staff.

The University of Oklahoma (OU) is located in Norman and the university has a total enrollment of 27,772 students and 5,070 faculty.

Note: Unless otherwise noted, “the planning area” refers to all of the jurisdictions participating in this update. When referring to specific details that refer to only “Cleveland County” as an unincorporated area, government, or geographic area, it will be specified.

The previous HMP included the Noble PS; however, Noble PS opted not to participate in the Cleveland County HMP Update, and will not be profiled.

The Oklahoma State Hazard Mitigation Plan includes all state-funded institutions of higher learning; however, OU wanted to participate in the Cleveland County HMP to more thoroughly identify the long-term needs of the campuses and OU’s Westheimer Airport, as it pertains to hazard mitigation.

1.2 Overview of Planning Process (Elements A1-a, A1-b, F2-a)

The Cleveland County Commissioners gave the Cleveland County Emergency Management (CCEM) Director to hire a firm to update the Cleveland County Hazard Mitigation Plan Update (CCHMPU). The CCEM director procured several bids through the bid process and the commissioners approved contracting L.E. Marshall Consulting, LLC (planner). Planning commenced in April 2024.

Eleven (11) planning meetings were held at multiple locations throughout the county. Locations included the Cleveland County Courthouse, Norman city hall, Noble city hall, Norman PS, Slaughterville town hall, and Lexington city hall. Virtual meetings and phone calls were also utilized to obtain follow-up information and reach any participants who could not attend the meetings. Each of these meetings included discussions on current needs, long-term planning pertaining to hazard mitigation, action items, damages from past natural hazard events, current growth in each community and how that growth is affecting current infrastructure.

The planner and CCEM director coordinated the meetings by phone and email. The meetings were held between October 2024 and June 2025. During that timeframe, two (2) LEPC meetings were used as opportunities to involve the public and community stakeholders. Those meetings discussed each jurisdiction's long-term planning needs, action items for the update, changes in each community, and damages to any infrastructure. Follow up communications by phone and email were made as needed to confirm jurisdictional details.

The CCEM director and planner shared the link, QR code, and fliers for the public survey with all jurisdictions to utilize in efforts to obtain public involvement. The survey results are detailed in Section 1.7. The City of Norman also created and promoted their own survey and those details are also included in Section 1.7.

One member of the public attended the LEPC meeting in February 2025 and no comments were given. No members of the public attended any of the other meetings.

Upon incorporating all feedback from the meetings and finalizing the draft, the planner submitted the HMP for review with the Oklahoma Department of Emergency Management (ODEM).

All respective jurisdictions were emailed the HMP and given the opportunity to make changes. The respective points of contact gave input as needed.

Once the HMP has been reviewed by ODEM and FEMA, and any and all necessary information has been incorporated, the jurisdictions will approve and adopt the HMP by resolution according to the protocols and procedures set by their respective governing boards. The approved resolutions will be sent to ODEM and FEMA for the final acknowledgement for approval.

1.3 Planning Committee Members (Element A2)

The names of the planning committee members are below. Primary jurisdictional representatives are noted by an asterisk (*). All persons met in person or over the phone.

Name	Title	Jurisdiction Represented	Contribution to the Process
George Mauldin*	Emergency Management & Safety Director	Cleveland County Emergency Management	Contributor-provided all jurisdictional information and coordinated obtaining specific details. Coordinated meeting with all jurisdictions and stakeholders.
Rod Cleveland*	County Commissioner	Cleveland County District 1	Contributor-provided all jurisdictional information and coordinated obtaining specific details.
Jacob McHughes*	County Commissioners	Cleveland County District 2	Contributor- provided details on jurisdictional information
Rusty Grissom*	County Commissioner	Cleveland County District 3	Contributor- provided details on jurisdictional information
Ronnie Fulks	Foreman	Cleveland County District 3	Contributor- provided details on jurisdictional information
David Grizzle	Emergency Management	City of Norman FD	Contributor-provided details on jurisdictional information
Amy Goodin	Emergency Management	City of Norman FD	Contributor-provided details on jurisdictional information
Travis King	Fire Chief	City of Norman FD	Contributor-provided details on jurisdictional information
Jason Murphy	Stormwater Program Manager	City of Norman Public Works	Contributor-provided details on jurisdictional information
Lance Harper	Parks and Recreation Manager	City of Norman Parks and Recreation	Contributor-provided details on jurisdictional information
Scott Sturgis	Engineer	City of Norman	Contributor-provided details on jurisdictional information
Wade Thompson	Parks and Recreation	City of Norman	Contributor-provided details on jurisdictional information
Rachel Camp	WTP Manager	City of Norman Utilities	Contributor-provided details on jurisdictional information
Darrel Pyle	City Manager	City of Norman	Contributor-provided details on jurisdictional information
Shannon Stevenson	Asst. City Manager	City of Norman	Contributor-provided details on jurisdictional information
Blake Madden	Parks and Recreation	City of Norman	Contributor-provided details on jurisdictional information
Chris Mattingly	Utilities Director	City of Norman	Contributor-provided details on jurisdictional information
Deana Allen	City Manager	City of Lexington	Contributor-provided details on jurisdictional information
Mike Donovan	Mayor	City of Lexington	Contributor-provided details on jurisdictional information
Trenton Mitchell	Fire Chief	City of Lexington	Contributor-provided details on jurisdictional information
Justin Milner	Chief Operating Officer	Norman PS	Contributor-provided details on jurisdictional information

Name	Title	Jurisdiction Represented	Contribution to the Process
David Tenscher	Facilities Director	Norman PS	Contributor-provided details on jurisdictional information
Ashley Furry	Town Clerk	Town of Slaughterville	Contributor-provided details on jurisdictional information
Kim Reynolds	Planning & Development	Town of Slaughterville	Contributor-provided details on jurisdictional information
Jay Decker	Fire Chief	Slaughterville Fire Department	Contributor-provided details on jurisdictional information
Matt Creed	Fire Chief	Noble Fire Department	Contributor-provided details on jurisdictional information
Trey Kirby	Floodplain Manager, Community Development	City of Noble	Contributor-provided details on jurisdictional information
Casey Cottrell	Police Chief	Noble Police Department	Contributor-provided details on jurisdictional information
Chris Sevier	Asst. Police Chief	Noble Police Department	Contributor-provided details on jurisdictional information
Jeffrey Perkins	Public Works Director	City of Noble	Contributor-provided details on jurisdictional information
Robert Porton	City Manager	City of Noble	Contributor-provided details on jurisdictional information
Michael Glessner	City Planner, Community Development	City of Noble	Contributor-provided details on jurisdictional information
Chad Hall	Superintendent	Lexington PS	Contributor-provided details on jurisdictional information
Jay Thomas	Superintendent	Little Axe PS	Contributor-provided details on jurisdictional information
Melissa Baughman	Superintendent	Robin Hill PS	Contributor-provided details on jurisdictional information
Norman Nieves	Emergency Manager	University of Oklahoma	Contributor-provided details on jurisdictional information
Jeremy Oxenford	Assistant Fire Marshal	University of Oklahoma	Contributor-provided details on jurisdictional information
Nathan Fisher	Fire Inspector	University of Oklahoma	Contributor-provided details on jurisdictional information

1.4 Other Stakeholders (Element A2-a)

These organizations and agencies were contacted by phone and invited to participate in discussions that related to any topics that would have had jurisdictional overlap. Neighboring jurisdictions participate as stakeholders and are noted by a (+).

Neighboring Agencies, Businesses, and Non-Profit Agencies Contacted

Name/Title	Agency Represented	How Agency Was Invited
Ron Johnson+/Emergency Management Director	McClain County	Phone Call
Gayland Kitch+/Emergency Management Director	City of Moore	Phone Call
Aaron Scott+/Emergency Management Director	Pottawatomie County	Phone Call
David Barnes+/Emergency Management Director	Oklahoma County	Phone Call
Blake Foster+/Emergency Management Director	Canadian County	Phone Call
Dennis Brewer Hospital Emergency Manager	Norman Hospital	In-Person
Janet Vlad/Town Clerk	Town of Etowah	Phone Call, In-Person
Angela Atkins/President	Food and Shelter for Friends	Email
Cathy Kanty	Hitachi	Email

The hospital and several local organizations work with members of the planning team as needed to serve the underserved and vulnerable populations throughout the planning area. They are also the sources who most often work with the underprivileged in the planning area.

Businesses are invited to participate by email and through a quarterly notice printed in the local newspapers for the LEPC meetings. Businesses are encouraged to attend these meetings and offer their expertise. However, very few businesses participate in the LEPC meetings that include discussions of hazard mitigation related topics.

1.5 Authority

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for state, tribal, and local governments to undertake risk-based approaches to reducing natural hazards risks through mitigation planning. Specifically, the Stafford Act requires state, tribal, and local governments to develop and adopt FEMA-approved hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance. This plan was written in accordance with all plan requirements per Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5165, and Title 44 Code of Federal Regulations (CFR) Part 201.

1.6 Purpose (Element A2-a)

The planning team discussed the purpose and goals of this HMP at the jurisdictional meetings. They remain consistent with the goals of the previous HMP with minor changes.

Purpose

The purpose of this HMP is to establish an understanding of the risks, vulnerabilities, and impacts across Cleveland County as it pertains to natural hazard mitigation. The completion of this HMP is to also provide the necessary documentation and compliance for participating jurisdictions to participate in federal and state grant programs pertaining to hazard mitigation.

The purpose of the discussions was to ascertain the main concerns, projects, and goals of each participant as it pertains to hazard mitigation.

Goals

The goals of the HMP are:

1. To increase countywide ability to communicate and respond quickly and efficiently to disasters.
2. To enhance public awareness and understanding of hazard mitigation.
3. To reduce repetitive flooding in flood-prone areas of Cleveland County.
4. To develop and educate responders and health care providers regarding mitigated measures for specific hazards.
5. To enhance pre-disaster and prevention activities.

1.7 Public Involvement (Element A3-a)

The CCEM director and planner began soliciting public input via public survey and the survey was shared to the attendees of the Cleveland County LEPC meeting. At each jurisdictional meeting, the flier for publicizing the survey, the QR code, and the link were shared with everyone who attended the meetings.

The City of Norman’s Emergency Management volunteer created a second hazard mitigation survey and promoted it as well. Both surveys were available to the public throughout the planning process. The purpose of the surveys was to learn which natural hazards are experienced by residents. The planning team considers the responses received representative of the population, though both had limited participation. The results of both surveys are included in the narrative below.

The insight into residents’ experience will be used to assist the prioritization of the Action Items and guide jurisdictional discussions on prioritizing future projects that will best mitigate these hazards.

Cleveland County Public Input Survey with Data for the 2025 Cleveland County Hazard Mitigation Plan Update

The link and QR code for the Cleveland County Hazard Mitigation Plan Survey were shared with all participating jurisdictions. Each municipality could utilize the survey by adding the link to any publication, utility bill, and/or social media page. The schools could also share the link with faculty, parents, and students.

The county wide survey was available online from October 2024-June 2025 and had 4 responses.

Question 1

In the last ten (10) years, which natural hazards have directly impacted you personally? Please select all that apply.

Hazard	Total respondents
Flooding	4
Tornado	3
Hail	3
Winter Storm (Ice, Snow, Wind Chill, Sleet)	2
High Winds/Straightline Winds	2
Lightning	1
Drought	1
Wildfire	1
Extreme Heat	1
Dam Failure	0
Earthquake	0
Other	0

Question 2

Do you frequently deal with any natural disasters not listed in Question 1?

No (0) respondents answered "Yes."

Three (3) respondents answered "No."

No addition comments were given.

Question 3

What concerns you most about these disasters?

Loss of life	Loss of property/ homelessness	Property damage	Inconvenience	Lack of personal preparedness	Community preparedness to respond to a widespread disaster	Other
2	1	3	0	2	2	0

Question 4

Do you feel prepared to deal with natural disasters?

I could support myself and my family for at least 24-72 hours.	Not at all prepared	Somewhat prepared
1	0	2

Question 5

Would you attend preparedness related meetings if or when they become available?

Yes	No	I would consider it.
2	1	0

Question 6

What do you believe are the most urgent needs of the school districts as it relates to preparedness for natural disasters?

School Shelters	Additional disaster preparedness for the school staff	Reinforced Windows (tornado, hail, high winds)	Other
1	0	1	1

The comment under "Other" voiced a concern that there was no school in the town limits of Slaughterville.

Question 7

What kind of hazard mitigation project do you believe Cleveland County residents could most benefit from?

Individual safe room installation reimbursement program	Community shelter	Designated warming/cooling station	Other
3	1	0	0

Question 8

What is your zip code?

Zip	Responses	Zip	Responses	Zip	Responses
73051 (Lexington)	3	73069 (Norman)	0	73026 (Uninc. Cleveland Co.)	0
73068 (Noble)	0	73019 (Norman)	0	73070 (Norman)	0
73072 (Norman)	0		0		0

Note: The zip codes in the table above are within Cleveland County.

**City of Norman Public Input Survey with Data
for the 2025 Cleveland County Hazard Mitigation Plan Update**

Introduction

The data shown below reflects the summarized responses for the City of Norman public input received via online survey conducted October 2024 through December 2024. Data was collected via the use of a QR code provided to potential respondents at the National Weather Festival held at the National Weather Center on October 26, 2024 as well as from posted QR codes at businesses throughout Norman. Note that there was no response from City Council wards per se despite a request put forth to garner the support for data collection efforts via official ward Facebook pages and other mechanisms. The vehicle for the online survey was a Microsoft Forms questionnaire. While every effort was made to gather information, a limited response resulted. The City of Norman survey was available online from October 2024 to December 2024 and had 140 responses.

Hazard Mitigation Planning Survey (2024-2025 Public Input Survey Form)

To better prepare for and respond to natural disasters, the City of Norman is conducting this survey of Norman residents. The information from this survey will be used to inform the five-year Hazard Mitigation Plan currently being developed in collaboration with Cleveland County Emergency Management. Public input is an important part of the planning process, and your assistance helps assure the plan submitted to the State of Oklahoma Office of Emergency Management (OEM) and the Federal Emergency Management Agency (FEMA) prioritizes hazards and aids efforts to strategically implement projects that minimize risks to life and property throughout the jurisdiction. While participation is voluntary, your help is appreciated. Note that only one response should be provided per household.

Section 1

1. What is the zip code at your primary residence? (Enter # only) Required to answer.

Zip Code	Count	Percent
73069	30	21.7%
73071	58	42.0%
73072	39	28.3%
73026	11	8.0%
N-size	138	100.0%
Missing	2	

2. What are your two nearest major cross streets? (Verbatim Responses)

- 24th Ave SE & Hwy 9
- 72nd Ave & Lindsey
- Flood & Boyd
- Tecumseh & 12th Ave NW
- 12th & Tecumseh
- Robinson & Peters
- Alameda & Shiloh Dr
- Lindsey & 24th Ave
- Oakhurst & Lindsey
- 24th Ave NE & Alameda
- Porter & Robinson
- Lindsey Street & Classen Blvd
- 48th & Robinson
- 12th Ave SE & Cedar Lane Rd
- 12th Ave SE & Cedar Lane Rd
- Tecumseh & 36th NW
- Riviera & Pinehurst
- 12th Ave & Alameda St.
- Classen & Brooks
- Tecumseh & Porter
- E Rock Creek & 60th
- Tecumseh & NW 12th Ave
- Main & University
- Main & 24th SW
- Rock Creek & Hamden Ave
- Greens Pkwy & Village Lake Dr
- E Tecumseh Rd & 12th Ave NE
- Boyd & 12th
- Robinson & 12th Ave
- 36th NW & Robinson
- Robinson & 36th
- Boyd & 24th Ave SW
- E Main St. & Findlay Ave.
- Main & Findlay
- 12th Ave NE & Tecumseh Rd
- Tecumseh & Sooner roads
- Sooner Rd & Robinson
- Oliver & Stewart
- Tecumseh & 12th Ave NE
- Lindsey Street & Ed Noble Parkway
- Imhoff & Hwy 9
- Imhoff & Hwy 9
- 108th & Hwy 9
- Iowa & Dakota
- 12th NE & Kingston
- Lindsey & Berry
- 36th & Franklin
- Tecumseh & 36th
- Main & 36th
- 36th NW & Rock Creek
- Berry & Lindsey
- Tecumseh & 12th Ave NE
- Walnut & Imhoff
- University & Boyd
- Lindsey & 12th Ave SE
- Main & Porter
- 12th & Cedar Lane
- 72nd & Hwy 9
- Classen & Boyd
- Boyd & Flood
- University & Apache
- Lindsey & Pickard
- 36th & Robinson
- Rock creek & 48th
- Rock Creek & 24th NE
- 24th & Alameda
- Main & SW 36th
- Main & 36th Ave SW
- Imhoff & Berry
- 12th NE & Robinson Street
- 12th & Alameda
- 84 & Lindsey
- Alameda & 12th
- SE 24th & Lindsey
- Tecumseh Rd & Sooner Rd
- 12th Ave SE & Cedar Lane
- NW 10th St
- Robinson & 24th Avenue
- 24SE & Hwy 9
- Porter & Rock Creek
- Tecumseh Rd & NW 36th Ave
- Shiloh & NE Alameda
- Findlay & Robinson
- S Pickard Ave & Lakewood Dr
- 36th SE & Hwy 9
- Alameda & East 12th Avenue
- Lindsey & 12th
- 48th NW & Robinson
- Alameda & Porter/Classen; Alameda & 12th Street
- Main & Berry
- N Porter Ave & W Rock Creek Road
- Lindsay & Classen
- 24th East & Alameda
- 60TH & Hwy 9
- Main & Flood
- 12th Avenue NE & Little River Rd
- Lindsey & Oakhurst
- Pickard & Timberdell
- W. Main & 36th SW
- Boyd & Alameda
- Hwy 9 & 72nd NE
- Alameda & 24th
- East Robinson & 24th Ave NE
- 12th Ave SE & Alameda
- Berry & Lindsay
- E. Lindsey & Clausen/Porter;
- E. Lindsey & SE 12th
- Porter/Classen & Alameda - Alameda & 12th St NE
- Findlay & Robinson
- Brook Hollow & Landsdowne Dr
- NW 36th & Main
- Flood & Symmes
- E 12th & E Boyd
- 120th & Franklin
- East Alameda Dr & 120th Ave NE
- Berry & Flood
- Main & 24th Street SW
- Flood & Main
- Imhoff & Castlewood
- Eastern Avenue & NE 27th Street
- Chautauqua & Eufaula
- Flood & Main St.
- Robinson Porter
- Lindsey & 24th SW
- E Lindsey & Oakhurst; Hwy 9 & SW 24th
- Rock Creek Road & NE 12th Ave
- 24th SE & Alameda
- Main & 36th Ave NW
- Robinson & 36th Ave NW
- 36th Ave NW & Rock Creek
- Berry Rd & Chatauqua
- Cedar Lane & 12th Av SE; Hwy 9 & 12th Av SE
- 24 NW & Robinson
- Crawford Ave & Acres St
- 24 Ave SE & Imhoff
- Porter & Rock Creek
- S Pickard Ave & Imhoff
- Boyd & 24th SW
- Main & NW 24th
- Hwy 9 & 60th SE

3. How many years have you lived at your current residence? (Enter # only) Required to answer

Years at Current Residence	Count	Percent	Descriptive Statistics	
0-4	34	24.3%	Average	17.5
5-9	29	20.7%	Median	15.0
10-14	21	15.0%	Mode	1.5
15-19	9	6.4%	Missing	0
20+	47	33.6%	Min	1.5
N-size	140	100.0%	Max	38
			N-size	140

4. Do you own or rent your current residence? Required to answer.

Type of Ownership	Count	Percent
Own	120	85.7%
Rent	18	12.9%
Other	2	1.4%
N-size	140	100.0%

5. Which of the following best describes your home? Required to answer.

Type of Residence	Count	Percent
Single family house	128	91.4%
Condo / Townhome	3	2.1%
Single family-w/duplex	1	0.7%
Manufactured/Mobile Home	1	0.7%
Duplex	3	2.1%
Apartment	4	2.9%
N-size	140	100.0%

6. Did you live in Norman prior to moving to your current residence?

	Count	Percent
Yes	102	72.9%
No	38	27.1%
N-size	140	100.0%

7. What was the zip code at your prior residence? (Enter # only)

	Count	Percent
73069	32	24.1%
73071	29	21.8%
73072	35	26.3%
73026	3	2.3%
73068	1	0.8%
Out of area	33	24.8%
Missing	7	
N-size	140	100.0%

8. How many individuals currently live in your home? (Enter # only)

Number of Persons	Count	Percent
1	31	22.1%
2	63	45.0%
3	26	18.6%
4	18	12.9%
5	2	1.4%
N-size	140	100.0%

9. How many of the individuals currently living in your home are 17 years old or younger?

Persons under 17	Count	Percent
0	87	62.1%
1	27	19.3%
2	23	16.4%
3	3	2.1%
4	0	0.0%
N-size	140	100.0%

Section 2 Average Impacts

(Questions 10-18) Please estimate how many times, on average, you have been impacted by each of the following in the last five years.

Descriptive Statistics	Average	Median	Mode	Missing	Min	Max	N-size
Ice Storms	2.3	2.0	2.0	6	0	10	134
Severe Thunderstorms	10.3	5.0	0.0	12	0	100	128
Severe Winds	7.1	3.0	2.0	12	0	50	128
Tornadoes	1.6	0.0	0.0	8	0	20	132
Wildfires/ Brushfires	0.1	0.0	0.0	5	0	5	135
Earthquakes	0.6	0.0	0.0	5	0	6	135
Drought	1.8	0.0	0.0	8	0	25	132
Extreme Temperatures	7.2	3.0	0.0	17	0	200	123
Flooding	2.3	0.0	0.0	7	0	75	133

Section 3 Flooding

19. Thinking specifically about flooding, would you say the streets near your home flood all of the time, sometimes, rarely, or never when it rains?

Frequency of Flooding	Count	Percent
Never	21	15.0%
Rarely	56	40.0%
Sometimes	55	39.3%
All of the time	8	5.7%
N-size	140	100.0%

20. Do you have flood insurance?

Flood Insurance	Count	Percent
Yes	15	10.7%
No	103	73.6%
Don't know	22	15.7%
N-size	140	100.0%

21. Is your home located in a designated flood plain?

Designated Floodplain	Count	Percent
Yes	3	2.1%
No	108	77.1%
Don't know	29	20.7%
N-size	140	100.0%

Section 4 Response Preparation

22. Please respond to each of the following statements using a scale ranging from strongly disagree (1) to strongly agree (5):

- a) The City of Norman can effectively respond and reduce the impact to me and my family during flooding.

	Count	Percent
Strongly Disagree	9	6.4%
Disagree	21	15.0%
Neither	57	40.7%
Agree	49	35.0%
Strongly Agree	4	2.9%
N-size	140	100.0%

- b) The City of Norman can effectively respond and reduce the impact to me and my family during ice storms.

	Count	Percent
Strongly Disagree	10	7.1%
Disagree	28	20.0%
Neither	37	26.4%
Agree	57	40.7%
Strongly Agree	8	5.7%
N-size	140	100.0%

- c) The City of Norman can effectively respond and reduce the impact to me and my family during severe thunderstorms.

	Count	Percent
Strongly Disagree	6	4.3%
Disagree	23	16.4%
Neither	48	34.3%
Agree	54	38.6%
Strongly Agree	9	6.4%
N-size	140	100.0%

- d) The City of Norman can effectively respond and reduce the impact to me and my family during severe winds.

	Count	Percent
Strongly Disagree	7	5.0%
Disagree	25	17.9%
Neither	51	36.4%
Agree	47	33.6%
Strongly Agree	10	7.1%
N-size	140	100.0%

- e) The City of Norman can effectively respond and reduce the impact to me and my family during tornadoes.

	Count	Percent
Strongly Disagree	9	6.4%
Disagree	16	11.4%
Neither	33	23.6%
Agree	69	49.3%
Strongly Agree	13	9.3%
N-size	140	100.0%

- f) The City of Norman can effectively respond and reduce the impact to me and my family during wildfires/brushfires.

	Count	Percent
Strongly Disagree	3	2.2%
Disagree	10	7.2%
Neither	72	51.8%
Agree	43	30.9%
Strongly Agree	11	7.9%
N-size	139	100.0%
Missing	1	

- g) The City of Norman can effectively respond and reduce the impact to me and my family during earthquakes.

	Count	Percent
Strongly Disagree	9	6.4%
Disagree	23	16.4%
Neither	82	58.6%
Agree	24	17.1%
Strongly Agree	2	1.4%
N-size	140	100.0%

- h) The City of Norman can effectively respond and reduce the impact to me and my family during drought.

	Count	Percent
Strongly Disagree	7	5.0%
Disagree	33	23.7%
Neither	63	45.3%
Agree	34	24.5%
Strongly Agree	2	1.4%
N-size	139	100.0%
Missing	1	

- i) The City of Norman can effectively respond and reduce the impact to me and my family during extreme temperatures.

	Count	Percent
Strongly Disagree	11	8.0%
Disagree	34	24.6%
Neither	67	48.6%
Agree	24	17.4%
Strongly Agree	2	1.4%
N-size	138	100.0%
Missing	2	

23. Please respond to each of the following statements using a scale ranging from strongly disagree (1) to strongly agree (5):

a) My household can effectively respond and reduce the impact to me and my family during flooding.

	Count	Percent
Strongly Disagree	4	2.9%
Disagree	27	19.4%
Neither	36	25.9%
Agree	58	41.7%
Strongly Agree	14	10.1%
N-size	139	100.0%
Missing	1	

b) My household can effectively respond and reduce the impact to me and my family during ice storms.

	Count	Percent
Strongly Disagree	2	1.4%
Disagree	28	20.1%
Neither	32	23.0%
Agree	63	45.3%
Strongly Agree	14	10.1%
N-size	139	100.0%
Missing	1	

c) My household can effectively respond and reduce the impact to me and my family during severe thunderstorms.

	Count	Percent
Strongly Disagree	4	2.9%
Disagree	18	12.9%
Neither	28	20.1%
Agree	72	51.8%
Strongly Agree	17	12.2%
N-size	139	100.0%
Missing	1	

d) My household can effectively respond and reduce the impact to me and my family during severe winds.

	Count	Percent
Strongly Disagree	5	3.6%
Disagree	17	12.2%
Neither	35	25.2%
Agree	68	48.9%
Strongly Agree	14	10.1%
N-size	139	100.0%
Missing	1	

e) My household can effectively respond and reduce the impact to me and my family during tornadoes.

	Count	Percent
Strongly Disagree	11	7.9%
Disagree	20	14.4%
Neither	26	18.7%
Agree	64	46.0%
Strongly Agree	18	12.9%
N-size	139	100.0%
Missing	1	

- f) My household can effectively respond and reduce the impact to me and my family during wildfires/brushfires.

	Count	Percent
Strongly Disagree	10	7.2%
Disagree	29	20.9%
Neither	54	38.8%
Agree	36	25.9%
Strongly Agree	10	7.2%
N-size	139	100.0%
Missing	1	

- g) My household can effectively respond and reduce the impact to me and my family during earthquakes.

	Count	Percent
Strongly Disagree	17	12.3%
Disagree	30	21.7%
Neither	49	35.5%
Agree	36	26.1%
Strongly Agree	6	4.3%
N-size	138	100.0%
Missing	2	

- h) My household can effectively respond and reduce the impact to me and my family during drought.

	Count	Percent
Strongly Disagree	7	5.0%
Disagree	14	10.1%
Neither	51	36.7%
Agree	57	41.0%
Strongly Agree	10	7.2%
N-size	139	100.0%
Missing	1	

- i) My household can effectively respond and reduce the impact to me and my family during extreme temperatures.

	Count	Percent
Strongly Disagree	7	5.0%
Disagree	14	10.1%
Neither	33	23.7%
Agree	72	51.8%
Strongly Agree	13	9.4%
N-size	139	100.0%
Missing	1	

Section 5 Personal Risk Assessment

24. Please respond to each of the following statements using a scale ranging from strongly disagree (1) to strongly agree (5):

(a) My family needs information about how to stay safe during floods.

	Count	Percent
Strongly Disagree	14	10.0%
Disagree	41	29.3%
Neither	36	25.7%
Agree	42	30.0%
Strongly Agree	7	5.0%
N-size	140	100.0%

(b) My family needs information about how to stay safe during ice storms.

	Count	Percent
Strongly Disagree	15	10.7%
Disagree	43	30.7%
Neither	34	24.3%
Agree	40	28.6%
Strongly Agree	8	5.7%
N-size	140	100.0%

(c) My family needs information about how to stay safe during severe thunderstorms.

	Count	Percent
Strongly Disagree	16	11.4%
Disagree	48	34.3%
Neither	37	26.4%
Agree	31	22.1%
Strongly Agree	8	5.7%
N-size	140	100.0%

(d) My family needs information about how to stay safe during severe wind events.

	Count	Percent
Strongly Disagree	15	10.7%
Disagree	47	33.6%
Neither	36	25.7%
Agree	34	24.3%
Strongly Agree	8	5.7%
N-size	140	100.0%

(e) My family needs information about how to stay safe during tornadoes.

	Count	Percent
Strongly Disagree	16	11.4%
Disagree	45	32.1%
Neither	29	20.7%
Agree	40	28.6%
Strongly Agree	10	7.1%
N-size	140	100.0%

(f) My family needs information about how to stay safe during wildfires/brushfires.

	Count	Percent
Strongly Disagree	13	9.3%
Disagree	28	20.0%
Neither	35	25.0%
Agree	57	40.7%
Strongly Agree	7	5.0%
N-size	140	100.0%

(g) My family needs information about how to stay safe during earthquakes.

	Count	Percent
Strongly Disagree	12	8.6%
Disagree	31	22.1%
Neither	40	28.6%
Agree	49	35.0%
Strongly Agree	8	5.7%
N-size	140	100.0%

(h) My family needs information about how to stay safe during drought.

	Count	Percent
Strongly Disagree	14	10.1%
Disagree	37	26.6%
Neither	36	25.9%
Agree	45	32.4%
Strongly Agree	7	5.0%
N-size	139	100.0%
Missing	1	

(i) My family needs information about how to stay safe during extreme temperatures.

	Count	Percent
Strongly Disagree	14	10.0%
Disagree	44	31.4%
Neither	36	25.7%
Agree	38	27.1%
Strongly Agree	8	5.7%
N-size	140	100.0%

Section 6 Rankings for risk mitigation

25. Please click on each activity to move it up or down as appropriate to reflect your ranked preference for each activity. The top activity should be the most important to you and the bottom item the least.

- Structures/Infrastructure: designing and improving structures and infrastructure to eliminate or reduce impacts from natural hazards
- Preparedness, Coordination, & Response: assure framework is in place for facilitating and coordinating response and mitigation activities including integrating administration and enforcement plans for community operations
- Education & Awareness: develop outreach strategies to promote awareness of hazard-specific risks and encourage participation in individual and community-wide efforts to reduce risk
- Local Planning & Regulation: integrate mitigation into local bylaws, ordinances, and regulations to protect vulnerable resources and reduce risk

Rank Ordering of Preferences for Activities	Count				Percent			
	1	2	3	4	1	2	3	4
Preparedness, Coordination, & Response	44	41	38	9	33.3%	31.1%	28.8%	6.8%
Structures/Infrastructure	54	34	27	17	40.9%	25.8%	20.5%	12.9%
Education & Awareness	9	24	35	64	6.8%	18.2%	26.5%	48.5%
Local Planning & Regulation	25	33	32	42	18.9%	25.0%	24.2%	31.8%
N-size	132	132	132	132	100.0%	100.0%	100.0%	100.0%

* Note: the numeric column headers (for both the counts and percentages) in the above table reflect the position of the selection for each of the items by the responding household member. For example, 40.9% of those responding ranked structures/infrastructure as the most important strategies for risk mitigation while preparedness, coordination, & response was ranked first among 33.3%.

Section 7 Household information

26. Which of the following, if any, do you have in your home? (Select all that apply)

n=138	Count	Percent
Smoke detectors on every level of your home	135	97.8%
Carbon Monoxide Detectors	105	76.1%
Weather Radio	81	58.7%
Go bag (smaller emergency supply kit to take when evacuating from your home)	56	40.6%
Emergency supply kit (with water and non-perishable food for each household member to last for three days, medical information/prescription lists, money, first aid kit, batteries/flashlights, portable radio, change of clothes, etc.)	58	42.0%
Storm shelter	72	52.2%

27. Which of the following, if any, have you done to assure you and your family are prepared for a natural disaster? [Select all that apply]

n=134	Count	Percent
Regularly test smoke detectors & replace batteries	99	73.9%
Have a home evacuation plan	52	38.8%
Been trained in First Aid and/or CPR	88	65.7%
Have an emergency plan for meeting up if separated in a disaster	39	29.1%
Have a list of emergency contacts for all family members	81	60.4%
Made sure trash or brush is not stockpiled close to the home	106	79.1%
Have a plan/tools to shut off utilities like the gas main in a disaster	42	31.3%
Learned about community evacuation plans	14	10.4%
Attended meetings or training on emergency preparedness	32	23.9%
Attended meetings or training on what to do in a disaster	33	24.6%

28. What is your preferred means for receiving information about protecting your family from natural disasters? [Select all that apply]

n=138	Count	Percent
Direct mailing/Newsletter	50	36.2%
TV News	72	52.2%
Utility bill enclosures	45	32.6%
Town / City website	48	34.8%
Social media (Facebook, Twitter, etc.)	81	58.7%
Email	82	59.4%
Newspaper	33	23.9%
Town / City meetings	15	10.9%
Radio	44	31.9%
Information at local library	13	9.4%
Roadside message boards	20	14.5%
Other (See below)	16	11.6%

- My mom, Amy Goodin
- NWS (2)
- Research on hazard impacts
- Self-awareness
- Telephone, cell phone, Text, Ham Radio
- Text (7)
- The Sky
- Weather app
- YouTube

29. How do you usually receive warnings about severe weather events? [Select all that apply]

(n=139)	Count	Percent
TV News	98	70.5%
Radio	39	28.1%
Email	15	10.8%
Town / City website	4	2.9%
Roadside message boards	6	4.3%
Social media (like Facebook, Twitter, etc.)	45	32.4%
TV emergency Alerts	62	44.6%
Cell phone app	97	69.8%
Phone alert system	88	63.3%
Other (See below)	19	13.7%

- Direct communication
- Family
- My mom Amy Goodin
- NOAA Weather Radio, Ham Radio, Weather Radar
- NWS & Radio Radio
- Radar software
- Security System in home
- Self-awareness
- Sirens (4)
- Sky
- Spouse who is weather-aware
- Text (2)
- We are meteorologists so we monitor weather closely. We also use a weather radio.
- Weather radio or self-monitoring radar
- Weather websites

30. Thinking about the variety of natural hazards that can impact you and your family, which of the following would minimize your risk from a disaster? (Select all that apply)

(n=127; 13 missing)	Count	Percent
Improving flood control near your home	4	3.1%
Having a safe room rebate program	3	2.4%
Having a free smoke alarm program	0	0.0%
Having a free carbon monoxide alarm program	6	4.7%
Having access to public education programs about how to minimize risks from a disaster	64	50.4%
Other (See Below)	13	10.2%

Under "Other", the responses included:

- Allow Impact Resistant shingles/ roofing in our neighborhood
- Mitigation with Insurance
- Functional coordinated emergency response from city
- Public shelters and hail proof parking
- electric power line hazard clearance program
- Having a prepared kit one can get for free or a number to call to alert authorizes that I'm here.
- More efficient way for emergency workers to find power outage sources
- Help clean tree debris
- Home inspection or improvement plans
- e.g. some kind of pressure from the municipality to pressure insurance to act quickly, to mitigate errors, and to limit post-disaster predatory behaviors.
- Signage of every creek along major arterial streets. Most people are unaware of Bishop, Merkle, Normandy, and other creeks that flood especially in urban core and residential areas.
- Improving traffic control on Imhoff
- Public Tornado Shelters (Multiple responses also included this.)

31. Before today, were you aware that Cleveland County has a Hazard Mitigation Plan?

	Count	Percent
Yes	55	39.3%
No	84	60.0%
Don't know	1	0.7%
N-size	140	100.0%

32. Are you aware that the Federal Emergency Management Agency (FEMA) requires counties to update their hazard mitigation plan every five years to be eligible to receive both federal pre- and post-disaster hazard mitigation funds?

	Count	Percent
Yes	50	35.7%
No	89	63.6%
Don't know	1	0.7%
N-size	140	100.0%

Section 8 Demographics

33. How old are you?

Age Groupings (recode)	Count	Percent	Descriptive Statistics	
< 25	3	2.2%	Average	56.1
25-29	2	1.5%	Median	61
30-34	9	6.7%	Mode	61
35-39	14	10.4%	Missing	5
40-44	13	9.6%	Min	20
45-49	9	6.7%	Max	84
50-54	7	5.2%	N-size	135
55-59	8	5.9%		
60-64	17	12.6%		
65-69	22	16.3%		
70 or older	31	23.0%		
N-size	135	100.0%	Verbatim Responses	
Other	2		Too damn	>60
NA	3		old.	

34. Do you have a disability or condition requiring accommodation and assistance?

	Count	Percent
Yes	19	13.6%
No	121	86.4%
Don't know	0	0.0%
N-size	140	100.0%

Section 9

To provide additional comments or to be added to a list to receive information about specific programs, please contact David Grizzle, City of Norman Emergency Management Coordinator, at david.grizzle@normanok.gov or Amy Goodin, Assistant Emergency Management Coordinator, at amy.goodin@normanok.gov. Or, if you prefer, you can provide your name and email address below

- 35.Name 69 responses
- 36.Email 71 responses

1.8 Literature, Resources, and Plans Reviewed (Element A4-a)

To ensure a basic understanding of natural hazard within the planning area, the following tables list the articles, plans, studies, and reports referenced and/or used in research for this HMP.

1.8.1 Literature and Resources Reviewed

The following table lists the resources referenced and/or used in research for this HMP Update.

Agency/Document	Relevant Information Incorporated into Plan
SCIPP Simple Planning Tool by SCIPP NOAA RISA	Weather related data
A Guide to F-Scale Damage Assessment by U.S. Dept. of Commerce, NOAA, NWS	Context and general information for how F-Scale is assessed
Comprehensive Fault Database and Interpretive Fault Map of Oklahoma by Stephen Marsh and Austin Holland.	Provides comprehensive earthquake data and explanations of how the data was compiled and how it can be used.
Seismicity and tectonic Relationships of the Nemaha Uplift in Oklahoma-Part III by Kenneth V. Luza and JLexington E Lawson, Jr.	Provided context for better understanding why Marshall Co. does not have as many earthquakes as neighboring counties; provided context for why Oklahoma has as many earthquakes as it does
Nemaha Strike-Slip Fault Zone by William McBee, Jr.	Provides a clearer description of the geology underlying Oklahoma.
Oklahoma Drought Management Plan prepared by the Oklahoma Drought Management Team	Provided context regarding drought management in Oklahoma
Changing Fire Regimes and Management Strategies by Southern Climate Impacts Planning Program by Darrian Bertrand (SCIPP)	Provided a general overview of the threshold conditions that allow for burn days in Nebraska, Oklahoma, Kansas, and Texas
2018 One-Year Seismic Hazard Forecast for the Central and Eastern United States from Induced and Natural Earthquakes by Mark D. Petersen, et. Al	Provided explanations of how seismicity within Oklahoma has changed in since 2015 and detailed explanations of the causes of Oklahoma earthquakes
"Geomorphic and Hydrologic Assessment of Erosion Hazards at the Norman Municipal Landfill, Canadian River Floodplain, Central Oklahoma" by Jennifer A. Curtis and John W. Whitney	Provided context into local, historical events within Cleveland County
"Geologic Hazards in Oklahoma" by Kenneth V. Luza and Kenneth S. Johnson	Provided context into local, historical events within Cleveland County
Drought and Its Impact on Agricultural Water Resources in OK-Khand, Taghvaeian, Ajaz	Overview of drought in Oklahoma
Vaisala Annual Lightning Reports 2009-2018 and 2019	Provides data regarding lightning strikes
Second Atoka Pipeline Project (A Public Utility Water Pipeline Project) Habitat Conservation Plan	Provides information on the Atoka Waterline that supplies water to areas of central Oklahoma

1.8.2 Local Plans Reviewed

The following plans were reviewed and provided essential details pertaining to the planning area.

Plan Title	Relevant Information Incorporated into Plan
Oklahoma State Hazard Mitigation Plan Update, 2019	General guidance specific to Oklahoma and the water supplies
Oklahoma Comprehensive Water Plan Executive Report	Information relevant to water supplies and sources
Goldco Dam (OK12563) EAP	Information on the dam and inundation area
Hall Park Lake Dam (OK11090) EAP	Information on the dam and inundation area
Huddleston Lake Dam (OK12568) EAP	Information on the dam and inundation area
Little River Park and Pond (OK30561) EAP	Information on the dam and inundation area
Regal Lake Dam EAP	Information on the dam and inundation area
Summit Lake/Misty Lake Dam (OK12578) EAP	Information on the dam and inundation area
Sutton Wilderness Lake Dam (OK12572) EAP	Information on Sutton Lake Dam and inundation area
Templo de Alabanza Dam (NID No. 11089) EAP	Information on the dam and inundation area
Turtle Lake (Lower) (OK30153) EAP	Information on the dam and inundation area

1.8.3 Additional Information

These articles were read for greater context of the hazards.

Document and Agency	Relevant Information Incorporated into the HMP
The susceptibility of Oklahoma's basement to seismic reactivation by F. Kolawole, et al (Nature Geoscience Vol. 12, October 2019 https://doi.org/10.1038/s41561-019-0440-5)	Background information for the fault lines that exist under Oklahoma as a whole; background information for fault lines that exist beneath the planning area.

Each jurisdiction provided specific information which is included under the corresponding hazard profiles.

1.8.4 State and Federal Agencies Contacted

Personnel from OKEMDHS provided guidance via phone and email throughout the process of developing this HMP. The state soil scientist provided guidance on soils via phone and email throughout the planning process. The NFIP Coordinator provided data and guidance on the NFIP, repetitive loss properties, and general floodplain information.

Name/Title	Agency Represented	How Agency Was Invited	Contribution to the HMP
Moriah Stanford, Planning Lead	OK Dept. of Emergency Management	Phone, Email, In person	Consultant, reviewer
Steve Alspach State Soil Scientist	Natural Resource Conservation Service	Phone, Email	Provided guidance on soils
Jon Phillips NFIP Coordinator	Oklahoma Water Resources Board	Phone, Email	Provided data related to NFIP
Cheyenne Reynolds Floodplain Management Specialist	Oklahoma Water Resources Board	Phone, Email	Provided data related to NFIP

Chapter II: Hazard Profiles and Risk Assessment (Element B)

2.1 List of Identified Hazards (Element B1-a)

The hazards affecting the participating jurisdictions is consistent with the list found in the 2019-2024 Oklahoma State Hazard Mitigation Plan Update (hereafter referred to as the OSHMPU). This CCHMPU will provide a starting point for the planning area to begin monitoring the natural hazards that affect the county.

