

CTP Business Plan

State of Oklahoma

Oklahoma Water Resources Board

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I. ACRONYMS AND ABBREVIATIONS

OGI	Oklahoma Geographic Information Council	HWM	High Water Mark
OWRB	Oklahoma Water Resources Board	IDIQ	Indefinite Delivery Indefinite Quantity
OGI	Oklahoma Geographic Information Council	LiDAR	Light Detection and Ranging System
BFE	Base (1-percent-annual-chance) Flood Elevation	LOMA	Letter of Map Amendment
BCW	Bird Creek Watershed	LOMC	Letter of Map Change
CAV	Community Assistance Visit	LOMR	Letter of Map Revision
CEO	Chief Elected Officer	LOMR-F	Letter of Map Revision based on Fill
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	MAT	Mitigation Assessment Team
CFR	Code of Federal Regulations	MDP	Master Drainage Plan
CFS	Cubic Feet per Second	MIP	Mapping Information Platform
CID	Community Identification Number	MLP	Midterm Levee Inventory
CLOMR	Conditional Letter of Map Revision	MXD	ArcMap Document Extension
CNMS	Coordinated Needs Management Strategy	NAVD	North American Vertical Datum
CRS	Community Rating System	NCDC	National Climatic Data Center
CTP	Cooperating Technical Partner	NRCS	National Resource Conservation Service
DEM	Digital Elevation Model	NFIP	National Flood Insurance Program
DFIRM	Digital Flood Insurance Rate Map	NHD	National Hydrologic Dataset
eLOMA	Electronic Letter of Map Amendment	NVUE	New Validated or Updated Engineering
EPA	Environmental Protection Agency	OEM	Oklahoma Department of Emergency Management
ESRI	Environmental Systems Research Institute	ODEQ	Oklahoma Department of Environmental Quality
FEMA	Federal Emergency Management Agency	ODOT	Oklahoma Department of Transportation
FIRM	Flood Insurance Rate Map	OKC	Oklahoma City
FIS	Flood Insurance Study	OWRB	Oklahoma Water Resources Board
FPA	Floodplain Administrator	PDF	Portable Document Format File
FY	Fiscal Year	PMR	Physical Map Revision
G&S	Guidelines and Standards for Flood Hazard Mapping Partners	RAMPP	Risk Assessment, Mapping and Planning Partners
GIS	Geographic Information System	RCRA	Resource Conservation and Recovery Act
HEC-1	Hydrologic Engineering Center – Hydrologic Model Program	Risk MAP	Risk Mapping, Assessment, and Planning
HEC-2	Hydrologic Engineering Center – Hydraulic Model Program	RL	Repetitive Loss
HEC-HMS	Hydrologic Engineering Center – Hydrologic Modeling System	RSC	Regional Service Center
H&H	Hydrologic and Hydraulic	SFHA	Special Flood Hazard Area
HMP	Hazard Mitigation Plan	SHMO	State Hazard Mitigation Officer
HUC	Hydrologic Unit Code	SHP	ESRI Shape File
		SQ MI	Square Mile
		SRL	Severe Repetitive Loss
		USACE	U.S. Army Corps of Engineers
		USDA	U.S. Department of Agriculture
		USGS	U.S. Geological Survey

II. INTRODUCTION

This Business Plan is prepared at the request of the Federal Emergency Management Agency (FEMA) and details the State of Oklahoma’s strategy for deployment of the Risk MAP Program under a Cooperative Technical Partner (CTP). This document is an update of the previously submitted plans, and incorporates revisions based on the work completed in past years of the State’s Risk MAP program.

The OWRB vision for 2015 – 2020 is to further the implementation of a multi-hazard, risk-focused approach for mitigation actions statewide through implementation of the following strategies:

- Strategy 1: Expand Digital Mapping to all NFIP participating Communities
- Strategy 2: Increase Mitigation Actions in Deployed Communities
- Strategy 3: Advance CNMS Deployment Statewide

The OWRB intends on using local funds and federal dollars for leverage in the deployment of a self-funding state program, long-term. FEMA funding is requested in the amount of \$ 1,914,000. Program scope, cost estimates and metrics are detailed in subsequent sections of this report.

A. Program Accomplishments

In partnership with FEMA and local communities, the State has facilitated completion of four Phase 1 discoveries, three Phase 2 (90 stream-miles) studies and two Phase 3 projects (35 stream-miles). Physical Map Revisions (PMR) are currently underway in Tulsa, Wagoner and Rogers Counties. Today, the State is completing one discovery, two (35 stream-miles) phase 2 studies – all scheduled for completion in 2015 – and phase 3 support.

Table 1: Summary of Local and FEMA CTP Funding

MAS No.	Year	Grant Total	Local Cash Match
1	2011	\$ 299,000.00	\$ -
2	2011	\$ 1,000,000.00	\$ 250,000.00
3	2012	\$ 50,000.00	\$ -
4	2012	\$ 100,000.00	\$ 25,000.00
5	2013	\$ 50,000.00	\$ -
6	2013	\$ 706,000.00	\$ 176,500.00
7	2014	\$ 50,000.00	\$ -
8	2014	\$ 144,004.00	\$ -
Total		\$ 2,399,004.00	\$ 451,500.00

Support from local communities for CTP projects remains very high, with local cash-match contributions meeting or exceeding 25% of total project funding. A summary of allocations is shown in Table 1.

It should also be noted that all studies completed within the City of Tulsa have employed existing topographic data (provided by local community at no cost to FEMA). These have resulted in considerable project savings, estimated between \$50,000 and \$75,000.

Prior to FEMA NFHL deployment, the OWRB launched a web-based mapping application (OWRB Floodplain Viewer) to assist Oklahoma communities in navigating the most current floodplain management information, flood mitigation resources, and flood preparedness. Training of local officials in the use of these digital tools occurs quarterly, as demand by communities continues to increase.

Today, the OWRB Floodplain Viewer provides a free, ESRI based, simple platform that allows communities and the public to easily locate and compare properties to the FEMA SHFA. The OWRB soon plans to incorporate parcel data from County Assessors to support Disaster Response, Hazard determination and Loss estimates, and Community outreach efforts. The parcel data, once displayed on the web viewer, would facilitate query for parcels impacting the SFHA, data often needed by but seldom available to communities seeking to increase insurance outreach efforts.

The OWRB also continues to foster partnerships with USACE, OEM, OGI, ODEQ and other State agencies for the purpose of promoting flood risk mitigation actions. The efforts have resulted in deployment of new flood warning tools, increased leverage of grant funding for risk mitigation and multi-agency sharing of valuable, existing GIS data.

Table 2: Oklahoma Risk MAP Program Metrics

Measure	2011		2015	
	Actual	Goal	Actual	Goal
Deployment	12.4%	44%	53%	53%
NVUE	45%	52%	45%	64%
Action 1		33%		43%
Action 2		37%		43%

Table 2 provides a status of the State’s Risk MAP Program in terms of Deployment and NVUE metrics. Deployment is computed based on Oklahoma Watersheds Discovered, while NVUE is computed as Valid Miles over Total Miles reported in the CNMS dataset dated October 2013. Benchmark Measures were obtained from FEMA publication “RiskMAP Performance Measures”, December 7, 2011.

B. Leverage and Local Support

As mentioned above, support from local communities for CTP projects remains very high, with local cash-match contributions of 25% of total project funding. To date, Oklahoma communities have contributed nearly \$500,000 in cash funding to the Risk MAP program and have budgeted an additional \$375,000 in cash for funding of FY 2015 Risk MAP projects – See Appendix A for Commitment Letters.

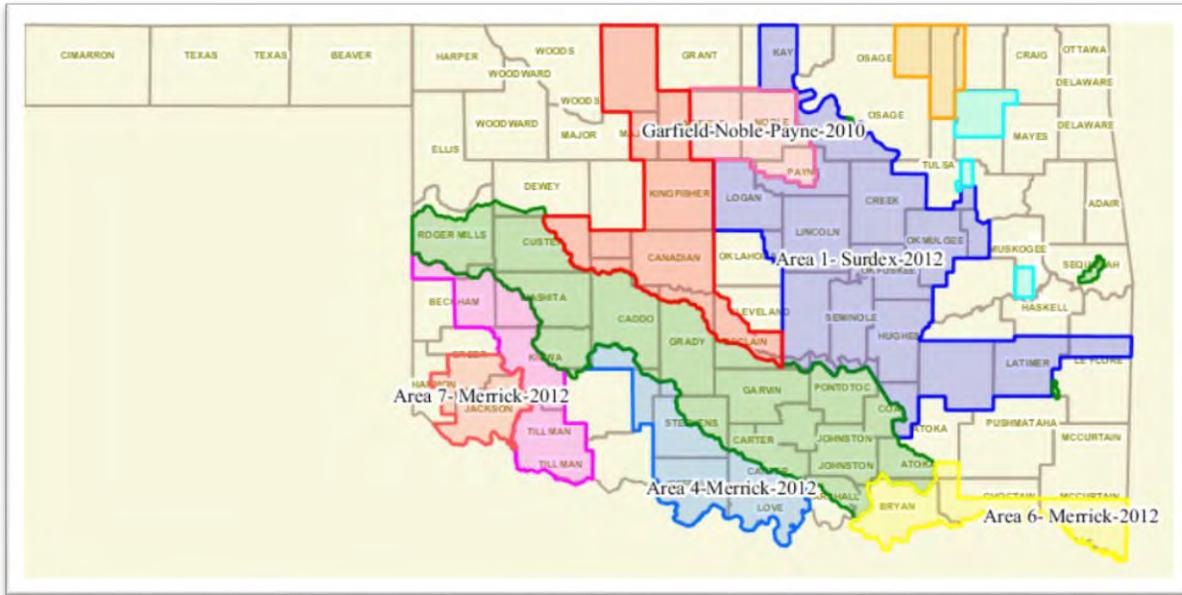


Figure 1: Oklahoma NRCS LiDAR Coverage (2014)

New topographic information (NRCS 2013 LiDAR coverage) exists for a significant portion of the State – See Figure 1, and the majority of Oklahoma urban communities have acquired their own topographic information. The City of Tulsa, for example, has updated topographic information, all of which has been and will continue to be used for Risk MAP studies at no cost to the projects.

The OWRB remains committed to the success of the State’s CTP Program and has experienced personnel in the completion of Risk MAP discoveries, studies and PMRs. Refer to previous State Business Plan documents for detailed discussion of CTP personnel resources and capabilities.

III. NEEDS ASSESSMENT

A. Program Participation

Of Oklahoma’s 77 counties, 55 currently participate in the NFIP – or 70% of the State’s area.

B. Mapping Status

Forty-nine Oklahoma counties have been mapped to-date, of which 46 are DFIRMs and 13 paper-mapped. These account for 60% of the State’s area. Of the unmapped counties, only one – McIntosh County¹ – participates in the NFIP (see Figure 2).

¹ County received FY 2010 funding – work which is currently underway. Prelim Date for mapping (34 miles) is scheduled for 9/30/15.

Approximately 38% of Oklahoma’s stream miles are mapped, 31% modernized and 7% paper inventory. Of the modernized and paper inventory, the overwhelming majority (90%) is Zone A. Unmapped inventory contains over 60,000 stream miles and comprises over 62% of Oklahoma’s stream miles.

During review of the Draft document, it was noted that both Craig and McIntosh County are currently under mapping. Thus, these counties has been removed from further consideration in the final version of this document.

C. CNMS Inventory

As shown in Table 3, 54% of modernized and 45% of all mapped miles are categorized as NVUE compliant. Unmapped miles are not included in the CNMS inventory.

