USDA United States Department of Agriculture

Supplemental Watershed Plan No. 2 and Environmental Assessment

for

The Rehabilitation of Floodwater Retarding Structure No. 12

Little Wewoka-Graves Creek Watershed

Hughes County, Oklahoma

APPENDICES

July 2025

Oklahoma Natural Resources Conservation Service

nrcs.usda.gov

Prepared by

USDA Natural Resources Conservation Service

IN COOPERATION WITH

Hughes County Conservation District

APPENDIX A
COMMENTS AND RESPONSES

Cultural Resources

Oklahoma Archeological Survey
THE UNIVERSITY OF OKLAHOMA

April 18, 2024

Natural Resources Conservation Service
Attn: K. C. Kraft
Archaeologist
100 USDA, Suite 206
Stillwater, OK 74074-2655

Re: OAS FY24-1508 *Archaeological Resources Survey Report: Little Wewoka Site 12 Dam Rehab.*
Report by Candace Parker & Amanda Temple (Stantec).
Legal Description: Section 32-33, T8N, R10E; Section 5, T7N, R10E, Hughes County, Oklahoma.

Dear Dr. Kraft,

This agency received the above-referenced cultural resources report in association with the proposed Little Wewoka Site 12 project in Hughes County for review and comment. From the information provided, we understand that Stantec staff surveyed the 106-acre project Area of Potential Effects (APE) on July 31-August 4, 2023. No archaeological sites or other historic resources were located within the APE. NRCS recommends a finding of *No Adverse Effect* for the undertaking.

I concur with the findings and recommendations as they pertain to precontact archaeological resources and defer opinion on the overall project effects to the Oklahoma State Historic Preservation Office.

This review has been conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society. You must also have a letter from that office to document your consultation pursuant to Section 106 of the National Historic Preservation Act.

Sincerely,

Kary L. Stackelbeck, Ph.D.
State Archaeologist

cc: SHPO

Oklahoma Historical Society
State Historic Preservation Office

March 28, 2024

Dr. K.C. Kraft, PhD, RPA
USDA NRCS
100 USDA, Suite 206
Stillwater, OK 74074

RE: File #1279-24 [Previous File #1104-23]; NRCS Proposed Rehabilitation of Little Wewoka Watershed Site #12, Hughes County (Properties Listed on Attachment to this Letter)

Dear Dr. Kraft:

We have received and reviewed the documentation submitted on the referenced project in Hughes County. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no known historic properties affected within the referenced project's area of potential effect.

In addition to our review, you must contact the Oklahoma Archeological Survey (OAS), 111 East Chesapeake, #102, Norman OK 73019-5111 (#405-325-7211, FAX #405-325-7604), to obtain a determination about the presence of prehistoric resources that may be eligible for the National Register of Historic Places. Should the OAS conclude that there are no prehistoric archaeological sites or other types of "historic properties," as defined in 36 CFR Part 800.16(l), which are eligible for inclusion in the National Register of Historic Places within the project area and that such sites are unlikely to occur, we concur with that opinion.

The OAS may conclude that an additional on-site investigation of all or part of the project impact area is necessary to determine the presence of archaeological resources. In the event that such an investigation reveals the presence of prehistoric archaeological sites, we will defer to the judgment of the OAS concerning whether or not any of the resources should be considered "historic properties" under the Section 106 review process. If sites dating from the historic period are identified during the survey or are encountered during implementation of the project, additional assessments by the SHPO will be necessary.

Please note that this project is located within the reservation boundaries of the Muscogee Nation and is therefore on tribal lands as defined in the National Historic Preservation Act (NHPA) and the Section 106 regulations (36 CFR Part 800).

Should further correspondence pertaining to this project be necessary, please reference the above underlined file number. If you have any questions, please contact Kristina Wyckoff, Historical Archaeologist, at 405-521-6381. Thank you.

RE: File #1279-24; NRCS Proposed Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma (Properties Listed on Attachment to this Letter)

Sincerely,

Lynda Ozan
Deputy State Historic
Preservation Officer

LO:pm

Attachment

cc: Mr. Turner Hunt, Muscogee Nation

FILE # LIST OF PROPERTIES

1279-24 NRCS PROPOSED LITTLE WEWOKA WATERSHED SITE #12 PROJECT, WETUMKA VICINITY, HUGHES COUNTY

I. APE FOR LITTLE WEWOKA WATERSHED SITE #12, SEC5 T7N R10E, SECS 32,33 T8N R10E, ON AN UNNAMED TRIBUTARY TO GRAVES CREEK

1. STRUCTURE #1A DAM & RESERVOIR, NORTH SIDE OF EW-131, SECS 32,33 T8N R10E

2. STRUCTURE #1B AUXILLIARY SPILLWAY, NORTH SIDE OF EW-131, SEC32 T8N R10E

3. OBJECT #1C PLAQUE, NORTH SIDE OF EW-131, SEC32 T8N R10E

4. STRUCTURE #2 STOCK POND, NORTH SIDE OF EW-131, SEC33 T8N R10E

Kraft, KC - FPAC-NRCS, OK

From: Jonathan Rohrer <noreply@jotform.com>
Sent: Tuesday, March 14, 2023 3:28 PM
To: Kraft, KC - FPAC-NRCS, OK
Subject: [External Email]Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, OK
-

THPO
~~OAS/SHPO~~
Concurrence

K.C.

Thank you for your request for consultation, received on 03-13-2023. The Caddo Nation appreciates your willingness to conduct proper consultation, pursuant to Section 106 of the National Historic Preservation Act.

Upon review of the project and location I have determined that it does not affect known cultural, traditional or sacred sites of interest to the Caddo Nation. As such, the Caddo Nation has no objection to the project at this time. However, in the event that an inadvertent discovery of potentially relevant cultural sites, funerary objects, or human remains occurs, we request that the project be immediately halted and the proper authorities be contacted. Additionally, The Caddo Nation would need to be notified of an inadvertent discovery with 24 hours.

Should you have any question or concerns regarding this response please feel free to contact our office.

Best regards,

Jonathan

Jonathan M. Rohrer
Tribal Historic Preservation Officer

Caddo Nation
P.O. Box 487
Binger, OK 73009
t: (405)656-0970 Ext. 2070
e: jrohrer@mycaddonation.com

www.mycaddonation.com

From: Billie Burtrum
To: Kraft, KC - FPAC-NRCS, OK
Subject: [External Email]Rehabilitation of Little Wewoka Watershed Site #12
Date: Tuesday, March 19, 2024 3:01:34 PM

Dear Mr. Kraft,

The Quapaw Nation Historic Preservation Program (QNHPP) has received and reviewed the information you have provided. Based upon the information you provided we believe that the Rehabilitation of Little Wewoka Watershed Site #12 in Hughes County AR will have no effect on known properties of cultural or sacred significance to the Quapaw Nation.

In accordance with the National Historic Preservation Act, (NHPA) [16 U.S C. 470 §§ 470-470w-6] 1966, undertakings subject to the review process are referred to in S101 (d) (6) (A), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Quapaw Nation has vital interests in protecting its historic and ancestral cultural resources. We do not anticipate that this project will adversely impact any cultural resources or human remains protected under the NHPA, NEPA, or the Native American Graves Protection and Repatriation Act. If, however, artifacts or human remains are discovered during project construction, we ask that work cease immediately and that you contact the Quapaw Nation Historic Preservation Office.

Should you have any questions or need any additional information, please feel free to contact Billie Burtrum at bburtrum@quapawnation.com please copy section106@quapawnation.com to ensure additional information requests are reviewed in a timely manner. Thank you for consulting with the Quapaw Nation on this matter.

Sincerely,

-Billie Burtrum
Preservation Officer/ QNHPP Director
Quapaw Nation
P.O. Box 765
Quapaw, OK 74363
(w) 918-238-3100
(f) 918-674-2456

Billie Burtrum
Preservation Officer/QHPP Director
Quapaw Nation
PO Box 765
Quapaw OK 74363
918-238-3100 ext 6023

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

March 20, 2024

Ian Thompson, PhD, RPA
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma
PO Drawer 1210
Durant, Oklahoma 74702-1210

Re: Natural Resources Conservation Service, Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Dr. Thompson,

This letter initiates Section 106 consultation per 36CFR800.2(c)(2) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure (dam), Little Wewoka Watershed, Site #12. Rehabilitation can include simply replacing the concrete principal spillway pipe and armoring the auxiliary spillway of the dam, concreting a portion of the dam and infilling the auxiliary spillway, or decommissioning by cutting a notch in the dam to allow floodwater to freely flow downstream. Although not a rehabilitation measure, the Oklahoma Conservation Commission (OCC)—perpetual easement holder—may choose to abandon the dam, the result being an eventual failure and breach.

The APE for Little Wewoka Watershed, Site #12 is in portions of sections 32 and 33, Township 8 North, Range 10 East, IM and Section 5, Township 7 North, Range 10 East, IM on an unnamed tributary of Graves Creek. A Section 106 report for the APE using 30-meter interval transects as well as 30-meter intervals for shovel testing was produced. This survey strategy, and definition of the APE were proposed in our initial consultation letter of March 8, 2023 and concurred with by the State Historic Preservation Officer on March 24, 2023. The survey and report were executed by Stantec Consulting Service. Also included with this correspondence is a separate architectural resource survey report for Little Wewoka Watershed, Site #12 and accoutrements, within the defined APE. The survey and report were executed by Stantec Consulting Service also.

No archaeological resources were observed in the APE during the pedestrian survey and subsurface probing. On the other hand, the architectural survey did record Little Wewoka Watershed, Site #12 as

an historic-age (45 years of age or older) resource. Little Wewoka Watershed, Site #12 was evaluated for its historic significance (36CFR800.4(c)) as part of the architectural survey. Applying National Register criteria to Little Wewoka Watershed, Site 12, association with significant events is nominal—1 dam out of 2,104 in Oklahoma (Criterion A), Little Wewoka Watershed, Site 12 was not designed by a significant person—cadre of engineers (Criterion B), Little Wewoka Watershed, Site 12 does not represent distinctive characteristics—standard design drawings using standard construction materials and equipment (Criterion C), and Little Wewoka Watershed, Site 12 is unlikely to yield information important to history—based on the above narrative (Criterion D).

Therefore, NRCS has determined that Little Wewoka Watershed, Site #12, does not meet National Register of Historic Places-eligibility under criteria A, B, C, or D (36 CFR 63.2(a), 36 CFR 60.4, GM 420 Part 601.23(B)(1), National Register Bulletin 15) . NRCS has also determined that the undertaking, structural rehabilitation, is not an adverse effect (36CFR800.4(d)(1)). The no adverse effect determination also incorporated an indirect effects assessment (including the "viewshed" as articulated by the historic preservation community). To that end, there are no recorded archaeological sites, NRHP-eligible properties, or no New Deal related bridges or road segments identified within a 5-mile radius of the undertaking, other than Little Wewoka Watershed, Site 12. Any form of structural rehabilitation of Little Wewoka Watershed, Site 12 will not change the existing agricultural (cultural) landscape as it currently exists (36 CFR 800.16(d), National Register Bulletin 18). As for reasonably foreseeable effects, such as an unplanned breach of the dam, there is one General Land Office-plotted structure along Graves Creek (non-extant), but it is on a hilltop. If the abandonment alternative is selected by OCC, NRCS determined that further consultation would be warranted.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (2)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

March 20, 2024

Turner Hunt
Tribal Historic Preservation Officer
Historic and Cultural Preservation Department
Muscogee (Creek) Nation
Post Office Box 580
Okmulgee, OK 74447

Re: Natural Resources Conservation Service, Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Mr. Hunt,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(2) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure (dam), Little Wewoka Watershed, Site #12. Rehabilitation can include simply replacing the concrete principal spillway pipe and armoring the auxiliary spillway of the dam, concreting a portion of the dam and infilling the auxiliary spillway, or decommissioning by cutting a notch in the dam to allow floodwater to freely flow downstream. Although not a rehabilitation measure, the Oklahoma Conservation Commission (OCC)—perpetual easement holder—may choose to abandon the dam, the result being an eventual failure and breach.

The APE for Little Wewoka Watershed, Site #12 is in portions of sections 32 and 33, Township 8 North, Range 10 East, IM and Section 5, Township 7 North, Range 10 East, IM on an unnamed tributary of Graves Creek. A Section 106 report for the APE using 30-meter interval transects as well as 30-meter intervals for shovel testing was produced. This survey strategy, and definition of the APE were proposed in our initial consultation letter of March 8, 2023 and concurred with by the State Historic Preservation Officer on March 24, 2023. The survey and report were executed by Stantec Consulting Service. Also included with this correspondence is a separate architectural resource survey report for Little Wewoka Watershed, Site #12 and accoutrements, within the defined APE. The survey and report were executed by Stantec Consulting Service also.

No archaeological resources were observed in the APE during the pedestrian survey and subsurface probing. On the other hand, the architectural survey did record Little Wewoka Watershed, Site #12 as an historic-age (45 years of age or older) resource. Little Wewoka Watershed, Site #12 was evaluated for its historic significance (36CFR800.4(c)) as part of the architectural survey. Applying National Register criteria to Little Wewoka Watershed, Site 12, association with significant events is nominal—1 dam out of 2,104 in Oklahoma (Criterion A), Little Wewoka Watershed, Site 12 was not designed by a significant person—cadre of engineers (Criterion B), Little Wewoka Watershed, Site 12 does not represent distinctive characteristics—standard design drawings using standard construction materials and equipment (Criterion C), and Little Wewoka Watershed, Site 12 is unlikely to yield information important to history—based on the above narrative (Criterion D).

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Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (2)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

March 19, 2024

Kary Stackelbeck
Oklahoma State Archaeologist
Oklahoma Archaeological Survey
111 East Chesapeake, Building 134
University of Oklahoma
Norman, OK 73019

Re: File #1104-23; NRCS Rehabilitation of Little Wewoka Watershed, Site #12, Hughes County

Dear Dr. Stackelbeck,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure (dam), Little Wewoka Watershed, Site #12. Rehabilitation can include simply replacing the concrete principal spillway pipe and armoring the auxiliary spillway of the dam, concreting a portion of the dam and infilling the auxiliary spillway, or decommissioning by cutting a notch in the dam to allow floodwater to freely flow downstream. Although not a rehabilitation measure, the Oklahoma Conservation Commission (OCC)—perpetual easement holder—may choose to abandon the dam, the result being an eventual failure and breach.

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K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (2)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

March 20, 2024

Andrea A. Hunter, Ph.D.
Tribal Historic Preservation Officer
Osage Nation
Historic Preservation Office
627 Grandview
Pawhuska, OK 74056

Re: Natural Resources Conservation Service, Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Dr. Hunter,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(2) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure (dam), Little Wewoka Watershed, Site #12. Rehabilitation can include simply replacing the concrete principal spillway pipe and armoring the auxiliary spillway of the dam, concreting a portion of the dam and infilling the auxiliary spillway, or decommissioning by cutting a notch in the dam to allow floodwater to freely flow downstream. Although not a rehabilitation measure, the Oklahoma Conservation Commission (OCC)—perpetual easement holder—may choose to abandon the dam, the result being an eventual failure and breach.

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Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (2)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

Submitting Agency Name and Contact Information **US Department of Agriculture—Natural Resources Conservation Service (USDA, NRCS)** **K.C. KRAFT, 100 USDA, Suite 206, Stillwater, OK 74074**	Project Name: **Natural Resources Conservation Service, Rehabilitation of Little Wewoka Watershed Site #12**
	Project Address: **8 miles east of Holdenville** Project County and State: **Hughes County, Oklahoma** Project Coordinates: **Latitude 35° 07'35.69"N,** **Longitude 96°15'59.33"W**
Project Description **Floodwater Control Dam Rehabilitation**	Agency Information **USDA, NRCS**

	Included	In Progress	Notes
Amount of Ground Disturbance: depth and area	**YES**		**Reworking an existing earthen structure**
Distance to nearest archeological and architectural sites	**5+ miles (or 0.25)**		**(or, Government Land Office-mapped structure--hilltop)**
Has a Cultural Resource, Archeological or Environmental Survey been conducted? If yes please include	**YES**		**Attached**
Maps: APE, County, State maps should be clear and detailed	**YES**		**Attached—within report**
Relevant pictures supporting document	**YES**		**Attached—within report**
Have any SHPO/THPO comments been received? IF yes please Include		**In progress**	

All correspondence should be addressed to QNHPP Director, emails should be sent to section106@quapwnation.com

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

March 19, 2024

Quapaw Nation Historic Preservation Program, Director
Quapaw Nation Historic Preservation Program Office
Quapaw Nation
PO Box 765
Quapaw, Oklahoma 74363-0765

Re: Natural Resources Conservation Service, Rehabilitation of Little Wewoka Watershed Site #12, Eight Miles East of Holdenville, Hughes County, Oklahoma

Dear Quapaw Nation Historic Preservation Program Director,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(2) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure (dam), Little Wewoka Watershed, Site #12. Rehabilitation can include simply replacing the concrete principal spillway pipe and armoring the auxiliary spillway of the dam, concreting a portion of the dam and infilling the auxiliary spillway, or decommissioning by cutting a notch in the dam to allow floodwater to freely flow downstream. Although not a rehabilitation measure, the Oklahoma Conservation Commission (OCC)—perpetual easement holder—may choose to abandon the dam, the result being an eventual failure and breach.

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Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (2)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

March 19, 2024

Ms. Lynda Ozan
Deputy State Historic Preservation Officer
Oklahoma State Historic Preservation Office
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105-7917

Re: File #1104-23; NRCS Rehabilitation of Little Wewoka Watershed, Site #12, Hughes County

Dear Ms. Ozan,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure (dam), Little Wewoka Watershed, Site #12. Rehabilitation can include simply replacing the concrete principal spillway pipe and armoring the auxiliary spillway of the dam, concreting a portion of the dam and infilling the auxiliary spillway, or decommissioning by cutting a notch in the dam to allow floodwater to freely flow downstream. Although not a rehabilitation measure, the Oklahoma Conservation Commission (OCC)—perpetual easement holder—may choose to abandon the dam, the result being an eventual failure and breach.

The APE for Little Wewoka Watershed, Site #12 is in portions of sections 32 and 33, Township 8 North, Range 10 East, IM and Section 5, Township 7 North, Range 10 East, IM on an unnamed tributary of Graves Creek. A Section 106 report for the APE using 30-meter interval transects as well as 30-meter intervals for shovel testing was produced. This survey strategy, and definition of the APE were proposed in our initial consultation letter of March 8, 2023 and concurred with on March 24, 2023. The survey and report were executed by Stantec Consulting Service. Also included with this correspondence is a separate architectural resource survey report for Little Wewoka Watershed, Site #12 and accoutrements, within the defined APE. The survey and report were executed by Stantec Consulting Service also.

No archaeological resources were observed in the APE during the pedestrian survey and subsurface probing. On the other hand, the architectural survey did record Little Wewoka Watershed, Site #12 as an historic-age (45 years of age or older) resource. Little Wewoka Watershed, Site #12 was evaluated for its historic significance (36CFR800.4(c)) as part of the architectural survey. Applying National Register criteria to Little Wewoka Watershed, Site 12, association with significant events is nominal—1 dam out of 2,104 in Oklahoma (Criterion A), Little Wewoka Watershed, Site 12 was not designed by a significant person—cadre of engineers (Criterion B), Little Wewoka Watershed, Site 12 does not represent distinctive characteristics—standard design drawings using standard construction materials and equipment (Criterion C), and Little Wewoka Watershed, Site 12 is unlikely to yield information important to history—based on the above narrative (Criterion D).

Therefore, NRCS has determined that Little Wewoka Watershed, Site #12, does not meet National Register of Historic Places-eligibility under criteria A, B, C, or D (36 CFR 63.2(a), 36 CFR 60.4, GM 420 Part 601.23(B)(1), National Register Bulletin 15) . NRCS has also determined that the undertaking, structural rehabilitation, is not an adverse effect (36CFR800.4(d)(1)). The no adverse effect determination also incorporated an indirect effects assessment (including the "viewshed" as articulated by the historic preservation community). To that end, there are no recorded archaeological sites, NRHP-eligible properties, or no New Deal related bridges or road segments identified within a 5-mile radius of the undertaking, other than Little Wewoka Watershed, Site 12. Any form of structural rehabilitation of Little Wewoka Watershed, Site 12 will not change the existing agricultural (cultural) landscape as it currently exists (36 CFR 800.16(d), National Register Bulletin 18). As for reasonably foreseeable effects, such as an unplanned breach of the dam, there is one General Land Office-plotted structure along Graves Creek (non-extant), but it is on a hilltop. If the abandonment alternative is selected by OCC, NRCS determined that further consultation would be warranted.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (2)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

February 27, 2024

Mr. Turner Hunt
Tribal Historic Preservation Officer
Historic and Cultural Preservation Department
Muscogee (Creek) Nation
P.O. Box 580
Okmulgee, OK 74447

Re: Rehabilitation of Little Wewoka Watershed, Site #12, Hughes County, Oklahoma

Dear Mr. Turner,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12. Since Little Wewoka Watershed, Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the earthen structure.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The earthen dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a second request for a NHPA-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka Watershed, Site #12. A merged copy of the US Geological Survey Lake Holdenville and Yeager 7.5-minute

topographic maps and an aerial photograph, which shows the site, are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka Watershed, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this consultation correspondence. We welcome the Muscogee (Creek) Nation as a consultation partner.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

February 27, 2024

Andrea A. Hunter, Ph.D.
Tribal Historic Preservation Officer
Osage Nation
Historic Preservation Office
627 Grandview
Pawhuska, OK 74056

Re: Rehabilitation of Little Wewoka Watershed, Site #12, Hughes County, Oklahoma

Dear Dr. Hunter,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12. Since Little Wewoka Watershed, Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the earthen structure.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The earthen dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a second request for a NHPA-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka Watershed, Site #12. A merged copy of the US Geological Survey Lake Holdenville and Yeager 7.5-minute

topographic maps and an aerial photograph, which shows the site, are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka Watershed, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this consultation correspondence. We welcome the Osage Nation as a consultation partner.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, OK 74074

February 27, 2024

Mr. Gary McAdams
Tribal Historic Preservation Officer
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

Re: Rehabilitation of Little Wewoka Watershed, Site #12, Hughes County, Oklahoma

Dear Mr. McAdams,

This letter is a continuation of Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPA), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12. Since Little Wewoka Watershed, Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the earthen structure.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The earthen dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a second request for a NHPA-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka Watershed, Site #12. A merged copy of the US Geological Survey Lake Holdenville and Yeager 7.5-minute topographic maps and an aerial photograph, which shows the site, are attached for your convenience.

A vicinity map is also provided. Please note that Little Wewoka Watershed, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this consultation correspondence. We welcome the Wichita and Affiliated Tribes as a consultation partner.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

March 8, 2023

Ms. Lynda Ozan
Deputy State Historic Preservation Officer
Oklahoma State Historic Preservation Office
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105-7917

Re: Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Ms. Ozan,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Construction of Site #12 was completed in 1959, hence the dam can be considered a historic property. Structural rehabilitation of the site could be considered an adverse effect. Likewise, a Section 106 assessment and report (36CFR800.4) of the dam centerline and pool were not performed before the site was constructed. To address both deficiencies, National Register of Historic Places-eligibility criteria will be applied to the dam itself and a pedestrian survey with shovel testing will be completed to determine if any historic properties are present. Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a request for a NHPR-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka, Site #12. A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute

Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74074-2655
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topographic maps and an aerial photograph, which shows the site, are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this opening consultation correspondence.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

Roderick Dukes
Assistant State Conservationist (Water Resources)

Encls. (3)

cc: K.C. Kraft, NRCS Oklahoma, Cultural Resources Coordinator

Natural Resources Conservation Service
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March 8, 2023

Kary Stackelbeck
Oklahoma State Archaeologist
Oklahoma Archaeological Survey
111 East Chesapeake, Building 134
University of Oklahoma
Norman, OK 73019

Re: Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Dr. Stackelbeck,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Construction of Site #12 was completed in 1959, hence the dam can be considered a historic property. Structural rehabilitation of the site could be considered an adverse effect. Likewise, a Section 106 assessment and report (36CFR800.4) of the dam centerline and pool were not performed before the site was constructed. To address both deficiencies, National Register of Historic Places-eligibility criteria will be applied to the dam itself and a pedestrian survey with shovel testing will be completed to determine if any historic properties are present. Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a request for a NHPR-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka,

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and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters (36CFR800.4(b)(1)). The above survey boundaries are used to define the Area of Potential Effect (36CFR800.4(a)(1)).

This is a request for a NHPR-Section 106 review and initial comments about the possible undertaking (rehabilitation), proposed survey methodology, and definition of the APE for Little Wewoka, Site #12 (36CFR800.3(c)(3)). A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute topographic maps and an aerial photograph, which shows the dam and pool (Site #12), are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this opening consultation correspondence.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, by telephone at 405.742.1271, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

cc: Roderick Dukes, NRCS Assistant State Conservationist (Water Resources)

Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74074-2655
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August 2, 2023

Quapaw Nation Historic Preservation Program, Director
Quapaw Nation Historic Preservation Program Office
Quapaw Nation
PO Box 765
Quapaw, Oklahoma 74363-0765

Re: Natural Resources Conservation Service, Rehabilitation of Little Wewoka Watershed Site #12, Eight Miles East of Holdenville, Hughes County, Oklahoma

Dear Quapaw Nation Historic Preservation Program Director,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) undertaking located in Hughes County, Oklahoma (36CFR800.3(a)). The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*.

The undertaking entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site. Rehabilitation would likely involve replacing the internal conduit (pipe). Two options are available: cutting a notch in the dam to reach the pipe for replacement with subsequent backfilling, or using the bore-and-jack method whereby a new pipe is hydraulicly pushed through the dam as a means to install a new conduit.

Little Wewoka Watershed, Site #12 is approximately eight miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #12, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Construction of Site #12 was completed in 1959, hence the dam can be considered a historic property. Structural rehabilitation of the site could be considered an adverse effect. Likewise, a Section 106 assessment and report (36CFR800.4) of the dam centerline and pool were not performed before the site was constructed. To address both deficiencies, National Register of Historic Places-eligibility criteria will be applied to the dam itself and a pedestrian survey with shovel testing will be completed to determine if any historic properties are present. Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation)

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Site #12. A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute topographic maps and an aerial photograph, which shows the site, are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this opening consultation correspondence.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

Roderick Dukes
Assistant State Conservationist (Water Resources)

Encls. (3)

cc: K.C. Kraft, NRCS Oklahoma, Cultural Resources Coordinator

Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74074-2655
Voice (405) 742-1204 – FAX (855) 421-4639

March 9, 2023

Mr. Jonathan Rohrer
Tribal Historic Preservation Officer
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Re: Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Mr. Rohrer,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

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This is a request for a NHPR-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka, Site #12. A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute

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Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

Natural Resources Conservation Service
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March 9, 2023

Mr. Turner Hunt
Tribal Historic Preservation Officer
Historic and Cultural Preservation Department
Muscogee (Creek) Nation
P.O. Box 580
Okmulgee, OK 74447

Re: Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Mr. Turner,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Construction of Site #12 was completed in 1959, hence the dam can be considered a historic property. Structural rehabilitation of the site could be considered an adverse effect. Likewise, a Section 106 assessment and report (36CFR800.4) of the dam centerline and pool were not performed before the site was constructed. To address both deficiencies, National Register of Historic Places-eligibility criteria will be applied to the dam itself and a pedestrian survey with shovel testing will be completed to determine if any historic properties are present. Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a request for a NHPR-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka,

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Site #12. A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute topographic maps and an aerial photograph, which shows the site, are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this opening consultation correspondence.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74074-2655
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March 9, 2023

Andrea A. Hunter, Ph.D.
Tribal Historic Preservation Officer
Osage Nation
Historic Preservation Office
627 Grandview
Pawhuska, OK 74056

Re: Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Dr. Hunter,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

Construction of Site #12 was completed in 1959, hence the dam can be considered a historic property. Structural rehabilitation of the site could be considered an adverse effect. Likewise, a Section 106 assessment and report (36CFR800.4) of the dam centerline and pool were not performed before the site was constructed. To address both deficiencies, National Register of Historic Places-eligibility criteria will be applied to the dam itself and a pedestrian survey with shovel testing will be completed to determine if any historic properties are present. Regarding the field survey methodology, the maximum extent of the pool (using the top of dam elevation) and potential breach area (to the NRCS easement limits), will be performed using 30 meter transect-spacing with shovel test pits every 30 meters. The above survey boundaries are used to define the Area of Potential Effect (APE).

This is a request for a NHPR-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka,

Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74074-2655
Voice (405) 742-1204 – FAX (855) 421-4639

Site #12. A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute topographic maps and an aerial photograph, which shows the site, are attached for your convenience. A vicinity map is also provided. Please note that Little Wewoka, Site #12 undertaking has yet to be surveyed, thus a Section 106 report is not included nor is there a determination included with this opening consultation correspondence.

Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74074-2655
Voice (405) 742-1204 – FAX (855) 421-4639

March 9, 2023

Mr. Gary McAdams
Tribal Historic Preservation Officer
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

Re: Rehabilitation of Little Wewoka Watershed Site #12, Hughes County, Oklahoma

Dear Mr. McAdams,

This letter initiates Section 106 consultation per 36CFR800.2(c)(1) as codified in of the National Historic Preservation Act of 1966 (NHPR), as amended, for a proposed US Department of Agriculture, Natural Resources Conservation Service (NRCS) project located in Hughes County, Oklahoma. The undertaking is authorized and funded by PL 106-472, commonly referred to as the *Small Watershed Rehabilitation Amendment of 2000*. PL 106-472 is an amendment to PL 83-566, the *Watershed Protection and Flood Prevention Act of 1954*. The project entails the possible rehabilitation of an existing NRCS floodwater control structure, Little Wewoka Watershed, Site #12 (Site #12). Since Site #12 does not meet current Oklahoma Water Resources Board or NRCS standards for its high hazard dam classification, NRCS is considering our options regarding the future of the site.

Little Wewoka Watershed, Site #12 is approximately ten miles northeast of Holdenville, Oklahoma, on an unnamed tributary of Graves Creek. The dam and pool are in portions of sections 32 and 33, Township 8 North, Range 10 East of the Indian Meridian. This coordinate is located on the *Lake Holdenville* and *Yeager* quadrangles of the United States Geological Survey's 7.5-minute series (topographic) maps. The geocentric coordinates of Site #2, in degrees, minutes, and seconds, are Latitude 35° 7'35.23"N, Longitude 96°15'59.58"W.

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This is a request for a NHPR-Section 106 review and initial comments about the possible rehabilitation, proposed survey methodology, and definition of the APE. for Little Wewoka, Site #12. A merged copy of the US Geological Survey *Lake Holdenville* and *Yeager* 7.5-minute

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Please send your comments to the address above marked to the attention of NRCS Cultural Resources Coordinator K.C. Kraft, or by electronic mail at kc.kraft@usda.gov.

Respectfully,

K.C. KRAFT

Kenneth C. Kraft, PhD, RPA

Encls. (3)

Natural Resources Conservation Service
100 USDA, Suite 206
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Voice (405) 742-1204 – FAX (855) 421-4639

Biological and Water Resources

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
Phone: (918) 581-7458 Fax: (918) 581-7467

In Reply Refer To: 12/11/2024 19:21:21 UTC
Project Code: 2023-0116791
Project Name: Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
(918) 581-7458

PROJECT SUMMARY

Project Code: 2023-0116791

Project Name: Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation

Project Type: Dam - Maintenance/Modification

Project Description: Latitude: 35.1265 Longitude: -96.2667 Hughes County, Oklahoma
Little Wewoka Site 12 is currently classified as a high hazard potential dam and was determined by NRCS to be out of compliance with NRCS TR-60 design criteria and performance standards regarding principal spillway capacity and freeboard capacity. The Oklahoma Water Resources Board determined the dam was out of compliance with Oklahoma State Dam Safety Criteria. Site 12 was built with single purpose flood control benefits. Little Wewoka Site 12 requires structural upgrades to meet current NRCS and State Dam Safety standards to reduce the risk of life and property and extend the service life of the dam.

Proposed rehabilitation alternative focuses on the structural upgrades to the dam to increase capacity by installing a new, widened stepped roller-compacted concrete (RCC) auxiliary spillway and raising the top of dam. The principal spillway and inlet tower would be replaced, and a new auxiliary spillway will be installed. This alternative proposes replacing the existing principal spillway (PSW) with a larger, 30-inch conduit to bring the dam into compliance with TR-60. The inlet tower must also be replaced with a new 3-foot x 15-foot x 12-foot reinforced concrete inlet tower. This new inlet tower increases the weir length for the principal spillway from 4 feet to 15 feet, to meet TR-60 requirements. The principal spillway crest elevation will remain unchanged.

The existing auxiliary spillway would be abandoned, and a new stepped auxiliary spillway with a width of 150-feet would be cut into the dam embankment. The spillway would be constructed of roller compacted concrete. Top of dam would be raised 2.9 feet to accommodate the 6-hour and 24-hour freeboard hydrographs. Drive access across the dam would be eliminated, requiring an alternate route for landowner access to be determined in future study.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@35.1208472,-96.26712274038385,14z

Counties: Hughes County, Oklahoma

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

REPTILES

NAME	STATUS
Alligator Snapping Turtle *Macrochelys temminckii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4658	Proposed Threatened

INSECTS

NAME	STATUS
American Burying Beetle *Nicrophorus americanus* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/66	Threatened
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Prairie Loggerhead Shrike *Lanius ludovicianus excubitorides* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8833	Breeds Feb 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

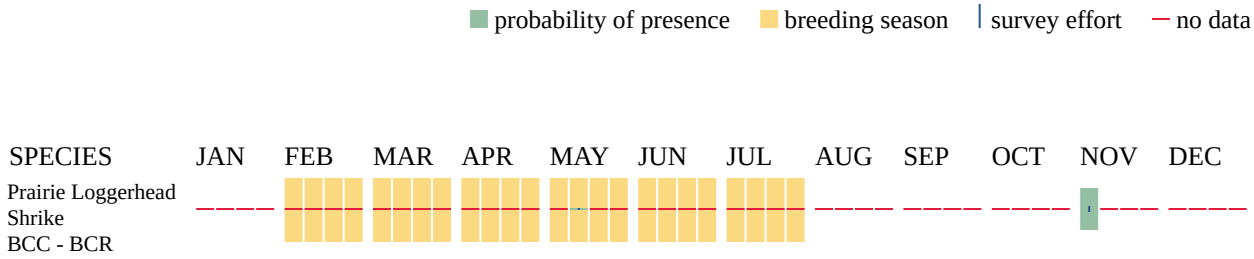
Probability of Presence (▪)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

LAKE

- L1UBHh

RIVERINE

- R4SBC
- R5UBF

FRESHWATER POND

- PUBHh

IPAC USER CONTACT INFORMATION

Agency: Natural Resources Conservation Service
Name: Melissa Jones
Address: 100 USDA Suite 206
City: Stillwater
State: OK
Zip: 74074
Email melissa.jones@usda.gov
Phone: 4057421232

August 2015

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
9014 East 21st Street
Tulsa, Oklahoma 74129
918/581-7458 / (FAX) 918/581-7467

July 11, 2024

Online Project Review Concurrence Letter

To: Jeanne Hamilton Oklahoma State Conservationist
Natural Resources Conservation Service
100 USDA, Suite 206
Stillwater, OK 74874

Project Name: Floodwater Retarding Structure (FWRS) Little Wewoka No. 12, Rehabilitation Project, Hughes County, Oklahoma

Consultation Code: 2023-0116791

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Oklahoma Ecological Services Field Office (ESFO) online project review process. By providing this letter in conjunction with your complete project review package, you are certifying that you have accurately completed the online project review process for the referenced project in accordance with all instructions provided, using the best available information to reach your conclusions. Concurrence with "not likely to adversely affect" determinations does not provide any exemption for violations of section 9 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA) or "take" of federally-listed species. The Federal action agency is ultimately responsible for ensuring compliance with the ESA and any take that occurs due to your proposed action would be considered a violation under section 9 of the ESA.

This letter and the enclosed project review package complete the review of your project in accordance with the ESA. This letter also provides information for your project review under the National Environmental Policy Act (National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C.4321-4347, 83 Stat. 852), as amended.

A copy of this letter and the project review package must be emailed to **okprojectreview@fws.gov** for this certification to be valid. This letter and the project review package will be maintained in Service records. **Please allow the Oklahoma ESFO 45 days to review your information. If the Oklahoma ESFO determines that the package is not complete, or that additional coordination is necessary, we will contact your office. If, after 45 days from the date of your email submittal of your project review package, the Oklahoma ESFO has not contacted your office, consider your section 7 consultation complete.**

The proposed action consists of:

Latitude: 35.1265 Longitude: -96.2667 Hughes County, Oklahoma
Little Wewoka Site No. 12 is currently classified as a high hazard potential dam and was determined by NRCS to be out of compliance with NRCS TR-60 design criteria and performance standards regarding principal spillway capacity and freeboard capacity. The Oklahoma Water Resources Board determined the dam was out of compliance with Oklahoma State Dam Safety Criteria. Site No. 12 was built with single purpose flood control benefits. Little Wewoka Site No. 12 requires structural upgrades to meet current NRCS and State Dam Safety standards to reduce the risk of life and property and extend the service life of the dam.

Project start and completion dates:

2026-2027

Federal agency or federal program providing a permit, funding, grant, authorization, loan, etc. associated with the proposed project and how that agency is associated with your project:

NRCA is the lead agency for the proposed project authorized by Public Law 83-566 as amended by Section 313 of Public Law 106-472.

Federal Agency/Program Point of contact (Name, phone, and email address):

Melissa Jones, 405-742-1232, melissa.jones@usda.gov

The species conclusions table in the enclosed project review package summarizes your ESA conclusions. These conclusions resulted in "not likely to adversely affect/modify" determinations for listed species and critical habitat in relation to potential effects of your proposed project. We certify that the use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with determinations of "not likely to adversely affect" for listed species and critical habitat reached by proper use of this process. For projects where this particular determination is reached, additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages efforts to avoid or minimize adverse impacts to them from project effects. Some federal agencies have standing policies that grant limited protections to candidate species. Conservation of candidate species now may preclude future needs to federally list them as endangered or threatened, at which point their legal protection would become required. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of listed species or critical habitat becomes available, this determination may be reconsidered. You should re-visit the Service's Information, Planning, and Conservation (IPaC) website at http://ecos/fws.gov/ipac/ within 90 days of project initiation to ensure species information is correct. If new species or critical habitat is identified, this letter is no longer valid and a new project package should be submitted to the Oklahoma ESFO.

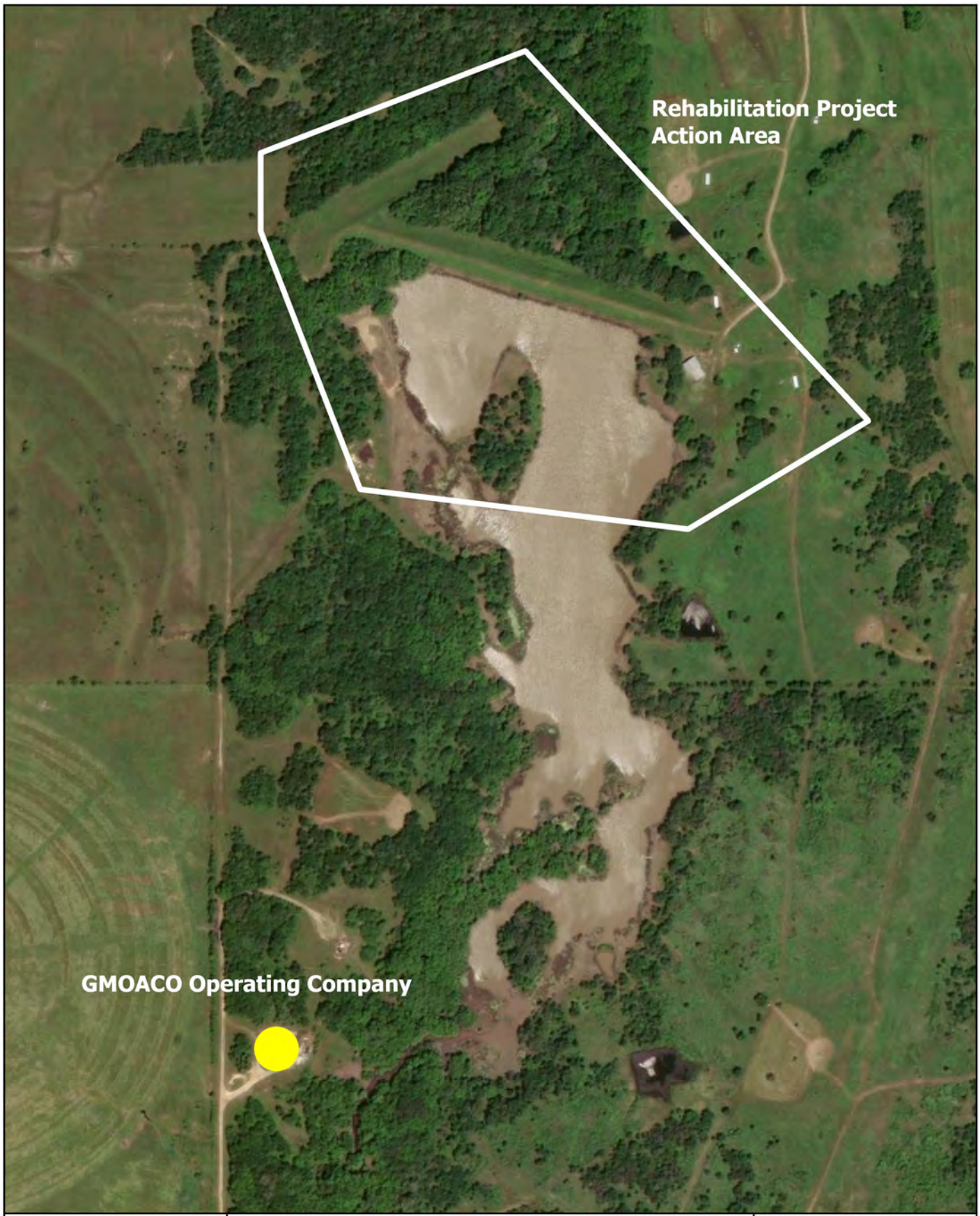
Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Oklahoma is available at our website: <http://www.fws.gov/southwest/es/oklahoma/ >. If you have any questions, please call 918-581-7458 or send an email message to OKProjectReview@fws.gov.

