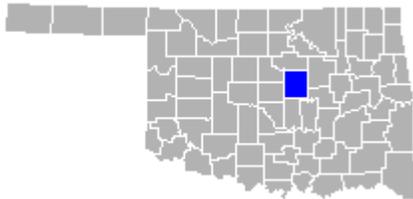


# FLOOD INSURANCE STUDY

## FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



## LINCOLN COUNTY, OKLAHOMA AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER
TOWN OF AGRA <sup>1</sup>	400571
TOWN OF CARNEY <sup>1</sup>	400275
CITY OF CHANDLER	400237
TOWN OF DAVENPORT	400365
TOWN OF FALLIS	400572
IOWA TRIBE OF OKLAHOMA	400577
TOWN OF KENDRICK <sup>1</sup>	400573
KICKAPOO TRIBE OF OKLAHOMA	400563
LINCOLN COUNTY (UNINCORPORATED AREAS)	400457
CITY OF MEEKER	400404
CITY OF PRAGUE	400435
SAC AND FOX NATION	400576
TOWN OF SPARKS	400574
CITY OF STROUD	400417
TOWN OF TRYON <sup>1</sup>	400332
TOWN OF WARWICK	400575
TOWN OF WELLSTON	400452

<sup>1</sup>No Special Flood Hazard Areas Identified

**PRELIMINARY**

**November 9, 2015**

**NOTICE**

This preliminary FIS report includes only revised Flood Profiles.

**Map Revised:**

FLOOD INSURANCE STUDY NUMBER  
40081CV000B

Version Number 2.3.3.2



**FEMA**

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**Exhibits**

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Chuckaho Creek.	Panels 07P-08P
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North Canadian River	Panels 11P-12P
Shan Creek	Panel 13P
Shan Creek Tributary 1	Panel 14P
West Captain Creek Tributary 1	Panels 15P-16P

**Published Separately**

Flood Insurance Rate Map (FIRM)

**FLOOD INSURANCE STUDY REPORT**

## LINCOLN COUNTY, OKLAHOMA

### SECTION 1.0 – INTRODUCTION

#### 1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these flood prone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

## **1.2 Purpose of this Flood Insurance Study Report**

This Flood Insurance Study (FIS) report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

## **1.3 Jurisdictions Included in the Flood Insurance Study Project**

This FIS Report covers the entire geographic area of Lincoln County, Oklahoma.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the 8-digit Hydrologic Unit Codes (HUC-8) sub-basins affecting each, are shown in Table 1. The Flood Insurance Rate Map (FIRM) panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table.

Jurisdictions that have no identified SFHAs as of the effective date of this study are indicated in the table. Changed conditions in these communities (such as urbanization or annexation) or the availability of new scientific or technical data about flood hazards could make it necessary to determine SFHAs in these jurisdictions in the future.

**Table 1: Listing of NFIP Jurisdictions**

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Town of Agra <sup>1</sup>	400571	11050003, 11100303	40081C0075D, 40081C0100D	
Town of Carney <sup>1</sup>	400275	11050003, 11100303	40081C0200D, 40081C0225D	
City of Chandler	400237	11100303	40081C0360D, 40081C0380D	
Town of Davenport	400365	11100303	40081C0400D	
Town of Fallis	400572	11100303	40081C0200D, 40081C0350D	
Iowa Tribe of Oklahoma	400577	11050003, 11100303	40081C0050D, 40081C0075D 40081C0175D, 40081C0200D, 40081C0325D, 40081C0350D, 40081C0375D,	
Town of Kendrick <sup>1</sup>	400573	11100303	40081C0250D	
Kickapoo Tribe of Oklahoma	400563	11100302, 11100303	40081C0475D <sup>2</sup> , 40081C0500D, 40081C0610E, 40081C0630E, 40081C0635D	Also Located in Pottawatomie County FIS report, (DATE)
City of Meeker	400404	11100302, 11100303	40081C0525D, 40081C0675D	
Lincoln County (Unincorporated Areas)	400457	11050003, 11100302, 11100303	40081C0025D, 40081C0050D, 40081C0075D, 40081C0100D, 40081C0125D, 40081C0150D, 40081C0175D, 40081C0200D, 40081C0225D, 40081C0250D,	

<sup>1</sup>No Special Flood Hazard Areas Identified

<sup>2</sup>Panel Not Printed No Special Flood Hazard Areas

<p>Lincoln County (Unincorporated Areas)  (Contd.)</p>	<p>400457</p>	<p>11050003, 11100302, 11100303</p>	<p>40081C0275D, 40081C0300D, 40081C0325D, 40081C0350D, 40081C0360D, 40081C0370D, 40081C0375D, 40081C0380D, 40081C0400D, 40081C0425D, 40081C0450D, 40081C0460D 40081C0475D<sup>2</sup>, 40081C0500D, 40081C0525D, 40081C0550D, 40081C0575D, 40081C0600D<sup>2</sup>, 40081C0610E, 40081C0625D<sup>3</sup>, 40081C0630E, 40081C0635D, 40081C0650D<sup>3</sup>, 40081C0675D, 40081C0700D, 40081C0705D, 40081C0710D, 40081C0725D<sup>3</sup>, 40081C0750D<sup>2</sup></p>	
<p>City of Prague</p>	<p>400435</p>	<p>11100302, 11100303</p>	<p>40081C0575D, 40081C0705D, 40081C0710D</p>	
<p>Sac and Fox Nation</p>	<p>400576</p>	<p>11050003, 11100302, 11100303</p>	<p>40081C0125D, 40081C0150D 40081C0275D, 40081C0300D, 40081C0425D, 40081C0450D, 40081C0550D, 40081C0705D</p>	

<sup>1</sup>No Special Flood Hazard Areas Identified

<sup>2</sup>Panel Not Printed No Special Flood Hazard Areas

<sup>3</sup>Panel Not Printed Area Outside County Boundary

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Town of Sparks	400574	11100303	40081C0550D	
City of Stroud	400417	11100303	40081C0275D, 40081C0300D, 40081C0425D	
Town of Tryon <sup>1</sup>	400332	11050003, 11100303	40081C0075D, 40081C0225D	
Town of Warwick	400575	11100303	40081C0350D, 40081C0375D	
Town of Wellston	400452	11100303	40081C0350D	

<sup>1</sup>No Special Flood Hazard Areas Identified

#### 1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 31, “Map Repositories,” within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual

communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

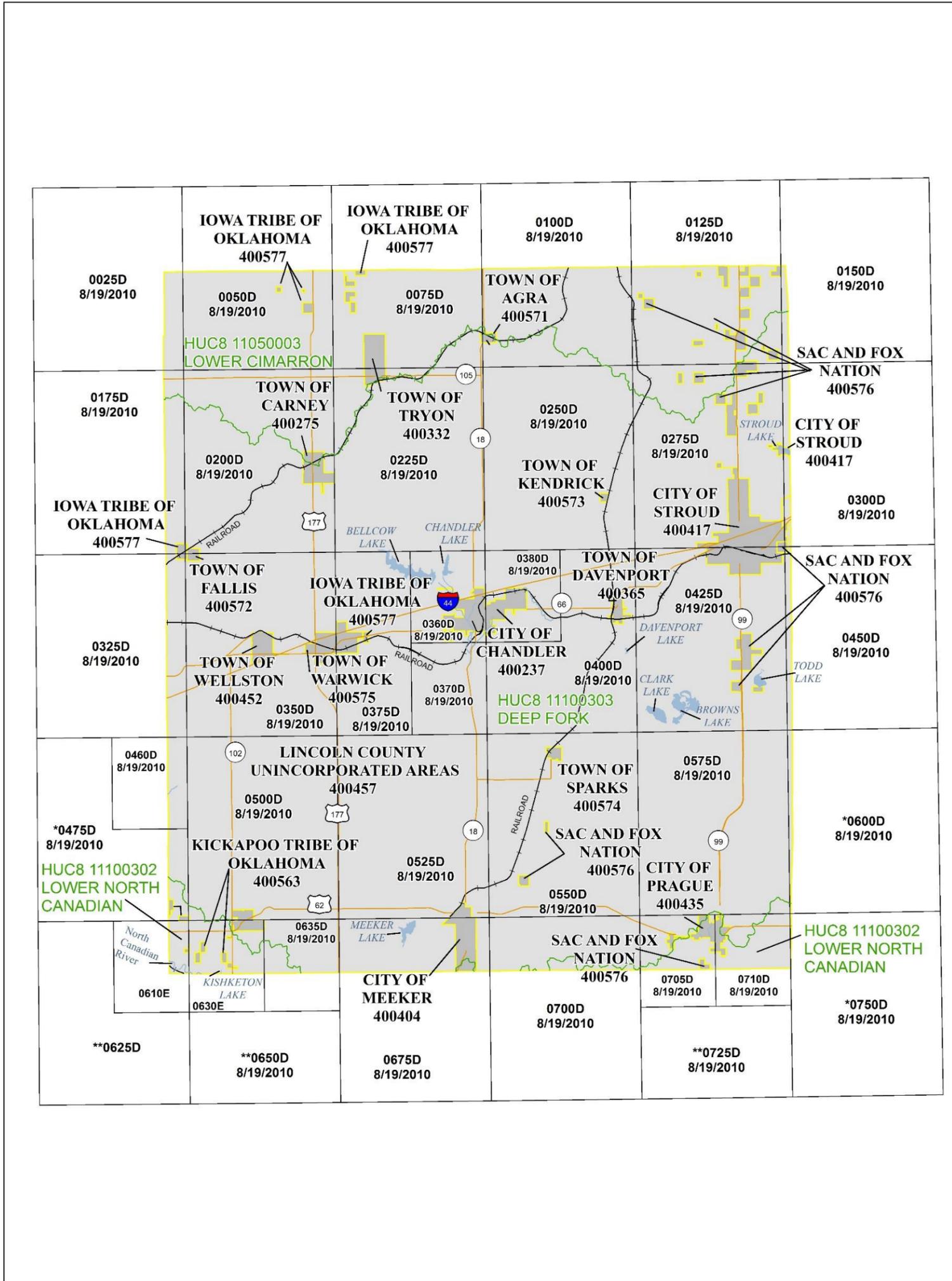
The initial Countywide FIS Report for Lincoln County became effective on August 19, 2010. Refer to Table 28 for information about subsequent revisions to the FIRMs.