Table 3: Oklahoma Stream Miles Inventory

Mapping Inventory	Stream Miles		
	Detailed	Approximate	Total
Mile Inventory			
Modernized	3,654.02	26,495.53	30,149.55
Paper	75.13	7,051.16	7,126.29
Unmapped	N/A	N/A	61,432
NVUE Inventory	Compliant	Non-Compliant	Percent Compliant
Modernized	16,306.50	13,843.05	54.09%
Full Inventory	16,756.73	20,825.89	44.59%

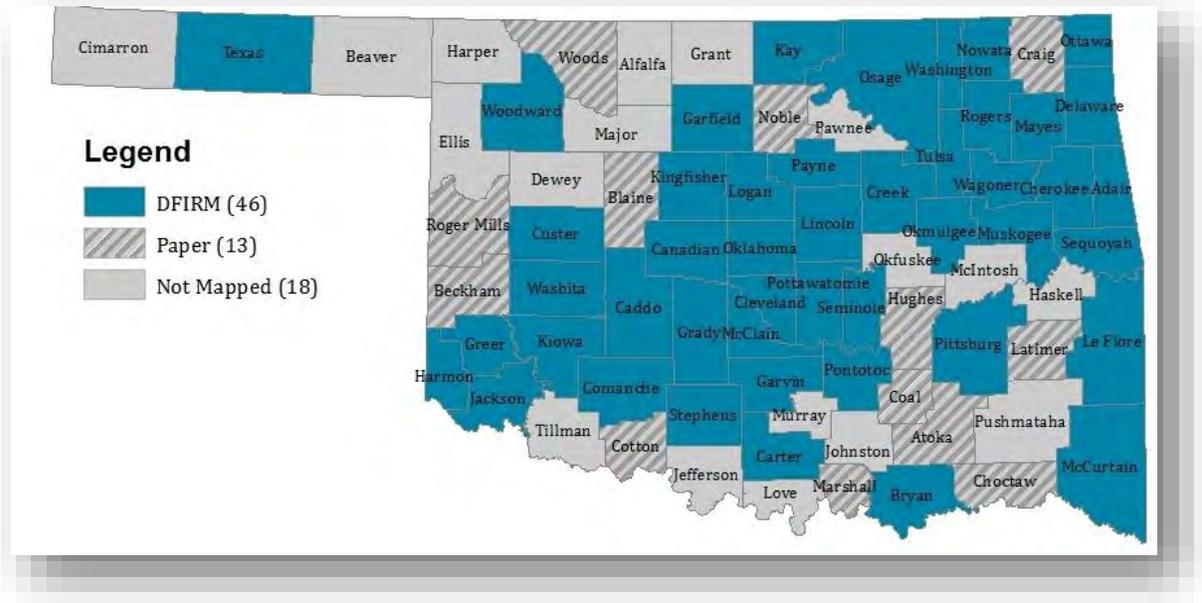


Figure 2: Oklahoma Map Inventory

D. LiDAR Availability

Existing LiDAR coverage extends over 53% of the State's area – expanding over 61 of the State's 77 counties. NRCS LiDAR coverage, available since 2010, has increased annually thereafter now covering a significant portion of the State. Recently, as part of Risk MAP efforts, FEMA also purchased LiDAR data for portions of Craig, Comanche, Cotton, Delaware, McIntosh and Ottawa Counties. A listing of unmapped or paper counties which currently lack LiDAR coverage are provided in Table 4. Partial availability is noted for those counties with LiDAR coverage less than 100%. Figure 3 illustrates the current LiDAR coverage (from NRCS and FEMA sources) for the State.

Table 4: Unmapped or Paper Counties – LiDAR Status

County Name	NFIP Participation	Mapping Status	LiDAR Availability	Area (sq. mi.)
Alfalfa	No	Unmapped	Yes	881.57
Atoka	Yes	Paper	Partial	990.89
Beaver	No	Unmapped	No	1,817.55
Beckham	Yes	Paper	Yes	904.35
Blaine	Yes	Paper	Partial	938.86
Choctaw	Yes	Paper	Yes	801.67
Cimarron	No	Unmapped	No	1,841.06
Coal	Yes	Paper	Yes	521.67
Cotton	Yes	Paper	Partial	643.24
Craig	Yes	Ongoing	No	762.64
Dewey	No	Unmapped	Partial	1,008.07
Ellis	No	Unmapped	No	1,231.82
Grant	No	Unmapped	No	1,003.51
Harper	No	Unmapped	No	1,040.97
Haskell	No	Unmapped	Partial	625.39
Hughes	Yes	Ongoing	Yes	814.90
Jefferson	No	Unmapped	Yes	776.56
Johnston	No	Unmapped	Yes	658.87
Latimer	Yes	Paper	Yes	729.36
Love	No	Unmapped	Yes	534.60
Major	No	Unmapped	Partial	957.82
Marshall	No	Paper	Partial	427.45
McIntosh	Yes	Ongoing	Partial	712.54
Murray	No	Unmapped	Yes	425.21
Noble	Yes	Paper	Yes	742.45
Okfuskee	No	Unmapped	Yes	629.10
Pawnee	No	Unmapped	Yes	594.89
Pushmataha	No	Unmapped	Partial	1,423.99
Roger Mills	Yes	Paper	Partial	1,146.34

County Name	NFIP Participation	Mapping Status	LiDAR Availability	Area (sq. mi.)
Tillman	No	Unmapped	Yes	880.01
Woods	Yes	Paper	No	1,290.14

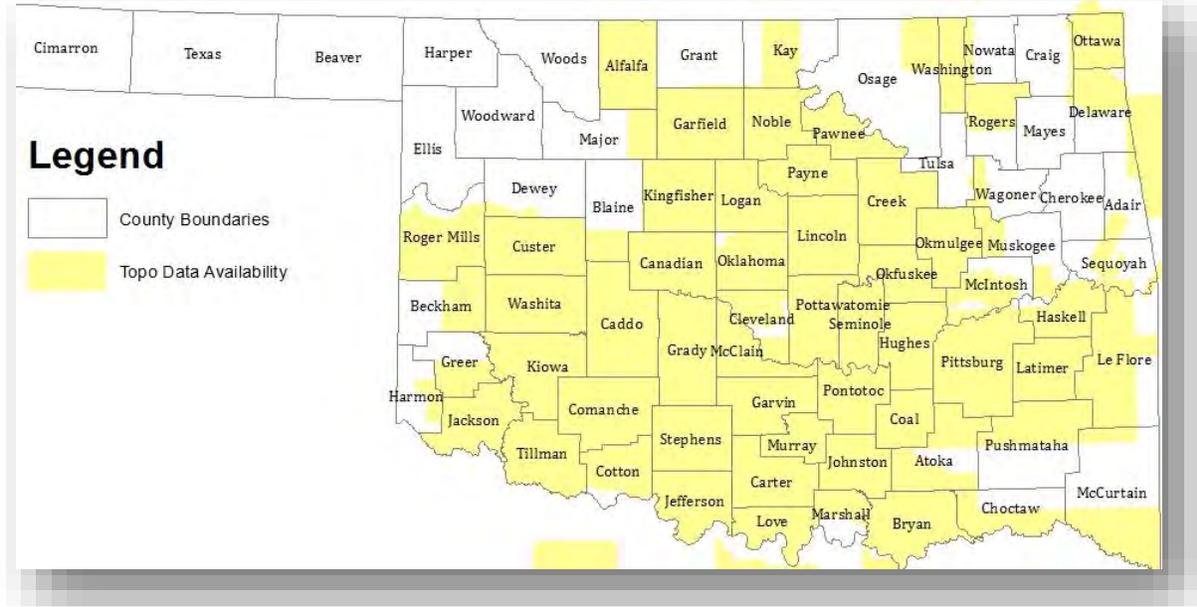


Figure 3: Oklahoma Topographic Data Inventory

LiDAR coverage is scarce along the Oklahoma panhandle and along the Northern and Eastern parts of the State, including areas in digital form. The State’s goal is to increase LiDAR coverage to all counties – whether mapped or not – to assist local risk mitigation and study efforts across the State.

Currently, 32 counties have no or partial LiDAR coverage. Of these, 16 are in DFIRM inventory, and the remaining 16 are unmapped or on paper only. Of the latter group, 6 are NFIP-participating counties.

The City of Woodward is one example in a long list of communities requesting LiDAR to facilitate local studies, grants and other local mitigation actions. The requested LiDAR covers 16 sq. mi. (basin) for the study of Woodward Creek Tributaries (approximately 8.1 stream miles) located in the urban area.

E. Discovery

Discovery efforts in Oklahoma have encompassed eight HUC-8 watersheds, expanding over 33 counties and 41.3% of the State’s area. Figure 4 provides an overlay of Discovery coverage over the State’s mapping inventory.

Eight counties (4 of the 18 unmapped and 4 of the 13 paper counties) have been included in Discovery thus far. Similarly, Table 5 provides a listing of remaining counties – unmapped or paper-mapped – which have not undergone Discovery. Mapping Status and LiDAR availability is provided for each.

Table 5: Unmapped and Paper Counties – No Discovery

County Name	Mapping Status	LiDAR Availability	County Name	Mapping Status	LiDAR Availability
Alfalfa	Unmapped	Yes	Jefferson	Unmapped	Yes
Atoka	Paper	Partial	Johnston	Unmapped	Yes
Beaver	Unmapped	No	Latimer	Paper	Yes
Beckham	Paper	Yes	Love	Unmapped	Yes
Choctaw	Paper	Yes	Marshall	Paper	Partial
Cimarron	Unmapped	No	Murray	Unmapped	Yes
Coal	Paper	Yes	Noble	Paper	Yes
Cotton	Paper	Partial	Pawnee	Unmapped	Yes
Ellis	Unmapped	No	Pushmataha	Unmapped	No
Grant	Unmapped	No	Roger Mills	Paper	Partial
Harper	Unmapped	No	Tillman	Unmapped	Yes
Haskell	Unmapped	No			

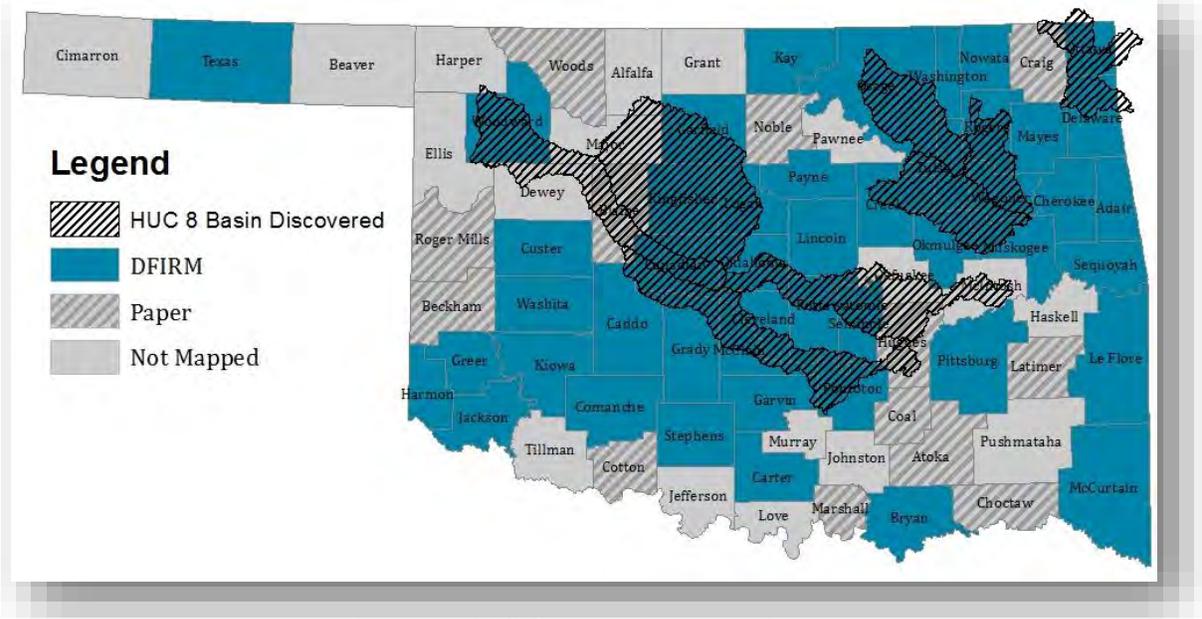


Figure 4: Oklahoma Discovery Status

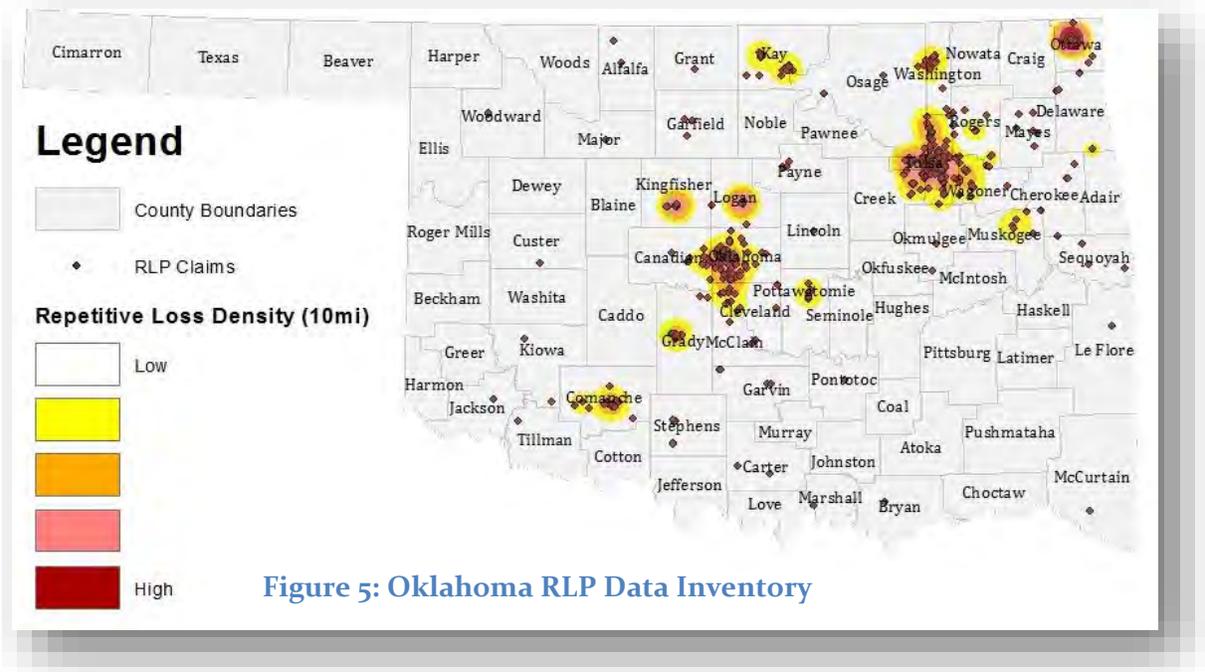
F. Areas of Mitigation Interest

The State is continuously collecting Areas of Mitigation Interest (AoMI) data as part of its CTP efforts. Data claims, flood risk areas, land use changes, urban growth, levees, dams,

flood constrictions, and more, is collected as part of Discovery. This information is reviewed annually for planning, scheduling and prioritization of future projects.