Sincerely,
/s/ Jonna Polk
Field Supervisor
Oklahoma Ecological Services Field Office

Enclosures:

1) ENTIRE PROJECT REVIEW
   - ☑ PACKAGE: Species Conclusion Table
   - ☑ IPaC Species List and Action Area map
   - ☑ This letter (Online Concurrence Letter)
   - ☑ (Optional) Additional maps
2) Other relevant project data/documents

MA Verification Letter American Burying Beetle Consultation



NRCS
Natural Resources Conservation Service

FWRS Little Wewoka No. 12
Action Area

Maxar
Map ID: Little Wewoka No. 12
Map Date: July 2024

2024

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

N

0 0.05 0.1 Mi

0 0.07 0.15 Km

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
Phone: (918) 581-7458 Fax: (918) 581-7467

In Reply Refer To: 04/04/2024 19:21:11 UTC
Project code: 2023-0116791
Project Name: Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation

Subject: Verification letter for 'Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation' project under the October 15, 2020, Programmatic Biological Opinion on Final 4(d) Rule for the American burying beetle and Activities Excepted from Take Prohibitions (50 CFR § 17.47(d), Federal Register Citation 85 FR 65241).

Dear Melissa Jones:

The U.S. Fish and Wildlife Service (Service) received on **April 04, 2024** your effect determination(s) for the 'Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation' (the Action) using the American burying beetle (*Nicrophorus americanus*) determination key within the Information for Planning and Consultation (IPaC) system.

This determination key assists users in determining whether a Federal action is consistent with the activities analyzed in the Service's October 15, 2020, Programmatic Biological Opinion (PBO). The PBO addresses activities excepted from incidental "take"[1] prohibitions applicable to the American burying beetle under the Endangered Species Act of 1973 (Act) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO. The Action may affect the American burying beetle; however, any incidental take that may occur as a result of the Action is not prohibited under the Act Section 4(d) rule adopted for this species at 50 CFR §17.47(d). **Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under Act Section 7(a)(2) with respect to the American burying beetle.**

Please report any changes to the information about the Action that you submitted in IPaC, the results of any American burying beetle surveys conducted in the Action area, and any dead, injured, or sick American burying beetles that are found during Action implementation. If the Action is not completed within one year of the date of this letter, you must update and resubmit the information required in the IPaC key.

This IPaC-assisted determination allows you to rely on the PBO for compliance with Act Section 7(a)(2) only for the American burying beetle.

---

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (Act, Section 3(19)).

This letter covers only the American burying beetle. It **does not** apply to the following ESA-protected species that also may occur in the Action area:

- Alligator Snapping Turtle *Macrochelys temminckii* Proposed Threatened
- Monarch Butterfly *Danaus plexippus* Candidate
- Piping Plover *Charadrius melodus* Threatened
- Rufa Red Knot *Calidris canutus rufa* Threatened
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

If your project may affect additional listed species, you must evaluate additional DKeys for other species, or submit a request for consultation for the additional species to your local Ecological Services Field Office.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation

2. Description

The following description was provided for the project 'Flood Water Retention Structure (FWRS) Little Wewoka No. 12 Dam Rehabilitation':

> Latitude: 35.1265 Longitude: -96.2667 Hughes County, Oklahoma
> Little Wewoka Site 12 is currently classified as a high hazard potential dam and was determined by NRCS to be out of compliance with NRCS TR-60 design criteria and performance standards regarding principal spillway capacity and freeboard capacity. The Oklahoma Water Resources Board determined the dam was out of compliance with Oklahoma State Dam Safety Criteria. Site 12 was built with single purpose flood control benefits. Little Wewoka Site 12 requires structural upgrades to meet current NRCS and State Dam Safety standards to reduce the risk of life and property and extend the service life of the dam.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@35.1208472,-96.26712274038385,14z

QUALIFICATION INTERVIEW

1. Is the action authorized, funded, or being carried out by a Federal agency?

   Yes

2. Have you determined that the proposed action will have “no effect” on the American burying beetle? (If you are unsure select "No")

   No

3. Will your activity **purposefully take** American burying beetles?

   No

4. Is your project wholly inside the 4d rule Analysis Area? For areas of your project occurring inside the Analysis Area (New England, Northern Plains, Southern Plains), your project may qualify for exemptions. For areas of your project occurring outside the Analysis Area, all incidental take is exempted according to the ABB 4d Rule.

   Automatically answered
   Yes

5. Is American burying beetle suitable habitat present within the action area?

   Yes

6. Will suitable habitat be affected by the proposed action? Suitable habitat may be impacted if the action involves soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals.

   Yes

PROJECT QUESTIONNAIRE

Please select the activity that best matches your proposed action.

13. Other activities with soil disturbance - briefly describe below

If you chose 13 above, please describe below. If you did not choose 13 above, please type "0".

Soil disturbance due to dam rehabilitation construction activities

Estimate the total acres of suitable American burying beetle habitat that may be affected.

7

Please estimate the total number of acres of **temporary impacts** to American burying beetle habitat. See definitions

4

Please estimate the total number of acres of **permanent impacts** to American burying beetle habitat. See definitions

3

IPAC USER CONTACT INFORMATION

Agency: Natural Resources Conservation Service
Name: Melissa Jones
Address: 100 USDA Suite 206
City: Stillwater
State: OK
Zip: 74074
Email melissa.jones@usda.gov
Phone: 4057421232

Species Conclusion Table – Rehabilitation of Flood Water Retarding Structure (FWRS) Little Wewoka No. 12

Table 1: Listed Species on Official Species List

Species/ Critical Habitat	**Habitat Determination**	**Notes/Documentation**	**ESA Determination**
Piping Plover	No habitat present	Some bare shoreline/mudflat as potential habitat for foraging	May affect, not likely to adversely affect
Red Knot	No habitat present	Some bare shoreline/mudflat as potential habitat for foraging.	May affect, not likely to adversely affect
Monarch Butterfly	Potential habitat present	Milkweed and nectar sources are present but limited due to maintenance of the earthen dam. Construction activities will be initiated outside of the prime reproductive period (Apr 1 – Jul 1) to minimize potential impacts to eggs and caterpillar. Approximately 2 acres of potential habitat will be paved over to a stepped roller-compacted concrete (RCC) auxiliary spillway. Other areas will return to conditions that existed pre-construction with no long-term impacts associated with activities. The existing auxiliary spillway will be abandoned, allowing for successional growth of the habitat.	May affect, not likely to adversely affect
American Burying Beetle	Potential habitat present	Construction will include soil disturbance activities within a footprint (> 9 acres) These will be temporary soil disturbance impacts. Areas will return to conditions that existed pre-construction with no long-term impacts associated with rehab activities. Approximately 2 acres of potential habitat will be paved over to a stepped roller-compacted concrete (RCC) auxiliary spillway.	May affect, not likely to adversely affect. (IPaC determination key Letter of Concurrence attached) Project Code #2023-0116791

		which will be potential permanent habitat loss for the ABB.	
Tri-colored Bat	Potential habitat present	Potential maternity or roost trees occur in the area of impact. Potential maternity/roost trees will be felled during the bats inactive period (Nov 15 – Mar 31). The abandoned auxiliary spillway will naturally be revegetated and provide new potential maternity/roost sites in the future.	May affect, not likely to adversely affect
Alligator Snapping Turtle	Potential habitat present	Downstream dam may limit migration of juvenile species. Lack of overstory/canopy cover along conservation pool perimeter. No evidence of structure (logs, undercut of bank) within conservation pool. Impacts would be temporary.	May affect, not likely to adversely affect

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Oklahoma State Office
100 USDA
Suite 206
Stillwater, Oklahoma 74074

July 03, 2024

U.S. Fish and Wildlife Service
Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428

RE: Formal request for U.S. Fish and Wildlife Service (USFWS) to provide agency input and/or consultation on the Little Wewoka Creek – Graves Creek Watershed for the Rehabilitation Watershed Plan and Environmental Evaluation (Plan-EE) of Floodwater Retarding Structure (FWRS) Little Wewoka No. 12, located in Hughes County, Oklahoma.

In accordance with the Council on Environmental Quality, regulations implementing the National Environmental Policy Act (NEPA), Endangered Species Act (ESA) Section 7 consultation, and regulations in part of the Watershed Protection and Flood Prevention Act (PL 83-566), Section 12, the Natural Resources Conservation Service (NRCS) is formally requesting your agency to provide input and/or consultation related to the dam rehabilitation project of FWRS Little Wewoka No. 12.

This request is being made because your agency has been identified as having special expertise or jurisdiction related to this project. A Supplemental Watershed Plan-EE is being prepared to fulfill NRCS' NEPA compliance responsibilities pertaining to our potential federal financial assistance through PL 83-566. Public Law 83-566 requires NRCS to notify USFWS to make recommendations concerning the conservation and development of wildlife resources related to the proposed dam rehabilitation project plan.

FWRS Little Wewoka No. 12 was constructed in 1959 as a low-hazard potential dam. It is currently classified as a high-hazard potential dam due to population at risk downstream. Currently, FWRS Little Wewoka No. 12 does not meet NRCS or Oklahoma Water Resources Board dam safety program standards and is out of compliance with NRCS TR-60 design criteria. Therefore, the project sponsors and NRCS are preparing a Plan-EE to evaluate alternatives to meet the current performance and safety criteria for a high hazard potential dam.

Thank you for your timely response and cooperation with this project. If you have any questions or comments, please contact Melissa Jones (Water Resources Biologist) at melissa.jones@usda.gov or 405-742-1232.

Respectfully,

JEANNE HAMILTON
Oklahoma State Conservationist

enclosures

Jones, Melissa - FPAC-NRCS, OK

From: Jones, Melissa - FPAC-NRCS, OK
Sent: Tuesday, July 23, 2024 10:41 AM
To: OK Project Review, FWS
Subject: RE: [EXTERNAL] Online IPaC Consultation Packet and Concurrence Letter Project # 2023-0116791 NRCS FWRS Little Wewoka 12 Dam Rehabilitation Project
Attachments: Species Conclusion Table Little Wewoka 12.docx

Good Morning Patricia,

I have updated the Species Impact Table to include the Tri-colored Bat for project #2023-0116791 NRCS FWRS Little Wewoka12 Dam Rehabilitation Project.

Yes, there will be tree clearing for this project. Approximately 2 acres will be temporarily cleared for construction activities. Impacts will be temporary as tree species cleared will naturally revegetate the area. Trees will also naturally revegetate within the abandoned auxiliary spillway. Permanent impacts will occur along the top of current dam. This dam is well maintained by the Sponsors, so no permanent impacts to potential maternity/roost trees will occur as dam is void of any brush or tree type vegetation.

Potential maternity/roost trees occur within the area of impact. Trees will be felled during the bats inactive period (Nov 15 – Mar 31).

Thank you!

Enclosure

Melissa Jones, PhD
Water Resources, Biologist
USDA-NRCS
Stillwater, OK
405-742-1232 - office

From: OK Project Review, FWS <OKProjectReview@fws.gov>
Sent: Tuesday, July 23, 2024 8:41 AM
To: Jones, Melissa - FPAC-NRCS, OK <Melissa.Jones@usda.gov>
Subject: Re: [EXTERNAL] Online IPaC Consultation Packet and Concurrence Letter Project #2023-0116791 NRCS FWRS Little Wewoka 12 Dam Rehabilitation Project

Greetings,

Will this project involve any tree clearing?

There is an inaccuracy on the species list, as the tricolored bat should be on the list, but it is not. And tree clearing during the active season will affect the species.

Thanks!

Patricia Echo-Hawk

From: Jones, Melissa - FPAC-NRCS, OK <Melissa.Jones@usda.gov>
Sent: Thursday, July 11, 2024 8:19 PM
To: OK Project Review, FWS <OKProjectReview@fws.gov>
Subject: [EXTERNAL] Online IPaC Consultation Packet and Concurrence Letter Project #2023-0116791 NRCS FWRS Little Wewoka 12 Dam Rehabilitation Project

Dear USFWS Oklahoma Project Review,

Attached are the following requirements for a USFWS Project Review for Project # 2023-0116791 Little Wewoka Creek Flood Water Retarding Structure (FWRS) Little Wewoka Creek No. 12 Dam Rehabilitation project in Hughes County, Oklahoma.

1. Action Area Map
2. Official IPaC Species List (07/08/2024)
3. Species Conclusion Table
4. Online Concurrence Letter
5. MA Verification Letter for the American Burying Beetle (04/04/2024)

After NRCS initial review, our ESA conclusion was "May affect, not likely to adversely affect" all five listed species (Piping Plover, Red Knot, Monarch Butterfly, American Burying Beetle, Alligator Snapping Turtle).

Thank you!

Melissa Jones, PhD
Water Resources, Biologist
USDA-NRCS
Stillwater, OK
405-742-1232 - office

Triveece Penelton

From: Little Wewoka Watershed Project c/o Ad Astra via Vireo <triveece@bevireo.com>
Sent: Tuesday, November 21, 2023 9:06 AM
To: Triveece Penelton
Subject: December 6 - Little Wewoka Watershed Project Public Meeting No. 2

USDA United States Department of Agriculture
Natural Resources Conservation Service

Little Wewoka Supplemental Watershed Plan & Environmental Document for Dam Site 12

You're Invited:
Public Meeting Wednesday, December 6, 2023
Little Wewoka Watershed Project

On behalf of the Hughes County Conservation District and the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Oklahoma, we are pleased to invite you to participate in the second public meeting for the ***Little Wewoka Watershed Project***. The meeting will be held Wednesday, December 6, 2023, from 4 to 6 p.m. at First United Bank (102 East Main Street) in Holdenville. **Click here** to see a map of the project area.

The meeting will be formatted as an open house; therefore, the public is welcome to stop by anytime during its two-hour timeframe. No formal presentations will be given. Anyone with an interest in the project is encouraged to participate.

What You Can Do

During the meeting, you'll be able to review exhibits describing the project schedule, Purpose and Need Statement, and rehabilitation alternatives, and more. You can also share thoughts on potential issues and concerns with the Hughes County Conservation District, USDA-NRCS, and the consultant team.

Background

The ***Little Wewoka Watershed Project*** involves completing a USDA-NRCS Supplemental Watershed Plan and Environmental Document (Plan-ED) for the Little Wewoka Site 12 Dam in Hughes County. Anticipated improvements to the dam involve:

- Evaluating safety concerns resulting from a failure of the dam.
- Assessing necessary upgrades to the dam to meet NRCS and State dam safety criteria and performance standards for its current high hazard potential classification.
- Maintaining the existing level of flood protection.

A supplemental watershed plan will be created to determine how the dam should be rehabilitated to meet current NRCS safety criteria.

Process and Schedule

Following the National Environmental Policy Act (NEPA) process, Hughes County Conservation District, USDA-NRCS, and the consultant team combined community feedback from the first public meeting with existing condition analyses to develop a Purpose and Need Statement for the project. Next, they referenced the Purpose and Need to evaluate the current NRCS hazard classification for the dam and proposed rehabilitation alternatives. The alternatives will be available for comment and consideration during the public meeting on December 6. The proposed dam rehabilitation alternative will be described in the draft Plan-ED. Both the proposed alternative and Plan-ED will be made available to the public for comment during spring 2024.

For More Information:

Roderick Dukes, USDA-NRCS Assistant State Conservationist for Water Resources
roderick.dukes@usda.gov and 405-742-1220

Mail written comments by Thursday, January 4 to:
ATTN: Roderick Dukes
100 USDA , Suite 206, Stillwater, OK 74074

littlewewoka12.nrcsdams.com
A consultant team led by Ad Astra, which consists of Water Resources Solutions, Vireo, and Affinis is assisting with the project.

USDA

United States Department of Agriculture

November 15, 2023

Name
Organization
City, State Zip

RE: Public Meeting No. 2 for the Little Wewoka Supplemental Watershed Plan and Environmental Document (Plan-ED) for Dam Site 12 in Hughes County

Dear NAME(S),

Hughes County Conservation District and the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Oklahoma are pleased to invite you to participate in **Public Meeting No. 2** for the ***Little Wewoka Watershed Project.*** The meeting will be held on Wednesday, December 6, 2023, from 4 to 6 p.m. at the First United Bank (102 East Main Street) in Holdenville. A map of the project area is enclosed.

The meeting will be formatted as an open house, so you are welcome to stop by anytime during its two-hour timeframe. No formal presentations will be given. This meeting is the second of three public input opportunities to participate in the project. During it, you will be able to review exhibits that describe the project's schedule, Purpose and Need Statement, rehabilitation alternatives, and other information. Representatives from Hughes County Conservation District, USDA-NRCS, and the consultant team will be present to listen to comments and answer questions.

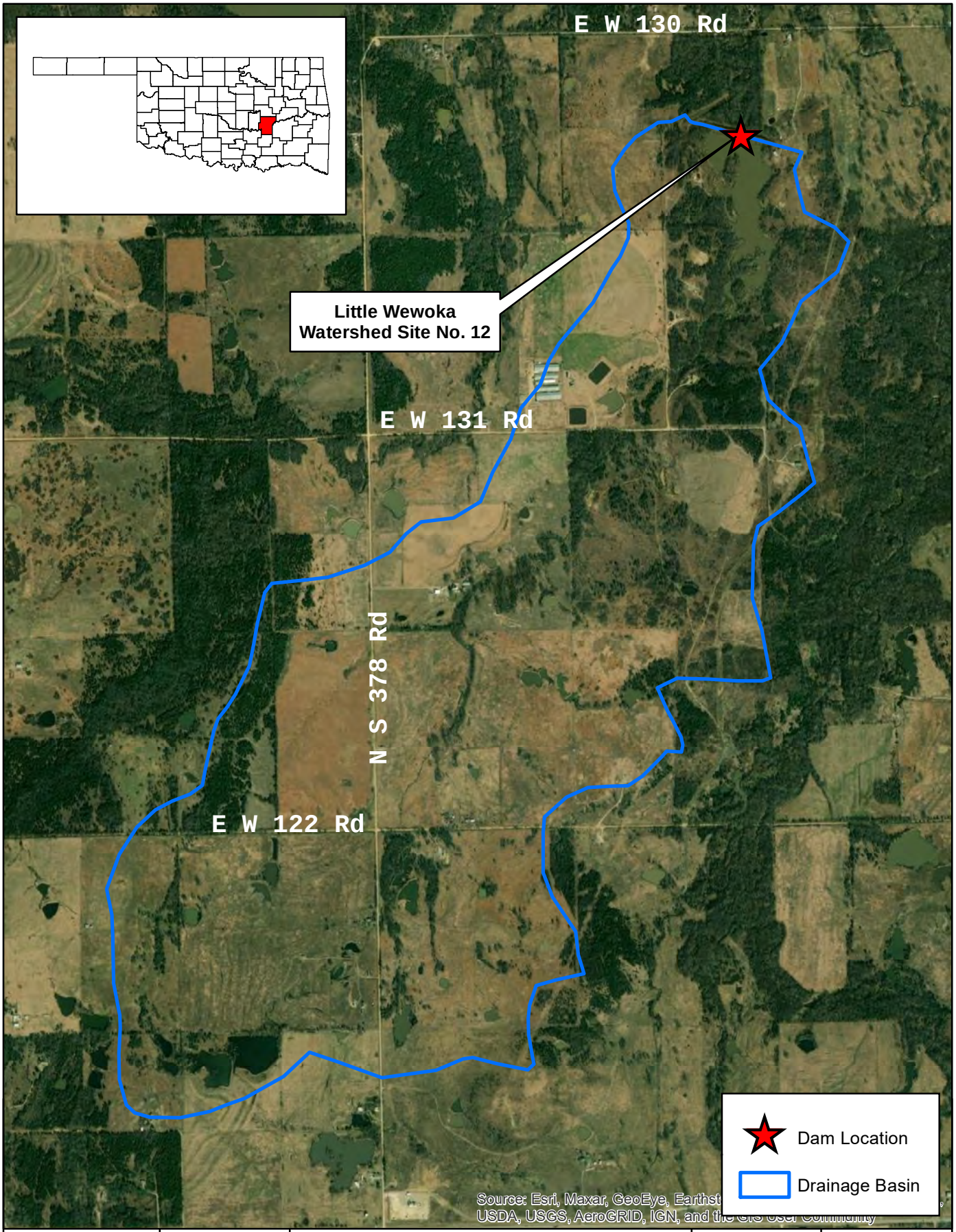
Your participation is important to the success of the Plan-ED. If you are unable to participate in the meeting, but would like to provide written comments, we would appreciate your response by Thursday, January 4. Written comments may be mailed to Roderick Dukes, USDA-NRCS Assistant State Conservationist for Water Resources at 100 USDA, Suite 206, Stillwater, OK 74074. If we do not hear from you within the comment period, we will assume you have no comment regarding the project at this time.

For additional information about the rationale for the project, please contact Roderick Dukes, USDA-NRCS Assistant State Conservationist for Water Resources, at roderick.dukes@usda.gov or 405-742-1220. You may also visit the project website at littlewewoka12.nrcsdams.com.

Sincerely,

Valerie Glasgow
USDA-NRCS Planning Engineer

APPENDIX B
PROJECT MAPS



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DATE CREATED	JULY 2021
PREPARED BY	BAS

FREESE NICHOLS
1017 Main Campus Dr #1200
Raleigh, NC 27606
919-582-5850

0 875 1,750 3,500 Feet

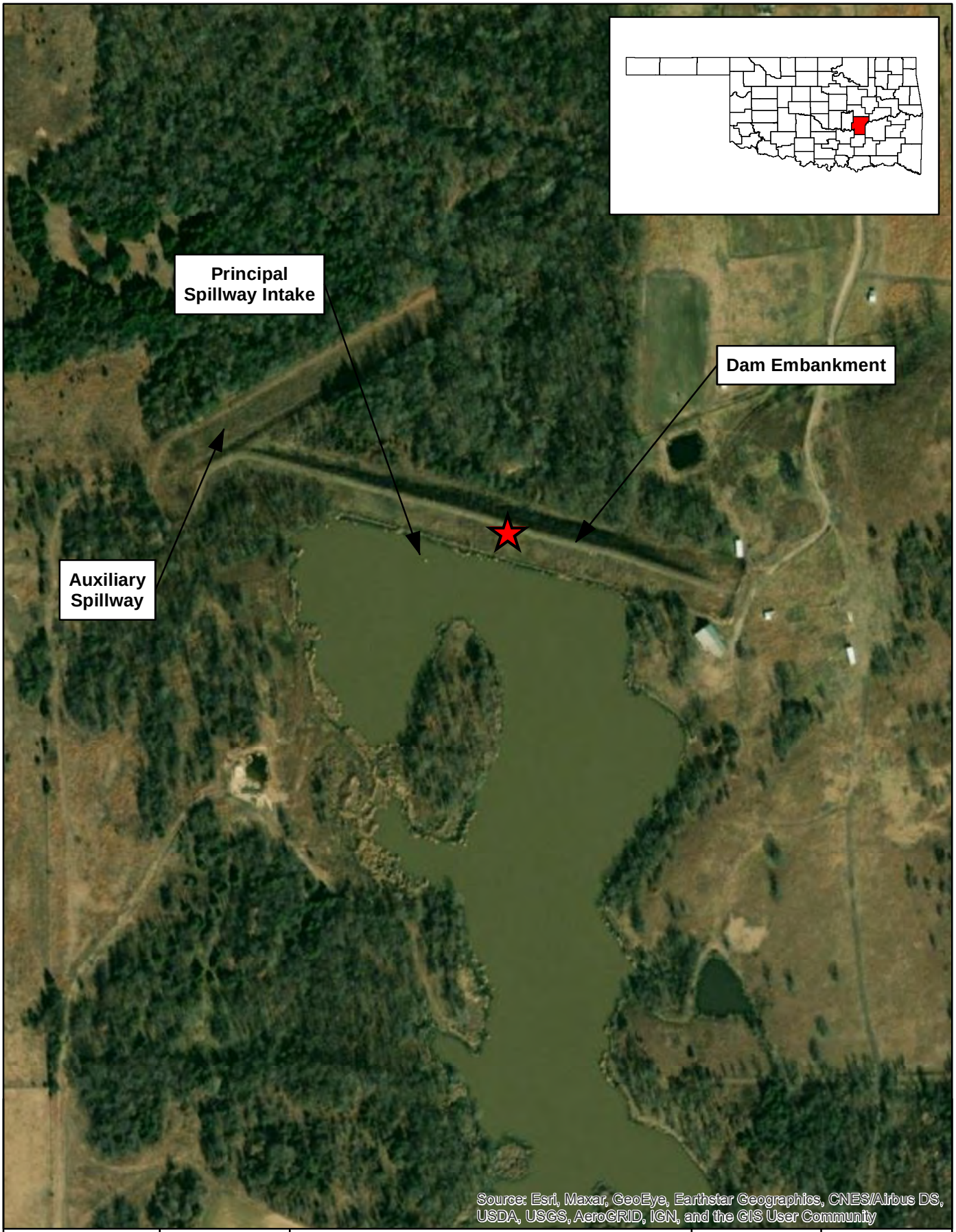
Little Wewoka Watershed Site No. 12

Watershed Map

N W E S

APPENDIX

A



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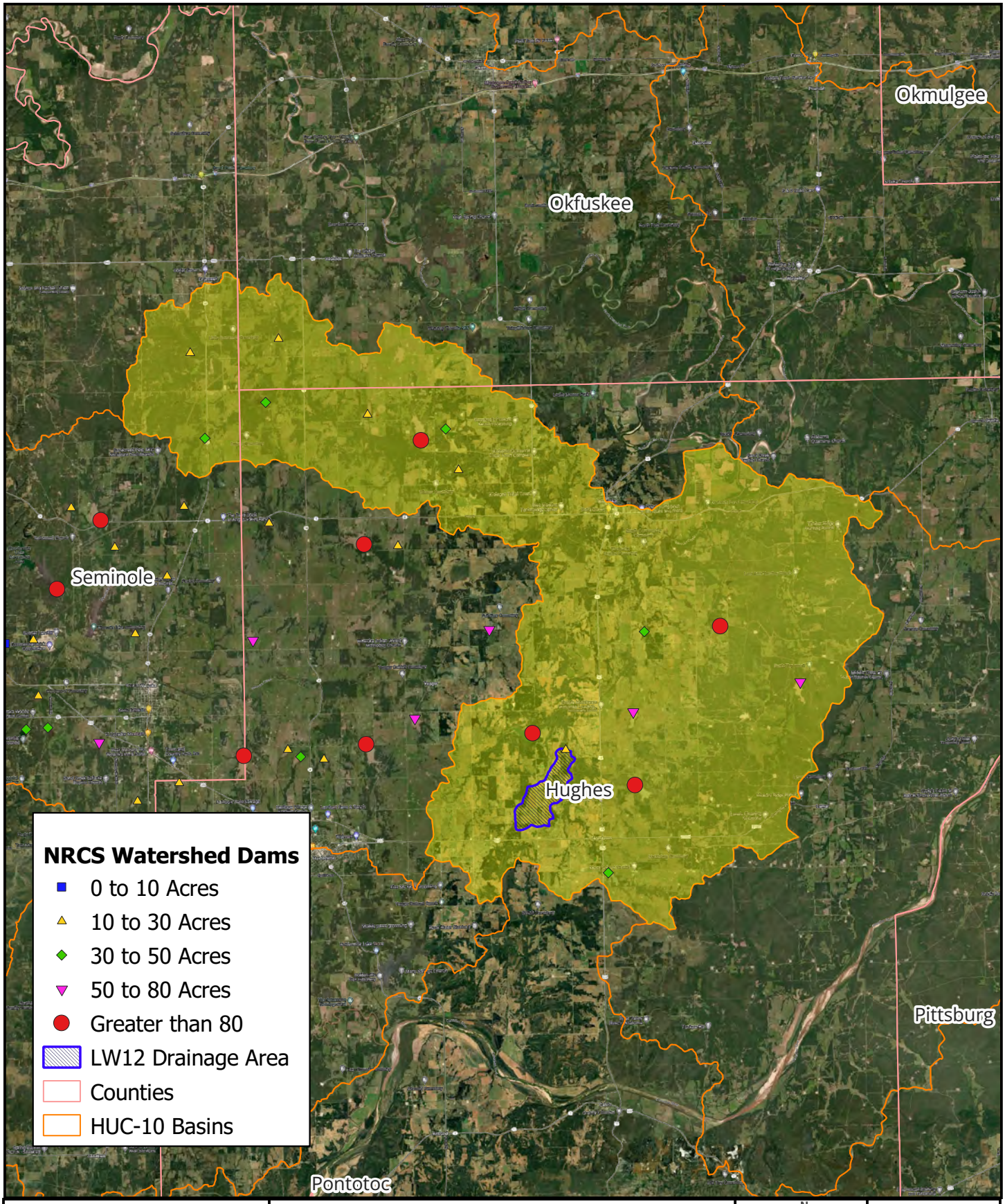


ADASTRA collaborative

0 5 10 mi

N W E S

Little Wewoka 12 Dam Rehabilitation

Watershed Improvements Map

APPENDIX C
SUPPORT MAPS

Hazard ID	Description	Depth	Velocity	Arrival Time
PDL-1	E 130 Rd	10.4 ft	7.4 ft/s	0.22 hr
PDL-2	Residence	6.4 ft	5.7 ft/s	0.22 hr
PDL-3	E 128 Rd	2.7 ft	0.5 ft/s	4.64 hr
PDL-4	E 127 Rd	4.3 ft	0.4 ft/s	7.84 hr
PDL-5	N 379 Rd	3.1 ft	0.5 ft/s	9.17 hr

Wetumka
Yeager
Little Wewoka 12
PDL-1
PDL-2
PDL-3
PDL-4
PDL-5
Page 1
Page 2
Page 3
Page 4
Page 5
Page 6
Page 7

Legend

- Pages
- Dam Location
- Hazard Points
- Road Hazards

Depth (ft)

- 0
- 3
- 6
- 9
- 12
- 15

Location Map

0 1 2 mi

Figure C-1. Mapping of areas within the breach inundation zone.

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Benschoter

N W E S

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

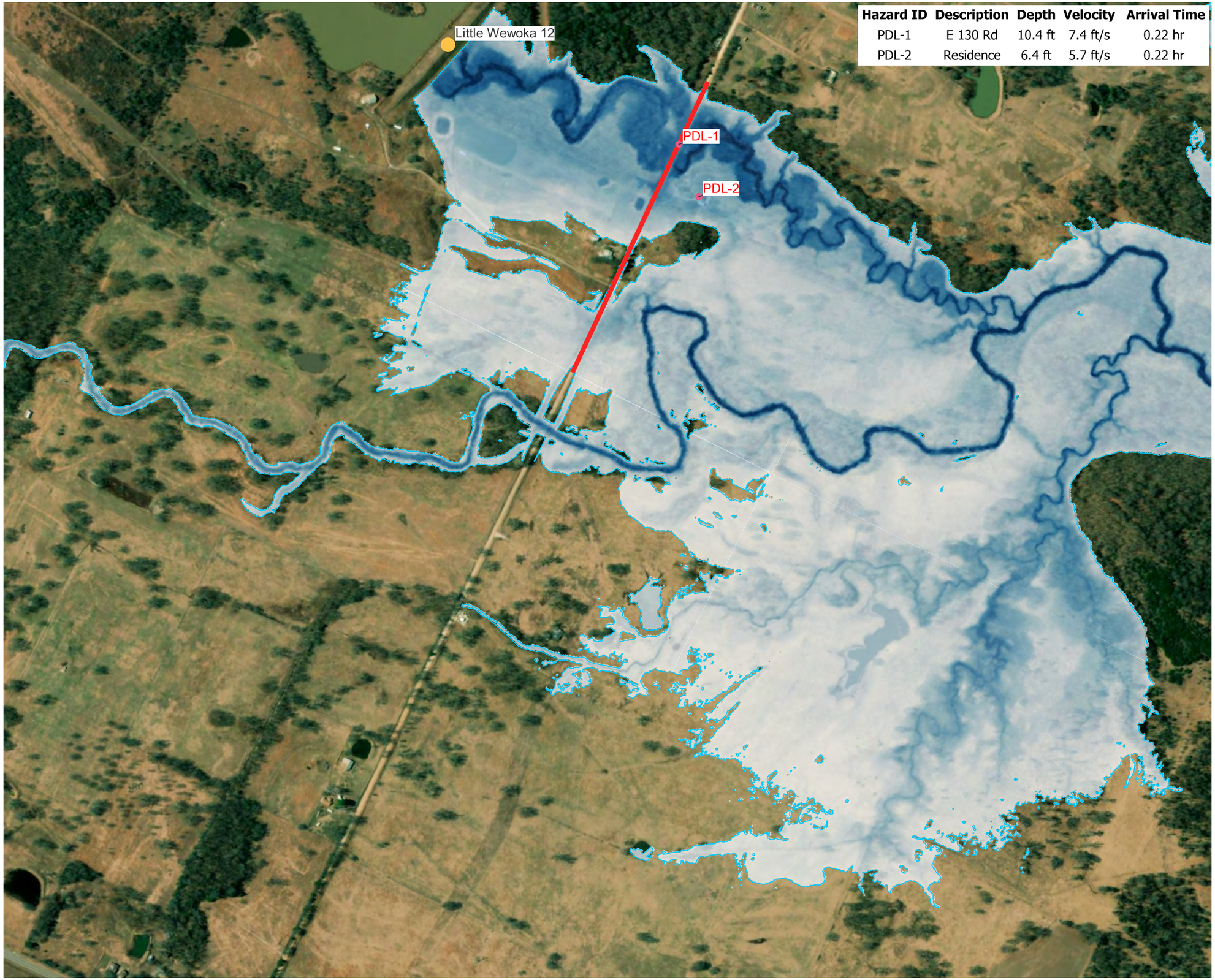
BREACH INUNDATION MAP

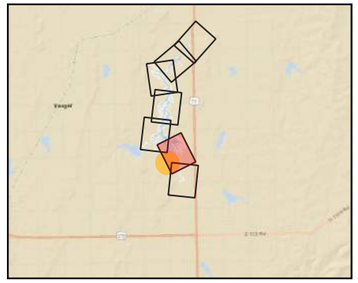
WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 200
PRAIRIE VILLAGE, KS 66207

Figure C-1

Index

Hazard ID	Description	Depth	Velocity	Arrival Time
PDL-1	E 130 Rd	10.4 ft	7.4 ft/s	0.22 hr
PDL-2	Residence	6.4 ft	5.7 ft/s	0.22 hr





Location Map

Legend

- Dam Location
- Road Hazards
- Inundation Boundary

Depth(ft)

- 0
- 3
- 6
- 9
- 12
- 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W 95TH STREET
SUITE 280
PRAIRIE VILLAGE, KS 66207

Figure C-1

Date Saved: 03/30/2023 9:24:25 AM

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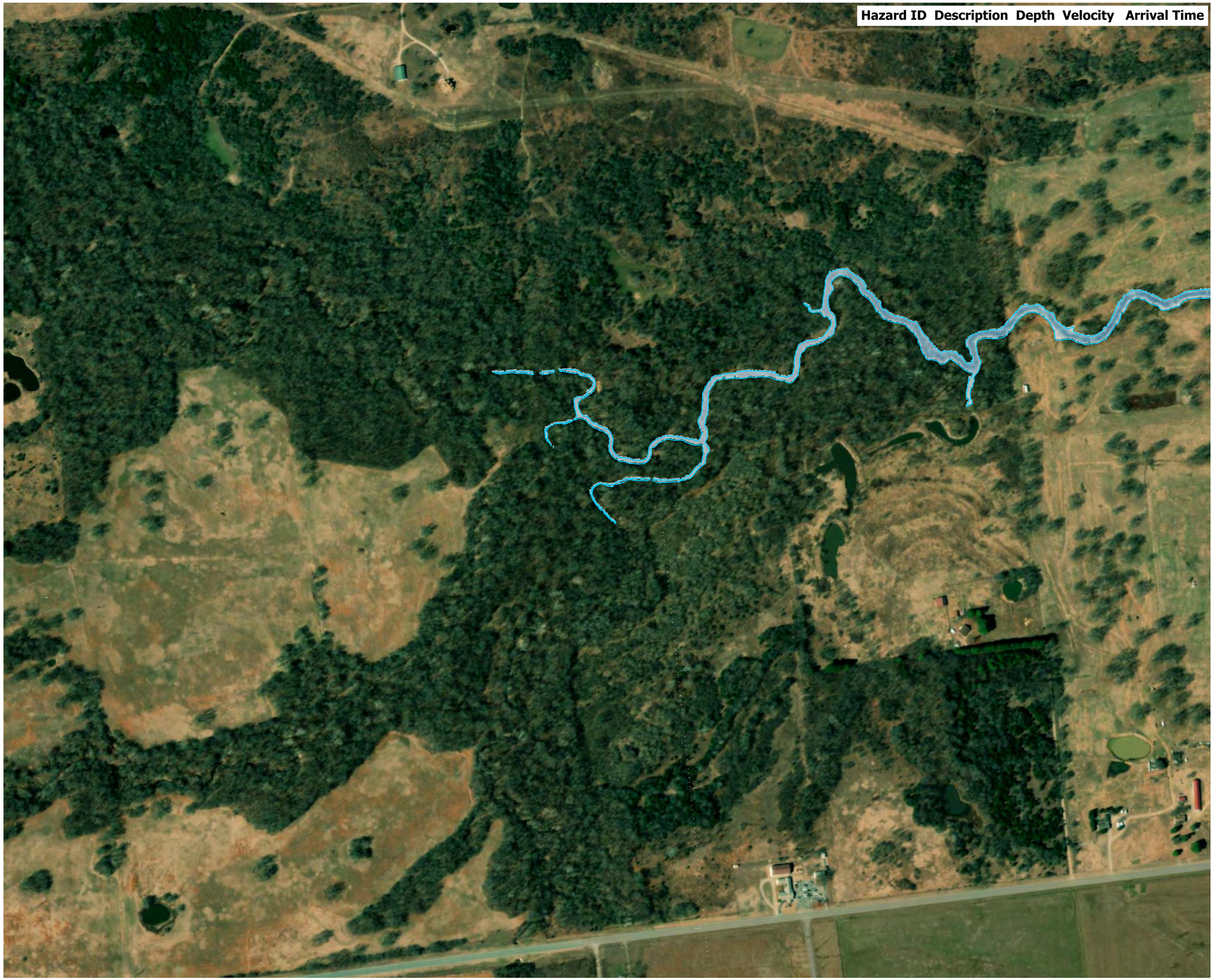

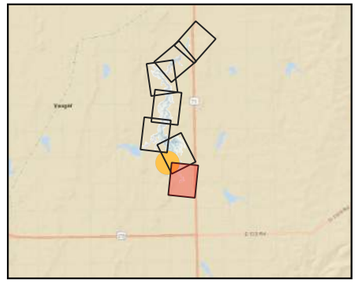

Location Map

Legend

- Inundation Boundary

Depth(ft)

- 0
- 3
- 6
- 9
- 12
- 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

W S E N

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-1

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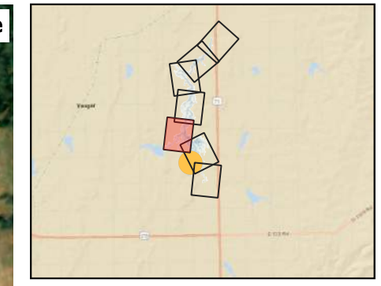
Hazard ID Description Depth Velocity Arrival Time



Location Map

Legend

- Inundation Boundary
- Depth(ft)
  - 0
  - 3
  - 6
  - 9
  - 12
  - 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

W S E N

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-1

Date Saved: 03/30/2023 9:24:39 AM

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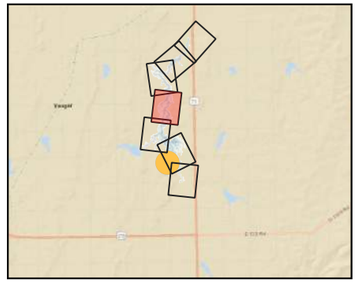
Hazard ID	Description	Depth	Velocity	Arrival Time
PDL-3	E 128 Rd	2.7 ft	0.5 ft/s	4.64 hr

PDL-3



Location Map

Legend

- Road Hazards
- Inundation Boundary

Depth(ft)