- The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at <http://www.fema.gov> or contact your appropriate FEMA Regional Office for more information about this program.
- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at <http://www.fema.gov>.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Lincoln County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and United States Geological Survey (USGS) Hydrologic Unit Code – 8 (HUC-8) codes. Because this Index may not be distributed to unaffected communities in subsequent revisions, users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center (MSC) website at <http://msc.fema.gov>, or by calling the FEMA Map Information eXchange (FMIX) at 1-877-336-2627.

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Figure 1: FIRM Panel Index



1 in = 4 miles  
 0 1 2 4 6 8 Miles  
 Map Projection: Lambert Conformal Conic  
 North American Datum 1983  
 THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)  
 SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION



**NATIONAL FLOOD INSURANCE PROGRAM**  
 FLOOD INSURANCE RATE MAP INDEX

LINCOLN COUNTY, OK And Incorporated Areas  
 PANELS PRINTED:  
 0025, 0050, 0075, 0100, 0125, 0150, 0175, 0200, 0225, 0250, 0275, 0300, 0325, 0350, 0360, 0370, 0375, 0380, 0400, 0425, 0450, 0460, 0500, 0525, 0550, 0575, 0610, 0630, 0635, 0675, 0700, 0705, 0710



**FEMA**

MAP NUMBER  
 40081CINDOB  
 MAP REVISED

\*PANEL NOT PRINTED - No Special Flood Hazard Areas  
 \*\*PANEL NOT PRINTED - Area Outside of County Boundary

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Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

## NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 28 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

**PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.**

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

**BASE FLOOD ELEVATIONS:** For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

**FLOODWAY INFORMATION:** Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

**FLOOD CONTROL STRUCTURE INFORMATION:** Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

**PROJECTION INFORMATION:** The projection used in the preparation of the map was Stateplane\_Oklahoma\_North\_FIPS\_3501\_Feet. The horizontal datum was NAD 83 GRS 1980 Spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

**ELEVATION DATUM:** Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988 (NAVD 88), visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

*NGS Information Services  
NOAA, N/NGS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, Maryland 20910-3282  
(301) 713-3242*

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 31 of this FIS Report.

**BASE MAP INFORMATION:** Base map information shown on the FIRM was provided by FEMA, Lincoln County E-911 Trust Authority, the U.S. Census Bureau, and the Center for Spatial Analysis (University of Oklahoma). For information about base maps, refer to Section 6.2 "Base Map" in this FIS Report.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

**NOTES FOR FIRM INDEX**

**REVISIONS TO INDEX:** As new studies are performed and FIRM panels are updated within Lincoln County, Oklahoma, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 28 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

**SPECIAL NOTES FOR SPECIFIC FIRM PANELS**

This Notes to Users section was created specifically for Lincoln County, Oklahoma, effective. *(Date)*

**FLOOD RISK REPORT:** A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Lincoln County.

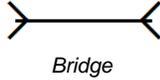
**Figure 3: Map Legend for FIRM**

<p><b>SPECIAL FLOOD HAZARD AREAS:</b> <i>The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.</i></p>	
	<p>Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)</p>
<p>Zone A</p>	<p>The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.</p>
<p>Zone AE</p>	<p>The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone, either at cross section locations or as static whole-foot elevations that apply throughout the zone.</p>
<p>Zone AH</p>	<p>The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.</p>
<p>Zone AO</p>	<p>The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.</p>
<p>Zone AR</p>	<p>The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.</p>
<p>Zone A99</p>	<p>The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.</p>
<p>Zone V</p>	<p>The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.</p>
<p>Zone VE</p>	<p>Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.</p>

	Regulatory Floodway determined in Zone AE.
<b>OTHER AREAS OF FLOOD HAZARD</b>	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood. See Notes to Users for important information.
<b>OTHER AREAS</b>	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible
	Unshaded Zone X: Areas determined to be outside the 0.2% annual chance flood hazard
<b>FLOOD HAZARD AND OTHER BOUNDARY LINES</b>	
	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
<b>GENERAL STRUCTURES</b>	
	Channel, Culvert, Aqueduct, or Storm Sewer
	Dam, Jetty, Weir



Levee, Dike, or Floodwall



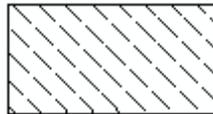
Bridge

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA):** *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.*



**CBRS AREA**  
09/30/2009

Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.



**OTHERWISE PROTECTED AREA**  
09/30/2009

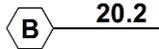
Otherwise Protected Area

**REFERENCE MARKERS**



River mile Markers

**CROSS SECTION & TRANSECT INFORMATION**



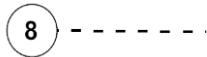
Lettered Cross Section with Regulatory Water Surface Elevation (BFE)



Numbered Cross Section with Regulatory Water Surface Elevation (BFE)



Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)



Coastal Transect



Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.



Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.



Base Flood Elevation Line (shown for flooding sources for which no cross sections or profile are available)

**ZONE AE**  
(EL 16)

Static Base Flood Elevation value (shown under zone label)

**ZONE AO**  
(DEPTH 2)

Zone designation with Depth

**ZONE AO  
(DEPTH 2)  
(VEL 15 FPS)**

Zone designation with Depth and Velocity

**BASE MAP FEATURES**

Missouri Creek

River, Stream or Other Hydrographic Feature



Interstate Highway



U.S. Highway



State Highway



County Highway

MAPLE LANE

Street, Road, Avenue Name, or Private Drive if shown on Flood Profile



Railroad



Horizontal Reference Grid Line



Horizontal Reference Grid Ticks



Secondary Grid Crosshairs

Land Grant

Name of Land Grant

7

Section Number

R. 43 W. T. 22 N.

Range, Township Number

**4276<sup>000</sup>mE**

Horizontal Reference Grid Coordinates (UTM)

**365000 FT**

Horizontal Reference Grid Coordinates (State Plane)

**80° 16' 52.5"**

Corner Coordinates (Latitude, Longitude)

## SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

### 2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Lincoln County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 23), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. **Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Lincoln County.**

Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Lincoln County, Oklahoma, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 13. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Each FIRM **panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Lincoln County.**

Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

**Table 2: Flooding Sources Included in this FIS Report**

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi <sup>2</sup> ) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Bellcalf Creek	Lincoln County, City of Chandler	At its confluence with Bellcow Creek	A point approximately 1.0 miles upstream	11100303	1.00		Y	AE	October 2008
Bellcow Creek	Lincoln County, City of Chandler	A point approximately 1.2 miles downstream of the Burlington Northern Railroad	A point approximately 2,000 feet upstream of Lake Road	11100303	4.9		Y	AE	October 2008
Bellcow Creek Split Flow	Lincoln County	The confluence with Bellcow Creek	Divergence from Bellcow Creek	11100303	1.3		Y	AE	October 2008
Chigger Creek	City of Chandler	At its confluence with Bellcow Creek upstream	Iowa Avenue	11100303	1.0		Y	AE	October 2008
Chuckaho Creek	Lincoln County, City of Chandler	A point approximately 1.2 miles downstream of U.S. Route 66	A point approximately 12,000 feet upstream of Section Road	11100303	3.6		Y	AE	October 2008

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi <sup>2</sup> ) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Indian Creek	Lincoln County, City of Chandler	The confluence with Bellcow Creek upstream	Approximately 1.8 miles upstream of State Highway 102 in Pottawatomie County	11100303	1.8		Y	AE	October 2008
North Canadian River	Lincoln County, Kickapoo Tribe of Oklahoma	Approximately 2,500 ft downstream of corporate limit of Kickapoo Tribal Land	Approximately 5,200 ft downstream of US Route 62	11100302	1.91		Y	AE	January 19, 2014
Shan Creek	City of Prague	Approximately 1,200 feet downstream of Babek Avenue	Approximately 950 feet upstream of 15th Street	11100302	1.0		Y	AE	October 2008
Shan Creek Tributary 1	City of Prague	A point just downstream of 8 <sup>th</sup> Street	Approximately 5.5 miles upstream in Oklahoma County	11100302	0.2		Y	AE	October 2008
West Captain Creek Tributary 1	Lincoln County	Approximately 1.5 miles upstream of its confluence with West Captain Creek	Approximately 5.5 miles upstream in Oklahoma	11100303	0.6		Y	AE	October 2008

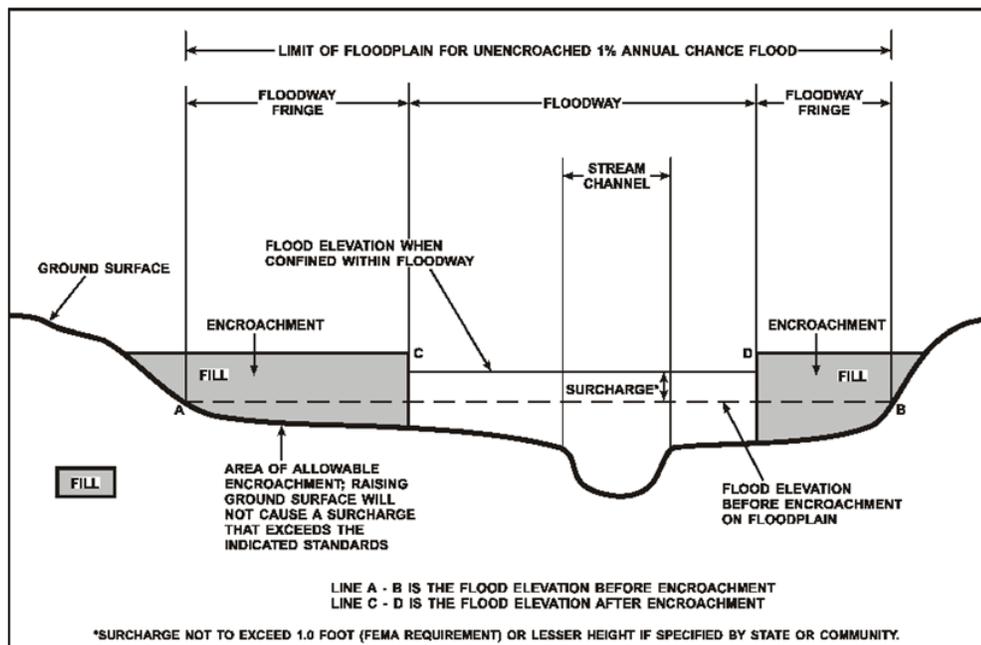
## 2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in **Error! Reference source not found.**

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. Regulations for Oklahoma require communities in Lincoln County to limit increases caused by encroachment to 1.0 foot and several communities have adopted additional restrictions. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

**Figure 4: Floodway Schematic**



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 24, “Floodway Data.”

All floodways that are developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. Each FIRM panel contains an abbreviated legend of the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Lincoln County. In cases where the floodway and 1% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

### **2.3 Base Flood Elevations**

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

### **2.4 Non-Encroachment Zones**

Some States and communities use non-encroachment zones to manage floodplain development. For flooding sources with medium flood risk, field surveys are often not collected and surveyed bridge and culvert geometry is not developed. Standard hydrologic and hydraulic analyses are still performed to determine BFEs in these areas. However, floodways are not typically determined, since specific channel profiles are not developed. To assist communities with managing floodplain development in these areas, a “non-encroachment zone” may be provided. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event. As with a floodway, all surcharges must fall within the acceptable range in the non-encroachment zone.

General setbacks can be used in areas of lower risk (e.g. unnumbered Zone A), but these are not considered sufficient where unnumbered Zone A is replaced by Zone AE. The NFIP requires communities to ensure that any development in a non-encroachment area causes no increase in BFEs. Communities must generally prohibit development within the area defined by the non-encroachment width to meet the NFIP requirement. Regulations for Oklahoma require communities

in Lincoln County to limit increases caused by encroachment to 1.0 foot and several communities have adopted additional restrictions for non-encroachment areas.

Non-encroachment determinations may be delineated where it is not possible to delineate floodways because specific channel profiles with bridge and culvert geometry were not developed. Any non-encroachment determinations for this FIS project have been tabulated for selected cross sections and are shown in Table 25, “Flood Hazard and Non-Encroachment Data for Selected Streams.” Areas for which non-encroachment zones are provided show BFEs and the 1% annual chance floodplain boundaries mapped as zone AE on the FIRM but no floodways.

## **2.5 Coastal Flood Hazard Areas**

This section is not applicable to this FIS Project

### **2.5.1 Water Elevations and the Effects of Waves**

This section is not applicable to this FIS Project

#### **Figure 5: Wave Runup Transect Schematic**

[Not Applicable to this FIS Project]

### **2.5.2 Floodplain Boundaries and BFEs for Coastal Areas**

This section is not applicable to this FIS Project

### **2.5.3 Coastal High Hazard Areas**

This section is not applicable to this FIS Project

#### **Figure 6: Coastal Transect Schematic**

[Not Applicable to this FIS Project]

### **2.5.4 Limit of Moderate Wave Action**

This section is not applicable to this FIS Project

## **SECTION 3.0 – INSURANCE APPLICATIONS**

### **3.1 National Flood Insurance Program Insurance Zones**

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Lincoln County.

Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards. Table 3 lists the flood insurance zones in the unincorporated and incorporated areas of Lincoln County.

**Table 3: Flood Zone Designations by Community**

Community	Flood Zone(s)
Town of Agra	X
Town of Carney	X
City of Chandler	A,AE,X
Town of Davenport	A,X
Town of Fallis	A,X
Town of Kendrick	X
Lincoln County	A,AE,X
City of Meeker	A,X
Kickapoo Tribe of Oklahoma	AE,X
Iowa Tribe of Oklahoma	A,X
City of Prague	A,AE,X
Sac and Fox Nation Tribal Land	A,X
Town of Sparks	A,X
City of Stroud	A,X
Town of Tryon	X
Town of Warwick	A,X
Town of Wellston	A,X

**3.2 Coastal Barrier Resources System**

This section not applicable to this FIS project.

**Table 4: Coastal Barrier Resources System Information**

[Not Applicable to this FIS Project]

**SECTION 4.0 – AREA STUDIED**

**4.1 Basin Description**

Table 5 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

**Table 5: Basin Characteristics**

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Deep Fork	11100303	Canadian River, Deep Fork	Largest watershed within Lincoln County encompassing over fifty percent of the county	779.2
Lower Cimarron	11050003	Cimarron River	A small portion of this watershed is located in the northern portion of Lincoln County	159.7
Lower North Canadian	11100302	North Canadian River	Smallest watershed within Lincoln County is located at the southern boundary of the county	26.9

#### 4.2 Principal Flood Problems

Table 6 contains a description of the principal flood problems that have been noted for Lincoln County by flooding source.