Table 6: Area of Mitigation Interest

Claims Ranking	County Name	NFIP Participant	Mapping Status	LiDAR Availability	Discovery	Area (sq. mi.)
1	Tulsa	Yes	Yes	Yes	Yes	586.87
2	Ottawa	Yes	Yes	Yes	Yes	484.79
3	Oklahoma	Yes	Yes	Yes	Yes	718.27
4	Logan	Yes	Yes	Yes	Yes	748.84
5	Kingfisher	Yes	Yes	Yes	Yes	905.87
6	Comanche	No	Yes	Yes	No	1,084.42
7	Wagoner	Yes	Yes	No	Yes	590.94
8	Kay	No	Yes	Partial	No	945.29
9	Creek	Yes	Yes	Yes	Yes	969.54
10	Grady	No	No	Yes	No	1,105.59



IV. KEY RISK MAP PROJECTS

Risk MAP projects are identified following the process depicted in Figure 6. Prioritization is based on the “Risk, Needs and Action Factors” weighted based on importance to meeting FEMA performance measures and the objectives of the State’s Program.

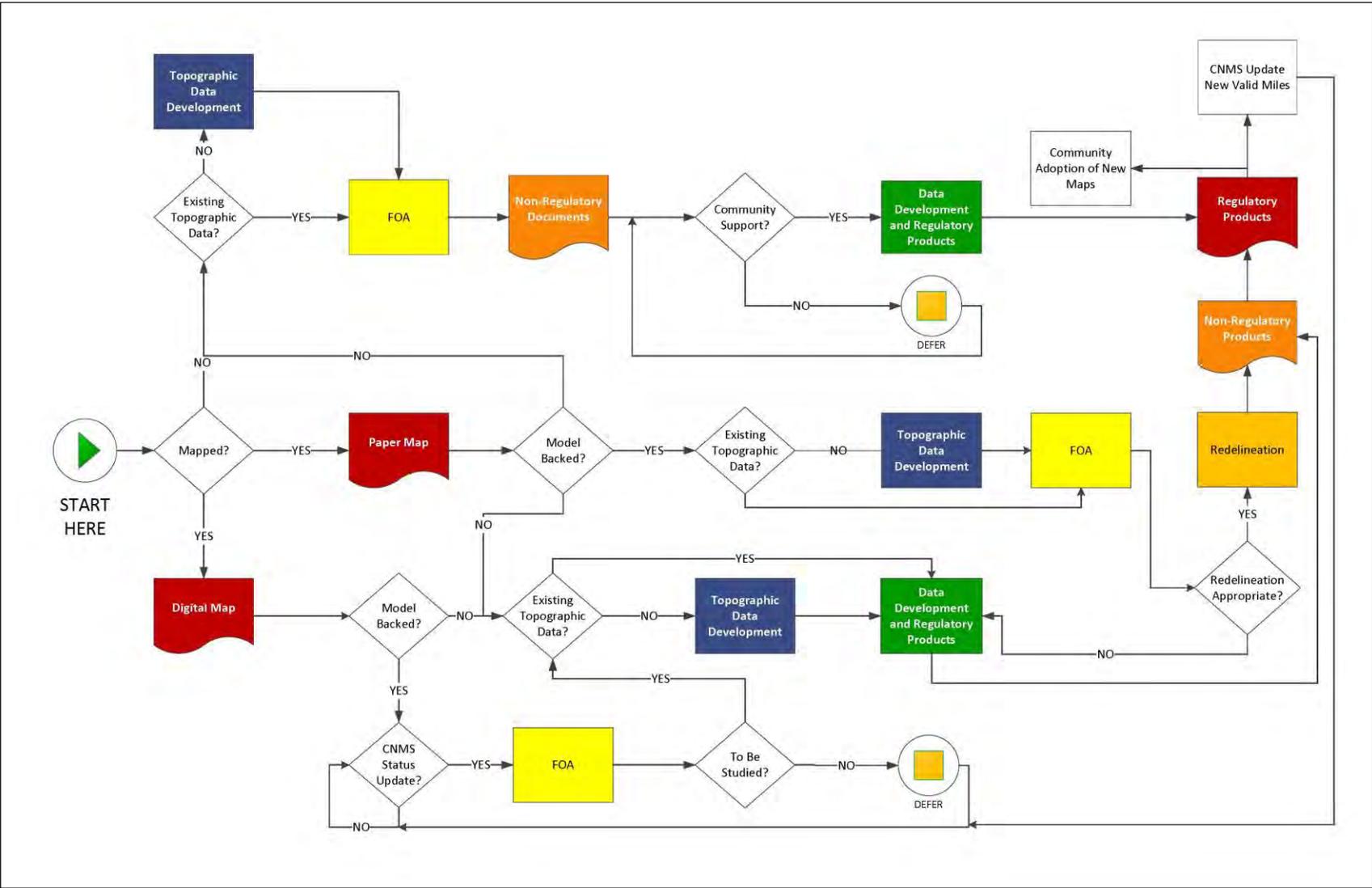


Figure 6: State of Oklahoma Mapping Support Process

Criteria includes Deployment, NVUE, Risk Awareness and Action – incorporating FEMA’s trifecta as well as local funding availability and support. Projects which further digital mapping and/or support local mitigation actions in NFIP participating communities were given the highest priority.

A. FEMA Funding Request

FEMA funding is requested in the amount of \$ 2,064,000. The FY 2015-2016 proposal includes First Oder Approximation projects, Discovery and Phase 2 studies – as a comprehensive, prioritized approach for Risk MAP in the State. It is understood that FEMA may opt to complete some of this work outside of the CTP program. A summary of the proposal is shown in Table 7.

B. Local Funding Cash-Match

Local funding is necessary for the deployment of Risk MAP projects under the CTP Program in Oklahoma. For FY 2015-2016, local funding has been guaranteed by contributions from the City of Tulsa and City of Norman in the amount of \$475,000. Commitment Letters are included in Attachment B.

Table 7: Oklahoma Risk MAP CTP Program (FY 2015-2016) Summary

CTP Projects	Estimated Project Costs	Leverage	
		Cash-Match	Avail. LiDAR
Pre-Phase 1 FOA Pilot	\$ 150,000		Yes
Phase 1: Discoveries		\$ 25,000	
Little Watershed	\$ 100,000		N/A
Deep Fork Watershed	\$ 100,000		N/A
Phase 2: Studies			
Bird Creek		\$ 275,000	
Brookhollow	\$ 264,000		Yes
Dirty Butter	\$ 311,000		Yes
Flat Rock	\$ 510,000		Yes
Polecat-Snake		\$ 100,000	
Little Haikey	\$ 364,000		Yes
Lower Canadian-Walnut		\$ 75,000	
Ten Mile-Brookhaven	\$ 265,000		Yes
Total	\$ 2,064,000	\$ 475,000	

C. LiDAR Acquisition

The State’s FY 2015 topographic data acquisition priorities are listed in Table 8. Priority has been given to NFIP-participating, unmapped or paper-mapped map counties which have underwent Discovery. Further prioritization was given based on “Risk, Needs and

Action Factors” weighted based on importance to meeting FEMA performance measures and the objectives of the State’s Program. Refer to Appendix A for additional information.

Table 8: Oklahoma LiDAR Collection Priorities (FY 2015)

LiDAR Priority	County Name	NFIP Participant	Mapping Status	LiDAR Coverage	Discovery	Area (sq. mi.)
1	Blaine	Yes	Paper	25%	Yes	938.86
2	Woods	Yes	Paper	0%	Yes	1,290.14
N/A	Atoka	Yes	Paper	79%	No	990.89
N/A	Roger Mills	Yes	Paper	82%	No	1,146.34
N/A	Cotton	Yes	Paper	89%	No	643.24

LiDAR coverage for Atoka, Roger Mills and Cotton – although not 100% - is deemed sufficient for mapping purposes. No additional LiDAR is requested at this time.

D. Pre-Phase 1: First Order Approximation

The First Order Approximation (FOA) process is being evaluated by FEMA for validation of existing Zone A’s and development of non-regulatory and regulatory products. The FOA process can be used to produce estimates of flood hazard boundaries for multiple recurrence intervals, and estimates of BFEs for communities seeking this information.

Of the 11 Oklahoma counties that remain in paper inventory, 3 (McIntosh, Hughes and Craig) are currently undergoing mapping by FEMA. Of the remaining 8, Discovery has been performed for Blain and Woods, and LiDAR is currently available for Latimer, Coal, Cotton, Roger Mills, Atoka, Beckham, Noble and Choctaw. Table 9 provides a summary of the State’s FOA priorities.

Table 9: Oklahoma FOA Priorities FY 2015

FOA Priority	County Name	NFIP Participant	Mapping Status	LiDAR Availability	Discovery	Stream Miles (mi)
Ongoing	McIntosh	Yes	Unmapped	Partial	Yes	
Ongoing	Hughes	Yes	Paper	Yes	Yes	
Ongoing	Craig	Yes	Paper	No	Yes	
1	Latimer	Yes	Paper	Yes	No	863
2	Coal	Yes	Paper	Yes	No	296
3	Cotton	Yes	Paper	Yes	No	375
4	Roger Mills	Yes	Paper	Yes	No	
5	Atoka	Yes	Paper	Yes	No	
6	Beckham	Yes	Paper	Yes	No	
7	Noble	Yes	Paper	Yes	No	
8	Choctaw	Yes	Paper	Yes	No	
9	Blaine	Yes	Paper	Partial	Yes	
10	Woods	Yes	Paper	No	Yes	

E. Phase 1: Discovery

Discovery projects were prioritized based on “Risk, Needs and Action Factors” weighted based on importance to meeting FEMA performance measures and the objectives of the State’s Program. Highest priority is given to NFIP-participating, unmapped or paper-mapped county for which LiDAR acquisition is currently available. This group is followed by counties for which LiDAR acquisition and FOA had been identified as a priority in the previous sections.

The State also wished to facilitate Discovery for NFIP-participating communities with digital maps which can complete mitigation projects. The Cities of Oklahoma City and Norman have communicated interest in completing Phase 2 studies as part of the CTP Program for grant purposes. To enable programming of such projects, discovery of Deep Fork and Little Watersheds have been added to FY 2015 priorities.

Table 10: Oklahoma Discovery Priorities (FY 2015)

Discovery Priority	County Name	HUC-8 Watershed
1	Various	Deep Fork
2	Various	Little
3	Latimer	Lower Canadian
4	Coal	Muddy Boggy
	Atoka	
	Choctaw	
5	Cotton	Cache
6	Roger Mills	Washita Headwaters
	Beckham	
7	Noble	Black Bear-Red Rock

The State wishes to investigate the possibility of completing a State-Wide Discovery Project. Efforts will result in a single Discovery Map for the State, along with consolidated databases for Flood Risk Review and Flood Risk Assessment purposes. These efforts will also expedite the completion of FOAs for non-digital, NFI-participating counties.

Most importantly, Statewide Discovery will enable immediate deployment of FOAs for non-participating communities with existing LiDAR data. This, the State believes, can achieve significant gains towards the goal of engaging non-participating communities in flood risk mitigation.

F. Phase 2: Studies

Once needs area are identified via Discovery, Phase 2 Projects are prioritized based on a formula containing nine, project-specific factors: Population Density, Percent Urban, Number of Repetitive Loss Properties, Total Value of Repetitive Loss Claims, Percent Available Topographic Data, Population Density in the Floodplain, Effective Study Age, Validation Status, and Available Local Funding.

Projects located in Bird, Lower Canadian-Walnut, Lower Verdigris, Middle North Canadian, and Polecat-Snake Watersheds have been include in the State’s prioritization process. This inventory includes a total of 105 studies covering 2,270 stream miles for an estimated cost of nearly \$50 million. Of this sum, 15 projects have been completed to-date, either via a CTP grant or local undertakings.

This list of projects is presented to communities for input annually for planning and prioritization purposes. At this time, communities interested in participating in the CTP Program are asked to budget contributions in advanced for future grant applications. As part of this process, communities also communicate preference for prioritization of their listed projects.

For example, since Discovery, the City of Broken has withdrawn interest in participating in the CTP Program for the re-mapping of several highly ranked streams by FEMA’s performance measures. Studies of Adams, Aspen and Elm Creek have been completed fairly recently by the City and provide sufficient flood risk data for implementation of local ordinance requirements.

Similarly, the City of Tulsa has also communicated the availability of several studies completed by the City (highly ranked streams) which serve adequately to support local risk mitigation actions. The State’s inventory tracks availability of local studies and adjusts project rankings accordingly.

Table 11, below, provides Phase 2 Projects – with local funding budgeted support – listed in the descending order of priority by FEMA’s performance measures. It also provides the Community Ranking, 1 representing highest priority, for funding and scheduling. Projects highlighted in “orange” are those proposed for study in FY 2015.