- 0
- 3
- 6
- 9
- 12
- 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

W S E N

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-1

Date Saved: 03/30/2023 9:24:45 AM

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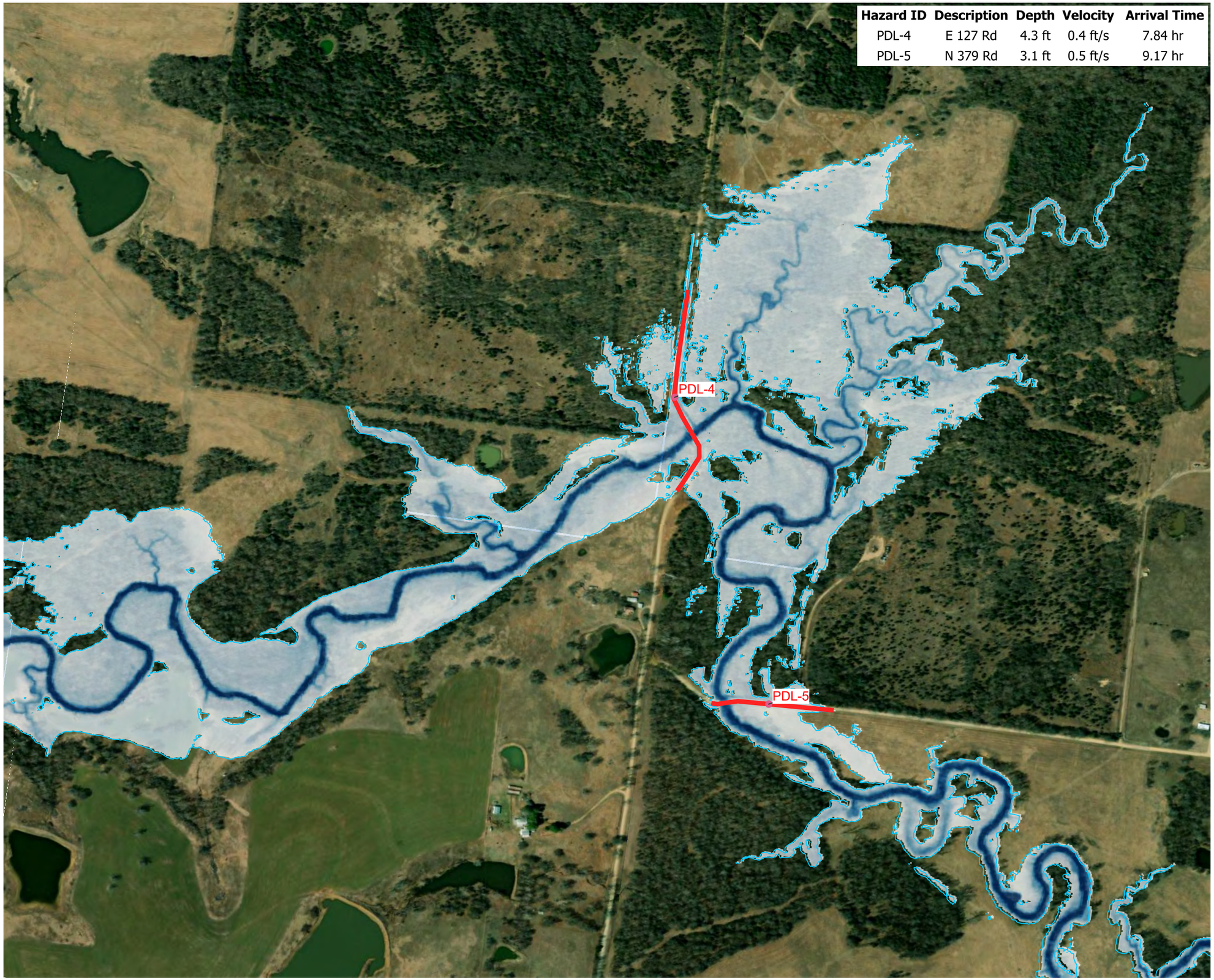
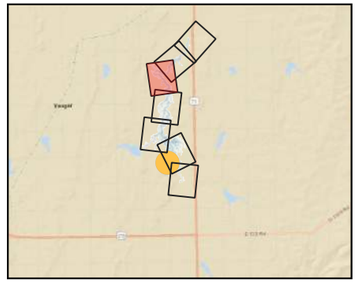
Hazard ID	Description	Depth	Velocity	Arrival Time
PDL-4	E 127 Rd	4.3 ft	0.4 ft/s	7.84 hr
PDL-5	N 379 Rd	3.1 ft	0.5 ft/s	9.17 hr





Location Map

Legend

- Road Hazards
- Inundation Boundary

Depth(ft)

- 0
- 3
- 6
- 9
- 12
- 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-1

Date Saved: 03/30/2023 9:24:51 AM

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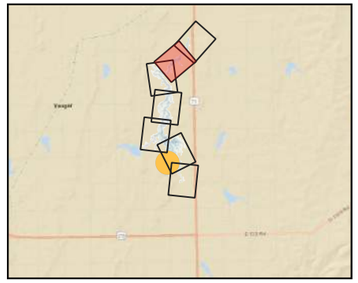
Hazard ID	Description	Depth	Velocity	Arrival Time
PDL-5	N 379 Rd	3.1 ft	0.5 ft/s	9.17 hr

PDL-5



Location Map

Legend

- Road Hazards
- Inundation Boundary

Depth(ft)

- 0
- 3
- 6
- 9
- 12
- 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-1

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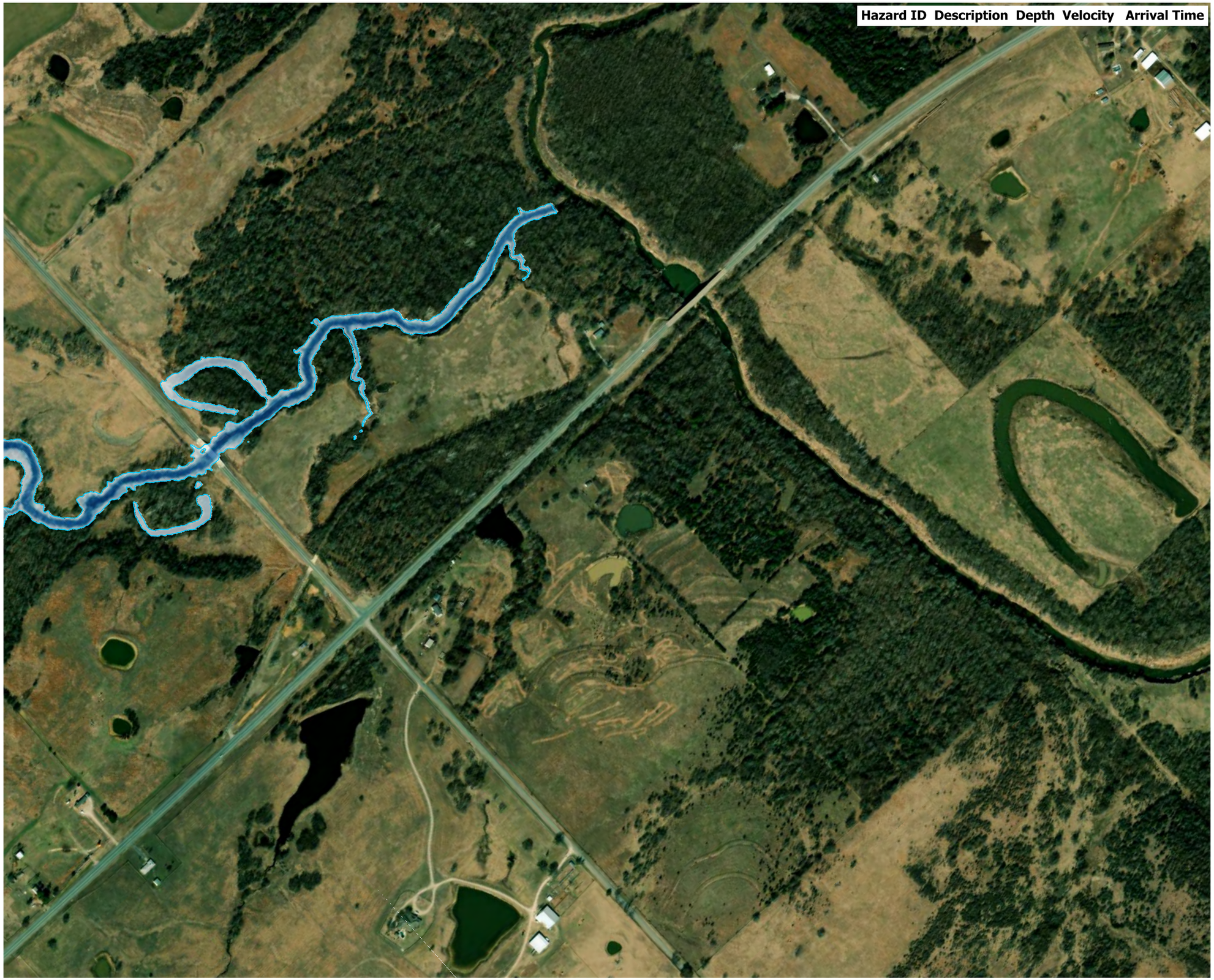

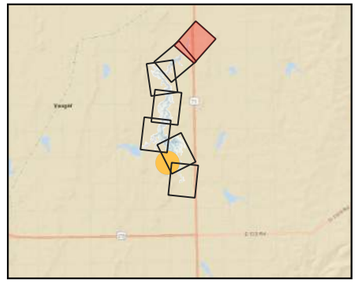

Location Map

Legend

- Inundation Boundary

Depth(ft)

- 0
- 3
- 6
- 9
- 12
- 15

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	March 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Inundation_Map
PREPARED BY	Tyler Banschoter

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

BREACH INUNDATION MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-1

Date Saved: 03/30/2023 9:25:07 AM

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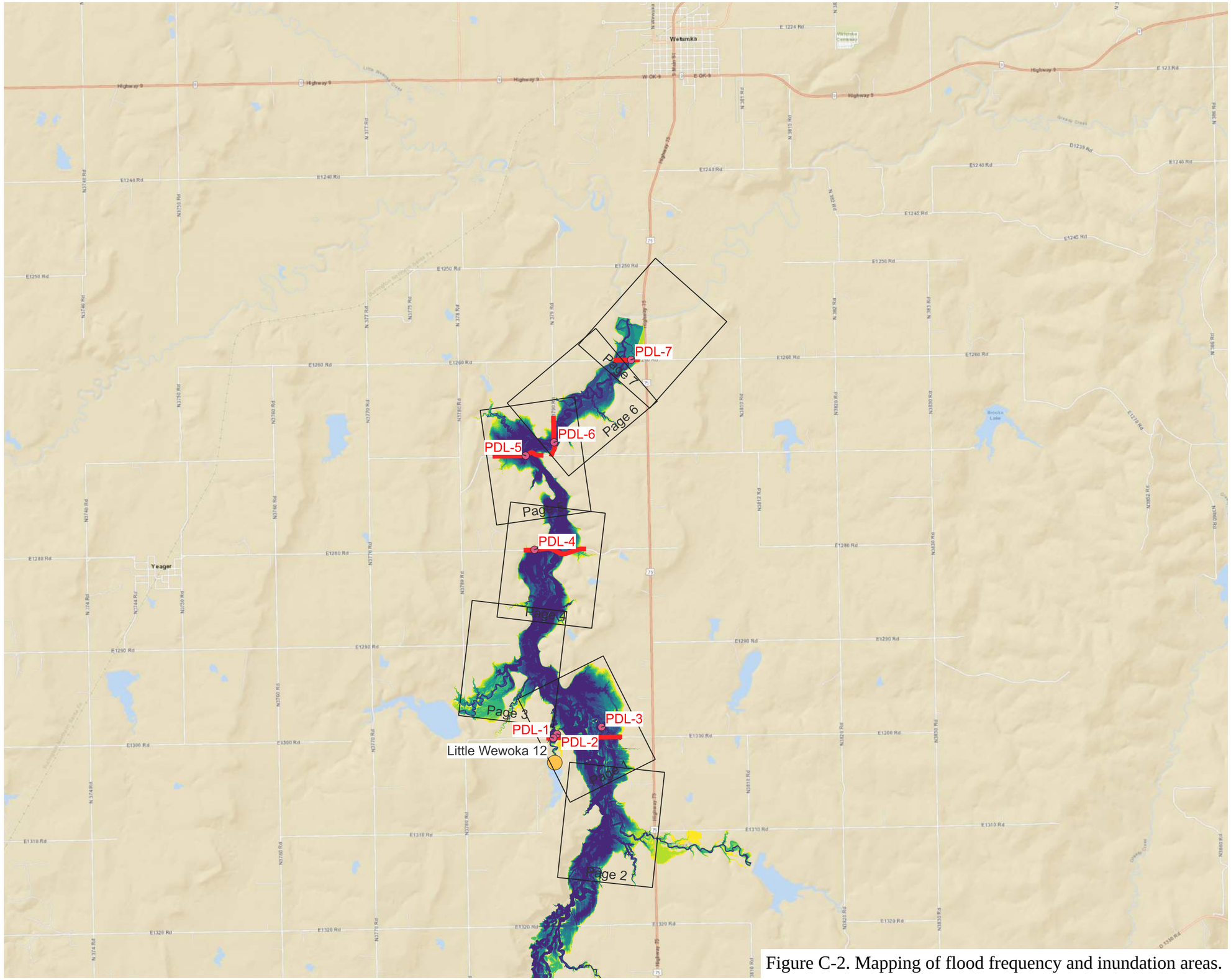


Figure C-2. Mapping of flood frequency and inundation areas.

Legend

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP
- Pages
- Dam Location
- Road Hazards

Location Map

Hazard ID	Note	Flood Risk
PDL-1	E 130 Rd	50%- AEP
PDL-2	Residence	0.1% - AEP
PDL-3	Residence	2% - AEP
PDL-4	E 128 Rd	50%- AEP
PDL-5	E 127 Rd	50%- AEP
PDL-6	N 379 Rd	50%- AEP
PDL-7	E 1260 Rd	0.2% - AEP

0 1 2 mi

MRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

N W E S

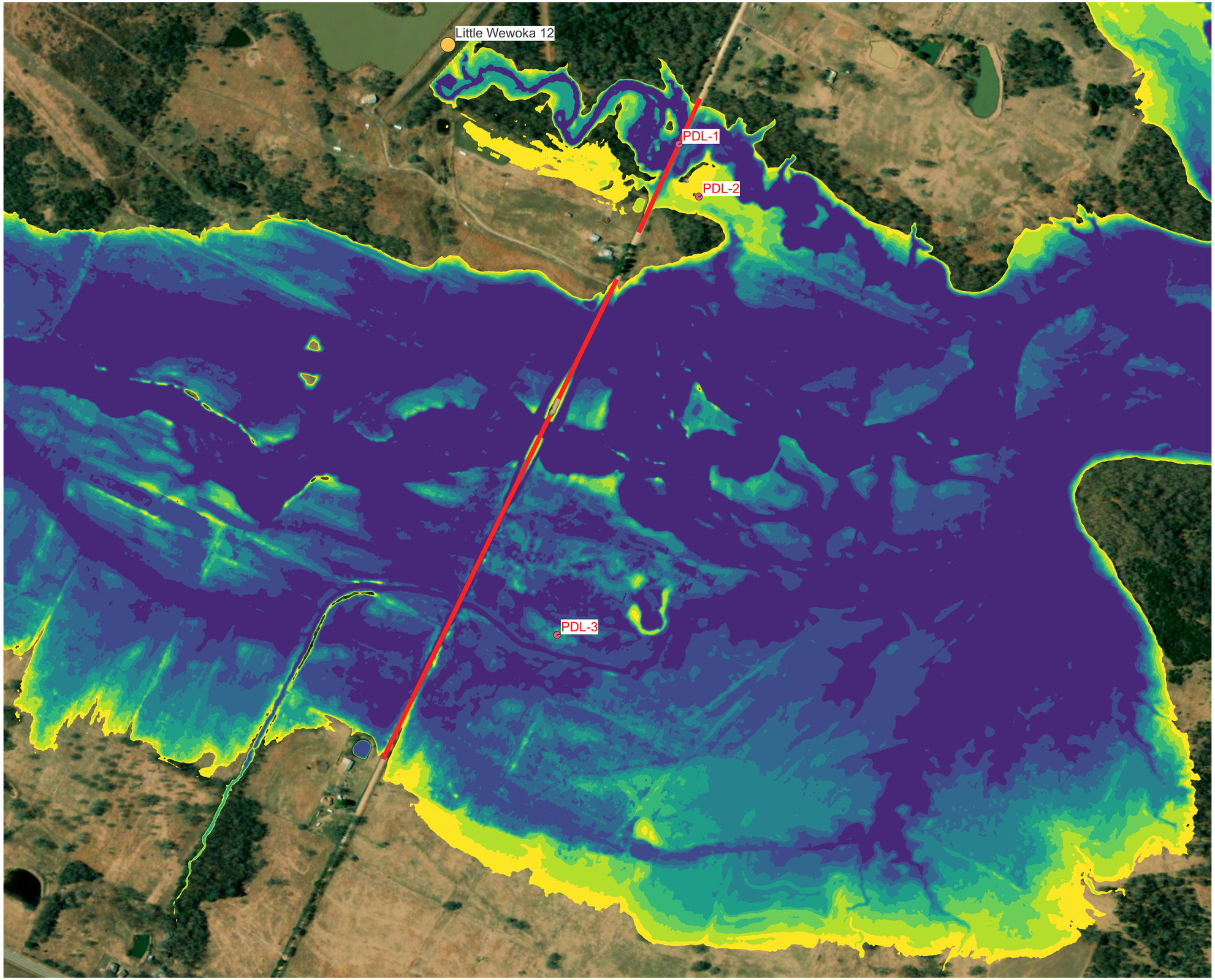
LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

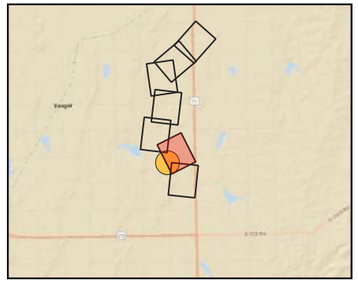
FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 250
PRAIRIE VILLAGE, KS 66207

Figure C-2

Index





Location Map

Legend

- Flood Hazard Points
- Dam Location
- Road Hazards

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID	Note	Flood Risk
PDL-1	E 130 Rd	50%- AEP
PDL-2	Residence	0.1% - AEP
PDL-3	Residence	2% - AEP

0 500 1,000 ft

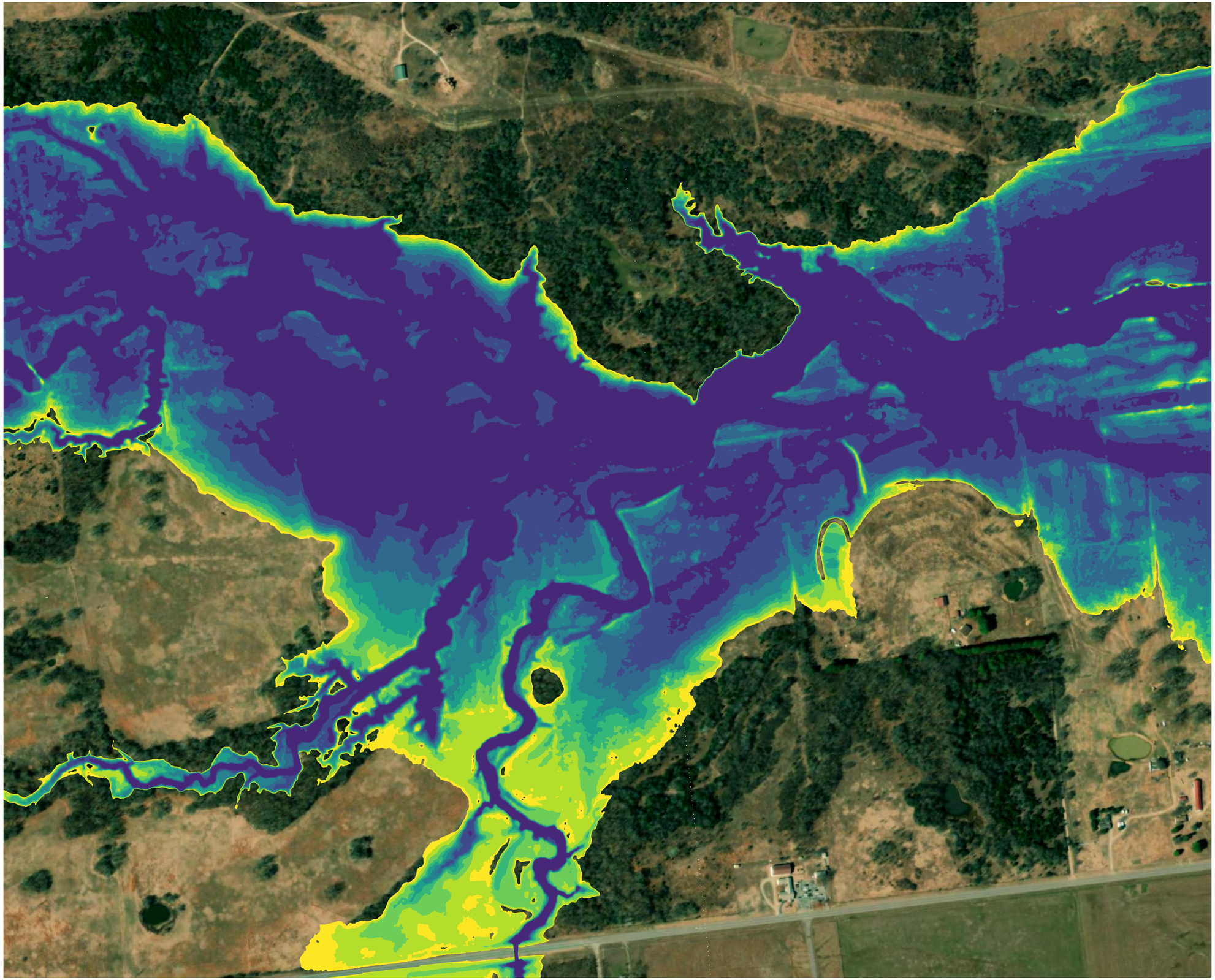
WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

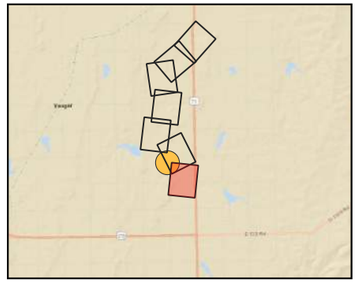
LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 280
PRAIRIE VILLAGE, KS 66207

Figure C-2





Location Map

Legend

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID Note Flood Risk

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

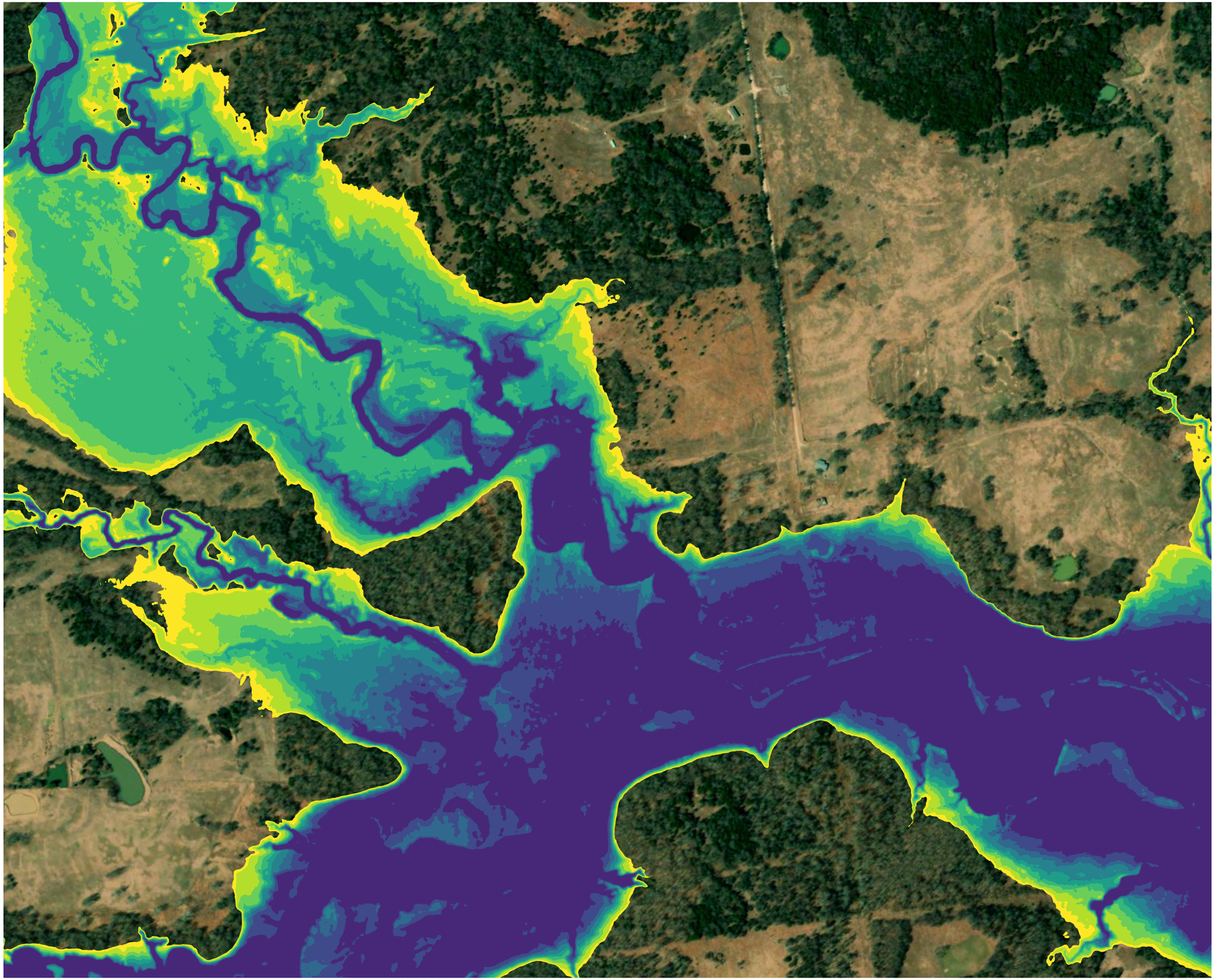
W S E N

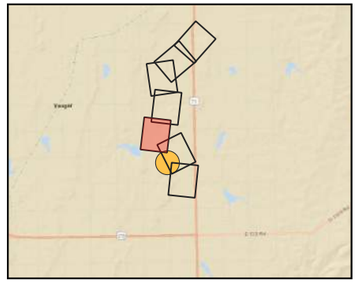
LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-2





Location Map

Legend

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID Note Flood Risk

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

W S E N

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-2

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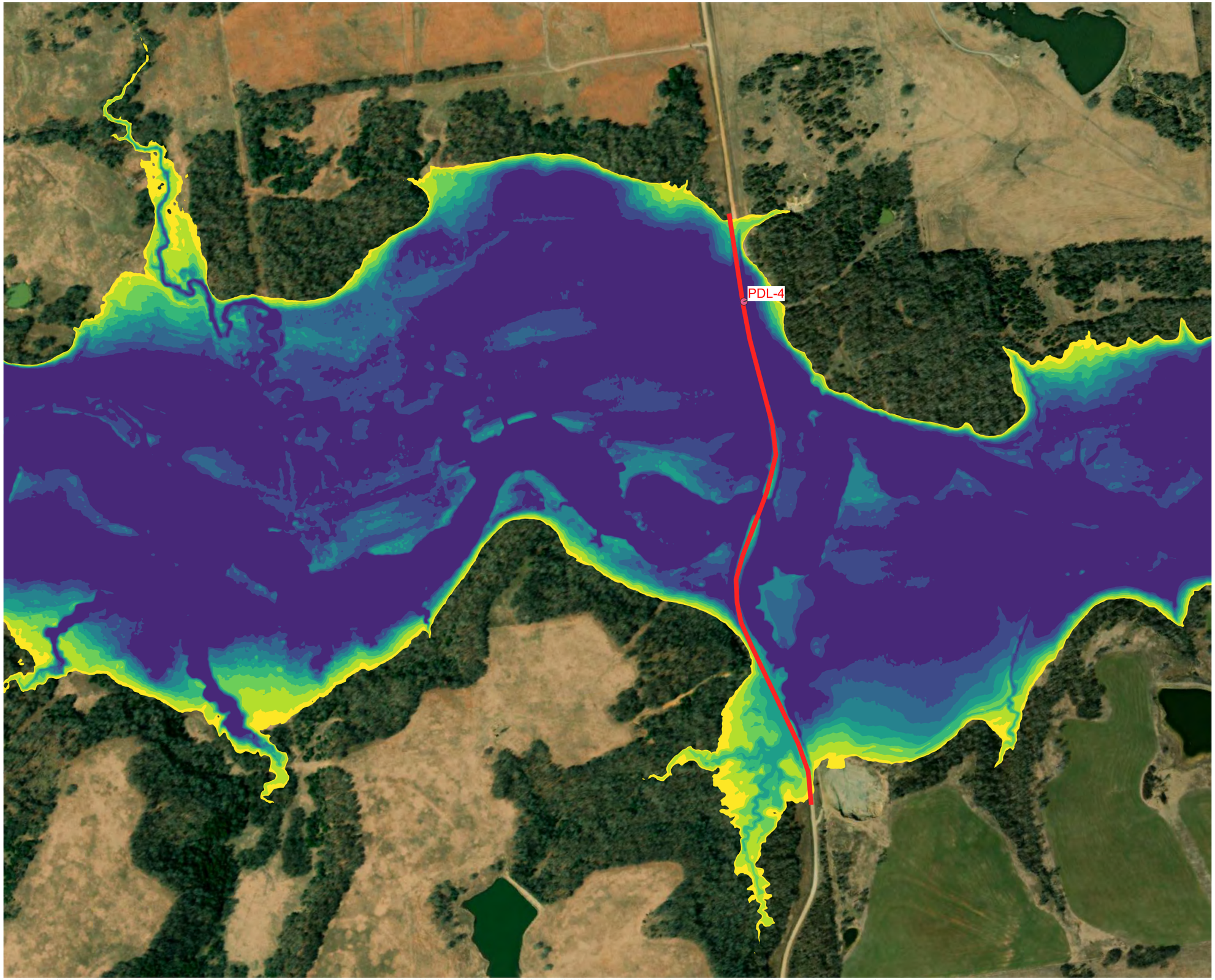

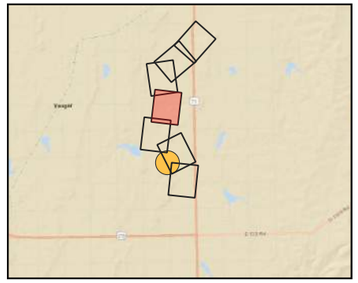

Location Map

Legend

- Flood Hazard Points
- Road Hazards

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID	Note	Flood Risk
PDL-4	E 128 Rd	50%- AEP

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

W S E N

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-2

Date Saved: 07/21/2023 14:09:48 PM

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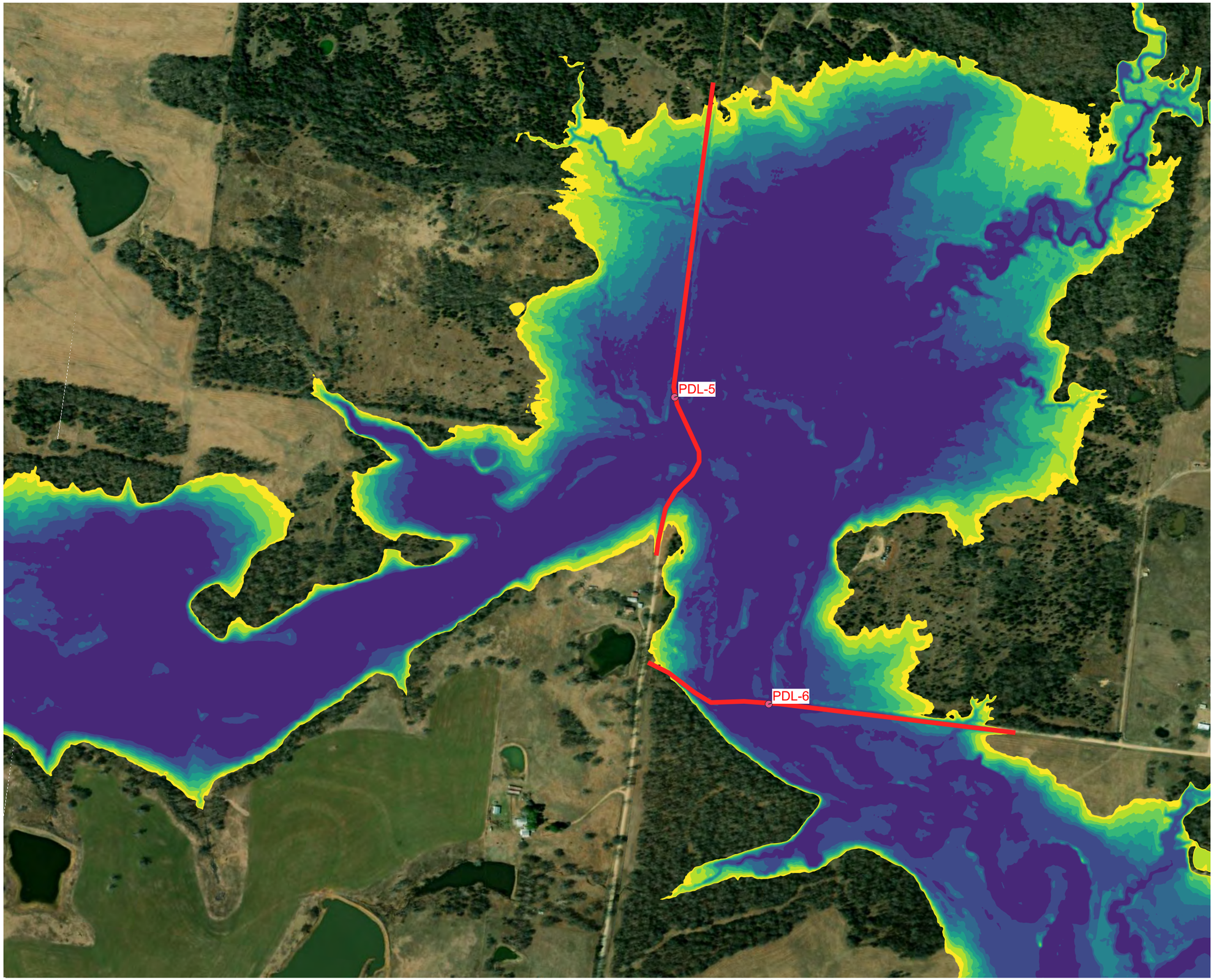
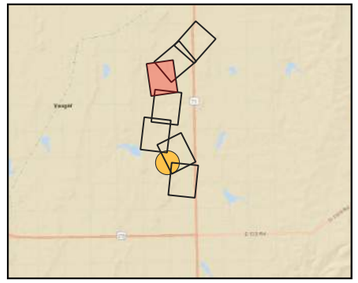




Location Map

Legend

- Flood Hazard Points
- Road Hazards

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID	Note	Flood Risk
PDL-5	E 127 Rd	50%- AEP
PDL-6	N 379 Rd	50%- AEP

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

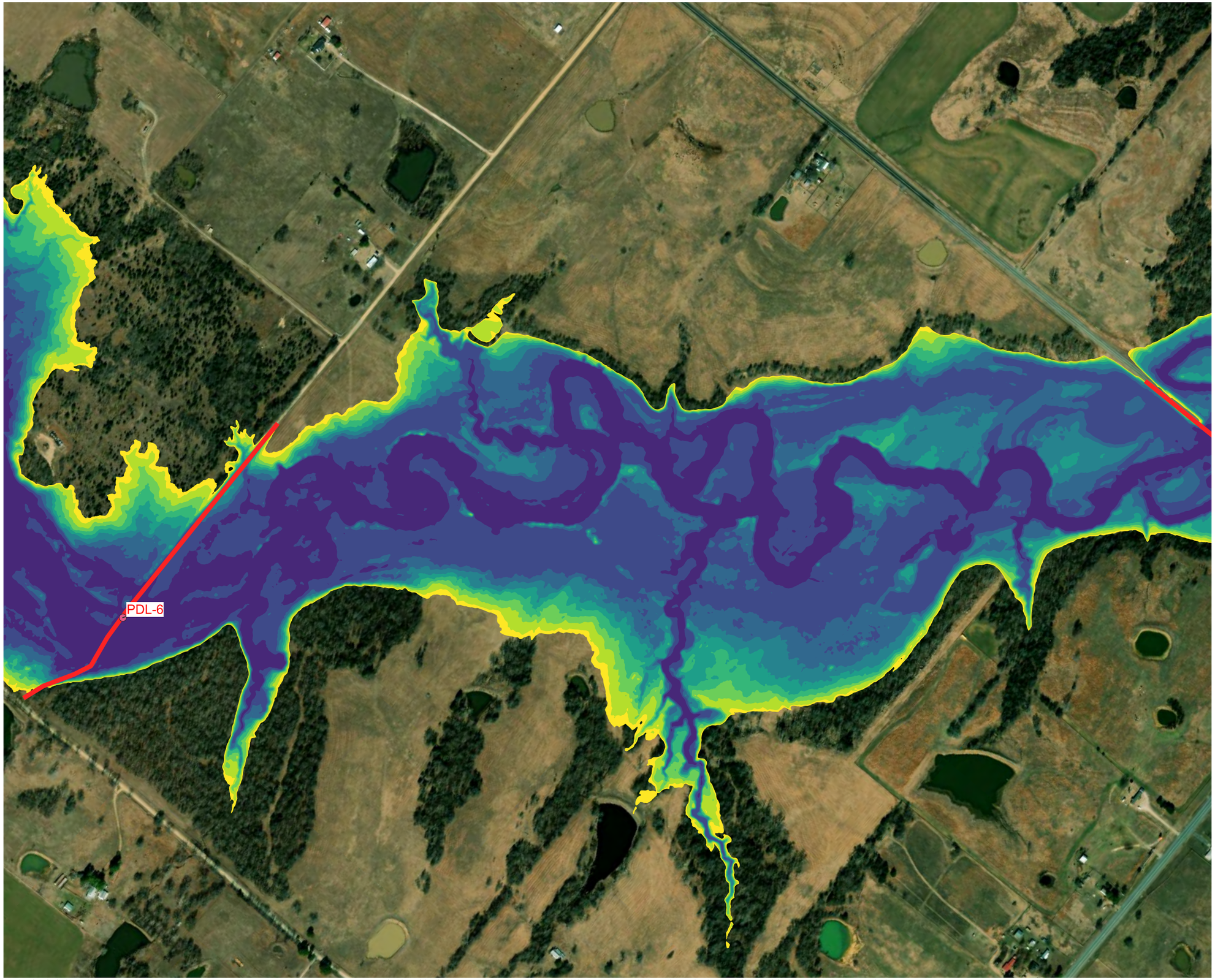
W S N E

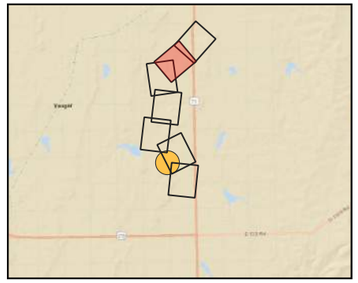
LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-2





Location Map

Legend

- Flood Hazard Points
- Road Hazards

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID	Note	Flood Risk
PDL-6	N 379 Rd	50%- AEP

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 280
PRAIRIE VILLAGE, KS 66207

Figure C-2

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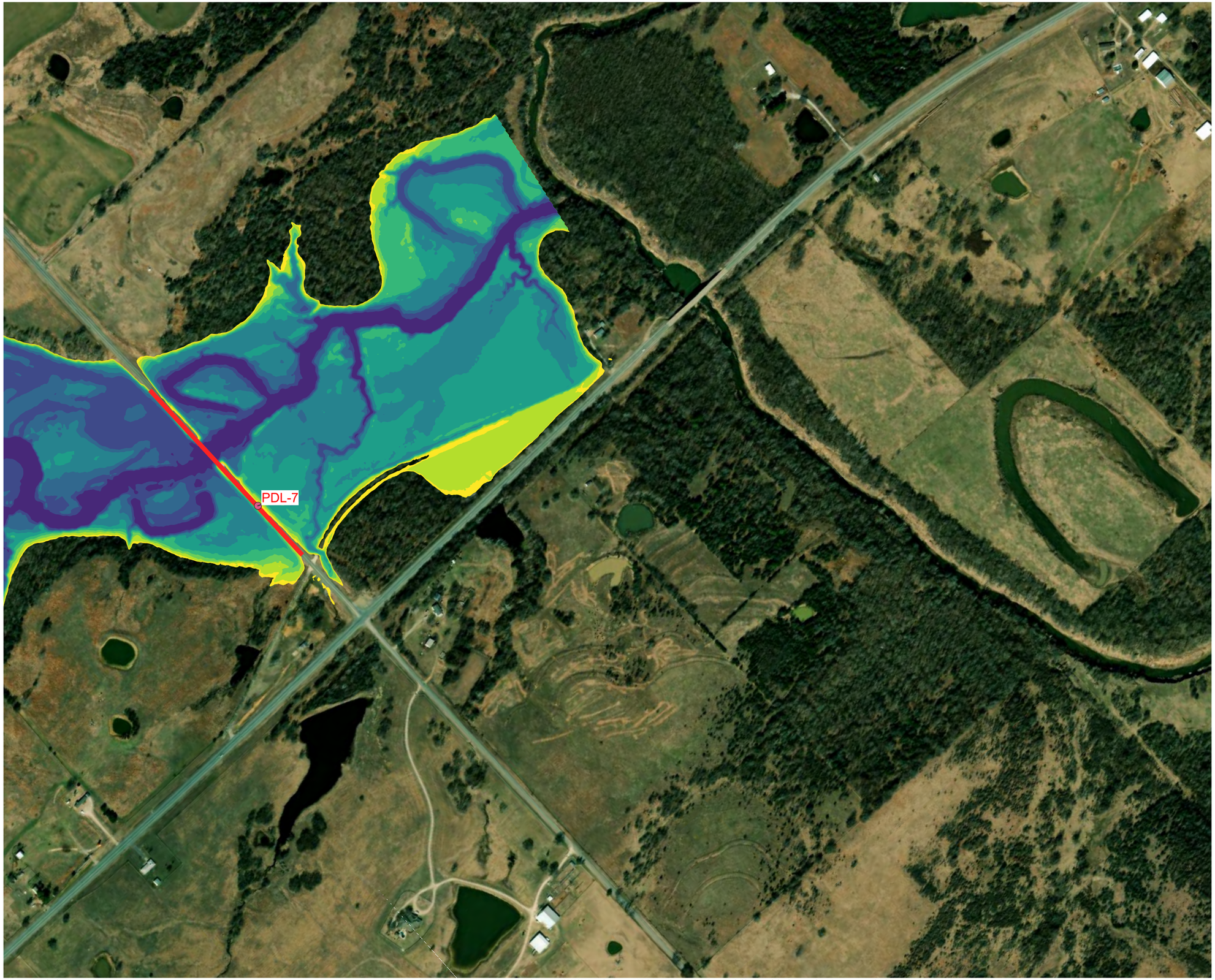
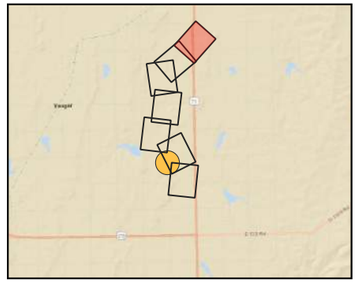




Location Map

Legend

- Flood Hazard Points
- Road Hazards

Frequency Flood Extents

- 0.1% - AEP
- 0.2% - AEP
- 0.5% - AEP
- 1% - AEP
- 2% - AEP
- 4% - AEP
- 10% - AEP
- 20% - AEP
- 50% - AEP

ESRI World Imagery

Hazard ID	Note	Flood Risk
PDL-7	E 1260 Rd	0.2% - AEP

0 500 1,000 ft

WRS PROJECT NO.	2023003
DATE CREATED	July 2023
DATUM & COORDINATE SYSTEM	NAD83 / Oklahoma South (ftUS)
FILE NAME	Name: LW12_Frequency_Flood_map
PREPARED BY	Tyler Benschoter

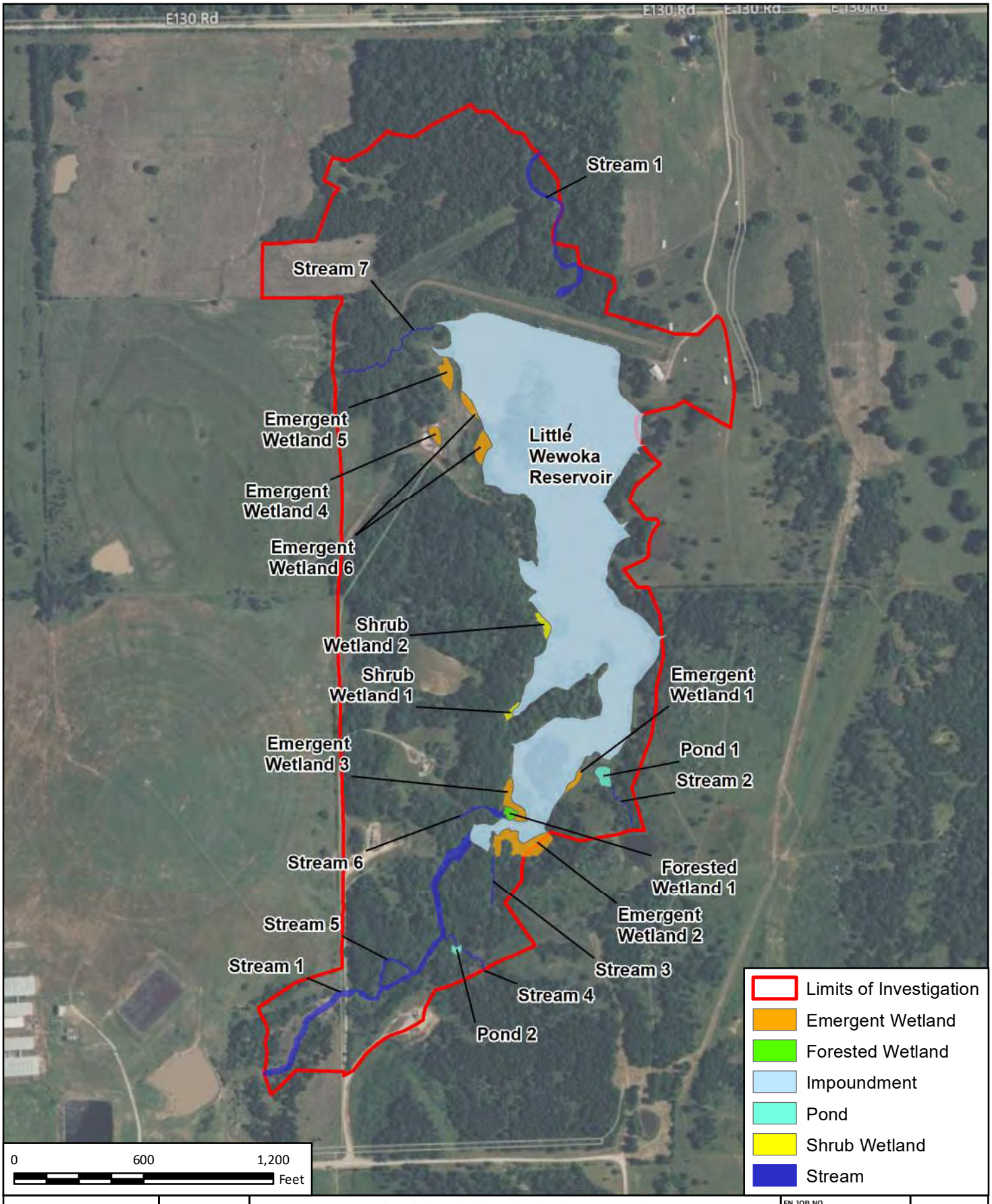
N E S W

LITTLE WEWOKA SITE #12 FLOOD PROTECTION DAM

FLOOD FREQUENCY MAP

WATER RESOURCES SOLUTIONS
5000 W. 95TH STREET
SUITE 230
PRAIRIE VILLAGE, KS 66207

Figure C-2



FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

AD ASTRA COLLABORATIVE, LLC

Little Wewoka 12 SWP-EE

Figure C-3. Map of waterbodies in the project area.