Table 2.1 lists the hazards which affect the planning area. These hazards remain the same as the hazards profiled in the previous HMP.

Table 2.1 Identified Hazards

Hazard	Jurisdictions Affected
Dam Failure	
Drought	All
Earthquake	All
Extreme Heat	All
Flood	All
Hail	All
High Winds	All
Lightning	All
Tornado	All
Wildfire	All
Winter Storm	All

2.2 Disaster History (Element B1-a)

Between 2014 and 2024, Cleveland County has been part of these federally declared disasters listed in the table below. This list reflects the information provided on the FEMA Declared Disasters website.

Disaster Number	Declaration Date	Incident Type
DR-4222	May 26, 2015	Severe Storms, Tornadoes, Straight-line Winds, Flooding
FM-5168	February 12, 2017	Wildfire
DR-4575	December 21, 2020	Severe Winter Storms
EM-3555	February 17, 2021	Severe Winter Storms
DR-4587	February 24, 2021	Severe Winter Storms
DR-4706	April 24, 2023	Severe Winter Storms, Straight-line Winds, Tornadoes

Cleveland County was included in several statewide emergencies between 2012-2022 and the disasters that included Cleveland County are listed below. The Oklahoma Department of Emergency Management & Homeland Security website lists these events.

Oklahoma Declared State of Emergencies 2014-2024

Declaration Date	Incident Type	Declaration Date	Incident Type
May 5, 2014	Drought, Wildfires	December 6, 2018	Winter Weather
March 25, 2015	Severe Storms	October 25, 2020	Winter Weather
November 29, 2015	Winter Storms	February 8, 2021	Winter Weather, Cold Temperatures
December 26, 2015	Winter Storms & Flooding	February 1, 2022	Winter Weather
February 18, 2016	Wildfire, Drought	December 21, 2022	Winter Weather
April 27, 2016	Severe Weather, Straight-line Winds, Tornado	November 2-4, 2024	Severe Weather
March 3, 2017	Wildfire		

2.3 Hazard Probability and Vulnerability Rating (Element B1-e)

Each hazard has its own probability of affecting the planning area based on past occurrences.

Probabilities for the identified hazards can be determined by calculating the:

$$\frac{\text{Total number of events}}{\text{Total number of years}} = \text{Probability \% of event occurring each year}$$

Based on the above calculation, probability is quantified as follows:

- High = 67 – 100%
- Medium = 34 – 66%
- Low = 0 – 33%

Hazard	Probability Rating
Dam Failure	Low
Drought	High
Earthquake	High
Extreme Heat	High
Flood	High
Hail	High
High Winds	High
Lightning	High
Tornado	High
Wildfire	High
Winter Storm	High

2.4 Profiled Hazards (Element B1, B2)

Hazards impacting Cleveland County and the participating jurisdictions are detailed in the following sections: Description, Location, Extent, Previous Occurrences, Probability of Future Events, and Vulnerability and Impact.

2.4.1 Dam Failure

Description

Dams are artificial barriers constructed across a stream or channel of water, usually constructed to impound water. Dams that impound water upstream are called reservoirs. The volume 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. 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.

A dam failure is an uncontrolled release of water from a reservoir through a dam as a result of structural failures or other deficiencies in the dam. Structural failures include seepage, erosion, cracking, sliding, or overturning due to the age of the structure and/or lack of maintenance. Levees can also experience the same kind of dam failures. Dam failure varies from a minor seepage to major collapse or breach when a dam can no longer contain the overflow of flood waters.

Dams are assigned various levels of hazard potential according to the population and structures that lie in the inundation area downstream.

- **Low Hazard Potential** – dams where failure or operational failure results in no probable loss of human life and low economic and/or environmental losses
- **Significant Hazard Potential** – 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 operational failure 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** –dams where failure or operational failure will probably cause loss of human life.

All respective owners of the dams are required by FEMA and the OWRB to develop and maintain Emergency Action Plans that detail protocols in the event of dam failure or dam breach. These documents detail areas of impact and can be requested, but these details are included for official use only (FOUO) and not for public dissemination.

This section includes the information necessary to:

- Examine the comprehensive “All Dam Risk” where the associated risks of varying degrees of potential dam failure;
- Define goals and propose strategies that would address the increasing concern for any of the dams being aging infrastructure (The goals are listed under Section 3.2); and
- Include strategic courses of action that could be executed by the affected jurisdictions within the planning area, in addition to the vulnerabilities and impact of dam failure. (Action Items

Location

There are twelve (12) high hazard dams within the planning area. The table below details the names of all high-hazard dams in Cleveland County. The table includes the location, area of impact, owner and/or operator, dam length and height, and capacities. All inundation maps are located in the Appendix and are FOUO. A map of all dam locations follows on the next page.

As indicated in the table, the City of Oklahoma City and the City of Moore include the respective bodies of water and dam structures in their respective Emergency Action Plans, Emergency Operation Plans, and Hazard Mitigation Plans.

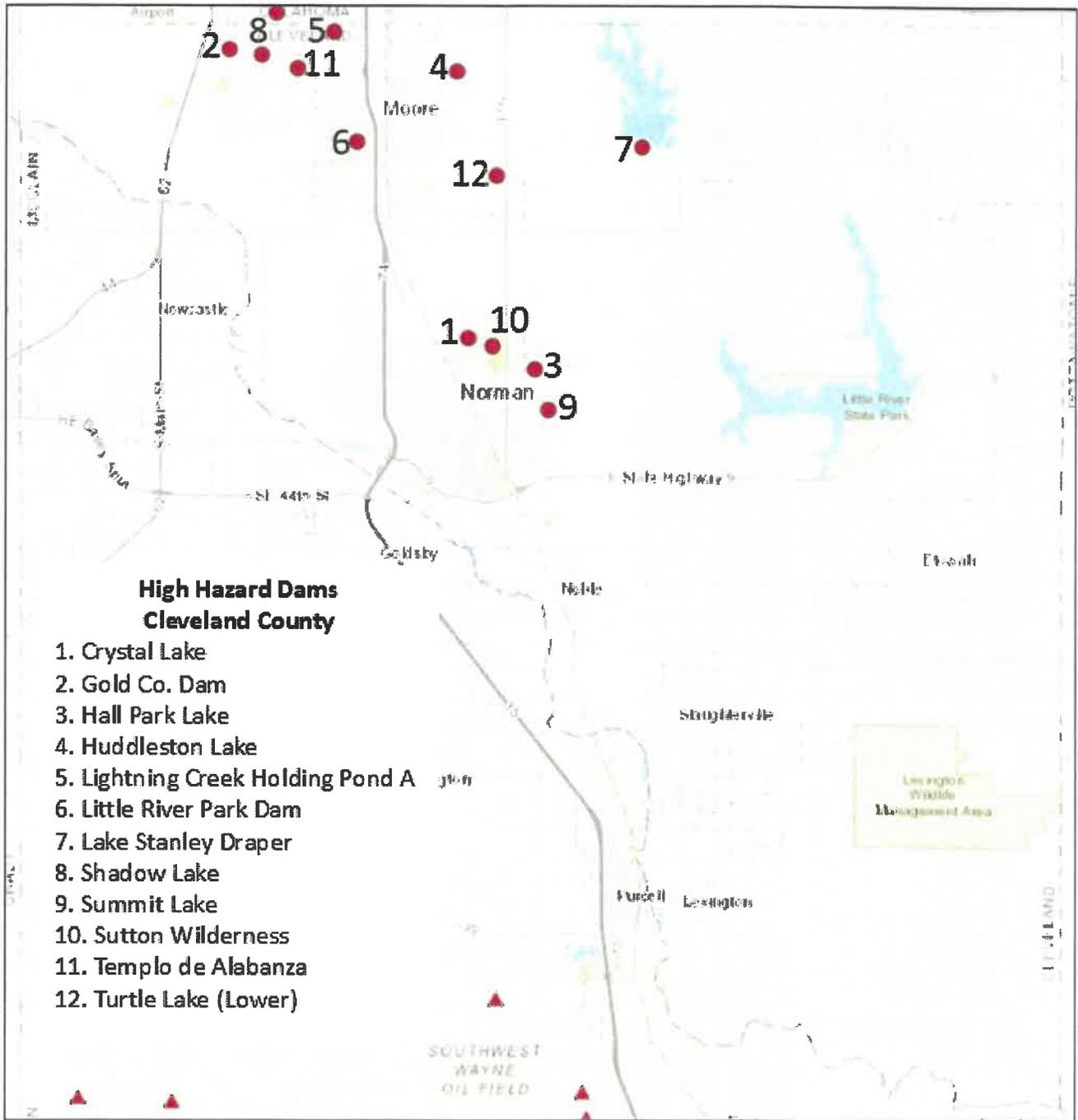
Privately owned lakes: Crystal Lake Dam, Goldco Dam, Shadow Lake Dam, Huddleston Lake Dam, Summit Lake, Templo de Alabanza, Turtle Creek (Lower). Summit Lake, aka Misty Lake, is in the process of being acquired by the City of Norman and, at that point will be a publicly owned lake.

Publicly owned lakes: Little River Lake Dam (Moore), Hall Park Dam (Norman), Sutton Wilderness Lake Dam (Norman), Lake Stanley Draper (OKC), Lightning Creek Holding Pond A (OKC).

High-Hazard Potential Dams within Cleveland County

Dam Name and ID	Location and Impact Area	Owner/ Operator	Dam Length/ Height	Max Capacity	Norm Capacity	Surface Area
Crystal Lake Dam (OK02586)	City of Norman	Cameron Tull/ Cameron Tull	610 ft/ 15 ft	210 acre ft	130 acre ft	24 acres
Goldco Dam (aka Avia at the Lakes) (OK12563)	City of Oklahoma City	RFA Land, LLC/ RFA Land LLC	745 ft/ 19 ft	Unknown	Unknown	Unknown
Hall Park Lake Dam (OK11090)	City of Norman	City of Norman/ City of Norman	600 ft/ 21 ft	144 acre ft	144 acre ft	9 acres
Huddleston Lake (OK12568)	City of Moore	Bama Holdings LLC/ Bama Holdings LLC	1,120 ft/ 24 ft	220 acre ft	110 acre ft	Unknown
Lake Stanley Draper (OK02580)	Uninc. Cleveland County, City of Norman	OKC Water UtilitiesTrust /OKC Water Utilities Trust	7,250 ft/ 111 ft	148,000 acre ft	114,500 acre ft	2,900 acres
Lightning Creek Holding Pond A (OK11070)	City of Oklahoma City	City of OKC/ City of OKC	6,000 ft/ 18 ft	541 acre ft	Unknown	Unknown
Little River Park Dam (OK30561)	City of Moore	City of Moore/ City of Moore	900 ft/ 23 ft	255 acre ft	164 acre ft	20.7 acres
Shadow Lake (OK02584)	City of Oklahoma City, Cleveland Co.	Bird in Hand/ T. Abercrombie	751 ft/ 11 ft	44 acre ft	20 acre ft	10 acres
Summit Lake Dam (aka Misty Lake) (OK12578)	City of Norman	Summit Lakes POA/ Summit Lakes POA	810 ft/ 21 ft	200 acre ft	130 acre ft	18 acres
Sutton Wilderness Lake Dam (OK12572)	City of Norman	City of Norman/ City of Norman	650 ft/ 22 ft	200.1 acre ft	116.8 acre ft	14.1 acres
Templo de Alabanza (OK11089)	City of Oklahoma City, City of Moore	Templo de Alabanza/ Templo de Alabanza	618 ft/ 20 ft	130 acre ft	78 acre-ft	11 acres
Turtle Creek Lower (OK0153)	City of Moore	Turtle Lake HOA/ Turtle Lake HOA	280 ft/ 20.5 ft	94.2 acre ft	58.4 acre ft	6 acres

Location of High-Hazard Dams across Cleveland County



Previous Occurrence

There is no history or accidents involving the participants of this HMP regarding a dam breach or failure from dams within the planning area between 2014-2024. This table gives the inspection report summaries for each high-hazard potential dam in the planning area.

Name of Dam and ID	Inspection Report Summary
<p>Crystal Lake Dam (OK02586) Privately owned within City of Norman City limits</p>	<p>As of the August 1, 2024 inspection, the earthen dam was in good/satisfactory condition. No longitudinal cracks were observed. Improved Bermuda grass growth on the crest of the dam since the previous inspection. The upstream dam slope was clear of vegetation and debris with no active erosion. Three small rodent holes needed remediation. Inspections have occurred on this dam in 2013, 2018, 2019-2024. The downstream dam slope needs continued removal of tree stumps and vegetation, other than Bermuda grass, to ensure that the rotting stumps will not cause seepage over time. A gas line is located approximately 50 ft. downstream of the toe of the dam. No observable areas of seepage flowing into the Spillway Discharge Channel from the Dam Embankment. The principal spillway is a concrete broad-crested weir with downstream rip-rap channel. Minor concrete cracks were observed and there are no observable changes since 2018. Considering the age of the structure, the condition is very good. Repairs were made in 2022 and 2023, continuing into 2025. The spillway discharge channel is in good condition, and no evidence any of the rip-rap rocks have moved. Recommendations were made to continue the improvements already made and noted in previous inspections. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Goldco Dam (aka Avia at the Lakes) (OK12563)</p>	<p>The inspection report of October 29, 2024 stated that the earthen dam and concrete spillway are used for storm water retention. Overall, the structure was in satisfactory and fair condition. The recommendations included riprap along the upstream toe to reduce the erosion. The noted depressions needed to be filled and covered with sod or seeded to match the surrounding area. The inspection recommended continued monitoring to ensure a larger issue was not the cause. The downstream embankment needs all trees and shrubs removed to ensure that the dam is clear for any and all inspections and maintain the structural integrity of the dam and spillway. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Hall Park Lake Dam (OK11090)</p>	<p>The inspection report of September 11, 2024 noted that all aspects of the dam are in satisfactory condition. The dam is well maintained and continued monitoring of the outlet joint was recommended though no repairs were needed. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Huddleston Lake (OK12568) Privately owned, within OKC city limits</p>	<p>An inspection report of December 10, 2024 noted that the earthen dam is "extremely well maintained." A fence and brush block the emergency spillway but not enough to cause damage the dam structure. The structure is in satisfactory condition. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Lake Stanley Draper (OK02580)</p>	<p>The inspection report of October 29, 2024 noted the following. This lake provides the water supply for Oklahoma City. The dam is an earthen embankment with a 1,000 ft long dike. Overall, the structure was in satisfactory conditions and no actions were immediately required. Recommendations to remove trees, woody vegetation, and grass are ongoing maintenance. Continued monitoring for seepage around the outlet tunnel exit and on areas around the downstream toe were recommended. Ongoing maintenance of removing trees and woody vegetation and removal of burrowing animals was noted as aspects of routine actions. There has been no dam failure of this structure between 2014 and 2024.</p>

Name of Dam and ID	Inspection Report Summary
<p>Lightning Creek Holding Pond A (OK11070) Publicly owned, within City of OKC city limits</p>	<p>As of the October 23, 2024 inspection, the earthen dam is a flood control dam, and drains between rains. Recommendations for repairs from the October 27, 2023 inspection had not been completed by the time of the October 23, 2024 inspection. Erosion in the gully and filling in low spots on the eastern embankment and rutting, and a review of the outlet gate operations had not been conducted at that time. The cracks noted in the report typically expand after rain. An area of the upstream slope was in poor condition due to a sinkhole where the embankment collapsed, but generally in satisfactory condition and no other issues were observed. The downstream slope was overall satisfactory. The outlet structure was in overall satisfactory condition. Recommendations for the dam included immediately ensuring that gate operations would work if needed in storm events, as well as replace the collapsed culvert and sinkhole on the eastern embankment. This pond was dry at the time of the inspection. The inspection report from October 27, 2023 had almost identical observations regarding the erosion of the eastern embankment and the gate operations. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Little River Park Dam (OK30561)</p>	<p>As of the inspection report of August 14, 2024, the entire structure is in fair condition with the emergency spillway being in satisfactory condition. The recommendations fell within the parameters of routine maintenance. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Shadow Lake (OK02584) Privately owned, within the City of Norman</p>	<p>The inspection report of January 19, 2024 noted that the dam was in fair condition. The report advised that areas of erosion of the upstream slope, vegetation within the rip-rap, minor cracks and displacement in the spillway, and minor cracks in the retaining wall should be monitored for future repairs. Recommendations for the erosion included seeding or sodding where the erosion is currently occurring and to prevent further erosion. Adding rip-rap around the spillway will reduce further undercutting. There has been no dam failure of this structure between 2014 and 2024.</p>
<p>Summit Lake Dam (aka Misty Lake) (OK12578) Privately owned, within the City of Norman city limits</p>	<p>The inspection dated January 24, 2024 noted that not much had changed regarding this dam since the previous inspection in 2011. The report noted that the HOA and the City of Norman were working through the funding issues needed to remediate the dam. The earthen dam is currently in poor condition, and several deficiencies need to be addressed to ensure the dam operates safely. The down stream slopes have trees and vegetation that could compromise the integrity of the dam, and removal of the trees and vegetation is required to prevent seepage on all downstream and upstream slopes. The inspection report advised that a formalized maintenance plan be developed and implemented, along with the update of the EAP and warning protocol. The emergency spillway is in satisfactory condition with some cracking and expansion joints that need to be resealed and monitored; the foundation of the dam is in good condition. Exact depth of flooding for the homes downstream cannot be determined without further investigation and surveys. Overall, the recommendations made would ensure the structural integrity of the dam as a whole can be rehabilitated and initiate a maintenance and monitoring plan going forward. The recommendations were consistent with the 2022 inspection report. Between 2014-2024, this dam has not experienced dam failure.</p>
<p>Sutton Wilderness Lake Dam (OK12572) Publicly owned, within the Norman city limits</p>	<p>The inspection report from September 11, 2024 included the following observations. Overall, the dam is in fair condition; the minor cracks can be "easily remediated." All other aspects of the dam were in "satisfactory" condition. Nothing else regarding the condition of the dam was included and it is considered stable. There has been no dam failure of this structure between 2014 and 2024.</p>

Name of Dam and ID	Inspection Report Summary
Templo de Alabanza (OK11089) Privately owned, within the city limits of OKC	The inspection report from February 2, 2024 included the following observations. The dam and spillway are in poor, but stable, condition. Evidence of gopher or other animal burrowing into the slopes and old trees were noted. Some progress had been made on removing the tree stumps. "The present condition of the dam would not pass 50% of the Probably Maximum Flood (PMF) with one foot of freeboard." The dam is an earthen embankment with a concrete emergency spill way control section. The foundation appears in good condition. The embankment has no excessive cracking or settlement, but the downstream slope has extensive tree growth. The upstream slope is in poor condition with "severe benching at the waterline." The emergency spillway is in fair condition. Tree removal is difficult due to the age and size of the trees and presence of power lines in the area. There has been no dam failure of this structure between 2014 and 2024.
Turtle Creek Lower (OK0153) Privately owned, within the OKC city limits	The inspection report from November 22, 2024 noted the following. The structure is maintained by the HOA and no major concerns were present. It was noted that significant improvements had been made since the previous inspection regarding the removal of vegetation on the principal and auxiliary spillways. The dam's crest was in good condition without cracks, ruts, or erosion. The downstream slope needs to establish grass to prevent erosion. The abutments had no erosion. The structure is in satisfactory condition and continued maintenance was recommended. There has been no dam failure of this structure between 2014 and 2024.

Extent

The planning area has identified the levels of extent as follows:

- Minor: Seepage or small breach where water stays within the downstream river channel.
- Major: Water exceeds the channel banks or rive, causing overflow that damages any structures and places people at risk.
- Severe: complete dam failure, all structures and roads damaged or washed out, people at risk and evacuations needed.

The evidence of dam failure could be as minimal as damages to uninhabited wildland to agricultural economic loss of crops and/or livestock to catastrophic flooding in urban areas that requires evacuation. This table includes the area of risk for each respective high hazard potential dam Cleveland County. Capacities are also included in the table under "Location" above.

Name of Dam	Norm Capacity/ Max Capacity	Area at Risk
Crystal Lake (OK02586) (City of Norman)	13 acre ft/ 210 acre ft	Approximately 129 residences, 1 business, and common areas would be inundated to an expected flood level up to 5 feet. Inundation times are included in the EAP, and the inundation times range from less than 15 minutes to 6 hours.

Name of Dam	Norm Capacity/ Max Capacity	Area at Risk
Goldco Dam (Avia at the Lakes) (OK12563) (Oklahoma City)	NA/NA	The EAP has identified the inundation area; however, it does not specify how many residences or structures could be inundated in a dam breach, nor does it give inundation times. This is a data deficiency in the EAP and Action Item 26 has been added to obtain this information. This dam is also included in the City of OKC HMP and it notes that approximately eighty-four (84) residential and six (6) commercial structures, roads, bridges, and channels downstream are at risk from flooding due to dam failure. However, inundation times and flood depths are not included; Action Item 26 is included to obtain this information.
Hall Park Lake (OK11090) (City of Norman)	144 acre ft/ 144 acre ft	One (1) utility authority, four (4) municipal structures, approximately seventy-four (74) residences, and four (4) businesses are at risk from inundation from this dam breach and listed in the EAP. However, the EAP does not specify inundation times or flood depths. This lack of information is a data deficiency and Action Item # has been added to obtain this information.
Huddleston Lake Dam (OK12568) (Moore)	110 acre ft/ 220 acre ft	The EAP has identified the inundation area; however, it does not specify how many residences or structures could be inundated in a dam breach, nor does it give inundation times. This lack of information is a data deficiency and Action Item 26 has been added to obtain this information.
Lake Stanley Draper (OK02580) (SE OKC, NE Norman)	114,500 acre ft/ 148,000 acre ft	Lake Stanley Draper is included in the City of OKC HMP, and it notes that approximately 295 residential homes, 11 commercial structures, Draper Ranger Police Station, the Draper Water Treatment Plant, roads, bridges, and channels downstream are at risk to flooding and damage from dam failure. The inundation time ranges from 01:40 to 03:10; no flood depths were included. This lack of information is a data deficiency and Action Item 26 has been added to obtain this information.
Lightning Creek Holding Pond A (OK11070) (City of OKC)	541 acre ft/ NA	This dam is included in the City of OKC HMP. It notes that over 600 residential and commercial structures, three (3) OKC schools, roadways, bridges, channels are at risk from flooding from dam failure. The inundation times range from 00:45 to 02:55. Depth of flooding could vary from a few inches to over 2'.
Little River Park Dam (OK30561) (City of Moore)	164 acre ft/ 255 acre ft	The EAP has identified the area at risk and it includes I-35, three (3) main streets in Moore, nine (9) residential streets, and two (2) commercial streets. Approximately a population of 300-400 is at risk in the inundation area. The flood depth from dam failure would be less than 12" to about 2' of water.

Name of Dam	Norm Capacity/ Max Capacity	Area at Risk
Shadow Lake (OK02584) (City of OKC)	20 acre ft/ 44 acre ft	Shadow Lake is included in the City of OKC HMP and it notes that approximately 56 residential structures and 21 commercial structures, roads, bridges, and channels downstream are at risk from flooding from dam failure. Based on the distances included in the EAP, some structures would be almost immediately inundated. However, flood depths are unknown and not included in the EAP. Action Item 26 has been added to obtain this information.
Summit Lake (Misty Lake) (OK12578) (City of Norman)	130 acre ft/ 200 acre ft	The EAP notes that approximately 38 residences, and a population of 95 are at risk from flooding due to dam failure. Twelve (12) of these homes are less than 500 ft downstream and would be inundated almost immediately. Inundation times range from immediately to 30 minutes. Flood depths would range from less than 12" to over 2'. The EAP does not include flood depths. This lack of information is a data deficiency and Action Item 26 has been added to obtain this information.
Sutton Wilderness Lake (OK12572) (City of Norman)	116.8 acre ft/ 200.1 acre ft	The EAP notes that approximately 127 residences and 4 roads are at risk from flooding due to dam failure. The estimated time of inundation for these structures and roads is between 00:10 and 00:20. The EAP does not include any distances from the dam or flood depths. This lack of information is a data deficiency and Action Item 26 has been added to obtain this information.
Templo de Alabanza (OK11089) (City of OKC)	78 acre ft/ 130 acre ft	Templo de Alabanza is included in the City of OKC HMP, and approximately 48 residential and 11 commercial structures, roadways, bridges, and channels downstream are at risk from flooding due to dam failure. There are no inundation times, distances of the structures from the dam, or flood depths. This lack of information is a data deficiency and Action Item 26 has been added to obtain this information.
Turtle Creek (Lower) (OK30153) (City of OKC, City of Moore)	58.4 acre ft/ 94.2 acre ft	Based on the information included in the EAP, there are approximately 5 structures at risk in the inundation area. The EAP lacks flood depth information and inundation times. This lack of information is a data deficiency and Action Item 26 has been added to obtain this information.

Probability

The probability of dam failure occurring in the planning area is low.

As the probability of dam failure is inherently tied to the amount of rain that falls within Cleveland County, but also upstream from the dams within Cleveland County, the ability to guarantee zero future dam failures cannot be done at this time.

Vulnerability & Impact

The following table details the vulnerabilities and impact of the high hazard potential dams that would affect the planning area. NOTE: None of the school buildings included in this HMP would be affected by dam failure, based on the information in the respective EAPs. Any schools affected are not part of this HMP and included in the EOPs, HMP, and EAPs for those areas outside the planning area. All inundation maps are included in the appendix.

The city of Norman has a process in place by which to determine which HHPDs are in most need of routine maintenance and/or rehabilitation. Annual inspections are made to remove any tree vegetation and ensure that the earthen dams are kept intact. With the other jurisdictions, efforts to maintain high hazard dams are conducted according to the processes in place by those respective dam owners.

Vulnerabilities & Impact of Cleveland Co. High Hazard Potential Dams		
Dam Name and ID	Vulnerability	Impact
Crystal Lake (OK02586) (City of Norman)	Approximately 129 residences, 1 business, and common areas are vulnerable from flooding due to a dam breach.	Structures and roads could be inundated up to 5 feet. The damage would result in an economic loss to the property owner. Any damages to the roads and common areas would be an economic loss to the City of Norman.
Goldco Dam (Avia at the Lakes) (OK12563) (Oklahoma City)	Approximately 84 residential and 6 commercial structures, roads, bridges, and channels downstream are at risk from flooding due to dam failure. No inundation time or flood depths are included in the EAP.	The residences could be inundated and the damage would result in economic losses to the property owners. The lack of inundation times in the EAP results in a data deficiency that needs to be determined so the home owners can be properly notified of the danger for evacuation as needed. Action Item # has been added to address this data deficiency.
Hall Park Lake (OK11090) (City of Norman)	One (1) utility authority, four (4) municipal structures, approximately seventy-four (74) residences, and four (4) businesses are vulnerable to flooding from dam failure. No inundation times or flood depths are included in the EAP.	Damage to the utility authority could result in a loss of service to residents. Any damage to the homes would result in economic losses to the property owners. Any damages to the municipal buildings could result in an economic loss and/or delay of business services of the city. The lack of inundation times in the EAP results in a data deficiency that needs to be determined so the home owners can be properly notified of the danger for evacuation as needed. Action Item # has been added to address this data deficiency.

Dam Name and ID	Vulnerability	Impact
Huddleston Lake Dam (OK12568) (Moore)	While the inundation area has been identified, the EAP does not include the number of structures, the population, inundation times, or flood depths.	Any damage to the homes would result in economic losses to the property owners. The lack of inundation times in the EAP results in a data deficiency that needs to be determined so the home owners can be properly notified of the danger for evacuation as needed.
Lightning Creek Holding Pond A (OK11070) (City of OKC)	Over 600 residential and commercial structures, three (3) OKC schools, roadways, bridges, channels are vulnerable to flooding from dam failure.	Any damages to property would be result in an economic loss to the property owners. Depending on how much water and what time the potential dam failure occurred, the schools might require evacuation. Damages to the school could result in the schools needing to relocate classes if the water damage was extensive. If the breach wave was strong enough to compromise the structural integrity of roads and bridges, detours would be necessary until repairs could be made.
Little River Park Dam (OK30561) (City of Moore)	<p>Approximately a population of 178, I-35, three (3) main streets, nine (9) residential streets, and two (2) commercial streets are vulnerable to flooding from dam failure.</p> <p>The EAP does not include inundation times.</p>	<p>Any damages to property would be result in an economic loss to the property owners. Inundation area could flood less than 12" to about 2' of water.</p> <p>The lack of inundation times in the EAP results in a data deficiency that needs to be determined so the home owners can be properly notified of the danger for evacuation as needed.</p>
Lake Stanley Draper (OK02580) (City of OKC)	<p>Approximately 295 residential homes, 11 commercial structures, Draper Ranger Police Station, the Draper Water Treatment Plant, roads, bridges, and channels downstream are vulnerable to flooding and damage from dam failure.</p> <p>This lake supplies water for OKC. If dam failure were to occur, the some of the population would potentially lose water service.</p> <p>The EAP does not include inundation flood depths.</p>	<p>Any damages to property would be result in an economic loss to the property owners. Damage to the water treatment plant could result in a loss of service to residents and an economic loss to the city.</p> <p>A loss of water supply could cause stress on other sources of the water supply, and residents and businesses would be required to find alternate water sources until the water supply was restored.</p> <p>The lack of information is a data deficiency and action item 25 has been added to obtain the information.</p>

Dam Name and ID	Vulnerability	Impact
Shadow Lake (OK02584) (City of OKC)	<p>Approximately 56 residential structures and 21 commercial structures, roads, bridges, and channels downstream are vulnerable to flooding and damage from dam failure.</p> <p>The EAP does not include inundation flood depths or inundation times.</p>	<p>Any damages to property would be result in an economic loss to the property owners. Delays to services and business could occur until the flood damages are repaired.</p> <p>The lack of information is a data deficiency and action item 25 has been added to obtain the information.</p>
Summit Lake (Misty Lake) (OK12578) (City of Norman)	<p>Approximately 38 residences, and a population of 95 are at vulnerable from flooding due to dam failure.</p> <p>The EAP does not include flood depths.</p>	<p>Twelve (12) of these homes are less than 500 ft downstream and would be inundated almost immediately. Inundation times range from immediately to 30 minutes. Any damages to property would be result in an economic loss to the property owners.</p> <p>This lack of information is a data deficiency and Action Item 25 has been added to obtain this information.</p>
Sutton Wilderness Lake (OK12572) (City of Norman)	<p>Approximately 127 residences and 4 roads are at risk from flooding due to dam failure.</p> <p>The EAP does not include any distances from the dam, inundation times, or flood depths.</p>	<p>Any damages to property would be result in an economic loss to the property owners. Delays to services and business could occur until the flood damages are repaired.</p> <p>This lack of information is a data deficiency and Action Item 25 has been added to obtain this information.</p>
Templo de Alabanza (OK11089) (City of OKC)	<p>Approximately 48 residential and 11 commercial structures, roadways, bridges, and channels downstream are at risk from flooding due to dam failure.</p> <p>The EAP does not include any distances from the dam, inundation times, or flood depths.</p>	<p>Any damages to property would be result in an economic loss to the property owners. Delays to services and business could occur until the flood damages are repaired.</p> <p>This lack of information is a data deficiency and Action Item 25 has been added to obtain this information.</p>
Turtle Creek (Lower) (OK30153) (City of OKC, City of Moore)	<p>There are approximately 5 structures at risk in the inundation area.</p> <p>The EAP lacks flood depth information and inundation times.</p>	<p>Any damages to property would be result in an economic loss to the property owners. Delays to services and business could occur until the flood damages are repaired.</p> <p>This lack of information is a data deficiency and Action Item 25 has been added to obtain this information.</p>

2.4.1 Drought

Description

A drought is a period of drier-than-normal conditions. Drought conditions worsen as temperatures remain high and precipitation levels remain below normal averages, though it should be noted that drought conditions can occur any time of year.

“Flash drought” is defined as “the rapid onset or intensification of drought, set in motion by lower-than-normal rates of precipitation, accompanied by abnormally high temperatures, winds, and radiation.” Climatologists cannot definitively say whether or not this will be a long-term trend; it is a trend that climatologists will be monitoring.

Location

The entire planning area experiences drought.

Extent

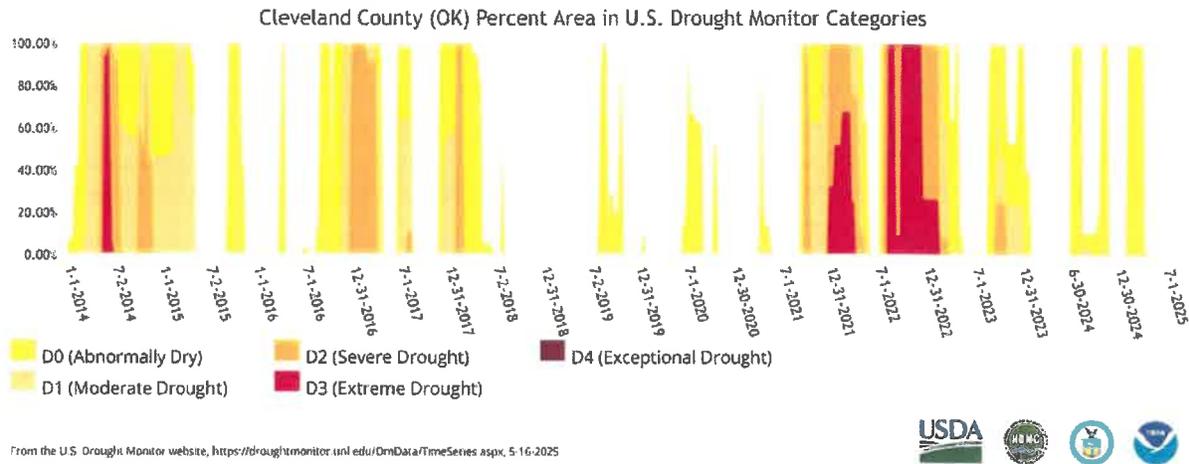
The Planning Area uses this Drought Severity Classification from the U.S. Drought Monitor to classify drought conditions. The Planning area can experience any category on the index.

It is expected that the Planning Area will continue to experience the full range of these drought categories in the future.

Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	<ul style="list-style-type: none"> Going into drought: <ul style="list-style-type: none"> short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> some lingering water deficits pastures or crops not fully recovered 	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested 	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> Crop or pasture losses likely Water shortages common Water restrictions imposed 	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> Major crop/pasture losses Widespread water shortages or restrictions 	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies 	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Previous Occurrence

This graph from the U.S. Drought Monitor shows the drought cycles that the planning area has experienced since January 1, 2014 to December 31, 2024.



This graph provides a visualization of the narrative below. According to the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), there were 32 drought events documented between January 1, 2014 and December 31, 2024. Consecutive months are listed together in the following table that further details the levels of drought throughout the planning area. By combining these two records of drought, a more complete picture of drought can be used for future planning throughout the planning area.

Drought Events, January 1, 2014 to December 31, 2024

Date	Description
January 2014 to April 2015	Abnormally dry (D0) and Moderately Dry (D1) conditions persisted throughout the planning area. Drought conditions reached Severe (D2) and Extreme (D3) drought conditions in May-June 2014. Sufficient rainfall diminished drought conditions and finally eliminated drought in Cleveland County in early May 2015.
May 2015 to August 2016	Several brief periods of Abnormally Dry (D0) and Moderately Dry (D1) conditions occurred during this timeframe. Drought conditions did not exceed D1.
September 2016 to April 2017	Abnormally dry (D0) conditions escalated to Severe Drought (D2). While Severe Drought did not worsen, it persisted until sufficient rain eradicated drought in the planning area in late April 2017.
June 2017 to August 2017	Abnormally dry (D0) and moderately dry (D1) drought affected the planning area. Only a small percentage of the planning area experienced Severe Drought (D2) conditions in this period.
December 2017- July 2018	The planning area experienced Abnormally dry (D0) to Severe (D2) drought in this time frame. Abnormally dry conditions (D0) persisted from February to July for most of the planning area.
July 2019 to September 2021	This timeframe saw only brief periods of Abnormally Dry conditions (D0) in the planning area.
September 2021 to May 2022	Extensive drought persisted in the planning area, reaching Extreme Drought (D3) conditions from December to April. Sufficient rain eradicated drought completely in May 2022.
July 2022 to May 2023	All levels of drought were experienced throughout the planning area. D3 level of drought was the most prominent level of drought in Cleveland County throughout this time period.
August 2023 to January 2024	The planning area experienced Abnormally dry (D0) to Severe (D2) drought in this time frame. Abnormally dry conditions (D0) persisted from February to July for most of the planning area.
July 2024 to October 2024	Abnormally dry (D0) and Moderately Dry (D1) conditions persisted throughout the planning area.

Probability

The probability of the planning area experiencing drought is high.

Vulnerability & Impact

The planning area is vulnerable to the effects of drought. The southern portion of the planning area is rural and unmanaged areas of wildland easily become fuel for wildfires as drought increases the chances of wildfires. As seen in the graph under "Previous Occurrences," drought conditions persist any time of year and for any length of time. The drier the planning area becomes, the availability for wildfire fuel increases as the vegetation continues to dry. More details regarding the planning area's vulnerability to wildfire will be found under the hazard profile "2.4.11 Wildfire."

Long-term drought negatively affects the agricultural industries in Cleveland County. Prolonged drought results in crop failures and livestock herds needing supplemental water supply if retention ponds or creeks dry up.

Generally, if an exceptional drought persisted longer than the droughts listed under “Previous Occurrences,” the participating municipalities would need to evaluate the respective water supplies of the jurisdictions to ensure sufficient quantities and drinking quality. **Lexington, Noble, Norman, and Slaughterville** rely on wells or Lake Thunderbird for the respective water supply of each municipality. **Noble PS** relies on Noble’s water supply. **Little Axe PS** and **Robin Hill PS** relies on the City of Norman’s water supply. **Little Axe PS** and **Lexington PS** depends on the City of Lexington’s water supply. If a drought persisted long enough, water rationing would be necessary to ensure that residents had some water for basic uses and drinking.

2.4.2 Earthquake

Description

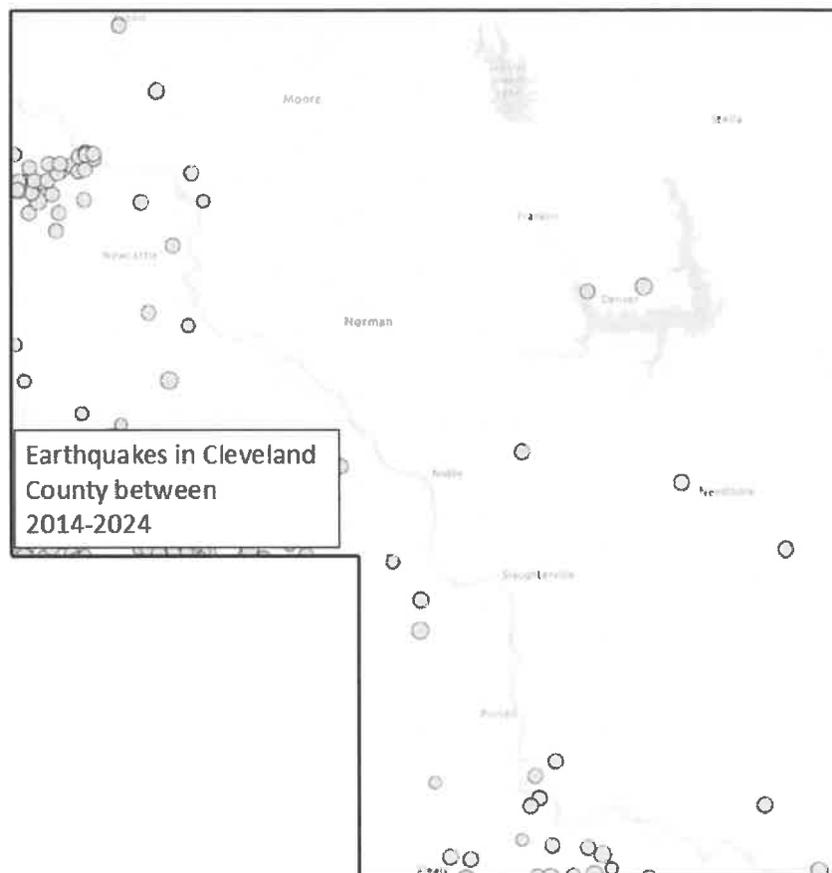
An earthquake occurs when two blocks of geological plates suddenly slip past one another as the result of slowly accumulating pressure underground near a geological fault plane or a plate boundary. The surface where they slip is called the fault or fault plane. The resulting waves of vibration within the earth create ground motion that vibrates at the surface. The location below the earth's surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.

The Nemaha Ridge Zone and the Wilzetta Fault both lie under the surface in the planning area, and these faultlines could contribute to the number of earthquakes felt across Oklahoma.

Location

The planning area experiences minor earthquakes.

This map from the United States Geological Survey (USGS) shows the earthquakes that occurred within Cleveland County between January 1, 2014 to December 31, 2024.



Extent

Based on the historical magnitudes Cleveland County has experienced, earthquakes within the range of 1.0 to 3.9 (Mercalli I-III) could be felt by persons indoors and outdoors, though most people would likely attribute any associated movement to passing trucks. Structural damage is unlikely within this range, and most people would not realize any associated movement as a minor earthquake. The expected range of earthquakes is from 1.0 to 4.0 (Mercalli I-III) within the planning area.

Richter Magnitude	Mercalli	Description	Earthquake Effects
1-2	I	Instrumental	Not felt except by very few under favorable conditions.
2-3	II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.
3-4	III	Slight	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4	IV	Moderate	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
4-5	V	Rather Strong	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5-6	VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
6	VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6-7	VIII	Destructive	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
7	IX	Ruinous	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7-8	X	Disastrous	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
8	XI	Very Disastrous	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
8+	XII	Catastrophic	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Previous Occurrence

None of the participating jurisdictions had any damages from earthquakes. The earthquakes that affected the planning area is as follows, as recorded by the OGS. This data shows the earthquakes greater than a magnitude of 0 or greater that occurred between January 1, 2014 to December 31, 2024. The planning area experienced 36 earthquakes during this time frame. Comparing the occurrence of earthquakes to the previous HMP, fewer earthquakes over a magnitude of 2 occurred between 2014-2024.

Earthquakes Recorded by OGS 2014-2024 in Cleveland County					
Year	Number of Earthquakes greater than 0	Range of magnitude	Year	Number of earthquakes greater than 0	Range of magnitude
2014	2	2.2-2.3	2020	1	1.2
2015	0	NA	2021	2	1.2-1.6
2016	0	NA	2022	6	0.9-1.4
2017	0	NA	2023	11	0.8-2.7
2018	1	2.4	2024	10	0.6-2.2
2019	3	1.6-1.9			

Probability

The probability of the entire planning area experiencing minor earthquakes is high.

Vulnerability & Impact

As mentioned above, none of the participants reported any kind of earthquake occurrence or damage from earthquakes since the previous HMP update. However, if a Cleveland earthquake (of a magnitude greater than 6/Mercalli VIII) were to occur within the planning area, the structures and infrastructures would be susceptible to shifting. Older structures would likely sustain damages.