Table 11: Oklahoma Phase 2 Study Inventory

HUC 8 Name	Project Name	Project Length	Cost	Community Priority
Polecat-Snake	Updating the FIRM and FIS for Little Haikey Creek, City of Tulsa	18.05	\$ 364,000	2
Polecat-Snake	Updating the FIRM and FIS for Harlow Creek, Bigheart Creek and West Bigheart Creek, Osage and Tulsa County	11.71	\$ 236,000	1
Bird Creek	Updating the FIRM and FIS for Brookhollow Creek, City of Tulsa	11.05	\$ 387,000	1
Bird Creek	Updating the FIRM and FIS for Audubon Creek, City of Tulsa	1.89	\$47,261	5
Bird Creek	Updating the FIRM and FIS for Tupelo Creek and Tributaries, City of Tulsa	4.93	\$ 123,198	5
Bird Creek	Updating the FIRM and FIS for Cooley Creek, City of Tulsa	7.04	\$ 176,026	3
Bird Creek	Updating the FIRM and FIS for Mingo Creek, City of Tulsa	16.51	\$ 412,737	4
Bird Creek	Updating the FIRM and FIS for Jones Creek, City of Tulsa	3.30	\$82,541	5
Bird Creek	Updating the FIRM and FIS for Mill Creek, City of Tulsa	3.30	\$82,541	5
Lower Canadian-Walnut	Updating the FIRM and FIS for Ten Mile Flat Creek, City of Norman.	5.40	\$ 128,613	1
Lower Canadian-Walnut	Updating the FIRM and FIS for Brookhaven Creek and Tributaries, City of Norman.	5.73	\$ 136,473	1
Bird Creek	Updating the FIRM and FIS for Dirty Butter Creek and Tributary, City of Tulsa	14.33	\$ 311,000	2
Bird Creek	Updating the FIRM and FIS for Flat Rock Creek and Tributaries, City of Tulsa	28.41	\$ 510,000	2

The following Phase 2 projects have received FY 2015 local match:

- Little Haikey Creek: This is the highest priority Phase 2 study in the State's inventory. City of Tulsa has provide matching funding and has LiDAR data which will be made available for the study.
- Brookhollow Creek: The City of Tulsa requests assistance to resolve an existing mapping deficiencies which surfaced following submittal of LOMR 13-06-2412P – see Figure 7. FEMA seeks to expand the model submitted under the LOMR to model segments of the stream lack floodways. The stream is located in the Bird Watershed which is currently under Discovery. The city has LiDAR data which will be made available for the study.

- Ten Mile Flat Creek: The City of Norman has requested the detailed study of 10 Mile Flat Creek to mitigate existing flood risk to life and property. This basin is extremely flat and has poor drainage throughout. Over the years development has occurred mostly consisting of road widening projects, homes, barns, and outbuildings. Although there is no 1% chance floodplain north of West Tecumseh Road, several structures have either flooded or experienced drainage problems over the years. In July of 2013, a new house under construction located in Zone “X” experienced flooding during a heavy rain event. Other existing Zone “X” structures were flooded as well. See Figure 8.

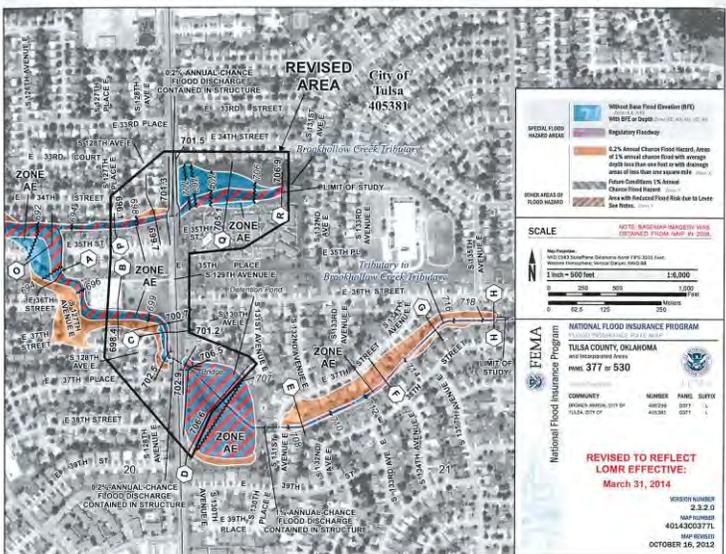


Figure 7: Brookhollow Creek



The Majority of 10 Mile Flat Creek basin is Zone “X”



2013 Flooding in Ten Mile Flat Creek Basin

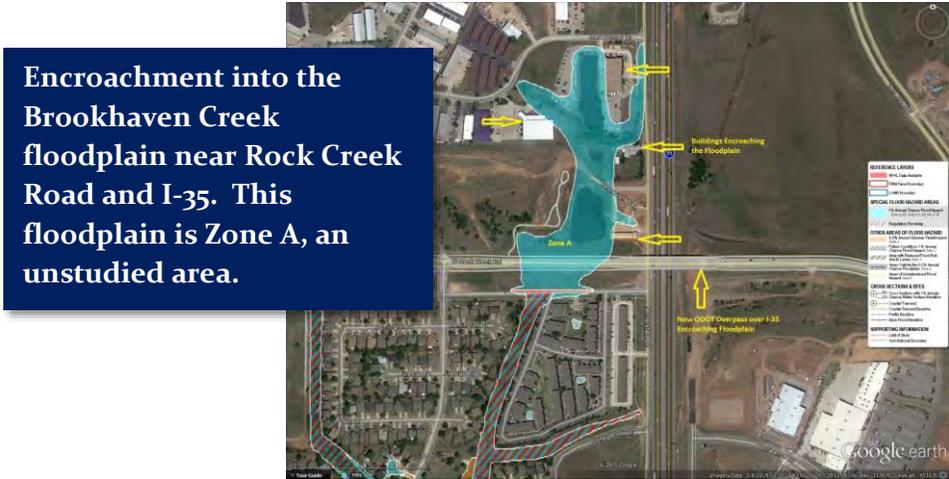


5651 West Tecumseh Road (new construction)

Figure 8: Ten Mile Creek Flooding Event, 2013

- Brookhaven Creek: Several homes and commercial businesses have been constructed in the basin especially at the north end over the last several years. The Oklahoma Department of Transportation also constructed a new overpass and embankment at Rock Creek Road over I-35 that traverses the regulatory floodplain. Although each individual building and structure met Norman’s floodplain ordinance and was approved by the Floodplain Permit Committee at the time, the cumulative effect has been encroachment into the floodplain. See Figure 9.

- Dirty Butter Creek and Tributary and Flat Rock Creek and Tributaries. Projects rank high in the State’s inventory. The City of Tulsa has provide matching funding and has LiDAR data which will be made available for the study.



Encroachment into the Brookhaven Creek floodplain near Rock Creek Road and I-35. This floodplain is Zone A, an unstudied area.

Figure 9: Brookhaven Creek

Location maps – depicting extent of each study – have been included in Appendix C.

G. Pilot Projects

The State maintains an inventory of potential outreach projects derived from requests received for assistance from Oklahoma communities and/or State agencies (see Table 12). None are scheduled for FY 2015-2016 due to lack of local match funding.

Table 12: Oklahoma Potential Pilot Projects

Project Description	Request Agency	Description
Develop Ranking Criteria for RL/SRL Properties	Oklahoma Emergency Management Agency (OEM)	OEM seeks assistance for the prioritization of property acquisition for the purpose of grant funding. The State proposes to use criteria – derived from Risk MAP projects – for the ranking of properties.
Low Water Crossing Inventory	Oklahoma Floodplain Managers Association	In cooperation with other agencies, the State wishes to complete a comprehensive inventory of low water crossings in the State for public outreach, assessment and mitigation purposes.

Project Description	Request Agency	Description
CNMS Update	FEMA	State wishes to collaborate with FEMA Region VI in the upcoming CNMS update to incorporate community data. Studies – enforced as higher standards – are available from several urban communities. These studies may be used to update Unknown or Unverified streams to Valid.

V. RECOMMENDED SCHEDULE

Table 13 illustrates the State’s proposed timeframe for performance of projects for which local support has been identified. The proposed schedule is subject to FEMA approval and funding – as well as local matching requirements.

Table 13: Oklahoma Risk MAP Program Schedule

Activity	Year 1	Year 2	Year 3	Year 4	Year 5
FOA	Latimer Coal Cotton	Roger Mills Atoka Beckham	Noble Choctaw Blaine	Woods	
Discovery	Little Deep Fork	Lower Canadian Muddy Boggy	Cache Washita Headwaters	Black Bear-Red Rock	Lower North Fork Red
Risk Identification & Assessment	Little Haikey Brookhollow Ten Mile Brookhaven Dirty Butter Flat Rock	REVIEW ANNUALLY			
Preliminary Regulatory	NONE	TO BE DETERMINED BASED ON PHASE 2 FUNDED PROJECTS			
Post-Preliminary Regulatory	Joe Creek Red Fork	TO BE DETERMINED BASED ON PHASE 3 FUNDED PROJECTS			

Appendix A Computations

TABLE A.1: STATE PRIORITIZATION COMPUTATIONS (PRE- AND PHASE 1)

County Name	NFIP Participation	Mapping Status	LiDAR	Discovered	DFIRM	CNMS Database	Area (sq.mi.)	Risk Factor Rank	Repetitive Loss P	LiDAR Rank	FOA Rank	Discovery
Adair	Yes	DFIRM	Partial	No	Yes	Yes	576.97	7.79				
Alfalfa	No	Unmapped	Yes	No	No	No	881.57	14.75	4			
Atoka	Yes	Paper	Partial	No	No	Yes	990.89	27.29		0	5	Muddy Boggy
Beaver	No	Unmapped	No	No	No	No	1,817.55	8.32		6		
Beckham	Yes	Paper	Yes	No	No	Yes	904.35	20.66			6	Washita Headwaters
Blaine	Yes	Paper	Partial	Yes	No	Yes	938.86	12.08		1	9	Middle North Canadian
Bryan	Yes	DFIRM	Yes	No	Yes	Yes	944.65	15.81	1			
Caddo	Yes	DFIRM	Yes	Yes	Yes	Yes	1,290.53	16.90				
Canadian	Yes	DFIRM	Yes	Yes	Yes	Yes	905.26	38.23	15			
Carter	No	DFIRM	Yes	No	Yes	Yes	834.50	29.91	2			
Cherokee	Yes	DFIRM	No	No	Yes	Yes	776.39	7.11	3			
Choctaw	Yes	Paper	Yes	No	No	Yes	801.67	10.27			8	Muddy Boggy
Cimarron	No	Unmapped	No	No	No	No	1,841.06	8.26		7		
Cleveland	Yes	DFIRM	Partial	Yes	Yes	Yes	558.35	34.66	26			
Coal	Yes	Paper	Yes	No	No	Yes	521.67	12.73			2	Muddy Boggy
Comanche	Yes	DFIRM	Yes	No	Yes	Yes	1,084.42	25.08	42			
Cotton	Yes	Paper	Partial	No	No	Yes	643.24	12.31		0	3	Cache
Craig	Yes	Ongoing	No	Yes	No	Yes	762.64	13.93		0		
Creek	Yes	DFIRM	Yes	Yes	Yes	Yes	969.54	22.15	29			
Custer	Yes	DFIRM	Yes	No	Yes	Yes	1,002.02	27.23	1			
Delaware	Yes	DFIRM	Partial	Yes	Yes	Yes	792.27	18.40	10			
Dewey	No	Unmapped	Partial	Yes	No	No	1,008.07	5.70		10		
Ellis	No	Unmapped	No	No	No	No	1,231.82	5.82		9		
Garfield	Yes	DFIRM	Yes	Yes	Yes	Yes	1,059.88	37.40	4			
Garvin	No	DFIRM	Yes	Yes	Yes	Yes	814.10	28.78	4			
Grady	No	DFIRM	Yes	No	Yes	Yes	1,105.59	20.79	29			
Grant	No	Unmapped	No	No	No	No	1,003.51	5.17	1	11		
Greer	Yes	DFIRM	Partial	No	Yes	Yes	643.78	8.28				
Harmon	Yes	DFIRM	Partial	No	Yes	Yes	538.81	5.23				
Harper	No	Unmapped	No	No	No	No	1,040.97	4.93		12		
Haskell	No	Unmapped	Partial	No	No	No	625.39	12.42		3		
Hughes	Yes	Ongoing	Yes	Yes	No	Yes	814.90	14.28				
Jackson	Yes	DFIRM	Yes	No	Yes	Yes	804.41	14.88	1			
Jefferson	No	Unmapped	Yes	No	No	No	776.56	13.78				
Johnston	No	Unmapped	Yes	No	No	No	658.87	13.49				
Kay	Yes	DFIRM	Partial	No	Yes	Yes	945.29	14.38	33			

TABLE A.1: STATE PRIORITIZATION COMPUTATIONS (PRE- AND PHASE 1)