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FILE NAME	Fig3_Waterbodies.mxd
DATE	7/6/2023
DESIGNED	MK
DRAFTED	MK

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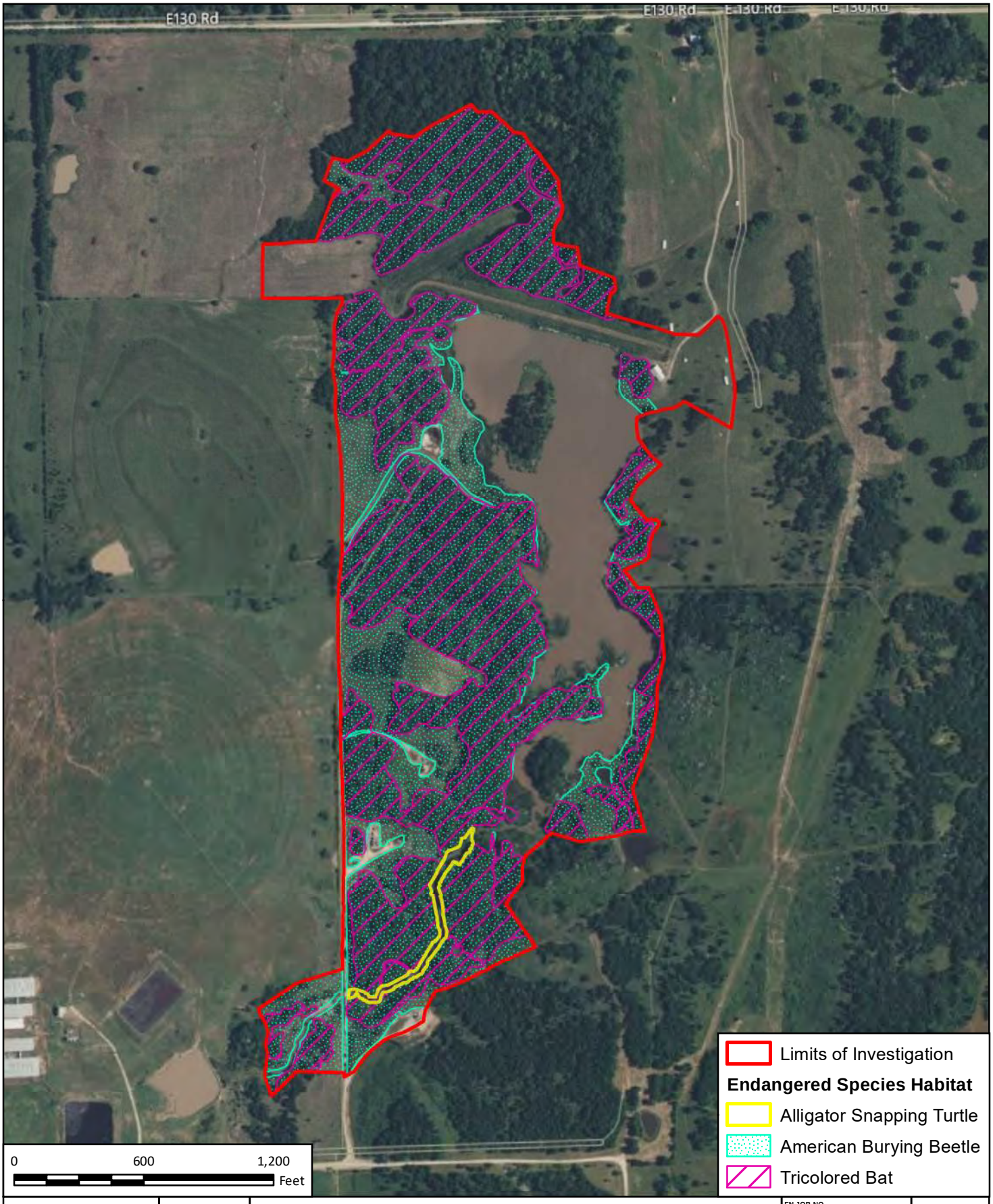

FREESE AND NICHOLS
FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

N W E S

AD ASTRA COLLABORATIVE, LLC

Little Wewoka 12 SWP-EE

Figure C-4. Map of T&E species habitats in the project area.

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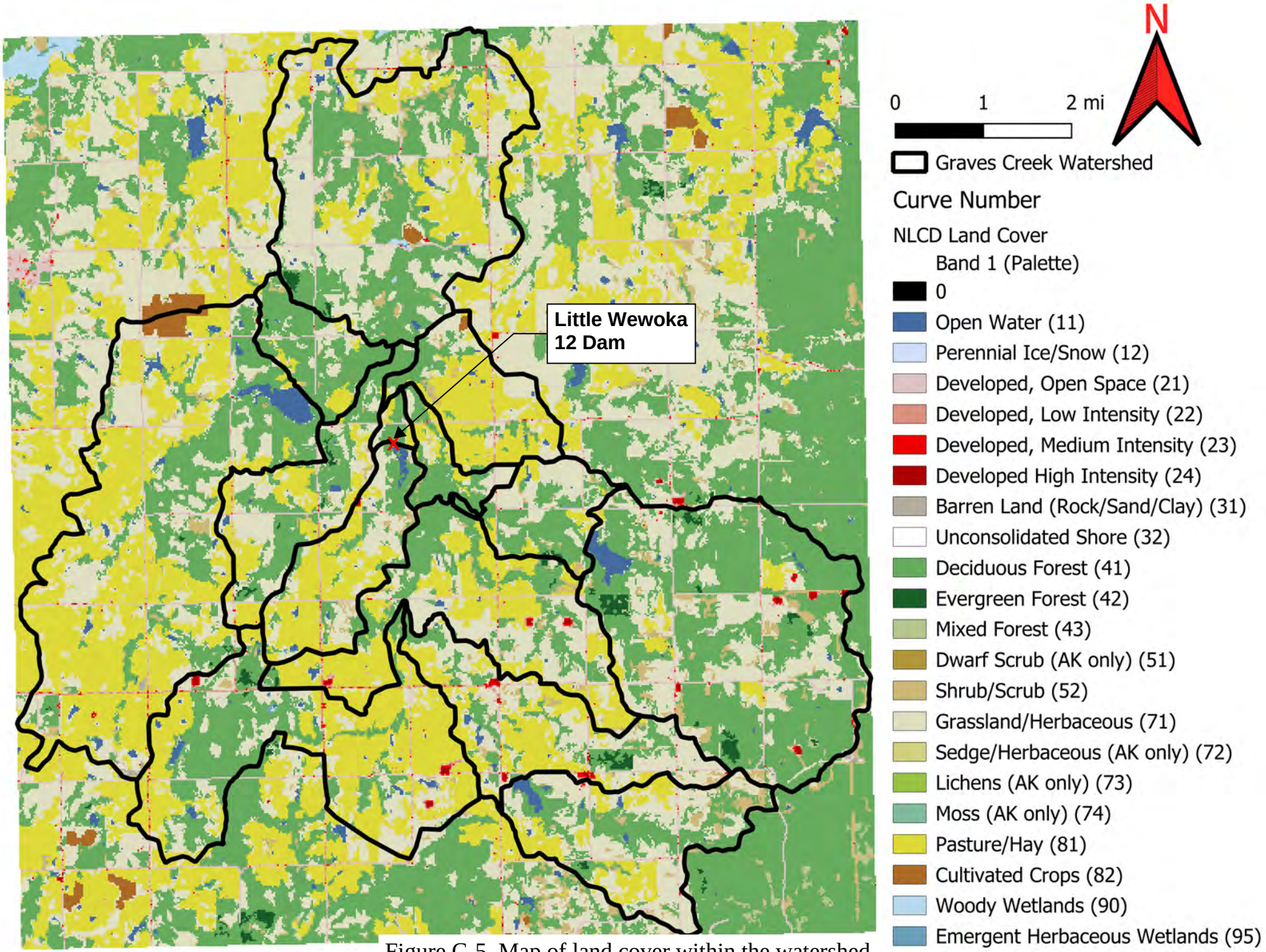

Figure C-5. Map of land cover within the watershed.

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CHANNEL RESTORATION AREA

RESERVOIR RESTORATION AREA

REMOVE PRINCIPAL SPILLWAY INLET TOWER

ABANDON EXISTING AUXILLIARY SPILLWAY

PROPOSED DAM NOTCH
CHANNEL BOTTOM WIDTH = 18'

REMOVE PRINCIPAL SPILLWAY CONDUIT

TOP OF DAM
ELEV.= 780.00

0 150 300 Feet

CHANNEL RESTORATION

RESORVOIR RESTORATION

PROPOSED DAM NOTCH

EXISTING AUX. SPILLWAY

TOP OF DAM OUTLINE

ALTERNATIVE NO. 1: DECOMMISSION
LITTLE WEWOKA FLOODWATER RETARDING STRUCTURE SITE NO 12
GRAVES CREEK WATERSHED
HUGHES COUNTY, OKLAHOMA

		Date
Designed	KMR	11-23
Drawn	CJD	7-23
Revised	CJD	11-23
Approved	XX	XX

United States Department of Agriculture
Natural Resources Conservation Service

E-File Location:
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Drawing No.
OK-001

Sheet 01 of 01

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Figure C-6. Alternative No.1: Decommissioning.

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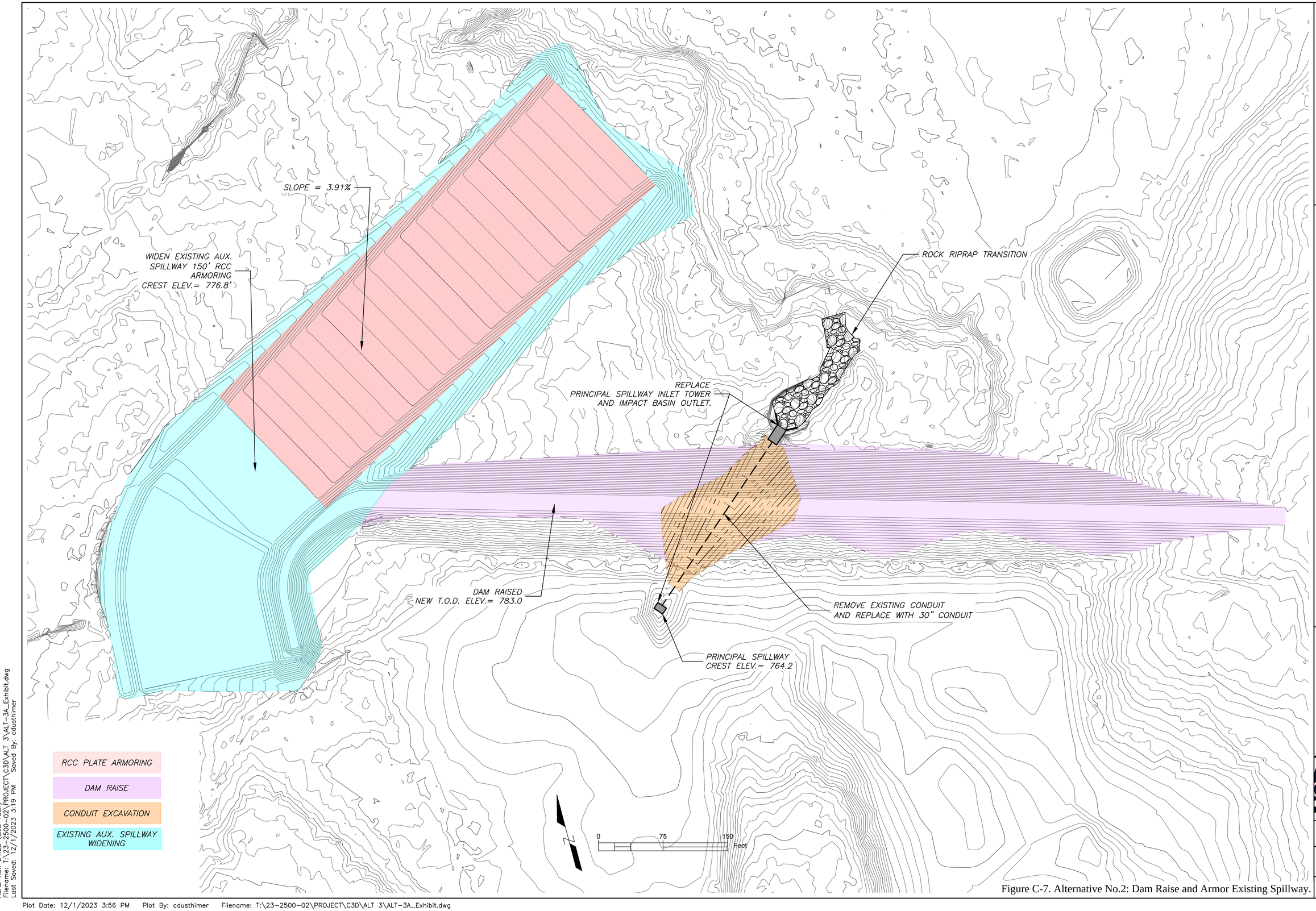

Figure C-7. Alternative No.2: Dam Raise and Armor Existing Spillway.

	Designed	Drawn	Revised	Approved
	KMR	CJD	CJD	XX
Date	11-23	7-23	11-23	XX

ALTERNATIVE NO. 2: DAM RAISE AND SPILLWAY WIDENING
LITTLE WEWOKA FLOODWATER RETARDING STRUCTURE SITE NO 12
GRAVES CREEK WATERSHED
HUGHES COUNTY, OKLAHOMA

United States Department of Agriculture
Natural Resources Conservation Service

E-File Location:
ALT-3A_EXHIBIT.DWG

Drawing No.
OK-001

Sheet 01 of 01

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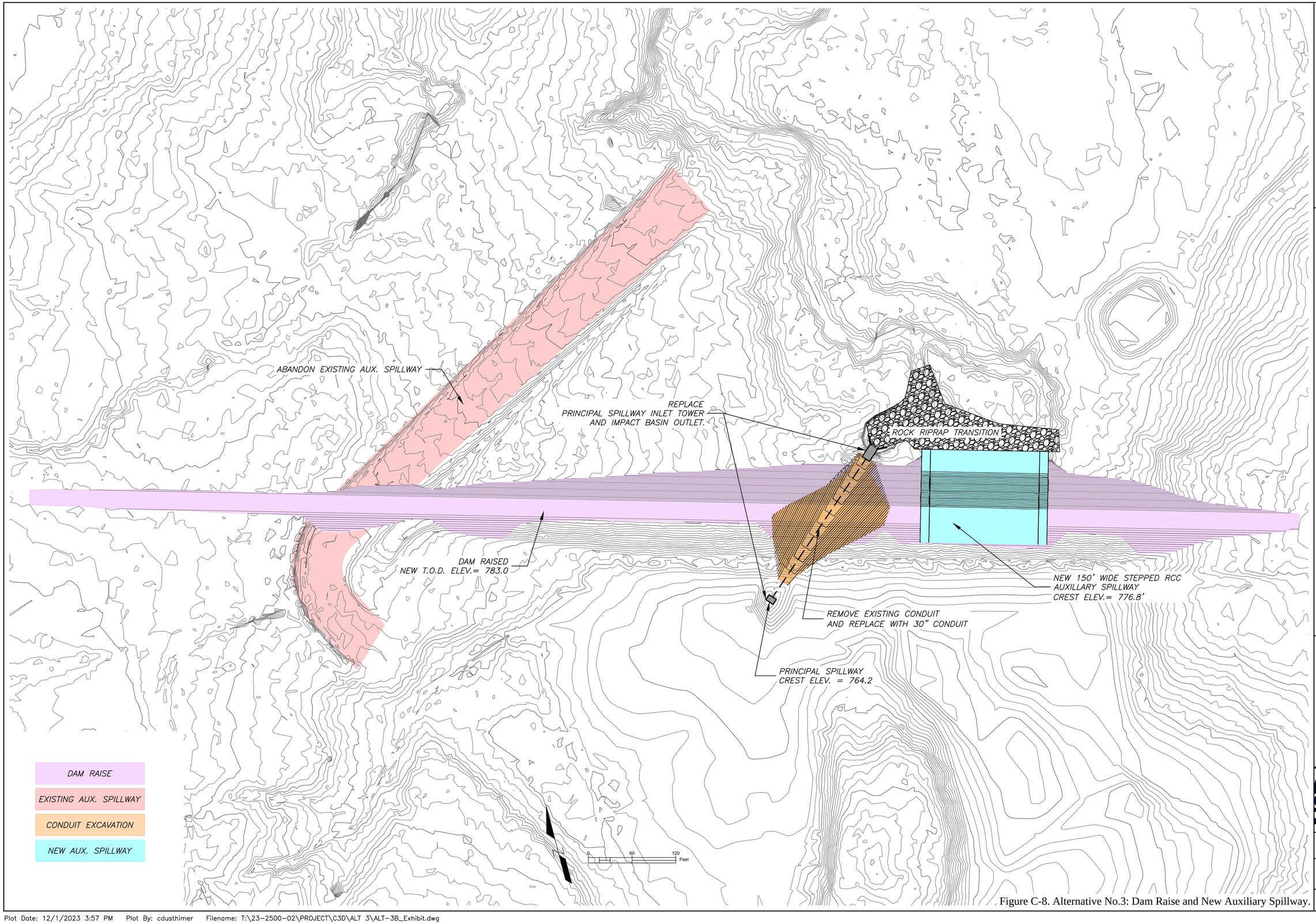

Figure C-8. Alternative No.3: Dam Raise and New Auxiliary Spillway.

	Designed	Drawn	Revised	Approved
	KMR	CJD	CJD	XX
Date	11-23	7-23	11-23	XX

ALTERNATIVE NO. 3: DAM RAISE AND SPILLWAY WIDENING
LITTLE WEWOKA FLOODWATER RETARDING STRUCTURE SITE NO 12
GRAVES CREEK WATERSHED
HUGHES COUNTY, OKLAHOMA

United States Department of Agriculture
Natural Resources Conservation Service

E-File Location:
ALT-3B_EXHIBIT.DWG

Drawing No.
OK-001

Sheet 01 of 01

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APPENDIX D
INVESTIGATIONS AND ANALYSES REPORT

APPENDIX D

INVESTIGATIONS AND ANALYSES REPORT

1.0 PLANNING ENGINEERING

1.1 BACKGROUND

Little Wewoka Creek – Graves Creek Watershed Floodwater Retarding Structure No. 12 (Little Wewoka Site 12) is a single purpose flood retarding structure designed and constructed in 1959, as a low hazard dam. Located about 8 miles south of Wetumka, Oklahoma, the structure is roughly 74 miles east-southeast of Oklahoma City and 73 miles south-southwest of Tulsa. The original watershed work plan under which Little Wewoka Site 12 was installed by authority of the Watershed Protection and Flood Prevention Act was developed in 1955 and called for the construction of 17 additional floodwater retarding structures. Two of the three original sponsoring local organizations, the Seminole County Conservation District and the Okfuskee County Conservation District, have now relinquished sponsorship, leaving sole local sponsorship with the Hughes County Conservation District.

Little Wewoka Site 12's 37-foot tall rolled-earthen fill embankment controls 1,366 acres of drainage. It has an 18-inch diameter reinforced concrete principal spillway conduit and a 70-foot-wide auxiliary spillway. Both NRCS and the Oklahoma Water Resources Board's dam safety program now classify Little Wewoka Site 12 as a high hazard dam. To meet the need to comply with NRCS and State dam safety regulations while maintaining the project's original flood damage risk reduction purpose, the local sponsor has developed and assessed several alternatives in this study.

Engineering work items completed as part of this planning study included the following. Additional detailed information is provided on selected items in subsequent sections:

- Reviewing and documenting the sponsoring local organization's goals and objectives.
- Reviewing the purpose(s) and need for the project.
- Performing inspections and topographic surveys to evaluate the dam.
- Performing hydrologic and hydraulic (H&H) analyses to determine flood prevention/protection needs, to evaluate the dam, and to formulate and evaluate alternatives.
- Conducting H&H analyses for TR-60 and state design floods and for a range of flood recurrence intervals to identify criteria deficiencies of the existing dam's capacity, stability, and integrity.
- Identifying resource problems and opportunities.
- Identifying social issues.

- Performing any necessary geologic and geotechnical investigations to evaluate alternatives for comparison.
- Consulting with involved agencies to scope the project.
- Developing and executing a public participation plan.
- Inventorying and evaluating the environmental, economic, and social resources in the watershed.
- Performing engineering analysis of proposed alternatives per NRCS requirements, including embankment stability analyses, analysis of reservoir sediment capacity and projected sedimentation rates, hydraulic analyses to determine impacts of a dam failure, and hydraulic analyses to determine downstream impacts of alternatives.
- Developing conceptual figures and cost estimates for plan alternatives.
- Identifying the net monetized benefits for all alternatives and the alternative with the greatest net monetized benefits.
- Identifying the preferred alternative that reasonably maximizes net public benefits to society.
- Preparing a supplemental watershed plan and environmental assessment document for the project sponsors.

1.2 PURPOSE OF THIS INVESTIGATIONS AND ANALYSES REPORT

This document summarizes the procedures, techniques, assumptions, and the scope and intensity of the investigations and analyses completed for the plan engineering of Little Wewoka 12. The following documents state in detail the assumptions, investigations, and analyses performed, and the conclusions developed:

- USDA-NRCS-Oklahoma, Little Wewoka 12 Survey Notes, February 17, 2023.
- GFAC Engineering, Geologic Investigation Report: Little Wewoka Watershed Floodwater Retarding Dam No. 12 Hughes County, Oklahoma, September 22, 2023.
- USDA-NRCS-Oklahoma, ENG—Soil Mechanics—Oklahoma (WRHB): Little Wewoka Site 12—Planning Phase, Hughes County, February 14, 2024.
- USDA-NRCS-Oklahoma, ENG—Soil Mechanics—Oklahoma (WRHB): Little Wewoka Site 12—Auxiliary Spillway Summary, Hughes County, August 23, 2023.
- Ad Astra Collaborative, Alternatives Analysis: Little Wewoka Site 12. March 2024.
- Ad Astra Collaborative. Hydrologic and Hydraulic Evaluation of Existing Dam: Phase I.
- USDA-NRCS Oklahoma, Little Wewoka Creek – Graves Creek Watershed Floodwater Retarding Structure No. 12 Dam Assessment Report, September 2021.
- Ad Astra Collaborative. Hydrologic Analysis and Frequency-based Floods Routing: Phase I, August 1, 2023.

- Ad Astra Collaborative. Breach Inundation Analysis and Hazard Classification Evaluation: Phase I, August 24, 2023.
- Freese and Nichols, Inc., Ecological Resources Inventory and Analysis: AAC23107—Little Wewoka 12, July 21, 2023.
- Stantec Consulting Services, Archaeological Resources Survey Report – Little Wewoka Site 12 Dam, Hughes County, Oklahoma, October 2023.
- Stantec Consulting Services, Architectural Resources Survey Report – Little Wewoka Site 12 Dam, Hughes County, Oklahoma, October 2023.
- Freese and Nichols, Inc., Economic Analysis Methodology for Little Wewoka Dam No. 12, February 4, 2025.

Current NRCS criteria and standards provided the basis for the plan engineering investigations and analysis and include the following:

- Natural Resources Conservation Service National Engineering Handbook Part 631 Chapter 2 – Engineering Geologic Investigations
- USDA Technical Release 210-60 – Earth Dams and Reservoirs, March 2019
- Title 180 Part 500 National Operations and Maintenance Manual
- Title 190, Part 410, General Manual
- Title 210 Part 500 National Engineering Manual
- Title 390 Part 500 National Watershed Program Manua
- Title 400 General Manual, Part 400 - Public Participation Policy
- Economic and Environmental Principles, Requirements and Guidelines for Water and Related Land Resources Implementation Studies (PR&G)
- Department Manual 9500-013 for PR&G
- Title 180 Part 600 National Planning Procedures Handbook
- Title 190 Part 610 National Environmental Compliance Handbook
- Title 190 Part 601 National Cultural Resources Procedures Handbook
- Title 200 National Resource Economics Handbook Part 611 Water Resources
- Title 200 Economics Technical Notes
- Title 210 Engineering Technical Releases
- Title 210 Engineering Technical Notes
- Title 210 National Engineering Handbooks
- Title 450 National Handbook of Conservation Practices
- Title 390 Part 600 National Watershed Program Handbook

1.3 TOPOGRAPHICAL SURVEY AND MAPPING

Over a period of six days between January 23 and February 13, 2023, staff members of NRCS-Oklahoma conducted bathymetric and topographic survey of the project site and structures, as well as four roads downstream and two nearby houses. Site photography was collected, including downstream roads and bridges. Project coordinates were based on the Oklahoma State Plane Coordinate System, Zone 14, NAD 83 National Grid Designator 14SQD4851595736. An additional topographic survey to establish elevation at the top of geotechnical testing bore holes was conducted by NRCS staff. Surface coordinates and elevation of each test hole were surveyed by NRCS during the week of May 15, 2023, after completion of field exploration operations. The provided coordinates are in NAD83 (2011) OK South Zone State Plane Coordinates.

The drainage basins to Little Wewoka 12, the dams upstream of Little Wewoka 12, and the major tributaries downstream of Little Wewoka 12 were delineated from U.S. Geological Survey digital elevation model data obtained from Oklahoma Maps website (https://okmaps.org/) using the WhiteboxTools plugin for the QGIS geographic information system. The most current data, from the 2013 digital elevation model, was used. This data was provided in six different rasters, and they were merged into one file. The native coordinate for these files was Oklahoma South State Plane, and the vertical data was in meters. A total of 14 drainage basins were delineated. These drainage basins were selected because runoff from these basins drains to the Little Wewoka 12 reservoir or to Graves Creek downstream of Little Wewoka 12. The 14 approximate drainage basins were then hand-verified using the contours and aerial imagery to correct regions where the program incorrectly accounted for road crossings and terraced cropland.

1.4 SEDIMENTATION ANALYSIS

A bathymetric survey was conducted in February 2023 to determine the existing available sediment storage and the sedimentation rate. The sedimentation rate was calculated by comparing the sediment storage volume (at sediment pool elevation) provided on the as-built drawings (November 1958) to the calculated storage volume using the bathymetric survey data at the same sediment pool elevation. The difference in storage volumes over the number of days between the as-built drawings and the bathymetric survey provided the daily sedimentation rate. The daily sedimentation rate was then used to determine the annual sedimentation rate. The projected 100-year sediment capacity was calculated using the annual sedimentation rate over 100 years. The projected 100-year sediment volume capacity was then compared to the design 100-year sediment volume capacity to complete the sedimentation analysis.

Estimates for erosion and sedimentation were included in the original work plan for the Little Wewoka Watershed (USDA 1955), but these estimates were not separated by the individual flood control structures. To maintain consistency with the original watershed plan, erosion and sedimentation damages were not independently estimated by flood control structure for this study. The following assumptions were used in order to include these damages in the economic analysis:

• Erosion and sedimentation damage estimates in the original work plan for the Little Wewoka watershed were assumed to be representative of the present conditions. Although significant development has occurred in the study area, it does not appear to have caused a significant change to the stream channels, except for the addition of some culverts and bridges. The stream channels downstream of Little Wewoka Dam No. 12 do not appear to be noticeably modified based on aerial imagery and historical USGS topographic maps. The upstream watershed contributing to Little Wewoka Dam No. 12 has met some development; however, the sedimentation rate originally estimated in the watershed plan has proven to be a significant overestimation. Thus, the damage values were adjusted to reflect the decreased sedimentation rate. Land treatment measures included in the work plan were not included in the original flood damage reduction benefits.

• Erosion and sedimentation damages are generally proportional to watershed area.

• Erosion and sedimentation damages generally change in cost over time according to the US GDP implicit price deflator.

• The proposed plans would have generally no effect on erosion and sedimentation damages compared to the existing conditions between the 2-year and 1000-year flood events. Damages for the proposed plans are assumed to be equal to those estimated for the existing structure under the original work plan.

• Erosion and sedimentation damages were included by taking the proportion of the damages from the original work plan for Little Wewoka Site 12 based on contribution to the total Little Wewoka Watershed and adjusting the original plan's 1955 base prices to 2023 dollars using the GDP implicit price deflator.

Table Appendix D - 1 Erosion and Sedimentation Damage Estimates Used in Plan-EA Alternatives Analysis

	Damages	Total Effect $
Annual Damage without Plan	$100,046	$100,046
Annual Damage with Structural Project	$43,356	$43,356
Price Base	1955	Not Applicable
1955 GDP Deflator	13.801	
2023 GDP Deflator (Q3)	122.817	
Annual Damage without Plan	$890,323	$890,323
Annual Damage with Project	$385,831	$385,831
Benefits under Plan	$504,492	$504,492
Total Watershed Area (ac)	122445	Not Applicable
Watershed Area (ac)	1414.4	
Damages without Plan	$10,284	$10,284
Damages with Project	$4,457	$4,457
Benefits under Plan	$5,828	$5,828

1.5 GEOLOGIC AND GEOTECHNICAL INVESTIGATIONS

A planning phase geological investigation comprised of geotechnical drilling and soil sample collection was conducted by GFAC Engineering between February 21and April 24, 2023, to assess the geologic and subsurface conditions. A total of 29 test holes were planned and created for this project as accepted by NRCS-OK. These locations included 3 holes at the centerline of the dam, 8 borrow borings, 14 auxiliary spillway, 2 principal spillway, and 2 downstream toe of dam/plunge pool test holes. There were no quantity or depth changes from planned to actual. Test holes were drilled using Central Mining Equipment 750 and a Central Mining Equipment 55 truck-mounted drill rig. All were advanced using 6.25-inch outer diameter hollow-stem augers. Materials were sampled continuously within the upper 10 feet, and then at approximately 5-foot intervals after. Samples were collected using a 2-inch diameter split spoon sampler in conjunction with the standard penetration test. Recovered spoon samples were field classified based on hand lens examination, textural plasticity, cohesion, dilatancy (if high moisture content), and calcareous carbonate reactivity with hydrochloric acid. These techniques were used to inform the field logging but were not specifically recorded when performed. At completion, the samples were placed in clear poly-plastic bags and sealed, and the sample bags were consolidated into larger bags that were organized by test hole. To accommodate possible laboratory strength testing, cohesive soils were collected at selected intervals using 3-inch diameter Shelby tubes. Material types were field logged by viewing the end of the tube. Tubes were sealed with caps and duct tape, and the tubes were placed and maintained in a vertical position in special transport containers to minimize transport disturbance. Test holes were backfilled with cement/bentonite grout, pressure-tremied from the bottom of the test hole up to the ground surface. The grout was mixed in conformance with Oklahoma Water Resource Board requirements. Samples from test holes were delivered for analysis to the NRCS laboratory located in Lincoln, Nebraska, on May 5, 2023.

Free water was encountered in 14 test holes at the project site. Two piezometers were installed at test hole 02 and 301. Sufficient data at time of drilling was unavailable to develop a phreatic surface to draw a conclusion about the presence of a phreatic surface within the embankment. Future readings of the piezometers installed during drilling will provide additional information for the interpretation of the phreatic/piezometric surface.

Boring logs included sample material description, sample depth, moisture content/water level, boring elevation, percent recovered, and standard penetration testing blow counts.

The resulting geologic investigation was prepared in accordance with the guidelines of the NRCS National Engineering Handbook Part 628 Chapter 52 – Field Procedures Guide for the Headcut Erodibility Index, 210-VH-NEH, 1997, as well as NRCS National Engineering Handbook Part 631 Chapter 4 – Engineering Classification of Rock Materials, 210-VH-NEH, Amend. 55, January 2012. Local topography, geologic formations, and surface deposits for the project area were described using existing published sources. Soil formations were described based on NRCS soil survey reports. Seismic evaluation was described using existing sources, including regional and

local dip and strike and presence of known faults, joints, unconformities, and others. The geologic formation and surface deposit data was collected from Map OGQ-95 published by the Oklahoma Geological Survey (OGS). The Geologic Atlas of Oklahoma (Oklahoma Geologic Quadrangle OGQ-95) was consulted for the presence of active faults within the project vicinity. The Preliminary Oklahoma Optimal Fault Orientations Map (OF4-2015, Plate A.4) was used for determining potential earthquakes. A 100-kilometer (62-mile) radius search for earthquake events was conducted using USGS's NEIC website (2014).

Current and historical aerial imagery was evaluated to provide some evidence of reservoir pool continuity.

1.6 SOIL MECHANICS INVESTIGATION

Data to create two separate planning phase soil mechanics reports for Little Wewoka 12 was collected during the planning phase geotechnical investigation. A total of 205 small, disturbed samples, 52 undisturbed Shelby tube samples, and 16 rock core samples were obtained during the geotechnical investigation described previously and submitted to the Lincoln Soil Mechanics Laboratory from this investigation.

A laboratory testing program was performed to aid in characterizing the soils as well as to develop material parameters for the SITES program. Crumb dispersion indication testing was performed on most of the fine-grained disturbed samples and the undisturbed Shelby tube samples in general accordance with ASTM D6572. Double hydrometer dispersion tests were performed on the samples indicating dispersion potential based on crumb testing, in accordance with ASTM D4221. The current ASTM indicates that these tests are applicable to soils whose Plasticity Index (PI) plots above the "A" line on the USCS Plasticity Chart and have more than 12% finer than 2 micron (0.002 mm). These SPT and Shelby tube samples were considered to be small discrete samples, appropriate for the dispersion testing. Two crumb test specimens were obtained from applicable samples with readings taken at 1 hour and 6 hours. Because dispersion can vary in intensity within short distances in the field, both crumb and double hydrometer dispersion tests were performed in the lab, to increase the chances of detecting the potential problem. However, because each test is performed on a small discrete portion of the sample, it is possible for the two tests to differ in finding and degree. For some Little Wewoka 12 samples, crumb dispersion indication tests correlated relatively well with the double hydrometer dispersion test results. However, because there was disagreement between the crumb and double hydrometer dispersion test results, performance-based pinhole dispersion testing was performed in accordance with ASTM D4647 on select samples. It was determined to use the more conservative ASTM guidance and consider soils with greater than 50 percent dispersive clay as dispersive. Soils with crumbs of 1 or 2 and double hydrometer dispersion less than 30 percent were considered nondispersive. Soils with crumbs of 3 or 4 and double hydrometer dispersion greater than 50 percent were considered dispersive.

An unconfined compression shear test was performed according to ASTM D2166 on appropriate undisturbed Shelby tube samples from borings from the existing auxiliary site and from the left and right abutments for possible proposed auxiliary spillway expansion sites. Tested soils were fine-grained, plastic, CL soils. Testing was conducted at the soils' in situ dry density and water content. The liquidity index was also calculated for these undisturbed auxiliary spillway samples.

The headcut erodibility index (K_h) for the cohesive clay soils from the auxiliary spillway was computed using the following equation:

$K_h = M_s \times K_b \times K_d \times J_s$

Where:

K_h = Headcut erodibility index, tbd
M_s = Material strength number, for soils – $M_s = 0.78(qu)^{1.09}$ or Ms = qu
K_b = block or particle size, for soils – $K_b = 1$
K_d = discontinuity or inter-particle bond shear strength number, for soils – $K_d = \tan Ø'_r$
Js = relative ground structure number, for soils – $J_s = 1$

For materials where the qu shear test was greater than 10 MPa M_s is equal to the qu results; otherwise, M_s is equal to $0.78(qu).^{1.09}$ For all of the qu shear tests performed on these soils, the results were less than 10 Mpa. For calculating the value of K_d, $Ø'_r$ was calculated based on percent clay and the liquid limit:

$Ø'r = 169.58(LL)^{-0.4925}$ for ≤ 20% clay (percent passing 2µ is less than or equal to 20%)
$Ø'r = 329.56(LL)^{-0.7100}$ for ≥25% to ≤45% clay (percent passing 2µ is between 25% and 45%)
$Ø'r = 234.73(LL)^{-0.6655}$ for ≥ 50% clay (percent passing 2µ is greater than or equal to 50%)

Triaxial shear testing was performed on select undisturbed Shelby tube samples, where suitable test specimens could be obtained. A total of ten consolidated undrained with pore pressure measured (CU', ASTM D4767), three unconsolidated undrained (UU, ASTM D2850) and one direct shear (DS, ASTM D3080) triaxial shear tests were performed. Five of the CU' tests and one of the UU tests were performed on existing embankment fill material, while the remaining shear testing (five CU', two UU, and one DS) were performed on foundation soils. CU' and UU triaxial shear tests were performed on the borrow soils representative of the potential new embankment fill material. Consolidation parameters for the structure foundation materials (existing embankment fill as well as the alluvial and residuum foundation units at the toe area of the current structure) were calculated from the one-dimensional consolidation tests (ASTM D2435) performed on 14 of the undisturbed Shelby tube core samples. Where applicable, the pre-consolidated pressure (P_c) value was estimated from the replotted e-log P curve of the consolidation test data. The current overburden pressure (P_o) was estimated from the profile, assuming the sample soils were similar to the material tested. In instances where the calculated P_o was greater than the P_c, the soils were treated as normally consolidated soils and assumed the current effective overburden pressure was the maximum pressure that the soil was subjected to in the past ($P_o = P_c$), as is the case for any existing embankment soils. Additional settlement analysis

parameters were also calculated from the consolidation tests performed on the undisturbed Shelby tube samples. These parameters (in addition to the P_o and P_c) used in the settlement analysis included the compression index, swell index, void ratio, and the coefficient of consolidation. The CU' and UU triaxial shear testing for the proposed borrow material was conducted on unused soil.

A settlement analysis was performed for each of the boring locations to examine the potential settlement caused by potential additional loading. Settlement parameters were obtained from the consolidation and foundation soils testing. Total, embankment fill, foundation, and differential settlement estimates were calculated. Differential settlement estimates between borings was estimated using the equation:

$\varepsilon_{Dif} = (\Delta_1 - \Delta_2)/\text{Distance}$

Where: Δ is the estimated total settlement for a selected boring

Distance is calculated based on latitude-longitude of borings (in feet)

Total settlement for each boring location is contained in **Error! Reference source not found.**. The estimated distances between bore hole locations are located in **Error! Reference source not found.**.