The municipal building codes follow the earthquake guidance provided under the OUBCC and newer structures would likely sustain the damages better than older structures in the event of a Cleveland earthquake. Any persons caught inside these structures could be injured from falling debris from the ceiling and/ or walls, shattering glass, or objects falling off shelving. **None of the participating jurisdictions** have reinforced shelving in public places to prevent collapse during an earthquake.

The main vulnerability affecting **all participating jurisdictions** is a lack of training and practicing earthquake drills. Emergency responders have no formal responses incorporated into their emergency response protocols. If the planning area experienced an earthquake greater than a magnitude of 6/Mercalli VIII, it is a vulnerability that residents, teachers, students, and emergency personnel would have little or no earthquake response protocol in place to ensure their safety.

Considering the likelihood of the planning area experiencing a Cleveland earthquake resulting in catastrophic damages is very low, participation of the jurisdictions in the National Shakeout exercise would provide all jurisdictions a starting point for addressing the earthquake hazard.

2.4.3 Extreme Heat

Description

FEMA describes extreme heat as a “long period (2-3 days) of high heat and humidity with temperatures above 90 degrees.” (All degrees in this text will be in Fahrenheit.) Heat waves combined with a lack of precipitation create drought and increase the potential for wildfires.

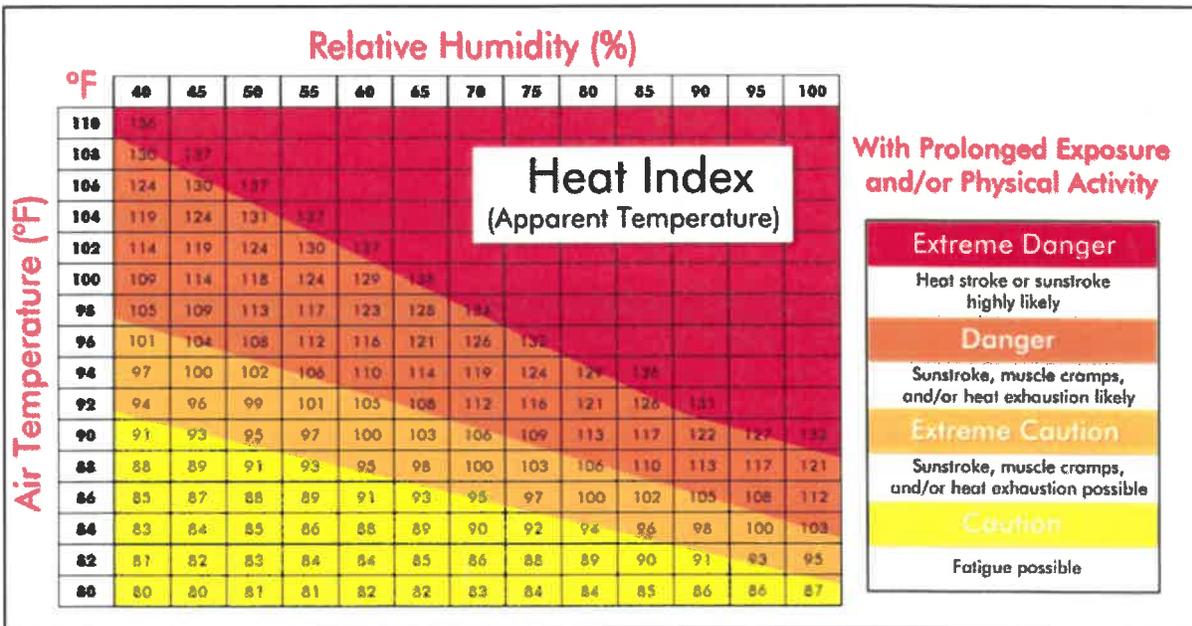
Location

The entire planning area experiences extreme heat.

Extent

The planning area uses the Relative Humidity Heat Index to categorize Extreme Heat. This chart shows how varying levels of heat and humidity affect humans, particularly during times of prolonged exposure and/or physical activity. The planning area can experience any value on this chart up to the middle Danger (orange) range (temperatures between 110-118 degrees).

If the conditions of high temperatures and relative humidity were conducive, the planning area has the potential to experience temperatures above 117 degrees.



Previous Occurrence

The planning area experiences extreme heat annually and expects an annual average of 91 days of extreme heat. The following table shows the annual number of days that the reported heat indices reached above 90 degrees between January 1, 2014 to December 31, 2024.

Number of Days with Extreme Heat in Cleveland County			
Year	Number of Days of Extreme Heat	Year	Number of Days of Extreme Heat
2014	81	2020	86
2015	87	2021	87
2016	98	2022	103
2017	78	2023	83
2018	100	2024	96
2019	100	2025	TBD

The highest heat index since 2014 occurred on July 11, 2020 at 114.83 degrees, with a maximum temperature of 100.24 degrees and a maximum relative humidity of 98.18 degrees. The second highest heat index since 2014 occurred on July 12, 2023 at 114.4 degrees, with a maximum temperature of 95.2 degrees and maximum relative humidity of 95.32 degrees. The third highest heat index since 2014 occurred on July 13, 2023 at 113.69 degrees with a maximum temperature of 97.27 degrees and maximum relative humidity of 91.66 degrees.

Probability

The probability of the entire planning area experiencing extreme heat is high.

Vulnerability & Impact

The table following details the vulnerability and impact Extreme Heat has upon the planning area. A summary follows.

Vulnerability and Impact of Extreme Heat in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	The county fairgrounds does not have a backup generator to maintain power during a power outage caused by extreme heat.	The lack of a generator at the county fairgrounds prohibits the facility from being used as a cooling station if it were required during a prolonged power outage due to extreme heat.
Lexington Noble Slaughterville	The city does not have formal documentation of the vulnerable populations of the community who would be particularly vulnerable to heat exhaustion during a prolonged power outage due to extreme heat.	The impact of this lack of information not being more accessible could result in poor communication/ notifications of public cooling stations available to those vulnerable populations and the public in general.
Norman	The city has an increasing population of homeless; the homeless and other vulnerable populations are vulnerable to heat exhaustion when temperatures have exceeded 90 degrees.	The impact of extreme heat can cause the emergency rooms and medical facilities to be overwhelmed during times of prolonged extreme heat.

Vulnerability and Impact of Extreme Heat in Cleveland County		
Jurisdiction	Vulnerability	Impact
Lexington PS Little Axe PS Norman PS Robin Hill PS	<p>School children do not always monitor their levels of exertion during recess or sporting events.</p> <p>The school does not have any backup generators to preserve food service in a prolonged power outage due to extreme heat.</p> <p>The schools rely on the municipalities for its electricity and water utilities. If the respective cities have a disruption of water or electricity service related to extreme heat, the campuses would be affected.</p>	<p>The impact of this is that teachers, coaches, and all staff must have a heightened awareness of the symptoms of heat-related illnesses.</p> <p>If extreme heat caused a prolonged power outage, the entire food service would spoil, resulting in an economic loss to the school.</p> <p>If the campus experienced a prolonged disruption of electricity or water utilities, the campus might need to consider remote instruction, cancelling classes and resuming once all utilities have returned to full capacity.</p>
OU	<p>The university relies on the municipalities for its electricity and water utilities. If the respective cities have a disruption of water or electricity service related to extreme heat, the campus would be affected.</p> <p>Students and game day spectators are vulnerable to heat exhaustion on days when football games occur in late summer as heat indices can reach over 90 degrees well into October.</p>	<p>If the campus experienced a prolonged disruption of electricity or water utilities, the campus might need to consider remote instruction, cancelling classes and resuming once all utilities have returned to full capacity.</p> <p>The campus and stadium need more cooling stations available to assist those who experience overheating and heat exhaustion due to extreme heat.</p>

Summary: Overall, Cleveland County and the municipalities do not have a single formalized documentation in their respective databases to quickly identify which critical facilities with backup generators could be used as cooling stations for vulnerable populations (elderly, school children, homeless) in the event of a widespread power outage due to extreme heat. The impact of this lack of information not being more readily available could result in not being able to communicate the location of public cooling stations to those vulnerable populations. The schools have no capability to be established as cooling stations throughout the county as none of the school districts have generators of any kind.

2.4.4 Flooding

Description

Various types of flooding can affect the planning area. The types of flooding include:

- Riverine flooding occurs when a river or stream rises above the banks and inundates the surrounding land.
- Low-lying areas and floodplains can experience flooding when there is excessive runoff from rainfall or melting snow.
- Flash flooding can result from extremely heavy rainfall from thunderstorms. Flash flooding can begin within 3 to 6 hours of heavy rainfall. Flash flooding can also occur after a dam or levee break.
- Sheet flooding results when excessive rainfall exceeds the drainage capabilities.

Factors that contribute to the severity of the flooding include the existing saturation of local soils, the local terrain, land use, and vegetation type and density.

Location

The planning area is affected by the types of flooding described above.

Extent

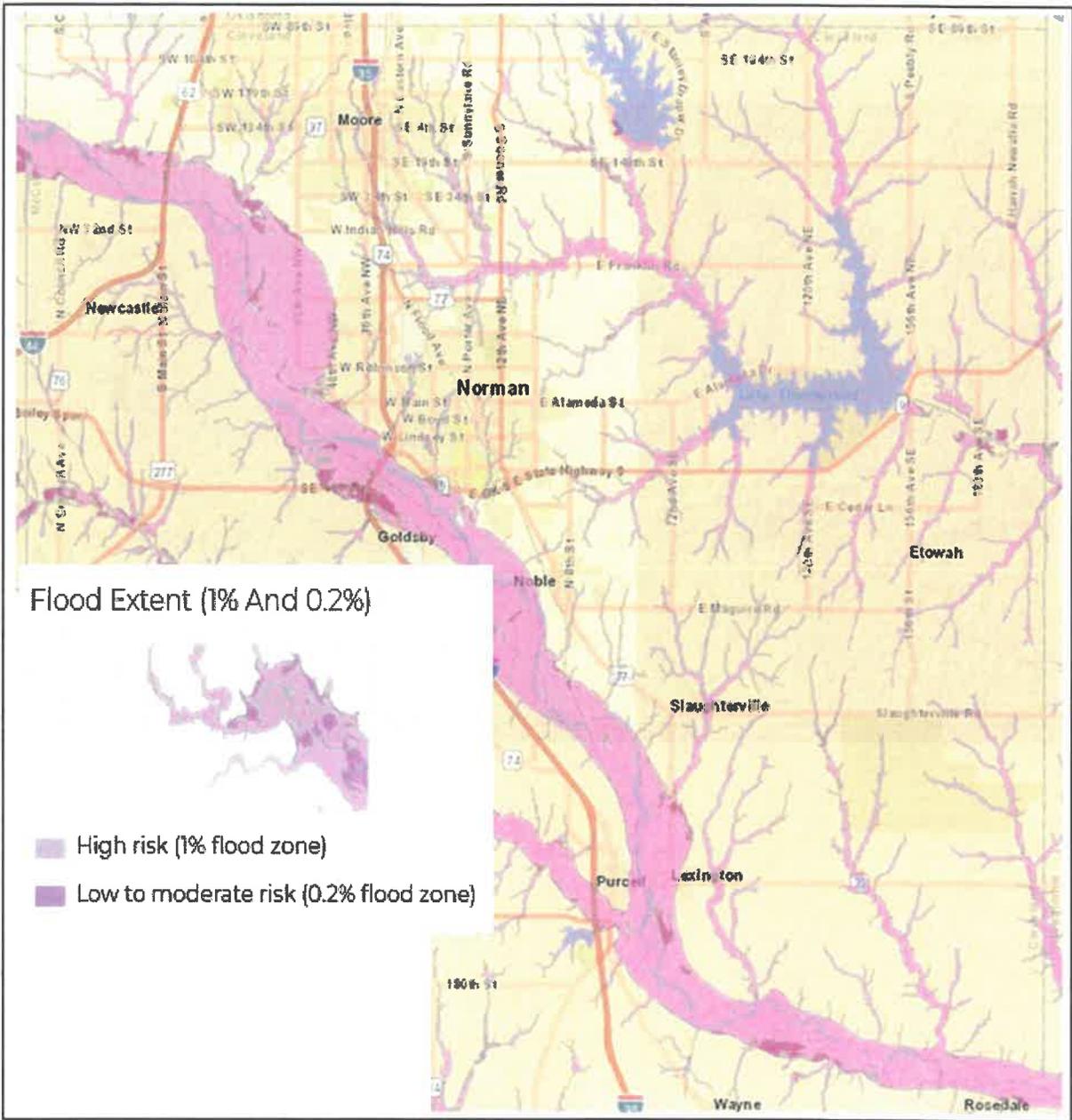
The planning area uses the FEMA Flood Damage Categories and Criteria to assess flood depth. The levels are described as follows:

FEMA Flood Damage Categories and Criteria	
Affected	0-6 inches of water inside the structure; minimal damage to the exterior and/or contents of the home
Minor	6-18 inches of water inside the structure; encompasses a wide range of damage that does not affect the structural integrity of the residence
Cleveland	18-48 inches of water inside the structure; structure sustains significant structural damage and will require extensive repairs
Destroyed	48+ inches of water inside the structure; structure is a total loss and repair is unfeasible

The planning area has the potential to experience the entire range of these flood levels, though the most likely range is from "Affected" to "Minor." Though in extremely heavy rainfall, there are a few areas throughout the planning area that could experience "Major" flooding.

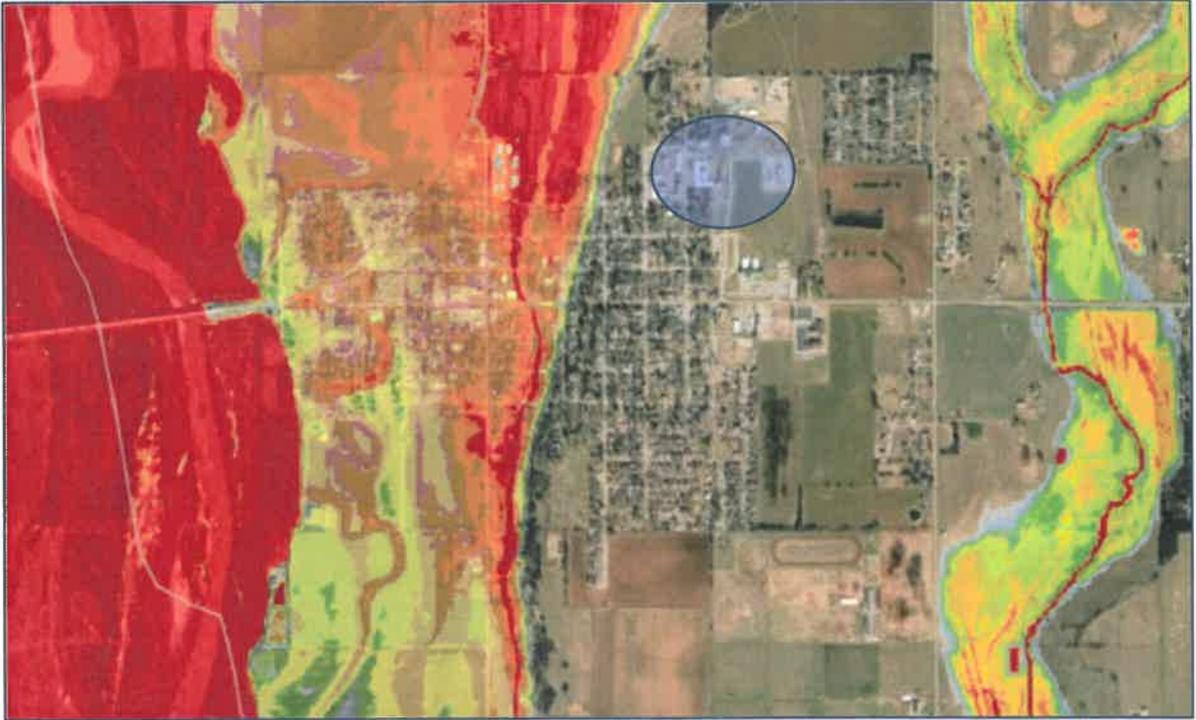
The following maps show the FEMA Flood Extent (1% and 0.5%) areas of concern for the planning area. The legend is included with the Cleveland County overview.

This map shows an overview of the 1% and 0.2% Flood Extent within Cleveland County. The Higher Risk areas are lighter purple, and the Low to Moderate Risk areas are darker purple.

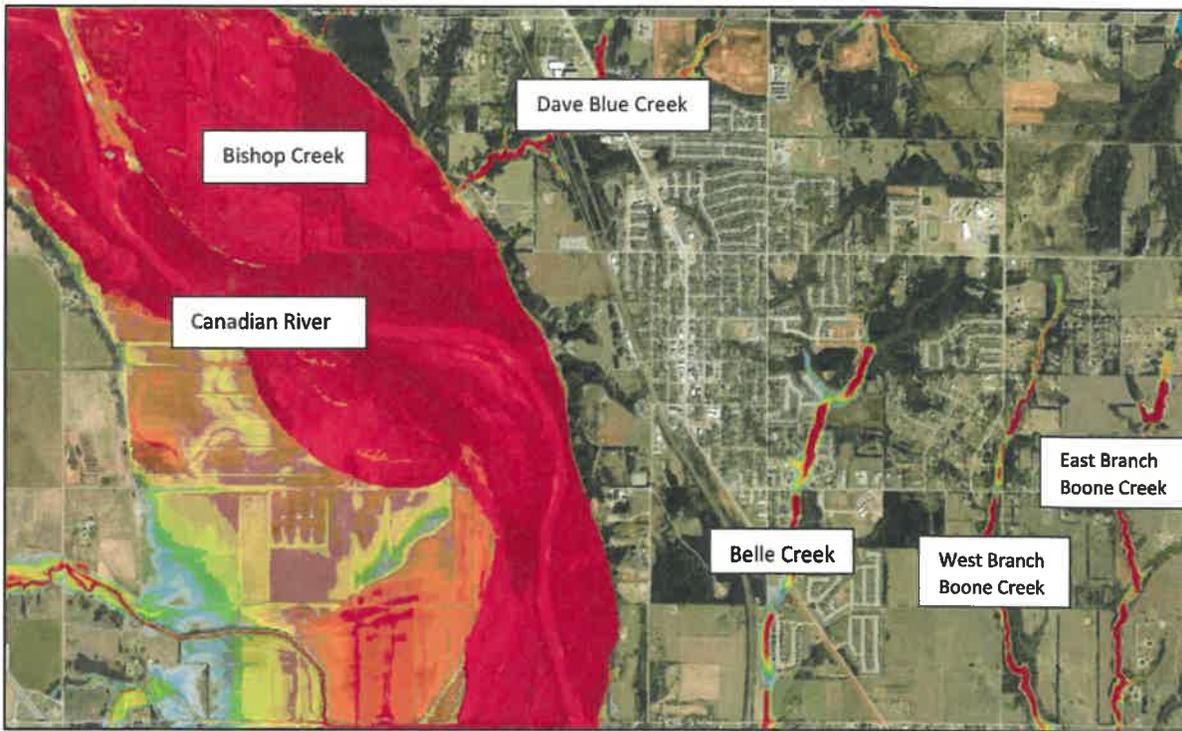


The following maps show the 1% and 0.2% flood extent for each municipality.

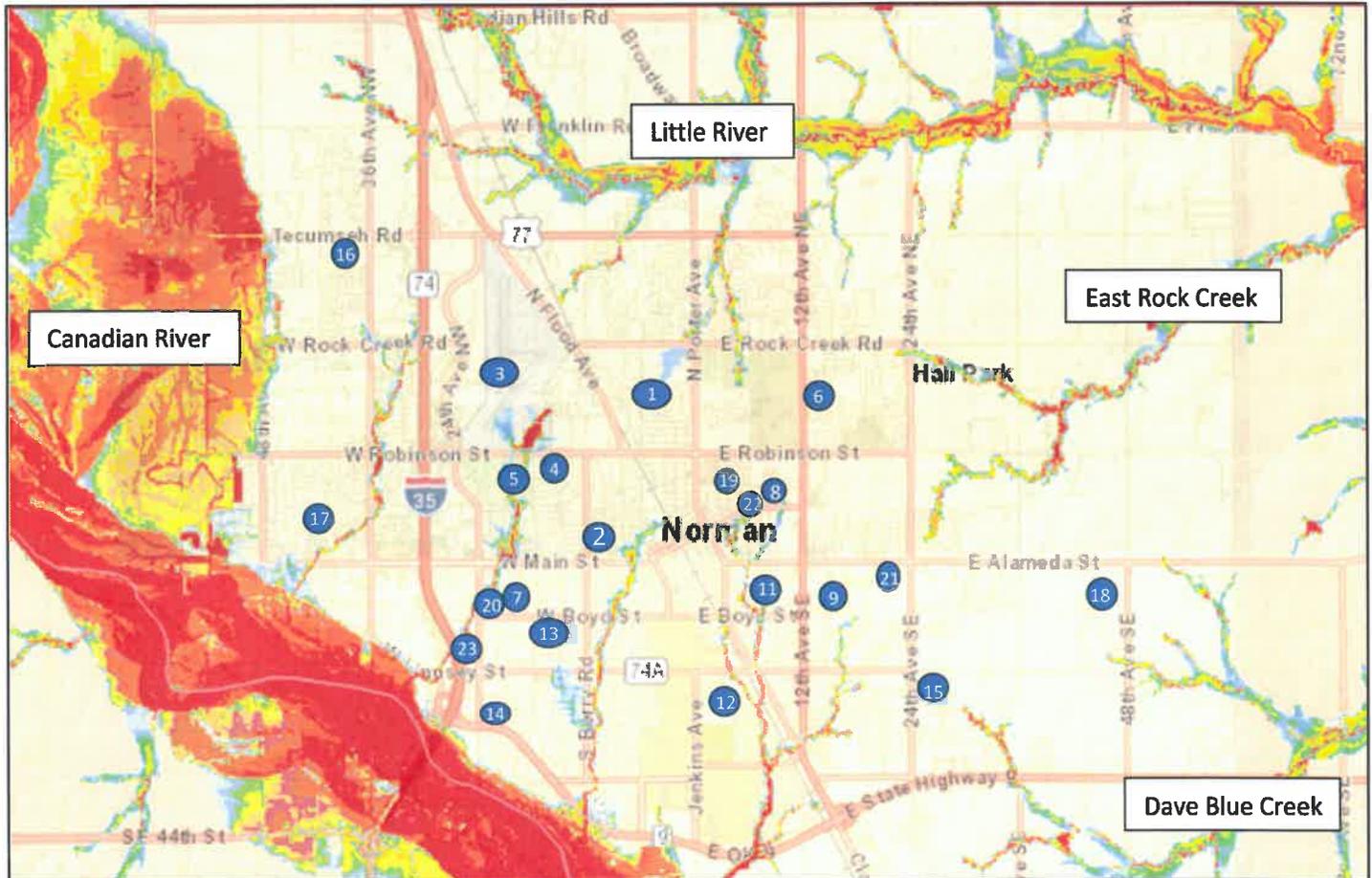
This map shows the 1% and 0.2% BFE for the City of **Lexington**. The flood extent ranges from less than 12" (light blue) to more than 5' (red), particularly on the northwest edge of Lexington along the Canadian River basin. **Lexington PS campuses** are indicated by a blue oval, and the school does not lie in a floodplain area.



This map shows the 1% and 0.2% BFE for the City of Noble. The Canadian River watershed area flows on the west side of Noble and as shown by the map, the creek bed can experience a range of flooding from less than 12" (light blue) up to 5' or more (red).



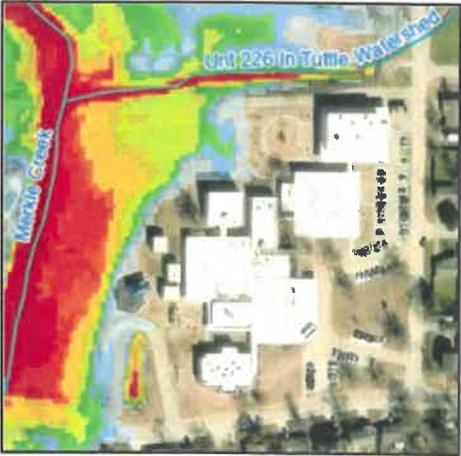
This map shows the 1% and 0.2% BFE for the City of Norman and the watershed areas for the Canadian River that flows on the west side of the city limits and creates the county line between McClain and Cleveland Counties. Little River and its tributaries flows east to Lake Thunderbird through the northeast side of Norman. East Rock Creek and Dave Blue Creek are tributaries that run through the central and southeast side of the city limits. As shown, the streets can experience a range of flooding from less than 12" (light blue) to 5' or more (red). The school campuses are numbered and listed on the following page.



Locations of Norman PS campuses noted above and listed in the table below. Lakeview Elementary is located outside the city limits of Norman, but is within the Norman PS district, and a map is included in the following narrative. Adams Elementary is the only campus that lies near a BFE within Norman.

1. Norman North HS	6. Eisenhower Elem.	11. Lincoln Elem.	16. Roosevelt Elem.	21. Irving MS
2. Norman HS	7. Jackson Elem.	12. Madison Elem.	17. Truman Elem.	22. Longfellow MS
3. OK Aviation Academy	8. Jefferson Elem.	13. McKinley Elem.	18. Washington Elem.	23. Whittier MS
4. Adams Elementary	9. Kennedy Elem.	14. Monroe Elem.	19. Wilson Elem.	
5. Cleveland Elem.	10. Lakeview Elem.	15. Reagan Elem.	20. Alcott MS	

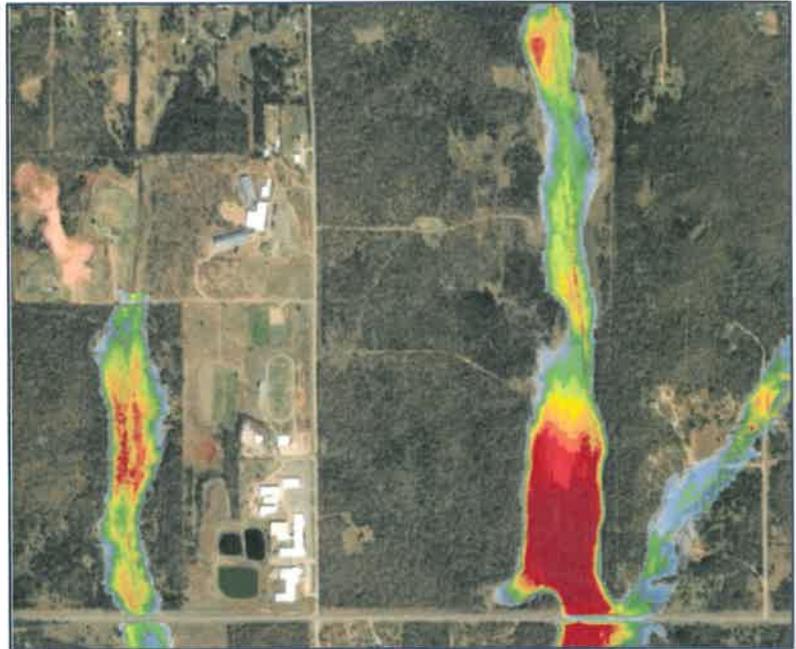
This map shows the 1% and 0.2% BFE near **Adams Elementary**; as shown, the buildings do not lie within the BFE. The BFE surrounding Merkle Creek could experience a range of flooding from less than 12" (light blue) to 5' or more (red).



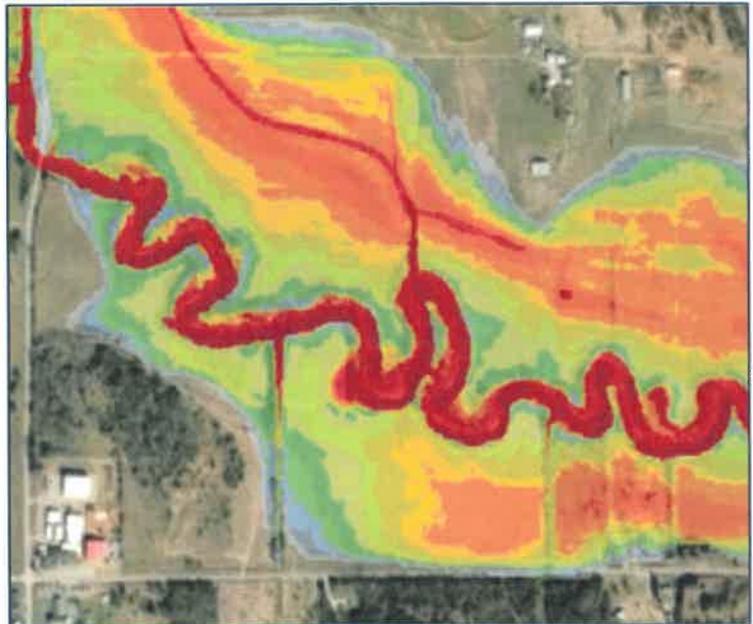
This map shows the 1% and 0.2% BFE of **Lakeview Elementary**; as shown, there is no BFE area around this school.



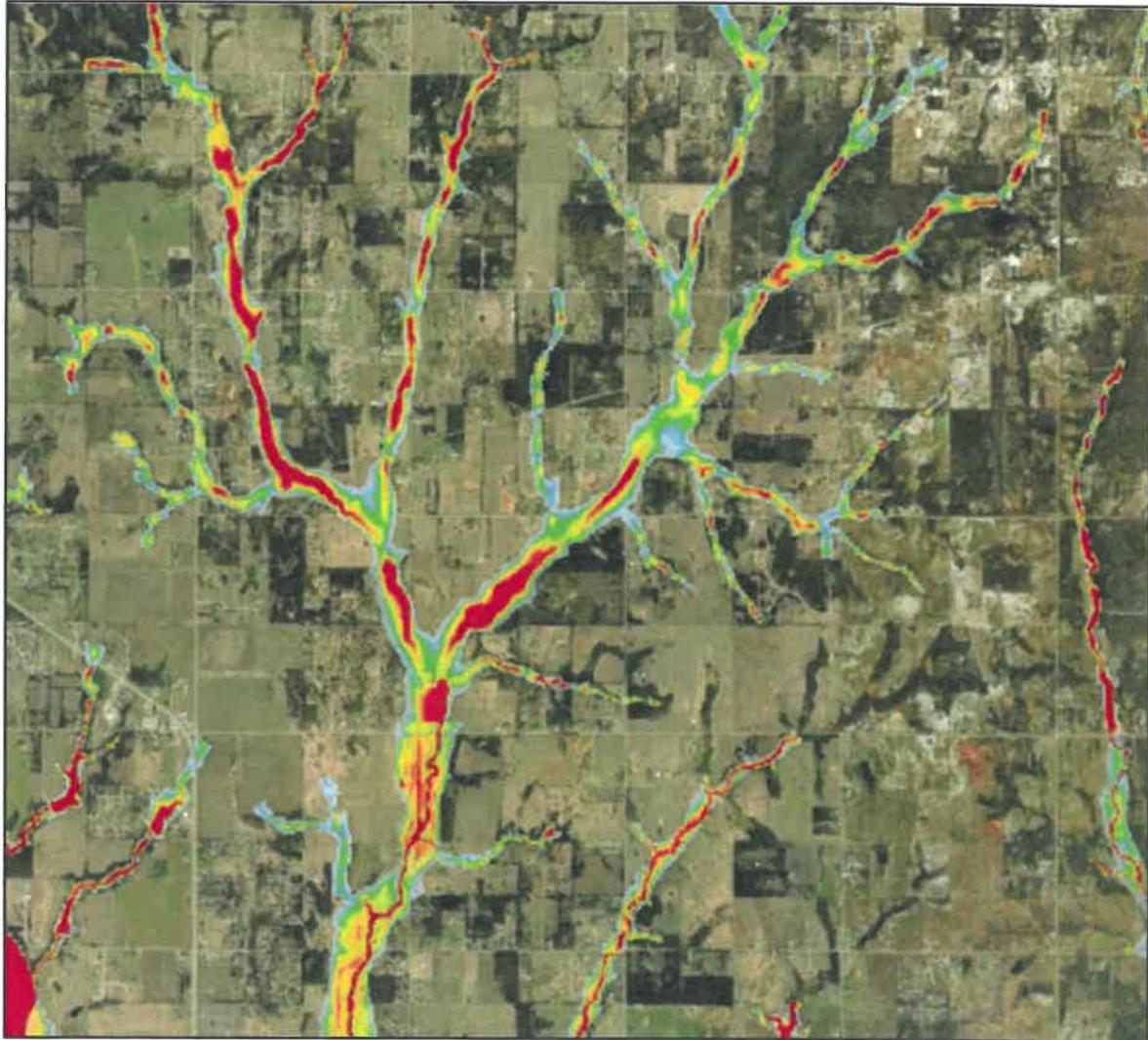
This map shows the 1% and 0.2% BFE for Little Axe PS. Little Axe PS is located east of Lake Thunderbird in Unincorporated Cleveland County. The campus lies between two tributaries off the Little River, but none of the school buildings are within the BFE. The BFE could experience a range of flooding from less than 12" (light blue) to 5' or more (red).



This map shows the 1% and 0.2% BFE for Robin Hill PS. Robin Hill PS is located near the Little River, but the school campus does not lie within the BFE. The BFE surrounding Little River could experience a range of flooding from less than 12" (light blue) to 5' or more (red).



This map shows the 1% and 0.2% BFE for the town of **Slaughterville**. Slaughterville has multiple tributaries throughout the town limits from the Tuttle watershed, West Willow watershed, and the Canadian River. These areas could experience a range of flooding from less than 12" (light blue) to 5' or more (red). There are no schools in Slaughterville, and the town's population is comparatively spread out, with open acreage between homes.



Previous Occurrence

The following table details the flooding events as recorded by the NCEI between January 1, 2014 and April 30, 2025.

Date	Location	Event Details
May 8, 2015	Norman	Water rescue near Main Street and SW 48 th ; damages unknown.
May 9, 2015	Norman	City streets flooded on the north side of Norman and many cars stalled in the waters. An estimated \$80,000 in damages occurred.
May 19, 2015	Norman Noble	Flooding at Lindsay and McGee streets. An estimated \$180,000 in damages occurred in Norman. In Noble, water was over the roadway at Etowah Road and Highway 77.
May 23, 2015	Norman Noble	Up to 2' of water over the road at the intersection of Lindey and Elm in Norman. In Noble, high water rescues occurred along Cedar Lane at 60 th and 24 th . Estimated damages were \$60,000 in Norman. In Noble, cars also stalled at 8 th and Etowah Road. Damages estimated at \$60,000 total for flooding events in Noble. Another vehicle was swept away in the flooding at 36 th Ave SE and Cedar Lane; an additional \$20,000 in damages occurred.
May 23, 2015	Uninc. Cleveland Co.	Multiple water rescues around Lake Thunderbird and the Little Axe FD assisted to rescue residents from their homes in the area. An estimated \$400,000 in damages occurred. Harrah Road washed out between Indian Hills and Tecumseh Road, and 3' of water went over Peebly Road, caused \$10,000 in damages.
June 15, 2015	Norman	Multiple water rescues and road closures near Alameda and 12 th Ave in Norman.
December 26, 2015	Norman	Between 6" to 12" of water was reported at I-35 and Highway 9 exit.
July 3, 2016	Norman, Uninc. Cleveland Co.	Flash flooding occurred throughout Norman. Outside city limits, 6" to 8" of water flowed over the road.
March 29, 2017	Norman	Water rescue for a car stalled in water.
August 22, 2017	Norman	Up to 3' of water flowed at the intersection of Boyd and Classen Blvd due to excessive rainfall. Stranded vehicles were located at 12 th Ave NE and E. Robinson due to the flooding.
June 7, 2018	Norman	Flooding occurred along Tecumseh Road, Boyd St., and other high traffic intersections throughout Norman.
August 14, 2018	Norman, Uninc. Cleveland Co.	Road closures and flooding over some roads. Road closed at E. Fox Lane between Walker and Portland. Some additional closures near the southwest area of Cleveland Co. Chautauqua Ave. and Imhoff Road had rapid water flowing over the road. Highwater rescues also occurred.
May 21, 2019	Norman	A few roads closed in Norman due to high water.
June 9, 2019	Norman	High water rescues close to the OU campus occurred.
June 23, 2019	Norman	Curb to curb flooding across the flood prone areas of the OU Campus.

August 31, 2020	Norman	Multiple reports of flooding over the streets across Norman. The water made Lindsay and Elm impassable.
April 28, 2021	Norman	Flooding occurred in the flood prone areas of the city, mostly on the NW side of Norman.
May 27, 2021	Norman	At Lindsay and Elm, water was up to 2' across the road and at least 3 cars stalled.
June 28, 2021	Norman	Several neighborhood streets had water across the road, with 6" over the streets.
December 13, 2022	Norman	A car stalled on Jenkins due to the floodwaters.
July 9, 2023	Norman, Noble	In Norman, social media and broadcast images showed 6" to 12" of flowing water flooding the typical intersections near the OU campus. Heavy rain caused a dry creek bed to overtop in portions at the Indian Hills Road bridge and 24 th Ave. NW. In Noble, Dave Blue Creek exceeded its banks and flooded a portion of 60 th Ave and Highway 9; a stalled vehicle occurred here.
July 11, 2023	Norman	Flooding at Lindsay and Elm occurred here.
September 22, 2024	Norman	Vehicle stalled at 36 th Ave. NW and Rock Creek Road. Lindsay and Elm also flooded in this storm. Approximately \$20,000 in damages occurred.
April 26, 2025	Norman, Lexington, Noble,	In Norman, a stranded vehicle in floodwaters near Goddard Ave. and 24 th Ave.; flooding also occurred at NW and Indian Hills Road as a tributary of Little River rose. The dry creek at Andrews Park exceeded its banks in Norman. Multiple reports of flooding from Willow Creek occurred in Lexington and multiple water rescues.
April 30, 2025	Norman, Uninc. Cleveland Co.	Flooding occurred near and on the OU campus, downtown Norman, and Highway 9. Road closures and stranded vehicles resulted. The Canadian River along Rock Creek Road between 48 th and 72 nd Ave. NW showed flooding.

The Cleveland County commissioners reported that culverts and drainage areas routinely need to be cleaned out. The county commissioners, as well as the municipalities, have identified the intersections that routinely flood or are prone to excessive flooding when several inches of rain fall in the area.

Probability

The probability of the planning area experiencing flooding is high.

Vulnerability & Impact

The entire planning area is vulnerable to the effects of flooding as there are numerous tributaries flowing off the Canadian River, Little River, and numerous creeks and tributaries. **Lexington, Noble, and Norman** all experience flooding from slow drainage due to aging infrastructure and the development of housing in the area.

The following table details the vulnerability and impact of each community as it relates to flooding.

Vulnerability and Impact of Flooding in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	Drainage areas and culverts routinely fill with debris and mud, causing water to back up and flood roads when excessive rainfall occurs. These areas are primarily along the Canadian River and its tributaries that flow throughout the county.	Broken infrastructure requires regular maintenance that slows traffic and causes minor delays.
Lexington	Chouteau Creek flows throughout Lexington and the town is vulnerable to flooding when the creek exceeds its banks. The aging drainage system becomes easily overwhelmed when rainfall comes.	The main roads throughout Lexington become inundated and traffic must be directed. There is a need for a study to determine how the creek could be either redirected or the existing channel can be rehabilitated. The lack of efficient drainage causes the drains to back up and the lift stations cannot process the water quickly.
Noble	The town is vulnerable routinely flooding the areas where the creeks flow through town.	The flooding causes delays where the water floods the streets and delays any travel through the area. If a detour is required, it is a long detour around the flooded road.
Norman	The area around Imhofe Creek is vulnerable to flooding due to poor drainage. The stormwater infrastructure is aging and in need of rehabilitation; a study and new drainage systems are needed to improve the drainage throughout the city. There is a need to address the homeless population in the drainage areas as they seek shelter in large drainage areas.	The flooding causes the roads and infrastructure to deteriorate faster, resulting in an economic loss to repair the streets, curbs, and sidewalks in the area. The city needs to construct a retention/detention pond to reduce the flooding and redirect the waters without causing new flooding issues downstream. Current damages and work on this area are an economic loss to the city. The aging infrastructure cannot drain the roads efficiently and the flooding overwhelms the stormwater system when significant rains fall. When the homeless population seeks shelter in the large culverts, there is a concern that they will come to harm in heavy rains. There is also a concern that the possessions will obstruct the flow of water and cause residual issues that will be an economic loss to the city, in addition to the life and safety of the homeless population.
Slaughterville	While the town does not have an issue with flooding, Highway 77 provides access through Slaughterville and could experience flooding.	If a significant rain were to fall, the highway has the potential to be flooded, causing traffic delays and possibly limiting access to Slaughterville.

Jurisdiction	Vulnerability	Impact
Lexington PS	The road that provides main access to Lexington is vulnerable to flooding from Chouteau Creek.	This flooding can impede the bus routes to and from school, causing long detours.
Little Axe PS Norman PS Robin Hill PS	The bus routes have identified areas where the roads are vulnerable to flooding.	The flooding causes delays in traffic and slows down the pick-up and drop-offs, depending on when the flooding occurs. Flooding can impede the bus routes, both in town and on rural roads, to and from school, causing long detours.
OU	If city streets become inundated, it can delay transportation to and from the university.	Since the campus has so many commuters and students, when the streets become flooded, the traffic delays affect the City of Norman and its flow of traffic.

2.4.5 Hail

Description

Hail is a frozen form of precipitation that occurs when precipitation has been swept back into the clouds by an updraft. Hailstones larger than the size of a quarter can result in thunderstorms with powerful updrafts. Hail usually accompanies supercell storms with a sustained rotating updraft. Once the updraft can no longer support the weight of the hailstone, it falls to the ground. Hail can vary in size from small pieces of ice that do little or no damage to very large stones that destroy homes, cars, crops, and other trees and vegetation.

Location

Hail affects the entire planning area.

Extent

Hail varies depending on the severity of storms that pass through the planning area. The planning area uses the NWS Hail Estimate Chart that provides general guidelines describing the extent of damage to be expected from various sizes of hailstones. It is possible that any size of hail described in the NWS Hail Estimate Chart could occur within the planning area; however, *the expected range of hail is between ¼" to 3"*. The participating jurisdictions consider any hail over an inch in diameter to be a threat for causing harm to anyone caught outdoors and/or causing damage to vehicles, structures, livestock, and crops.

NWS Hail Estimate Chart	
Hail Diameter (inches)	Size Description
¼"	Pea; no damage
½"	Penny or large marble; slight damage to vegetation
¾"	Penny or large marble; significant damage to vegetation and crops
7/8"	Nickel; severe damage to crops, damage to glass, plastic structures, paint and wood scoring
1"	Quarter; severe damage to crops, damage to glass, paint and wood scoring
1 ¼"	Half dollar; widespread glass damage to tile roofs, significant risk of injury
1 ½"	Walnut or ping-pong ball; widespread glass damage and vehicle body damage
1 ¾"	Golf ball; destruction of glass, damage to tile roofs, significant risk of injury
2"	Hen's egg; aircraft body dented, brick wall pitted
2 ½"	Tennis ball; severe roof damage, risk of serious injury
2 ¾"	Baseball; severe damage to aircraft bodywork
3"	Teacup size; severe damage to aircraft bodywork
4"	Grapefruit; extensive structural damage, risk of severe or fatal injury to people in the open
4 ½"	Softball; extensive structural damage, risk of severe or fatal injuries to people out in the open

Previous Occurrence

The National Centers for Environmental Information (NCEI) reports that Cleveland County as a whole had 55 hail events between January 1, 2014 to December 31, 2024. It should be noted that multiple hail events occurred on a single date, either in one location at different times, or at multiple locations in a single storm.