County Name	NFIP Participation	Mapping Status	LiDAR	Discovered	DFIRM	CNMS Database	Area (sq.mi.)	Risk Factor Rank	Repetitive Loss P	LiDAR Rank	FOA Rank	Discovery
Kingfisher	Yes	DFIRM	Yes	Yes	Yes	Yes	905.87	20.21	48			
Kiowa	Yes	DFIRM	Yes	No	Yes	Yes	1,031.15	15.21	2			
Latimer	Yes	Paper	Yes	No	No	Yes	729.36	13.69			1	Lower Canadian
Le Flore	Yes	DFIRM	Yes	No	Yes	Yes	1,608.61	15.82	1			
Lincoln	Yes	DFIRM	Yes	Yes	Yes	Yes	965.63	15.88	3			
Logan	Yes	DFIRM	Yes	Yes	Yes	Yes	748.84	22.89	53			
Love	No	Unmapped	Yes	No	No	No	534.60	13.07				
Major	No	Unmapped	Partial	Yes	No	No	957.82	7.80		8		
Marshall	No	Paper	Partial	No	No	Yes	427.45	9.74	1	5		
Mayes	Yes	DFIRM	No	Yes	Yes	Yes	683.45	6.44	7			
McClain	Yes	DFIRM	Yes	Yes	Yes	Yes	580.42	14.59	2			
McCurtain	No	DFIRM	Partial	No	Yes	Yes	1,899.94	14.29	5			
McIntosh	Yes	Ongoing	Partial	Yes	No	No	712.54	10.30			0	
Murray	No	Unmapped	Yes	No	No	No	425.21	13.05				
Muskogee	Yes	DFIRM	Partial	Yes	Yes	Yes	838.96	10.96	22			
Noble	Yes	Paper	Yes	No	No	Yes	742.45	14.15			7	Black Bear-Red Rock
Nowata	Yes	DFIRM	Partial	No	Yes	Yes	580.90	9.36				
Okfuskee	No	Unmapped	Yes	Yes	No	No	629.10	13.46				
Oklahoma	Yes	DFIRM	Yes	Yes	Yes	Yes	718.27	49.41	103			
Okmulgee	Yes	DFIRM	Yes	Yes	Yes	Yes	702.36	16.19	2			
Osage	Yes	DFIRM	Partial	Yes	Yes	Yes	2,303.44	28.32	2			
Ottawa	Yes	DFIRM	Yes	Yes	Yes	Yes	484.79	40.46	132			
Pawnee	No	Unmapped	Yes	No	No	No	594.89	13.61				
Payne	Yes	DFIRM	Yes	No	Yes	Yes	697.10	17.06	4			
Pittsburg	Yes	DFIRM	Partial	No	Yes	Yes	1,378.36	17.47				
Pontotoc	Yes	DFIRM	Yes	Yes	Yes	Yes	725.87	14.95	1			
Pottawatomie	Yes	DFIRM	Yes	Yes	Yes	Yes	793.27	18.06	14			
Pushmataha	No	Unmapped	Partial	No	No	No	1,423.99	11.66		4		
Roger Mills	Yes	Paper	Partial	No	No	Yes	1,146.34	13.52		0	4	Washita Headwaters
Rogers	Yes	DFIRM	Yes	Yes	Yes	Yes	711.37	17.02	19			
Seminole	Yes	DFIRM	Yes	Yes	Yes	Yes	640.64	14.23				
Sequoyah	Yes	DFIRM	Yes	Yes	Yes	Yes	714.84	8.62	4			
Stephens	Yes	DFIRM	Yes	No	Yes	Yes	891.85	16.54	7			
Texas	Yes	DFIRM	No	No	Yes	Yes	2,049.01	11.36				
Tillman	No	Unmapped	Yes	No	No	No	880.01	14.55	1			
Tulsa	Yes	DFIRM	Partial	Yes	Yes	Yes	586.87	62.25	243			

TABLE A.1: STATE PRIORITIZATION COMPUTATIONS (PRE- AND PHASE 1)

County Name	NFIP Participation	Mapping Status	LiDAR	Discovered	DFIRM	CNMS Database	Area (sq.mi.)	Risk Factor Rank	Repetitive Loss P	LiDAR Rank	FOA Rank	Discovery
Wagoner	Yes	DFIRM	Partial	Yes	Yes	Yes	590.94	13.00	38			
Washington	Yes	DFIRM	Yes	Yes	Yes	Yes	424.11	17.55	26			
Washita	Yes	DFIRM	Yes	No	Yes	Yes	1,009.13	15.08				
Woods	Yes	Paper	No	Yes	No	Yes	1,290.14	6.25		2	10	Upper Salt Fork Arkansas
Woodward	Yes	DFIRM	No	Yes	Yes	Yes	1,245.81	6.69	2			

TABLE A.2: CTP PROJECT INVENTORY

ID	Status	HUC 8 Name	Project Name	Project Length	Ranking	Cost
1	Under Study by USACE	Polecat-Snake	Updating the FIRM and FIS for Crow Creek, Tulsa County	1.84	69.75	\$ 35,000
2	Completed	Polecat-Snake	Updating the FIRM and FIS for Joe Creek, Tulsa County	12 7/8	69.75	\$ 322,000
3	Completed	Polecat-Snake	Updating the FIRM and FIS for Mooser Creek, Tulsa County	4.74	69.75	\$ 119,000
4	Study Available	Lower Verdigris	Updating the FIRM and FIS for Adams Creek, Tulsa and Wagoner Counties	63.67	50.08	\$ 795,875
	Study Available	Polecat-Snake	Updating the FIRM and FIS for Aspen Creek, Tulsa County	7.14	45.77	\$ 178,500
	Study Available	Polecat-Snake	Updating the FIRM and FIS for Elm Creek, Tulsa County	4.00	45.77	\$ 100,000
7	Completed	Polecat-Snake	Updating the FIRM and FIS for Broken Arrow Creek, Tulsa and Wagoner County	24.94	45.77	\$ 603,000
8	No Local Interest	Lower Verdigris	Updating the FIRM and FIS for Cat Creek and Dog Creek in Rogers County	35.41	45.62	\$ 886,000
		Polecat-Snake	Updating the FIRM and FIS for Harlow Creek, Bigheart Creek and West Bigheart Creek, Osage and Tulsa County	11.71	30.00	\$ 236,000
10	No Local Interest	Polecat-Snake	Updating the FIRM and FIS for Haikey Creek, City of Broken Arrow and Bixby	25.00	41.99	\$ 625,000
11	Under Study by Others	Polecat-Snake	Updating the FIRM and FIS for White Church Creek, Tulsa County	4.09	41.17	\$ 103,000
12		Lower Verdigris	Updating the FIRM and FIS for Inola Creek, Rogers County	64.39	38.24	\$1,610,000
13	Completed	Polecat-Snake	Updating the FIRM and FIS for Nickel Creek, Creek County	6.65	36.98	\$ 167,000
14		Polecat-Snake	Updating the FIRM and FIS for Wilmott Creek, Tulsa County	1.27	36.98	\$ 32,000
15	Completed	Polecat-Snake	Updating the FIRM and FIS for Red Fork Creek, Tulsa County	2/3	36.85	\$ 17,000
16		Polecat-Snake	Updating the FIRM and FIS for Coal Creek, Tulsa County	20.32	33.46	\$ 387,000
17		Middle North Canadian	Updating the FIRM and FIS for Campbell Creek, Canadian and Oklahoma Counties.	13.00	33.16	\$ 325,000
18		Middle North Canadian	Updating the FIRM and FIS for North Canadian River Tributary 14, Oklahoma County.	3.35	33.16	\$ 84,000
19		Middle North Canadian	Updating the FIRM and FIS for Mustang Creek, City of Mustang and Canadian County.	32.55	30.91	\$ 814,000
20		Lower Verdigris	Updating the FIRM and FIS for Commodore Creek-Verdigris River	35.76	30.08	\$ 895,000
2		Bird Creek	Updating the FIRM and FIS for Brookhollow Creek, City of Tulsa	11.05	29.38	\$ 264,000
22		Polecat-Snake	Updating the FIRM and FIS for Fry Creek, Tulsa County	5.54	29.82	\$ 106,000
23	Completed	Lower Verdigris	Updating the FIRM and FIS for Spunky Creek, Rogers, Tulsa and Wagoner Counties	21.56	29.77	\$ 539,000
1		Polecat-Snake	Updating the FIRM and FIS for Little Haikey Creek, City of Tulsa	18.05	41.99	\$ 364,000
		Bird Creek	Updating the FIRM and FIS for Dirty Butter Creek and Tributary, City of Tulsa	14.33	13.28	\$ 311,000
		Bird Creek	Updating the FIRM and FIS for Flat Rock Creek and Tributaries, City of Tulsa	28.41	13.28	\$ 510,000

TABLE A.2: CTP PROJECT INVENTORY

ID	Status	HUC 8 Name	Project Name	Project Length	Ranking	Cost
5		Bird Creek	Updating the FIRM and FIS for Cooley Creek, City of Tulsa	7.04	29.38	\$ 176,026
6		Bird Creek	Updating the FIRM and FIS for Mingo Creek, City of Tulsa	16.51	29.38	\$ 412,737
3		Bird Creek	Updating the FIRM and FIS for Audubon Creek, City of Tulsa	1.89	29.38	\$ 47,261
4		Bird Creek	Updating the FIRM and FIS for Tupelo Creek and Tributaries, City of Tulsa	4.93	29.38	\$ 123,198
31		Lower Verdigris	Updating the FIRM and FIS for Port of Dunkin-Verdigris River for Rogers County	14.45	29.12	\$ 361,243
32		Middle North Canadian	Updating the FIRM and FIS for Turtle Creek, Canadian County.	8.30	27.30	\$ 208,000
33		Polecat-Snake	Updating the FIRM and FIS for Bixby Creek, Tulsa County	1.00	27.29	\$ 10,000
34	Completed	Polecat-Snake	Updating the FIRM and FIS for Vensel Creek, Tulsa County	4.57	27.29	\$ 115,000
35		Lower Canadian-Walnut	Updating the FIRM and FIS for the Canadian River, Cleveland County.	58.37	27.13	\$1,361,000
36		Polecat-Snake	Updating the FIRM and FIS for Coweta Creek, Wagoner County	15.81	27.04	\$ 301,000
37		Polecat-Snake	Updating the FIRM and FIS for Haskell Creek, Muskogee County	7.46	27.04	\$ 142,000
38		Lower Verdigris	Updating the FIRM and FIS for Moss Creek-Verdigris River for Rogers County	44.66	26.11	\$1,117,000
39		Lower Canadian-Walnut	Updating the FIRM and FIS for Buggy Creek, Caddo Counties.	18.09	23.32	\$ 304,000
40	Completed	Middle North Canadian	Updating the FIRM and FIS for Fourmile Creek, Canadian County.	18 1/3	22.55	\$ 458,000
9		Lower Canadian-Walnut	Updating the FIRM and FIS for Ten Mile Flat Creek, City of Norman.	5.40	22.49	\$ 128,613
42		Middle North Canadian	Updating the FIRM and FIS for Shell Creek, Canadian County.	28.88	22.32	\$ 723,000
43		Lower Verdigris	Updating the FIRM and FIS for Salt Creek for Wagoner County	14.83	21.73	\$ 370,696
44		Lower Verdigris	Updating the FIRM and FIS for Fife Creek for Wagoner County	26.20	21.07	\$ 655,085
45		Lower Canadian-Walnut	Updating the FIRM and FIS for Pond Creek, City of Newcastle.	9.96	20.99	\$ 254,000
46		Lower Canadian-Walnut	Updating the FIRM and FIS for Merkle Creek, City of Norman.	3.85	20.60	\$ 88,000
10		Lower Canadian-Walnut	Updating the FIRM and FIS for Brookhaven Creek and Tributaries, City of Norman.	5.73	20.51	\$ 136,485
48		Lower Verdigris	Updating the FIRM and FIS for Lake Claremore Dam for Rogers County	59.20	19.85	\$1,480,050
49		Lower Canadian-Walnut	Updating the FIRM and FIS for Bishop Creek and Tributaries, City of Norman.	18.33	19.77	\$ 466,000
50		Lower Canadian-Walnut	Updating the FIRM and FIS for Unnamed Stream, City of Slaughterville. Project A	1.48	19.39	\$ 25,000
51		Lower Canadian-Walnut	Updating the FIRM and FIS for East Creek, City of Tuttle, Grady County.	17.81	18.14	\$ 299,000
52		Lower Canadian-Walnut	Updating the FIRM and FIS for the Canadian River Tributaries, Oklahoma City.	30.98	18.00	\$ 767,000