Table Appendix D - 2 Estimated total settlement for bore holes

Boring location	Total settlement (feet)
$\Delta_{BH\ 1}$	0.46
$\Delta_{BH\ 2}$	0.45
$\Delta_{BH\ 3}$	0.57
$\Delta_{BH\ 301}$	0.48
$\Delta_{BH\ 302}$	0.52
$\Delta_{BH\ 601}$	0.42
$\Delta_{BH\ 602}$	0.57

Table Appendix D - 3 Estimated distance between bore holes

Boring locations	Distance between (feet)
BH 601 to BH 302	105
BH 1 to BH 2	265
BH 302 to BH 301	45
BH 2 to BH 3	265
BH 301 to BH 602	125

Flexwall permeability testing was conducted on a portion of 10 of the undisturbed Shelby tube samples—four from the dam centerline, two from the downstream toe area, and four further

downstream from the toe in the auxiliary spillway outlet areas. The testing was performed in accordance with ASTM D5084.

Standard proctor maximum dry density and optimum water content compaction tests were performed on each of the composite samples representative of the clay borrow soils available from proposed pool borrow area. The standard proctor compaction tests were performed according to ASTM D698, using Method A. A fine specific gravity test was also performed in general accordance with ASTM D854. It was performed to assist in calculating the zero air voids curve for the compaction plots and in calculating the saturated water content of the soil.

A full seepage quantity analysis was not performed. A steady state seepage analysis was performed to help determine the piezometric line and phreatic surface for the slope stability analysis, particularly the flood surcharge analysis. Using onsite soil type and permeability rates, the analysis was conducted using GeoStudio's SEEP/W analysis program.

A slope stability analysis, performed according to the March 2019 TR60, was conducted for the initial proposed structural rehabilitation measures. The structure was analyzed at two centerline locations. The in-place embankment material was modeled using shear strength parameters from triaxial shear tests performed on samples obtained from the existing embankment. The new embankment fill material was modeled using shear strength parameters from the composite borrow samples from the pool area shoreline. The foundation soil units were modeled using triaxial shear strengths from samples tested from the centerline and downstream toe area boreholes. The structure was first analyzed for the flood surcharge condition, which includes the reservoir level at the freeboard hydrograph level. The piezometric line was developed from the seepage analysis, and the saturated embankment and foundation layers were modeled with the lower values of the effective stress or the total stress strengths. Drainable foundation soils and moist embankment zones (above the phreatic line) were modeled using the effective stress strengths obtained from the CU' triaxial shear tests to model a long term, consolidated, drained condition. The phreatic line was set at the permanent pool elevation, as directed in TR60, and then conservatively extended linearly to the existing toe of the structure.

The structure was also analyzed for the long-term steady state seepage condition at the same two centerline borehole locations. The downstream steady seepage analysis includes uplift or flood pool induced pore pressures at the downstream toe of the structure with the reservoir at the highest normal pool. The piezometric and phreatic lines were both set at the principal spillway elevation and conservatively extended linearly to the toe of the structure. The downstream steady seepage analyses were made with all embankment and foundation soils modeled with effective stress values from the CU' triaxial shear testing from existing embankment, foundation, and remolded borrow samples, in accordance with the 2019 TR60.

End of construction analysis was performed on the downstream 3H:1V slope of the proposed rehabilitated structure to determine the potential for instability due to excessive pore pressure build

up during loading of earth fill materials. A maximum loading condition, which included all anticipated settlement in the top of dam height, was considered for this condition. The existing embankment and foundation soils were modeled using unconsolidated undrained from UU triaxial shear test results or total stress values from CU' triaxial shear tests, as directed by the 2019 TR60. The proposed new embankment soils were modeled with unconsolidated undrained shear strengths. Only the downstream slope was examined, as the new embankment fill would be placed almost entirely downstream of the existing structure centerline. The structure was analyzed at both centerline locations previously examined. Analysis for the upstream rapid drawdown condition was performed per 2019 TR60. Two different conditions were analyzed at each of the cross sections. For the first condition, required by 2019 TR60, pool water was drawn down from the normal pool elevation to the lowest gated outlet. A second upstream rapid drawdown analysis was also conducted, to model how the structure would react if floodwaters at the auxiliary spillway elevation were rapidly drawn down to the principal spillway elevation. The composite failure envelope, as described in TR60 using Figure 5-2, was used for the saturated, non-drainable cohesive soils for the upstream rapid drawdown analyses.

A "sunny day" breach routing, with the water level set at the normal pool elevation, was conducted for seismic analysis. Data for choosing the design peak ground acceleration and earthquake for this seismic analysis per TR60 and NRCS Seismic Analysis Manual for Dams, which require a seismic loading based on a 1,000-year return period earthquake, was based on the de-aggregation of seismic hazard at one period of spectral acceleration from the 2014 version of the United States Geological Survey National Seismic Hazards Mapping Project. This information represents the most current data available. The soil mechanics report concluded Little Wewoka Site 12 meets TR60's seven criteria to qualify as a site with a limited loss of strength and thus warrants no additional in-depth seismic analysis.

Two planning phase soil mechanics reports were created for this project from the lab findings: An initial report to develop and transmit the soils data primarily for use in the study's SITES analysis, followed by a second report to conclude all soil mechanics testing and recommendations. Additional geologic investigation (a design phase investigation) will likely be necessary to provide additional site information for the rehabilitation design. A more complex investigation will be required, as the SITES analysis indicates that the proposed vegetated spillway does not meet the current TR-60 requirements for integrity and stability. Additional borings, sampling, and testing may be advisable to better establish a profile for a potential right abutment spillway alignment and left abutment profile. In addition to boring, sampling, and testing to determine the extent of any sand pockets or layers and to determine additional dispersion potential if the spillway is to be located in the right abutment, large disturbed borrow samples may also be necessary to test for standard proctor density and moisture properties, as well as shear strength. Because the proposed action involves construction of a roller compacted concrete spillway over the existing structure, an additional comprehensive geologic investigation for the spillway is necessary. Additional

sampling and testing (SPTs, Shelby tubes, and possibly large, disturbed samples) will be necessary to provide pertinent soils information for the design.

2.0 ENVIRONMENTAL CONDITIONS INVENTORY

Freese and Nichols, Inc. personnel conducted a pedestrian survey of the Little Wewoka 12 project site on May 31, 2023. The purpose of the survey was to identify potential waters of the United States that could be regulated by Section 404 of the Clean Water Act, and areas that could be potential habitat for federally listed threatened or endangered species within the proposed limits of investigation. The survey was also performed to characterize the soils, floodplains, fish and wildlife habitat, invasive species, and riparian areas identified within the proposed area of interest. Site photography was taken and catalogued.

2.1 THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPAC) resource list received on July 5, 2023, was consulted to identify federally listed threatened, endangered, or candidate species that may occur or could potentially be affected by construction activities in the project area. The Oklahoma Department of Wildlife Conservation (ODWC) list of State Threatened and Endangered Species was likewise consulted.

During the pedestrian survey described previously, the presence of migratory birds, migratory bird nests, bald and golden eagles, or their nests were observed and noted. The likelihood the proposed project activity might result in a take of those species was noted as well as the presence or absence of suitable nest habitats. This was done in accordance with the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. Amphibian and reptile communities were observed and noted. Common amphibians and reptiles were documented based on the ODWC's lists (Threatened and Endangered Species/ Oklahoma Field Guide). Other common terrestrial vertebrates as well as fish were documented based on the ODWC's information. Finally, vegetative invasive species were documented during the survey, as well as any evidence of invasive animals, fungi, or microbial organisms.

2.2 WATER QUALITY

Aerial image analysis was conducted to determine the presence or absence of open water bodies or impoundments in the project areas. The Oklahoma Department of Environmental Quality (ODEQ) maintains a list of impaired water through the National Pollutant Discharge Elimination System. The 303(d) and 305(b) lists were used to identify surface water quality concerns to Public Health and Safety.

2.3 WETLANDS IDENTIFICATION

The U.S. National Wetlands Inventory digital data bundle is a set of records of wetland locations and classifications as defined by the U.S. Fish and Wildlife Service. This dataset is one of a series

available in 7.5 minute by 7.5 minute blocks containing ground planimetric coordinates of wetlands point, line, and area features and wetlands attributes. A test wetland determination data form was used to determine the existence of wetlands within the proposed project area.

2.4 FEMA FLOODPLAINS INVENTORY

The Federal Emergency Management Agency Flood Insurance Rate Maps 40063C0175C and 40063C0300C were consulted to identify and map the floodplain of the project area, to characterize the hazard zones in the downstream valley, and to map the structures and infrastructure at risk. See FEMA Firmette map E-3 in Appendix E for additional floodplain information.

2.5 CULTURAL RESOURCES INVENTORY

In August 2023, Stantec Consulting personnel conducted a reconnaissance-level survey of the area of potential effect for the proposed rehabilitation project area. The area of potential effect, encompassing approximately 106 acres, was defined by NRCS Oklahoma based on the flood pool at the top of dam elevation and the auxiliary spillway. Stantec staff conducted the cultural resources survey using Osage Nation Tribal Historic Preservation Office standards (effective September 2019) and Oklahoma State Historic Preservation Office Fact Sheet 16: Guidelines for Developing Archaeological Survey Reports in Oklahoma. Survey standards were coordinated with NRCS prior to fieldwork. In May 2023, Stantec conducted a site file review at OAS to determine the extent of cultural resources surveys conducted in the area of potential effect, as well as to identify any previously recorded archaeological sites within a 1-mile (1.6-kilometer) buffer zone surrounding the area of potential effect. The Determinations of Eligibility in Oklahoma list, the National Register of Historic Places in Oklahoma, and the Oklahoma Landmarks Inventory Database, available from the Oklahoma Historical Society (OHS) were reviewed to determine if any NRHP, NRHP-eligible, or previously recorded resources are located within the affected or surrounding area. A review of available General Land Office maps, historic aerials, topographic maps, and other map resources was undertaken to determine how the project area has been utilized over time; these sources include Google Earth™, the Nationwide Environmental Title Research website (NETR 2023), USGS Topographic Map Explorer (USGS 2023b), and the Bureau of Land Management's General Land Office records. Historic aerial images of the area of potential effect were also examined. The earliest available aerial image on the NETR website was from 1955.

The entire area of potential effect was subject to a pedestrian survey augmented with the excavation of shovel test units. In total, 230 shovel tests were excavated. Shovel tests were placed at 98-foot (30- meter) intervals throughout the extent of the area of potential effect, with a few exceptions (e.g., inundation, extreme disturbance). The excavated matrix was screened through a 0.25-inch (0.64-centimeter) hardware screen, and deposits were described using conventional texture classifications with reference to NRCS soil series and Munsell color designations. All observations were recorded on handheld tablets using the ArcGIS Survey 123 (version 3.12.277)

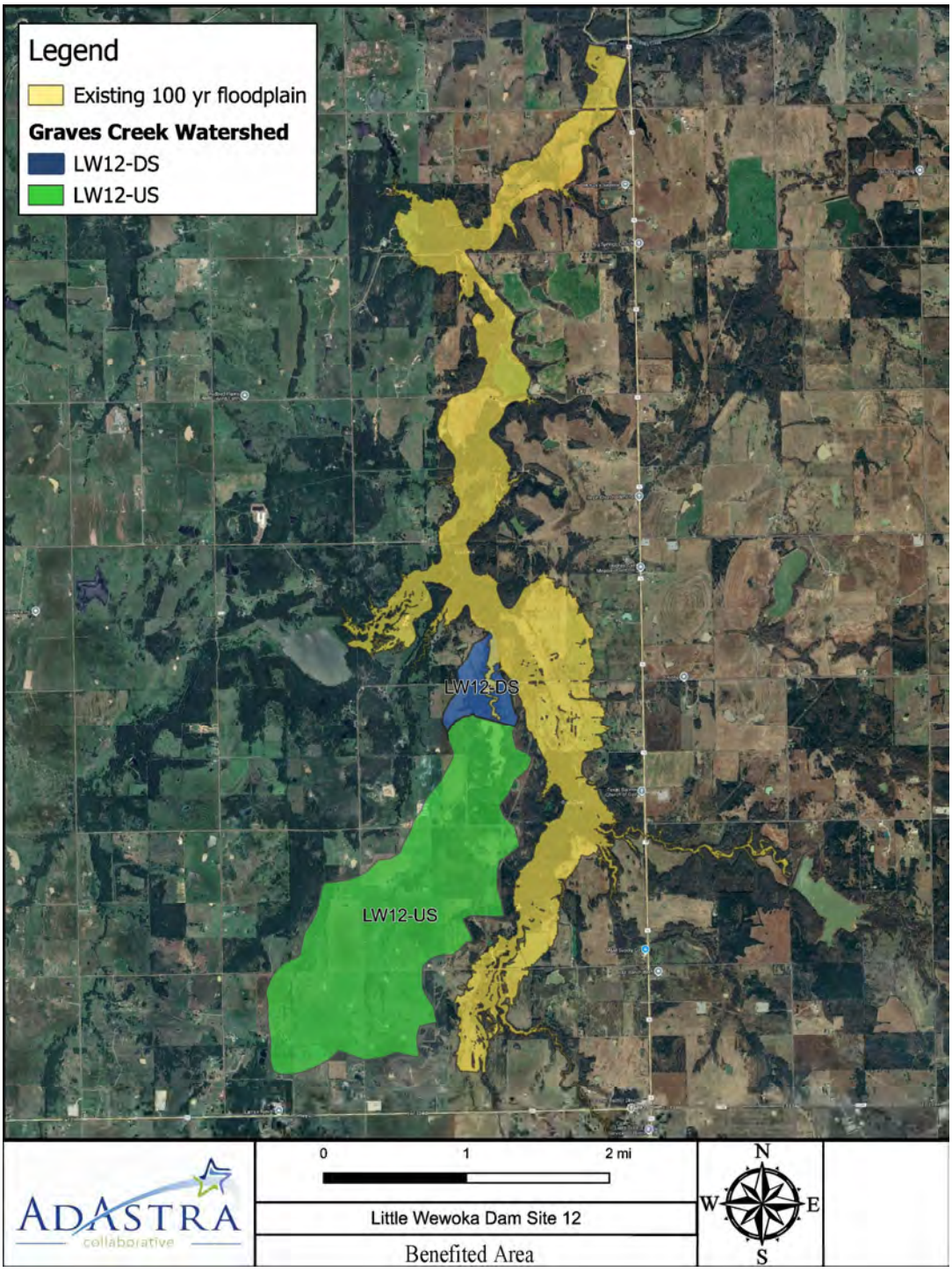
and the ArcGIS Field maps (version 22.2.0) applications. Shovel test units were backfilled after recording. Photographs were taken of the project area.

A reconnaissance-level architectural survey of the area of potential effect was also conducted at the same time, to identify all built environment resources located in the area of potential effect, to perform a preliminary evaluation of any identified resources' potential for inclusion in the NRHP, and to make recommendations. Background research for the reconnaissance-level architectural survey included review of the OK/SHPO online database for potentially relevant historic resource surveys. Stantec also conducted a site file review at the Oklahoma Archeological Survey, to determine the extent of prior cultural resources surveys. Prior to survey, Stantec historians reviewed high-resolution historical aerial images of the survey area. By comparing historical aerial photographs of the survey area to current aerial photographs, Stantec was able to identify the location of resources and mark them as historic-age or non-historic-age on an ArcGIS online map. Additionally, areas that appeared currently vacant or obscured by tree cover in aerial imagery were marked for closer inspection during fieldwork. Fieldworkers used GIS-enabled tablet computers loaded with the ArcGIS map and preliminary aerial review data, to navigate to known built environment resources, areas with former resources, and areas with a high probability to contain resources based on historical and current photographs. The architectural survey consisted of photographing the dam, spillway, and other elements associated with the dam and its operation. This included all other historic-age and non-historic-age buildings, structures, sites, and objects in the area of potential effect. All identified historic-age resources (45 years old or older; built in or before 1978) were documented on OK/SHPO historic preservation resource identification forms, researched, and contextualized through the development of a historic context.

The Tribal Directory Assessment Tool developed by the Office of Environment and Energy of the U.S. Department of Housing and Urban Development and a recent cultural resources management plan for the Oklahoma Army National Guard was used to review tribal interest in the area of potential effect (HUD 2023; Oklahoma Military Department 2017). NRCS personnel led Tribal and agency consultations.

3.0 ALTERNATIVES DEVELOPMENT

The benefited area for the Little Wewoka 12 project is shown in Appendix D - 1. Formulation of the alternative rehabilitation plan for the flood retarding structure followed procedures out-lined in the NRCS National Watershed Program Manual (NWPM).



Appendix D - 1: Little Wewoka Site 12 Benefited Area

Other guidance incorporated into the formulation process included O.S. 785:25. The formulation process began with formal discussions between the sponsors and NRCS Oklahoma. For structural alternatives, plan sheets showing conceptual layouts and typical sections of each alternative were developed using typical assumptions based on similar project experience. Those assumptions

would need to be refined during any final design stage of the project. Geotechnical and structural aspects were not evaluated per the scope of work.

3.1 STRUCTURAL ALTERNATIVES

A SITES model was developed to evaluate the existing condition and was used to determine hydraulic capacity and integrity of the dam. The SITES Version used was 2005.1.12. Data development and SITES modeling procedures were conducted in accordance with standard NCRS procedures as referenced in this report. All elevation for the existing condition model were updated to use the as-built drawing elevations with a datum adjustment. The storage capacity, soil parameters, and hydrologic parameters were also updated. The existing SITES model contained storage capacity information using 2018 LiDAR; these storage and elevation values were used again. However, new interpolated values were created using the datum-adjusted as-built elevations.

Hydrologic data parameters, including the probable maximum precipitation (PMP) depths for the 6-, 12-, and 24-hour events, were updated using the ArcGIS regional PMP tool in place of the HMR52 method. This was done using the drainage basin shapefile from the 2021 assessment based on the centroid of the basin, the gridded PMP tool from the "Regional Probable Maximum Precipitation Study for Oklahoma, Arkansas, Louisiana, and Mississippi Final Report" (Applied Weather Associates, 2019) was used to compute the PMP depths for the basin. The maximum depth of the tropical, general, and local storm was selected for each duration. Other hydrologic parameters include watershed area (mi^2), max/min basin elevation (ft), average basin slope (ft/mi), initial abstraction (in), curve number, time of concentration (hr), and lag time (min). Soil information was added from the soil mechanics reports, including dry density, plasticity index, material strength, detachment rate coefficient, and headcut erodibility index.

Elevation data to determine the top of dam and auxiliary spillway crest elevations were taken from LiDAR data collected in conjunction with the 2021 dam assessment. The as built drawing elevation with a datum adjustment were used to evaluate the existing condition as directed by the NRCS Oklahoma. This datum adjustment was done using the NGS Coordinate Conversion and Transformation Tool (NCAT) which can be found at https://geodesy.noaa.gov/NCAT/, to convert from the NAVD 29 to NAVD 88 at the dam location. The datum adjustment was found to be +.371 feet. A value of +0.4 was used, as all as-built elevation precision is to the tenth of a foot.

The top of dam and auxiliary spillway elevations were evaluated under high hazard classification criteria for both the 6-hour freeboard hydrograph and the 24-hour free board hydrograph, in accordance with procedures outline in TR-60. The SITES results were also evaluated under the Oklahoma Dam Safety Program coordinated by the Oklahoma Water Resources Board. An integrity analysis was conducted on the auxiliary spillway showing significant erosion, making it out of compliance with TR-60. Finally, maximum allowable soil and vegetal stress were calculated and found to be 0.78 psf and 5.13 psf, respectively (out of compliance with TR-60).

An economic analysis was calculated for annual flood damages with no action. Since the probability for overtopping the dam is less than 0.1% the worst possible economic damage was estimated with the 0.1% annual exceedance.

Alternative No. 1 (decommissioning) was evaluated using a 2-D HEC-RAS model to establish the 100-year floodplain extent and elevation (required under federal policy). At risk downstream locations were identified and located. A cost estimate was then conducted, including the post dam decommissioning slope stabilization. The cost for decommissioning the dam is $41,350,00 which makes this alternative unfeasible. The high cost is due to the road raises needed ($15,290,000) and the excavation and restoration needed to restore the stream channel ($6,263,900). Decommissioning the dam would also result in the loss of flood damage benefits and would not meet the project purpose and need. The cost estimate summary of decommissioning the dam is shown below (Table Appendix D - 4).

Table Appendix D - 4 Summar of cost estimate for decommissioning the dam

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Mobilization and Demobilization	5%	% Const.	$ 1,077,700	$ 1,077,700
2	Construction Survey	2%	% Const.	$ 431,100	$ 431,100
3	Contractor Quality Control	4%	% Const.	$ 862,200	$ 862,200
4	Removal of Water	5%	% Const.	$ 1,077,700	$ 1,077,700
5	Pollution Control	3%	% Const.	$ 646,700	$ 646,700
6	Structure Removal - Existing Principal Spillway	1	LS	$ 70,000	$ 70,000
7	Excavation, Common (Main Dam Embankment)	12,300	CY	$ 6	$ 73,800
8	Excavation, Common (Stream Channel)	42,600	CY	$ 6	$ 255,600
9	Spoil excavated material	10,700	CY	$ 4	$ 42,800
10	Rock Riprap	16,500	Ton	$ 180	$ 2,970,000
11	Riprap Bedding	11,600	Ton	$ 180	$ 2,088,000
12	Hydro-seeding and Hydro-mulching	50	AC	$ 6,000	$ 300,000
13	Riparian Corridor Plantings	5,510	LF	$ 17.50	$ 96,500
14	Topsoil	112,400	SY	$ 3	$ 367,200
15	Road Raise	1	LS		$ 15,290,000
	Construction - Subtotal				$ 25,649,300
	Construction - Contingency	30%	% Const.		$ 7,694,800
	Construction - Total				**$33,344,100**
	Engineering (% of Construction)	10%	% Const.		**$ 3,334,500**
	Remapping of FEMA Floodplain	1	LS		**$ 400,000**
	Land Acquisition / Easements	32	AC	**3,340**	**$ 108,300**
	Real Property Rights (Home Buyouts)	1	LS		**$ 158,900**
	Project Administration (% of Construction)	12%	% Const.		**$ 4,001,300**
Total (Construction + Engineering + Administration + Easements)					**$ 41,347,100**

Alternative No. 1 (decommissioning) was evaluated using a 2-D HEC-RAS model to establish the 100-year floodplain extent and elevation. At risk downstream locations were identified and located within the 100-year floodplain extent. A cost estimate was then conducted, including the post dam decommissioning slope stabilization; relocation of at-risk structures; and raising of roads. Potential

relocation costs to pay at-risk landowners to move structures out of the flood damage area were considered. Property plat maps and aerial imagery were used to count and classify existing structures within the modeled 100-year floodplain of the project area. The cost of purchasing properties and relocating associated buildings within the 100-year floodplain was calculated based on an approximate average total building value per parcel average farm storage building value. The property buyout alternative would require deed restrictions to limit future development at those locations, but deed restriction costs were not included in this preliminary evaluation.

Construction plans consisting of detailed drawings were prepared in AutoCAD Civil 3D 2020 for Alternative No. 2 (widen existing auxiliary spillway) and Alternative No. 3 (new auxiliary spillway, preferred). Modified standard drawings were used. An opinion of probable construction cost was developed for each structure based on the calculated quantities from the final design and unit construction costs based on recent project bids and other data available with adjustments to reflect individual site characteristics. Alternative 4 (widen the existing spillway and raise the embankment height) was removed from in depth analysis due its similarity to Alternatives 2 and 3 and to the sponsoring local organization's concerns about the potential induced flooding impacts downstream. Alternative No. 5 was removed from in depth analysis due to the high cost of construction.

4.0 FLOODPLAIN HYDROLOGIC AND HYDRAULIC INVESTIGATION

A hydrologic analysis for this study included delineating the drainage basins to the dam and major tributaries upstream and downstream of the dam, identifying and quantifying land uses, developing weighted curve numbers, and calculating times of concentration to develop both inflow hydrographs and tributary hydrographs.

The time of concentration for each drainage basin was calculated using the methods outlined in Chapter 15, "Time of Concentration," of Part 630, "Hydrology," of the National Engineering Handbook. The watershed lag method was used to calculate the time of concentration for the drainage basins. The watershed lag method is recommended for watersheds with a drainage area of 19 square miles or less, under which Little Wewoka 12 qualifies. The watershed lag method, developed by Victor Mockus in 1961, uses the flow length, lag, average watershed slope, and maximum potential retention to calculate the time of concentration. To develop parameters to calculate watershed lag, the longest flow path for each subbasin was first estimated in QGIS using the "LongestFlowpath" tool from WhiteboxTools and the project digital elevation model data. Then, a visual inspection using the generated contours was used to compare other possible flowpaths. The final flowpath value was selected by tracing the remote boundary point of the watershed downslope until it reached the subbasin pourpoint using the "TraceDownslopeFlowpaths" tool from WhiteboxTools. For the subbasins that contained a dam, these paths were trimmed to the point where the path met the permanent pool elevation. The average basin slope for each subbasin was determined in QGIS using the raster slope calculation

for the terrain model, then clipping the slope data to the drainage basin boundary for each subbasin using the "Clip Raster by Mask Layer" tool. Then, the statistical mean for each subbasin was collected and converted to percent slope.

The hydrologic analysis developed NRCS weighted curve numbers with antecedent runoff condition II (ARC II) for existing and future conditions using the most recent NRCS procedures and hydrologic soil groups. An NRCS weighted curve number was developed with antecedent runoff conditions I, II, and III for each of the drainage basins, following the methods outlined in Chapter 9, “Hydrologic Soil- Cover Complexes,” of Part 630, “Hydrology,” of the “National Engineering Handbook,” using the National Land Cover Database land use information and the U.S. Department of Agriculture Web Soil Survey. The department’s Soil Survey Geographic Database soils layer and the National Land Cover Database land cover layer were joined with the subbasin layer to create a union layer, and the resulting curve numbers for each subbasin were determined using the land use classification as approved by NRCS TR-55: “Urban Hydrology for Small Watersheds.”

4.1 METEOROLOGY

The precipitation data for the subbasins was obtained from the updated National Oceanic Atmospheric Administration Atlas 14 precipitation frequency estimates, via the administration’s Precipitation Frequency Data Server website. The routing of the frequency-based floods consisted of routing 24-hour duration 2-, 5-, 10-, 25-, 50-, 100-, 200-, 500-, and 1,000-year storm event floods downstream of the dam, to evaluate the agricultural and urban flood damages for the existing dam condition, the non-existent dam condition, and dam improvement alternatives. The hydrologic analysis of Little Wewoka 12 was completed using the U.S. Army Corps of Engineers Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) modeling program, Version 4.10.

4.2 LAND USE INFORMATION

Land use data was collected to determine the simulated roughness of the surface and its impact on flow (Manning’s n value). The land use was assigned based on land cover classification for the area as defined in the U.S. Geological Survey National Land Cover Database (2016). These were then equated to the corresponding TR-55 land use designations. Manning’s values assigned were based on the HEC-RAS 2D Modeling Manual and agreed upon with NCRS Oklahoma during a previous 2022 project to conduct NRCS dam assessments on 20 Oklahoma dams. An assessment of the soil types and current land use was used to estimate the curve number.

4.3 SSURGO SOILS

The Soil Survey Geographic Database was used to derive the prime farmland and hydrologic soils group information for the project’s watershed. SSURGO datasets consist of MPA and tabular data

that is used to develop a soil survey area. This can consist of a single county, multiple counties, or parts of multiple counties. The SSURGO map data was viewed using the NRCS' Web Soil Survey.

4.4 HYDRAULIC GEOMETRY

The HEC-RAS model began at Little Wewoka Site 12 Dam and extended approximately 6.2-miles downstream. The model used a 2D computation mesh with approximately 9,700 grid cells to represent the channel from the dam through Graves Creek and surrounding low-lying areas until the model termination before the confluence at Wewoka creek south of Wetumka, Oklahoma. Manning's roughness coefficient was determined from land cover data provided by the 2016 National Land Cover Dataset consistent with Oklahoma NCRS guidelines for dam breach analysis.

4.5 HYDRAULIC BOUNDARY CONDITIONS

After the flow area was defined, computational limits were set up to account for inflow and outflow locations. One boundary condition was set at the toe of the dam to represent the breach inflow using the breach hydrograph. The other boundary condition was set downstream of the location at which all flow was contained in the channel and further hazards would be encountered and modeled as a friction slope boundary where the slope was set to match the channel bed. Computational inaccuracy at the downstream boundary was minimized by ensuring enough distance between where the last critical elevation was measured, and the boundary placed. Bridges and culverts in the direct flow path to the downstream boundary condition were modeled as two-dimensional connections with application of culvert parameters best representing the parameters of the hydraulic structure, as evaluated through a combination of field survey, LiDAR data, or aerial imagery. Additional culverts were represented in the model through terrain modification. Elevated roads and other embankments were represented by enforcing 2-D connections and breaklines along their crests to capture their terrain profile in the hydraulic mesh.

4.6 PROJECT IMPACT AREA

The purpose of the project impact area was to verify that the model extents captured the full area of economic impact of the project, and to limit the spatial extent of flood damage inventory data to features that would be affected by evaluated project alternatives. The project area was determined as the combination of the 1000-year and breach inundation areas, clipped where the breach water surface elevation falls below the 1000-year water surface elevation. The project area limits selected for the analysis include the watershed that drains to the site and the inundation area downstream of the dam along Elm Creek, a tributary to Graves Creek. Structures identified within the project area were categorized using aerial photography, street level imagery, and data from the Hughes County appraisal district. The floor elevations of the structures were assigned based on 2019 LiDAR.

4.7 FREQUENCY STORM ANALYSIS

Frequency storm modeling of the Little Wewoka Creek – Graves Creek Watershed was conducted to evaluate proposed flood impacts in the floodplain below Little Wewoka 12. Existing flood control structures in the study area were evaluated in SITES version 2005.1.8 to obtain discharge rating curves applied to Little Wewoka 12 modeling. HEC-HMS version 4.10 was used to develop the tributary hydrographs for each of the drainage basins. The information calculated and collected, including weighted curve number, time of concentration, and precipitation data, were entered into the HEC-HMS modeling program to generate the hydrographs for each of the storm events. Four dams are located within the drainage basins included in the frequency-based flood modeling for Little Wewoka 12. They include Little Wewoka Creek Site 11, Little Wewoka Creek Site 13, and Little Wewoka Creek Site 14. The dam information for the Little Wewoka site 12 and 13 Dams came from the SITES models completed for this study and from the previously completed dam assessments in 2022. The stage-storage of these dams was determined using the lidar, and the normal pool was set from the volume stated on the as-built plans. Cursory SITES models were prepared using as-built data to determine the stage-discharge curves for use in the HEC-HMS models for the Little Wewoka Creek Site 11 and 14 dams. For Little Wewoka Creek Site 11 no interpolation was required; the principal spillway was modeled as a simplified weir and a range of entrance loss coefficients were used to test for sensitivity. For Little Wewoka Creek Site 14 a linear interpolation of the last two stage-storage values as shown on the plans was performed to extrapolate the storage at the top of the dam. The weir flow, orifice flow, and conduit flow equations were checked individually for each storage elevation, and the controlling flow was selected. The default discharge coefficient was as used in the SITES calculations of 3.1 for weir flow and 0.6 for orifice flow were conserved. The change in discharge was negligible in comparison to the flow in the basin, so the default value as recommended by the SITES documentation was sufficient for this analysis. Each dam and basin was created in a HEC-HMS 4.10 Model. No reaches were modeled, as all routing was to be completed in HEC_RAS 2D. Each dam was modeled using outlet 3 structures. The primary spillway and auxiliary spillway were accounted for using the SITES stage-discharge curve. The top of dam was also modeled as a weir, although none of the dams overtop in any of the frequency storms modeled as part of this effort.

A two-dimensional HEC-RAS 6.3.1 model was used to model the existing condition and dam-removed condition for each storm event. The bridges and road survey modifications were imported to the frequency flood model. The NLCD 2019 landuse was downloaded and the same Manning's n table was used. The HEC-HMS DSS results file was read as the inflows at each boundary condition. For the existing condition, the outflow hydrograph from each dam was read and the outflow from each subbasin not controlled by a dam was read. All plans were run with a variable timestep between 5 and 40 seconds, using the diffusion wave equations. No WSE error messages were generated for any of the model runs, and max error was less than 0.04%.

5.0 DAM BREACH ANALYSIS

Dam breach analysis was performed by inputting the breach hydrograph into the unsteady flow routine of the two-dimensional HEC-RAS model, version 5.0.7. Road crossings with existing channel bed information were modeled with breaklines where the water never overtopped the bridge and as internal two-dimensional connections at low water crossings and culverts where channel bed information was not available. Culvert sizes were taken from survey or assumed via available visual and terrain data. Breach scenarios were created for the dam. Dam breach analysis was conducted by inputting breach hydrograph into the unsteady flow routine of a two-dimensional HEC-RAS model, version 5.0.7.

6.0 ECONOMIC ANALYSIS

An economic analysis of project alternatives advanced for further study was conducted using the NRCS National Watershed Program Manual, along with three other documents: the National Resource Economics Handbook, Part 611 Water Resources Handbook for Economics, USDA/Natural Resources Conservation Service, July 1998; Principles and Guidelines for Water and Land Related Resources Implementation Studies (P&G), December 1983; and Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments (PR&G), DM 9500-013. The latter includes requirements set forth in the Council on Environmental Quality (CEQ) Principles and Requirements for Federal Investments in Water Resources (P&R) and Interagency Guidelines (IAG). DM 9500-013 provides guidance on completing a PR&G analysis, including steps in the planning and evaluation process, differences between project- and programmatic-level evaluations, direction on incorporating an ecosystem services framework, and techniques for economic analysis.

The project area limits selected for the analysis included the watershed that drains to the site and the inundation area downstream of the dam along Elm Creek, a tributary to Graves Creek. The analysis evaluated four potential plans. Analyzed benefits under the proposed plans were limited to flood damage reduction, including damages to structures, crops, pasture, bridges and culverts in addition to erosion and sedimentation damages. A “no-action” alternative was used to set the baseline to perform the economic analysis.

6.1 LAND ACQUISITION

The costs for purchasing easements below the proposed top of dam elevations to prohibit future construction were developed by overlaying the area of the proposed top of dam contour over the parcel data containing parcel land values. For each affected property, the overlapped area was divided by the total parcel area and multiplied by the total land value, resulting in a total cost of acquisition for each parcel easement area. This value is summed to generate the total cost of upstream land acquisition.

6.2 FLOOD DAMAGES

The dam breach analysis described in a previous section performed for each of the conceptual structural alternatives was utilized to identify structures and roads that could be potentially impacted by flooding from each of the failure scenarios modeled. To determine the expected impacts downstream of the dam in the event of failure of the dam, the 1,000-year storm event was run in a 2D HEC-RAS model. A full analysis with maps showing the location and flood inundation maps is included in the memo Hydrologic Analysis and Frequency-based Floods Routing (Frequency Analysis). This study indicated that during the 1,000-year event, a total of twelve possible locations, including six roadway bridges or culverts and six buildings, will be impacted. One of the buildings is a residence.

Under this scenario, there is a potential for loss of life. One residence is located approximately 1,500 feet downstream of the dam, and the estimated arrival time of the peak of the flood wave is 13 minutes. The estimated depth of the flood wave is 6.4 feet.

The six roadway bridges are E 130 Road (two locations), E 128 Road, E 127 Road, N 379 Road, and E 1260 Road. E 130 Road is located 1,500 feet downstream, and the estimated arrival time of the flood wave is 13 minutes, with a depth of 10.4 feet. E 128 Road is located 2.6 miles downstream, and the estimated arrival time of the flood wave is 4.6 hours, with a depth of 2.7 feet. E 127 Road is located 3.8 miles downstream, and the estimated arrival time of the flood wave is 7.8 hours, with a depth of 4.3 feet. N 379 Road is located 4.2 miles downstream, and the estimated arrival time of the flood wave is 9.2 hours, with a depth of 3.1 feet. E 127 Road is located 5.5 miles downstream, and the estimated arrival time of the flood wave is 21.2 hours, with a depth of 1.5 feet.

6.2.1 STRUCTURE DAMAGES

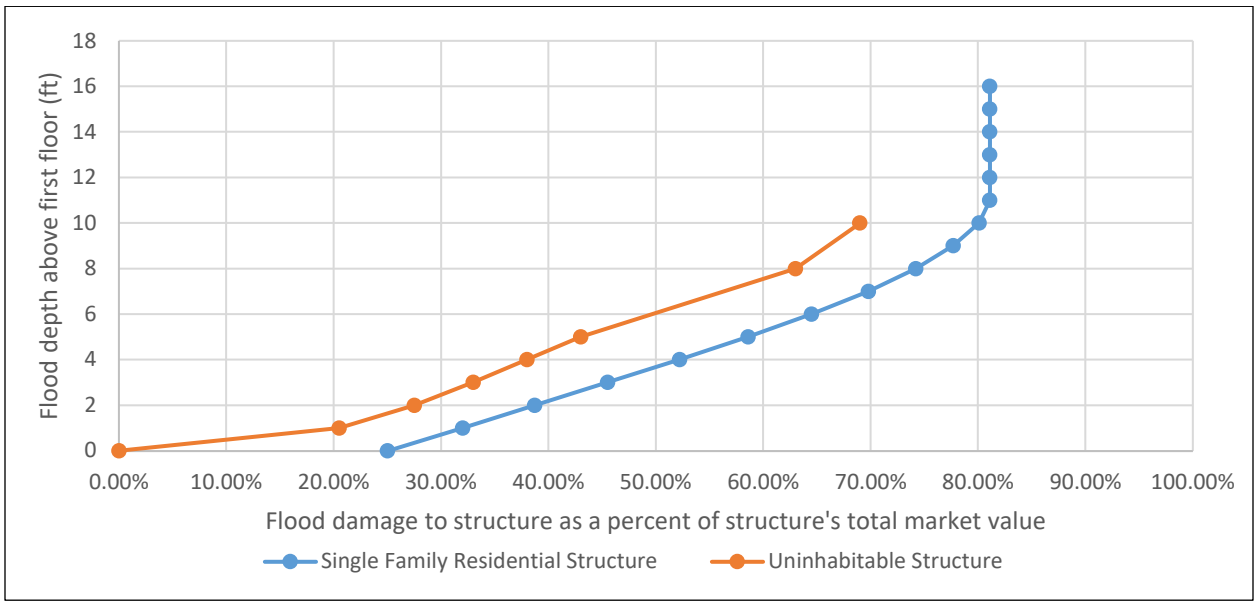
The maximum water depths and flow velocities were imported into ArcMap directly from the HEC-RAS 2D hydraulic model for each alternative and frequency event. The water depths and flow velocities are then identified at the locations of interest (e.g., bridges, culverts, houses, structures, etc.) using Google Earth web imagery. This process is possible due to HEC-RAS 2D capabilities to generate georeferenced shapefiles. The values obtained at the desired locations were then used in conjunction with the stage/velocity damage curves associated to each kind of structure. See Appendix B for maps of flooding at selected storm recurrence intervals and the associated risk to structures.

Structure Occupancy Types

Six structures were identified within the project area and categorized using aerial photography, street level imagery, and data from the Hughes County appraisal district. The project area was determined as the combination of the 1000-year and breach inundation areas, clipped where the breach water surface elevation falls below the 1000-year water surface elevation. One of these

structures is a residential structure and five are barns/outbuildings. The floor elevations of the structures were assigned based on the 2019 LiDAR.

For multiple structure types, stage-damage and associated uncertainty was based on guidance from the U.S. Army Corps of Engineers (USACE) Economic Guidance Memorandum (EGM) 04-01 (USACE 2003, 2006). This document includes damage to structures and contents. Figure 1 shows the relationship between water depth and flood damage as percentage of the structure's total damageable value. The finished floor elevation (FFE) from which damage was computed was assumed to be equal to the mean terrain elevation at the structure footprint plus 6 inches to represent the concrete slab. The content values for each structure were computed as 100% of the structure value for residential and commercial structures, based on NRCS guidance. The content values for barns/outbuildings was computed as 30% of the structure value. The damage to contents was computed based on unique depth-damage curves for contents, shown in Figure 1.



Appendix D - 2 Structure Depth-Damage Curves

Structure Inventory

Data from the Hughes County appraisal district was used to determine the 2023 market value of affected structures. Many barns/outbuildings did not have appraisal data available, and some had unrealistically low costs. The value of barns/outbuildings was assumed to be $30/SF based on online information about prefabricated structures on tuffshed.com. Appraisal district information did not provide sufficient detail to obtain the value of barns/outbuildings, with most omitted or having no value provided.

The structures inventory is shown in Table 5 and the damages for each structure in existing conditions are shown in Table 6.

Table Appendix D - 5 Impacted Properties Within Project Area Little Wewoka Dam No. 12

Struct ID	Appraised Value of Structure	Lowest Adjacent Grade	Occupancy Type
1	$ 1,000.00	748.17	Outbuilding
2	$ 49,863.00	748.77	Residential
3	$ 1,000.00	750.16	Outbuilding
4	$1,000.00	747.97	Outbuilding
5	$ 1,000.00	748.65	Outbuilding
6	$ 1,000.00	753.82	Outbuilding

Table Appendix D - 6 Impacted Properties Within Project Area Little Wewoka Dam No. 12: Flood Damages in Existing Conditions by Frequency Event

Struct ID	Appraised Value of Structure	2-year	5-year	10-year	25-year	50-year	100-year	200-year	500-year	1000-year
1	$1,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$111.98	$451.74	$1,266.83
2	$33,710.95	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$20,383.00	$49,427.01
3	$1,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,053.87
4	$1,000.00	$0.00	$0.00	$0.00	$155.51	$247.35	$320.78	$413.36	$507.94	$676.40
5	$1,000.00	$0.00	$106.60	$162.36	$251.33	$319.19	$385.81	$426.88	$477.20	$621.61
6	$1,000.00	$0.00	$105.08	$259.08	$387.45	$434.64	$465.16	$494.14	$533.48	$560.23

Stage-Damage Function

The flood damage for each structure is determined using the water depths obtained from HEC-RAS, the stage-damage relationship, and the structure market value with a straight-line depreciation based on the age of the structure. The flood damage to the structure as a percentage of the total market value is determined from Figure 1, using the water depths obtained in HEC-RAS, then this percentage is multiplied by the structure's total damageable value and the result corresponds to the damage for a specific structure. This process is repeated for each of the frequency storm event in order to plot a damage-probability curve for each alternative. The damages for each frequency storm by alternative are shown in Table 7. The integral of this curve is the annual damage to the structures for each alternative, shown in Table 8.