The largest hailstone reported during this time frame measured 3.41" from a hail event on May 4, 2020. Another event occurred on April 28, 2021 in Lexington and Norman and reported 3" hail. The next largest hailstones fell on May 4, 2020 and on April 28, 2021 and measured 2.75".

The following table shows how many days had hail events documented in the planning area between January 1, 2014 and December 31, 2024. None of these events resulted in a loss of life or any injuries.

Number Days with Hail Events between January 1, 2012 and December 31, 2022 in Cleveland County			
Year	Number Days with Hail Events	Year	Number of Hail Events
2014	2	2020	4
2015	4	2021	3
2016	6	2022	4
2017	5	2023	10
2018	4	2024	6
2019	7		6

Note: several of these hail events produced widespread hail in the planning area and multiple reports with hailstones ranging in various sizes occurred on these dates. May 4, 2020; August 31, 2020; April 28, 2021; April 19, 2023; June 12, 2023; and September 24, 2024 each had widespread hail reports.

Little Axe PS reported that hail damage from the May 4, 2020 event caused \$3.8 million in damages.

Norman PS reported that several buildings required new roofing after hail events in 2022; the school district had \$30 million in damages.

The City of Noble had extensive hail damage to the police fleet vehicles in 2023 and the damages cost the city \$14,000. In 2024, 12 of the 17 police cars required repairs and the damages cost \$38,000.

Probability

The probability for the planning area to experience hail events is high.

Vulnerability & Impact

All participating jurisdictions could experience hail at any time due to the strong storm systems that develop and pass through the planning area. April through June typically produces the most violent storms in central Oklahoma, and as documented above, historically, the month of May has produced the most violent hail events in Cleveland County.

The following table details the vulnerabilities and impact for each jurisdiction.

Vulnerability and Impact of Hail in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	<p>The windows at the courthouse do not have impact resistant film and would be vulnerable to hail.</p> <p>The county does not have any covered parking at the courthouse. Any county owned vehicles parked outdoors at the courthouse would be vulnerable to a hail event.</p>	<p>Glass could shatter and injure anyone in close proximity to the airborne shards of glass.</p> <p>County-owned vehicles could be damaged in hail events. The resulting damages could mean that vehicles would be out of commission until repairs were done. Having vehicles out of commission could then cause a delay in completing road projects.</p>
Lexington	<p>The roofing on the city hall is vulnerable to the effects of hail as it is not a metal roof.</p> <p>The windows do not have impact resistant film and are vulnerable to hail.</p>	<p>Extensive hail damage would result in an economic loss to the town.</p> <p>Glass could shatter and injure anyone in close proximity to the airborne shards of glass.</p>
Noble	<p>The windows do not have impact resistant film and are vulnerable to hail.</p> <p>The city does not have covered parking for its fleet vehicles. Any city owned vehicles parked outdoors at the city hall is vulnerable to hail events.</p>	<p>Glass could shatter and injure anyone in close proximity to the airborne shards of glass.</p> <p>City-owned vehicles could be damaged in hail events. The resulting damages could mean that vehicles would be out of commission until repairs were done, delaying projects.</p>
Norman	<p>The city does not have covered parking for all of its fleet vehicles. Any city owned vehicles parked outdoors at the city hall is vulnerable to hail events.</p>	<p>City-owned vehicles could be damaged in hail events. The resulting damages could mean that vehicles would be out of commission until repairs were done, delaying projects.</p>
Slaughterville	<p>The windows at the town hall do not have impact resistant film and are vulnerable to hail.</p> <p>The town does not have covered parking for its fleet vehicles. Any town owned vehicles parked outdoors at the town hall would be vulnerable to a hail event.</p>	<p>Glass could shatter and injure anyone in close proximity to the airborne shards of glass.</p> <p>Town-owned vehicles could be damaged in hail events. The resulting damages could mean that vehicles would be out of commission until repairs were done, delaying projects.</p>

Vulnerability and Impact of Hail in Cleveland County		
Jurisdiction	Vulnerability	Impact
Lexington PS Little Axe PS Norman PS Robin Hill PS	Some windows on various school buildings do not have impact resistant film and are vulnerable to hail. Older roofing, especially any flat composite roofing, on some of the school buildings are vulnerable to hail.	Glass could shatter and injure anyone in close proximity to the airborne shards of glass. Hail damage to the roof could cause weak places over time or result in a total loss in a single hail event. Either situation is an economic loss to the school.
OU	The radar equipment and communications towers, as well as the windows in some of the buildings across the OU campus and the Westheimer Airport, are vulnerable to hail events. The campus has limited covered parking for fleet vehicles.	If the radar equipment and communications towers are damaged in hail, it could cause communication issues with any aircraft seeking to land or depart at the airport. If any windows are broken in hail events, any electronic devices, or other contents of the room could be damaged or broken as well. Hail damage to fleet vehicles would cause vehicles to potentially be out of commission until repaired.

Extensive hail damage to infrastructure can cause economic loss to schools, municipalities, and the county. Depending on the damage from any hail event, the repairs to roofing, buildings, signage, street lights, or any other infrastructure cause economic loss and potential project delays from the vehicles spent in repairs.

It is assumed that anyone caught outdoors during a hail event could be injured, especially if the hail is more than an inch in diameter.

If the hail is large, tree limbs and branches can be stripped from trees and crops can be utterly destroyed. Hail events have the potential to cause power outages if hail damages the transformers, fuses, or other components on electric utility lines and poles.

2.4.6 High Winds

Description

Wind is the movement of air relative to the earth's surface. The NWS issues wind advisories when sustained winds of 40 mph or greater occur. High winds can occur during severe thunderstorms and on extraordinarily windy days without another accompanying natural hazard.

High winds can be classified as:

- "Straight-line" winds, with speeds reaching 58 mph or more;
- Downdraft winds, small columns of air that sink quickly to the ground;
- Microbursts (less than 4 kilometers wide); and
- Macrobusts (more than 4 kilometers wide).

Location

All jurisdictions are affected by high winds.

Extent

The planning area uses the Beaufort Scale below as a guide to measure winds, and all jurisdictions have the potential to experience wind speeds of any value on this scale.

Beaufort Number	Wind Speed (miles/hour)	Wind Speed (km/hour)	Wind Speed (knots)	Description	Wind Effects on Land
0	<1	<1	<1	Calm	Calm. Smoke rises vertically.
1	1-3	1-5	1-3	Light Air	Wind motion visible in smoke.
2	4-7	6-11	4-6	Light Breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	12-19	7-12	Gentle Breeze	Leaves and smaller twigs in constant motion.
4	13-18	20-28	11-16	Moderate Breeze	Dust and loose paper are raised. Small branches begin to move.
5	19-24	29-38	17-21	Fresh Breeze	Small trees begin to sway.
6	25-31	39-49	22-27	Strong Breeze	Large branches are in motion. Whistling is heard in overhead wires. Umbrella use is difficult.
7	32-38	50-61	28-33	Near Gale	Whole trees in motion. Some difficulty experienced walking into the wind.
8	39-46	62-74	34-40	Gale	Twigs and small branches break from trees. Cars veer on road.
9	47-54	75-88	41-47	Strong Gale	Larger branches break from trees. Light structural damage.
10	55-63	89-102	48-55	Storm	Trees broken and uprooted. Considerable structural damage.
11	64-72	103-117	56-63	Violent Storm	Widespread damage to structures and vegetation.
12	>73	>117	>64	Hurricane	Considerable and widespread damage to structures and vegetation. Violence.

Previous Occurrence

The planning area was included in numerous high wind warnings, advisories, and watches between January 1, 2014 and December 31, 2024.

The planning area had 116 wind advisories issued during this time frame. The table below shows the dates that wind advisories were issued for the planning area; red-flag advisories and wind chill advisories will be included under the hazard profiles Wildfire and Winter Weather respectively. The dates are included to demonstrate that high winds can occur any time of year and do not always accompany a severe thunderstorm.

Number of days with Wind Advisories in Cleveland County 2014-2024					
2014	2015	2016	2017	2018	2019
January 12, 27	January 25	February 8, 18, 23	January 22, 24	January 11, 22	January 19
February 17, 20	February 1, 4	March 6, 22	February 12	March 5, 6	February 23
March 11, 16, 26	March 26	April 5	March 6, 23, 24	April 3, 13, 14	March 9
April 13, 16, 27	April 3	October 17	April 30	May 11	April 10, 13
May 11	November 11, 21	November 17	May 17	November 25	November 11, 26,30
October 13		December 16, 25	October 15, 27	December 13	
November 11, 23			November 18		
December 25					
2020	2021	2022	2023	2024	2025
March 20	January 14, 15, 30	January 15, 19	January 12	January 8, 12, 19	TBD
April 12	February 4	February 17	February 14, 26	February 27	
June 9	March 10, 17	March 17, 22, 29, 30	March 16, 31	March 24	
September 27	April 6, 9, 26	March 6, 7, 19, 22, 29	April 4	April 6	
October 29	October 28	May 30	May 7	May 2	
November 14, 15	December 6, 10, 15	October 25	December 7	October 28	
December 23		December 3, 22, 28		November 18	

This table shows that the annual number of days that planning area experiences with sustained wind speeds over 30 mph. The planning area experiences an annual average of 13 days with sustained wind speeds that exceed over 30 mph. The strongest wind speed recorded within the planning area occurred on May 8, 2015 at 48.34 mph. The second strongest wind speed recorded occurred on July 11, 2020 at 45.88 mph. The third strongest wind speed recorded on June 17, 2023 at 44.16 mph.

Number of Days with Wind Gusts over 30 mph between 2014-2024					
Year	Range of Wind Gusts (MPH)	Number of Days	Year	Range of Wind Gusts (MPH)	Number of Days
2014	30.0-37.51	16	2020	30.38-45.88	14
2015	30.0-48.34	19	2021	30.76-38.05	11
2016	30.04-35.81	11	2022	30.00-37.49	15
2017	30.82-42.39	10	2023	30.06-44.16	11
2018	30.67-43.96	13	2024	30.24-35.59	9
2019	31.36-40.51	13			

The jurisdictions noted minor damages from high winds between 2014-2024, aside from occasional and brief power outage or tree limbs breaking.

Probability

The probability of the planning area experiencing high winds is high.

Vulnerability & Impact

All jurisdictions noted in the planning sessions that high winds are the most common cause of power outages in the planning area. The high winds can break the transformers or break lines, as well as breaking tree limbs that then could fall upon the power transmission lines. Power outages cause delays to routine services if the power companies cannot restore power quickly. The table details the vulnerability and impact of high winds in the planning area.

Vulnerability and Impact of High Winds in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	The county is vulnerable to power outages and blackouts due to high winds. The district barns do not have reinforced roofing.	Power outages cause delays to routine services if the power company cannot restore power quickly. Depending on the time of year, extreme heat or extreme cold could be more of a concern to vulnerable populations if power outages are prolonged, preventing these populations from proper cooling or warming. Repairs would result in an economic loss and possibly relocating to conduct business.

Vulnerability and Impact of High Winds in Cleveland County		
Jurisdiction	Vulnerability	Impact
Lexington Noble Slaughterville	<p>The city is vulnerable to power outages and blackouts due to high winds. Transformers and power lines are vulnerable to breaking in high winds. Tree branches broken in the winds can also fall and break power lines, causing additional repairs.</p> <p>The municipal buildings do not have reinforced roofing and could be vulnerable to blowing off in extremely high winds.</p>	<p>Power outages cause delays to routine services if the power company cannot restore power quickly. Depending on the time of year, extreme heat or extreme cold could be more of a concern to vulnerable populations if power outages are prolonged, preventing these populations from proper cooling or warming.</p> <p>Repairs would result in an economic loss and/or the town having to close or relocate business until roof repairs are made.</p>
Norman	<p>The current generator at city hall is insufficient to power the entire building during a power outage due to high winds. City hall, the fire department, and the library are all housed in one large building.</p>	<p>The lack of a generator at the city hall prohibits the facility from being used as a cooling station or warming station, depending on the season, if it were required during a prolonged power outage due to high winds.</p>
Lexington PS Little Axe PS Norman PS Robin Hill PS	<p>The school is vulnerable to power outages and blackouts due to high winds. The schools lack generators to maintain basic power and preserve the food service until power is fully restored.</p> <p>Most of the roofing is not reinforced and could be vulnerable to exceptionally high winds.</p>	<p>Power outages can affect the school's communication and security systems. The lack of a generator results in the school losing its food service in a prolonged power outage.</p> <p>Any roof repairs caused by high winds results in an economic loss to the school.</p>
OU	<p>The roofing on some of the older structures at the Westheimer Airport is not reinforced and vulnerable to damage from exceptionally high winds.</p> <p>Some of the outdoor equipment is vulnerable to damage from high winds.</p>	<p>Any roof repairs caused by high winds results in an economic loss to the university.</p> <p>Damaged radar or communications equipment compromises reliable communications with aircraft and repairs are an economic loss to the university.</p>

2.4.7 Lightning

Description

The National Severe Storms Laboratory defines lightning as, “a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity or the air breaks down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.”

Location

The planning area can experience lightning strikes.

Extent

Lightning strikes have been underreported compared to other hazards due to their unpredictability and highly variable occurrences.

The planning area references the Lightning Activity Level (LAL) Scale to categorize Lightning Extent. The planning area can and expects to experience any level on LAL Scale shown on the right.

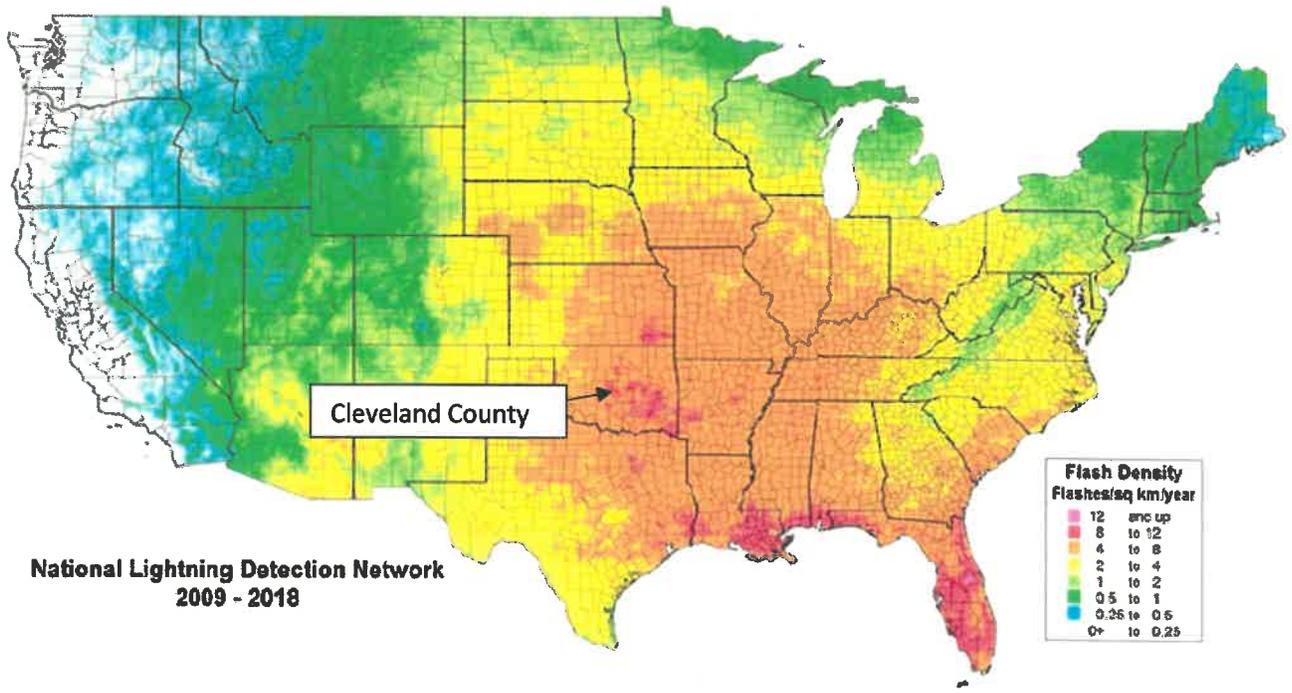
Using this scale, anecdotal conclusions can result for each storm that passes over Cleveland County. However, as lightning strikes are highly unpredictable, and using anecdotal information is not always reliably reported to county, municipal, and school officials, the planning team also uses the Vaisala Lightning Reports to inform long-term lightning mitigation planning.

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 than 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.

Previous Occurrence

According to the data from Vaisala, the planning area receives 4-12 lightning strikes annually between 2009-2018.

U.S. Cloud-to-Ground Flash Density Map, 2009-2018



This map showing the 2016-2023 Cloud-to-Ground flash density map, and Cleveland County experienced 6-8 lightning strikes per square kilometer per year.

Cloud-to-ground flash density in the U.S.

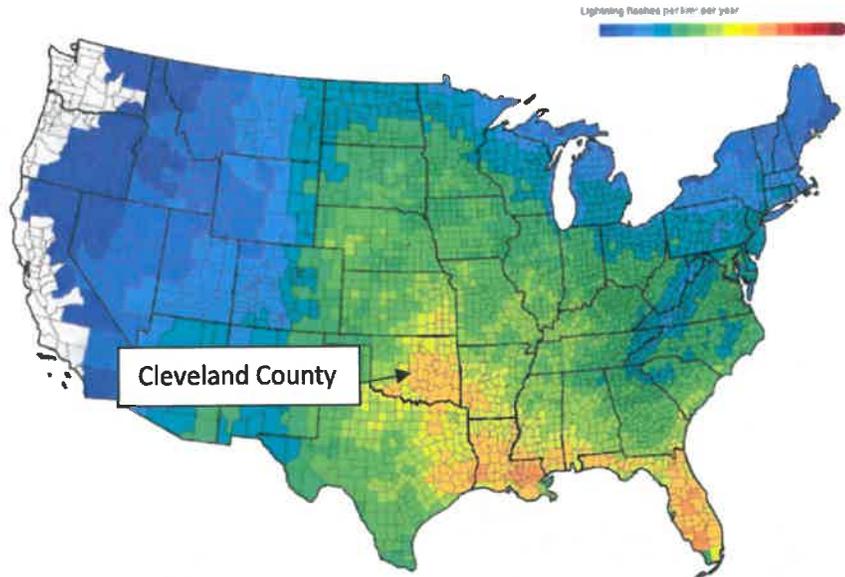
2024 GRIDDED 2016-2023
 2024 COUNTY 2016-2023

#1 by count

Cocoma County, Arizona, saw 84,994 cloud-to-ground flashes in 2024

#1 by density

San Jacinto County, Texas, saw 11.2 ground flashes per km² in 2024



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This map shows the 2024 Cloud-to-Ground flash density map, and Cleveland County experienced 5-6 lightning strikes per square kilometer per year.

Cloud-to-ground flash density in the U.S.

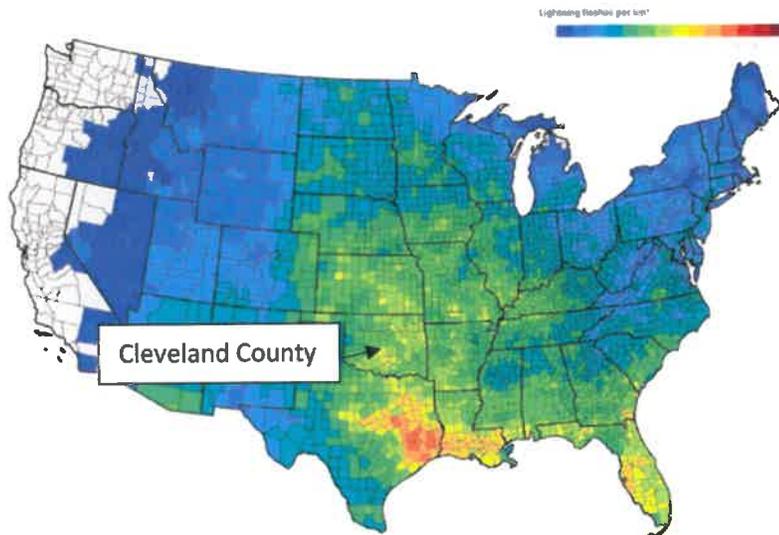
2024 GRIDDED 2016-2023
 2024 COUNTY 2016-2023

#1 by count

Cocoma County, Arizona, saw 84,994 cloud-to-ground flashes in 2024

#1 by density

San Jacinto County, Texas, saw 11.2 ground flashes per km² in 2024



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Probability

The probability of the planning area experiencing lightning strikes is high.

Vulnerability & Impact

The table following details the vulnerability and impact Lightning has upon the planning area.

Vulnerability and Impact of Lightning in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	<p>The unincorporated areas are vulnerable to lightning strikes that ignite wildland fires throughout the county.</p> <p>Electronics and electronic systems are vulnerable to direct lightning strikes.</p>	<p>If a lightning strike hits a dry grass or vegetation in drought conditions, it can cause a wildfire.</p> <p>If the electronics were damaged by a lightning strike, it would result in an economic loss to repair, in addition to causing delays in routine business operations and communications.</p>
Lexington Noble Norman Slaughterville	The electronics at the respective city halls are vulnerable to lightning strike due to a lack of surge protection.	If the electronics were damaged by a lightning strike, it would result in an economic loss to repair, in addition to causing delays in routine business operations and communications.
Lexington PS Little Axe PS Norman PS Robin Hill PS	The electronics and communication system are vulnerable to lightning strikes due to a lack of surge protection.	If the electronics or communication systems are damaged by a lightning strike, it could impact the teachers and students by delaying important information or announcements. Repairing the equipment would result in an economic loss to the school.
OU	The electronics and monitoring systems at the airport are vulnerable to lightning strikes due to a lack of surge protection.	Some of the airport buildings have aging wiring in need of replacement and other aging components that could not be replaced as is if equipment and wiring is damaged from a lightning strike to the buildings. Entire buildings need new wiring for electricity, communication systems, and backup power.

Generally, anyone caught outdoors is vulnerable to lightning strikes in severe weather. Lightning strikes can occur anywhere within the planning area, and tall structures, utility poles, communication towers, and radio towers can attract lightning strikes.

If a severe thunderstorm swiftly develops across the planning area, associated crowds at sporting events for the school districts and university could be at risk of experiencing lightning strikes and need to leave the stadiums and fields.

Lightning strikes can also cause wildfires in the unincorporated areas of the planning area, especially if the wildland areas have an abundance of dry vegetation during drought.

2.4.8 Tornado

Description

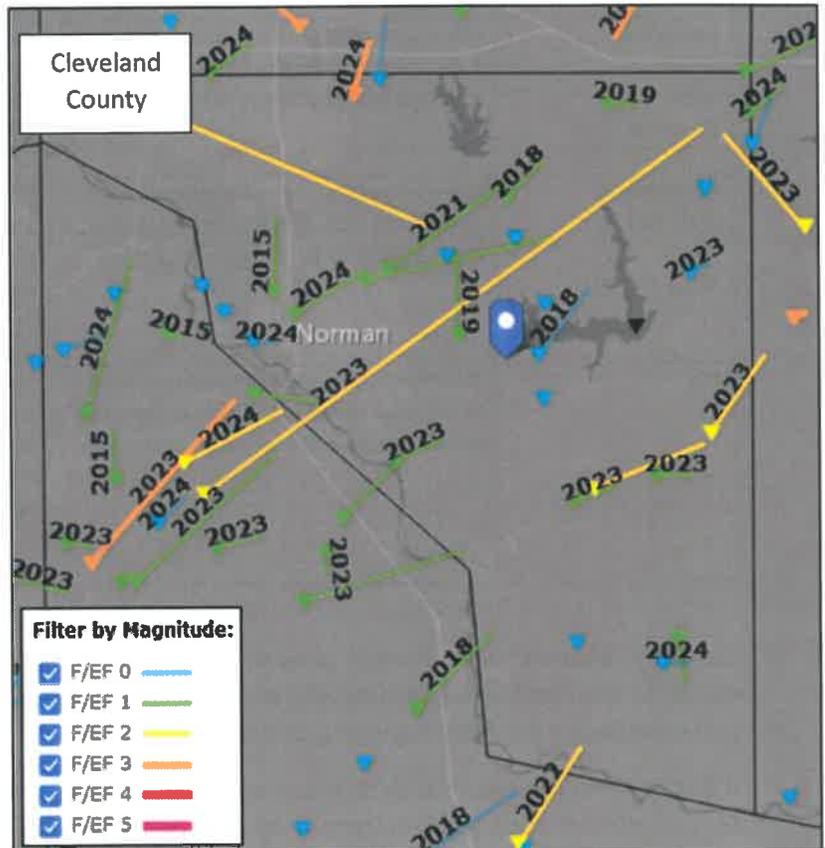
When warm air collides with a cool front, tornadoes can result as a rotating column of air, varying in appearance from thin rope-like columns to large wedge shapes more than a mile wide. Tornadoes often accompany supercell thunderstorms, but the presence of a thunderstorm does not guarantee the development of a tornado. Tornadoes might last a few seconds or more than an hour.

These violently rotating columns can vary in size and do not necessarily correlate with its wind speed. Within the planning area, most tornadoes occur between 3pm and 9pm, between March and May. However, due to the extremely variable weather in central Oklahoma, tornadoes can and have occurred any time of year if the wind shear, lift, atmospheric instability, and moisture are present. A “second” storm season can also occur in the October as seasons change and weather patterns become less predictable.

Location

The entire planning area is affected by tornadoes.

This map shows the tornado paths with touchdown points indicated by the small arrows that occurred in the planning area between 2014 and 2024. (Note: The latest data on this website is from 2024.) Not all touchdown points included a long tornado path. The legend shows the color coding for each EF magnitude of the tornado paths.



The following table from the NWS gives the specific locations within the planning area under the “Path” column of the tornado events between 2014 and 2024. All tornado paths listed had all or a portion pass through Cleveland County. Some unincorporated communities named in the table include Stella, Etowah, Little Axe, and others; they are included as a geographic reference only. Oklahoma City and Moore are likewise mentioned as geographic reference only.

Tornado Paths in Cleveland County between 2014 – 2024							
Date	Time	Length (miles)	Width (yards)	F-Scale	Injured	Killed	Location/Path
3/25/15	1734-1750	11	50	EF2	0	7	4.5 WNW-7 SE Moore
5/06/15	1646	0.5	25	EF0	0	0	Norman (near 60 th Ave NW/Robinson)
5/06/15	1653-1710	3	1000	EF1	0	0	Norman (36 th Ave NW/Rock Creek NW/Indian Hills)
5/19/15	1422	0.1	20	EF1	0	0	4 ENE Lexington
5/6/16	1616	0.1	10	EF?	0	0	Lake Thunderbird
10/21/17	1936-1942	3	50	EF1	0	0	Began near Goldsby, McClain County; travelled to Cleveland County SW of SH-9/Chautauqua
5/02/18	1942-1951	8	400	EF1	0	0	2 NNE Norman – 5NW Lake Thunderbird
5/02/18	1948-1953	5	40	EF1	0	0	Began near Purcell, McClain County – 2N Lexington
10/09/18	0730-0734	4	50	EF0	0	0	Norman N Lindsay Ave SE and E of 120 th SE/Rock Creek)
10/09/18	0731-0733	3	40	EF1	0	0	Norman (NE to SE OKC to Norman E)
5/21/19	0245-0250	4	250	EF1	0	0	3.5 SSE McClain Co. to 0.75 NW Noble
5/21/19	0257-0308	4	50	EF1	0	0	5 E Downtown Norman
5/21/19	0313	0.3	20	EF0	0	0	8 ENE Downtown Norman
5/21/19	0322-0324	1.4	30	EF1	0	0	3.5 NE Uninc. Cleveland Co. – 104 th SE and Indian Meridian to Triple X Road
5/25/19	2156-2157	0.7	30	EF0	0	0	Norman near 72 nd Ave NW and Rock Creek Rd.
5/4/20	1650-1654	2	50	EF1	0	0	8 E Lexington (168 th /Moffet)
7/11/20	2304	0.2	10	EF0	0	0	NE Norman (NE 48 th /Tecumseh Rd)
10/26/21	2336-2345	7	50	EF1	0	0	NE Norman/ SW OKC
12/13/22	0527-0533	5	300	EF2	0	0	Started in McClain Co. and travelled 5 miles SE Lexington
2/26/23	2114-2138	27	900	EF2	0	12	NE Coie, Goldsby. McClain Co.; SE Norman to NE Uninc. Cleveland Co.
2/26/23	2142-2148	6	440	EF1	0	0	NNE Cleveland Co. to NNW Pottawatomie Co.
4/19/23	1803-1808	3	250	EF0	0	0	SSW – WSW Tinker AFB, Uninc. Cleveland Co.
4/19/23	1855-1910	8	700	EF1	0	0	McClain Co. to 1 W Slaughterville
4/19/23	1932-1935	2	150	EF1	0	0	4 NE Slaughterville to 1 NNW Etowah
4/19/23	1936-1945	5	700	EF2	0	0	Slaughterville to - SE Uninc. Cleveland Co.
4/19/23	1941-1944	1.7	50	EF1	0	0	1S – 2 SE Etowah Uninc. Cleveland Co.
4/19/23	1947-1959	4	2200	EF2	0	0	2 ENE Etowah, Uninc. Etowah to Pottawatomie Co.
4/19/23	2007-2008	0.3	60	EF0	0	0	E Norman, NW 108 th Ave SE
4/19/23	2013-2023	6	700	EF2	0	0	Uninc. Pottawatomie Co. to NE Uninc. Cleveland Co.
4/19/23	2018-2021	1	75	EF0	0	0	E. Uninc. Cleveland Co., Little Axe
5/11/23	2003-2013	2.3	300	EF1	0	0	W Noble to Noble to 1.5 NE Noble
5/11/23	2033-2033	0.2	25	EF0	0	0	SE Norman along Hwy 9
4/26/24	0349-0350	0.5	30	EF0	0	0	2 ESE Stella, Uninc. Cleveland Co.
4/26/24	0353-0356	1.9	75	EF1	0	0	Uninc. Cleveland Co. to Uninc. Pottawatomie Co.
4/27/24	2029-2036	3.5	200	EF1	0	0	Norman, NW 24 th /Robinson to SW 12 th /Tecumseh Rd
11/3/24	0020-0025	2.4	400	EF3	0	6	Moore, Cleveland Co. to ESE OKC, Oklahoma Co.
11/3/24	0158-0201	1	30	EF0	0	0	SW Norman (S Main and SW 48 th)
11/4/24	1026-1028	1.3	30	EF0	0	0	E Lexington

Extent

The planning area uses the Enhanced Fujita Scale to classify the magnitude of tornadoes. The planning area has the potential to experience any level of tornado on this scale, but the expected range is EF0-EF4.

Enhanced Fujita Scale		
	EF Number	3 Second Gust (mph)
0	0	65-85
1	1	86-110
2	2	111-135
3	3	136-165
4	4	166-200
5	5	Over 200

NOTE about Enhanced F-Scale Winds: The Enhanced F-Scale still is a set of wind estimates (not measurements) based on damage. It uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to the 28 indicators. These estimates vary with height and exposure. Important: The 3 second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one minute mile" speed.

Previous Occurrence

Between January 1, 2014 and December 31, 2024, the planning area experienced the following tornadic events as reported to the NCEI. Twenty (20) different events occurred in this timeframe; events occurring on the same day will be listed under one date. (Lake Thunderbird, Lake Stanley Draper, and Moore are within Cleveland County and used only as a geographic reference.)

Date	Location	Magnitude	Death	Injury	Economic Loss
March 25, 2015	Moore	EF2	0	7	\$50 million
May 6, 2015	Norman	EF0	0	0	0
		EF1			0
May 19, 2015	Lexington	EF0	0	0	0
May 9, 2016	Uninc. Cleveland Co. (Lake Thunderbird)	EFU	0	0	0
October 21, 2017	Norman	EF0	0	0	\$2,000
May 2, 2018	Norman	EF1	0	0	\$10,000
	Lexington	EF0			0
October 9, 2018	Lake S. Draper (OKC)	EF0	0	0	\$20,000
	Lake Thunderbird	EF1			\$75,000
May 21, 2019	Noble	EF0	0	0	\$1,000
	Norman	EF1			\$6,000
	Lake S. Draper (OKC)	EF0			\$3,000
	Uninc. Cleveland Co.	EF1			\$0
May 25, 2019	Norman	EF0	0	0	\$10,000
May 4, 2020	Uninc. Cleveland Co.	EF1	0	0	\$20,000
July 11, 2020	Lake S. Draper (OKC)	EF0	0	0	\$20,000
October 26, 2021	Norman	EF1	0	0	\$25,000
Dec. 13, 2022	Lexington	EF1	0	0	\$5,000
February 26, 2023	Norman	EF2	0	12	\$50,000,000
	Uninc. Cleveland Co.	EF1			0

Date	Location	Magnitude	Death	Injury	Economic Loss
April 19, 2023	Moore	EF0	0	0	\$5,000
	Slaughterville	EF0	0	0	\$1,000
	Slaughterville	EF1	0	0	\$10,000
	Slaughterville	EF2	0	0	\$500,000
	Lake Thunderbird Dam	EF1	0	0	\$50,000
	Lake Thunderbird Dam	EF2	0	0	\$750,000
	Lake Thunderbird Dam	EF0	0	0	\$5,000
	Lake Thunderbird Dam	EF0	0	0	\$10,000
	Uninc. Cleveland Co.	EF1	0	0	\$5,000
May 11, 2023	Noble	EF1	0	0	\$200,000
	Lake Thunderbird Dam	EF0	0	0	\$10,000
April 26, 2024	Uninc. Cleveland Co.	EF1	0	0	\$10,000
	Uninc. Cleveland Co.	EF0	0	0	\$1,000
April 27, 2024	Norman	EF1	0	0	\$100,000
November 3, 2024	Moore	EF3	0	0	\$1,000,000
	Norman	EF0	0	0	\$5,000
	Lexington	EF0	0	0	\$2,000

While many of these events had reportable damage, none of the participants reported any tornado damages to their respective county, municipal, or school infrastructures between 2014-2024. Damages within the communities at large varied with the strength of each event, and the economic losses listed in the table are estimates provided from NCEI.

Probability

The probability of the planning area experiencing a tornadic event is high.

Vulnerability & Impact

When tornadoes rapidly develop or when tornadoes travel through the planning area, the impact is that anything in the path of the tornado is at risk. **Lexington, Noble, and Slaughterville** are not large cities, and a massive tornado could easily demolish the entire town or significant portions of the town, resulting in economic loss to everyone affected. If grocery stores, gas stations, and banks are significantly damaged in the path of the tornado, business is closed or must relocate until the structures are repaired or rebuilt. Schools, nursing homes, and residents living in mobile homes need as much time possible to evacuate the threatened area to seek shelter or shelter in place. Additionally, trees, vegetation, and any structures in the path of the tornado would incur damage at minimum or be utterly destroyed in worst case scenarios. In such cases, injuries and deaths are also more likely if residents cannot reach shelter. Loss of life and injury is always a concern when tornadic events occur.

Utility infrastructure, particularly power lines, substations, water towers, communication towers and lines, can be utterly devastated in a tornado. Even an EF0 tornado can cause damage and disruption to utility services for a few hours to a couple of days.

Cleveland County, Lexington, Noble, Norman, and Slaughterville have a variety of documentation regarding individual storm shelters. **Lexington and Slaughterville** are small enough that anecdotally, everyone knows who has storm shelters and who does not; however, formalizing this data could save lives if a catastrophic tornado event were to occur and debris cover the respective shelters. **Cleveland County, Noble, and Norman** discussed that a few outdoor warning sirens are needed in specific areas

identified by these respective jurisdictions. All jurisdictions would like to expand their respective outdoor warning siren networks.

All of the participating school districts and OU reported that only in the newest buildings have impact resistant film on the windows; all institutions reported that each respective school building still have some windows without impact resistant film. In a tornado event, the windows can shatter and cause shards of glass to fly everywhere. Anyone in close proximity to the flying shards of glass could be injured. If any of the schools experienced a direct hit by an EF2 tornado or greater during the school year, classes would either need to be relocated, postponed, or students would possibly need to attend another school district temporarily, unless the respective school board deemed remote classes a better option for the district.

Additionally, Lexington PS, Little Axe PS, and Robin Hill PS do not have generators that could preserve food service or provide basic power for communications in a prolonged power outage due to a tornado event in the planning area.

Vulnerability and Impact of Tornado in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	The county has identified that a lack of outdoor warning sirens is a vulnerability, particularly in where numerous unincorporated communities are established throughout the county.	A lack of outdoor warning sirens could lead to residents being unaware of impending danger from a tornadic event, resulting in potential injury or loss of life.
Lexington	The city does not have a process to update and maintain a storm shelter list within city limits.	Residents could be trapped in a shelter and responders might not realize it if the shelter was covered in debris from a tornadic event.
Noble	The city does not have a process to update and maintain a storm shelter list within town limits.	Residents could be trapped in a shelter and responders might not realize it if the shelter was covered in debris from a tornadic event.
Norman	The recreation centers across the city need generators; the lack of back up power limits how these facilities can be used as community safe rooms. These facilities provide many after school programs for school aged children and these facilities need to be able to shelter children in tornadic events. Portions of the city have areas where coverage of outdoor warning sirens is insufficient and expanding the outdoor warning siren network would expand the ability of the city to warn residents to seek shelter.	The lack of back up power in these facilities limits the city's ability to provide community shelters in tornado events, especially for the vulnerable populations. These facilities cannot be used at this time to shelter kids who attend after school programs at these facilities. A lack of outdoor warning sirens could lead to residents being unaware of impending danger from a tornadic even, resulting in potential injury and loss of life.
Slaughterville	The town does not have a process to update and maintain a storm shelter list within town limits.	Residents could be trapped in a shelter and responders might not realize it if the shelter was covered in debris from a tornadic event.
Lexington PS Little Axe PS Norman PS Robin Hill PS	Some windows do not have impact resistant film and are vulnerable to debris generated by a tornadic event. The school is vulnerable to power outages caused by tornadic events in the planning area. The school lacks generators to maintain basic	Flying debris could shatter glass and injure anyone in close proximity to the airborne shards of glass. Power outages can affect the school's communication and security systems. The lack of a generator results in the school

	power and preserve the food service until power is fully restored.	losing its food service in a prolonged power outage.
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Jurisdiction	Vulnerability	Impact
OU	<p>Some student housing buildings and multiple buildings at the Westheimer Airport have no backup generators and are vulnerable to power outages caused by tornadic events.</p> <p>Some windows do not have impact resistant film and are vulnerable to debris generated by a tornadic event.</p>	<p>Power outages can affect the school's communication and security systems, particularly at the airport. If communications cannot be reliable during prolonged power outages, any aircraft must be redirected.</p> <p>Flying debris could shatter glass and injure anyone in close proximity to the airborne shards of glass.</p>

2.4.9 Wildfire

Description

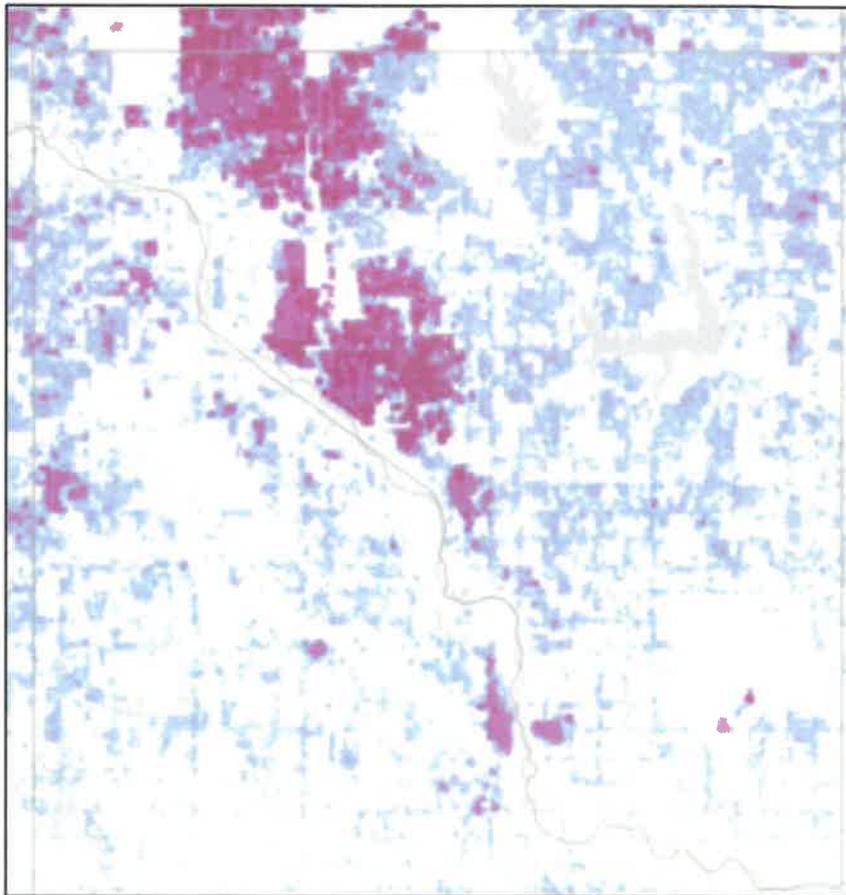
Wildfire is an uncontrolled fire in a rural or wilderness area, but these fires can also extend into wildland-urban interface (WUI) or areas of varying housing density. Dry vegetation, low levels of precipitation, and high winds create the conditions for wildfires to begin by a loose spark, discarded cigarette, or other source of ignition. These fires can quickly spread due to strong winds that ignite brush, trees, and other structures.

There are three (3) different classes of wildfires:

- A **surface fire** is common in grasslands, or areas with open vegetation and spreads 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** move by embers and jumping along the tops of trees.

Location

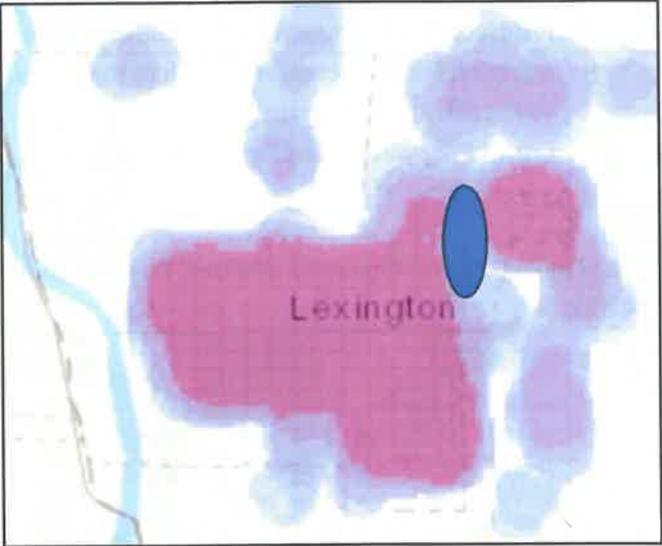
The planning area is affected by wildfires. This map shows the Housing Unit Density (HUD) for the entire county.