**Table 6: Principal Flood Problems**

Flooding Source	Description of Flood Problems
Bellcalf Creek	In the unincorporated areas of Lincoln County, majority of floods that affect the community are flash floods.
Chigger Creek	In the City of Chandler, most floods affecting the city are flash floods which have caused several homes to sustain structural damages as well as content damages.
Shan Creek	The history of flooding within the City of Prague indicates that flooding can occur during any season of the year. Most major floods occurred due to storm water runoff, usually the results of heavy thunderstorm activity.

Table 7 contains information about historic flood elevations in the communities within Lincoln County.

**Table 7: Historic Flooding Elevations**

[Not Applicable to this FIS Project]

#### 4.3 Non-Levee Flood Protection Measures

Table 8 contains information about non-levee flood protection measures within Lincoln County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

## **Table 8: Non-Levee Flood Protection Measures**

[Not Applicable to this FIS Project]

### **4.4 Levees**

This section is not applicable to this FIS Project

#### **Table 9: Levees**

[Not Applicable to this FIS Project]

## **SECTION 5.0 – ENGINEERING METHODS**

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 27, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

### **5.1 Hydrologic Analyses**

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

**Table 10: Summary of Discharges**

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Future	0.2% Annual Chance
Bellcalf Creek	At confluence with Bellcow Creek	5.60	1,089	*	1,532	1,786	2,254
Bellcow Creek	Approximately 9,300 feet downstream of State highway 66	50.60	2,996	*	4,324	5,086	6,672
Bellcow Creek	Above confluence of Indian Creek	49.50	2,033	*	2,929	3,443	4,494
Bellcow Creek	Above Railroad bridge**	47.70	2,009	*	2,867	3,372	4,301
Bellcow Creek	Above confluence of Chigger Creek	45.80	2,781	*	3,940	4,632	5,908
Bellcow Creek	Above confluence of Bellcalf Creek	39.30	1,450	*	2,157	2,508	3,100
Bellcow Creek Split Flow	Below Railroad bridge	0.40	934	*	1,333	1,567	1,989
Chigger Creek	At confluence with Bellcow Creek	1.50	646	*	1,027	1,253	1,668
Chuckaho Creek	Approximately 12,800 feet downstream of S 3460 Road	6.40	2,150	*	4,250	5,550	9,550
Chuckaho Creek	Above State highway 66 bridge	5.20	1,500	*	2,950	3,800	6,550
Chuckaho Creek	Above unnamed city road bridge	2.70	600	*	1,100	1,450	2,450

\*Data not computed

\*\*Split-flow of Bellcow Creek begins here causing the large drop in discharges above the Indian Creek Confluence

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Future	0.2% Annual Chance
Indian Creek	At confluence with Bellcow Creek	1.70	805	*	1,257	1,521	2,011
North Canadian River	Approx. 9,250 ft U/S of State Hwy 102	13,806.80	18,223	24,674	29,929	35,547	50,093
Shan Creek	Approximately 1,300 feet upstream of First Street	1.11	*	*	*	2,020	*
Shan Creek	At Babek Street	0.86	*	*	*	1,770	*
Shan Creek	At U.S. Highway 62	0.74	*	*	*	1,670	*
Shan Creek	At W 13th Street	0.57	*	*	*	1,450	*
Shan Creek	At N Whitmore Ave	0.38	*	*	*	1,150	*
Shan Creek	At 15th Street	0.30	*	*	*	1,020	*
Shan Creek Tributary 1	Approximately 575 feet upstream of First Street	0.58	*	*	*	1,490	*
Shan Creek Tributary 1	At W 8th Street	0.30	*	*	*	1,050	*
Shan Creek Tributary 1	Downstream of U.S. Highway 62	0.20	*	*	*	830	*
West Captain Creek Tributary 1	At Oklahoma County line	9.86	7,000	*	11,450	14,300	19,650

\*Data not computed

### Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this FIS Project]

### Table 11: Summary of Non-Coastal Stillwater Elevations

[Not Applicable to this FIS Project]

### Table 12: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
North Canadian River	USGS_07 241550	USGS	North Canadian River Near Harrah, Ok	13,501	1/1/1977	12/31/2011
North Canadian River	USGS_07 242000	USGS	North Canadian River Near Wetumka, Ok	14,290	1/1/1938	12/31/2011

## 5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed on Table 24, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 13. Roughness coefficients are provided in Table 14. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

**Table 13: Summary of Hydrologic and Hydraulic Analyses**

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Bellcalf Creek	At its confluence with Bellcow Creek	A point approximately 1.0 miles upstream	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	
Bellcow Creek	A point approximately 1.2 miles downstream of the Burlington Northern Railroad	A point approximately 2,000 feet upstream of Lake Road	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	
Bellcow Creek Split Flow	The confluence with Bellcow Creek	Divergence from Bellcow Creek	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	
Chigger Creek	At it's confluence with Bellcow Creek upstream	Iowa Avenue	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	
Chuckaho Creek	A point approximately 1.2 miles downstream of U.S. Route 66	A point approximately 12,000 feet upstream of Section Road	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	
Indian Creek	The confluence with Bellcow Creek upstream	Approximately 1.8 miles upstream of State Highway 102 in Pottawatomie County	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
North Canadian River	Approximately 2,500 ft downstream of corporate limit of Kickapoo Tribal Land	Approximately 5,200 ft downstream of US Route 62	Peak FQ	HEC RAS 4.1	01/19/2014	AE w/ Floodway	
Shan Creek	Approximately 1,200 feet downstream of Babek Avenue	Approximately 950 feet upstream of 15th Street	HEC-1	HEC RAS	10/1/2008	AE w/ Floodway	
Shan Creek Tributary	A point just downstream of Eighth Street	Approximately 5.5 miles upstream in Oklahoma County	HEC-1	HEC RAS	10/1/2008	AE w/ Floodway	
West Captain Creek Tributary 1	Approximately 1.5 miles upstream of its confluence with West Captain Creek	Approximately 5.5 miles upstream in Oklahoma	HEC-1	HEC-2	10/1/2008	AE w/ Floodway	
Approximate Streams in Deep Fork Watershed	Entire Deep Fork Watershed	Entire Deep Fork Watershed	N/A	HEC-RAS	10/1/2008	Zone A	
Approximate Streams in Lower Cimarron Watershed	Entire Lower Cimarron Watershed	Entire Lower Cimarron Watershed	N/A	HEC-RAS	10/1/2008	Zone A	

Flooding Source	Study Limits		Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
	Downstream Limit	Upstream Limit					
Approximate Streams in Lower North Canadian Watershed	Entire Lower North Canadian Watershed	Entire Lower North Canadian Watershed	N/A	HEC-RAS	10/1/2008	Zone A	

**Table 14: Roughness Coefficients**

Flooding Source	Channel “n”	Overbank “n”
Bellcow Creek	0.070-0.040	0.120-0.020
Bellcalf Creek	0.045-0.065	0.040-0.100
Bellcow Creek Split	*	*
Chigger Creek	0.075-0.025	0.080-0.015
Chuckaho Creek	0.080-0.025	0.1-0.04
Indian Creek	0.065-0.035	0.07-0.03
North Canadian River	0.045	0.050-0.080
Shan Creek	0.045-0.065	0.045-0.065
Shan Creek Tributary	0.05-0.065	0.045-0.09
West Captain Creek Tributary 1	0.06	0.05

\* Not calculated for this Flood Risk project

### 5.3 Coastal Analyses

This section is not applicable to this FIS Project

**Table 15: Summary of Coastal Analyses**

[Not Applicable to this FIS Project]

#### 5.3.1 Total Stillwater Elevations

This section is not applicable to this FIS Project

**Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas**

[Not Applicable to this FIS Project]

**Table 16: Tide Gage Analysis Specifics**

[Not Applicable to this FIS Project]

#### 5.3.2 Waves

This section is not applicable to this FIS Project

### **5.3.3 Coastal Erosion**

This section is not applicable to this FIS Project

### **5.3.4 Wave Hazard Analyses**

This section is not applicable to this FIS Project

#### **Table 17: Coastal Transect Parameters**

[Not Applicable to this FIS Project]

#### **Figure 9: Transect Location Map**

[insert 11x17 inch transect location map in PDF]

### **5.4 Alluvial Fan Analyses**

This section is not applicable to this FIS Project.

#### **Table 18: Summary of Alluvial Fan Analyses**

[Not Applicable to this FIS Project]

#### **Table 19: Results of Alluvial Fan Analyses**

[Not Applicable to this FIS Project]

## SECTION 6.0 – MAPPING METHODS

### 6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/>, or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA, N/NGS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, Maryland 20910-3282  
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at <http://www.ngs.noaa.gov/>.