Table Appendix D - 7 Expected Frequency Storm Damages to Structure

Frequency Event	FWOFI	Alt 1	Alt 2	Alt 3	Alt 5
2- year	$0	$0	$0	$0	$0
5- year	$212	$212	$212	$212	$212
10-year	$421	$421	$421	$421	$421
25-year	$794	$22,505	$795	$795	$794
50-year	$1,001	$25,189	$1,002	$1,002	$1,001
100-year	$1,172	$27,332	$1,173	$1,173	$1,172
200-year	$1,446	$29,192	$1,426	$1,426	$1,334
500-year	$22,353	$31,463	$21,962	$21,962	$1,519
1000-year	$53,606	$33,013	$26,671	$26,671	$1,858

Table Appendix D - 8 Expected Annual Damages to Structures by Little Wewoka Dam No. 12

Plan Annual Expected Damages					
Category	**FWOFI**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**
Structure Damages	$300	$400	$200	$300	$200

6.2.2 AGRICULTURAL DAMAGES

For the purpose of this study, agricultural damages include damages to crops and pastureland productivity due to inundation by floodwaters. Damages associated with agricultural production are included in the Erosion and Sedimentation category for damages to the value of the land itself.

Crop Damages

Seasonal Damage Factor

Since crops do not exist for 100 percent of a year, the damageable value must be adjusted down based on seasonal factors. The U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) publishes typical planting and harvesting dates for various crops (USDA 1997). Crops were assumed to vary linearly from 0 percent damageable to 100 percent damageable between the planting start date and harvesting start date; from 100 percent damageable to 0 percent damageable between harvest start date and harvest end date; and remain at 0 percent damageable between harvest end and planting start date. The seasonal damage factor is computed as the average annual damage factor (as a percent of total damageable crop value) of each crop type.

Inundation Damage Factor

Floodwater is not especially harmful to crops except when either flood depth, velocity, and/or duration are high. For this study, duration and velocity effects were neglected and only water depth was considered. Depth of flooding was separated into three categories: < 1 foot, between 1 and 3 feet, and > 3 feet. For each crop and depth category, a factor was assigned based on how much damage a crop would be expected to sustain. Data for these factors was used from examples in the Water Resources Economic Handbook (USDA 1988). A detailed study of agricultural inundation damage factors was deemed unwarranted due to the low expected magnitude of the damages.

Crop Yield and Market Value

The NASS publishes yields and prices for various crops by state and year. Since these values have significant variability, the average yield and prices for the last three years (2017 to 2019) were used in the analysis. The crop prices were adjusted to real 2023 dollars prior to averaging. Prices were adjusted using the GDP implicit price deflator, which is a broad measure of the change of the value of money over long periods of time Damageable unit value for each crop is determined by multiplying yield by unit price and the two damage factors described above. Table 9 shows the development of the damageable values for the crops in the project area.

Table Appendix D - 9 Development of Damageable Values for Crops affected by Little Wewoka Dam No. 12.

Crop	Other Hay/Non Alfalfa
Planting Starts	16-Mar
Harvesting Starts	15-May
Harvesting Ends	1-Nov
Seasonal Damage Factor	0.32
Inundation Damage Factor (≤ 1ft)	0.2
Inundation Damage Factor (1-3 ft)	0.23
Inundation Damage Factor (≥ 3 ft)	0.36
2020 Unit Price	118
2021 Unit Price	128
2022 Unit Price	137
2020 GDP Deflator	113.0
2021 GDP Deflator	114.7
2022 GDP Deflator	121.7
2023 GDP Deflator (Q1)	124.1

Determination of Damages

The NASS publishes the Cropscape GIS data layer of land use (USDA n.d.-b). HEC-RAS provides GIS shapefiles of areal inundation extents for each frequency flood event. These shapefiles were intersected with the Cropscape layer to aggregate the area inundated for each land use type, depth category, and plan for each frequency storm event. The total damage is determined by multiplying the inundated area in each depth category for each crop by its corresponding damageable unit value. The total damages for each frequency storm event are summed and plotted with probability. The integral of this curve is the expected annual damages to crops for each alternative plan, which are shown in Table 10.

Table Appendix D - 10 Expected Annual Damages to Crops

Alternative	FWOFI	Alt 1	Alt 2	Alt 3	Alt 5
Average Annual Losses	$207.09	$213.84	$206.06	$206.06	$207.09

Pasture Damages

NASS publishes county-wide average pasture cash rental rates each year (USDA 2021). This is assumed to be the flood-free productive value of the land. NRCS developed generalized damage factors for pastureland grasses in a 1978 Technical Note (USDA 1978). Pastureland was assumed to be made up of Grassland and Shrubland cover types in the NASS Cropscape dataset.

The damage factors are expressed as a percentage of the flood-free yield and include seasonal changes and changes in actual damage to productive value based on depth. Using the same methodology and land use data as the crop damage analysis, inundated pastureland areas were aggregated for each depth category, frequency storm event, and plan. The total damages for each frequency storm event are summed up and plotted with probability. The integral of this curve is the expected annual damages to pastureland productive value for each plan. Table 11 and Table 12 present the development of pastureland damageable values in the project area and the expected annual damages for each alternative, respectively.

Table Appendix D - 11 Development of Pastureland Damageable Values

Damage factor (≤ 2 feet depth)	0.14
Damage factor (> 2 feet depth)	0.23
2023 Cash Rental Rate for Pasture	$13.00
Adjusted Cash Rental Rate (2023 dollars)	$13.00
Damageable Value per Acre (≤ 2ft)	$0.00
Damageable Value per Acre (> 2 ft)	$0.00

Table Appendix D - 12 Expected Annual Damages to Pastureland Affected by Little Wewoka Dam No. 12

Category	FWOFI	Alt 1	Alt 2	Alt 3	Alt 5
Structure	$359	$372	$360	$360	$359

6.2.3 BRIDGE AND CULVERT DAMAGES

There are five bridges and one culvert in the project area. This data was last published in 2020, so these costs were adjusted to 2023 dollars using the ENR construction cost index. The area of each crossing was determined using aerial photography and LIDAR data. The replacement cost of each bridge/culvert is assumed to be the deck area times the average unit price in 2023 dollars.

Bridges

Bridges were assumed to receive no damage at water elevations below the low chord of the bridge. Total loss of the bridge (full replacement required) was assumed to occur based on flow depth and velocity in accordance with guidance in an NRCS Technical Note for estimating floodwater damage to roads and bridges. Velocity and peak stage data from HEC-RAS was used to determine the total loss stage. Percent damage was linearly interpolated between the low chord of the bridge and the total loss stage. Many railroad bridges were present within the project area.

Culverts

According to a 1987 Federal Highway Administration report (USDA 1969), performance of culvert embankments during flooding is influenced by a number of factors that have not been determined as a part of this study, including fill material types, grain size distributions of embankment material, armoring and vegetative cover, and duration of overtopping. For this reason, and the fact that culvert damages are not anticipated to constitute a significant portion of the flood damage reduction benefits generated by improvements to the dam (based on engineering judgment and the damage estimates in the original watershed plan) a simplified model was developed to account for damages to the culvert embankments. Damage was assumed to begin when the water surface elevation in the stream reached the top of the culvert embankment and progress linearly to complete failure of the embankment at six feet of overtopping depth. Table 13 shows the expected damages to bridges and culverts in frequency events.

Table 14 summarizes the results obtained for the bridges and culverts analyzed in the project area.

Table Appendix D - 13 Expected Frequency Storm Damages to Bridges and Culverts

Frequency Event	FWOFI	Alt 1	Alt 2	Alt 3	Alt 5
2- year	$700,964	$0	$699,248	$699,248	$0
5- year	$822,846	$0	$837,953	$837,953	$0
10-year	$929,278	$0	$946,273	$946,273	$0
25-year	$1,109,526	$0	$1,124,976	$1,124,976	$0
50-year	$1,267,114	$0	$1,269,003	$1,269,003	$0
100-year	$1,335,675	$0	$1,331,060	$1,331,060	$0
200-year	$1,428,089	$1,847,209	$1,418,856	$1,418,856	$1,428,089
500-year	$2,131,845	$2,876,233	$2,112,158	$2,112,158	$2,131,845
1000-year	$2,894,601	$2,881,040	$2,771,010	$2,771,010	$2,894,601

Table Appendix D - 14 Expected Annual Damages to Bridges and Culverts

Category	FWOFI	Alt 1	Alt 2	Alt 3	Alt 5
Bridges	$603,552	$14,058	$605,634	$605,634	$11,128
Culverts	$573	$524	$2,660	$2,660	$295
Total	$604,126	$14,582	$608,294	$608,294	$11,423

6.2.4 ROAD DAMAGES

There are six roads and crossings in the project area. The area of each crossing was determined using aerial photography and LIDAR data. The replacement cost of each road/crossing is assumed to be the area flooded times the base aggerate and asphalt paving.

Road

Roads were assumed to receive no damages at water elevations below the road embankment crests. Damages to the roads were assumed to occur based on flow mean depth. Depth rasters were generated from HEC-RAS, and the mean depth across each road/crossing was used to determine in GIS. It was assumed that, if damaged these roads would be replaced with base aggerate and asphalt paving which RS means provides an estimate of cost. Table 15 shows the expected damages to roads in frequency events. Table 16 summarizes the results obtained for the roads analyzed in the project area.

Table Appendix D - 15 Expected Frequency Storm Damages to Road Crossings

Frequency Event	FWOFI	Alt 1	Alt 2	Alt 3	Alt 5
2- year	$217,374	$0	$214,955	$214,955	$0
5- year	$313,213	$0	$325,120	$325,120	$0
10-year	$353,602	$0	$365,611	$365,611	$0
25-year	$423,247	$0	$430,878	$430,878	$0
50-year	$478,544	$0	$484,133	$484,133	$0
100-year	$537,818	$0	$536,636	$536,636	$0
200-year	$572,748	$591,772	$571,181	$571,181	$572,748
500-year	$624,015	$639,385	$622,618	$622,618	$624,015
1000-year	$715,425	$679,151	$664,964	$664,964	$715,425

Table Appendix D - 16 Expected Annual Damages to Road Crossings

Plan Annual Expected Benefits					
Category	**FWOFI**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 5**
Roads	$154,905	$3,326	$158,257	$158,257	$3,227

Erosion and Sedimentation Damages

Erosion and sedimentation damages were not independently estimated for this study to maintain consistency with the original watershed plan. Estimates for erosion and sedimentation were included in the original work plan for the Little Wewoka Watershed (USDA 1955). These estimates were not separated by the individual flood control structures and have a price base of 1955. The following assumptions were used in order to include these damages in the economic analysis:

- Erosion and sedimentation damage estimates in the original work plan for the Little Wewoka watershed were assumed to be representative of the present conditions. Significant development has occurred in the study area but does not appear to have caused a significant change to the stream channels, except for the addition of some culverts and bridges. The stream channels downstream of Little Wewoka Dam No. 12 do not appear to be noticeably modified based on aerial imagery and historical USGS topographic maps. The upstream watershed contributing to Little Wewoka Dam No. 12 has met some development; however, the sedimentation rate originally estimated in the watershed plan has proven to be a significant overestimate. Thus, the damage values were adjusted to reflect the decreased sedimentation rate. Land treatment measures included in the work plan were not included in the original flood damage reduction benefits.
- Erosion and sedimentation damages are generally proportional to watershed area.
- Erosion and sedimentation damages generally change in cost over time according to the US GDP implicit price deflator.
- The proposed plans would have generally no effect on erosion and sedimentation damages compared to the existing conditions between the 2-year and 1000-year flood events.
- Damages for the proposed plans are assumed to be equal to those estimated for the existing structure under the original work plan.
- Erosion and sedimentation damages were included by taking the proportion of the damages from the original work plan for Little Wewoka Site 12 based on contribution to the total

Little Wewoka Watershed and adjusting the prices to 2023 dollars using the GDP implicit price deflator.

Table Appendix D - 17 Erosion and Sedimentation Damages

	Damages	**Total Effect $**
Annual Damage without Plan	$100,046	$100,046
Annual Damage with Structural Project	$43,356	$43,356
Price Base	1955	Not Applicable
1955 GDP Deflator	13.801	
2023 GDP Deflator (Q3)	122.817	
Annual Damage without Plan	$890,323	$890,323
Annual Damage with Project	$385,831	$385,831
Benefits under Plan	$504,492	$504,492
Total Watershed Area (ac)	122445	Not Applicable
Watershed Area (ac)	1414.4	
Damages without Plan	$10,284	$10,284
Damages with Project	$4,457	$4,457
Benefits under Plan	$5,828	$5,828

Benefit-Cost Analysis

The flood damage reduction benefits are computed by subtracting the flood damages associated with each plan from the damages associated with the "future without federal investment" plan. Project costs were developed for each proposed plan and include construction costs, engineering, real property rights/acquisition, project administration, and annual operation and maintenance costs. These costs, except O&M, are capital costs and must be amortized in order to compare them to the annualized flood damage reduction benefits.

Federal agencies are required by the Water Resources Development Act of 1974 to use a specified discount rate in the formulation and evaluation of water and related land resource plans for the purpose of discounting future benefits and computing costs. The discount rate formula is

established by Section 80 of the Act and is tied to yields on government securities with more than 15 years to maturity. This rate is computed annually and published by the Bureau of Reclamation (DOI n.d.-c). The FY 2024 discount rate is 2.75 percent. It was assumed that the project lifespan will be 100 years based on available sediment volume. The final portion of the economic analysis is a comparison between the costs and benefits for the proposed plan. The benefit-cost ratio (BCR) is the total annualized benefits divided by the total annualized costs. The following tables show the results of the economic analysis. Table Appendix D - 18 summarizes the flood damage reduction benefits of each alternative, Table Appendix D - 19 summarizes the costs of each alternative, and Table Appendix D - 20 presents the benefit-cost analysis for each alternative. Of the two structural rehabilitation options, Alternative 3 had the greatest cost-benefit ratio. Alternative 5, the non-structural alternative, has the greatest cost-benefit ratio of all of the alternatives considered for detailed study.

Table Appendix D - 18 Flood damages and Damage Reduction Benefits for Little Wewoka Dam No. 12

	Expected Annual Damages					*Annual Benefits Compared to FWOFI*			
Damage Category	**No Action**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 5**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 5**
Structures	$300	$400	$200	$200	$200	($200)	$100	$100	$100
Crops and Pastureland	$600	$600	$600	$600	$600	$0	$0	$0	$0
Road Crossings	$604,200	$14,600	$608,300	$608,300	$11,500	$589,500	($4,200)	($4,200)	$592,800
Roads	$155,000	$3,400	$158,300	$158,300	$3,300	$151,600	($3,400)	($3,400)	$151,700
Erosion and Sedimentation	$10,300	$10,300	$4,500	$4,500	$4,500	$0	$5,800	$5,800	$5,900
Total	**$770,400**	**$29,300**	**$771,900**	**$771,900**	**$20,100**	**$740,900**	**($1,700)**	**($1,700)**	**$750,500**

Table Appendix D - 19 Project Costs for Little Wewoka Dam No. 12

Cost Category	**FWOFI**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 5**
Capital Costs	$ -	$ 41,349,100	$ 11,355,170	$ 5,480,670	$ 27,886,700
O&M	$ 5,700	$ 1,500	$ 5,700	$ 5,700	$ 5,700
Discount Rate	2.75%	2.75%	2.75%	2.75%	2.75%
Project Lifespan (years)	102	102	102	102	102
Total Annual Costs	**$5,700**	**$1,214,900**	**$338,900**	**$166,500**	**$824,000**

Table Appendix D - 20 Benefit-Cost Calculations for Little Wewoka Dam No. 12

	Alt 1	Alt 2	Alt 3	Alt 5
Flood Damage Reduction Benefits	$740,900	($1,700)	($1,700)	$750,500
Total Benefits	$740,900	($1,700)	($1,700)	$750,500
Annual Costs	$1,214,900	$338,900	$166,500	$824,000
Benefit-Cost Ratio	**0.6**	**0.0**	**0.0**	**0.91**
Net NED Benefits	**($474,000)**	**($340,600)**	**($168,200)**	**($73,500)**

6.2.5 THREAT TO LIFE

The threat to life calculation was performed by using the procedure set by the NRCS population at risk process. The 500-year frequency flood depth raster for the no action alternative and each structural alternative were used to estimate the threat to life at inundated road crossings and buildings in the project area for each scenario. Three breach scenarios including hydrologic, static, and seismic were computed to estimate maximum population-at-risk (PAR). The potential maximum loss of life was estimated using the process prescribed by the worksheets "PAR Computation Worksheet" and "Evaluation of Potential Rehabilitation Projects" (390 – National Watershed Program Handbook, Part 506, subpart D, Section 506.40) and the failure and risk indexes computed. They are illustrated in Table.

Table Appendix D - 1 COMPUTATION OF POPULATION AT RISK (PAR) DURING DAM FAILURE

COMPUTATION OF POPULATION AT RISK (PAR) DURING DAM FAILURE						
STATE	Oklahoma		**BY**	WRS	**DATE**	9/1/23
DAM	Little Wewoka 12		**CHECKED BY**		**DATE**	
YEAR BUILT	1959	**DESIGN HAZARD CLASS**	L	**DRAINAGE AREA**	2.21	mi^2
WORK PLAN DATE	8/1/1955	**CURRENT HAZARD CLASS**	H	**DAM HEIGHT**	30	ft
	STATIC FAILURE SCENARIO (ver. 2013-01)				**NID ID**	OK02215
Structures (Elevated) Impacted by Potential Breach	**Number of Structures**			**PAR per Exposure with Inundation Depths >=2.0 Ft.**		**PAR**
	Inundation Depth Above Natural Ground		**Total**			
	<2.0 Ft	**>=2.0 Ft.**				
Mobile Homes	0			3		

Seasonal Use RV's				2	
Other					
Structures (With Foundations) Impacted by Potential Breach	**Number of Structures**			**PAR per Exposure with Inundation Depths >=1.0 Ft.**	**PAR**
	Inundation Depth Above Natural Ground		**Total**		
	<1.0 Ft	**>=1.0 Ft.**			
Homes	0	1	1	3	3
Seasonal Use Homes and Cabins				1.5	
Duplexes				5	
Apartments					
Commercial Buildings					
Schools (In Use)					
Schools (Not in Use)					
Hospitals					
Other	0				
Highways and Railroads	**Number of Roads, Highways and Railways**			**PAR per Exposure with Inundation Depths >=1.0 Ft.**	**PAR**
	Road Overflow Depth		**Total**		
	<1.0 Ft	**>=1.0 Ft.**			
Main Local Roads and Minor State Highways					
E 130 Rd, E 128 Rd, E 127 Rd		3	3	2	6
N 379 Rd	1		1	2	0
Major State and Minor Federal Highways					
Highway Name(s) or Number(s)				4	
Highway Name(s) or Number(s)				4	
Major Federal and Interstate Highways					
Highway Name(s) or Number(s)				8	

Highway Name(s) or Number(s)				8	
Railroads					
UPSF Freight Traffic Only				3	
Passenger Traffic				20	
TOTAL NUMBER OF PEOPLE AT RISK (PAR)					**9**

6.2.6 PERIOD OF ANALYSIS DETERMINATION

Federal agencies are required by the Water Resources Development Act of 1974 to use a specified discount rate in the formulation and evaluation of water and related land resource plans for the purpose of discounting future benefits and computing costs. The discount rate formula is established by Section 80 of the Act and is tied to yields on government securities with more than 15 years to maturity. This rate is computed annually and published by the Bureau of Reclamation (DOI n.d.-c). The FY 2021 discount rate is 2.5 percent. It was assumed that the project lifespan will be 100 years. The final portion of the economic analysis is a comparison between the costs and benefits for the proposed plan. The benefit-cost ratio (BCR) is the total annualized benefits divided by the total annualized costs.

APPENDIX E
OTHER SUPPORTING INFORMATION

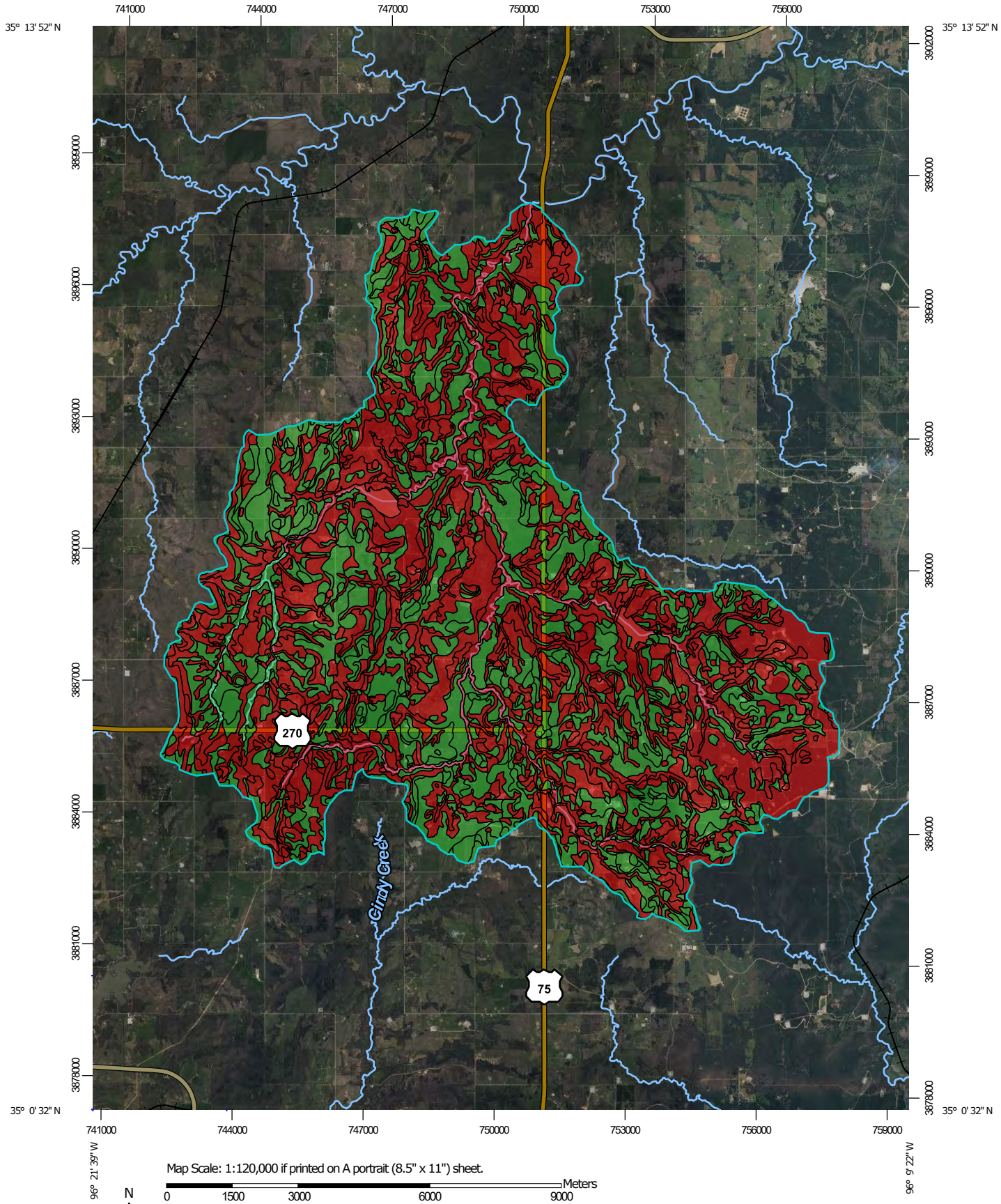


Figure E-1. Map of prime farmland within the watershed and project area.

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

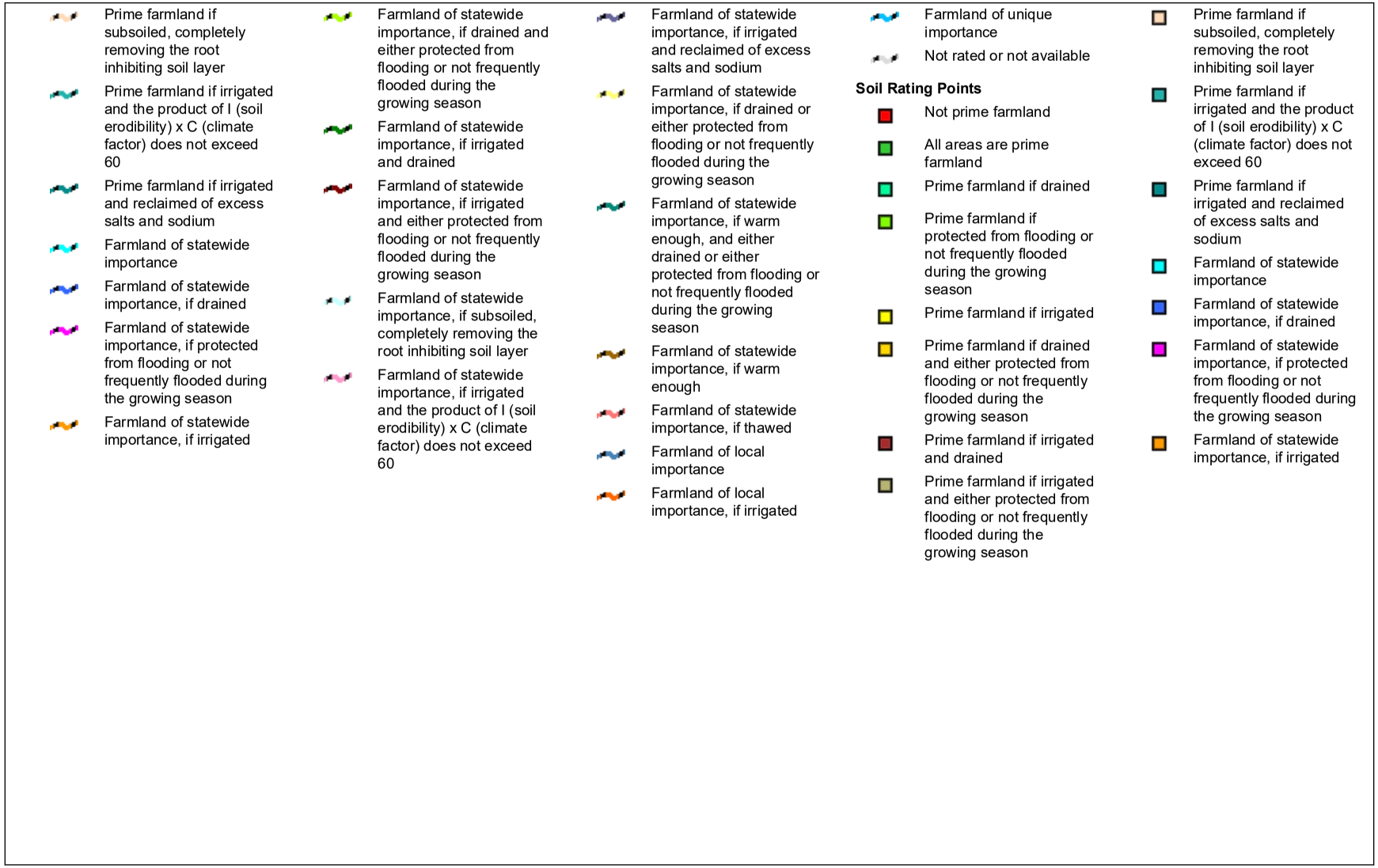
Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hughes County, Oklahoma
Survey Area Data: Version 19, Sep 11, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 6, 2020—May 6, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure E-2. Sole source aquifer map for the region.

National Flood Hazard Layer FIRMette

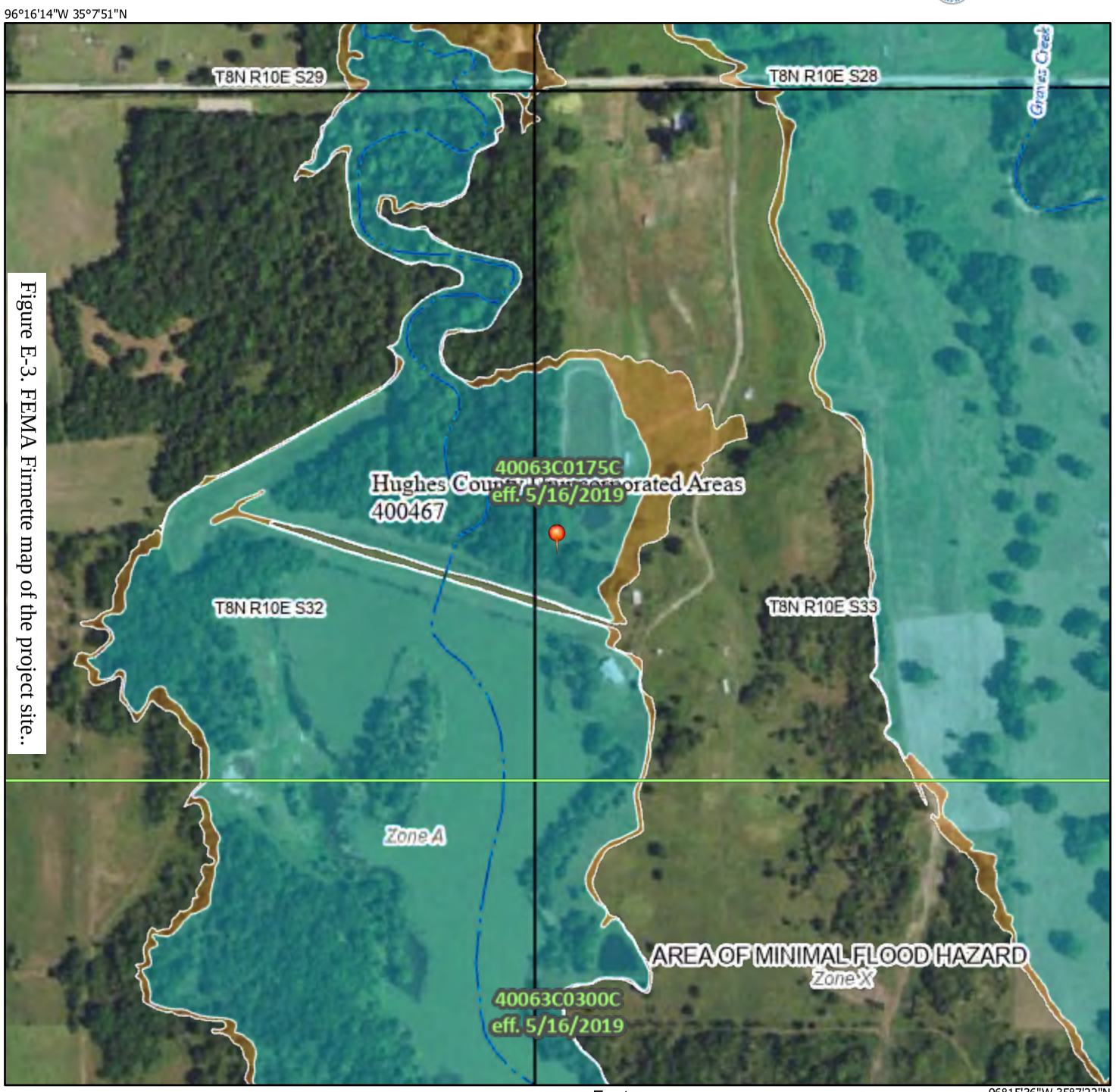


Figure E-3. FEMA Firmette map of the project site..

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

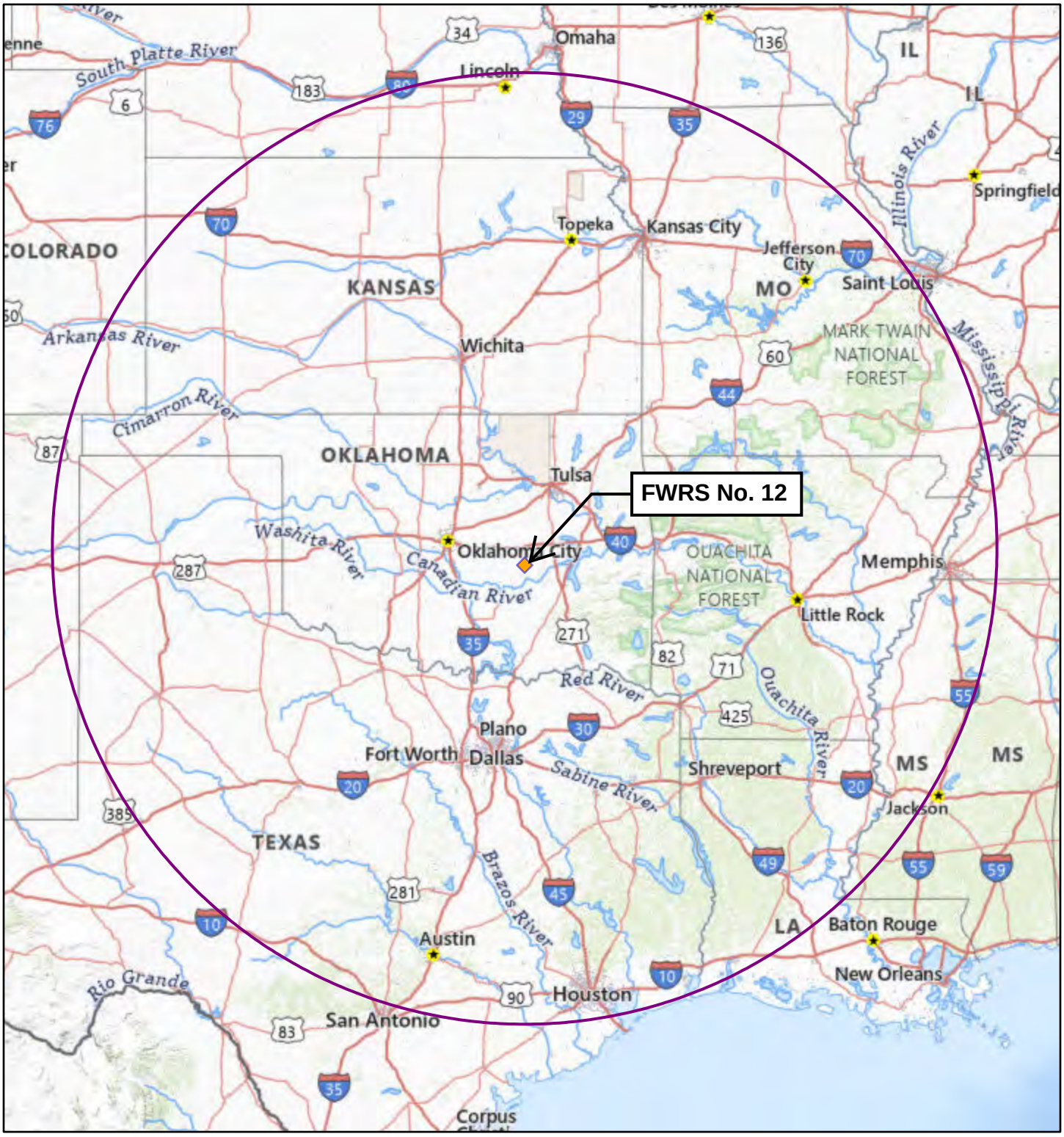
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/31/2024 at 8:34 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

The National Map Advanced Viewer



12/30/2024, 5:43:14 PM

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0 65 130 260 mi

0 100 200 400 km

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S.

Figure E-4. Map showing distance from the project area to the nearest ocean.

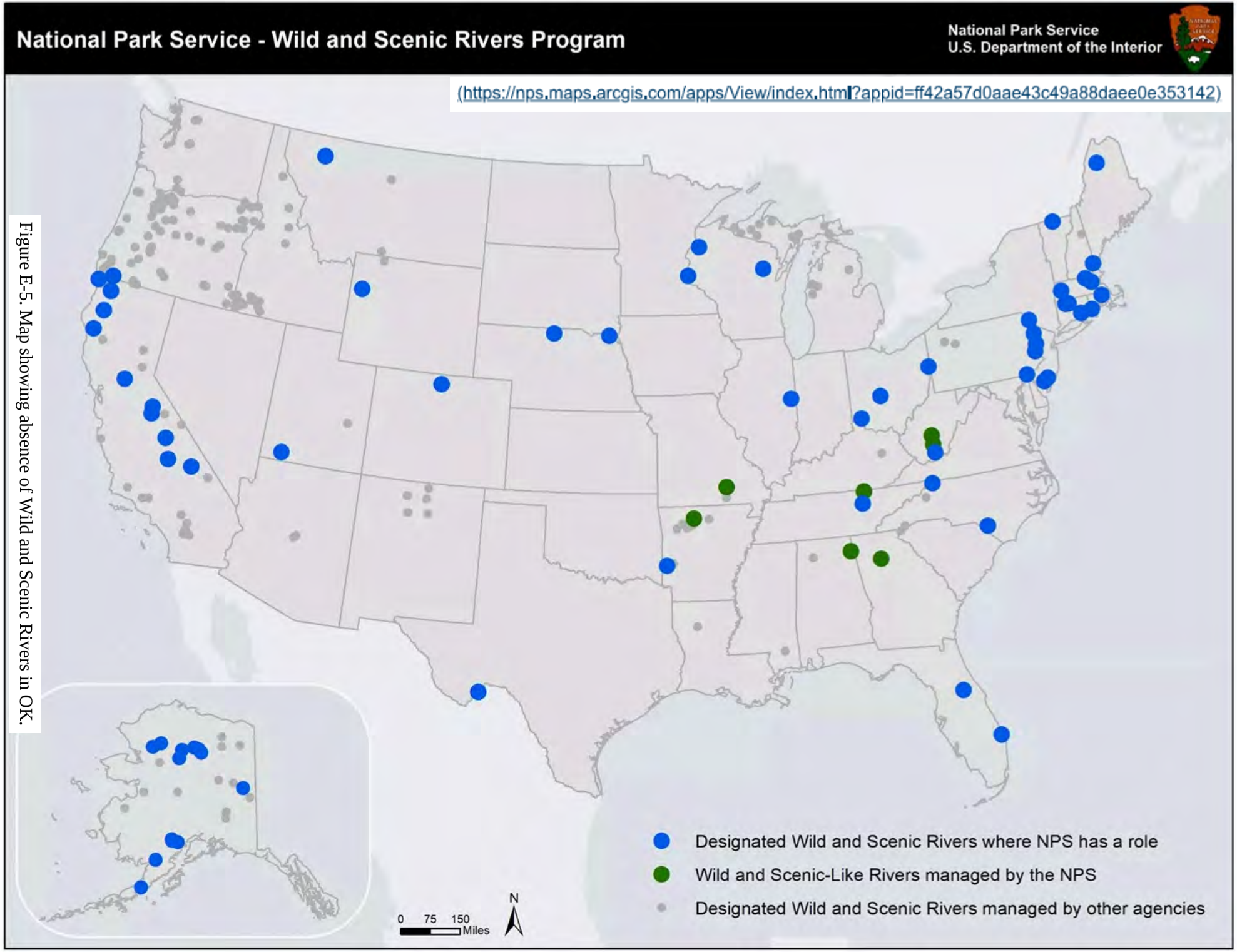
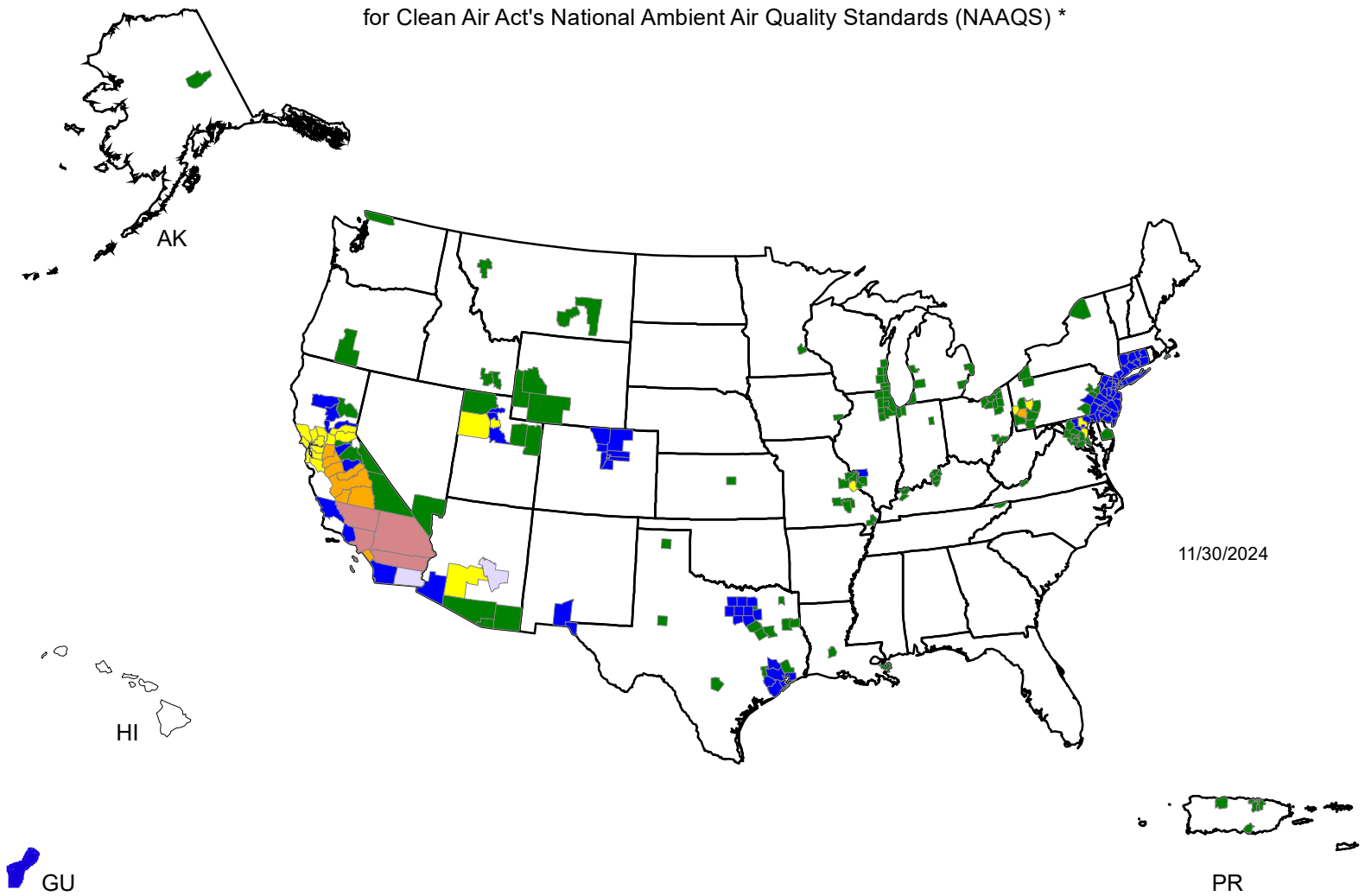


Figure E-5. Map showing absence of Wild and Scenic Rivers in OK.