TABLE A.2: CTP PROJECT INVENTORY

ID	Status	HUC 8 Name	Project Name	Project Length	Ranking	Cost
53		Lower Canadian-Walnut	Updating the FIRM and FIS for the Canadian River, Blaine, Canadian, Caddo and Grady Counties.	108.98	17.98	\$1,831,000
54		Lower Canadian-Walnut	Updating the FIRM and FIS for Cow Creek, Oklahoma City.	29.58	17.54	\$ 725,000
55		Middle North Canadian	Updating the FIRM and FIS for Purcell Creek, Canadian County.	31.07	17.42	\$ 777,000
56		Lower Canadian-Walnut	Updating the FIRM and FIS for the Snake Creek, Grady County.	5.06	17.35	\$ 85,000
57		Lower Verdigris	Updating the FIRM and FIS for Four Mile Creek for Rogers County	47.26	17.30	\$1,182,000
58		Middle North Canadian	Updating the FIRM and FIS for Sixmile Creek and Tributary, El Reno and Canadian County.	45.95	17.22	\$ 982,000
59		Lower Canadian-Walnut	Updating the FIRM and FIS for Coal Creek, City of Tuttle, Grady County.	14.13	17.20	\$ 325,000
60		Lower Canadian-Walnut	Updating the FIRM and FIS for Walnut Creek, McClain and Grady Counties.	53.51	17.03	\$1,014,000
61		Lower Canadian-Walnut	Updating the FIRM and FIS for Walnut Creek, City of Purcell.	4.62	16.99	\$ 118,000
62		Lower Canadian-Walnut	Updating the FIRM and FIS for Buggy Creek, Grady County.	22.52	16.93	\$ 378,000
63		Lower Canadian-Walnut	Updating the FIRM and FIS for Worley Creek, City of Tuttle, Grady County.	12.10	16.59	\$ 308,000
64		Polecat-Snake	Updating the FIRM and FIS for Arkansas River, Muskogee County	4.62	16.53	\$ 116,000
65		Lower Canadian-Walnut	Updating the FIRM and FIS for Buggy Creek, Canadian County.	10.80	16.51	\$ 181,000
66		Middle North Canadian	Updating the FIRM and FIS for North Canadian River, Canadian, Oklahoma and Woodward County.	120.19	16.26	\$2,616,000
67		Lower Canadian-Walnut	Updating the FIRM and FIS for the Canadian River, McClain, Pottawatomie and Pontotoc Counties.	107.52	16.21	\$1,829,000
68		Middle North Canadian	Updating the FIRM and FIS for Laughlin Lake, Canadian County.	1.22	16.08	\$ 24,000
69		Lower Canadian-Walnut	Updating the FIRM and FIS for West Creek, City of Tuttle, Grady County.	8.91	15.93	\$ 150,000
70		Lower Canadian-Walnut	Modernize Hughes County.	105.49	15.85	\$1,772,000
71		Polecat-Snake	Updating the FIRM and FIS for Rock Creek, Tulsa County.	10.48	15.80	\$ 263,000
72		Lower Canadian-Walnut	Updating the FIRM and FIS for Unnamed Stream, City of Slaughterville. Project B	3.03	15.80	\$ 51,000
73		Bird Creek	Updating the FIRM and FIS for Horse Creek, City of Skiatook	1.12	15.41	\$ 27,974
74		Bird Creek	Updating the FIRM and FIS for Horsepen Creek, Tulsa and Osage Counties	1.87	15.41	\$ 46,714
75		Bird Creek	Updating the FIRM and FIS for Skiatook Lake, Osage County	131.09	15.41	\$3,277,229
76		Lower Canadian-Walnut	Updating the FIRM and FIS for Little Sandy Creek, City of Ada, Pontotoc County.	13.21	15.37	\$ 247,000
77		Lower Canadian-Walnut	Updating the FIRM and FIS for Belle Creek, City of Noble.	4.52	14.45	\$ 89,000
78		Polecat-Snake	Updating the FIRM and FIS for Crow Creek, Tulsa County	1.84	14.29	\$ 35,000

TABLE A.2: CTP PROJECT INVENTORY

ID	Status	HUC 8 Name	Project Name	Project Length	Ranking	Cost
79		Lower Canadian-Walnut	Updating the FIRM and FIS for Imhoff Creek, City of Norman.	4.07	14.00	\$ 104,000
80		Lower Canadian-Walnut	Updating the FIRM and FIS for Dripping Springs Creek, City of Slaughterville.	9.75	13.78	\$ 202,000
7		Bird Creek	Updating the FIRM and FIS for Jones Creek, City of Tulsa	3.30	29.38	\$ 82,541
8		Bird Creek	Updating the FIRM and FIS for Mill Creek, City of Tulsa	3.30	29.38	\$ 82,541
83		Lower Canadian-Walnut	Updating the FIRM and FIS for Chouteau Creek (North of Lexington), City of Slaughterville.	22.25	12.21	\$ 432,000
84		Middle North Canadian	Updating the FIRM and FIS for City of Woodward, Woodward County.	22.35	12.15	\$ 528,000
85		Polecat-Snake	Updating the FIRM and FIS for Polecat Creek, Creek and Tulsa County	17.07	11.58	\$ 427,000
86		Lower Verdigris	Updating the FIRM and FIS for East Coal for Wagoner County	21.39	11.07	\$ 534,798
87		Middle North Canadian	Updating the FIRM and FIS for City of Watonga, Blain County.	5.99	10.34	\$ 114,000
88		Lower Canadian-Walnut	Updating the FIRM and FIS for West Willow Creek, City of Slaughterville.	15.75	9.63	\$ 265,000
89		Polecat-Snake	Updating the FIRM and FIS for Childres Creek, Creek County	11.20	9.46	\$ 213,000
	Completed	Bird Creek	Updating the FIRM and FIS for Coal Creek, City of Tulsa	6.72	8.39	\$ 167,881
91		Bird Creek	Updating the FIRM and FIS for Ator Tributary, City of Owasso	0.40	8.39	\$ 9,998
92		Bird Creek	Updating the FIRM and FIS for Bird Creek and Tributary 5A, City of Owasso	6.43	8.39	\$ 160,685
93		Bird Creek	Updating the FIRM and FIS for Ranch Creek, City of Owasso	24.11	8.39	\$ 602,757
94		Polecat-Snake	Updating the FIRM and FIS for Snake Creek, Tulsa County	15.65	7.34	\$ 392,000
95		Middle North Canadian	Modernize unmapped segments of North Canadian River, Blain, Dewey and Major County.	84.55	6.08	\$1,607,000
96		Bird Creek	Updating the FIRM and FIS for Bird Creek, City of Skiatook	30.00	4.26	\$ 749,984
97	Completed	Polecat-Snake	Updating the FIRM and FIS for Hager Creek, Tulsa County	4.02	4.02	\$ 77,000
98		Middle North Canadian	Updating the FIRM and FIS for South Persimmon Creek, Woodward County.	9.95	3.87	\$ 190,000
99		Bird Creek	Updating the FIRM and FIS for Elm Creek, City of Owasso	11.95	3.57	\$ 298,641
		Bird Creek	Updating the FIRM and FIS for Bird Creek, Rogers County	10.92	3.57	\$ 272,922
101		Middle North Canadian	Updating the FIRM and FIS for Indian Creek, Woodward County.	21.44	3.26	\$ 408,000
102		Middle North Canadian	Updating the FIRM and FIS for Persimmon Creek, Woodward County.	45.05	1.66	\$ 856,000
103		Bird Creek	Updating the FIRM and FIS for Hominy Creek, Osage County	36.80	0.57	\$ 919,921
104		Bird Creek	Updating the FIRM and FIS for Claremore Creek, Osage County	4.32	0.46	\$ 108,000
105		Bird Creek	Updating the FIRM and FIS for Penn Creek and Unmapped Tributary, City of Hominy	2.96	0.46	\$ 73,918

Appendix B Commitment Letters



ENGINEERING SERVICES DEPARTMENT

December 15, 2014

Mr. Ron Wanhanen
DHS/FEMA, REGION VI
800 N. Loop 288
Denton TX 76209

**RE: COOPERATING TECHNICAL PARTNER
FY2016 CTP FUNDING REQUIREMENTS
PLANNING APPLICATION GRANT**

Dear Mr. Wanhanen,

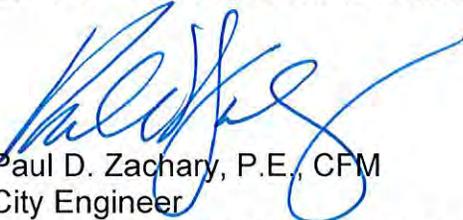
The City of Tulsa would like to participate in the Cooperating Technical Partner Program referenced above. The City of Tulsa, Engineering Services has identified local matching funds in the amount of \$375,000.00. However grant funding applications require Mayoral approval.

Engineering Services is committed to processing an application when FEMA is ready to move forward with this project. It is anticipated that this funding will not be required before July 1, 2015.

The City of Tulsa is excited to participate in this program and appreciates the assistance of you and your staff in this regard.

Sincerely,

CITY OF TULSA, ENGINEERING SERVICES DEPARTMENT



Paul D. Zachary, P.E., CFM
City Engineer
Engineering Services Department

cc. Henry Som de Cerff
Matt Liechti
Bill Robison
Deborah Stowers



The City of
NORMAN

201 West Gray, Bldg. A · P.O. Box 370
Norman, Oklahoma 73069 · 73070

January 2, 2014

Mr. Ron Wanhanen
DHS/FEMA Region VI
800 N. Loop 288
Denton, TX 76209

RE: Cooperating Technical Partner
FY2016 CTP Funding Requirements
Planning Application Grant

Dear Mr. Wanhanen:

The City of Norman would like to participate in the Cooperating Technical Partner Program referenced above. The City of Norman has identified local matching funds in the amount of \$100,000 for the flood studies of 10 Mile Flat Creek and Brookhaven Creek.

The City of Norman is committed to processing an application when FEMA is ready to move forward with these projects. It is anticipated that the City's portion of this funding will not be required until October 1, 2015.

The City of Norman is excited to participate in this program and appreciates the assistance of you and your staff.

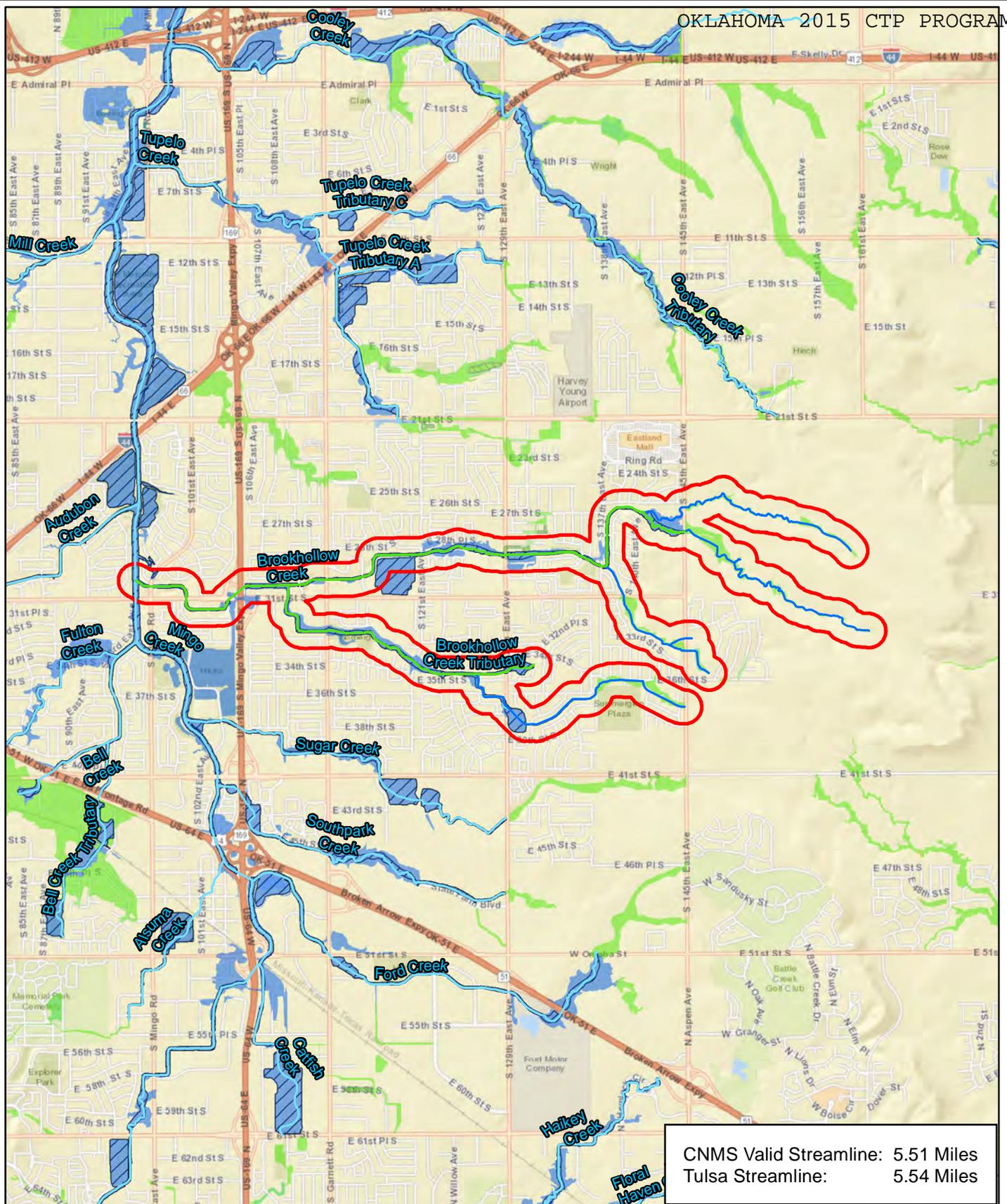
If you need further information, please contact me at 405-307-7118.