This table provides a guide for the maps and describes the housing density levels.

Color	Description	Density
Dark Purple	Very High	3 or more houses per acre
Plum	High	1-2 houses per 2-3 acres
Light Purple	Medium High	1 house per 2-5 acres
Periwinkle	Medium	1 house per 5-10 acres
Grey-Blue	Low	1 house per 10-20 acres
Light Blue	Very Low	1 house per 20-40 acres
White	Below Housing Density Rating	1 house per 40+ acres

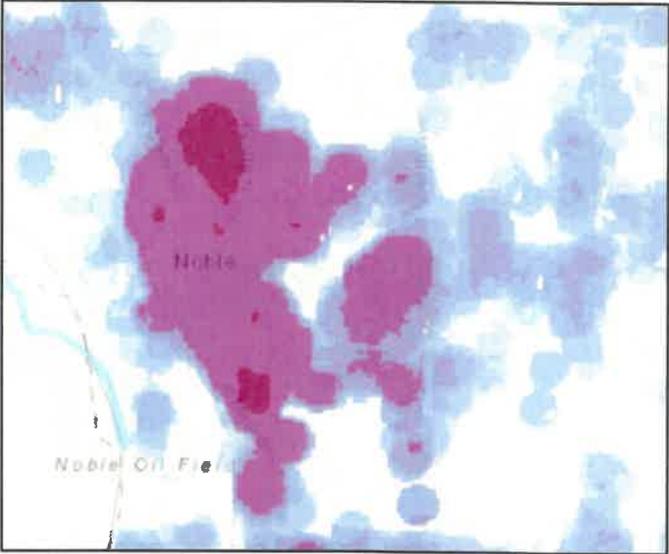
This is the HUD map for Lexington. The HUD ranges from the medium purple area (1 house per 2-3 acres) to blue areas with the least amount of housing density (1 house per 40+ acres). The blue oval indicates the Lexington PS campuses. They lie in an area of very low to medium high housing density.



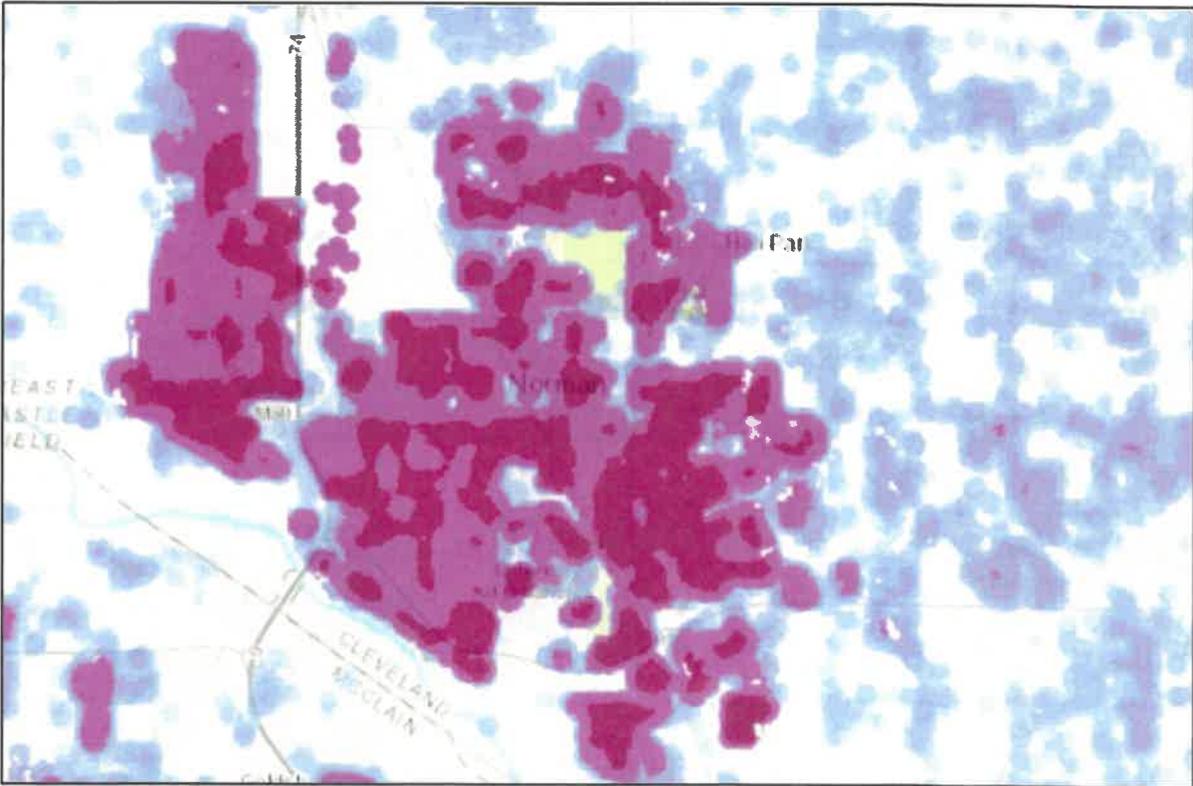
The Little Axe PS is located in an unincorporated area of Cleveland County and the HUD map show that the campus is within a HUD area of grey-blue to light blue (Low to Very Low) housing density. The circle shows the approximate location of the school.



This is the HUD map for Noble. The HUD ranges from the dark purple area (3+ house per acre) to light blue areas with the least amount of housing density (1 house per 20-40 acres).

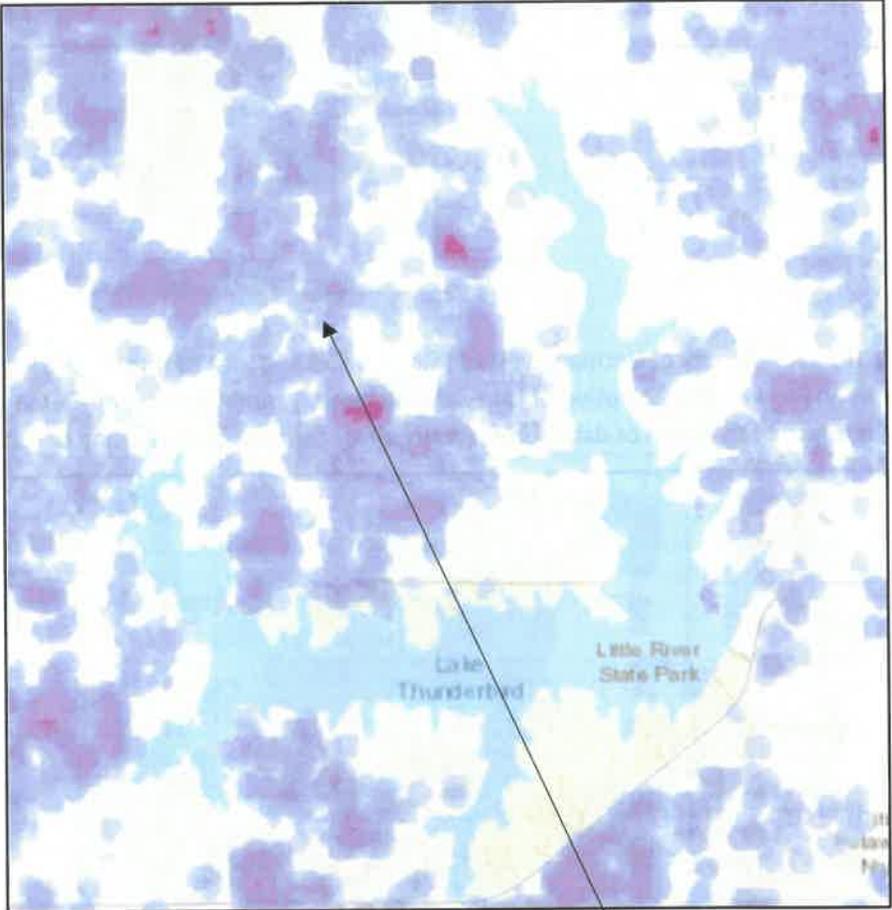


This is the HUD for the city of Norman, west of Interstate 35 and east of Interstate 35 to 60th Ave NE. All of the Norman PS, with the exception of Lakeview Elementary, and Washington Elementary (both within medium), are within the plum or dark purple (very high or high) areas of housing density.



The specific site maps of each school's location in the HUD can be found in the appendix.

This is the eastern side of the **Norman** city limits from 60th Ave. NE to the area around Lake Thunderbird. The more urban areas of Norman have a very high housing density, indicated by the dark purple areas and the less urbanized areas, indicated by the light blue and white areas that are very low and below the housing density rating.



Lakeview Elementary is within a medium (1 house per 5-10 acres) housing density area.



The Robin Hill PS campus is shown on this map. The school lies within a HUD area of medium (1 house per 5-10 acres).



Extent

The planning area uses the Keetch-Byram Drought Index (KBDI) to identify and categorize the extent of dryness across the county. The planning area can experience all ranges of dryness on this index.

The Keetch-Byram Drought Index with Fire Danger Rating Data Incorporated	
0 - 200	Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
200 - 400	Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.
400 - 600	Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
600 - 800	Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a Cleveland problem. Fires will burn thorough the night and heavier fuels will actively burn and contribute to fire intensity

Previous Occurrence

None of the participating jurisdictions reported wildfires affecting their infrastructure.

However, the following table lists the average number of wildfire responses for each fire district within Cleveland County annually. The number of wildfires varies from year to year, depending on the severity of drought conditions.

Fire District	Estimated total number of Wildfire Responses between 2014-2024
Lexington (Lexington)	120
Noble (Noble)	200
Norman (Norman)	1,362
Slaughterville (Slaughterville & Uninc. Cleveland Co.)	457
Cedar Country (Uninc. Cleveland Co.)	475
Little Axe (Uninc. Cleveland Co.)	242

Wildfires in the unincorporated areas of Cleveland County occur annually and the volunteer fire departments respond to the number of wildfires listed above.

None of the jurisdictions reported damages to their respective infrastructures due to wildfires between 2014-2024.

The NCEI reported one (1) wildfire in the planning area between 2014-2024. Neither had a loss of life or injury. The wildfire occurred on February 12, 2017 and it burned 897 acres; it was subsequently declared a state emergency as noted in Section 2.2.

Probability

The probability of the planning area experiencing wildfire is high. This map shows the burn probability according to the USGS WRAP data. The darker the area, the higher probability to wildfire.

Vulnerability & Impact

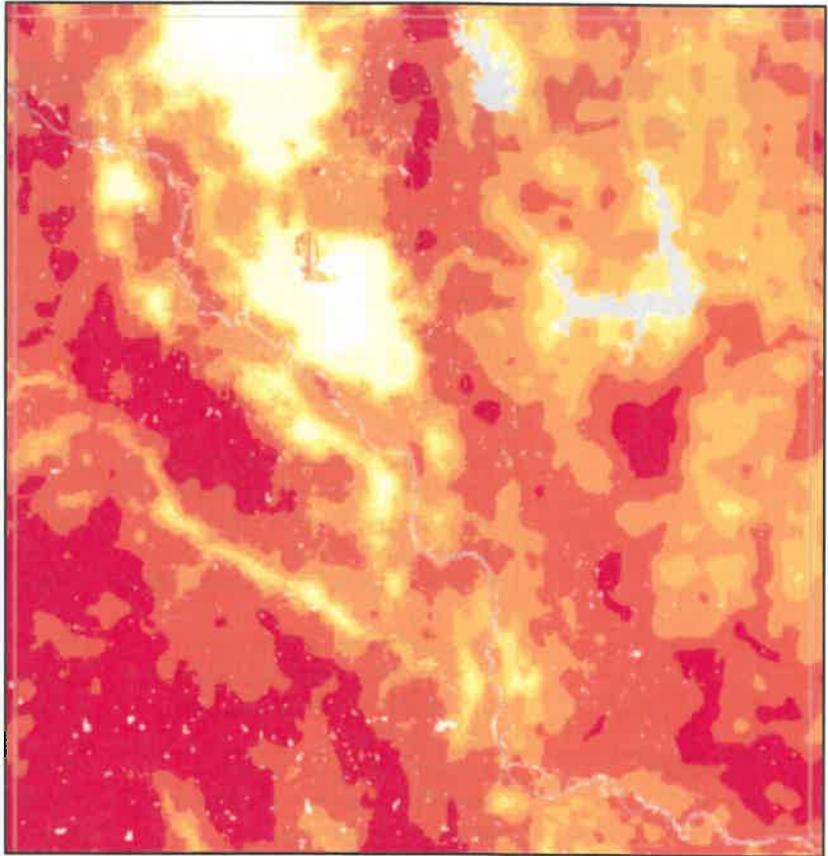
The planning area is susceptible to the threat of wildfire, particularly in drought conditions, which can occur any time of year.

In discussing wildfire vulnerabilities with the participants, the overgrown brush and prominence of red cedars in the area in the unincorporated areas, as well as the number of red cedars within the wildland-urban interface on the city limits of Lexington, Norman, Noble, and Slaughterville, wildfires can become uncontrolled very quickly if the drought conditions are severe, winds are high, and the humidity is very low.

Depending on the area where the wildfire occurs, accessing water to refill water trucks is a concern. Fire plugs, dry hydrants, and irrigation tie-ins are not a reliable option. The Cleveland County emergency management director and several fire chiefs have discussed the need for at least three (3) filling stations in the unincorporated areas would reduce the amount of time tanker trucks usually take in going to a fire station to refill with water and return to the wildfire.

As with all wildfire events, smoke can cause visibility issues for emergency responders fighting the fires and anyone traveling in the path of the smoke. Smoke inhalation can affect residents living downwind from the fire. Loss of property and loss of life can also occur with wildfires, particularly if the wind shifts significantly and changes the course of the fire.

The following table details the vulnerability and impact each community has as it pertains to wildfire.



Vulnerability and Impact of Wildfire in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	<p>Unincorporated Cleveland County is almost entirely wildland on the eastern side and is served by 2 fire districts. Both of these fire districts are staffed by volunteer firefighters, who must travel from their homes or jobs for fighting fires. Anticipating the variance of response times is a vulnerability throughout the entire county.</p> <p>Refilling water trucks is a vulnerability in the remote areas where wildfires are the most likely to occur. The lack of reliable water sources in the unincorporated areas is a vulnerability.</p> <p>Communications can also be a vulnerability in the planning area as remote areas do not always have reliable service.</p>	<p>Response times greatly vary, depending where the volunteer firefighters are at the time of the call. Until fires can be extinguished, they will potentially damage or completely devastate anything in the fires' path, causing displacement, economic loss, and emotional trauma to affected residents.</p> <p>Refilling water trucks typically requires time, both in filling and in traveling to the fire. During this lag, the fire continues to burn anything in its path, causing damage and/or economic loss to farmland or structures.</p> <p>Poor communication between fire departments can result in resources being delayed or confusion.</p>
Lexington	Lexington relies on a small fire department, and it needs gear, more personnel, and trucks.	The lack of funding makes it difficult for the department to grow and maintain its optimum capability.
Noble	<p>Station 2 has a well as a water source, and the well is very slow. The station lacks the ability to fill tankers quickly in this area. The amount of time needed to refill water tankers is a vulnerability.</p> <p>Noble FD routinely offers mutual aid across the county to fight wildfires.</p>	<p>A new well and/or new pump is needed to fill the tankers in a timelier fashion.</p> <p>Response times greatly vary, depending where the volunteer firefighters are at the time of the call. Until fires can be extinguished, they will potentially damage or completely devastate anything in the fires' path, causing displacement, economic loss, and emotional trauma to affected residents.</p>

Jurisdiction	Vulnerability	Impact
Norman	<p>Many areas within the city limits have a high number of red cedars.</p> <p>When the Norman FD offers mutual aid throughout the planning area for significant wildfires, response time from Norman to the fire is the main vulnerability.</p> <p>The wildland-urban interface is prone to overgrowth and is vulnerable to wildfire. This concern is exacerbated by the homeless population that seeks to create shelters in these areas of town.</p>	<p>If wildfire starts in these areas, any homes in these less densely populated areas will be damaged or consumed.</p> <p>Response times greatly vary, depending where the fire is within the planning area. Until fires can be extinguished, they will potentially damage or completely devastate the impacted area, causing displacement, economic loss, and emotional trauma to affected residents until the fires are extinguished.</p> <p>If and when these areas catch on fire, either through a loose spark or improperly discarded cigarettes, or fires, any properties are at risk for being damaged or consumed. Property damage and loss is an economic loss to the property owner, as well as to the city if any city property is damaged. There is also a concern for the life and safety of any persons who might be in the area.</p>
Slaughterville	Slaughterville relies on a volunteer fire department to respond to any large fires in the area.	Response times greatly vary, depending where the volunteer firefighters are at the time of the call. Until fires can be extinguished, they will potentially damage or completely devastate anything in the fires' path, causing displacement, economic loss, and emotional trauma to affected residents.
Lexington PS	The bus routes extend into the rural, wildland areas and are vulnerable to the effects of wildfire.	Buses would need to be redirected and detour if a wildfire occurred in these areas.
Little Axe PS	<p>The campus is vulnerable to wildfire as it is surrounded by red cedars and wildland.</p> <p>The school has only one access road to and from the school.</p> <p>The bus routes extend into the rural, wildland areas and are vulnerable to the effects of wildfires.</p>	<p>Any wildfire damage to the buildings would be an economic loss to the school.</p> <p>If a wildfire blocked the road, it would limit the ability of the school to safely evacuate students.</p> <p>Buses would need to be redirected and detour if a wildfire occurred in these areas.</p>
Norman PS	The campuses for Washington Elementary and Lakeview Elementary are located are surrounded by red cedars. These areas of unmanaged vegetation, in dry conditions are vulnerable to wildfire, and if conditions were conducive, a wildfire could be driven toward the campus by wind.	If wildfire encroached near the campus, it could result in the campus being evacuated and the building could be damaged or lost in an extreme situation with high winds.

Vulnerability and Impact of Wildfire in Cleveland County		
Jurisdiction	Vulnerability	Impact
Robin Hill PS	The bus routes extend into the rural, wildland areas and are vulnerable to the effects of wildfires.	Buses would need to be redirected and detour if a wildfire occurred in these areas.
OU	The Westheimer Airport lacks the fire support needed to quickly put out fires that start on airport property.	A fire started by landing aircraft or any loose spark from welding could ignite a fire. If it spreads to the open, grassy areas, the airport currently relies on the Norman FD for assistance, and depending on the availability of the FD, drought, and wind conditions, a grassfire could quickly escalate.

2.4.10 Winter Storm

Description

Winter storms can be incredibly difficult to predict since they usually involve any combination of 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, or it might develop into blizzard conditions and extremely cold temperatures that last several days. The effects of the winter storm can also widely vary depending on the ground temperatures and atmospheric conditions. The following definitions are from the NWS.

Snow is “precipitation in the form of ice crystals, mainly of intricately branched, hexagonal form and often agglomerated into snowflakes, formed directly from the freezing [deposition] of the water vapor in the air.” Snow can vary in winter storms from powdery flakes that drift and blow easily to wetter, denser flakes that create a layer on the ground and does not as readily drift.

Sleet is “pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Heavy sleet is a relatively rare event defined as an accumulation of ice pellets covering the ground to a depth of a ½" or more.”

Freezing Rain is “rain that falls as a liquid but freezes into glaze upon contact with the ground.”

Wind Chill is usually a “reference to the **Wind Chill Factor**; increased wind speeds accelerate heat loss from exposed skin, and the wind chill is a measure of this effect. No specific rules exist for determining when wind chill becomes dangerous. As a general rule, the threshold for potentially dangerous wind chill conditions is about -20°F.”

Location

The entire planning area experiences winter storms and the variety of conditions that accompany winter storms.

Extent

The planning area uses several tools to categorize the severity of winter storms. As shown by the data, the types of winter weather (and/or precipitation) vary from year to year, but it can be expected that the planning area can experience a combination of at least two types of winter weather annually. For example, extremely cold wind chill and snow, snow and ice, freezing rain and high winds, etc. The severity of winter storms depends on climatological factors and winter storms varies greatly year to year.

Snow:

Based on data collected from the Oklahoma Mesonet between 1991-2020, the planning area can expect 4" of snowfall annually. The extent of snowfall can vary from as little as no snow to over 4" in any given event.

Extreme Cold/Wind Chill:

The planning area experiences wind chills during winter months. The planning area experiences an average of 67 days annually with high temperatures below 32 degrees Fahrenheit. The planning area expects that this number of days with temperatures between 0 to 32 degrees Fahrenheit will continue.

The table below shows the range of wind chill temperatures that annually occur, recorded by the Oklahoma Mesonet. If conditions were conducive, it is reasonable to expect even lower temperatures than the lower range recorded below. However, wind chill temperatures falling below -30 degrees is rare, while wind chills between -30 and 0 is expected for the planning area. The expected range of annual temperatures is between -30 to 32 degrees.

Year	Days with wind chill below 0 (F)	Range of recorded wind chill temperatures (F)	Year	Days with wind chill below 0 (F)	Range of recorded wind chill temperatures (F)
2014	8	-10 to 31.8	2020	0	5.83 to 31.96
2015	2	-3.24 to 31.88	2021	8	-29.3 to 31.75
2016	3	-12.23 to 31.34	2022	10	-21.99 to 31.92
2017	4	-8.32 to 31.74	2023	0	2.29 to 31.99
2018	6	-12.42 to 31.71	2024	7	-18.79 to 31.6
2019	2	-6.85 to 31.78	2025	TBD	TBD

Ice: The planning area uses the Sperry-Piltz Ice Accumulation (SPIA) Index as a guide to categorize the severity of damage from ice storms. The planning area typically experiences a range from levels 0 to 3 on this index. However, it can experience any level on this index if conditions are conducive.

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 - 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 - 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Previous Occurrence

Between January 1, 2014 and December 31, 2024, the planning area has experienced twenty (20) winter storm events as documented by the NCDRC/NOAA. Any event that continued over consecutive days is considered a single event on the table below.

Date	Precipitation/Event Details
February 2, 2014	Total snowfall ranged to 5" in Norman and up to 6" south of Noble.
November 16, 2014	Snow began early on the 16 th , and continued until evening. Around 3" of snow fell around the Norman area.
December 27, 2014	The planning area received 2"-3" of snow.
January 22, 2015	Light snow fell across the planning area and up to half an inch fell in the planning area.
February 22-23, 2015	Total snowfall measured half an inch to 1.5" throughout the northern half of Cleveland County.
February 27-28, 2015	Snow continued from late morning on the 27 th into the morning on the 28 th . Norman reported 2.5" of snowfall in Norman.
March 4, 2015	Light sleet and snow fell across the planning area; reports of 2" to 3" of precipitation fell between Lexington and Norman.
November 27-29, 2015	Ice storm caused extensive power outage for 6,534 customers across the planning area.
January 3, 2019	Winter storm produced heavy snowfall; multiple reports of 4" to 6" of snow were provided.
February 5, 2020	The planning area had 4"-5" of snow.
October 26-28, 2020	Freezing rain and sleet fell across the planning area. The ice accumulations totaled between 0.20" to 0.8" Damage estimates reached \$5,790,000. Extensive power outages also occurred due to the ice damage.
January 1, 2021	The planning area reported 4" to 8" of snowfall in this winter storm.
February 14-16, 2021	Snowfall, ranging between 4" to 7.5", was reported throughout the planning area in this storm. Norman reported 7.5" of snow. Noble reported 3" of snow. Extreme cold temperatures accompanied the snow and temperatures between -20 and -35 degrees were reported.
February 2-3, 2022	The planning area reported anywhere from 4" to 5.5" of snowfall.
February 23, 2022	The planning area experienced up to 1.5" of ice and sleet accumulation, along with freezing rain.
January 24-25, 2023	Snowfall reports of 2" to 4" were measured across the planning area.
January 30, 2023	Sleet accumulated up to 0.3" across the planning area.
January 13-16, 2024	Extreme cold temperatures accompanied the snow and temperatures between -20 and -25 degrees were reported.
January 19, 2024	Wind chills between -20 to -5 degrees were reported in the planning area.
January 21-22, 2024	Freezing rain between .10" and .25" caused hazardous traveling conditions.

Lexington PS reported that freezing pipes burst in the gym and the floor had to be replaced in the extremely cold temperatures that occurred in February 14-16, 2021; the damages were \$100,000.

The City of Noble mentioned that a water main and frozen hydrant burst due to cold temperatures occurred in 2024 and 4 feet of standing water occurred in the street and near a residence.

Probability

The probability of the planning area experiencing winter storm/winter weather events is high.

Vulnerability & Impact

All participating jurisdictions can experience power outages if freezing rain/ice weighs down power lines and breaks them or other electrical components. A loss of power for a prolonged amount of time during periods of extreme cold or winter storms could result in vulnerable populations needing a warming station. Prolonged power outages due to ice and winter storms have occurred multiple times over the past 5 years as noted above in "Previous Occurrences." Additionally, depending on the severity of the winter storm, travel conditions vary depending on the amount of sleet, ice, or snow that impedes traffic.

In the past five years, record breaking wind chills have occurred as noted in the "Previous Occurrences" section above. It is unknown at this time if this was a result of weather conditions at that time, or if these record-breaking wind chills will become more frequent.

These communities are equipped for the expected .1" to 5" snowfall that typically occurs; however, on the rare occasions that ice and snow exceed normal amounts, clearing roads and streets across the county can take longer than normal. This could result in a delay of emergency services arriving to and from any incidents.

Vulnerability and Impact of Winter Storms in Cleveland County		
Jurisdiction	Vulnerability	Impact
Cleveland County	The county fairgrounds and the district barns do not have backup generators and are vulnerable to power outages caused by winter storms.	Ice buildup on power lines causes power outages throughout the county, and the lack of generators makes conducting business during a prolonged power outage difficult. Also, the lack of generators does not allow for the possibility of a warming station to be open at the courthouse in case members of the community need it.

Vulnerability and Impact of Winter Storms in Cleveland County		
Jurisdiction	Vulnerability	Impact
Lexington Noble	<p>If extremely cold temperatures were to reach even lower than the record setting lows in the past 5 years, the water and sewer pipelines could be vulnerable to freezing and bursting as they are aging infrastructure.</p> <p>Neither municipality has sufficient generators, either permanent or portable, to support basic power supply at critical infrastructure in the event of prolonged power outages due to winter storms.</p>	<p>Frozen lines would cause a disruption of services to residents and would result in an economic loss to the town for water loss, cleanup, and repairs.</p> <p>Loss of power due to winter storms could prevent or delay business operations during prolonged power outages.</p>
Norman	The city hall does not have sufficient backup generators to power the entire building and community center in a power outage due to winter storms.	The city hall and community building are connected as one large facility. The lack of backup generator power limits the ability to open the community center as a warming station if it were needed during a prolonged power outage.
Slaughterville	Slaughterville does not have the equipment to clear the roads in the town limits. They must rely on the county when the roads need to be cleared of snow.	Since the town must rely on the county to clear the roads, it can cause additional delays for residents for traveling or delay any emergency response that might be needed during those times if and when snow covers the streets.
Lexington PS Little Axe PS Norman PS Robin Hill PS	<p>The bus routes are vulnerable to snow drifting and blocking the roads.</p> <p>The school is vulnerable to power outages due to winter storms, as none of the buildings have backup generators.</p> <p>Various school buildings are vulnerable to freezing pipes in extremely cold temperatures.</p>	<p>The school relies on the county or the municipalities to clear the roads. Roads blocked by drifted snow must be cleared to ensure the safety of students. Delays in roads being cleared results in delayed openings or cancelled school.</p> <p>The food service would be an economic loss in a prolonged power outage. The security and electronic systems fail in prolonged power outages, causing security concerns.</p> <p>If pipes freeze and burst, the water damage causes an economic loss to the school.</p>
OU	The buildings at the Westheimer Airport and the some of the student housing dorms/housings do not have adequate backup generators to provide power in extended power outages caused by winter weather events.	If the Westheimer Airport loses power, it could potentially inhibit communications with aircraft needing to land. A prolonged power loss in the student housing could mean that students would potentially need to seek alternative housing if the buildings became too chilled.

2.5 NFIP Participation (Element C2-a)

FEMA released a Flood Insurance Study Report (FISR) in 2012 and is the most current information available. Details from the FISR will be incorporated throughout this portion. Additional flooding information is detailed in the hazard profile “Flooding”.

The details of National Flood Insurance Program (NFIP) participation is as follows:

Jurisdiction ID	Initial FHBM Identified	FIRM Map Effective Date
Cleveland County (400475D)	June 11, 1974	January 15, 2021
Lexington (400043)	June 28, 1974	August 14, 2024
Noble (400045)	August 30, 1974	February 20, 2013
Norman (400046D)	August 23, 1974	January 15, 2021
Slaughterville (400539)	NA	September 26, 2008

Cleveland County: Cleveland County adopted their most recent flood plain ordinance on July 17, 2008. According to the FEMA CSBR, Cleveland County had an initial FHBM identified on June 11, 1974 and the current effective date on the FIRM map is January 15, 2021. The CCEM director is the floodplain manager, and is responsible for maintaining compliance with NFIP, and also assists the schools in understanding floodplain management as needed. The floodplain administrator will continue compliance by enforcing the Floodplain ordinances in any Special Flood Hazard Areas with NFIP requirements and incorporated new NFIP guidance as it is released.

Lexington: Lexington adopted their most recent flood plain ordinance on August 25, 2008. According to the FEMA CSBR, Cleveland County had an initial FHBM identified on June 28, 1974 and the current effective date on the FIRM map is August 14, 2024. The code enforcement officer is the floodplain administrator, and is responsible for maintaining compliance with NFIP, and also assists the school in understanding floodplain management as needed. The floodplain administrator will continue compliance by enforcing the floodplain ordinances in any Special Flood Hazard Areas with NFIP requirements and incorporated new NFIP guidance as it is released.

Noble: Noble adopted a their most recent flood plain ordinance on September 26, 2008. According to the FEMA CSBR, the town of Noble had an initial FHBM identified on August 30, 1974 and the current effective date on the FIRM map is February 20, 2013. The town of Noble has a floodplain manager, who is responsible for maintaining compliance with NFIP, and assists the school as needed regarding floodplain questions. The floodplain administrator will continue compliance by enforcing the Floodplain ordinances in any Special Flood Hazard Areas with NFIP requirements and incorporated new NFIP guidance as it is released.

Norman: The City of Norman adopted their most recent floodplain ordinance on January 8, 2012. According to the FEMA CSBR, the city of Norman had an initial FHBM identified on August 23, 1974 and the current effective date on the FIRM map is January 15, 2021. The city of Norman has a floodplain manager. The floodplain administrator is responsible for maintaining compliance with NFIP, and these floodplain administrators assist the schools in understanding floodplain questions as needed. The floodplain administrator will continue compliance by enforcing the Floodplain ordinances in any Special Flood Hazard Areas with NFIP requirements and incorporated new NFIP guidance as it is released.

Slaughterville: The Town of Slaughterville adopted their most recent floodplain ordinance on December 15, 1998. According to the FEMA CSBR, the town of Slaughterville had an initial FHBM identified on an unknown date and the current effective date on the FIRM map is September 26, 2008. The town of Slaughterville has a floodplain manager, who addresses floodplain questions. The floodplain administrator will continue compliance by enforcing the Floodplain ordinances in any Special Flood Hazard Areas with NFIP requirements and incorporated new NFIP guidance as it is released.

The public schools rely on the respective floodplain managers of the municipalities for any floodplain related information or activity.

2.6 Repetitive and Severe Repetitive Loss Structures in the Planning Area (Element B2-c)

As required to participate in the NFIP according to 44 CFR 60.1, the participating jurisdictions have adopted a floodplain ordinance and regulations that govern the Special Flood Hazard Area as determined by FEMA Flood Insurance Rate Maps. These jurisdictions require the governing body to issue and maintain floodplain permits, development standards and approve or reject any construction in the special flood plain area. Any new development or construction within floodplain areas are required to follow NFIP guidelines and obtain permits as enforced by each local jurisdiction. Additionally, floodplain administrators are required to have annual training and accreditation by state statute. These jurisdictions are detailed in Section 2.5 above and in Section 3.1.2 following.

The information below states the number of repetitive loss and severe repetitive loss properties within the planning area and also includes the types of structure. The following definitions explain what is considered repetitive and severe repetitive losses. All information was provided by the Oklahoma Water Resources Board (OWRB) and the OWRB relies on FEMA to provide the information.

The following information was provided by FEMA; it is current NFIP data as of December 2023. It includes all repetitive loss and severe repetitive loss on file as provided by FEMA.

The estimated number of Repetitive and Severe Repetitive Loss Properties in the planning area are as follows:

Repetitive Loss Properties - those properties for which two or more losses of at least \$1,000.00 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978.

The following table shows the RL properties in Cleveland County according to the FEMA data available.

Repetitive Loss Properties by Jurisdiction in Cleveland County		
CID	Jurisdiction	Repetitive Loss Buildings
400475	Cleveland County	1 (residential)
400043	Lexington	3 (2 residential, 1 commercial)
400045	Noble	0
400046	Norman	17 (residential)
400539	Slaughterville	0

Severe Repetitive Loss Properties - residential properties that have at least four (4) 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.

The information was provided by the Oklahoma Water Resources Board who collects information from the NFIP program and FEMA. See Section 2.5 for more details regarding the jurisdictions' NFIP Participation.

The OWRB confirmed that there have been two (2) SRL properties in Cleveland County.

The City of Norman included the RL/SRL property maps in the Appendix.

2.7 Substantial Improvement/Damage Determination (Element C2-a)

A determination of “substantial damage” applies to a severely damaged home or other structure in a Special Flood Hazard Area (SFHA). This determination can be made regardless of the cause of damage, where the community participates in the NFIP. The SFHA is an area designated by the NFIP floodplain management regulations that must be enforced and mandatory purchase of flood insurance by the property owner applies. All NFIP participating communities are required to adopt floodplain regulations, as outlined in 44 CFR, and the provisions for substantial improvements can be found in sections 60.3 a (3), b (4), c (2, 3, and 5), and d. The Oklahoma Statute Title 82, Section 1608 also outlines the requirement for NFIP communities to adopt a floodplain ordinance.

If the cost to repair (improve) the structure will be 50% or more of the structure’s market value, then it is considered to be substantially damaged. These determinations are made by a local building official or floodplain manager.

After an event that results in substantial damage, the corresponding flood plain manager(s) in the NFIP participating jurisdiction(s) will comply with all required ordinances, to include a substantial improvement/damage provision of their floodplain management regulations.

The following table details the HMP participants and lists the applicable ordinances adopted by the respective jurisdictions. Each NFIP participant in Cleveland County has the necessary language in their respective ordinances as detailed below.

Jurisdiction	Substantial Improvement/Damage Provisions adopted by jurisdiction	Date Adopted
Cleveland County	Definitions; Article V, Section A, Section B, Section D	July 17, 2008
Lexington	Flood Damage Prevention Ord. #2008-02; Definitions, Article V	August 25, 2008
Noble	Article V, Section A, Section B	August 18, 2008
Norman	Ord. O-0809-3, Section 429.1; Definitions; 5. Floodplain Permit Administration	January 8, 2012
Slaughterville	Article V, Section B, Section D	December 15, 1998

Chapter III: Mitigation Strategy (Element C)

83.1 Capability Assessment (Element C1-a, C1-b, C1-c)

3.1.1 Existing Institutions, Plans, and Ordinances

The checkmark (v) indicates that the jurisdiction reported to have the authority to implement the specified regulatory tool and that the tool is currently in place. Further details are below the table.

Jurisdiction	Building Code	Zoning Ordinance	Subdivision Ordinance	Special Purpose Ordinance	Growth Management Ordinance	Site Plan Review Requirements	Comprehensive Plan	Capital Improvement Plan	Economic Development Plan	Emergency Response Plan/ Emergency Operations Plan	Post-Disaster Recovery Plan
County	No	No	No	No	No	No	v	v	v	v	v
Lexington	v	v	v	v	No	v	No	v	v	v	v
Noble	v	v	v	v	No	v	v	No	No	v	No
Norman	v	v	v	v	v	v	v	v	v	v	v
Slaughterville	No	v	v	v	v	v	v	v	No	No	No

Cleveland County: Cleveland County has no authority to implement or enforce building codes and ordinances. The county commissioners are the governing body that reviews and approves the county’s Emergency Response (ERP) that is specific for the courthouse and the Emergency Operations Plan (EOP) which includes the entire county. The county emergency manager is responsible to see that the ERP and EOP and all other related emergency plans are updated, reviewed, and submitted to the board of county commissioners for an annual approval. Once the ERP and EOP are reviewed and updated, the county emergency manager presents it to the county commissioners and the respective fire chiefs, police chiefs, and governing boards around July 1, coinciding with the fiscal year.

Lexington: The City of Lexington adopted the International Building Code (IBC) in 2009 and amended the code to include the International Property Maintenance Code in 2015. Biennial supplements are added to each category on a 2-year cycle as needed. The last update was completed in 2024. The Capital Improvement Plan was updated in 2023 by the city clerk and hazard mitigation efforts are identified in the CIP. The city has an informal economic development plan. The town’s Emergency Response Plan and the Post-Disaster Recovery Plan are annually reviewed by the fire chief.

Noble: The City of Noble maintains building codes and zoning ordinances and the updated codes and ordinances were adopted in 2020 by the city council. They are updated every three years and reviewed annually. The comprehensive master plan is on a 25-year cycle at the time of writing this HMP, is in the process of being updated. The building inspector is responsible for reviewing the building codes and bringing them before the city council with any changes or recommendations. The zoning ordinances and subdivision ordinances are reviewed multiple times annually by the city manager and updated annually.

Norman: The City of Norman updated the municipal codes and adopted them in February 28, 2023, according to Norman's three-year review/update cycle. The Department of Planning and Community Development (DPCD) are responsible to maintain the building codes, zoning ordinances, and special purpose ordinances. The **Stormwater Master Plan** was adopted in 2011 and the **Norman Phase II MS4 Stormwater Management Program** was adopted in 2022. The Public Works Department is responsible for overseeing the updating process and bringing any necessary changes before the city council for adoption. The **Norman 2025 Land Use and Transportation Plan** was adopted on November 16, 2004, and is also maintained and updated by the DPCD. Chapter 19 of Norman's Code of Ordinances contains the subdivision ordinance and site plan review ordinance. Both are updated as needed. The Capital Improvement Plan is maintained through the collaboration of all municipal departments, and this plan has the most elements that overlap with hazard mitigation. The Norman Economic Development Council is responsible for the maintenance of the **Economic Development Plan**. It was last updated in 2020. Emergency Management falls under Norman's Fire Department maintains and updates the city's Emergency Operation Plan (EOP); it also includes elements relating to hazard mitigation. **Emergency Action Plans (EAP)** for the high hazard dams within the city limits are maintained by the Parks and Recreation Department, Public Works Department, and the Emergency Management Department. The Public Works Department maintains the Disaster Debris Management Plan.

Slaughterville: The town of Slaughterville currently maintains the administrative capabilities above. The town board of trustees gives final approval for the adoption or suspension of any municipal ordinances. The town has a volunteer fire chief who is responsible for the emergency plans of the town. The town clerk is responsible for maintaining the codes and ordinances and for making recommendations to the town board of trustees.

3.1.2 Administrative and Technical Capability

The checkmark (✓) indicates that the jurisdiction reported to have the authority to implement the specified regulatory tool and that the tool is currently in place. Further details are below the table.

Jurisdiction	Personnel w/ knowledge of land development and management practices	Professionals trained in construction practices related to buildings and fire	Professionals with an understanding of natural and/or human caused hazards	Floodplain Manager	Surveyors	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or HAZUS	Scientists familiar with the hazards of the community	Emergency Manager	Grant writers
County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lexington	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Noble	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Norman	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slaughterville	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Cleveland County: The county has the staff available or the ability to contract these roles. The board of county commissioners is the governing body that approves contracting for these services. The county has an emergency manager on staff who is available to assist and/or coordinate with all of the communities as needed in emergencies. The CCEM also provides an emergency text program that allows residents to opt into receiving text messages regarding any emergency situation that the CCEM deems important to the general population.

Lexington: The city has the ability to contract for any of these roles as needed. The responsibilities typically designated to an emergency manager are fulfilled by the water operator (public works) and the fire chief, as the situation demands.

Noble: The city has the staff available or the ability to contract these roles. The city council is the governing board that approves the contracting or hiring for these services. The fire chief also serves as the emergency manager. The city has a floodplain manager to ensure compliance with NFIP guidance and requirements and the floodplain manager brings any new guidance to the town council as needed.

Norman: The City of Norman has the staff available and the ability to contract for any additional roles needed. The city council is the governing body that approves contracting for these services. The city has public works director, fire chief, and a floodplain manager on staff. The city's floodplain manager ensures compliance with NFIP guidance and requirements by bringing any new guidance to the city council for adoption as needed.

Slaughterville: The town has the ability to contract for any of these roles as needed. The town clerk is the grant writer and the volunteer fire chief is the emergency manager. The board of trustees approves any contracts.

3.1.3 Financial Capability

The checkmark (v) indicates that the jurisdiction reported to have the authority to implement the specified regulatory tool and that the tool is currently in place. Further details are below the table.

Jurisdiction	Capital Improvements Project Funding	Authority to levy taxes for specific purposes	Water, Sewer, Gas, or Electric service Fees	Incur fees for new development	Incur debt through general obligation funds and/or special tax bonds	Community Development Block Grant	Federal funding programs	State funding programs
County	✓	✓	No	✓	✓	✓	✓	✓
Lexington	✓	✓	Water, Sewer, Trash	✓	✓	✓	✓	✓
Noble	No	✓	Water, sewer, trash	✓	✓	✓	✓	✓
Norman	✓	✓	Water, Sewer, Electric, Sanitation	✓	✓	✓	✓	✓
Slaughterville	✓	✓	Water, Sewer	No	✓	✓	✓	✓

Cleveland County: The county has these financial capabilities listed above and any necessary changes are brought before the board of county commissioners each June, coinciding with the fiscal year beginning July 1. The county can only levy taxes and incur debt by a vote of the people. Administrative capabilities are continually maintained to ensure compliance for state and federal grant participation. The county provides no utility services of any kind. In the unincorporated areas, the Rural Water Districts, a privately owned entity, provides water service to residents or the residents own their own wells in unincorporated areas.

Lexington: The city has these financial capabilities listed above and any necessary changes are brought before the city council when they arise. The city can only levy taxes and incur debt by a vote of the people. Administrative capabilities are maintained to ensure compliance for state and federal grant participation. The City of Lexington has limited financial flexibility and significant projects are decided upon and completed very intentionally.