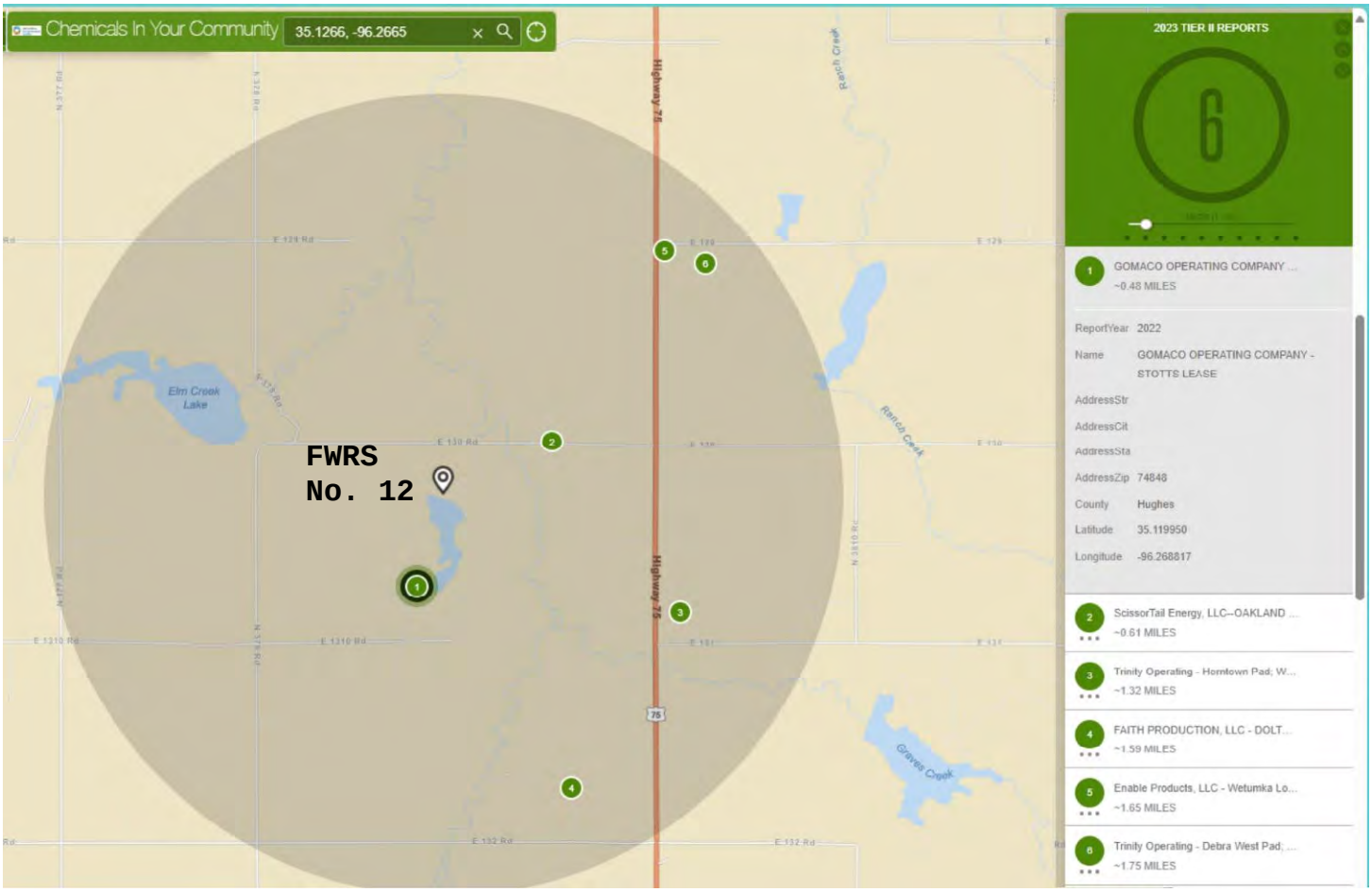


* The National Ambient Air Quality Standards (NAAQS) are health standards for Carbon Monoxide, Lead (1978 and 2008), Nitrogen Dioxide, 8-hour Ozone (2008), Particulate Matter (PM-10 and PM-2.5 (1997, 2006 and 2012), and Sulfur Dioxide.(1971 and 2010)

** Included in the counts are counties designated for NAAQS and revised NAAQS pollutants. Revoked 1-hour (1979) and 8-hour Ozone (1997) are excluded. Partial counties, those with part of the county designated nonattainment and part attainment, are shown as full counties on the map.

Figure E-6. Map showing nonattainment for air quality standards by county.

Tier II Facilities near FWRS No. 12.



Source: Oklahoma Environmental Quality, Tier II Information: https://deq.maps.arcgis.com/apps/LocalPerspective/index.html?appid=671e8f1b8ccd49f7ae6e8824521d435e

Figure E-7. Map showing the location of Tier II facilities in the region.

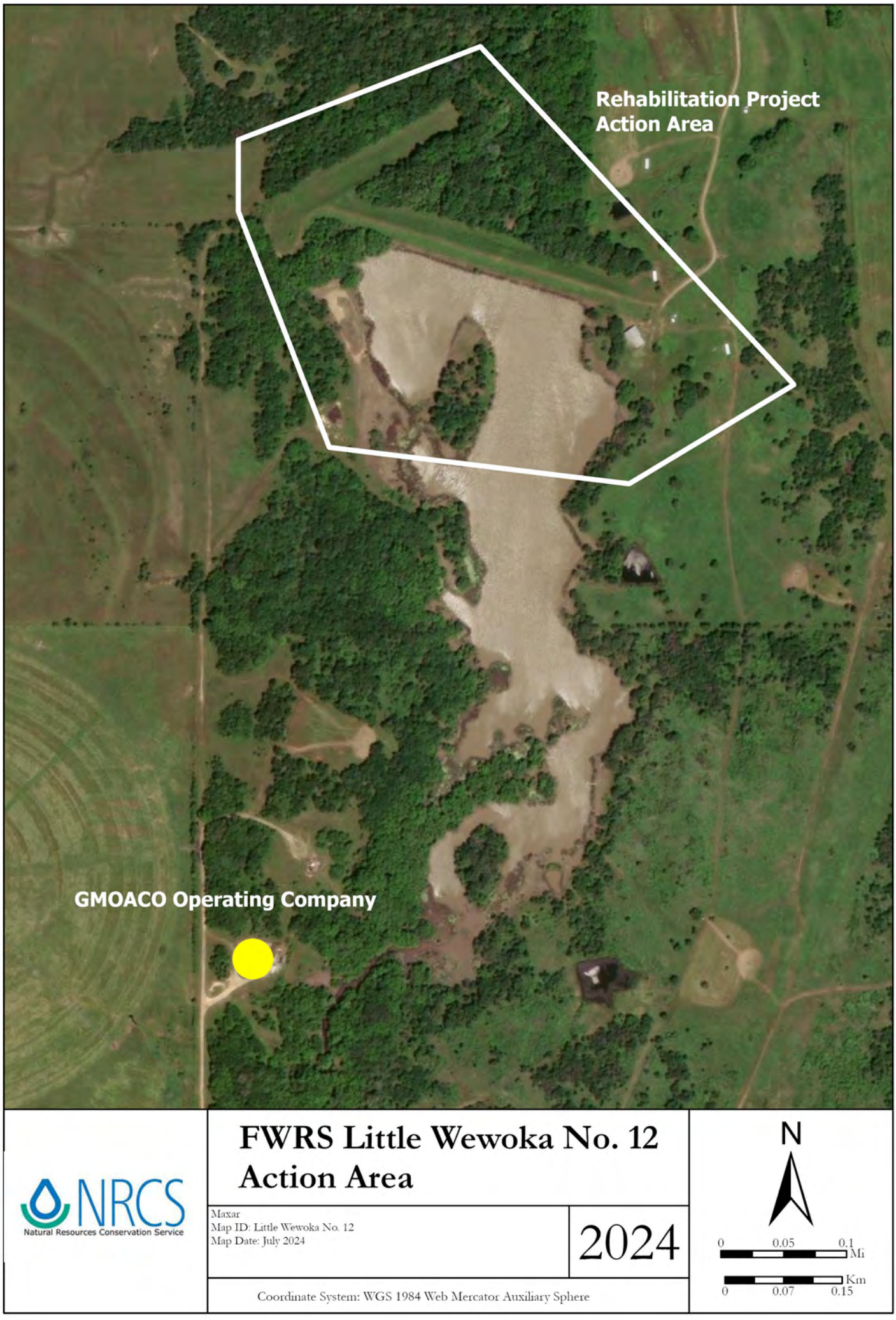
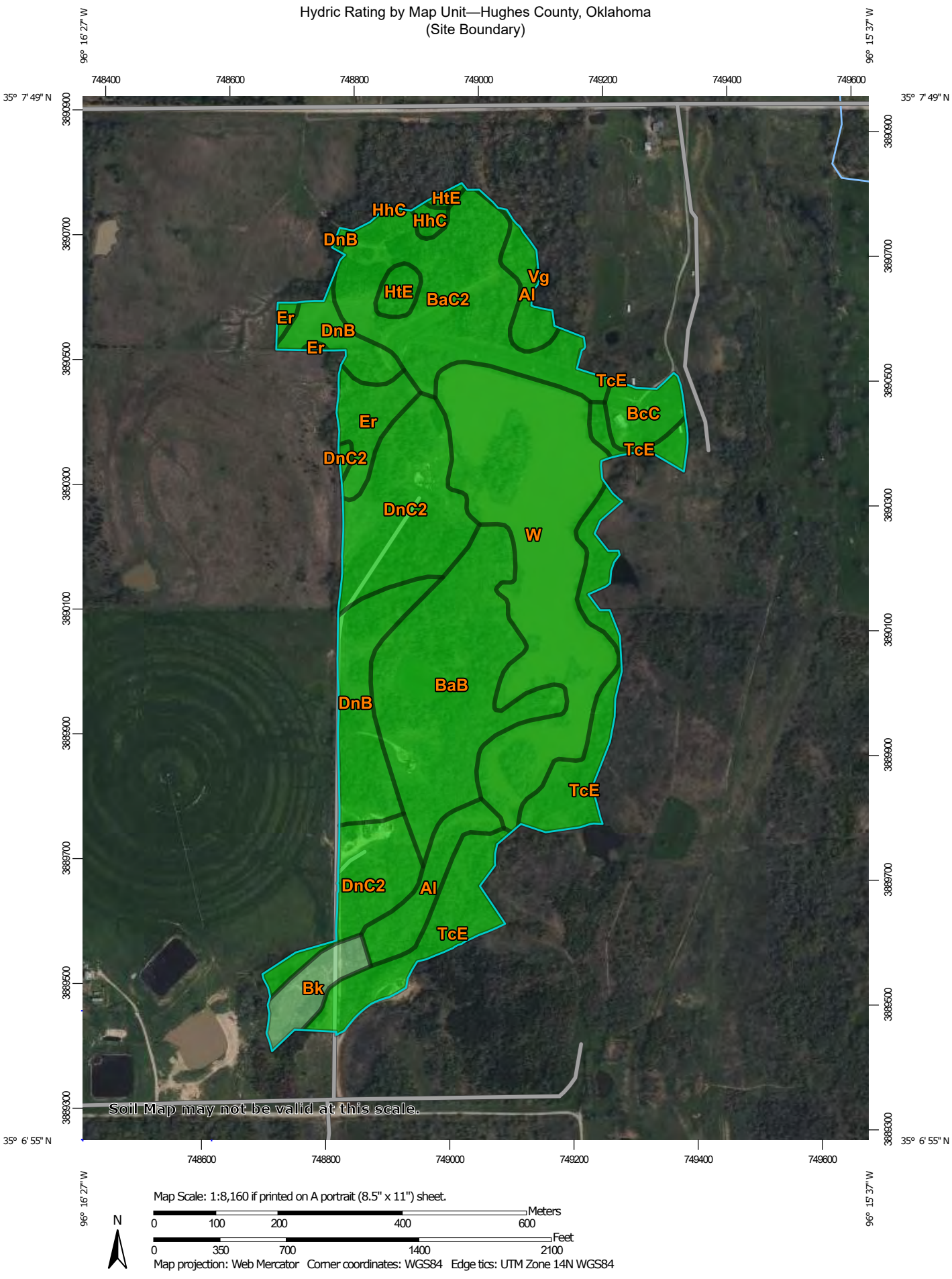


Figure E-8. Map showing location of a Tier II facility in relation to the project action area.



USDA Natural Resources Conservation Service

Figure E-9. Map showing the absence of hydric soils within the project area.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hughes County, Oklahoma
Survey Area Data: Version 19, Sep 11, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 2, 2023—May 6, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Al	Verdigris silt loam, 0 to 2 percent slopes, frequently flooded	0	6.3	5.1%
BaB	Bates fine sandy loam, 1 to 3 percent slopes	0	19.7	15.8%
BaC2	Bates fine sandy loam, 3 to 5 percent slopes, eroded	0	17.3	13.9%
BcC	Bates-Coweta complex, 3 to 5 percent slopes	0	2.8	2.2%
Bk	Eram-Verdigris complex, 0 to 20 percent slopes	2	3.1	2.5%
DnB	Dennis loam, 1 to 3 percent slopes	0	10.5	8.4%
DnC2	Dennis loam, 3 to 5 percent slopes, eroded	0	17.3	13.9%
Er	Dennis loam, 2 to 8 percent slopes, severely eroded	0	3.8	3.1%
HhC	Clearview-Hector complex, 3 to 5 percent slopes	0	0.6	0.5%
HtE	Hector-Endsaw complex, 5 to 30 percent slopes, stony	0	1.4	1.2%
TcE	Talihina-Coweta complex, 5 to 20 percent slopes, very stony	0	13.9	11.1%
Vg	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	8	0.0	0.0%
W	Water	0	27.7	22.3%
Totals for Area of Interest			**124.4**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

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www.freese.com

TO: Laurie Brown, LEED AP

CC: Patrick Garnett, PWS, CWB, CPESC, ISA Certified Arborist

FROM: Wes Wiegreffe, CWB

SUBJECT: Ecological Resources Inventory and Analysis

DATE: January 6, 2025

PROJECT: AAC23107 – Little Wewoka 12

Introduction

Freese and Nichols, Inc. (FNI) personnel conducted a pedestrian survey of the proposed Little Wewoka 12 project site on May 31, 2023. The purpose of the survey was to identify potential waters of the U.S. that could be regulated by Section 404 of the Clean Water Act, and areas that could be potential habitat for federally listed threatened or endangered species within the proposed limits of investigation (LOI). Furthermore, the survey was performed to characterize the soils, floodplains, fish and wildlife habitat, invasive species, and riparian areas identified within the proposed LOI. Figures and site photographs are presented in **Appendices A and B**, respectively.

Project Description

The Little Wewoka 12 project includes the completion of a Natural Resource Conservation Service (NRCS) Watershed Plan-Environmental Document (Plan-ED) for the existing Little Wewoka Creek Flood Retarding Structure (FRS) No. 12. The local sponsor, Hughes County Conservation District, and the NRCS are seeking to complete an authorized plan assessing project alternatives, which would address the reclassification of the FRS to a high-hazard dam. The Plan-ED will describe the existing conditions, develop alternatives, evaluate the economic, social, and environmental impact of the alternatives, and recommend a preferred alternative. The Plan-ED must be prepared in accordance with the National Environmental Policy Act (NEPA).

Ecological Setting

The LOI is located within the Northern Cross Timbers ecoregion of the Cross Timbers. This ecoregion was historically a mosaic of oak savanna, scrubby oak forest, eastern red cedar, and tall grass prairie. Today, livestock farming is the main land use, along with cropland agriculture. Soils are highly erodible when disturbed and consist of porous, course-textured soils in forests, fine-textured soils in grasslands, and sandy substrates within stream bottoms. Large oilfields were developed in the early 20th century and associated brine, drilling mud, and petroleum waste products have increased salinity in many streams. (Woods, et al., 2005).

Site Conditions

The Little Wewoka Creek FRS 12 project site is located approximately 3 miles northwest of Horntown in Hughes County, Oklahoma (**Figures 1 and 2**). The site is currently located within partially forested pastureland used for livestock grazing and the proposed normal pool elevation impounds an intermittent tributary of Graves Creek. Site photos are attached in **Appendix B**.

Hughes County has a humid subtropical climate with hot summers and mild winters. Average summer temperatures are near 80 °F, and are near 40 °F during the winter. Precipitation is abundant throughout the year, with an approximate yearly average of 40 inches, though thunderstorms are common during the spring and summer months. The county also receives a fair amount of snow during the colder months, with an average annual snowfall of 2 inches.

Soil series present within the proposed LOI include: Bates fine sandy loam, 1 to 3 percent slopes; Bates fine sandy loam, 3 to 5 percent slopes, eroded; Bates-Coweta complex, 3 to 5 percent slopes; Clearview-Hector complex, 3 to 5 percent slopes; Dennis loam, 1 to 3 percent slopes; Dennis loam, 3 to 5 percent slopes, eroded; Dennis loam, 2 to 8 percent slopes, severely eroded; Eram-Verdigris complex, 0 to 20 percent slopes; Hector-Endsaw complex, 5 to 30 percent slopes, stony; Talihina-Coweta complex, 5 to 20 percent slopes, very stony; Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded; Verdigris silt loam, 0 to 2 percent slopes, frequently flooded; and Water. According to the NRCS list of hydric soils, Two of the soil series within the proposed LOI (Eram-Verdigris complex, 0 to 20 percent slopes and Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded) are classified as hydric (**Figure 3**).

Vegetation at the site is consistent with the surrounding area and includes tree and shrub species such as: American elm (*Ulmus americana L.*), American persimmon (*Diospyros virginiana*), blackjack oak (*Quercus marilandica*), Osage orange (*Maclura pomifera*), buttonbush (*Cephalanthus occidentalis*), cedar elm (*Ulmus crassifolia*), eastern red cedar (*Juniperus virginiana*), honey locust (*Gleditsia triacanthos*), pecan (*Carya illinoinensis*), possumhaw (*Ilex decidua*), post oak (*Quercus stellata*), and sugarberry (*Celtis laevigata*). Herbaceous and vine species included: buffalo grass (*Bouteloua dactyloides*), clasping coneflower (*Dracopis amplexicaulis*), common spikerush (*Eleocharis palustris*), gum bumelia (*Bumelia lanuginosa*), hop sedge (*Carex lupulina*), Japanese brome (*Bromus japonicus*), perennial rye (*Lolium perenne*), sawtooth greenbrier (*Smilax rotundifolia*), softstem bulrush (*Schoenoplectus tabernaemontani*), sticky willy (*Galium aparine*), swamp smartweed (*Persicaria hydropiperoides*), switchgrass (*Panicum virgatum*), wild onion (*Allium canadaese*), and Virginia wildrye (*Elymus virginicus*).

Potential Waters of the U.S.

The U. S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into waters of the U.S. (WOTUS), including wetlands, under Section 404 of the Clean Water Act. WOTUS (i.e., jurisdictional waters) include streams that display ordinary high water marks (OHWMs) and a surface downstream hydrologic connection with traditional navigable waters (TNW) of the U.S., impoundments of such streams, and wetlands adjacent to these jurisdictional waters. The term OHWM means “that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural lines impressed on the bank,

shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR 328.3). Official determination of the presence or absence of WOTUS can only be obtained by requesting an approved jurisdictional determination (AJD) from the USACE. **Figure 4** displays the locations and types of waterbodies present within the LOI.

Open Water Bodies/Impoundments

Three open water body features were identified in the proposed LOI. Little Wewoka 12 Reservoir is an impoundment of Stream 1 (**Photo 1**). Pond 1 is an impoundment of Stream 2 caused by beaver activity and is located directly adjacent to the eastern shore of Little Wewoka 12 Reservoir (**Photo 2**). Pond 2 is an impoundment of Stream 4 caused by beaver activity and is located east of the upstream extents of Stream 1 in the LOI (**Photo 3**).

Streams

Seven streams were identified in the proposed LOI. Stream 1 is an intermittent tributary of Little Wewoka Creek impounded by the Little Wewoka 12 FRS within the LOI (**Photos 4-5**). Stream 1 flows north through the LOI and has an average OHWM width of 25 ft upstream of Little Wewoka 12 Reservoir, and 15 ft downstream of the FRS. Stream 2 is an ephemeral stream which flows northwest into Pond 1 and has an average OHWM width of 2 ft (**Photo 6**). Stream 3 is an ephemeral stream, which flows north into Emergent Wetland 2 and has an average OHWM width of 2 ft (**Photo 7**). Stream 4 is an ephemeral tributary of Stream 1 which flows north through the LOI and has an average OHWM width of 4 ft (**Photo 8**). Stream 5 is an intermittent side channel of Stream 1 which has an OHWM width of 7 ft (**Photo 9**). Stream 6 is an ephemeral stream which flows east into Little Wewoka 12 Reservoir and has an average OHWM width of 10 ft (**Photo 10**). Stream 7 is an ephemeral stream which flows east into Little Wewoka 12 Reservoir and has an average OHWM width of 4 ft (**Photo 11**).

Wetlands

Nine wetlands (One forested wetland, two shrub wetlands, and six emergent wetlands) were identified within the proposed LOI. Forested Wetland 1 is a riparian forested wetland located between Stream 6 and Emergent Wetland 3, north of an upstream segment of the reservoir (**Photo 12**). Forested Wetland 1 is dominated by common persimmon, pecan, and Japanese stiltgrass (*Microstegium vimineum*). Shrub Wetlands 1 and 2 are fringe shrub wetlands located west of the reservoir and are dominated by buttonbush, common persimmon, and hop sedge (*Carex lupulina*) (**Photos 13-14**). Emergent Wetland 1 is a fringe emergent wetland located east of the reservoir and is dominated by softstem bulrush (**Photo 15**). Emergent Wetland 2 is a fringe emergent wetland located south of the of an upstream segment of the reservoir and is dominated by hop sedge (**Photo 16**). Emergent Wetland 3 is a fringe emergent wetland located west of the reservoir and is dominated by softstem bulrush and floating primrose-willow (*Ludwigia peploides*) (**Photo 17**). Emergent Wetland 4 is a depressional emergent wetland located on a hillslope approximately 200 ft west of the reservoir and was dominated by broadleaf cattail (*Typha latifolia*) (**Photo 18**). Emergent Wetland 5 is a depressional emergent wetland located adjacent to the western shore of the reservoir southwest of the dam and is dominated by common spikerush (*Eleocharis palustris*) (**Photo 19**).

Emergent Wetland 6 is a fringe emergent wetland located along the western shore of the reservoir and is dominated by softstem bulrush (**Photo 20**).

Table 1 summarizes the potential WOTUS within the LOI. See relevant maps (**Figures 4 and 7**) in **Appendix A**, and site photos in **Appendix B**.

Table 1 – Waterbodies within the Proposed LOI

Feature Name	Feature Type	Potential Jurisdictional Status*	Area in LOI (Acres)	Length in LOI (Linear Feet)
Stream 1	Intermittent Stream	Jurisdictional	1.31	2,616
Stream 2	Ephemeral Stream	Jurisdictional	0.01	246
Stream 3	Ephemeral Stream	Jurisdictional	0.01	272
Stream 4	Ephemeral Stream	Jurisdictional	0.03	287
Stream 5	Intermittent Stream	Jurisdictional	0.05	265
Stream 6	Ephemeral Stream	Jurisdictional	0.07	272
Stream 7	Ephemeral Stream	Jurisdictional	0.06	611
Forested Wetland 1	Forested Wetland	Jurisdictional	0.06	-
Shrub Wetland 1	Shrub Wetland	Jurisdictional	0.05	-
Shrub Wetland 2	Shrub Wetland	Jurisdictional	0.09	-
Emergent Wetland 1	Emergent Wetland	Jurisdictional	0.07	-
Emergent Wetland 2	Emergent Wetland	Jurisdictional	0.48	-
Emergent Wetland 3	Emergent Wetland	Jurisdictional	0.20	-
Emergent Wetland 4	Emergent Wetland	Non-Jurisdictional	0.08	-
Emergent Wetland 5	Emergent Wetland	Jurisdictional	0.16	-
Emergent Wetland 6	Emergent Wetland	Jurisdictional	0.28	-
Little Wewoka 12 Reservoir	Impoundment	Jurisdictional	26.27	-
Pond 1	On-channel Pond	Jurisdictional	0.13	-
Pond 2	On-channel Pond	Jurisdictional	0.04	-

*Official determination of the presence or absence of WOTUS can only be obtained by requesting an AJD from the USACE.

Section 303 (d) & 305 (b)

Section 303(d) requires States, territories, and Tribes to identify "impaired waters" and to establish total maximum daily loads (TMDLs). A TMDL is a regulatory planning term used to describe a plan for restoring impaired waters that identifies the maximum amount of pollutant that a body of water can receive while still meeting water quality standards.

The Oklahoma Department of Environmental Quality (ODEQ) maintains a list of impaired water through the National Pollutant Discharge Elimination System (**Appendix C**). The 303(d) and 305(b) lists were used to identify surface water quality concerns to Public Health and Safety. The lists identified impaired surface waters within the Lower North Canadian Watershed (HUC 11100302), but not within the Little Wewoka 12 project limits; however, the Little Wewoka 12 project limits are hydraulically connected to the identified impaired surface waters and TMDLs. For this evaluation, hydraulically connected is defined as the flow path to the first classified segment, directly or indirectly, that first receives the construction site's discharges. Discharges from the Little Wewoka 12 project site eventually reaches the following classified segments by way of unnamed tributaries:

- Graves Creek (OK520500020060_00)
- Wewoka Creek (OK520500020010_00)
- North Canadian River (OK520500010110_00)

Graves Creek (OK520500020060_00) is located to the north of the Little Wewoka 12 project and flows north toward Wewoka Creek (OK520500020010_00). Graves Creek receives discharges from the Little Wewoka 12 project indirectly by way of an unnamed tributary. According to the 2022 305(b) list Graves Creek has either not been assessed or insufficient information is available to determine designated uses. Graves Creek is not identified on the 2022 Oklahoma 303(d) List of Impaired Waters as an impaired water. However, Graves Creek, located within the Lower North Canadian Watershed (HUC 11100302), is subject to TMDLs for E. Coli, Enterococcus and Turbidity.

At the confluence with Graves Creek, Wewoka Creek (OK520500020010_00) runs northeast toward the North Canadian River (OK520500010110_10), which is northeast of the Little Wewoka 12 project. Wewoka Creek (OK520500020010_00) receives stormwater discharges from the Little Wewoka 12 project indirectly by way of an unnamed tributary and Graves Creek. Wewoka Creek fully supports designated uses for Aesthetics, Agriculture, Primary Body Contact Recreation, and Emergency Water Supply while the Warm Water Aquatic Community designated use is not supported as determined by Macroinvertebrate Bioassessments. The designated use for Fish Consumption is identified in the 2022 Comprehensive Waterbody Assessment but has not been assessed. Wewoka Creek is identified on the 2022 Oklahoma 303(d) List of Impaired Waters and has an impaired use for Warm Water Aquatic Communities determined by Macroinvertebrate Bioassessments. Additionally, Wewoka Creek is directly associated with TMDLs for E. Coli, Enterococcus and Turbidity.

The North Canadian River (OK520500010110_10) and Wewoka Creek confluence is located approximately 4 miles northeast of Wetumka, Oklahoma and approximately 10 miles northeast of the Little Wewoka 12 project. The

North Canadian River is fully supporting the designated use of Agriculture. The Warm Water Aquatic Community designated use is not supported as determined by Turbidity Assessments, Fish Consumption is not supported as determined by Lead Assessments, and Primary Body Contact Recreation designated use is not supported by Enterococcus Assessments. Additionally, Public and Private Water Supply and Aesthetics designated uses are currently noted as having insufficient information. The North Canadian River is identified on the 2022 Oklahoma 303(d) List of Impaired Waters and has an impaired use for Primary Body Contact Recreation determined by Enterococcus Assessments, Warm Water Aquatic Community for Turbidity Assessments, and Fish Consumption for Lead Assessments. Additionally, the North Canadian River is directly associated with TMDLs for Enterococci, Fecal Coliform, and Turbidity.

If construction activities discharge stormwater directly to an impaired segment or discharge stormwater indirectly to a segment with a TMDL, the entire watershed is subject to the TMDL requirements. The Lower North Canadian Subbasin (HUC 11100302) is subject to TMDL requirements, and as such all waterbodies within the watershed of the project area are subject to these TMDL requirements. The classified segment listed above, as well as unclassified/unnamed water bodies that receive stormwater discharges are summarized in Table 2.

Table 2 – Classified Segment Summary

Classified Water Body/Watershed	Receiving Water Body Name	Receives Stormwater Directly or Indirectly	303(d) or 305(b) List	TMDL	Listed Water Quality Concerns
North Canadian River (HUC 11100302)	North Canadian River (OK520500010110_10)	Indirectly	Yes	Yes	E. Coli (2014) Enterococcus (2011) Turbidity (2011)
	Wewoka Creek (OK520500020010_00)	Indirectly	Yes	Yes	
	Graves Creek (OK520500020060_00)	Indirectly	No	Yes	
	Unnamed Tributaries	Directly	No	Yes	

TMDLs

E. Coli and Enterococcus occur in waterbodies as a result of municipal or agricultural runoff. Construction activities are not listed in the full TMDL description for either as a point or non-point source. Regardless, all sanitary waste produced during construction must be properly managed and prevented from discharging to surface waters during construction activities. TMDLs related to bacteria can be found by accessing the Oklahoma Department of

Environmental Quality 2014 Bacterial and Turbidity Total Maximum Daily Loads for Oklahoma Streams in the Lower North Canadian-Deep Fork Area.

Potential sources of Turbidity can be classified as clean sediment, the grazing in riparian corridors of streams and creeks, highway/road/bridge runoff not related to construction activities, non-irrigated crop production, petroleum/natural gas activities, rangeland grazing, and other potential unknowns. There are several NPDES-permitted facilities classified point sources that have the potential to contribute to Total Suspended Solid (TSS) concentrations. These NPDES facilities include municipal wastewater treatment plant (WWTP), Industrial WWTP discharges, Municipal No-Discharge WWTPs, Concentrated Animal Feeding Operations (CAFO), Municipal Separate Storm Sewer System (MS4) discharges, Multi-Sector General Permits, and Construction stormwater discharges. Stormwater discharges from construction sites may contain higher concentrations of TSS. However, according to 40 CFR § 130.2(h), the Oklahoma Water Quality Standards turbidity criteria may only "apply to seasonal base flow conditions" and "elevated turbidity levels may be expected, and for several days after, a runoff event". Meaning, waste load allocations for NPDES-regulated stormwater discharges are unnecessary in TMDL Pollutant Source Assessment, and calculations do not include that of a TMDL.

Impairment

Macroinvertebrates can be affected by a variety of items, such as metals, pesticides, pH, reduced riparian vegetation, and water nutrient levels. However, Little Wewoka 12 construction activities discharge stormwater runoff indirectly to Wewoka Creek (OK520500020010_00). Therefore, the construction activities are unlikely to contribute to the Macroinvertebrate impairment in Wewoka Creek. According to the 2022 Oklahoma 303(d) List of Impaired Waters, additional data and information is necessary for a TMDL or a water quality standard to be scheduled.

Lead generally enters from industrial sources and contaminated sites. Lead sticks to soil particles and may move from soil to water depending on Lead compound and the soil characteristics. Lead is generally associated with unstable flow conditions associated with stormwater runoff events. However, Little Wewoka 12 construction activities discharge stormwater runoff indirectly to the North Canadian River (OK520500010110_10). Therefore, the construction activities are unlikely to contribute to the Lead impairment in the North Canadian River. According to the 2022 Oklahoma 303(d) List of Impaired Waters, a TMDL is in the works or will be scheduled.

Section 402

Section 402 establishes the National Pollutant Discharge Elimination System (NPDES) Program, which is administered by the State of Oklahoma. Section 402 requires a permit for sewer and stormwater discharges from developments, construction sites, or other areas of soil disturbance. As mentioned, Graves Creek, Wewoka Creek, and the North Canadian River are subjected to TMDLs by way of the watershed approached used to apply TMDL requirements to a watershed and not just a stream. The TMDLs (E. Coli, Enterococcus, and Turbidity) and impairments (Macroinvertebrates, Enterococcus, Turbidity, and Lead) do not explicitly list construction activities as a point or non-point source and do not have any additional requirements for construction. For Turbidity criteria, the Oklahoma Water Quality Standards should be reviewed. Notwithstanding, construction activities should

maintain compliance with the Oklahoma NPDES General Permit for Stormwater Runoff from Construction Activities and should be monitoring for the potential for these contaminants, among others, during construction activities.

Section 404

Stream 1 is a tributary of the Wewoka Creek, which is a perennial tributary of the North Canadian River, listed as a TNW by the USACE. Therefore, due to the presence of a downstream surface hydrologic connection to a TNW, Stream 1, its tributaries, and any adjacent wetlands or impoundments would be considered WOTUS by the USACE and subject to Section 404 jurisdiction.

Based on the results of the pedestrian survey and preliminary project design, construction of the proposed project would most likely result in permanent impacts to WOTUS and are subject to Section 404 permitting regulations.

Nationwide Permit (NWP) 43, Stormwater Management Facilities, authorizes the discharge of dredged or fill material into non-tidal WOTUS for the construction of stormwater management facilities, including stormwater detention basins and retention basins and other stormwater management facilities, including stormwater drainage features. If the construction of the proposed project would involve rehabilitation of the dam and would not result in the loss of over 0.5 acre of WOTUS, the project could be authorized by NWP 43 with the submittal of a pre-construction notification (PCN) to the USACE.

NWP 27, Aquatic Habitat Restoration, Enhancement, and Establishment Activities, authorizes activities in WOTUS associated with the restoration and enhancement of tidal and non-tidal wetlands, riparian areas, streams, and other open waters, provided those activities result in net increases in aquatic resource functions and services. If the construction of the proposed project would involve the decommissioning of the dam and would result in a net increase in aquatic resource function, the project could be authorized by NWP 27 without a PCN. However, the NRCS and sponsors would be required to notify the USACE according to the reporting requirements of NWP 27.

If impacts to WOTUS resulting from project alternatives are greater than 0.5 acre the project would not be authorized by a USACE nationwide permit, but would require authorization by a USACE Individual Permit (IP).

If the project is authorized by NWP 43 or an IP, and would result in over 0.1 acre of loss to jurisdictional wetlands or open waters, or over 0.03 acre of loss to streams, compensatory mitigation would generally be required for unavoidable impacts to WOTUS. Acceptable forms of mitigation would include the purchase of mitigation bank credits from a private mitigation bank or In-lieu fee bank, which services the Lower North Canadian HUC-8 Watershed (11100302) with sufficient stream and wetland bank credits. The USACE Tulsa District uses the Oklahoma Stream Mitigation Method (OSMM) to calculate the required number of mitigation credits to offset losses to jurisdictional streams.

Clean Air Act

The Clean Air Act (CAA) regulates air emissions from stationary and mobile sources and authorizes the U. S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of hazardous air pollutants. Non-attainment areas area areas considered to have air quality worse than the NAAQS defined in the Clean Air Act. The proposed LOI is currently not within a non-attainment area.

The proposed project is expected to result in only minor, short-term emissions of dust and other particulate matter from construction, and will not significantly increase the emission rate of any regulated air pollutant.

FEMA Floodplains

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) 40063C0175C and 40063C0300C, the proposed project site would be constructed within the floodplain of Stream 1 (**Figure 5**). As such, the local floodplain administrator should be contacted prior to construction for the proposed project to acquire floodplain-related authorizations, if needed.

Threatened and Endangered Species

Table 1. Federally Listed Species of Potential Occurrence in Hughes County, Oklahoma[1]

Common Name	Scientific Name[2]	Federal Status[2]	State Status[2]	Effects Determination
Piping Plover	*Charadrius melodus*	T	T	No Effect
Rufa Red Knot	*Calidris canutus rufa*	T	T	No Effect
Alligator Snapping Turtle	*Macrochelys temminckii*	PT	-	May Effect
American Burying Beetle	*Nicrophorus americanus*	T	T	May Effect
Monarch Butterfly	*Danaus plexippus*	PT	-	May Effect

[1] According to ODWC (2025) and USFWS (2025).
[2] E = Endangered; T = Threatened; PE = Proposed Endangered; PT = Proposed Threatened; C = Candidate

Federally Listed Species

According to the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) resource list received on January 6, 2025 (**Appendix D**), the following species are listed as threatened, endangered, or candidate under the Endangered Species Act (ESA), and may occur in the LOI located within Hughes County, Oklahoma:

The piping plover (*Charadrius melodus*) is federally listed as threatened in Hughes County. In the interior U.S., piping plovers nest on the unvegetated shorelines of alkaline lakes, reservoirs, or river sandbars. No shorelines/sandbars, which may serve as nesting habitat were identified within the proposed LOI. Therefore, no alternatives may result in an effect to the piping plover.

The rufa red knot (*Calidris canutus rufa*) is federally listed as threatened in Hughes County. In the interior U.S., rufa red knots use saline lakes, and possibly large wetlands and riverine sandbars as stopover habitat. No potential stopover habitats were identified within the proposed LOI. Therefore, no alternatives may result in an effect to the rufa red knot.

The alligator snapping turtle (*Macrochelys temminckii*) is a species proposed for federal listing as threatened in Hughes County. Alligator snapping turtles are bottom-dwellers, which generally occupy the deeper waters of large rivers and major tributaries, but are also found in fresh waterbodies with high canopy cover and aquatic structures (tree root masses, stumps, submerged trees, etc.). While no individuals were identified during the pedestrian survey, freshwater areas within upstream segments of Stream 1 and Little Wewoka 12 Reservoir, which may serve as habitat for alligator snapping turtles were identified within the proposed LOI (**Appendix A, Figure 6; Appendix B, Photo 5**). Therefore, alternatives that would impact these habitats within the LOI may affect the alligator snapping turtle.

The American burying beetle (*Nicrophorus americanus*) is federally listed as threatened in Hughes County. American burying beetles utilize and move between several vegetation types, including riparian zones, coniferous forest, mature forest, oak-hickory forest, as well as native grassland and grazed pasture with vegetation at a height over eight inches. While no individuals were identified during the pedestrian survey, preferred habitats for this species were identified within the proposed LOI (**Appendix A, Figure 6; Appendix B, Photos 21-22**). According to the American Burying Beetle 4(d) Rule for Federal and Non-Federal Activities, the proposed LOI would be located within the South Plains Analysis Area for the American burying beetle, but would be located outside of "Conservation Lands" described in the 4(d) Rule. Therefore, in accordance with the Determination Key to the American Burying Beetle 4(d) Rule for Federal and Non-Federal Activities, the proposed project actions may affect the American burying beetle. However, according to the 4(d) Determination Key, any incidental take of the American burying beetle that may occur as a result of an action covered by the 4(d) Rule within the South Plains Analysis Area that is not part of Conservation Lands is not prohibited under the ESA. If the USFWS determines that the proposed project action is included under the 4(d) Rule, mitigation for adverse impacts to the American burying beetle at the project site may not be required.

The monarch butterfly (*Danaus plexippus*) is a species proposed for federal listing as threatened in Hughes County. Monarch butterflies undergo long-distance migrations throughout North America and lay their eggs on obligate milkweed host plants in a variety of forested and grassland habitats. While no individuals were identified during the pedestrian survey, grassland and forested habitats that is not regularly mowed or maintained which may serve as habitat for the monarch butterfly was identified within the proposed LOI (**Appendix A, Figure 6; Appendix B, Photo 21 & 22**). Therefore, alternatives that would impact these habitats within the LOI may affect the monarch butterfly.

State Listed Species
According to the Oklahoma Department of Wildlife Conservation (ODWC) list of State Threatened and Endangered Species, no strictly state-listed threatened or endangered species occur within Hughes County, Oklahoma.

Migratory Birds and Bald and Golden Eagle Protection
The Migratory Bird Treaty Act (MBTA) of 1918 prohibits the "take" (e.g., pursue, hunt, shoot, wound, kill, trap, capture, or collect) or possession of migratory birds, as well as the parts, nest, or eggs of migratory birds. According to the U.S. Department of the Interior Director's Order No. 225, "incidental take", which includes the take or kill of migratory birds that results from, but is not the purpose of an activity, is included as "take" under the MBTA.

The following migratory birds were observed during the site visit: Bewick's wren (*Thryomanes bewickii*), black-and-white warbler (*Mniotilta varia*), blue-gray gnatcatcher (*Polioptila caerulea*) carolina chickadee (*Poecile carolinensis*), dickcissel (*Spiza americana*), indigo bunting (*Passerina cyanea*), northern cardinal (*Cardinalis cardinalis*), northern flicker (*Colaptes auratus*), northern parula (*Setophaga americana*), painted bunting (*Passerina ciris*), red-shouldered hawk (*Buteo lineatus*), red-winged blackbird (*Agelaius phoeniceus*), tufted titmouse (*Baeolophus bicolor*), yellow-billed cuckoo (*Coccyzus americanus*), and white-eyed vireo (*Vireo griseus*).

No migratory bird nests were observed during the survey; however, migratory birds are likely to nest within the LOI or the immediate vicinity. Thus, the project may impact migratory birds. Two common avoidance practices to reduce the potential for the incidental take of migratory birds are (1) clearing or grading of the site during the non-breeding season, or (2) conducting migratory bird nest surveys shortly before project construction.

Coordination with the USFWS would be required by the Bald and Golden Eagle Protection Act of 1940 if proposed project activities would "take" or disturb a protected eagle or their nest. It is generally not considered disturbance if construction activities occur greater than 660 feet from a protected nest. Bald and golden eagles or their nests were not observed during the pedestrian survey and are unlikely to use the proposed LOI due to the absence of large trees and agricultural land use.