The datum conversion locations and values that were calculated for Lincoln County are provided in Table 20.

**Table 20: Countywide Vertical Datum Conversion**

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from National Geodetic Vertical Datum of 1929 to North American Vertical Datum of 1988 (NAVD 88) (ft)
Average Conversion from National Geodetic Vertical Datum of 1929 to North American Vertical Datum of 1988 (NAVD 88) = +0.337 ft				

**Table 21: Stream-by-Stream Vertical Datum Conversion**

[Not Applicable to this FIS Project]

## 6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA’s FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA’s *Guidelines and Standards for Flood Risk Analysis and Mapping*, <http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping>.

Base map information shown on the FIRM was derived from the sources described in Table 22.

**Table 22: Base Map Sources**

Data Type	Data Provider	Data Date	Data Scale	Data Description
Political Boundaries	FEMA	2008	1:12,000	Municipal and county boundary
Transportation Features	Lincoln County 911 Board	2008	1:12,000	Roads and railroad line data
Surface Water Features	U.S. Census Bureau	2008	1:12,000	Streams, rivers, and lakes data
Public Land Survey System (PLSS)	Center for Spatial Analysis (University of Oklahoma)	2008	1:12,000	PLSS data were digitized from USGS quadrangles

### **6.3 Floodplain and Floodway Delineation**

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 24, "Floodway Data."

**Table 23: Summary of Topographic Elevation Data used in Mapping**

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	RMSE <sub>x</sub>	Accuracy <sub>z</sub>	Citation
Lincoln County, City of Chandler	Bellcalf Creek	Topographic Maps	1:7,200	2 feet			
Lincoln County, City of Chandler	Bellcow Creek	Topographic Maps	1:7,200	2 feet			
Lincoln County	Bellcow Creek Split Flow	Topographic Maps	1:7,200	2 feet			
City of Chandler	Chigger Creek	Topographic Maps	1:7,200	2 feet			
Lincoln County, City of Chandler	Chuckaho Creek	Topographic Maps	1:7,200	2 feet			
Lincoln County, City of Chandler	Indian Creek	Topographic Maps	1:7,200	2 feet			
Lincoln County, Kickapoo Tribe of OK	North Canadian River	Digital Elevation Model (DEM)	1:2,400	2 feet			USGS
City of Prague	Shan Creek	Topographic Maps	1:24,000	10 feet			
City of Prague	Shan Creek Tributary 1	Topographic Maps	1:24,000	10 feet			
Lincoln County	West Captain Creek Tributary 1	Topographic Maps	1:7,200	2 feet			

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

**Table 24: Floodway Data**

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>BELLCALF CREEK</b>								
A	3,745	333	728	2.5	864.1	864.1	864.9	0.8
B	4,185	283	631	2.9	864.7	864.7	865.6	0.9
C	4,575	191	483	3.7	865.3	865.3	866.1	0.8
D	5,220	80	399	4.5	866.9	866.9	867.8	0.9

<sup>1</sup>Feet above confluence with Bellcow Creek

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY LINCOLN COUNTY, OKLAHOMA AND INCORPORATED AREAS</b>	<b>FLOODWAY DATA</b>
		<b>BELLCALF CREEK</b>

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>BELLCOW CREEK</b>								
A	0	663	2,856	1.8	823.1	823.1	824.1	1.0
B	555	513	2,624	1.9	823.3	823.3	824.3	1.0
C	1,140	592	3,149	1.6	823.6	823.6	824.6	1.0
D	1,820	453	2,483	2.0	823.8	823.8	824.9	1.0
E	2,440	791	3,633	1.4	824.2	824.2	825.2	1.0
F	3,065	899	3,708	1.4	824.4	824.4	825.4	1.0
G	3,730	241	631	7.8	825.0	825.0	825.3	0.3
H	5,330	666	2,812	1.7	829.2	829.2	830.1	0.9
I	6,560	896	2,935	1.7	830.2	830.2	831.0	0.8
J	7,355	844	2,265	2.2	830.9	830.9	831.9	1.0
K	7,940	655	1,389	3.6	831.5	831.5	832.5	1.0
L	8,750	1,172	3,106	1.6	832.6	832.6	833.6	1.0
M	9,675	1,116	4,484	1.1	835.4	835.4	835.8	0.4
N	10,345	959	2,527	2.0	835.5	835.5	836.1	0.6
O	11,315	737	1,710	2.9	836.6	836.6	837.6	1.0
P	12,015	1,080	1,389	3.1	837.4	837.4	838.4	1.0
Q	12,597	710	907	4.7	838.4	838.4	839.1	0.7
R	13,630	1,351	2,508	1.7	839.5	839.5	840.5	1.0
S	17,435	95	687	6.2	846.6	846.6	847.1	0.5

<sup>1</sup>Feet above limit of detailed study (Limit of detailed study is located approximately 1.2 miles downstream of Railroad)

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY LINCOLN COUNTY, OKLAHOMA AND INCORPORATED AREAS</b>	<b>FLOODWAY DATA</b>
		<b>BELLCOW CREEK</b>

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>BELLCOW CREEK (CONTINUED)</b>								
T	18,105	354	906	4.7	848.3	848.3	848.8	0.5
U	19,000	93	812	5.2	849.9	849.9	850.7	0.8
V	19,340	324	1,600	2.7	850.9	850.9	851.6	0.7
W	21,405	579	1,473	2.9	854.2	854.2	854.9	0.7
X	23,120	110	1,004	0.8	855.0	855.0	855.9	0.9
Y	25,320	99	741	1.1	855.6	855.6	856.4	0.8

<sup>1</sup>Feet above limit of detailed study (Limit of detailed study is located approximately 1.2 miles downstream of Railroad)

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY LINCOLN COUNTY, OKLAHOMA AND INCORPORATED AREAS</b>	<b>FLOODWAY DATA</b>
		<b>BELLCOW CREEK</b>

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>BELLCOW CREEK SPLIT FLOW</b>								
A	1,820	96	446	3.5	828.5	828.5	829.4	0.9
B	2,400	205	871	1.8	828.9	828.9	829.7	0.8
C	3,460	503	502	3.1	829.4	829.4	830.0	0.6
<b>CHIGGER CREEK</b>								
A	2,405	158	267	4.7	843.1	843.1	843.9	0.8
B	3,225	136	348	3.6	847.9	847.9	848.8	0.9
C	4,015	60	281	4.5	854.4	854.4	855.3	0.9
D	4,565	45	251	5.0	858.7	858.7	859.0	0.3
E	5,500	74	333	3.8	868.3	868.3	869.1	0.8

<sup>1</sup>Feet above confluence with Bellcow Creek

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>LINCOLN COUNTY, OK AND INCORPORATED AREAS</b>	
<b>BELLCOW CREEK SPLIT FLOW-CHIGGERCREEK</b>		

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>CHUCKAHO CREEK</b>								
A	0	85	1,007	5.5	862.5	862.5	863.5	1.0
B	130	85	1,000	5.5	862.8	862.8	863.8	1.0
C	1,065	80	1,006	5.5	864.2	864.2	865.1	0.9
D	1,650	83	994	5.6	864.9	864.9	865.8	0.9
E	2,405	85	846	6.6	865.9	865.9	866.9	1.0
F	3,210	80	685	8.1	868.4	868.4	869.0	0.6
G	3,620	90	520	10.7	871.2	871.2	871.3	0.1
H	4,560	105	843	6.6	876.0	876.0	876.7	0.7
I	5,055	202	1,257	4.4	876.8	876.8	877.8	1.0
J	5,525	85	856	6.5	878.2	878.2	878.6	0.4
K	6,060	85	773	7.2	879.0	879.0	879.7	0.7
L	6,555	85	695	5.5	880.7	880.7	881.3	0.6
M	7,530	90	769	4.9	883.2	883.2	883.5	0.3
N	8,040	65	601	6.3	884.2	884.2	884.6	0.4
O	8,795	65	570	6.7	886.6	886.6	887.2	0.6
P	9,915	65	635	6.0	890.3	890.3	890.9	0.6
Q	10,490	80	714	5.3	891.8	891.8	892.5	0.7
R	11,290	65	470	8.1	894.4	894.4	894.7	0.3
S	11,635	56	550	6.9	896.3	896.3	896.7	0.4

<sup>1</sup>Feet above limit of detailed study (Limit of detailed study is located approximately 1.2 miles downstream of OK Highway 66)

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>LINCOLN COUNTY, OK AND INCORPORATED AREAS</b>	<b>CHUCKAHO CREEK</b>