Sincerely,

Shawn O'Leary, P.E., CFM
Director of Public Works/Floodplain Administrator
City of Norman, Oklahoma
201 W. Gray St., Bldg. A
Norman, OK 73069

cc: Steve Lewis, City Manager
Scott Sturtz, City Engineer
Todd McLellan, Development Engineer
Ana Stagg, Meshek & Associates, PLC

Appendix C Phase 2 Studies

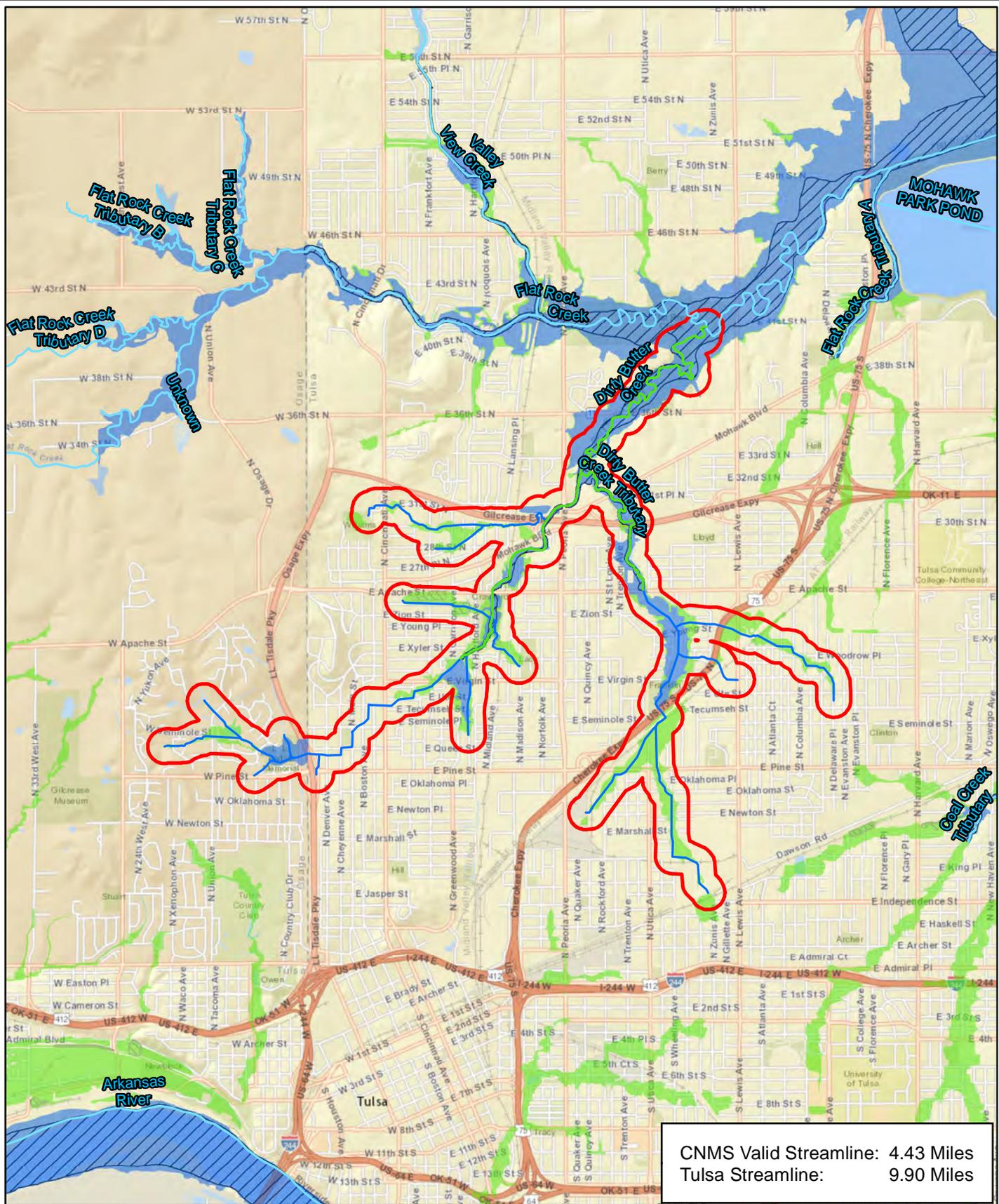


Project Area: Brookhollow Creek
Updating the FIRM and FIS for Brookhollow Creek, City of Tulsa



CNMS Valid Streamline	Tulsa DFIRM Floodway	Tulsa Regulatory Floodplain
Tulsa Streamline	Floodway Boundary	Shallow Flooding (100yr)
Recommended Project	Zone AE; Zone AO	Regulatory Floodplain (100yr)
	Zone A	





CNMS Valid Streamline: 4.43 Miles
 Tulsa Streamline: 9.90 Miles

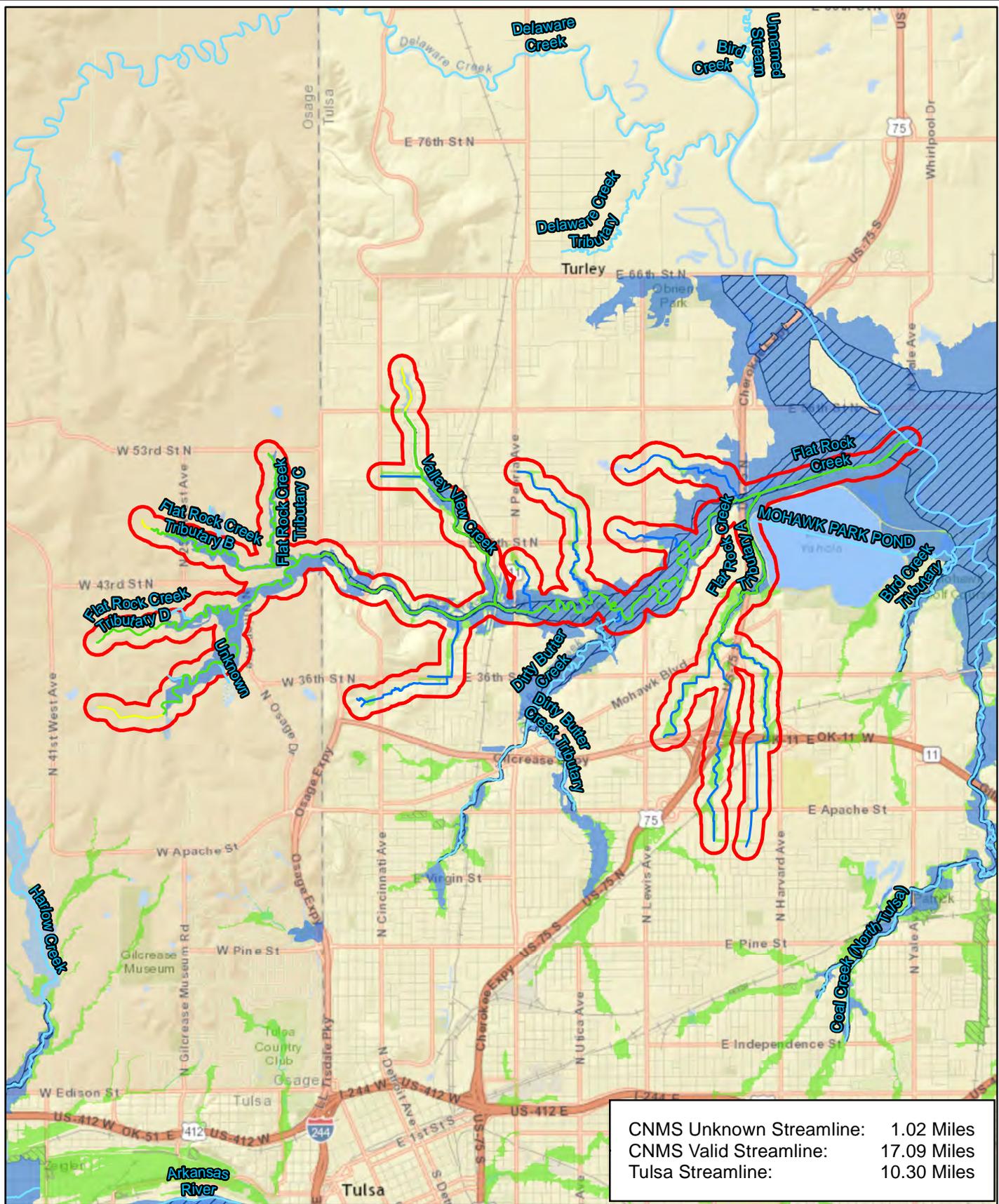
Project Area: Dirty Butter Creek

Updating the FIRM and FIS for Dirty Butter Creek, City of Tulsa

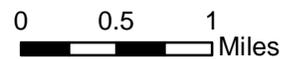


CNMS Valid Streamline	Tulsa DFIRM Floodway	Tulsa Regulatory Floodplain
Tulsa Streamline	Floodway Boundary	Shallow Flooding (100yr)
Recommended Project	Zone AE; Zone AO	Regulatory Floodplain (100yr)
	Zone A	



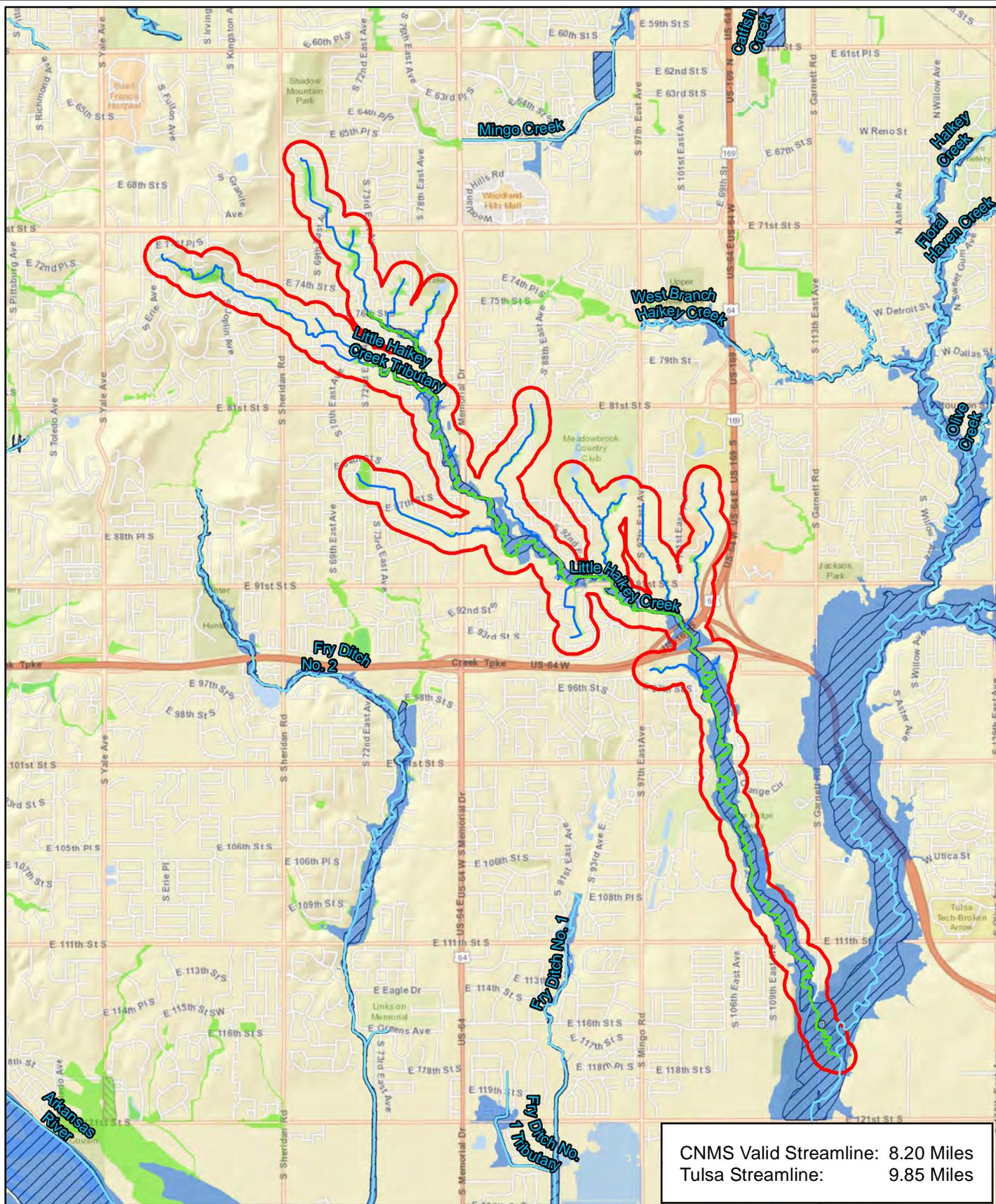


Project Area: Flat Rock Creek
Updating the FIRM and FIS for Flat Rock Creek, City of Tulsa

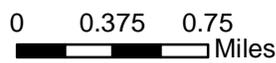


CNMS Unknown Streamline	Tulsa DFIRM Floodway	Tulsa Regulatory Floodplain
CNMS Valid Streamline	Floodway Boundary	Shallow Flooding (100yr)
Tulsa Streamline	Zone AE; Zone AO	Regulatory Floodplain (100yr)
Recommended Project	Zone A	