Noble: The city has these financial capabilities listed above and any necessary changes are brought before the city council when they arise. The city can only levy taxes and incur debt by a vote of the people. Administrative capabilities are maintained to ensure compliance for state and federal grant participation. The City of Noble pursues large capital improvement projects very intentionally, and develop a schedule

of smaller infrastructure projects that can be pursued and completed annually to keep up with the growth in the area.

Norman: The city has these financial capabilities listed above and any necessary changes are brought before the city council in May or June, coinciding with the fiscal year beginning July 1. The city can levy taxes and incur debt only by a vote of the people. Administrative capabilities are continually maintained in order to ensure compliance for state and federal grant participation. The city provides water, sewer, electricity, and sanitation services.

Slaughterville: The town has these financial capabilities listed above and any necessary changes are brought before the board of trustees when they arise. The town can only levy taxes and incur debt by a vote of the people. Administrative capabilities are maintained to ensure compliance for state and federal grant participation. The Town of Slaughterville has very limited financial flexibility and projects are decided upon and completed very intentionally.

3.1.4 Education and Outreach Capability

The checkmark (v) indicates that the jurisdiction reported to have the authority to implement the specified regulatory tool and that the tool is currently in place. Further details are below the table.

Jurisdiction	Local citizen groups/Non-profit organizations willing to assist with mitigation activities	Ongoing public education or information programs	Natural disaster or safety related programs	StormReady Certification	Firewise Communities Certification	Public-Private partnership initiatives addressing disaster-related issues
County	v	v	v	v	No	v
Lexington	v	v	v	v	No	v
Noble	v	v	v	No	No	v
Norman	v	v	v	No	No	v
Slaughterville	v	v	v	No	No	v

Cleveland County: The CCEM is the point of contact to coordinate county wide partnerships, particularly in times of large disaster events. The CCEM director is constantly building upon existing relationships with all jurisdictions throughout the county and private partnerships with churches and the Red Cross, in addition to building upon relationships with neighboring counties.

Lexington: The city maintains a social media presence for any announcements. Seasonal preparedness or other information also gets posted on fliers in public places across town. There is no formal association for disaster response; however, the community and county assist in times of disaster.

Noble: The city maintains a social media presence and has a mass texting for any residents who opt-in. Announcements, ranging from water line breaks to temporary changes in hours of operation, are posted on the city’s website, messaging, and on social media, and on public notices at city hall. The fire department has an educational outreach with the school for fire safety and awareness.

Norman: The city maintains a social media page and regularly posts city announcements to inform the public of outages, meetings, and any other public information. The social media page and the utility bills are used to distribute seasonal preparedness information to the public. The city also offers a mass texting notification that residents can sign-up to opt-in. The City of Norman has an active volunteer outreach with the city and public surveys are frequently offered.

Slaughterville: The town has very limited outreach. Seasonal preparedness or other information also gets posted on fliers at town hall. There is no formal association for disaster response; however, the

community and county assist in times of disaster. The fire department hands out literature and brochures as they have them available.

Summary:

Cleveland County, Lexington, Noble, Norman, and Slaughterville are all growing communities. Since the previous HMP, significant improvements to updating codes, ordinances, and long-term planning have been made. These communities should continue these efforts as they will benefit the long-term growth and resilience of the area.

3.1.5 School District Capability Assessment

The Oklahoma Department of Education oversees public K-12 education and public libraries in Oklahoma. Following the ratification of the Oklahoma Constitution in 1907, the governor, secretary of state and the attorney general of Oklahoma served as the State Board of Education. The Department in its current iteration was created by the Oklahoma School Code of 1971, which also established the Oklahoma State Board of Education. The school districts are funded by way of *local Ad Valorem* taxes and from the allocations from the State of Oklahoma’s General Funds and Federal Allocations. The school districts are governed by locally elected school boards and superintendents.

The checkmark (✓) indicates that the jurisdiction School District reported to have the authority to implement the specified regulatory tool and that the tool is currently in place. Clarifying details follow the table.

Jurisdiction	Capital Improvement Plan	Emergency Management Plan and/or procedures in place	Budget to raise funds for mitigation (bond)	Ways to raise funds through public partnerships, corporate donations etc.	Designated emergency manager (even as a secondary position)	PTO/PTA	Training for teachers to practice natural hazard response	Training for teachers/coaches to ensure consistency in evaluating lightning	Post-Disaster Recovery Plan	Code Enforcement
Lexington PS	✓	✓	✓	✓	✓	✓	✓	✓	No	✓
Little Axe PS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Norman PS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Robin Hill PS	✓	✓	✓	No	✓	✓	✓	✓	✓	✓
OU	✓	✓	NA	✓	✓	NA	NA	NA	✓	✓

Lexington PS: The school has passed bonds in the past successfully for capital improvements, and remaining funds from bonds are used to improve projects on the long-term planning list. The superintendent functions as the emergency manager when the need arises. The school district has an active PTO for the elementary grades and booster clubs for other grades. Teachers and coaches attend annual natural hazard response training and the coaches and game officials use detection apps for lightning related to lightning safety. The school’s EOP includes a post-disaster recovery plan and the superintendent updates it every July before the school year begins. Reunification plans and locations have also been identified. The school board approves any changes. The school can accept donations and a foundation has been formed. The school adheres to all necessary building codes and permitting for any new building and routine building inspections that apply under the existing municipal code.

Little Axe PS: The school district has passed bonds successfully in the past. The superintendent is the school’s emergency manager or if needed, the middle school principal can also fill this role. Emergency management plans and procedures are updated by the superintendent each summer before the new

school year begins in compliance with state requirements. They are sent to the CCEM director for approval. The school can accept donations by a school procedure. Coaches attend lightning evaluation training in compliance with OSSAA requirements and the coaches use lightning detection apps as the situation requires. The school has PTO and booster clubs, depending on the grade. The school adheres to all necessary building codes and permitting for any new building and routine building inspections that apply under the existing municipal code.

Norman PS: The school district has a successful history of bonds passing. The projects are completed as funding becomes available and new projects are added according to the needs of the district. The superintendent is the school's emergency manager, but the director of operations and facilities director would also coordinate emergency response between campuses as needed. Emergency plans and procedures are updated by the superintendent each summer before the new school year begins in compliance with state requirements. Coaches attend lightning evaluation training in compliance with OSSAA requirements. The school has an EOP and it is annually updated and given to the Cleveland County EM director, and it includes a post-disaster recovery plan. The school adheres to all necessary building codes and permitting for any new building and routine building inspections that apply under the existing municipal code.

Robin Hill PS: Robin Hill PS has the capabilities listed in the table above. The school has a CIP and it is annually updated by the superintendent. The CIP focuses on long-term facility upgrades, maintenance, technology improvements, and campus safety. The school board is made up of five (5) elected members to the Board of Education and all plans receive final approval from the board. All capital improvements are discussed at the school board meetings and facilities planning meetings. The superintendent is the designated emergency manager and incident commander and coordinates with CCEM and Norman emergency services as required. The teachers drill natural hazard response annually and the coaches use lightning detection apps during sporting events in potential severe weather conditions. The school modified its Continuity of Operations Plan (COOP) that addresses all-hazard recovery, remote learning transitions, power loss contingencies, and staff communication procedures. The school has an EOP and it is annually updated and given to the Cleveland County EM director, and it includes a post-disaster recovery plan. The school adheres to all necessary building codes and permitting for any new building and routine building inspections that apply under the existing municipal code.

OU: OU has the capabilities listed in the table above. The university maintains the necessary financial mechanisms to project and complete capital improvements. The university has an emergency manager and emergency management department that coordinates activities with campus security and any other department as required depending on the activity. For any construction undertaken across the campuses, the applicable municipal and/or Life Safety Codes are adhered to, as well as any necessary FAA regulations for the Westheimer Airport that is part of the campus.

The school districts and OU responded accordingly:

1. **Has your school district had positive responses to bond issues?**
 - a. **Lexington PS:** Yes, the school district has been historically supportive.
 - b. **Little Axe PS:** Yes, the school district is supportive of bond issues, and we are currently in the process of getting a bond to build a high school.

- c. **Norman PS:** Yes, the school district is supportive of bond issues.
 - d. **Robin Hill PS:** Yes, we have had success in the past. Robin Hill PS is a small district, but has strong ties within the community and we focus on clearly communicating the needs of the district to ensure a successful bond passage.
 - e. **OU:** This is not applicable.
2. **Based on population, is the school district population growing or declining?**
- a. **Lexington PS:** The school district has been declining slightly in the past few years, particularly in the very young elementary grades. There are numerous options for parents to choose in our district and it varies from school year to school year.
 - b. **Little Axe PS:** The school district is growing.
 - c. **Norman PS:** The district is growing.
 - d. **Robin Hill PS:** The district is steadily growing. The school has a reputation as a smaller, community-oriented school environment.
 - e. **OU:** The university is growing.
3. **How will the Cleveland County HMP data be integrated into other school plans and policies?**
- a. **Lexington PS:** The data included will be reviewed, and will supplement the school's existing emergency management plans and protocols.
 - b. **Little Axe PS:** The data included will be reviewed and any capital improvement projects will be added to the bond series plan if they are not already included.
 - c. **Norman PS:** The HMP data will be used to see what changes we need to implement and areas we need to improve in our long-term planning. We would see what could be integrated into our existing emergency plans.
 - d. **Robin Hill PS:** The district would align its emergency plans with the Cleveland Co. HMP, by identifying shared risks, participate in any regional training opportunities, and seek hazard mitigation grants for generators, radios, or storm shelter improvements.
 - e. **OU:** The campus department of emergency management will use the HMP to assist the university as a whole in prioritizing what needs should be completed first according to the growth of the campus.
4. **How can the school district build upon their capabilities in the future?**
- a. **Lexington PS:** The storm shelters might have some backup power, and we do not have backup generators for the food service. The bus surveillance camera sys; radio communications are in place between schools.
 - b. **Little Axe PS:** The school would like to acquire generators as we do not have any at this time.
 - c. **Norman PS:** The school needs to improve the interoperability of communications, radios, and internal campus notifications in order to adequately inform students and staff of any natural hazard events that will affect Cleveland County, especially if any weather events are anticipated to be severe.

- d. **Robin Hill PS:** We could expand our capabilities by offering advanced training for our administrators and key staff for better response in natural hazard events, installing a permanent backup generator, implementing redundant communications (ex. Radios, satellite phones), and increasing community and student reunification drill practice.
- e. **OU:** The airport has several buildings that need significant improvements, for resilience and improved functionality. The campus also needs additional generators for the housing buildings to improve the safety of the residents in times of power outages. Generally, the campus can improve its self-sufficiency to reduce reliance upon the City of Norman. Improving the campus self-sufficiency will also increase the mutual aid the campus could extend to neighboring municipalities.

Summary:

All schools and OU can improve their capabilities by acquiring generators capable of preserving their respective food services and communications in prolonged power outages due to natural hazards.

All participating jurisdictions could improve capability related to training by practicing earthquake drills. Emergency responders have no formal responses incorporated into their emergency response protocols. If the planning area experienced an earthquake greater than a magnitude of 6/Mercalli VIII, it is a vulnerability that residents, teachers, students, and emergency personnel would have little or no earthquake response protocol in place to ensure their safety. Participation in the National Shakeout would be a starting point for adding earthquake response to the planning area. Action Item 21 has been added to improve this capability.

Lexington, Noble, Norman, and Slaughterville can improve their capabilities by continuing to strengthen their long-term planning and infrastructure projects with hazard mitigation aspects that foster long-term resilience in new construction. The county commissioners can likewise continue to enhance the roads and bridge projects with greater capacities to withstand future hazard impacts.

3.2 Mitigation Goals (Element C3-a)

These general hazard mitigation goals represent what the jurisdictions seek to accomplish through mitigation plan implementation.

Goal 1. To protect lives and property.

Goal 2. To improve or enhance emergency services.

Goal 3. To prevent or reduce the effects of natural hazard events.

Goal 4. To identify and protect critical facilities in participating jurisdictions.

Goal 5. To develop or improve structures to become a more disaster resilient community.

Goal 6. To provide more public awareness of natural disaster threats.

Upon reviewing these goals, the planning team agreed to continue working toward these mitigation goals.

High Hazard-Potential Dam Mitigation Goals –

Goal 7: The city of Norman will continue working with the OWRB to ensure that the Crystal Lake Dam transfer of ownership is in full compliance and certified before assuming full responsibility for the maintenance and operation of the dam.

Goal 8: “To minimize the loss of life and property from a dam failure in the City of Norman, and to enable the continuous operation of critical business and government functions, for human health and safety, and economic security.”

(Note: These goals also reflect the Mitigation Goal 1: Protection of lives and property; Goal 2: Improved identification and protection of critical facilities.)

3.3 Action Items (Element C4-a, C4-b)

The Action Items are listed in order of their priority as the planning team discussed. This prioritization results from the multiple discussions that occurred with the planning team and the needs that each jurisdiction discussed.

Action Item 1	Replace Deficient Concrete Culverts and Drainage Boxes				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville				
Action	Various culverts and drainage structures need improvement across the planning area. Improvements will increase resilience of the roads and provide better drainage. In County Commissioner District 3, Box Structure (14E1330N3190001 Local ID:018) and the tinhorn on 192 nd between Box Road and Edge of the Earth Road need replacing to improve drainage and mitigate flooding in the area.				
Responsible Party	Cleveland County commissioners, Respective public works departments at City of Lexington, City of Noble, City of Norman, Town of Slaughterville.				
Estimated Timeline	1-5 years				
Cost	\$20,000-\$40,000				
Potential Funding Sources	HMPG Grants, BRIC grants, county and municipal funding				
Goals Addressed	Goals 1 & 5				

Action Item 2	Improve drainage in District 3				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington				
Action	Cleveland County Commissioner District 3 extends to the Canadian River watershed that creates the county line between Cleveland and McClain Counties. In particular, additional drainage projects are needed to control floodwaters and divert them to the Canadian River by upgrading/expanding the tinhorns and drainage ditches to increase the water flow and enhance Low Impact Development management. Lexington also needs additional drainage or rehabilitation of existing drainage in the area to improve drainage in the city.				
Responsible Party	Cleveland County Commissioner District 3, Lexington				
Estimated Timeline	1-5 years				
Cost	\$20,000-\$40,000				
Potential Funding Sources	HMPG Grants, BRIC grants				
Goals Addressed	Goals 1 & 5				

Action Item 3		Install water supply tanks with wells as fill stations across Cleveland County				
Hazard(s) addressed	Drought, Wildfire					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville					
Action	The county emergency manager will collaborate with municipalities or landowners as necessary in determining strategic placement of large water supply tanks. The intent is to provide a reliable water source for volunteer fire trucks to fill tankers in times of drought or when wildfires occur. These fill stations would be equipped with a large capacity tank, well, and fire hydrant to ensure that these stations efficiently fill water tankers.					
Responsible Party	Cleveland County Emergency Management, Lexington fire chief, Noble fire chief, Norman fire chief, volunteer fire department chiefs, including Slaughterville VFD					
Estimated Timeline	48 months					
Cost	\$75,000 to \$100,000					
Potential Funding Sources	County funds, Forestry grants, BRIC grants					
Goals Addressed	Goals 1 & 2					

Action Item 4		Install redundant communication systems (Public Safety Radios)				
Hazard(s) addressed	Extreme Heat, Flood, Hail, High Winds, Lightning, Tornado, Wildfire, Winter Storms					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU					
Action	Install redundant communication system at critical facilities. This would include backup power, public safety radios for communicating with the VFDs across the planning area. Redundant communication systems ensure interoperability and reliable communications during natural hazard events if one method of communicating fails.					
Responsible Party	Cleveland County Emergency Management director, Lexington Fire Chief, Noble Fire Chief, Norman Fire Chief, Slaughterville Fire Chief, volunteer Fire Chiefs, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU Emergency Management director					
Estimated Timeline	36-60 months					
Cost	Variable according to the scope of each project					
Potential Funding Sources	County, municipal, and school budgets, public safety grants					
Goals Addressed	Goals 1					

Action Item 5		Expand Outdoor Warning Siren Network				
Hazard(s) addressed	Tornado					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville					
Action	Purchase and install new outdoor warning sirens to replace outdated equipment, and/or update existing outdoor sirens to place into working condition					
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief					
Estimated Timeline	Variable according to size and scope of the project					
Cost	\$5,000 to \$50,000 depending on the scope of the project					
Potential Funding Sources	County budgets municipal budgets, REAP grants, HMGP grants					
Goals Addressed	Goal 2 & 5					

Action Item 6		Acquire curtain burner for red cedar eradication				
Hazard(s) addressed	Drought, Wildfire					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County					
Action	Acquire a curtain burner that can be used to clear unincorporated areas of Cleveland County from overgrowth of red cedar. Red cedar is an invasive species and worsens wildfires if they catch on fire and explode due to the natural oils of the tree and the high temperatures of the wildfires. Removing red cedar also preserves the natural water table as the trees require more water than smaller vegetation and native grasses.					
Responsible Party	Cleveland County Commissioner Dist. 1					
Estimated Timeline	1-5 years					
Cost	None					
Potential Funding Sources	NA					
Goals Addressed	Goal 2 & 3					

Action Item 7		Install permanent generators in existing critical infrastructure				
Hazard(s) addressed	Earthquake, Extreme Heat, High Winds, Lightning, Tornado, Wildfire, Winter Storm					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU					
Action	Purchase and install permanent generators as secondary power sources for county and municipal buildings, EOCs, municipal water treatment plants, or other identified critical infrastructure, and in public schools. Adding generators would also allow flexibility for existing facilities to be used as cooling and warming stations as the need arises. Generators at the schools would enable the school to preserve food service in prolonged power outages due to natural hazard events. Generators at the OU would be placed in the on-campus housing areas that do not have backup power currently. Generators are needed at the rec centers across Norman, as well as the Development Center. The county election board building needs backup generator power as it currently does not have any. The recreational centers also need backup power to ensure operation and safety during power outages caused by natural hazards for the children who attend after school programs.					
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU Emergency Management					
Estimated Timeline	12 months per project					
Cost	Variable					
Potential Funding Sources	County budget, municipal budget, school budgets, grants					
Goals Addressed	Goal 1 & 5					

Action Item 8		Deep Water Wells (or secure a secondary water source)				
Hazard(s) addressed	Drought					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Noble PS, Norman PS, OU					
Action	Drill additional wells ensuring that adequate water supply is available as a redundant water supply for residents, schools, and unincorporated communities.					
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Respective superintendents for Lexington PS, Little Axe PS, Norman PS, Robin Hill PS; and OU emergency manager.					
Estimated Timeline	Ongoing					
Cost	Variable per project					
Funding Sources	County budget, municipal budget, school budget, REAP grants, OWRB grants					
Goals Addressed	Goal 1 & 5					

Action Item 9	Improve drainage areas and structures				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Improve drainage areas to increase resilience and reduce effects of water backing up into identified areas across the planning area. This activity would include removing silt and debris from drainage channels, culverts, ditches, etc. and replacing culverts with larger, more resilient culverts. This activity includes stormwater drainage infrastructure.				
Responsible Party	Cleveland County Commissioners, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Public Works, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU EM director				
Estimated Timeline	36-60 months				
Cost	Variable				
Potential Funding Sources	County budget, municipal budget, CDBG grants				
Goals Addressed	Goal 2 & 4				

Action Item 10	Create retention pond around Imhofe Creek				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	City of Norman				
Action	Construct a pond that would reduce the flooding in this area of Norman.				
Responsible Party	City of Norman Public Works, City of Norman Stormwater Dept.				
Estimated Timeline	36-60 months				
Cost	Variable				
Potential Funding Sources	Municipal budget, CDBG grants, BRIC				
Goals Addressed	Goal 2 & 4				

Action Item 11	Acquire Portable Generators				
Hazard(s) addressed	Earthquake, Extreme Heat, High Winds, Lightning, Tornado, Wildfire, Winter Storm				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Acquire portable generators for mutual aid and/or for use within the individual jurisdiction at a public facility in a prolonged power outage.				
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU Emergency Manager				
Estimated Timeline	12 months per project				
Cost	Variable				
Potential Funding Sources	County budget, municipal budget, grants, school and university budget or grants				
Goals Addressed	Goal 1 & 5				

Action Item 12	Conduct public awareness seminars/meetings regarding all natural hazards and mitigation activities				
Hazard(s) addressed	Dam Failure*, Drought, Earthquake, Extreme Heat, Flooding, Hail, High Winds, Lightning, Tornado, Wildfire, Winter Storm (*Only Cleveland Co. and Norman)				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County*, Lexington, Noble, Norman*, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Coordinate public meetings with local OSU Extension office, fire department, or municipal office where residents can receive information about mitigation activities related to natural hazards. Discussions would include mitigation activities such as drought, extreme heat, flooding, hail, high winds, lightning, wildfire, and winter storms, and dam failure*. The goal is to improve public outreach for the population to have a better understanding of the warnings, watches, and encourage businesses to have better plans to accommodate clients and guests if/when severe weather occurs.				
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU EM director				
Estimated Timeline	1-5 years				
Cost	\$0				
Potential Funding Sources	NA				
Goals Addressed	Goals 1, 2, & 4				

Action Item 13	Upgrade & New Construction of Water Supply Systems				
Hazard(s) addressed	Drought, Extreme Heat, Wildfire				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Strategically replace aging infrastructure with new waterlines in order to compensate for the growth across the county. Upgrading water supply lines would increase the resilience of these systems particularly as they contract during periods of Drought and Extreme Heat. Some of these lines could include replacing any aging fire hydrants along the line to improve the output and reliability of the hydrant in case of wildfire on the perimeter of the municipalities.				
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Respective superintendents for Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU Utilities Director				
Estimated Timeline	Variable according to size and scope of the project				
Cost	Variable according to size and scope of the project				
Potential Funding Sources	County budgets municipal budgets, REAP grants, BRIC grants, CDBG Grants, Oklahoma Department of Commerce Grants, school budget				
Goals Addressed	Goal 2 & 5				

Action Item 14	Install surge protectors on all electronics				
Hazard(s) addressed	Lightning				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Purchase and install additional surge protectors to reduce damages to electronics. Action includes any measures to the outside of critical infrastructure to ensure enhanced grounding and redirecting of lightning.				
Responsible Party	Cleveland County Emergency Management director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU Facilities Director				
Estimated Timeline	36 months				
Cost	Variable per project				
Potential Funding Sources	County budget, municipal budget, school funds, grants, donations				
Goals Addressed	Goal 2 & 5				

Action Item 15	Protective Crosswalks for Schools				
Hazard(s) addressed	High Winds, Hail				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Construct protective crosswalks to protect students, staff, and visitors for protection in the event of high winds and hail.				
Responsible Party	Respective superintendents for Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU emergency management director				
Estimated Timeline	1-5 years				
Cost	None				
Potential Funding Sources	None				
Goals Addressed	Goals 3 & 5				

Action Item 16	Install window safety film on county, city, school owned property				
Hazard(s) addressed	Earthquake, Extreme Heat, Hail, High Winds, Tornado				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Install window safety film on windows in the county, city, and school owned property to improve resilience in natural hazard events.				
Responsible Party	Cleveland County EM director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU EM Director				
Estimated Timeline	Ongoing				
Cost	Variable according to the scope of the project				
Potential Funding Sources	County budget, municipal budget, school funds, DHS Safety grants, HMGP grants				
Goals Addressed	Goal 5				

Action Item 17	Drainage Bridge Structure (24th Ave NW and Indian Hills)				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Norman				
Action	Elevate road 24 th NW and Indian Hills to mitigate repetitive flooding issues.				
Responsible Party	City of Norman Public Works				
Estimated Timeline	36-60 months				
Cost	Variable according to the phase				
Potential Funding Sources	OWRB Grants, BRIC grant				
Goals Addressed	Goal 2 & 4				

Action Item 18	Map at-risk transportation routes				
Hazard(s) addressed	Dam Failure, Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Norman				
Action	Identify transportation routes at most risk of flooding and flooding from potential dam failure. Identify alternate routes for transportation of residents and commuters.				
Responsible Party	Cleveland County Emergency Management, Norman Public Works director				
Estimated Timeline	12 months				
Cost	\$0-\$5,000				
Potential Funding Sources	County budgets, municipal budgets				
Goals Addressed	Goal 1 & 4				

Action Item 19		Increase availability of covered parking at critical infrastructure				
Hazard(s) addressed	Hail, High Wind, Lightning, Winter Storm					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU					
Action	Build covered parking at critical infrastructure to protect fleet vehicles and employees' vehicles from damages in debris generating events or hailstorms.					
Responsible Party	Cleveland County Commissioners, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU Facilities Director					
Estimated Timeline	1-5 years					
Cost	Variable according to the size of the project					
Potential Funding Sources	County, municipal, School Funding					
Goals Addressed	Goals 5					

Action Item 20		Property Acquisition in Dam Breach inundation Areas or Flood Prone areas				
Hazard(s) addressed	Dam Failure*, Flooding					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Cleveland County*, Lexington, Noble, Norman*, Slaughterville					
Action	Buyout of properties in imminent danger from dam failure and flooding due to dam failure, as well as, buyout of repetitive loss or severe repetitive loss properties in the planning area.					
Responsible Party	Cleveland County Commissioners, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Town Board					
Estimated Timeline	60 months					
Cost	\$250,000-\$750,000					
Potential Funding Sources	County budgets, municipal budgets, BRIC grants					
Goals Addressed	Goal 2, 3, & 5					

Action Item 21	Participation in National Shakeout				
Hazard(s) addressed	Earthquake				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU EM director				
Action	Increase awareness of earthquake protocols by participating in the National Shakeout and including earthquake drills in response protocols				
Responsible Party	Cleveland County EM director, Lexington Public Works director, Noble Public Works director, Norman Public Works director, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU EM director				
Estimated Timeline	60 months				
Cost	None				
Potential Funding Sources	Not needed				
Goals Addressed	Goal 2 & 5				

Action Item 22	Chouteau Creek Rehabilitation				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Lexington				
Action	Rehabilitate the drainage area of Chouteau Creek in Lexington. Current dredging is not sufficient to mitigate routine flooding that occurs in rainfalls of 1" or more.				
Responsible Party	Lexington Public Works director, Lexington City Council				
Estimated Timeline	60 months				
Cost	None				
Potential Funding Sources	Not needed				
Goals Addressed	Goal 2 & 5				

Action Item 23		Replace aging fire hydrants				
Hazard(s) addressed	Wildfire					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Lexington, Noble, Norman, Slaughterville, OU					
Action	Replace aging fire hydrants with new fire hydrants to enhance output and improve reliability during usage; 16 hydrants currently out of commission					
Responsible Party	Lexington Public Works director and city council, City of Noble public works and city council, City of Norman public works and city council, Slaughterville town board, OU operations					
Estimated Timeline	60 months					
Cost	\$5,000 per hydrant and section of line					
Potential Funding Sources	Municipal and university funds, bonds, grants from BRIC or Dept. of Commerce					
Goals Addressed	Goal 2 & 5					

Action Item 24		Improve lift station and water processing plant				
Hazard(s) addressed	Flooding					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	Lexington					
Action	Expand capacity of the lift station to withstand extra water that currently overwhelms the stormwater runoff that routinely falls.					
Responsible Party	Lexington Public Works director, Lexington city council					
Estimated Timeline	60 months					
Cost	\$1,000,000					
Potential Funding Sources	Grants from BRIC, OWRB, DEQ					
Goals Addressed	Goal 2 & 5					

Action Item 25	Conduct inundation studies to enhance existing EAPs to correct data deficiencies				
Hazard(s) addressed	Dam Failure* (*Affects only Cleveland County and Norman)				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, City of Norman				
Action	Conduct inundation studies for Shadow Lake Dam, Summit Lake Dam, and Sutton Wilderness Lake Dam to complete the inundation times and flood depths. (Goldco Dam, Huddleston Lake Dam, Lake Stanley Draper, Templo de Alabanza, and Turtle Creek Lower are not under the jurisdiction of the participants of this HMP; these respective EAPs also need inundation times and flood depths.)				
Responsible Party	City of Norman Floodplain Manager, Cleveland County Emergency Management Director				
Estimated Timeline	60 months				
Cost	\$10,000 to \$50,000				
Potential Funding Sources	Grants from BRIC, OWRB, DEQ				
Goals Addressed	Goal 2 & 5				

Action Item 26	Scoping project for generator accessibility				
Hazard(s) addressed	Extreme Heat, Flooding, Hail, High Winds, Lightning, Tornado, Winter Storm				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Conduct a thorough evaluation of each building considered critical infrastructure and determine which buildings would be best suited for installing generator hook-ups for smaller, portable generators.				
Responsible Party	Cleveland County EM director, Lexington Fire Chief, Noble Fire Chief, Norman Emergency Management, Slaughterville Fire Chief, Superintendent and Maintenance director at Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, and OU EM director				
Estimated Timeline	60 months				
Cost	\$10,000 to \$50,000				
Potential Funding Sources	Grants from BRIC, OWRB, DEQ				
Goals Addressed	Goal 2 & 5				

Action Item 27	Individual Saferoom Reimbursement Grant Program				
Hazard(s) addressed	High Winds, Tornado				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville				
Action	Offer Cleveland County residents the opportunity to install private, individual saferooms and be reimbursed through a county-wide grant				
Responsible Party	Cleveland County Emergency Management director, respective city councils for Lexington, Noble, and Norman, Slaughterville town board, respective municipal departments that oversee planning and development to ensure proper documentation for the program.				
Estimated Timeline	1-5 years				
Cost	\$20,000-\$40,000				
Potential Funding Sources	HMPG Grants, BRIC grants				
Goals Addressed	Goals 1 & 5				

Action Item 28	Safe rooms installed in critical infrastructure				
Hazard(s) addressed	Extreme Heat, High Winds, Tornado, Winter Storms				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Install safe rooms in public critical infrastructure with accompanying generators for secondary power in prolonged power outages.				
Responsible Party	Cleveland County Emergency Management director, Lexington Fire Chief, Noble Public Works director, Norman Emergency Management, Slaughterville Fire Chief, Lexington PS Superintendent, Little Axe PS Superintendent, Norman PS Superintendent, Robin Hill PS Superintendent, OU EM Director				
Estimated Timeline	2 years per project				
Cost	Variable				
Potential Funding Sources	County budget, municipal budget, school budget, HMGP grants				
Goals Addressed	Goal 2 & 5				

Action Item 29	Riley Park Drainage study				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	City of Noble				
Action	Conduct a drainage study in this area to determine the options the city might pursue to mitigate flooding in this area.				
Responsible Party	City planner, City council				
Estimated Timeline	2-3 years				
Cost	Variable depending on the scope of the project				
Potential Funding Sources	Municipal budget, BRIC grant				
Goals Addressed	Goal 2 & 5				

Action Item 30	Master Drainage Study				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	City of Noble				
Action	Develop a master drainage study to determine where the most interventions can be made to “Old Town” Noble where the city has the oldest housing and infrastructure.				
Responsible Party	City planner, City manager, City Council				
Estimated Timeline	2-3 years				
Cost	Variable according to the scope of the project				
Potential Funding Sources	Municipal budget, HMGP grants, BRIC grants				
Goals Addressed	Goal 2 & 5				

Action Item 31	Replace drainage structures within Noble				
Hazard(s) addressed	Flooding				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Noble				
Action	Replace culvert at 72 nd and Dab o' Dirt Road. Second St. and Eighth St. along Oak and Chestnut streets need rehabilitation and new construction to mitigate flooding in the area.				
Responsible Party	City of Noble Public Works				
Estimated Timeline	36-60 months				
Cost	Variable according to the project				
Potential Funding Sources	Municipal funding, BRIC grant				
Goals Addressed	Goal 2 & 4				

Action Item 32	Continue monitoring all High-hazard dams within City of Norman				
Hazard(s) addressed	Dam Failure* *(Applies only to Norman)				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	City of Norman				
Action	The public works department will continue monitoring any deficiencies of any of the dams owned and operated by the City of Norman to ensure the safety of the residents and resilience of the infrastructure.				
Responsible Party	City of Norman Parks and Recreation Department Director, City of Norman Floodplain Administrator/Public Works Director, City of Norman Emergency Management Director, City of Norman Fire Department, City of Norman Public Works Director				
Estimated Timeline	60 months				
Cost	Variable according to erosion that occurs annually				
Potential Funding Sources	Grants from BRIC, OWRB, DEQ				
Goals Addressed	Goal 7 & 8				

Action Item 33		Ensure compliance of dam condition prior acquisition				
Hazard(s) addressed	Dam Failure* *(Applies only to Norman)					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	City of Norman					
Action	The public works department will ensure that the Crystal Lake Dam is rehabilitated prior acquisition to ensure a smooth transition of ownership between the HOA and the City of Norman.					
Responsible Party	City of Norman Parks and Recreation Department Director, City of Norman Floodplain Administrator/Public Works Director, City of Norman Emergency Management Director, City of Norman Fire Department, City of Norman Public Works Director					
Estimated Timeline	60 months					
Cost	Variable according to erosion that occurs annually					
Potential Funding Sources	Grants from BRIC, OWRB, DEQ					
Goals Addressed	Goal 7 & 8					

Action Item 34		Expand Capacity of High Hazard Potential Dams				
Hazard(s) addressed	Dam Failure* *(Applies only to Norman)					
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects	
Jurisdictions	City of Norman					
Action	The public works department will ensure that the Crystal Lake Dam or any other high-hazard potential dam within the city limits is built up should the capacity need expanding. This would include building up the dam or dredging the pond to increase the capacity due to a massive increase of stormwater runoff due to development upstream. These actions to expand capacity would be an effort to preserve life and property downstream.					
Responsible Party	City of Norman Parks and Recreation Department Director, City of Norman Floodplain Administrator/Public Works Director, City of Norman Emergency Management Director, City of Norman Fire Department, City of Norman Public Works Director					
Estimated Timeline	60 months					
Cost	Variable according to erosion that occurs annually					
Potential Funding Sources	Grants from BRIC, OWRB, DEQ					
Goals Addressed	Goal 7 & 8					

Action Item 35	Scoping project of all critical infrastructure for generator hook-up compatibility				
Hazard(s) addressed	Extreme Heat, Flooding, High Winds, Lightning, Tornado, Winter Storm				
Mitigation Action Type	Local Plans & Regulations	Structure/ Infrastructure Projects	Natural Systems Protection	Education/ Awareness Programs	5% Projects
Jurisdictions	Cleveland County, Lexington, Noble, Norman, Slaughterville, Lexington PS, Little Axe PS, Norman PS, Robin Hill PS, OU				
Action	Each jurisdiction needs to prioritize a systematic evaluation of each building or facility they would like to use as a community shelter, or which buildings the jurisdictions want to utilize as a facility with backup power. This project would validate which buildings would be best for installing the appropriate connections and wiring for temporary, portable generator hook-ups.				
Responsible Party	Cleveland County Emergency Management director, Cleveland County Commissioners, Lexington City Manager, Noble Fire Chief, Slaughterville Fire Chief, Respective superintendents and/or maintenance staff at each school				
Estimated Timeline	60 months				
Cost	Variable according to erosion that occurs annually				
Potential Funding Sources	Grants from BRIC, OWRB, DEQ				
Goals Addressed	Goal 4 & 5				

3.4 Action Item Prioritization (Element C5-a)

County and Municipalities: Each jurisdiction maintains their own respective governing board. The board of county commissioners governs the final decisions of the county. The respective city councils/board of trustees govern the respective municipalities. Each respective board has the authority to appropriate funding or issue bonds to complete hazard mitigation projects. The determining factors in prioritizing projects for each community will be:

- The cost-benefit analysis for each project to weigh the long-term benefits;
- Availability of local, state, and federal funding; and/or
- The social and political factors driving the project(s).

Occasionally, the respective jurisdictions might choose to pursue specific grant opportunities (whether through private or public funding) for one-time hazard mitigation projects, example: federal funding for a storm shelter, or local bonds for permanent emergency generators at critical facilities.

The planning departments and governing bodies consider questions such as:

- 1 Does the project enhance public awareness and understanding of hazards specific to the Planning Area?
- 2 Can the project be accomplished in a way that maximizes mitigation activities between the local community, non-profit, and private business entities?
- 3 Will the project provide an opportunity for new construction that enhances mitigation?
- 4 Will the project help to educate the public on mitigation and prevention activities?

Ultimately, each governing body decides which hazard mitigation projects to prioritize according to the funds available, either through budgetary appropriations or by putting the project to a vote by the people to issue bonds that would pay for the hazard mitigation project. The social, political, and economic factors, and public involvement will also influence how these projects would be prioritized and implemented.

Schools: School budgets are directly tied to state funding and schools rely on the authorization and support of the respective school boards to complete action projects such as these listed in the Action Projects. The hazard mitigation planning team discussed how these projects would be prioritized and implemented. The determining factors in prioritizing projects for the schools will be:

- The cost-benefit analysis for each project; and/or,
- The availability of local, state, and federal funding.

Occasionally, individual school districts might choose to pursue specific grant opportunities (through private or public funding) for one-time hazard mitigation projects, example: federal funding for a storm shelter, or local bonds for emergency generators. Oklahoma schools cannot issue a bond without a vote of the people; therefore, social and political factors play a critical role when large district-wide hazard mitigation projects need to be funded.

As funding for action projects becomes available, the participating jurisdictions will also use the STAPLEE evaluation table, in addition to the cost-benefit analysis for each project.

The STAPLEE method provides a framework that jurisdictions can employ to evaluate the feasibility of alternative considerations, and the respective limitations and impacts.

Example STAPLEE Evaluation for future reference

Evaluation Category	Sources of Information S.T.A.P.L.E.E.
Social	Members of the HazMit Planning Team had input throughout the planning process. The team included government officials, school administrators, emergency response/emergency management personnel, business owners, and professionals. Discussions included those among the school population who are most vulnerable during times of hazardous events.
Technical	Community officials, the Oklahoma Water Resources Board (OWRB), and the Oklahoma Department of Emergency Management (ODEM), Cleveland County Commissioners, and other subject matter experts were consulted about technical aspects of the projects and hazards.
Administrative	Administrative staff will be responsible for the implementation of action projects as funding becomes available.
Political	Officials and members of the governing boards were part of the planning process.
Legal	Legal questions will be presented to the respective legal counsels to ensure compliance and that no legal issues would arise with project implementation.
Economic	As anticipated, (the jurisdiction) does not currently have funds to implement all action projects. The main focus of the HazMit Planning Team are Action Items 1-13. All other projects will undergo a cost-benefit analysis to inform the public if any bonds are initiated to generate revenue for future projects.
Environmental	Agencies such as the Oklahoma Department of Environmental Quality (ODEQ), Oklahoma Forestry Service (OFS), and the OWRB, among others have been consulted regarding the technical details of hazards and their impacts upon the jurisdiction(s).

Conclusion: During the planning process, the planning team discussed and prioritized the respective projects that would likely be accomplished with the available funding within the respective jurisdictions. For the projects that were not/are not feasible at this time, the planning team discussed which ones would likely require a bond or grant to be funded and accomplished.

The cost-benefit analysis concluded that action items 1-13, 34 will be the most comprehensive action items to accomplish all five goals. The benefit of these goals is ultimately to protect and save lives which exceeds the economic cost it will require to install safe rooms, acquire generators, improving building envelopes, expand capabilities, and improve long-term resilience.

The planning team has identified the action items and prioritized them according to which goals will be the most likely to be completed and most likely to be budgeted into the respective capital improvement plans/projects. The planning team anticipates that Action Items 1-13, 34 will be evaluated annually to see how the implementation and completion can be/is being achieved. It is not anticipated that these completions will occur simultaneously by will occur individually as funding becomes available. These are the projects that the planning team identified as having the most social and political capital to achieve.

The planning team expects to evaluate Action Items 14-33 annually as well; execution of these action items is completely dependent upon the funding of each individual jurisdiction, as well as the community's support and the long-term benefit of the project. If an opportunity to pursue any of these becomes available, the necessary steps will be taken to ensure the due process occurs.

Chapter IV: Plan Maintenance (Element D)

4.1 Continued Public Involvement (Element D1-a)

The Cleveland County HMP planning team confirmed that individual meetings with the participating jurisdictions is the best way to involve the public in future hazard mitigation planning efforts, gain insight into each community's needs, and incorporate hazard mitigation goals into each community's long-term planning.

Generally, there is little public involvement with hazard mitigation planning meetings. Public involvement centers upon specific projects that the respective municipalities have publicized in local newspapers, social media, and the posting of public agendas for regular meetings. These projects vary in public interest and in the degree that it includes aspects of hazard mitigation. All participating municipalities noted that drainage, storm water, and flood mitigation projects are often included in the regularly scheduled municipal meetings.

The leaders of each participating jurisdiction discussed how to improve on incorporate hazard mitigation projects into regularly occurring meetings, such as school board meetings, city/town council meetings, and fire chiefs' meetings.

Moving forward, the planning team concluded that the Cleveland County emergency management (CCEM) director and primary jurisdictional contacts for the CCHMPU planning team to proactively present information regarding the HMP updates, action items, and mitigation discussions. The LEPC is also another public meeting attended by both county, municipal, and private business leaders each quarter. The discussions at the LEPC explained the purpose of the hazard mitigation planning process and the value of adding various projects to the HMP as action items.

As demonstrated by the survey results detailed in Section 1.7, the surveys did not have an overwhelming response. Since OU is located in Cleveland County, numerous surveys from OU are developed throughout each semester. Survey fatigue could have played a role in the lack of responses; however, it is difficult to determine a single reason why public involvement is difficult to obtain in any planning area. The Norman EM team who coordinated the hazard mitigation survey for the City of Norman also noted that feedback was lower than anticipated.

By utilizing regular meetings, hazard mitigation items could be more frequently brought before the respective governing bodies where due process can be executed. Hazard mitigation projects overlap with long-term planning and are not generally single-issue topics; bringing public attention to those components could bring greater public interest and involvement.

Regularly scheduled meetings provide the opportunity to present Hazard Mitigation projects, thoroughly examine bond issues for hazard mitigation projects, and prompt regular discussions with the public. Regular meetings offer an existing means for hazard mitigation topics and projects to be presented as an agenda item where community members are continually invited to participate.

4.2 Plan Monitoring, Evaluating, and Updating (Element D2-a to D2-c)

MONITORING and TRACKING THE PLAN

The CCEM director will be the designated personnel who will monitor *all aspects* of the Cleveland County HMP update process. The CCEM director will also train the deputy director to monitor, evaluate, and update the HMP between the five-year updates. He/she will be responsible for:

- Contacting participating jurisdictions every six months or after significant natural hazard events as they occur;
- Documenting any damages that might have occurred;
- Documenting if any jurisdictions encountered any implementation problems as action projects were initiated.

These findings will be compiled in an annual assessment that the CCEM director provides to and reviews with each jurisdiction at an annual countywide meeting. The CCEM director will meet individually with any jurisdiction that could not attend the annual meeting. These updates will also be given at the LEPC meetings.

EVALUATING THE PLAN

The documentation of the annual assessment will help the CCEM director and jurisdictions evaluate the effectiveness of the mitigation actions. The CCEM director and jurisdictions will use these objectives for evaluating the findings of the annual assessment. The evaluation objectives will determine:

- If any magnitudes of risk have changed;
- If current resources are appropriate for implementing the mitigation projects;
- If any problems were encountered in the implementation of any projects;
- If there are changes in prioritization per the social, economic, and political conditions;
- If coordinating agencies' participation was effective (if a factor);
- If mitigation actions and outcomes occurred as expected:
 - Was the intended purpose of the original mitigation action met?
 - Was the mitigation action met in the proposed timeline?
 - Did the listed agencies participate and follow through on any commitments?
 - Did the mitigation action stay within the proposed budget?