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>CHUCKAHO CREEK (CONTINUED)</b>								
T	12,210	95	764	5.0	898.2	898.2	899.0	0.8
U	12,800	91	751	5.1	900.0	900.0	900.5	0.5
V	13,185	108	884	4.3	901.2	901.2	901.6	0.4
W	13,355	100	754	5.0	901.6	901.6	902.0	0.4
X	13,695	70	564	6.7	902.4	902.4	902.7	0.3
Y	13,950	87	521	7.3	904.0	904.0	904.3	0.3
Z	14,530	86	458	3.2	906.5	906.5	906.6	0.1
AA	15,030	116	494	2.9	908.2	908.2	908.9	0.7
AB	16,000	135	1,247	1.2	921.0	921.0	921.8	0.8
AC	17,150	75	568	2.6	921.2	921.2	922.0	0.8
AD	18,450	51	313	4.6	925.7	925.7	925.9	0.2
AE	19,580	70	314	4.6	932.7	932.7	932.7	0.0
AF	19,980	60	337	4.3	934.9	934.9	935.0	0.1

<sup>1</sup>Feet above limit of detailed study (Limit of detailed study is located approximately 1.2 miles downstream of OK Highway 66)

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>LINCOLN COUNTY, OK AND INCORPORATED AREAS</b>	

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>INDIAN CREEK</b>								
A	1,045	185	637	2.4	830.4	830.4	830.7	0.3
B	1,465	243	742	2.0	830.6	830.6	831.1	0.5
C	1,785	100	261	5.8	831.0	831.0	831.6	0.6
D	2,195	102	255	6.0	833.2	833.2	833.9	0.7
E	2,450	66	323	4.7	835.1	835.1	836.1	1.0
F	3,210	60	299	5.1	839.1	839.1	839.6	0.5
G	4,100	43	244	6.2	844.7	844.7	844.8	0.1
H	4,550	55	322	4.7	847.5	847.5	847.8	0.3
I	4,880	52	294	5.2	849.0	849.0	849.2	0.2
J	5,205	70	229	6.6	853.2	853.2	853.2	0.0
K	6,085	75	473	3.2	860.2	860.2	860.4	0.2
L	6,980	70	330	4.6	866.4	866.4	866.9	0.5
M	7,840	85	553	0.7	879.4	879.4	879.4	0.0
N	8,330	80	219	1.9	879.4	879.4	879.4	0.0
O	8,958	41	66	6.2	887.7	887.7	887.8	0.1
P	9,415	75	153	2.7	892.4	892.4	892.8	0.4
Q	9,960	30	68	6.0	898.4	898.4	898.5	0.1

<sup>1</sup> Feet above confluence with Bellcow Creek

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>LINCOLN COUNTY, OK AND INCORPORATED AREAS</b>	<b>INDIAN CREEK</b>

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>NORTH CANADIAN RIVER</b>								
A	1,073,697 <sup>1</sup>	3,100	27,877	1.3	1,059.2	1,059.2	1,059.9	0.7
B	1,081,583 <sup>1</sup>	3,984	24,635	1.4	1,060.6	1,060.6	1,061.5	0.9
<b>SHAN CREEK</b>								
<b>A</b>	45,330 <sup>2</sup>	119	470	3.8	971.0	971.0	972.0	1.0
<b>B</b>	45,598 <sup>2</sup>	62	283	5.9	972.0	972.0	972.6	0.6
<b>C</b>	45,914 <sup>2</sup>	65	302	5.5	973.7	973.7	974.1	0.4
<b>D</b>	46,383 <sup>2</sup>	85	405	4.1	976.3	976.3	976.6	0.6
<b>E</b>	47,009 <sup>2</sup>	119	349	4.2	977.4	977.4	978.4	1.0
<b>F</b>	48,375 <sup>2</sup>	95	267	3.8	984.7	984.7	985.7	1.0
<b>G</b>	48,706 <sup>2</sup>	319	967	1.1	988.1	988.1	989.1	1.0

<sup>1</sup> Feet above confluence with Lake Eufaula

<sup>2</sup> Feet above confluence with Canadian River

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>LINCOLN COUNTY, OK AND INCORPORATED AREAS</b>	

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
<b>SHAN CREEK TRIBUTARY 1</b>								
A	3,825 <sup>1</sup>	100	649	1.6	979.1	979.1	980.1	1.0
B	4,797 <sup>1</sup>	32	87	9.6	982.7	982.7	983.3	0.6
<b>WEST CAPTAIN CREEK TRIBUTARY 1</b>								
A	8,000 <sup>2</sup>	496	2,951	4.8	940.7	940.7	941.6	0.9
B	8,740 <sup>2</sup>	441	2,473	5.8	942.8	942.8	943.7	0.9
C	9,922 <sup>2</sup>	430	2,492	5.2	947.3	947.3	948.2	0.9
D	10,235 <sup>2</sup>	488	2,789	4.6	948.2	948.2	949.2	1.0
E	10,660 <sup>2</sup>	402	2,104	6.2	949.4	949.4	950.3	0.9

<sup>1</sup> Feet above confluence with Shan Creek

<sup>2</sup> Feet above confluence with West Captain Creek

<b>TABLE 24</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>LINCOLN COUNTY, OK AND INCORPORATED AREAS</b>	

## **Table 25: Flood Hazard and Non-Encroachment Data for Selected Streams**

[Not Applicable to this FIS Project]

### **6.4 Coastal Flood Hazard Mapping**

This section is not applicable to this FIS Project

## **Table 26: Summary of Coastal Transect Mapping Considerations**

[Not Applicable to this FIS Project]

### **6.5 FIRM Revisions**

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions to FIS projects may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 31, “Map Repositories”).

#### **6.5.1 Letters of Map Amendment**

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMR, visit <http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions> and download the form “MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision”. Visit the “Flood Map-Related Fees” section to determine the cost of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at <http://www.fema.gov/online-tutorials>.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

### **6.5.2 Letters of Map Revision Based on Fill**

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA’s determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained the in same manner as that for a LOMA, by visiting [www.fema.gov/floodplain-management/letter-map-amendment-loma](http://www.fema.gov/floodplain-management/letter-map-amendment-loma) for the “MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill” or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA Map (1-877-336-2627). Fees for applying for a LOMR-f, if any, are listed in the “Flood Map-Related Fees” section.

A tutorial for LOMR-F is available at <http://www.fema.gov/online-tutorials>

### **6.5.3 Letters of Map Revision**

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit <http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions> and download the form “MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision”. Visit the “Flood Map-Related Fees” section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Lincoln County FIRM are listed in Table 27. Please note that this table only includes LOMCs that have been issued on the FIRM panels updated by this map revision. For all the other areas within this county, users should be aware that revisions to the FIS Report made by prior LOMRs may not be reflected herein and users will need to continue to use the previously issued LOMRs to obtain the most current data.

**Table 27: Incorporated Letters of Map Change**

[Not Applicable to this FIS Project]

### **6.5.4 Physical Map Revisions**

PMRs are an official republication of a community’s NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit <http://www.fema.gov/> and visit the "Flood Map Revision Processes" section.

### **6.5.5 Contracted Restudies**

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit <http://www.fema.gov/> to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

### **6.5.6 Community Map History**

The current FIRM presents flooding information for the entire geographic area of Lincoln County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBM) and/or Flood Boundary and Floodway Maps (FBFM) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 28, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.
- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 28 but not identified on the map, the community is treated as if it were unmapped.
- *Initial FHBM Effective Date* is the effective date of the first Flood Hazard Boundary Map (FHBM). This date may be the same date as the Initial NFIP Map Date.
- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community. This is the first effective date that is shown on the FIRM panel.
- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as Physical Map Revisions (PMR) of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Lincoln County FIRMs in countywide format was August 19, 2010.