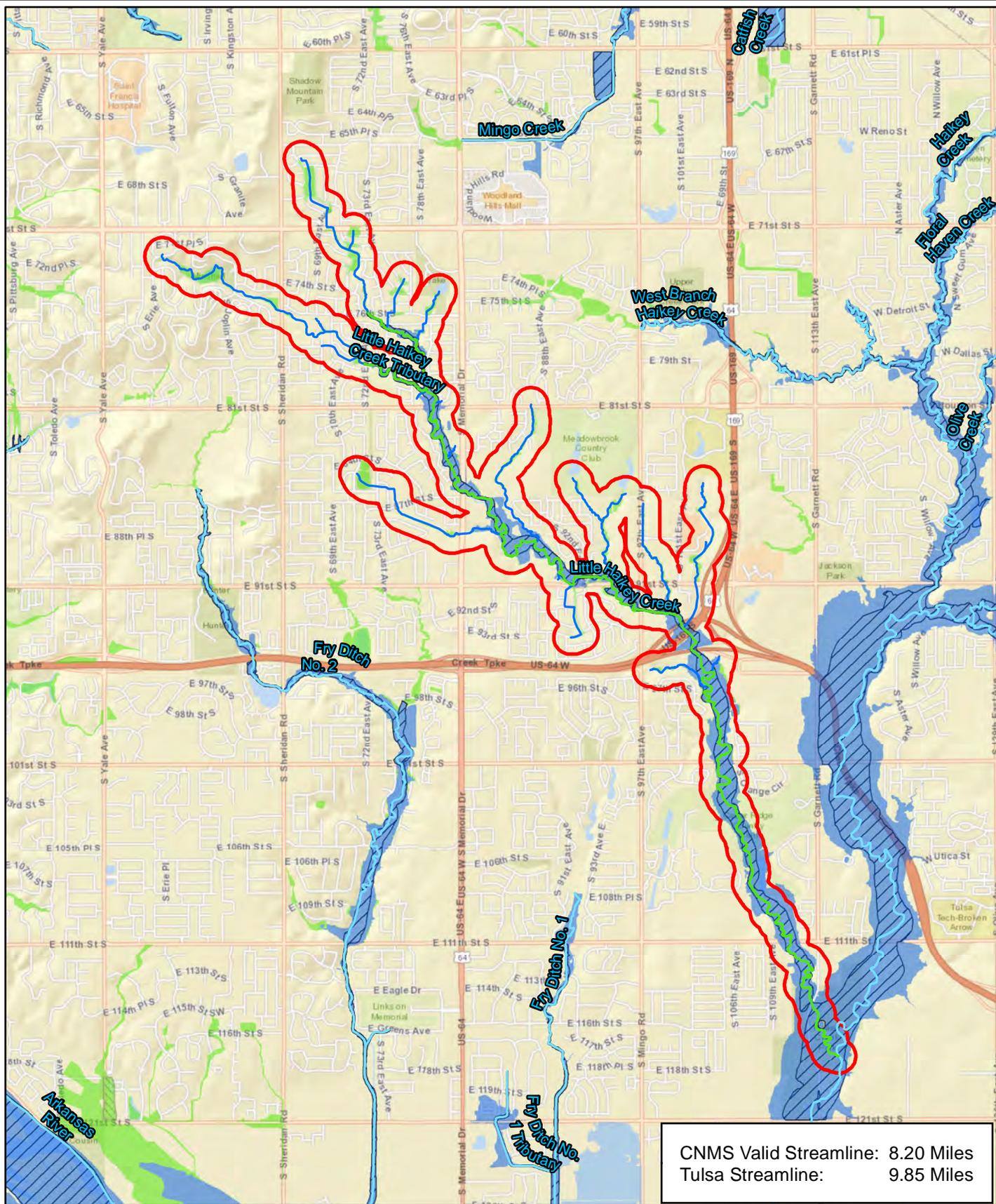


Project Area: Little Haikay Creek
Updating the FIRM and FIS for Little Haikay Creek, City of Tulsa



CNMS Valid Streamline	Tulsa DFIRM Floodway	Tulsa Regulatory Floodplain
Tulsa Streamline	Floodway Boundary	Shallow Flooding (100yr)
Recommended Project	Zone AE; Zone AO	Regulatory Floodplain (100yr)
	Zone A	





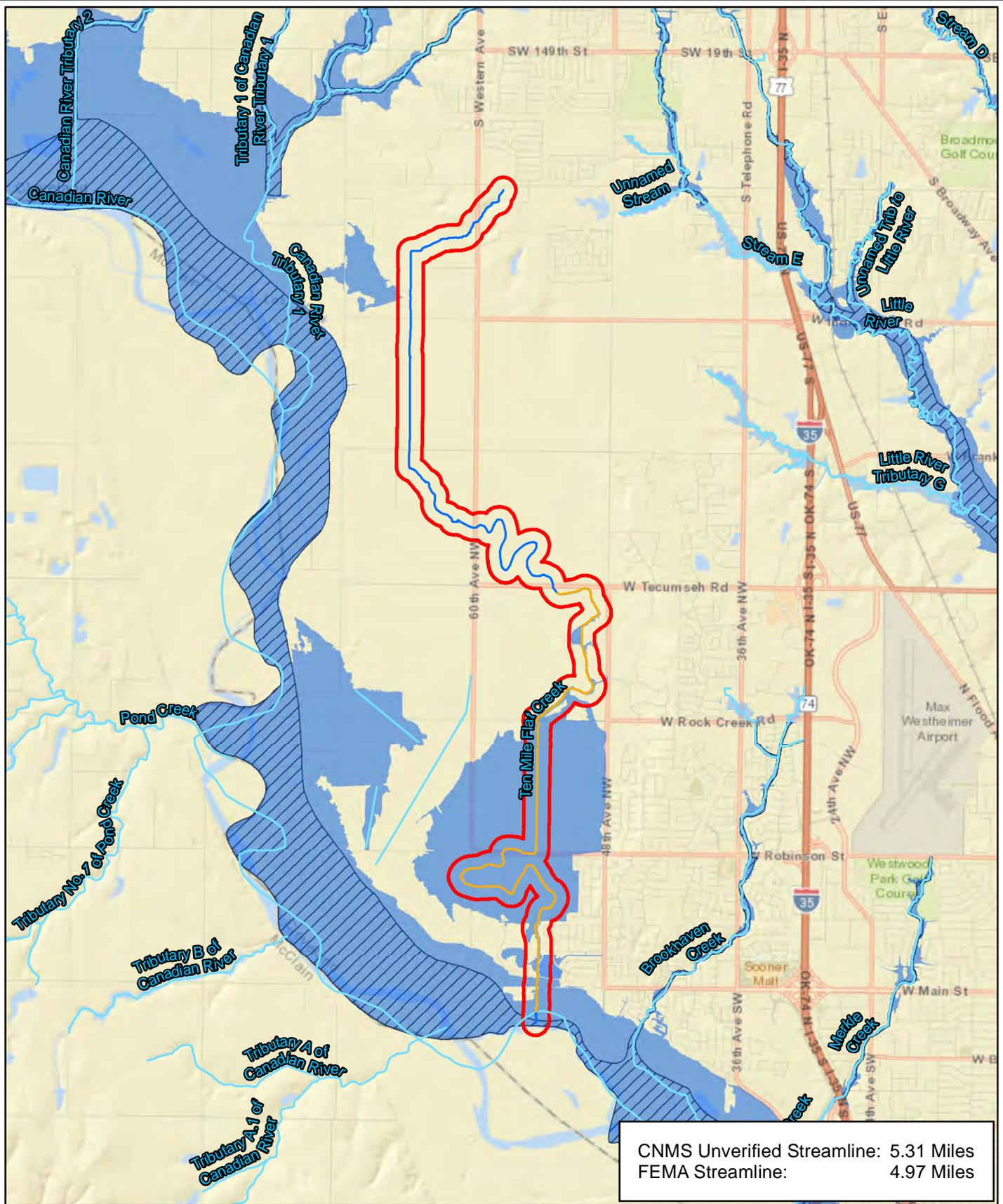
CNMS Valid Streamline: 8.20 Miles
 Tulsa Streamline: 9.85 Miles

Project Area: Little Haikay Creek
Updating the FIRM and FIS for Little Haikay Creek, City of Tulsa



CNMS Valid Streamline	Tulsa DFIRM Floodway	Tulsa Regulatory Floodplain
Tulsa Streamline	Floodway Boundary	Shallow Flooding (100yr)
Recommended Project	Zone AE; Zone AO	Regulatory Floodplain (100yr)
	Zone A	



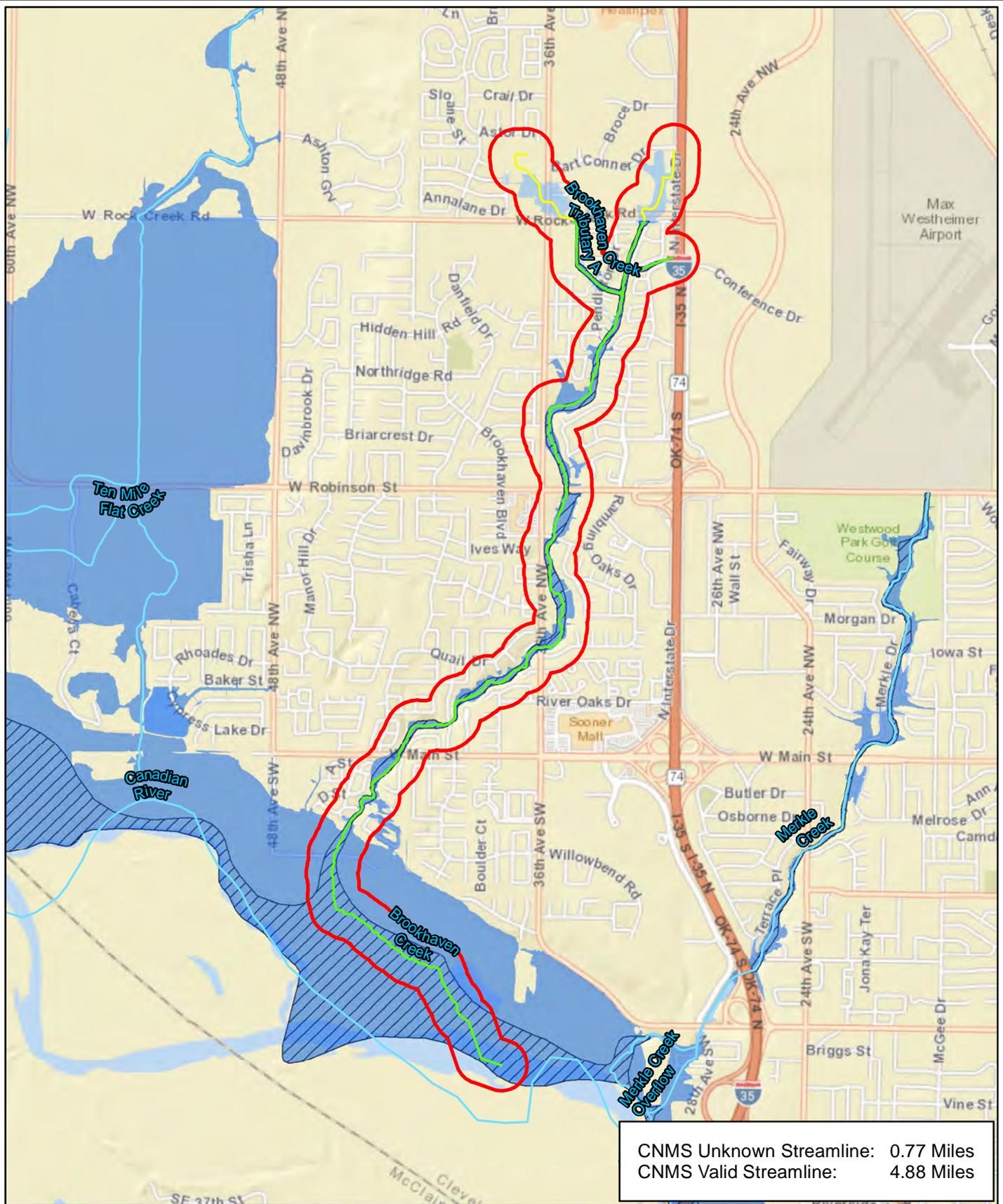


CNMS Unverified Streamline: 5.31 Miles
 FEMA Streamline: 4.97 Miles

Project Area: Ten Mile Flat Creek
Updating the FIRM and FIS for Ten Mile Flat Creek, City of Norman



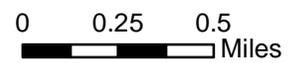
CNMS Unverified Streamline	Cleveland DFIRM Floodway
FEMA Streamline	Zone AE; Zone AO
Recommended Project	Zone A



CNMS Unknown Streamline: 0.77 Miles
 CNMS Valid Streamline: 4.88 Miles

Project Area: Brookhaven Creek

Updating the FIRM and FIS for Brookhaven Creek, City of Norman



CNMS Unknown Streamline	Cleveland DFIRM Floodway
CNMS Valid Streamline	Zone AE; Zone AO
Recommended Project	Zone A



Prepared by:



Meshek & Associates, PLC
1437 South Boulder Avenue, Suite 1550
Tulsa, Oklahoma 74119
918.392.5620

Prepared for:



Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, Oklahoma 73118
405.530.8800