This evaluation will be prepared, along with the annual assessment, by the CCEM director. This evaluation will be presented to participating jurisdictions' governing councils and boards at the same time as the annual assessment. Any member of these boards and any members of the community can and will be encouraged to offer input on any of the information as it relates to prioritizing the hazard mitigation action items. This evaluation will also be presented at the Cleveland County LEPC meeting.

UPDATING THE PLAN

The CCEM director will be responsible for adding the findings of the annual assessment and evaluation to the HMP each June-July in connection with the county's fiscal year. The CCEM director will conduct an annual meeting with the Planning Team each August and distribute the annual assessment and evaluation to all Planning Team members. Any changes to the action items will be submitted as addendums to FEMA if needed between formal updates.

The CCEM director will be responsible for initiating the planning meetings with Cleveland County Planning Team at a minimum of 18 months prior the HMP expiration date in preparation for the standard five-year update for submission to OEM and FEMA. By the CCEM director conducting annual hazard mitigation planning meetings and making the annual updates ensures continuity of the MHMP so there is no lapse of any grant funding and eligibility. Once the Cleveland County Planning Team has finalized it, then the MHMP will be submitted to OEM and FEMA for approval.

This process of monitoring, evaluating, and updating occurs concurrently with the regular schedule of public meetings, such as school board meetings, city/town council meetings, Local Emergency Planning Committee (LEPC) meetings, the monthly Cleveland County emergency managers' meetings, and fire chiefs' meetings. Any hazard mitigation related discussions, ideas, or projects that are included as agenda items will be integrated into the annual assessment and evaluation conducted by the CCEM director.

This will ensure that Action Items will be regularly discussed among the jurisdictions, changes to prioritization are documented, and appropriate budgets for hazard mitigation projects are presented to the respective governing bodies.

4.3 Integration of Data, Goals, and Action Items into Planning Mechanisms (Element D3-a to D3-c)

Information on how each jurisdiction reviews its planning mechanisms is included in detail below. In each review, jurisdictional POCs will review the HMP hazard data and mitigation action item list at least annually. All jurisdictions will incorporate any updated hazard profile data into their respective Emergency Action Plans. Whenever possible, **Cleveland County, Lexington, Noble, Norman, and Slaughterville, Lexington PS, Little Axe PS, Norman PS, and Robin Hill PS, and OU** will look for funding opportunities to incorporate hazard mitigation action items into their respective budgets, particularly when hazard mitigation components can be incorporated. All municipalities have the ability to enforce building codes will also review the HMP for opportunities to incorporate enhanced building codes that promote hazard mitigation aspects.

Each jurisdiction individually decides how to appropriate or seek funding for their most urgent or most needed projects. They follow protocols of their respective governing bodies accordingly. As much as they are able with their existing plans, the jurisdictions individually ensure that appropriate overlap with their comprehensive master plans, emergency operation plans, capital improvement plans, etc., as shown in Sections 3.1.1 to 3.1.5. Those tables and following narrative show the planning mechanisms each jurisdiction has in place to accomplish their hazard mitigation goals.

The planning team will annually review the goals to ensure if changes are needed, based on what the planning team experienced in the previous year. If changes are required, it will be documented according to the process outlined in Section 2.7.

Cleveland County: The plans identified and details in Sections 3.1.1 to 3.1.4 are annually updated by the emergency management director and approved by the board of county commissioners, either on January 1 or July 1, depending on the cycle of each respective plan. The Cleveland County Commissioners give the final approval for any changes or updates to prioritizing hazard mitigation project implementation, as the board of commissioners decide how the county budget is appropriated and prioritized. As mentioned in Section 3.1.1, the county EOP is in the process of being reworked at the time of writing this HMP. Upon its completion the CCEM director will annually review and update the EOP and Post-Disaster Recovery Plan and submit each to the board of county commissioners for approval.

The City of Lexington: The plans identified and details in Sections 3.1.1 to 3.1.4. As detailed above, the city has a limited capacity by which it can implement large scale hazard mitigation projects and implementing projects will be decided by the city council. The city relies on grant funding for significant capital improvement projects.

The City of Noble: The plans identified and details in Sections 3.1.1 to 3.1.4. As detailed above, the city has a somewhat limited capacity by which it can implement hazard mitigation projects and implementing projects will be decided by the city council. The city relies on grant funding for large capital improvement projects. The city would promote any county-wide initiatives facilitated and funded by the county.

The City of Norman: The plans identified and details in Sections 3.1.1 to 3.1.4 are annually updated by each department and the city clerk. They are submitted to and approved by the city council. The ordinances are continually reviewed by the city clerk and formally updated as needed. Any changes are brought before the city council for approval each June, coinciding with the fiscal year budget approval. The city council gives the final approval for any changes or updates to prioritizing hazard mitigation project implementation.

The Town of Slaughterville: The plans identified and details in Sections 3.1.1 to 3.1.4. As detailed above, the town has a limited capacity by which it can implement hazard mitigation projects and implementing projects will be decided by the town's board of trustees. The town relies on grant funding for capital improvement projects. The town would promote any county-wide initiatives facilitated and funded by the county.

Schools: Each respective superintendent is the primary contact responsible for ensuring that emergency plans and protocols are annually updated (or updated according to its cycle) and approved by the respective school boards. The superintendent holds this responsibility as emergency/crisis management is part of the job description. The respective superintendents work with safety committees made up of teachers who can provide the practical insight into implementation of emergency plans and protocols. As each respective superintendent presents the CCHMPU to each respective school board for adoption, the CCHMPU will be used to compare existing protocols with the hazards addressed in the school plans. The respective school boards are the governing authority to approve emergency plans and protocols upon the recommendation of the superintendent. The superintendent is also responsible to ensure that the school's plans and protocols meet state requirements.

How Jurisdictions Have Already Incorporated Hazard Mitigation Plan Data into Planning Mechanisms

Perhaps the best way to explain how communities in the planning area have already incorporated hazard mitigation data into planning mechanisms, is to acknowledge that facets of hazard mitigation are implemented in routine maintenance and improvement. Facets of hazard mitigation is a natural consequence of improving drainage structures for mitigating flooding, adopting new building codes for improved construction resilience, and other related practices.

That being said, the previous HMP Update specifically was incorporated into some planning mechanisms as newer codes and ordinances have been adopted. However, as shown by the tables in Section 3.1, some of the jurisdictions simply do not have existing planning mechanisms available in order to rigorously incorporate hazard mitigation plan data and institutionalize practices.

The respective jurisdictions did accomplish, partially or completely, some of the previous HMP Update action items. They focused on completing action items that provided the most benefit to the community and that were affordable within the jurisdiction's budget. The previous mitigation action items and status are detailed in Section 5.2.

The limiting hindrance to incorporating hazard mitigation data within each respective jurisdiction is a limited personnel and financial resources available. Each jurisdiction does have the personnel on staff or the ability to contract for roles not on staff as listed in Section 3.1.2. However, often one individual is responsible for multiple roles, as budgetary restraints must be managed judiciously and intentionally by the respective governing bodies. Another factor is simply the social and political capital within each respective community. As with many projects, the governing body ultimately decides which projects to pursue based on what the community can afford as well as what will be widely supported and benefit the most population.

Chapter V: Plan Update (Element E1-a to E2c)

5.1 Changes in Jurisdictional Development (Element E2-a)

Each municipality noted distinct changes as noted below.

Cleveland County: The county commissioners discussed the rapid growth within Cleveland County since the previous HMP update. Cleveland County had a population of 296,396 in 2020 and in 2025, the estimated population has grown to 304,611. The urban sprawl between Norman, Noble, and Slaughterville has seen significant growth with housing development. The amount of housing developments in the unincorporated areas has prompted the commissioners to consider whether or not new codes and ordinances should be explored to ensure the long-term public safety in these areas. The county commissioners recognize that the long-standing rural areas are quickly becoming urbanized, and want to pursue options within legal confines of exploring any codes and/or ordinances that could beneficially preserve public safety, preserve the watersheds, and mitigate wildfire potential along these housing editions.

Lexington: Chouteau Creek flows through the town, and with the general growth in the area, and the aging infrastructure surrounding the creek, the town recognizes that a significant drainage project will be required to mitigate the flooding that occurs in significant rains. Ongoing discussions occur with the town board and personnel, as well with the county commissioners. Mitigating the flooding associated with this watershed area currently is cost prohibitive for the town without a bond, grant funding, or both. Another priority that has become more urgent is the rehabilitation of the town's drainage infrastructure. April 2025 saw record amounts of rain statewide, and Lexington was no exception. The stormwaters often overwhelm the drains and infiltrate the drainage. The lift station is adequate in sunny day conditions; however, when rains fall on sequential days or an extremely heavy rain falls, the lift station cannot process the additional water adequately. This project is currently is cost prohibitive, though options are being explored with DEQ.

Noble: The City of Noble evaluates on a continual basis how to manage and anticipate the growth of the city. Urban sprawl from Norman keeps expanding into the area, and the watersheds also need attention to best mitigate flooding onto private properties and prevent homes from becoming repetitive loss properties. The city would like to conduct drainage studies to ensure the city can continue growing and also preserve the older parts of Noble that need rehabilitation. In 2023, a tornado damaged the grocery store and a couple of homes. The repairs allowed the opportunity for the store to become more resilient for any future natural hazard impacts.

Norman: The City of Norman has acquired and assumed responsibility for Summit Lake, a high hazard dam within the city limits, and discussions within the city departments continue to formalize the transfer of ownership, maintenance, and operations of the dam. Ongoing discussions about the increase of homelessness in the area is a frequent discussion point at city

meetings and within departments. Permanent solutions have not been reached at the time of writing this HMP.

Slaughterville: The town of Slaughterville continually discusses how to maintain its current status. As the town does not have the ability to provide many services, the county maintains the roads within the town limits. Long-term solutions on how to continue managing the growth in the area remain undetermined points of discussion and have been undetermined for many years.

OU: The university is expanding its aerospace and aviation technology program and it is expected to double or triple over the next few years. The airport renovations and improvements are being considered with the natural hazards that affect the area in mind. With more activity, students, and staff on the airport grounds, water lines, hydrants, communication lines, and security measures are needed to ensure the optimal functionality of the airport as the facility increases its usage.

Each school district also discussed how improving their facilities is a need and each school has a list for improving their facilities as their districts expand. All school districts discussed the need for generators on the campuses during prolonged power outages due to hazards in the planning area.

All municipalities have taken steps to pursue various grants and use them to improve the long-term planning and increase resilience in their respective jurisdictions. Grants have been pursued in addition to placing specific projects as priorities within each city's plans.

All jurisdictions discussed various topics of need and interest in the hazard mitigation discussions and all related to proactively pursuing projects and expanding administrative capabilities that will enhance the growth in throughout the planning area.

The developments that have occurred across the planning area have not necessarily increased or decreased the vulnerabilities listed under the hazard profiles. The main thing that the changes within these communities have noted is that the need for improving and rehabilitating drainage and water transmission lines has become a more obvious and the timelines for improving these infrastructures have been placed as higher and more urgent priorities within the municipalities. **Noble and Norman** both discussed that ensuring that updated ordinances related to building in flood prone areas has been a necessary and useful mechanism for ensuring development occurs in areas where flooding is less likely to occur. **Lexington and Slaughterville** both have limited funding and development is somewhat difficult. Cleveland County commissioners have discussed if the adoption of some codes and ordinances for the unincorporated areas would provide an overall benefit to the citizens to ensure the long-term safety and growth these areas are experiencing.

5.2 Status of Previous Mitigation Action Items (Element E2-b)

This table details the status of hazard mitigation actions in the previous plan and identifies those that have been completed and those that have not. For action that have not been completed, a brief explanation is included. The number indicates the number associated with the action item as listed in the previous plan. It should also be noted that some actions listed are ongoing projects that must be maintained long-term, and including them in this HMP is necessary. Due to the inevitable social, political, and economic changes, the action items in Section 3.3 have been modified to fit the current and expected trends.

Status of Action Items				
Action Item	Hazard Mitigated	Jurisdiction Impacted	Accomplished or Not Accomplished	Is Action Item still relevant?
1. Individual Safe Room Program	Tornado, High Winds	All municipalities and county	Ongoing	Yes
2. Outdoor Early Warning Devices	Tornado, High Winds	All jurisdictions	Ongoing	Yes
3. Emergency Generator for Critical Facilities	Earthquake, Extreme Heat, Hail, High Winds, Lightning, Wildfire, Winter Storm	All jurisdictions	Ongoing	Yes
4. School Safe rooms	Tornado, High Wind	All public schools	Not accomplished	Yes
5. Protective Crosswalks for Schools	High Winds, Hail	All public schools	Not accomplished	Yes
6. Install redundant communication systems	Earthquake, Extreme Heat, Hail, High Winds, Lightning, Wildfire, Winter Storm	All municipalities and county	Accomplished	No
7. Establish Water lines/Supply	All	All	Ongoing	Yes
8. FireWise Awareness Program	Wildfire	All jurisdictions	Ongoing	Yes
9. StormReady Business	All	All jurisdictions	Not Accomplished	No
10. Public Burn Ban Warning Signage	Wildfire	All municipalities and county	Ongoing	Yes

Status of Action Items				
Action Item	Hazard Mitigated	Jurisdiction Impacted	Accomplished or Not Accomplished	Is Action Item still relevant?
11. Window Film on Critical Facilities	Earthquake, Extreme Heat, Hail, High Winds, Tornado	All	Not Accomplished	Yes
12. Drainage Improvements	Dam Failure* Flooding	Cleveland County*, Lexington, Noble, Norman* Slaughterville,	Not Accomplished	No
13. Drainage Bridge Structure (Eastern & Indian Hills)	Flood	City of Norman	Not accomplished	Yes
14. Bury Electrical Service Lines	Hail, High Winds, Lightning, Tornado, Wildfire, Winter Storm	County and all municipalities	Not accomplished	No, responsibility of the electric companies
15. Maguire Road 144 th -156 th Project (roadway flooding District 2)	Flooding	Cleveland County	Not Accomplished	Yes
16. Portable Motorist Information Signs	All	All	Not accomplished	Yes
17. Establish Significant Hazard Dam Registration & Safety Checks	Dam Failure	Cleveland County, Norman	Not accomplished	Yes
18. Pipeline Identification	Earthquake	Cleveland County	Accomplished	No
19. Convert Outdoor Warning Devices to Solar Power	High Winds, Tornado	All	Not accomplished	Yes
20. Drainage Project with Norman (Telephone Road to I-35)	Flood	City of Norman	Not accomplished	Yes
21. Public Information/Education on Natural Hazards	All hazards	All jurisdictions	Accomplished	No
22. Cooling Stations/Facilities	Extreme Heat	County and all municipalities	Not accomplished	Yes

Status of Action Items				
Action Item	Hazard Mitigated	Jurisdiction Impacted	Accomplished or Not Accomplished	Is Action Item still relevant?
23. Inhofe Creek Channel Improvements	Flooding	City of Norman	Not accomplished	Yes
24. Relocate/Elevate Mobile Home Parks	Flooding	Cleveland County, Lexington, Noble, Norman, Slaughterville	Not accomplished	Yes
25. Parking Garage	Extreme Heat, Hail, High Winds, Lightning, Winter Storms	Cleveland County	Ongoing	No
26. Vegetation Management	Wildfire	All	Ongoing	Yes
27. Earthquake Preparedness	Earthquake	All municipalities	Not accomplished	Yes
28. Incorporate No Adverse Impact Floodplain Mgmt Req.	Flood	All municipalities and county	Ongoing	Yes
29. City of Lexington Flood Project	Flood	Town of Lexington	Not accomplished	No
30. Organize youth preparedness camp	All hazards	City of Norman	Accomplished	Yes
31. Construct stormwater retention pond at Cleveland Co. Fairgrounds	Flood	Cleveland County	Not Accomplished	No
32. New Expo Center at Fairgrounds w/ enhanced wind resistance requirements, generators, beyond current building codes	High Winds, Tornado	Cleveland County	Not accomplished	Yes
33. Adopt more resilient building standards for new or remodeled structures/ Update existing residential and commercial building codes	All Hazards	All municipalities	Not accomplished	No

Status of Action Items				
Action Item	Hazard Mitigated	Jurisdiction Impacted	Accomplished or Not Accomplished	Is Action Item still relevant?
34. Low Impact/ Xeriscaping around public facilities	Drought	All jurisdictions	Accomplished	No
35. Permeable Sidewalks and Parking Lot Surfaces	Flooding	County and all Municipalities	Not Accomplished	Yes
36. Bridge Redesign (192 nd & Lewis and 144 th & Lewis)	Flooding	Cleveland County	Not accomplished	Yes
37. Lightning Protection System	Lightning	All	Not accomplished	No
38. At Risk transportation Routes	Dam Failure, Flood	Cleveland County, City of Norman	Not accomplished	Yes
39. Property Acquisition in Dam Breach Inundation Area	Dam Failure	Cleveland County, City of Norman	Not accomplished	Yes

5.3 Changes in Jurisdictional Priorities regarding Integration of the HMP (Element E2-c)

Overall, there have been few events that have precipitated significant changes to the jurisdictions' respective priorities as it pertains to integrating the HMP. The planning team affirmed in the planning process that ordinances and codes are changed on an as needed basis typically, or updated every 7-10 years. Funding and personnel availability largely dictate the ability of each participant to prioritize hazard mitigation projects as grant funding would likely be one of the only options for the participants to undertake large-scale projects.

In discussing the needs of the planning area, it was noted that the communities are quickly growing as the urban sprawl from the greater Oklahoma City and greater Norman areas see increased population. Long-term planning is becoming more proactive in terms of anticipating the growth in the area and addressing capital improvement.

Integrating Priorities: The priorities of the planning area remain consistent with the goals listed under Section 3.2. In the planning meetings, the planning team members confirmed that there have been minimal changes in the priorities of the planning area as it pertains to hazard mitigation planning.

Integrating Planning: The previous Cleveland County HMP was adopted in 2020 and a general process of hazard mitigation planning has been followed. General maintenance of drainage structures, infrastructure, and capital improvement projects typically include some elements of hazard mitigation, even on a small scale. Depending on the needs as they arise, the planning team discussed that, revising and/or updating codes and ordinances in the respective communities is a natural starting point for integrating hazard mitigation planning. All participating schools want to improve resilience at their respective campuses by acquiring generators and install impact resistant film on windows. However, for all participants, integrating the projects will largely depend upon grants. Large drainage projects will require grant funding and hazard mitigation aspects are included in these long-term planning projects.

Integrating Goals: Each community operates independently of each other and have become more cooperative and collaborative over time. The Cleveland County LEPC maintains a consistent avenue for collaborative efforts between the county, municipalities, hospitals, fire departments, and the public. Again, however, the priorities remain the same for the planning area as they were in 2020. The goals remain the same for the schools, namely, that acquiring generators to preserve food service in prolonged power outages due to natural hazard events, and improving the building envelopes in such a way as to also improve campus security.

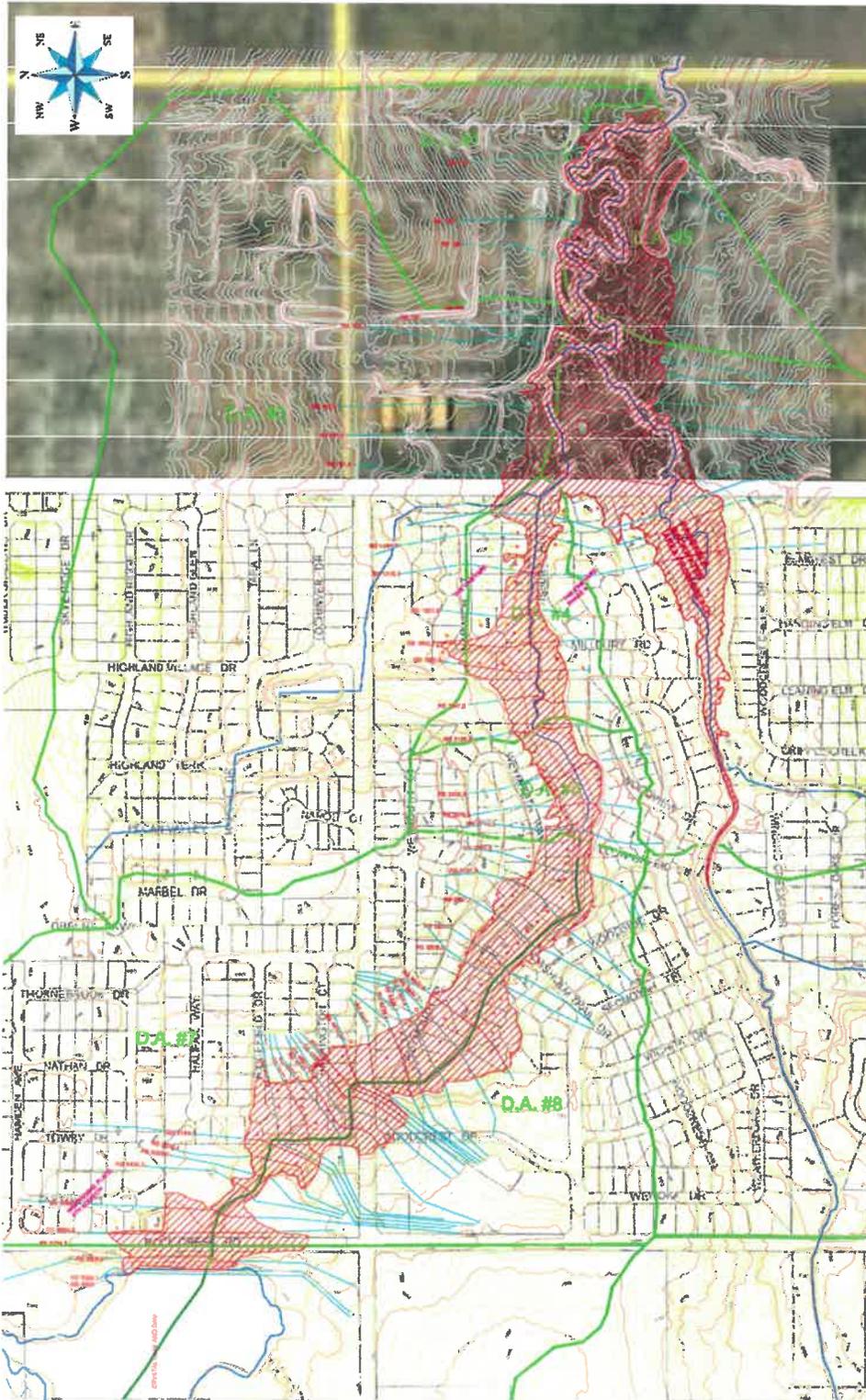
Appendix A

Inundation Maps

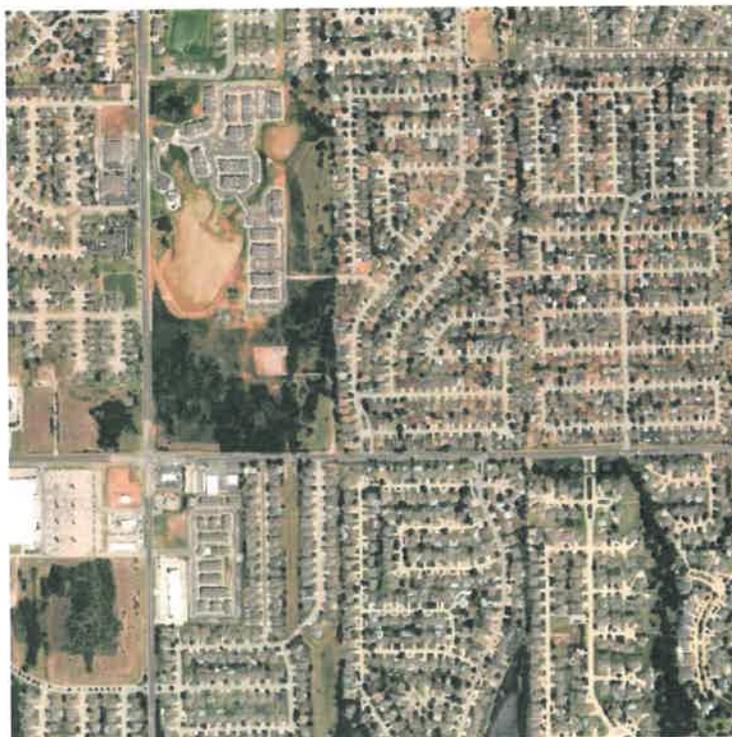
For Official Use Only

These maps are included to provide a comprehensive look at the high-hazard potential dams within Cleveland County. All maps were provided by the OWRB, and/or by the jurisdiction who has ownership of the dam.

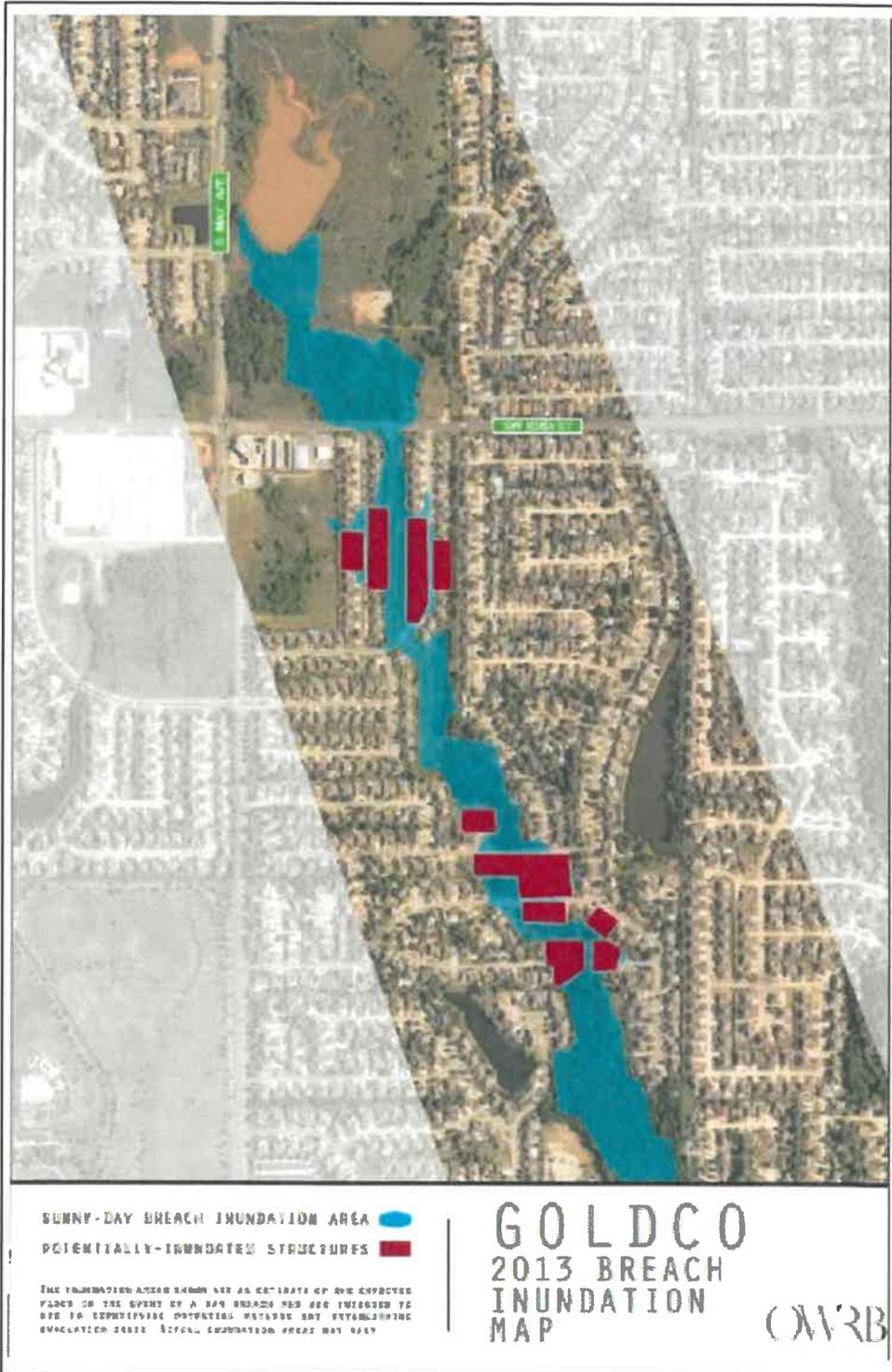
Crystal Lake, Norman, OK; Inundation map



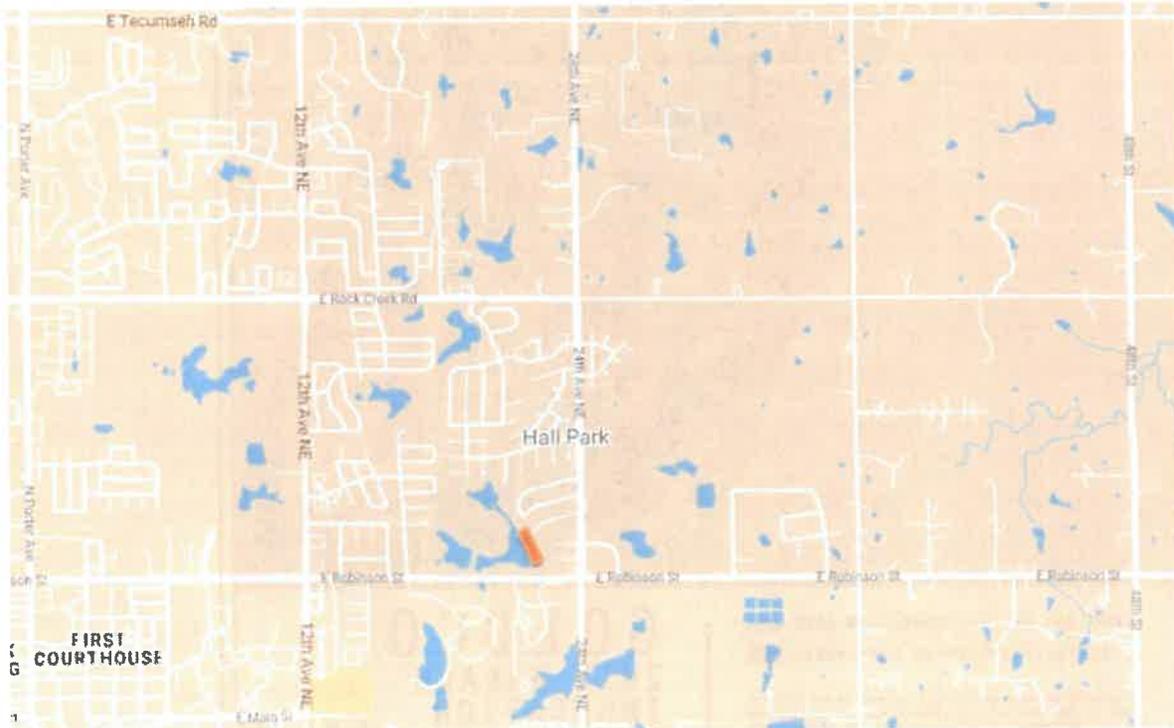
Goldco Dam (Avia at the Lakes), Oklahoma City; both images give the location within OKC.



Goldco Dam (Avia at the Lakes), Oklahoma City



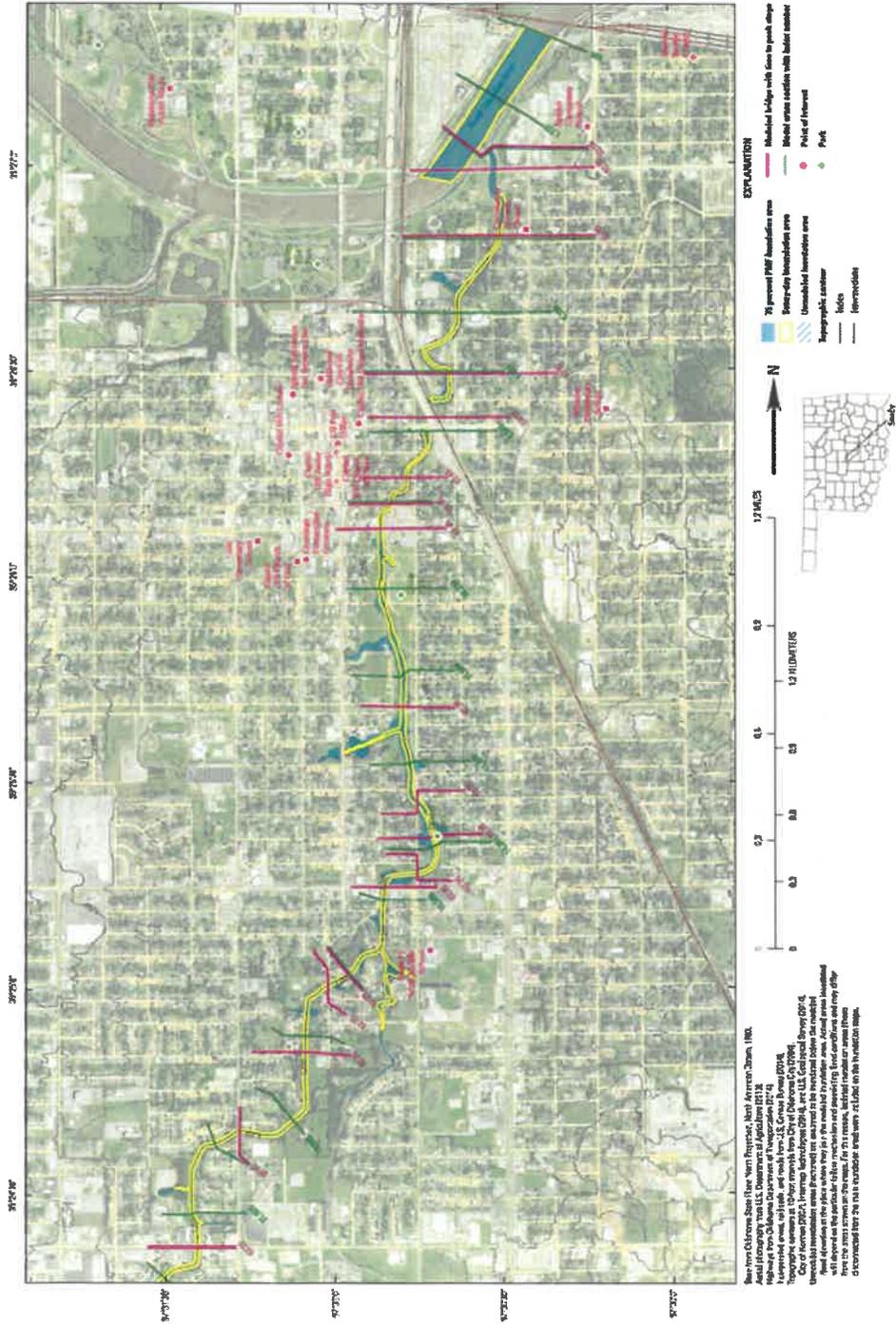
Hall Park Lake, Norman, OK



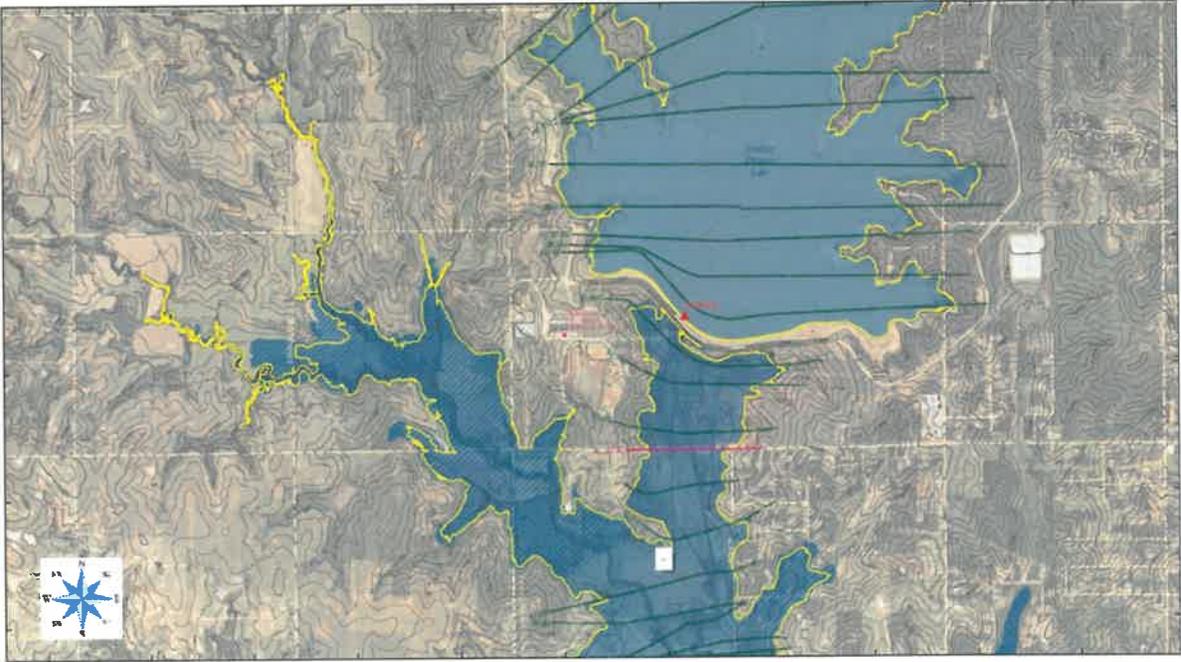
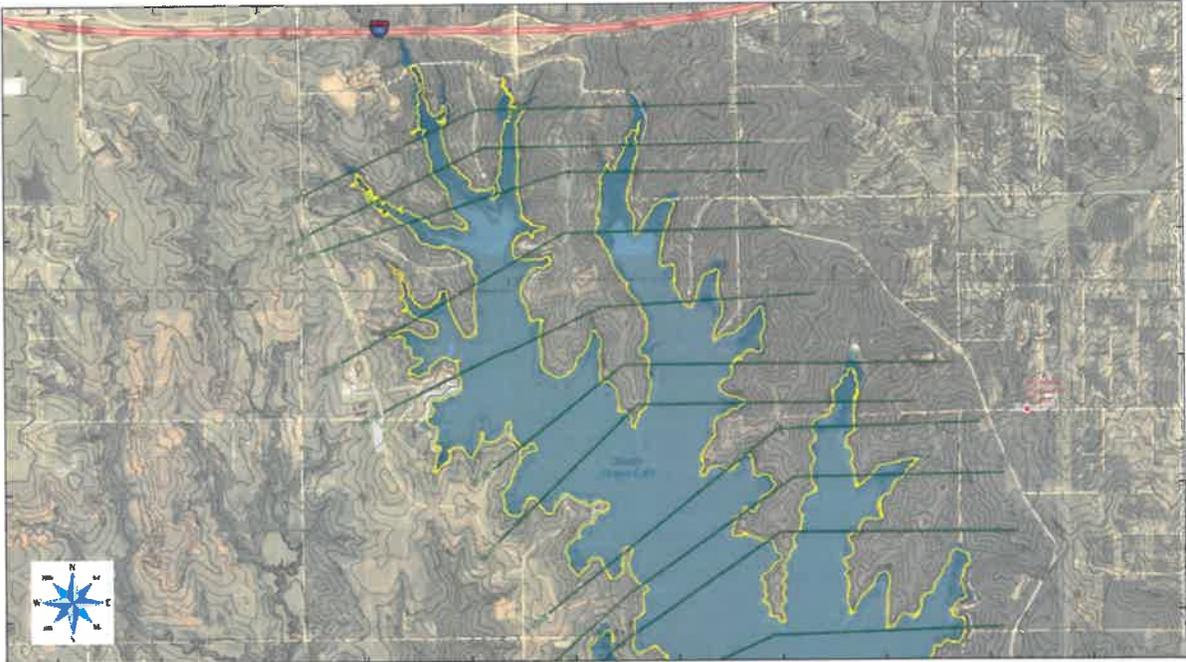
Huddleston Lake, Norman, OK



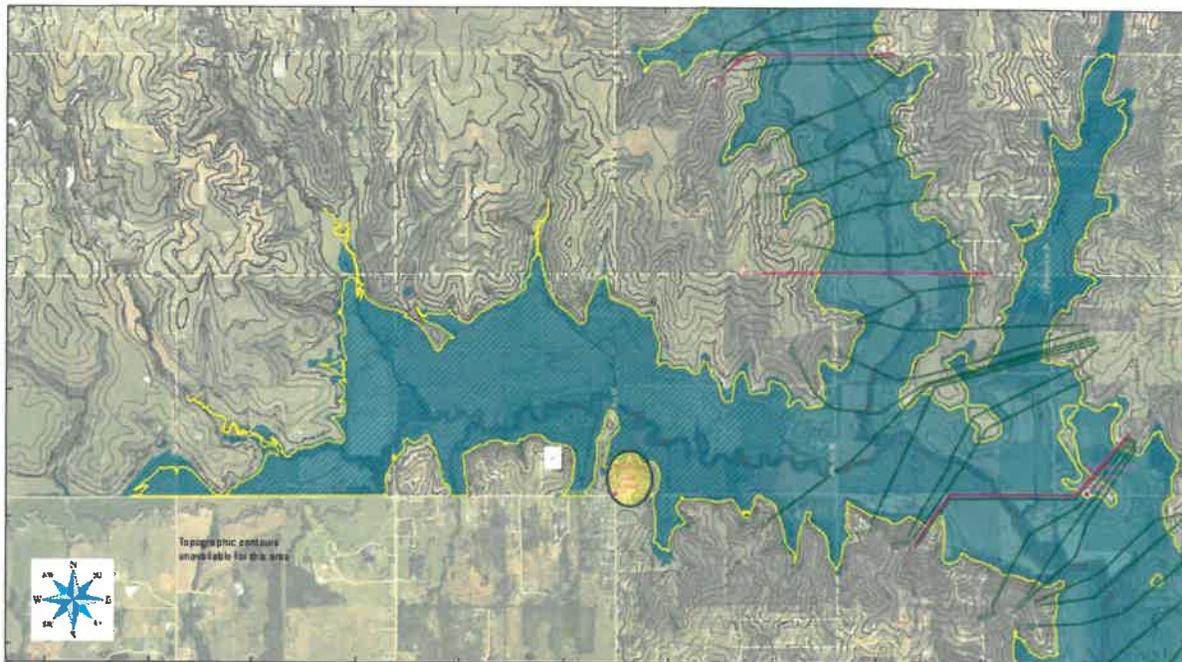
Lightning Creek Holding Pond A Map 7-2



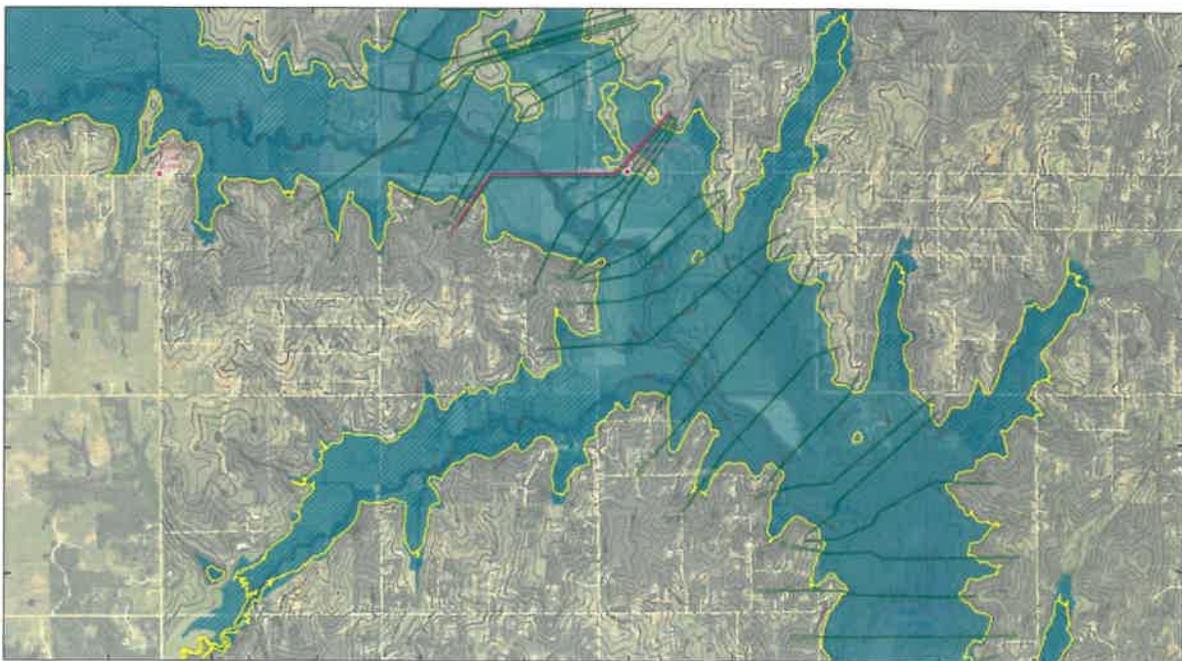
Lake Stanley Draper, OKC, OK; Map 1 and 2



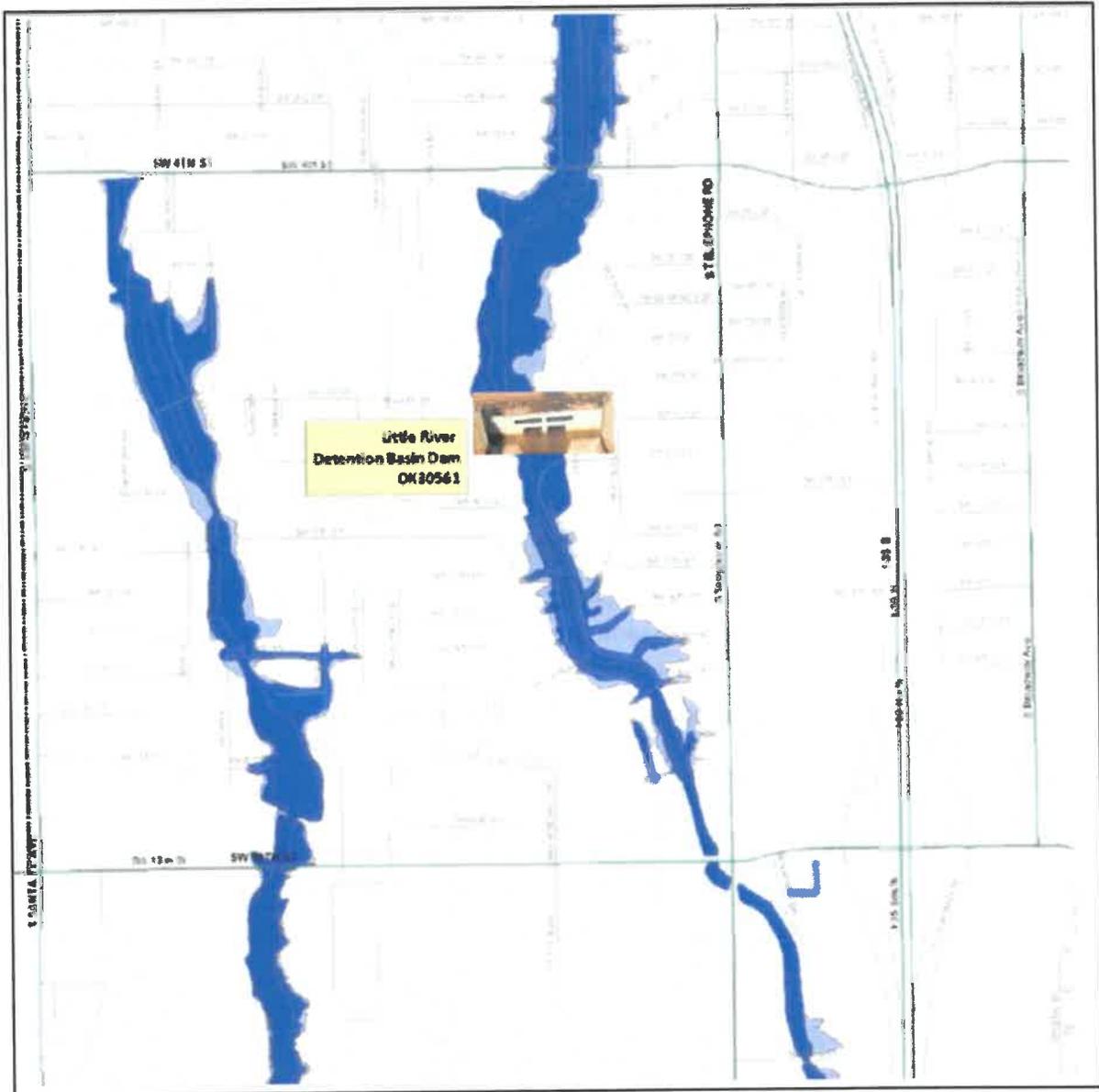
Lake Stanley Draper, OKC, OK; Maps 3 and 4



The yellow oval highlights Robin Hill PS, and the school property lies very close to the inundation area; however, none of the buildings would be impacted in a dam breach.