**Table 28: Community Map History**

Community Name	Initial Identification Date (First NFIP Map Published)	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Town of Agra <sup>1</sup>	8/19/2010		N/A	8/19/2010	
Town of Carney <sup>1</sup>	8/19/2010		N/A	8/19/2010	
City of Chandler	8/13/1976	8/13/1976	N/A	11/4/1987	12/15/1990, 7/16/1996, 8/19/2010
Town of Davenport	8/22/1975	8/22/1975	5/24/1977	10/31/1987	8/19/2010
Town of Fallis	8/19/2010		N/A	8/19/2010	
Iowa Tribe of Oklahoma	8/19/2010		N/A	8/19/2010	
Town of Kendrick <sup>1</sup>	8/19/2010		N/A	8/19/2010	
Kickapoo Tribe of Oklahoma	8/19/2010		N/A	8/19/2010	
Lincoln County	2/3/1993		N/A	2/3/1993	7/16/1996, 12/6/1999, 8/19/2010
City of Meeker	8/13/1976	8/13/1976	N/A	4/15/1986	8/19/2010
City of Prague	4/9/1976	4/9/1976	N/A	9/4/1985	5/5/2003, 8/19/2010
Sac and Fox Nation Tribal Land	8/19/2010		N/A	8/19/2010	
Town of Sparks	8/19/2010		N/A	8/19/2010	
City of Stroud	8/23/2000		N/A	8/23/2000	

Community Name	Initial Identification Date (First NFIP Map Published)	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Town of Tryon <sup>1</sup>	8/19/2010		N/A	8/19/2010	
Town of Warwick	8/19/2010		N/A	8/19/2010	
Town of Wellston	4/9/1976		N/A	8/19/2010	

## SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

### 7.1 Contracted Studies

Table 29 provides a summary of the contracted studies, by flooding source, which are included in this FIS Report.

**Table 29: Summary of Contracted Studies Included in this FIS Report**

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Bellcalf Creek	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County, City of Chandler
Bellcow Creek	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County, City of Chandler
Bellcow Creek Split Flow	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County
Chigger Creek	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	City of Chandler
Chuckaho Creek	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County, City of Chandler
Indian Creek	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County, City of Chandler
North Canadian River		RAMPP	HSFEHQ-09-D-0369	January 19,2014	Lincoln County, Kickapoo Tribe of Oklahoma

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Shan Creek	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	City of Prague
Shan Creek Tributary	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	City of Prague
West Captain Creek Tributary 1	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County
Approximate Streams in Deep Fork Watershed	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	City of Chandler, City of Meeker, Town of Fallis, Iowa Tribe of Oklahoma, Town of Sparks, City of Stroud, City of Prague, Sac and Fox Nation, Town of Warwick, Town of Wellston
Approximate Streams in Lower Cimarron Watershed	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Iowa Tribe of Oklahoma, Sac and Fox Nation
Approximate Streams in Lower North Canadian Watershed	8/19/2010	Watershed VI Alliance	EMT-2002-CO-0048	October 2008	Lincoln County

## 7.2 Community Meetings

The dates of the community meetings held for this FIS project and any previous FIS projects are shown in Table 30. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

**Table 30: Community Meetings**

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
City of Chandler	11/4/1987	2/15/1984	Initial CCO	FEMA, City of Chandler, and USACE
		11/19/1986	Final CCO	FEMA, City of Chandler, and USACE
City of Prague	5/5/2003	8/6/1999	Initial CCO	FEMA, City of Prague, and Study Contractor
		4/25/2002	Final CCO	FEMA, City of Prague, and Study Contractor
Lincoln County (Unincorporated Areas)	2/3/1993	11/15/1991	Initial CCO	FEMA
		2/11/1992	Final CCO	USACE, Lincoln County, and FEMA
	12/6/1999	12/17/1998	Final CCO	Lincoln County and FEMA
Lincoln County and Incorporated Areas	8/19/2010	4/8/2008	Initial CCO	FEMA, Watershed VI Alliance, Lincoln County, City of Prague, Town of Davenport, City of Stroud and State NFIP Coordinator
		5/20/2009	Final CCO	FEMA, Oklahoma Water Resources Board (OWRB), Lincoln County, the Cities of Chandler, Meeker, Prague, and Stroud; the Towns of Agra, Tyron, and Wellston; Kickapoo Tribe of Oklahoma and Sac & Fox Nation
Lincoln County and Kickapoo Tribe of Oklahoma	(Date)	2/3/2015	Flood Risk Review	FEMA, RAMPP, Oklahoma Water Resources Board (OWRB)
	(Date)	(Date)	Initial CCO	
	(Date)	(Date)	Final CCO	

## SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see <http://www.fema.gov>.

Table 31 is a list of the locations where FIRMs for Lincoln County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

**Table 31: Map Repositories**

Community	Address	City	State	Zip Code
Town of Agra	City Hall 22 S. Main Street	Agra	OK	74824
Town of Carney	324 S Main Street	Carney	OK	74832
City of Chandler	City Hall 414 Manvel Avenue	Chandler	OK	74834
Town of Davenport	Town Hall 214 Broadway Avenue	Davenport	OK	74026
Town of Fallis	Town Hall 2 <sup>nd</sup> And Birch	Fallis	OK	74881
Iowa Tribe of Oklahoma	RR1 Box 721	Perkins	OK	74059
Town of Kendrick	City Hall 223 E. Main Street	Kendrick	OK	74079
Kickapoo Tribe of Oklahoma	101 North Blackberry Drive	McLoud	OK	74851
Lincoln County	County Courthouse 811 Manvel Avenue	Chandler	OK	74834
City of Meeker	City Hall 510 West Carl Hubbell Boulevard	Meeker	OK	74855
City of Prague	City Hall 820 Jim Thorpe Boulevard	Prague	OK	74864
Sac and Fox Nation	201 North Harrison Street	Shawnee	OK	74801
Town of Sparks	Town Hall 209 6 <sup>th</sup> Street	Sparks	OK	74869

Community	Address	City	State	Zip Code
City of Stroud	City Hall 220 West 2 <sup>nd</sup> Street	Stroud	OK	74079
Town of Tryon	City Hall 250 S. Main Street	Tyron	OK	74875
Town of Warwick	Town Hall RR3 Box 139	Wellston	OK	74881
Town of Wellston	Town Hall 211 Cedar Avenue	Wellston	OK	74881

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 32.

Table 32 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the state NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of state and local GIS data in their state.

**Table 32: Additional Information**

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	<a href="http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library">http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library</a>
NFIP website	<a href="http://www.fema.gov/national-flood-insurance-program">http://www.fema.gov/national-flood-insurance-program</a>
NFHL Dataset	<a href="http://msc.fema.gov">http://msc.fema.gov</a>
FEMA Region VI	Jennifer Knecht 800 North Loop 288 Denton, TX 76209 (940) 898-5553 <a href="mailto:Jennifer.Knecht@fema.dhs.gov">Jennifer.Knecht@fema.dhs.gov</a>
Other Federal Agencies	
USGS website	<a href="http://www.usgs.gov">http://www.usgs.gov</a>
Hydraulic Engineering Center website	<a href="http://www.hec.usace.army.mil">http://www.hec.usace.army.mil</a>

State Agencies and Organizations	
State NFIP Coordinator	Gavin Brady, CFM Oklahoma Water Resources Board 3800 North Classen Blvd. Oklahoma City, OK 73118 (918) 581-2924 Fax: (918) 581-2754 <a href="mailto:jgbrady@owrb.ok.gov">jgbrady@owrb.ok.gov</a>
State GIS Coordinator	Dr. Mike Sharp Director, Information Technology Division Oklahoma Conservation Commission 2800 North Lincoln Boulevard, Suite 160 Oklahoma City, OK 73105 (405) 521-4813 Fax: (405) 521-6686 <a href="mailto:msharp@okcc.state.ok.us">msharp@okcc.state.ok.us</a> <a href="mailto:mikes@okcc.state.ok.us">mikes@okcc.state.ok.us</a>
State Floodplain Mapping Coordinator	Matt Rollins, CFM Oklahoma Water Resources Board 3800 North Classen Blvd. Oklahoma City, OK 73118 405-530-8800 <a href="mailto:matt.rollins@owrb.ok.gov">matt.rollins@owrb.ok.gov</a>