Amphibian and Reptile Community
The following amphibians and reptiles were observed during the site visit: American bullfrog (*Lithobates catesbeianus*), Blanchard's cricket frog (*Acris blanchardi*), cottonmouth (*Agkistrodon piscivorus*), diamondback watersnake (*Nerodia rhombifer*), plains leopard frog (*Lithobates blairi*), and red-eared slider (*Trachemys scripta elegans*). According to the ODWC, other common amphibians and reptiles found in this area of Oklahoma include: American toad (*Anaxyrus* americanus), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), gray tree frog (*Hyla versicolor*), small-mouthed salamander (*Ambystoma texanum*), Strecker's chorus frog (*Pseudacris streckeri*), western narrow-mouthed toad (*Gastrophryne olivacea*), Woodhouse's toad (*Anaxyrus woodhousii*), common box turtle (*Terrapene carolina*), common snapping turtle (*Chelydra serpentina*), common five-lined skink (*Plestiodon fasciatus*), Dekay's brownsnake (*Storeria dekayi*), eastern hog-nosed snake (*Heterodon platirhinos*), eastern racer (*Coluber constrictor*), little brown skink (*Scincella lateralis*), ornate box turtle (*Terrapene ornate*), plain-bellied watersnake (*Nerodia erythrogaster*), prairie kingsnake (*Lampropeltis calligaster*), prairie lizard (*Sceloporus consobrinus*), ring-necked snake (*Diadophis punctatus*), river cooter (*Pseudemys concinna*), rough greensnake

(*Opheodrys aestivus*), six-lined racerunner (*Aspidoscelis sexlineatus*), speckled kingsnake (*Lampropeltis* holbrooki), timber rattlesnake (*Crotalus horridus*), western diamondback rattlesnake (*Crotalus atrox*), and western ribbonsnake (*Thamnophis Proximus*).

Terrestrial Vertebrate Community

The only terrestrial vertebrate observed during the site visit was a raccoon (*Procyon lotor*). According to the ODWC, other common terrestrial vertebrates found in this area of Oklahoma include: American badger (*Taxidea taxus*), American beaver (*Castor canadensis*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), eastern cottontail (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), eastern mole (*Scalopus aquaticus*), eastern woodrat (*Neotoma floridana*), gray fox (*Urocyon cinereoargenteus*), nine-banded armadillo (*Dasypus novemcinctus*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and white-tailed deer (*Odocoileus virginianus*).

Fish Habitat

The only fish observed during the site visit were western mosquitofish (*Gambusia affinus*). According to the ODWC, other common fish found within this area of Oklahoma include: black crappie (*Pomoxis nigromaculatus*), blue catfish (*Ictalurus furcatus*), bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), golden shiner (*Notemigonus crysoleucas*), green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), longear sunfish (*Lepomis megalotis*), redear sunfish (*Lepomis microlophus*), spotted bass (*Micropterus punctulatus*), white bass (*Morone chrysops*), and white crappie (*Pomoxis annularis*). The proposed LOI is inland and not located in or adjacent to areas designated as Essential Fish Habitat.

Invasive Species

Vegetative invasive species observed during the site visit include Japanese brome and perennial rye throughout uplands in the LOI, while Japanese stiltgrass was identified within wetlands adjacent to the reservoir. Because these species are ubiquitous within the LOI, if excavated fill from the LOI is not removed, but is used on-site for project related earthwork, construction of the proposed project would not contribute to the spread of vegetative invasive species within or outside the LOI.

No evidence of invasive animals, fungi, or microbial organisms were observed during the site visit, and no areas at risk for future invasions were identified.

Riparian Areas

Riparian areas adjacent to Streams 1-7 and the Little Wewoka Creek Site 12 Reservoir are located within the project LOI. These areas contribute to floodplain function, streambank stability and integrity, nutrient cycling, pollutant filtering, sediment retention, and biological diversity of these habitats. NRCS policy requires project alternatives to maintain or improve water quality benefits of riparian areas as a result of project construction. If preferred alternatives do not maintain or improve water quality benefits, the NRCS must discontinue assistance on those portions of the plan impacting riparian areas.

Natural Areas

No recorded designations of Federal, non-federal, or private natural areas were observed within the limits of the proposed LOI.

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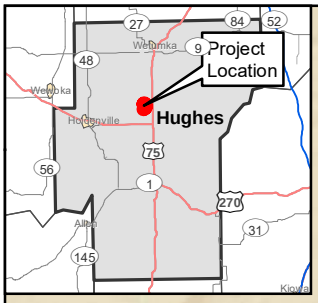
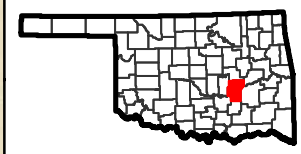
Appendix A
Figures





Hughes County, Oklahoma

LOI

75

Highway 75

270

E 133 Rd

0 5,000 10,000 Feet

Limits of Investigation

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N W E S

AD ASTRA COLLABORATIVE, LLC

Little Wewoka 12 SWP-EE

Overview Map

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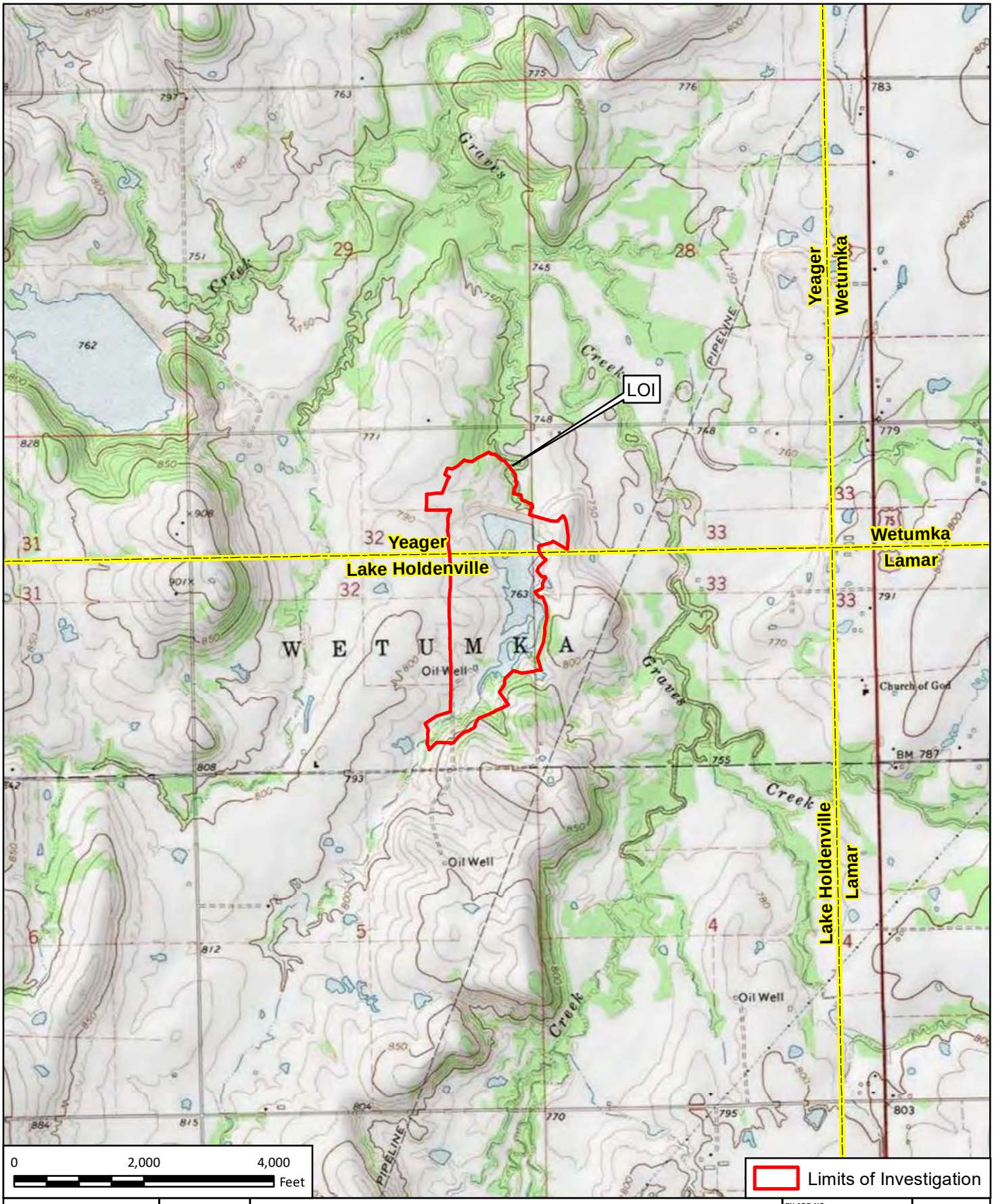

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Little Wewoka 12 SWP-EE

USGS Topographic Map

Quad Names: Yeager and Lake Holdenville

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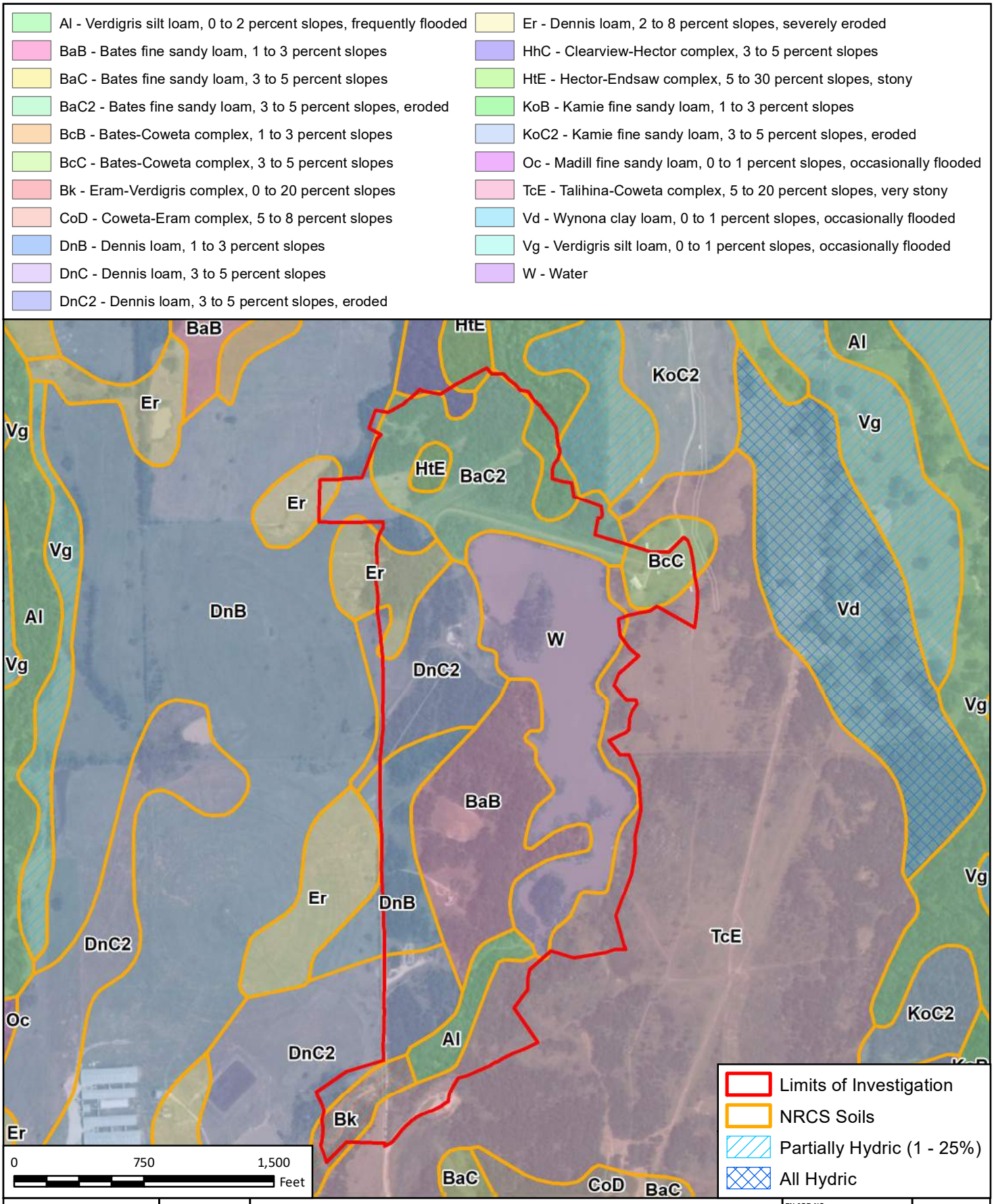

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NRCS Soils Map

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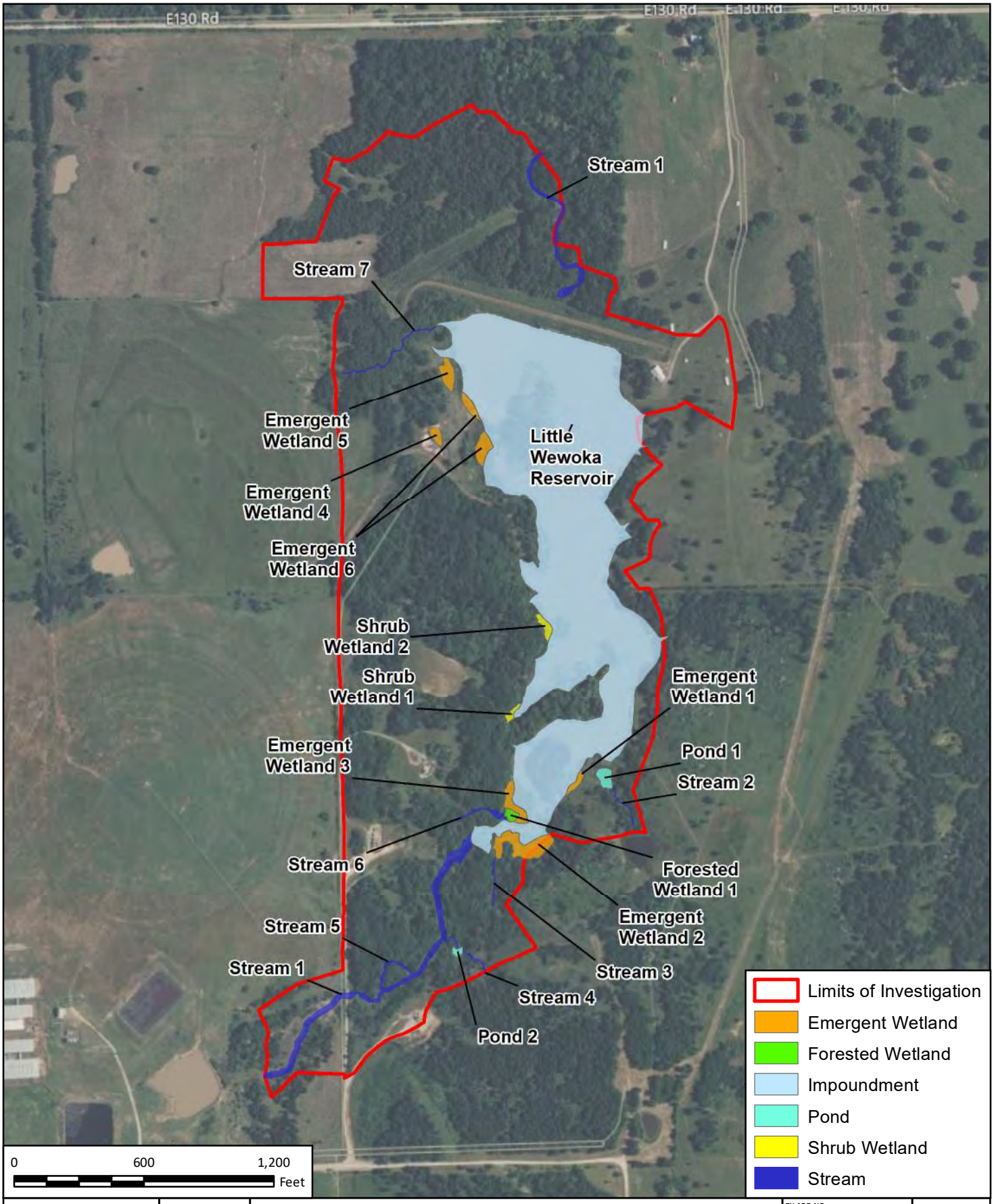

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Waterbodies Map

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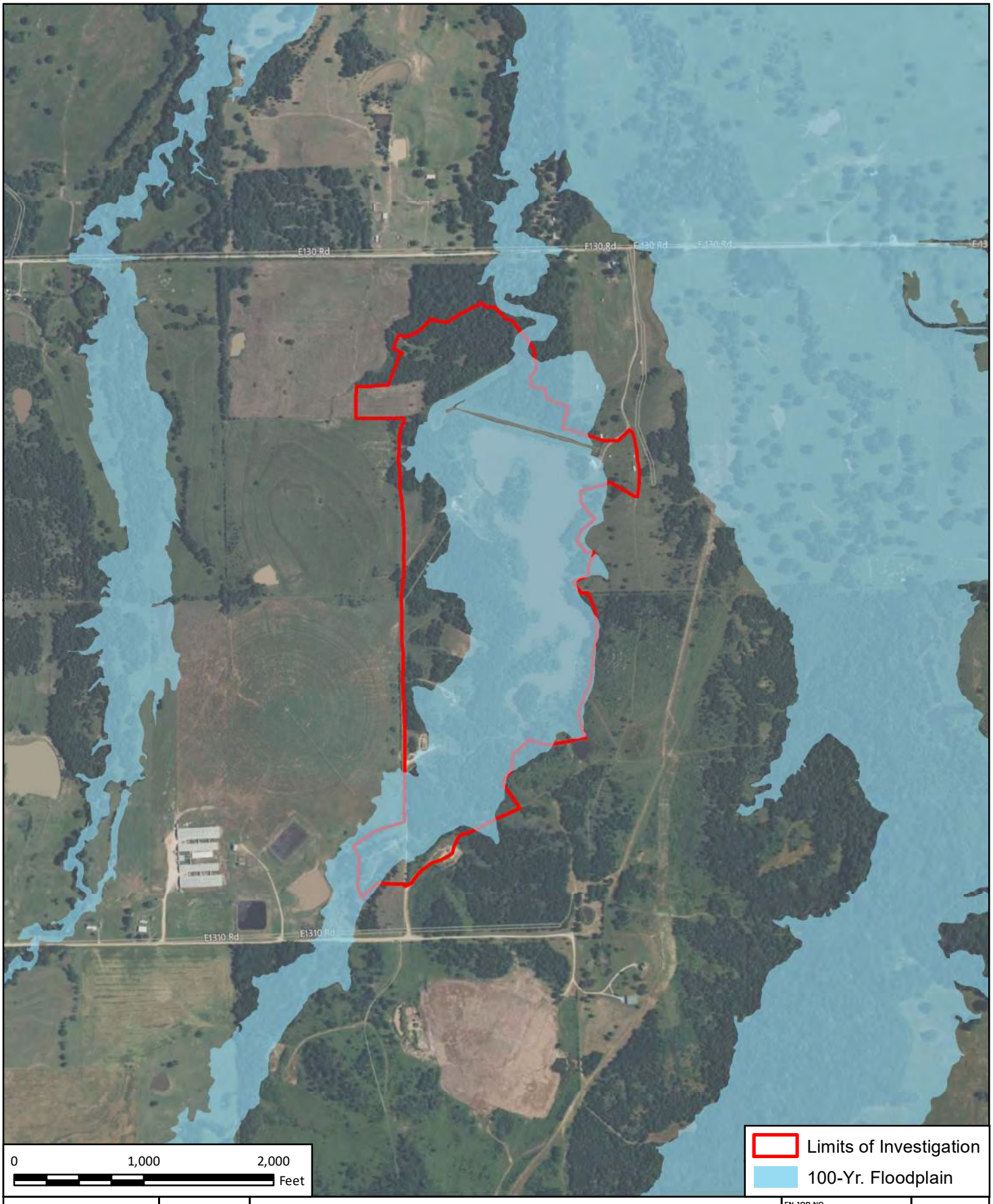

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Little Wewoka 12 SWP-EE

FEMA 100-Yr. Floodplain Map

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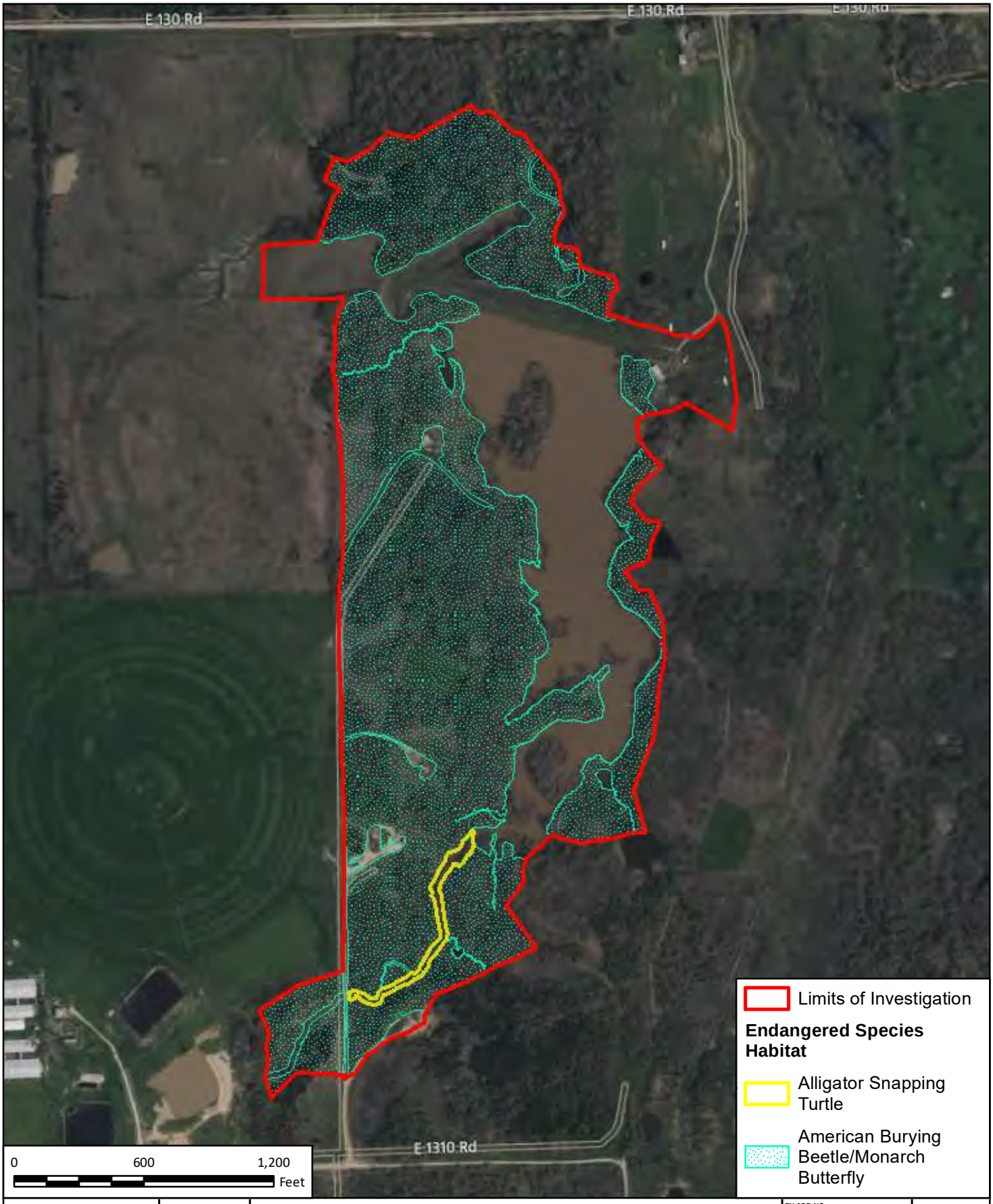

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Endangered Species Habitat

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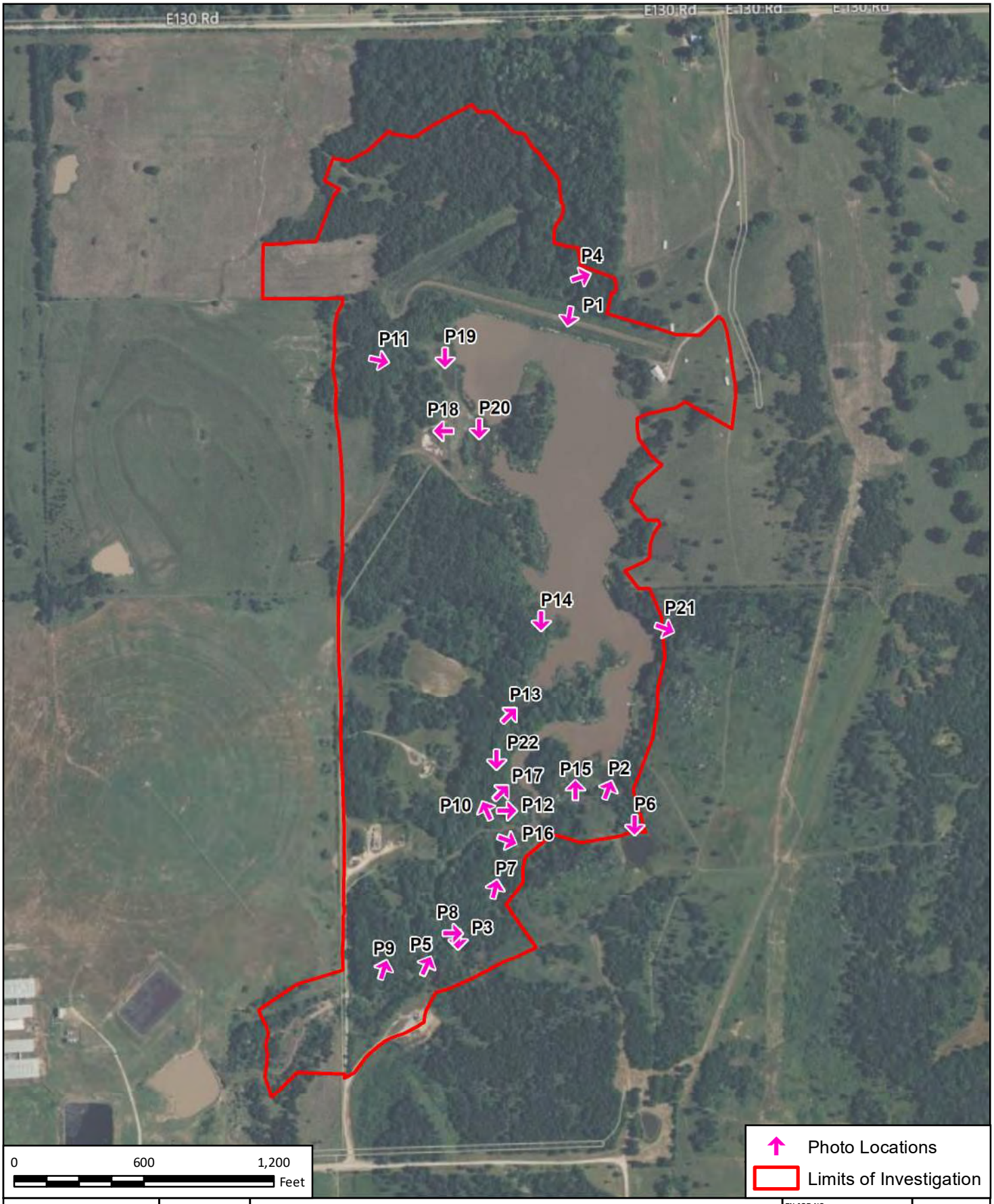

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Little Wewoka 12 SWP-EE

Photo Locations Map

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Appendix B
Site Photographs

Photo 1. View looking south towards Little Wewoka 12 Reservoir from the existing dam crest.

Photo 2. View looking north towards Pond 1, an on-channel impoundment of Stream 2 caused by beaver activity in the LOI.

Photo 3. View looking south towards Pond 2, an on-channel impoundment of Stream 4 caused by beaver activity in the LOI.

Photo 4. View looking east (upstream) along Stream 1 south of the principal spillway outfall of the Little Wewoka 12 FRS.

Photo 5. View looking north (downstream) along Stream 1 south of its impoundment by the existing Little Wewoka 12 Reservoir.

Photo 6. View looking east (upstream) along Stream 2, an ephemeral stream in the LOI.

Photo 7. View looking north (downstream) along Stream 3, an ephemeral stream in the LOI.

Photo 8. View looking east (upstream) along Stream 4, an ephemeral stream in the LOI.

Photo 9. View looking north (downstream) along Stream 5, an intermittent side channel of Stream 1 in the LOI.

Photo 10. View looking west (upstream) along Stream 6, an ephemeral stream in the LOI. Water in photograph is from reservoir backup.

Photo 11. View looking east (downstream) along Stream 7, an ephemeral stream in the LOI.

Photo 12. View looking east within Forested Wetland 1, a fringe forested wetland in the LOI.

Photo 13. View looking north within Shrub Wetland 1, a fringe shrub wetland in the LOI.

Photo 14. View looking south within Shrub Wetland 2, a fringe shrub wetland in the LOI.

Photo 15. View looking north within Emergent Wetland 1, a fringe emergent wetland in the LOI.

Photo 16. View looking east within Emergent Wetland 2, a fringe emergent wetland in the LOI.

Photo 17. View looking northeast within Emergent Wetland 3, a fringe emergent wetland in the LOI.

Photo 18. View looking west within Emergent Wetland 4, a depressional emergent wetland in the LOI.

Photo 19. View looking south within Emergent Wetland 5, a depressional emergent wetland in the LOI.

Photo 20. View looking south along Emergent Wetland 6, a fringe emergent wetland in the LOI.

Photo 21. View looking southeast at open upland forest along the eastern shore of the Little Wewoka 12, typical of uplands and pastureland surrounding the reservoir

Photo 22. View looking south along at riparian forest along the western shore of the Little Wewoka 12 Reservoir, typical of riparian habitats surrounding the reservoir.

Appendix C
Lower North Canadian Subbasin
Total Maximum Daily Load Records

2011 Bacteria and Turbidity Total Maximum Daily Loads for the Lower North Canadian River Area, Pg. 9

Table ES-5 Stream Segments and Pollutants for TMDL Development

Waterbody ID	Waterbody Name	Stream Miles	TMDL Date	Priority	ENT	*Fecal Coliform*	Turbidity
OK520500010110_10	Lower North Canadian River	48.39	2010	1	X	X	X
OK520500020010_00	Wewoka Creek	42.99	2013	2	X		X
OK520510000010_00	Middle NorthCanadian River	36.94	2013	2	X		X
OK520510000110_00	Upper North Canadian River	3.04	2013	2	X		X
OK520500010170_00	Bad Creek	19.11	2013	2	X		

Table ES-6 Summary of Potential Pollutant Sources by Category

Waterbody ID	Waterbody Name	Municipal NPDES Facility	Industrial NPDES Facility	MS4	NPDES No Discharge Facility	CAFO	Mines	Construction Stormwater Permit	Nonpoint Source
OK520500010110_10	Lower North Canadian River	Bacteria							Bacteria, TSS
OK520500020010_00	Wewoka Creek	Bacteria				Bacteria			Bacteria, TSS
OK520510000010_00	Middle NorthCanadian River	Bacteria				Bacteria			Bacteria, TSS
OK520510000110_00	Upper North Canadian River								Bacteria, TSS
OK520500010170_00	Bad Creek								Bacteria,

No facility present in watershed.

Facility present in watershed, but not recognized as pollutant source.

2014 Bacterial and Turbidity Total Maximum Daily Loads for Oklahoma Streams in the Lower North Canadian-Deep Fork Area, Pg. 8

phenomena. There was insufficient data available to quantify contributions of TSS from these natural processes. TSS or sediment loading can also occur under non-runoff conditions as a result of anthropogenic activities in riparian corridors which cause erosive conditions. Given the lack of data to establish the background conditions for TSS/turbidity, separating background loading from nonpoint sources whether it was from natural or anthropogenic processes was not feasible in this TMDL development.

Table ES-4 summarizes the list of TMDLs that were developed in this report and Table ES-5 summarizes the point and nonpoint sources that contribute bacteria to each waterbody.

Table ES - 4 Stream and Pollutants for TMDL Development

Waterbody ID	HUC 8 Codes	Waterbody Name	Stream Miles	TMDL Date	Priority	ENT	E.coli
OK520500010170_00	11100302	Bad Creek	19.11	2017	2		X
OK520500010200_00	11100302	Alabama Creek	14.2	2017	2	X	X
OK520500020010_00	11100302	Wewoka Creek	42.99	2017	2		X
OK520500020090_00	11100302	Little Wewoka Creek	20.44	2023	4	X	X

Table ES - 5 Summary of Potential Pollutant Sources by Category

Waterbody ID	Waterbody Name	Municipal OPDES Facility	Industrial OPDES Facility	MS4	OPDES No Discharge Facility	CAFO	Mines	Construction Stormwater Permit	Multi-Sector General Permit	Nonpoint Source
Bad Creek	OK520500010170_00									Bacteria
Alabama Creek	OK520500010200_00									Bacteria
Wewoka Creek	OK520500020010_00									Bacteria
Little Wewoka Creek	OK520500020090_00									Bacteria

Facility present in watershed and potential as contributing pollutant source.
Facility present in watershed, but not recognized as pollutant source.
No facility present in watershed.

ES - 4 USING LOAD DURATION CURVES TO DEVELOP TMDLS

The TMDL calculations presented in this report were derived from load duration curves (LDC). LDCs facilitate rapid development of TMDLs. As a TMDL development tool, LDCs can provide some information for identifying whether impairments are associated with point or nonpoint sources. The LDC is a simple and efficient method to show the relationship between flow and pollutant load. LDCs graphically display changing water quality over changing flows that may not be apparent when visualizing raw data. The LDC has additional valuable uses in the post-TMDL implementation phase of the restoration of the water quality for a waterbody. Plotting future monitoring information on the LDC can show trends of improvement to sources that will identify areas for revision to the watershed restoration plan. The low cost of the LDC method allows accelerated development of TMDL plans on more

Waterbody ID	Waterbody Name	Size (Lake Acres or Stream Miles)	Type	Category	Aesthetic	Agriculture	Cool Water Aquatic Comm	Habitat Limited Aquatic Comm	Trout Fishery	Warm Water Aquatic Comm	Fish Consumption	Navigation	Primary Body Contact Rec	Secondary Body Contact Rec	Public and Private Water Supply	Emergency Water Supply	High Quality Water	Outstanding Resource Water	Sensitive Water Supply
OK520500010130_00	Gar Creek	5.34	R	2	I	F				I	X		X		I				
OK520500010140_00	Piney Creek	3.52	R	3	X	X				X	X		X						
OK520500010150_00	Fish Creek	11.00	R	3	X	X				X	X		X						
OK520500010151_00	Dustin Creek	1.44	R	3	X	X				X	X		X						
OK520500010152_00	Dustin Lake	27	L	3	X	X				X	X		X		X				
OK520500010160_00	Parsley Creek	8.04	R	3	X	X				X	X		X						
OK520500010170_00	Bad Creek	19.11	R	2	F	F				I	X		F		I				
OK520500010180_00	Salt Creek	4.90	R	3	X	X				X	X		X						
OK520500010190_00	Rock Creek	4.71	R	3	X	X				X	X		X						
OK520500010200_00	Alabama Creek	14.20	R	2	F	F				F	X		F		I				
OK520500010210_00	Weleetka Creek	2.96	R	3	X	X				X	X		X		X				*
OK520500010220_00	Weleetka City Lake	61	L	3	X	X				X	X		X		X				*
OK520500010240_00	Dale Turner Lake!	49	L	3	X	X				X	X		X						
OK520500010242_00	Clearview Creek	2.29	R	5b	I	N				X	X		X						
OK520500010260_00	Salt Creek	3.01	R	3	X	X				X	X		X						
OK520500010270_00	Wetumka City Lake	169	L	5a	F	F				I	N		N		X				
OK520500010280_00	Flat Rock Creek	9.72	R	2	I	I				F	X		X		X				
OK520500010290_00	Battle Creek	4.21	R	2	I	X				I	X		F						
OK520500010300_00	Airport Lake	100	L	3	X	X				X	X		X						
OK520500020010_00	Wewoka Creek	42.99	R	5c	F	F				N	X		F			F			
OK520500020020_00	Greasy Creek	18.51	R	5a	F	F				N	X		I						
OK520500020026_00	Cheyarha Creek	1.76	R	2	I	F				I	X		X		I				
OK520500020027_00	Cheyarha Creek, East	3.01	R	5b	I	N				I	X		X		I				
OK520500020028_00	Cheyarha Creek, West	2.92	R	3	I	I				I	X		X		I				
OK520500020030_00	Fish Creek	8.72	R	2	I	F				I	X		X		I				
OK520500020035_00	Wetumka Creek!	2.39	R	5	X	X		X			X			X					
OK520500020040_00	Brooks Lake	120	L	2	F	I				I	I		F						
OK520500020050_00	Ranche Creek	10.83	R	3	X	X				X	X		X						
OK520500020060_00	Graves Creek	13.50	R	3	I	I				I	X		X		I				
OK520500020070_00	Elm Creek	7.90	R	3	X	X				X	X		X						
OK520500020080_00	Grief Creek	7.10	R	3	X	X				X	X		X						

F = Fully Supporting I = Insufficient Information X = Not Assessed **N = Not Supporting**

Waterbody ID	Waterbody Name	New WB	Waterbody Size	Units	WB Category	Cause Category	Impaired Use	Cause of Impairment	New Cause	TMDL Priority	TMDL ID	Unconfirmed Potential Sources
						5a	PBCR	Escherichia coli		3		46, 92, 108, 111, 133, 136
OK410600020020_00	Sandy Creek		15.35	MILES	5a	5a	PBCR	Enterococcus		3		140
						5a	PBCR	Escherichia coli		3		46, 92, 108, 111, 133, 136
OK410600020100_00	Little West Blue Creek		19.08	MILES	5a	5a	PBCR	Enterococcus		4		46, 92, 108, 111, 133, 136, 140
OK520500010020_00	Eufaula Lake, N. Canadian River Arm		20680	ACRES	5a	5c	FC	Mercury		1		140
						5a	WWAC	Turbidity		1		140
OK520500010110_10	Canadian River, North		48.39	MILES	5a	4a	PBCR	Enterococcus			40589	46, 59, 85, 92, 111, 133, 136, 140
						4a	WWAC	Turbidity			40589	46, 85, 87, 108, 140
						5a	FC	Lead		3		49, 85, 140
OK520500010242_00	Clearview Creek		2.29	MILES	5b	5b	AG	Chloride		3		140
						5b	AG	Total Dissolved Solids		3		140
OK520500010270_00	Wetumka City Lake		169	ACRES	5a	5a	PBCR	Enterococcus		2		140
						5c	FC	Mercury		2		140
OK520500020010_00	Wewoka Creek		42.99	MILES	5c	5c	WWAC	Macroinvertebrate Bio		2		4, 39, 46, 49, 59, 69, 85, 92, 100, 102, 108, 111, 128, 133, 136, 140
OK520500020020_00	Greasy Creek		18.51	MILES	5a	5a	WWAC	Oxygen, Dissolved		4		140
						5a	WWAC	pH		4		140
OK520500020027_00	Cheyarha Creek, East		3.01	MILES	5b	5b	AG	Chloride		2		102
OK520500020090_00	Little Wewoka Creek		20.44	MILES	5a	5a	WWAC	Turbidity		4		140
OK520500020190_00	Wewoka Lake		371	ACRES	5a	5a	PPWS	Chlorophyll-A		2		140
						5c	FC	Mercury		2		140
						5a	WWAC	Turbidity		2		140
OK520500020220_00	Sportsman Lake		354	ACRES	5c	5c	FC	Mercury		2		140
OK520500020230_00	Carter Creek		2.70	MILES	5b	5b	AG	Chloride		2		102, 140
						5b	AG	Total Dissolved Solids		2		102, 140
OK520500020240_00	Wewoka Creek		5.36	MILES	5a	5a	HLAC	Cadmium		2		140

New Waterbody for 2022 New Cause for 2022

Appendix D
USFWS IPaC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
Phone: (918) 581-7458 Fax: (918) 581-7467

In Reply Refer To: 01/06/2025 15:00:31 UTC
Project Code: 2023-0081327
Project Name: Little Wewoka 12

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
(918) 581-7458

PROJECT SUMMARY

Project Code: 2023-0081327
Project Name: Little Wewoka 12
Project Type: Dam - Maintenance/Modification
Project Description: The NRCS and local sponsors proposed to rehabilitate the dam of the Little Wewoka 12 FRS in Hodgeman County, Oklahoma.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@35.1230166,-96.267330015579,14z

Counties: Hughes County, Oklahoma

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

REPTILES

NAME	STATUS
Alligator Snapping Turtle *Macrochelys temminckii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4658	Proposed Threatened

INSECTS

NAME	STATUS
American Burying Beetle *Nicrophorus americanus* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/66	Threatened
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Prairie Loggerhead Shrike *Lanius ludovicianus excubitorides* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8833	Breeds Feb 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

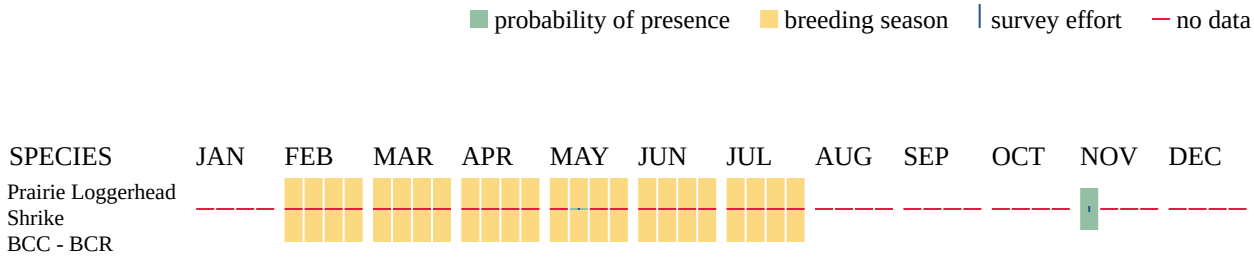
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R5UBF
- R4SBC

FRESHWATER POND

- PUBHh

LAKE

- L1UBHh

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Wesley Wiegreffe
Address: 801 Cherry Street
Address Line 2: Suite 2800
City: Fort Worth
State: TX
Zip: 76102
Email wes.wiegreffe@freese.com
Phone: 8177357514

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Natural Resources Conservation Service

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