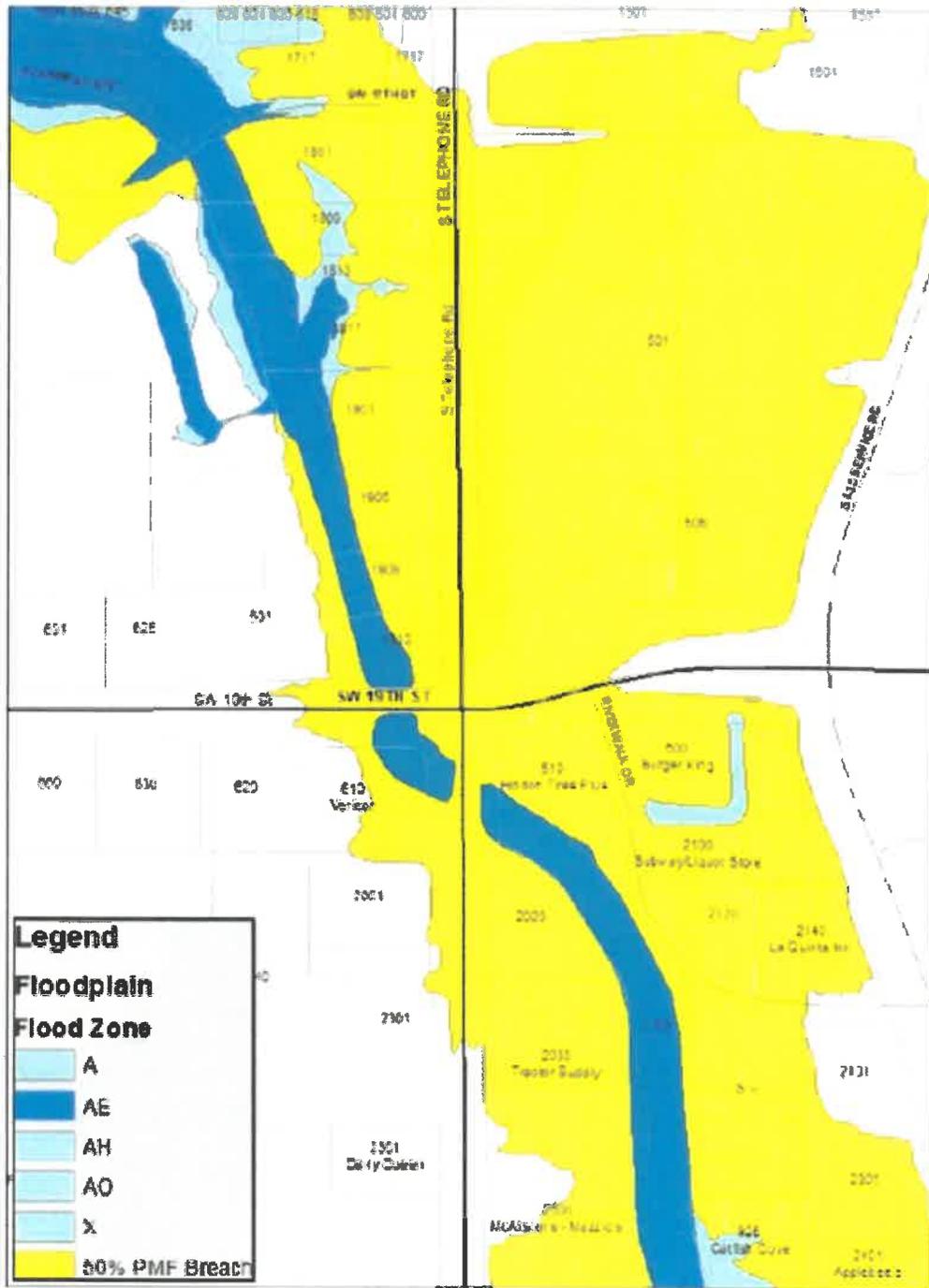


Little River Dam, Moore, OK



Little River Dam Inundation Map

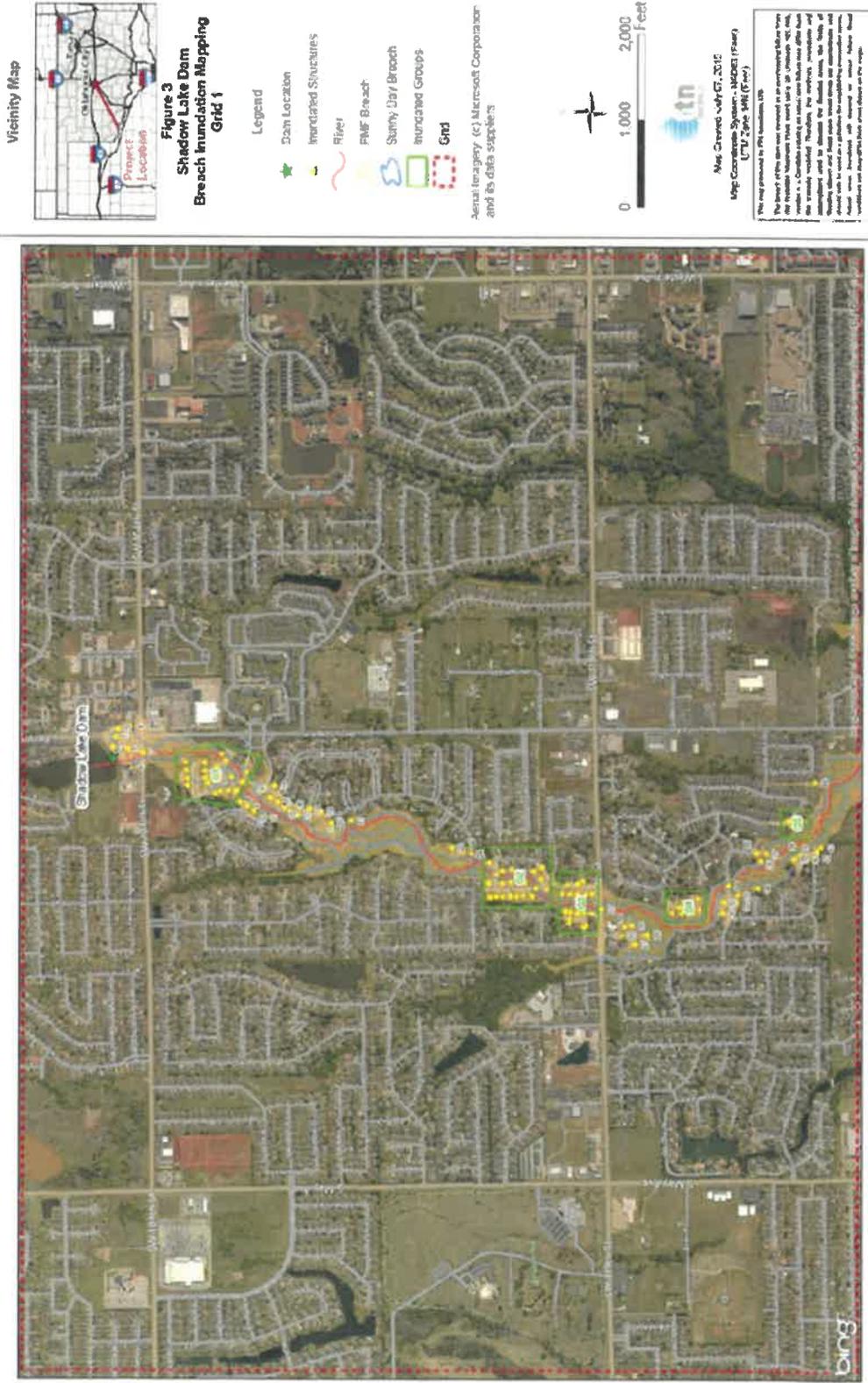
Inundation Area - SW 17th to SW 25th (commercial)



Shadow Lake, Norman, OK; Inundation Map 1



Shadow Lake, Norman, OK; Inundation Map 3



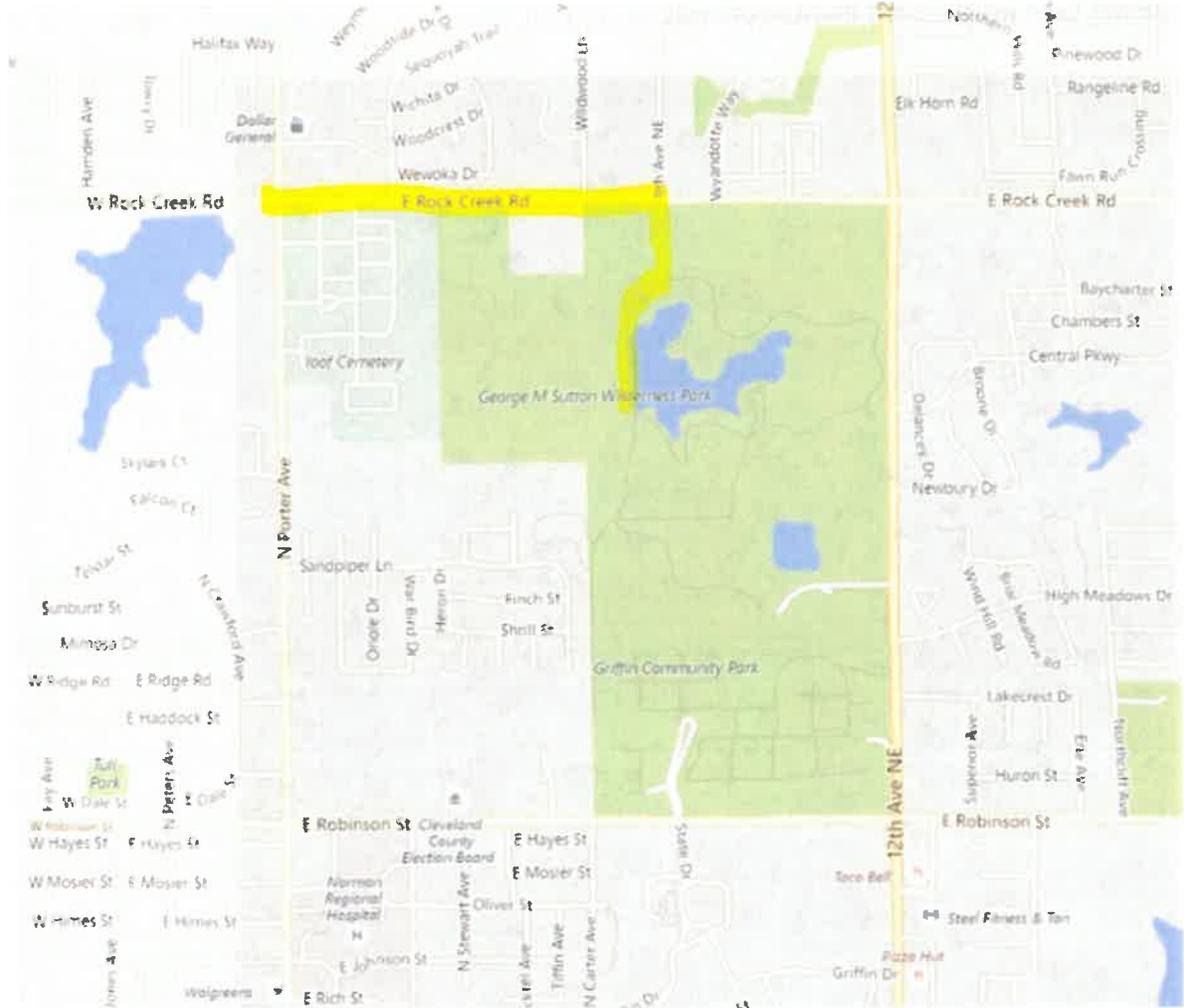
Shadow Lake, Norman, OK; Inundation Map 4



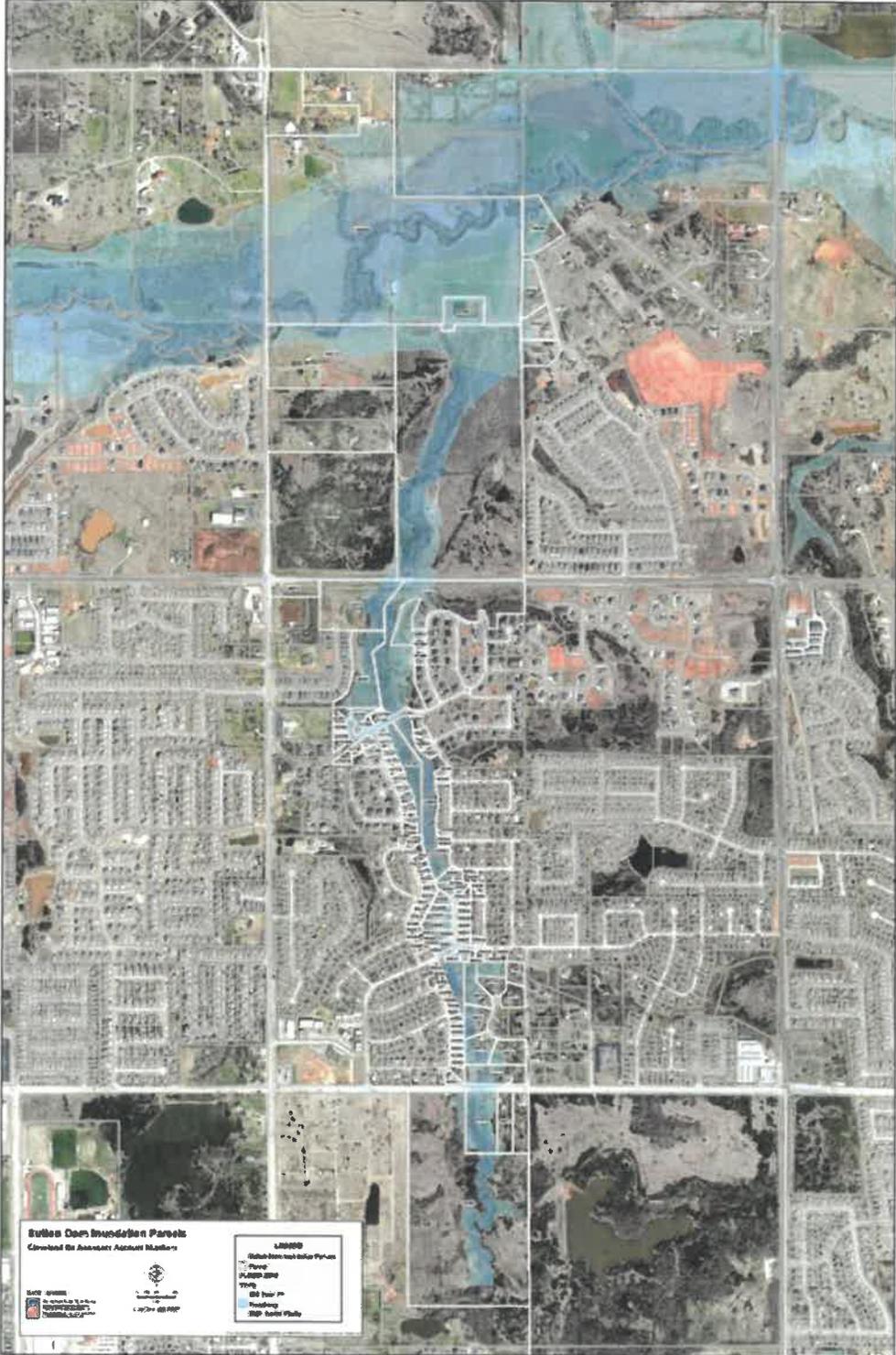
Summit Lake (Misty Lake) Inundation map



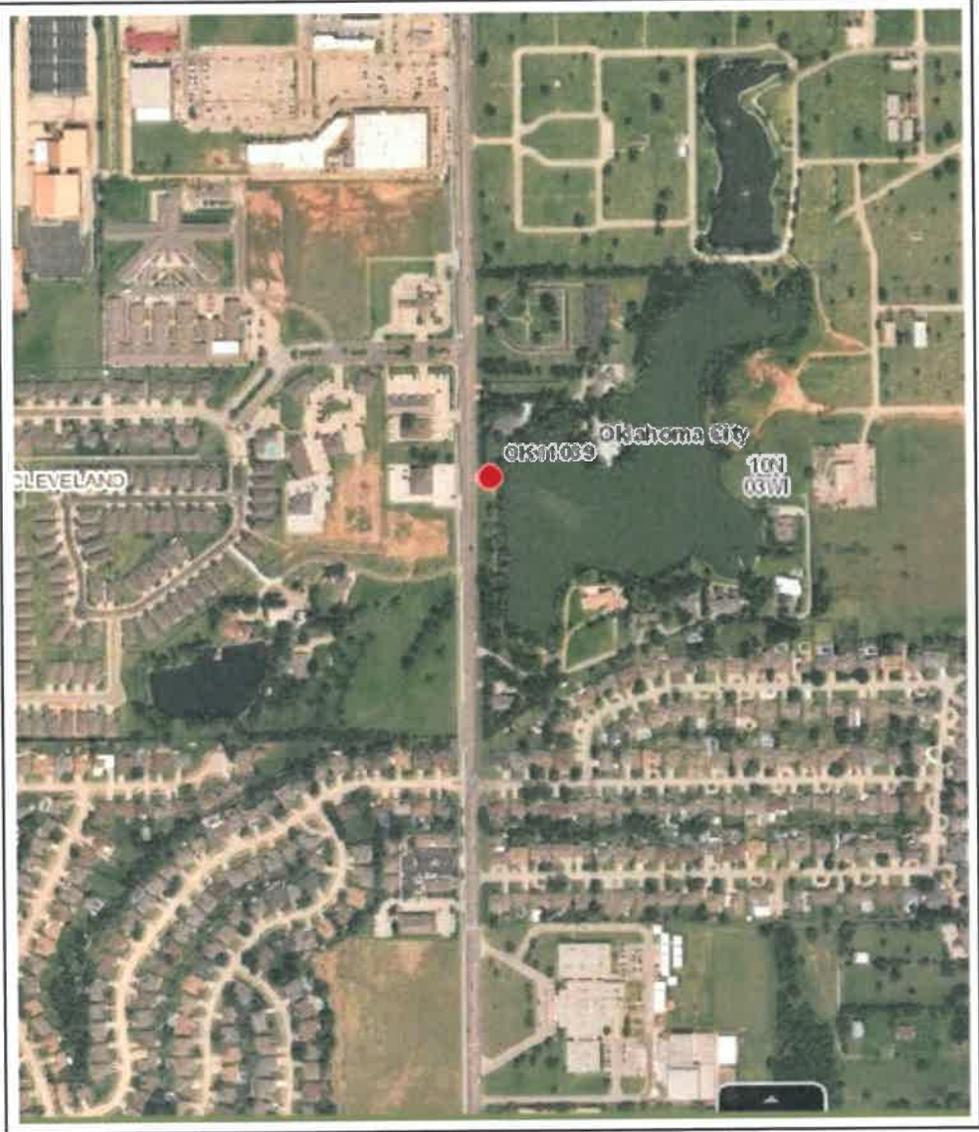
Sutton Wilderness Lake Dam, Norman, OK (Location)



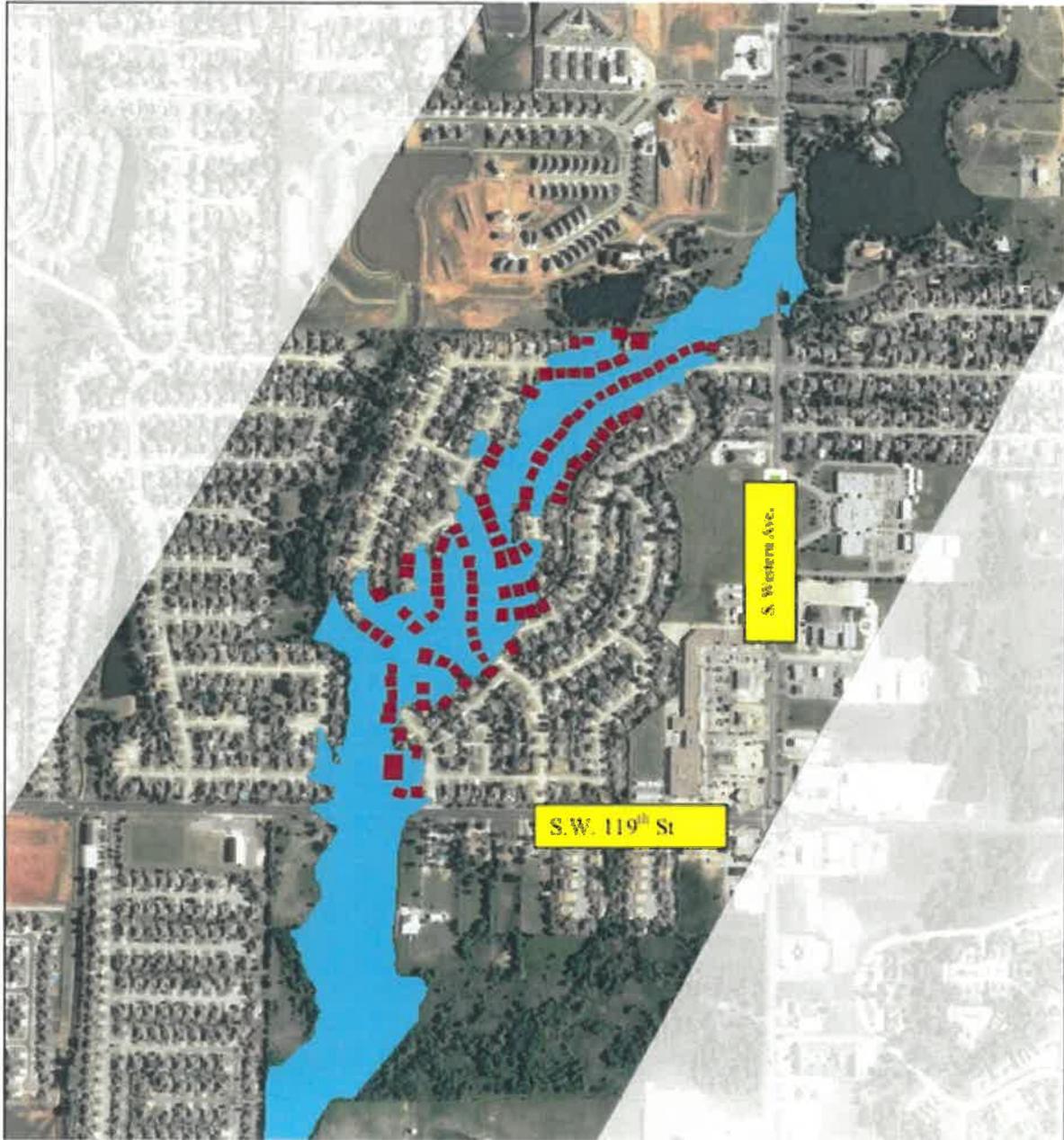
Inundation Map



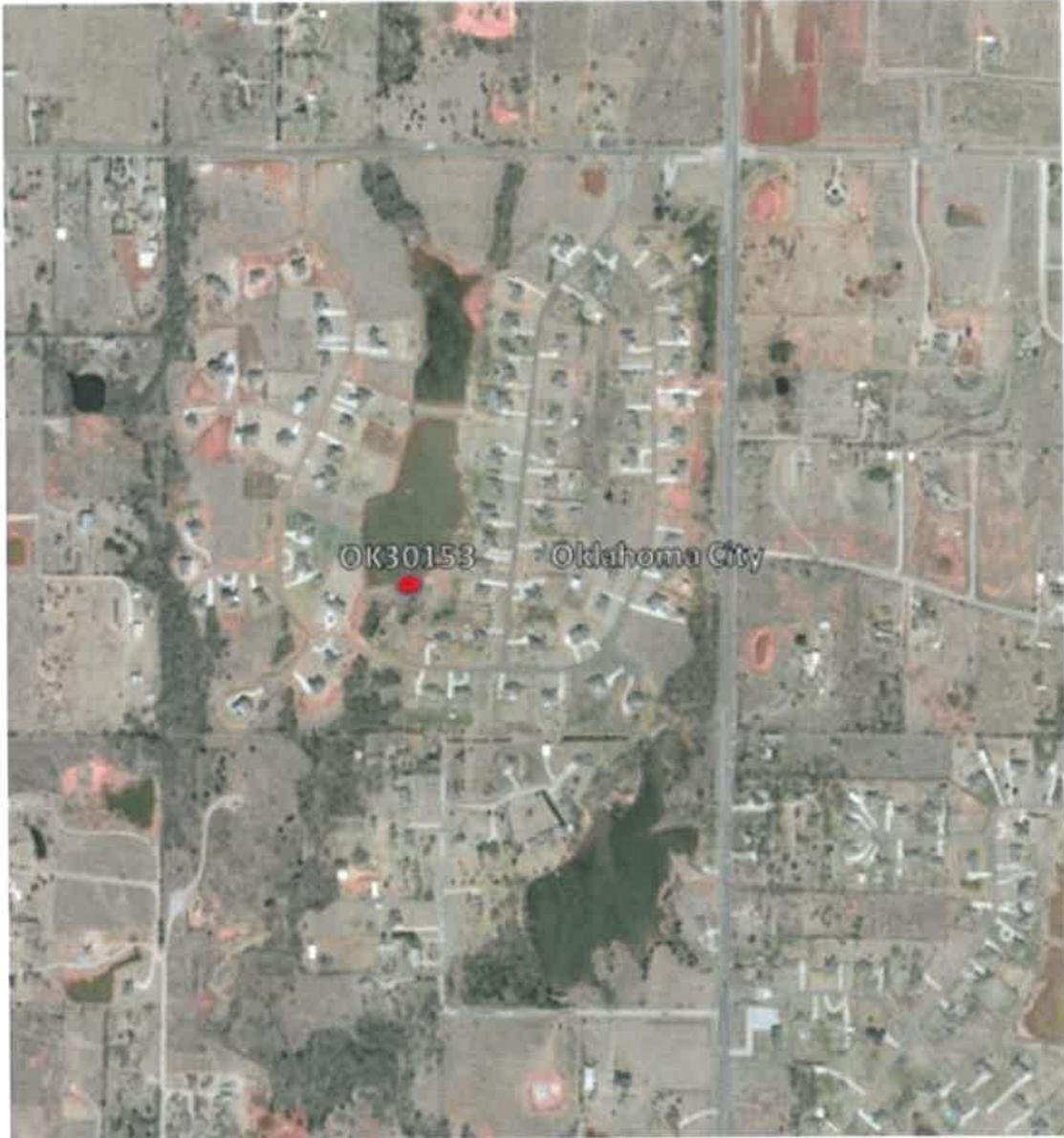
Templo de Alabanza, Oklahoma City



Templo de Alabanza Inundation Map, Oklahoma City



Turtle Creek (Lower) in Oklahoma City, OK



Turtle Creek Lower Inundation Map, SE Oklahoma City area

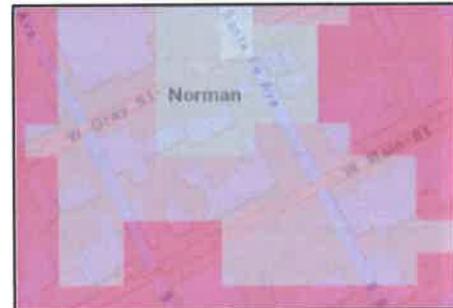


Location of Norman Public Schools in the Housing Unit Density maps

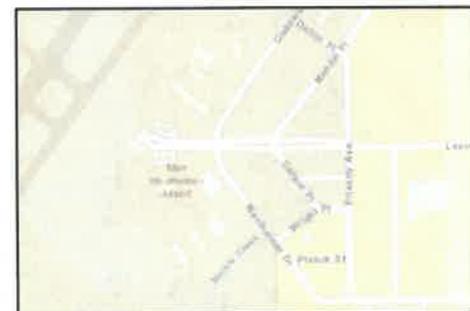
Norman North HS (HUD Medium High-High)



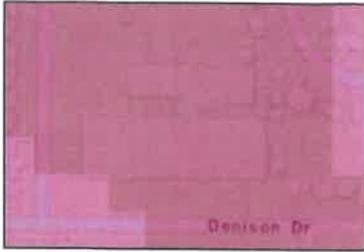
Norman HS (HUD medium-medium high-high)



Oklahoma Aviation Academy at Westheimer Airport, Norman (HUD below density rating)



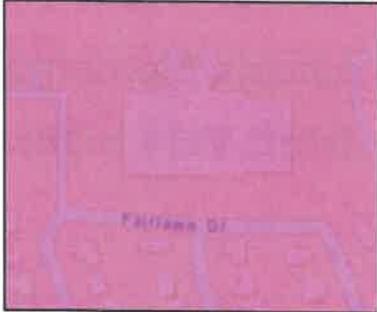
Adams Elementary PS
(Very High HUD)



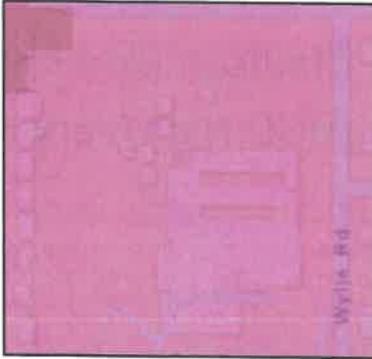
Cleveland Elementary
(High HUD)



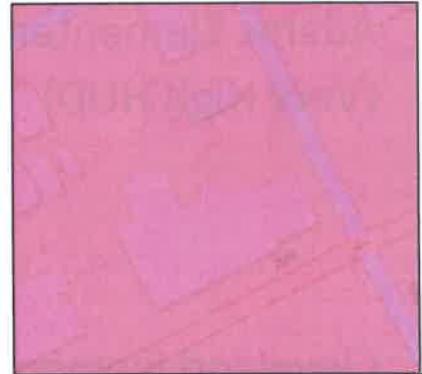
Eisenhower Elementary
(HUD High)



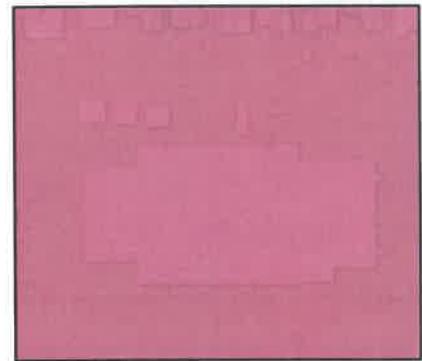
Jackson Elementary
(HUD High)



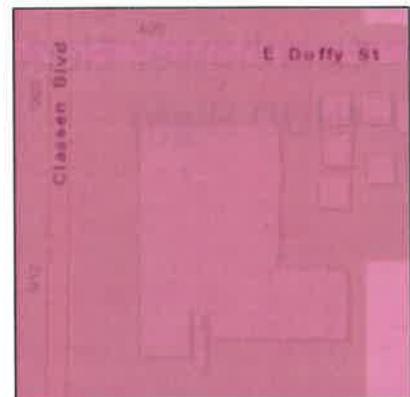
Jefferson Elementary
(HUD High)



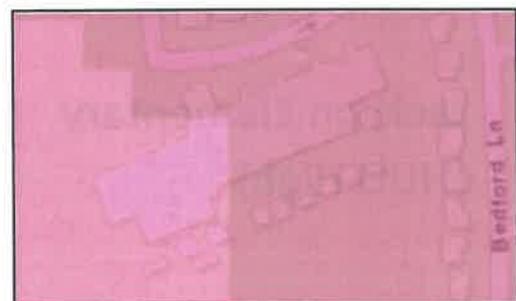
Kennedy Elementary
(HUD Very High)



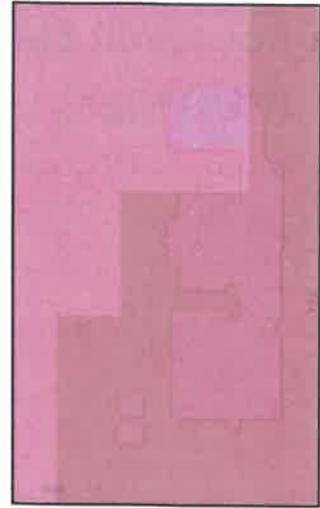
Lincoln Elementary
(HUD Very High)



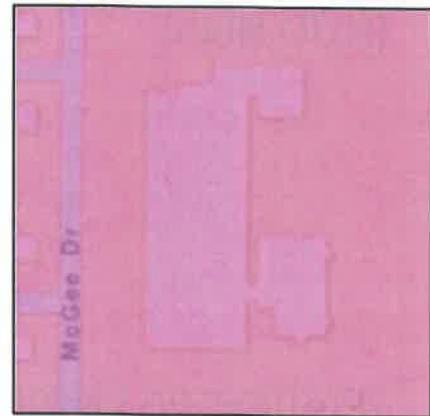
Madison Elementary
(HUD High-Very High)



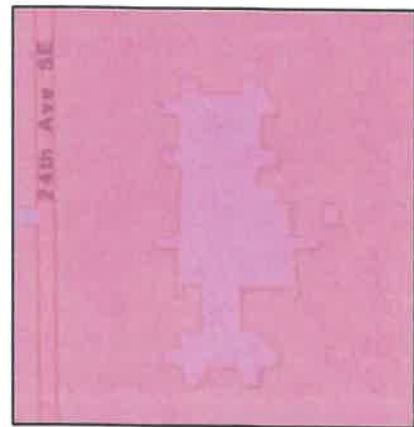
McKinley Elementary
(HUD High-Very High)



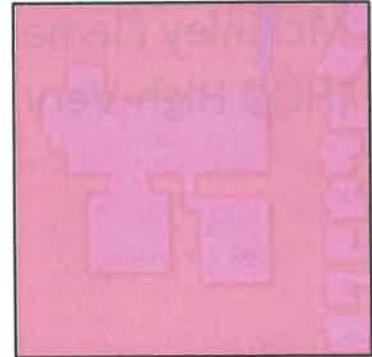
Monroe Elementary
(HUD High)



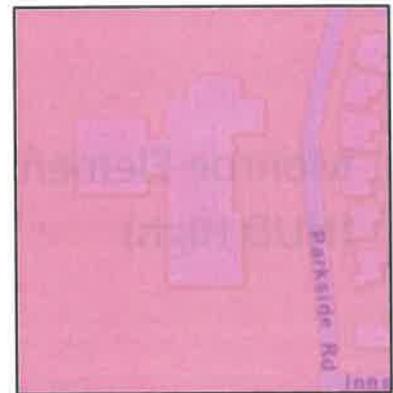
Reagan Elementary
(HUD High)



Roosevelt Elementary
(HUD High)



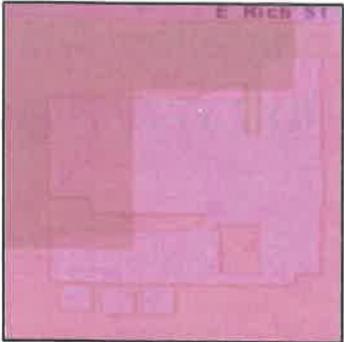
Truman Elementary
(HUD High)



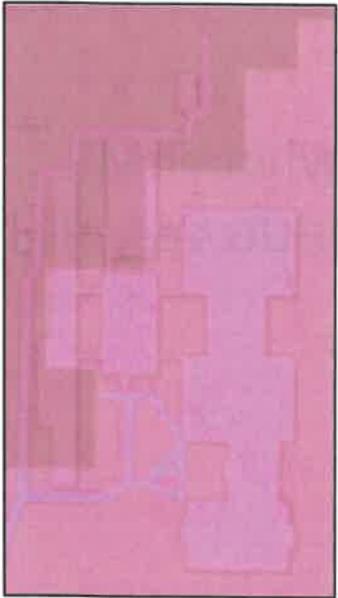
Washington Elementary
(HUD Medium)



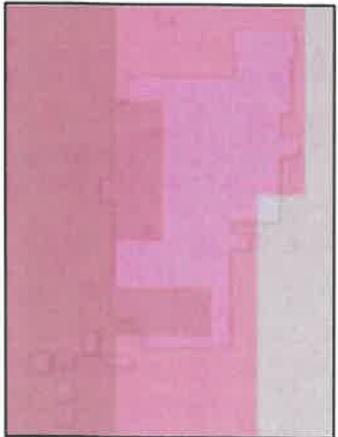
Wilson Elementary
(HUD High-Very High)



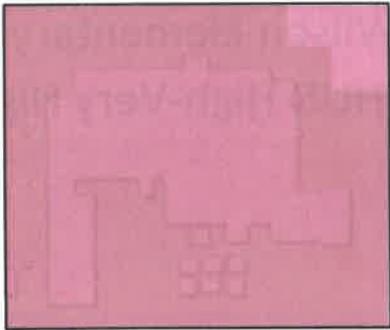
Alcott MS
(HUD High-Very High)



Irving MS
(HUD Medium High-
High-Very High)



Longfellow MS
(HUD Very High)



Whittier MS
(HUD Very High)