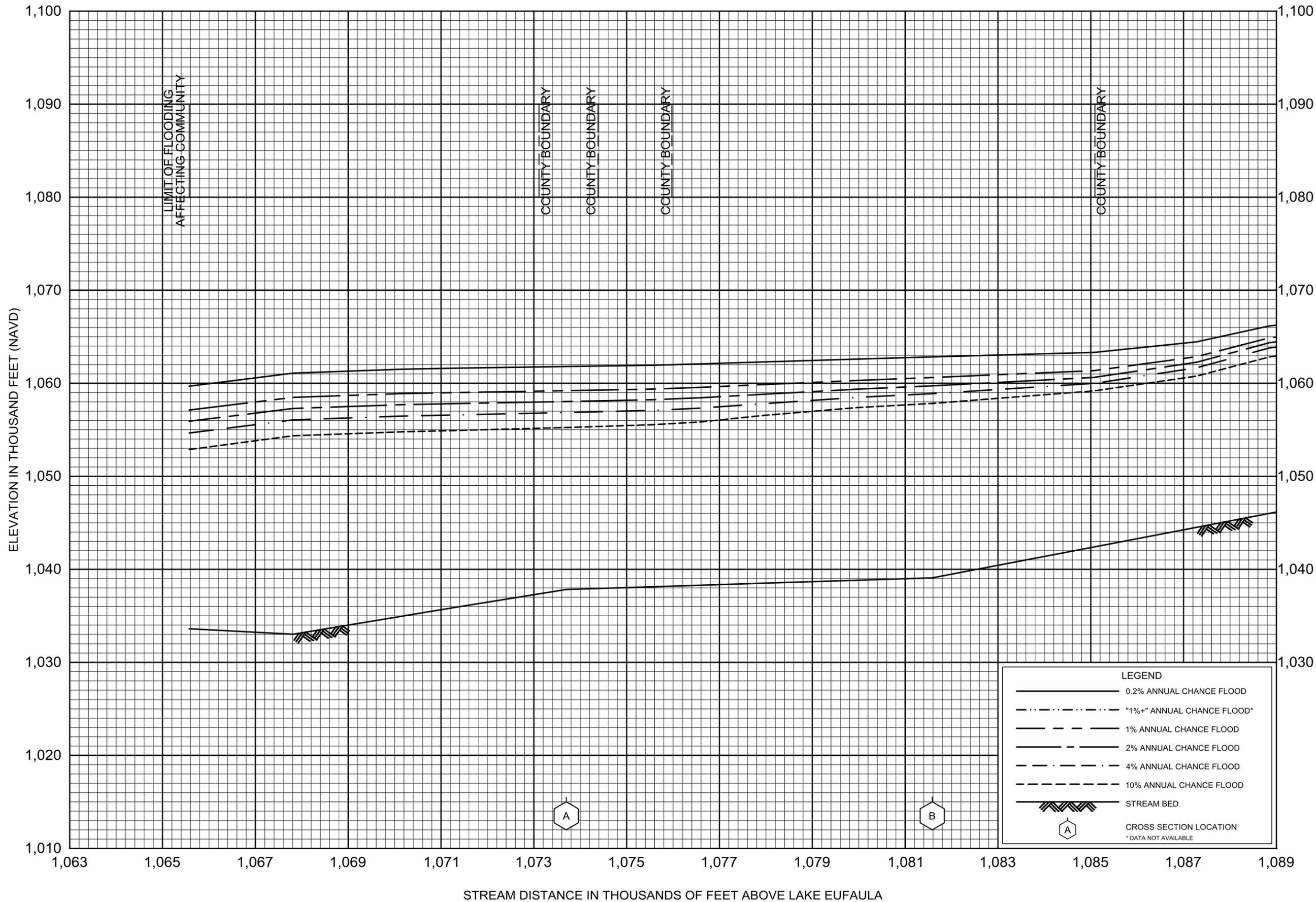
## SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 33 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

**Table 33: Bibliography and References**

Citation in this FIS	Publisher/ Issuer	<i>Publication Title, "Article," Volume, Number, etc.</i>	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
RAMPP, 2015	Risk Assessment, Mapping, and Planning Partners	<i>Base Map Submittal for Lincoln County, OK</i>	Risk Assessment, Mapping, and Planning Partners	Denton, TX	2/27/2015	<a href="https://hazards.fema.gov">https://hazards.fema.gov</a>
FEMA, 2010	Federal Emergency Agency	<i>Flood Insurance Rate Map, Lincoln County, OK and Incorporated Areas</i>	Federal Emergency Agency	Washington, DC	8/19/2010	<a href="https://msc.fema.gov/portal">https://msc.fema.gov/portal</a>

## Profiles

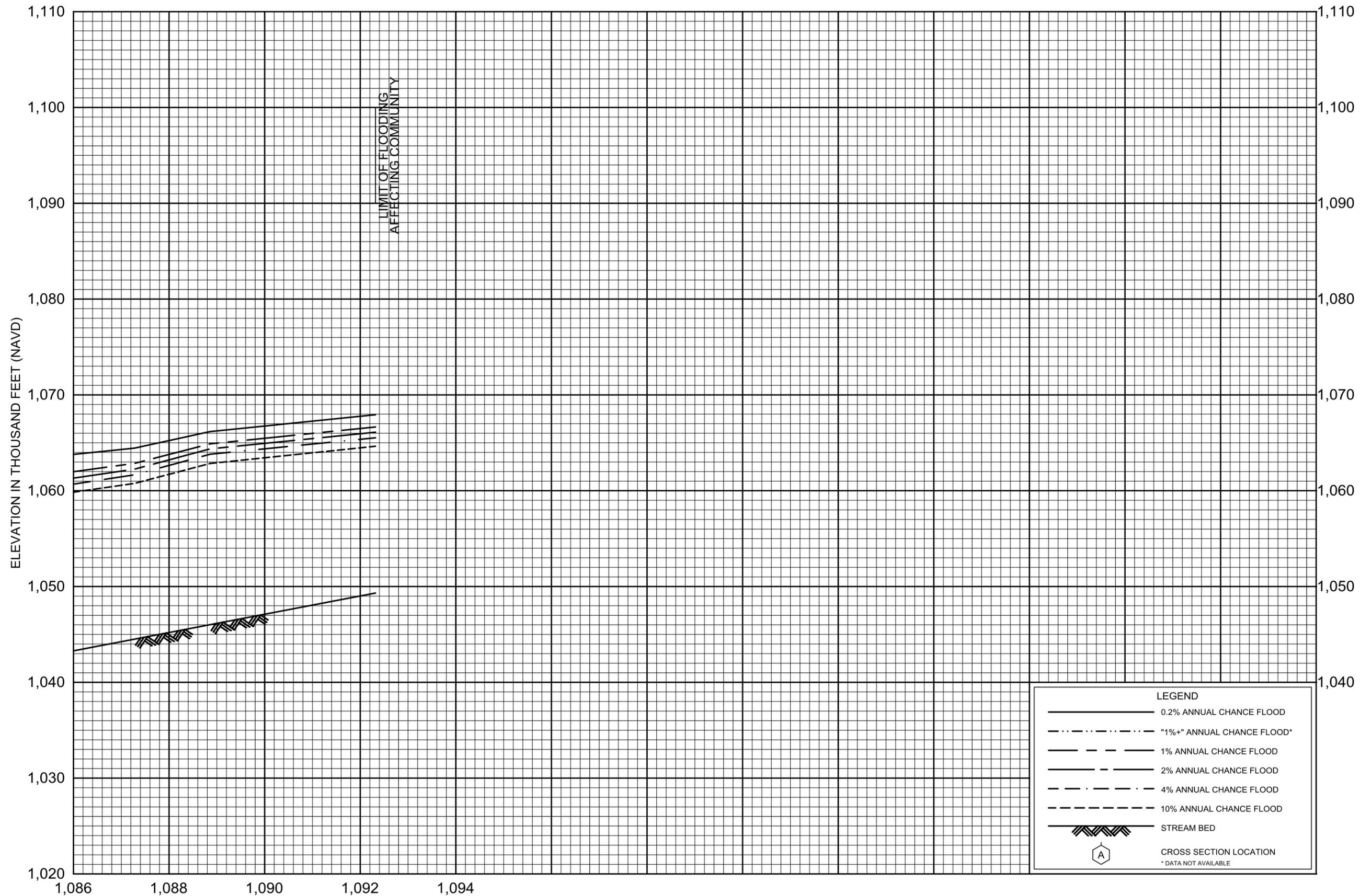


FLOOD PROFILES

NORTH CANADIAN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, OK  
AND INCORPORATED AREAS



**LEGEND**

- 0.2% ANNUAL CHANCE FLOOD
- - - "1%+" ANNUAL CHANCE FLOOD\*
- - - 1% ANNUAL CHANCE FLOOD
- · - 2% ANNUAL CHANCE FLOOD
- · - 4% ANNUAL CHANCE FLOOD
- · - 10% ANNUAL CHANCE FLOOD
- ▨ STREAM BED
- ⬡ CROSS SECTION LOCATION  
\*DATA NOT AVAILABLE

**FLOOD PROFILES**  
NORTH CANADIAN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**LINCOLN COUNTY, OK**  
AND INCORPORATED AREAS