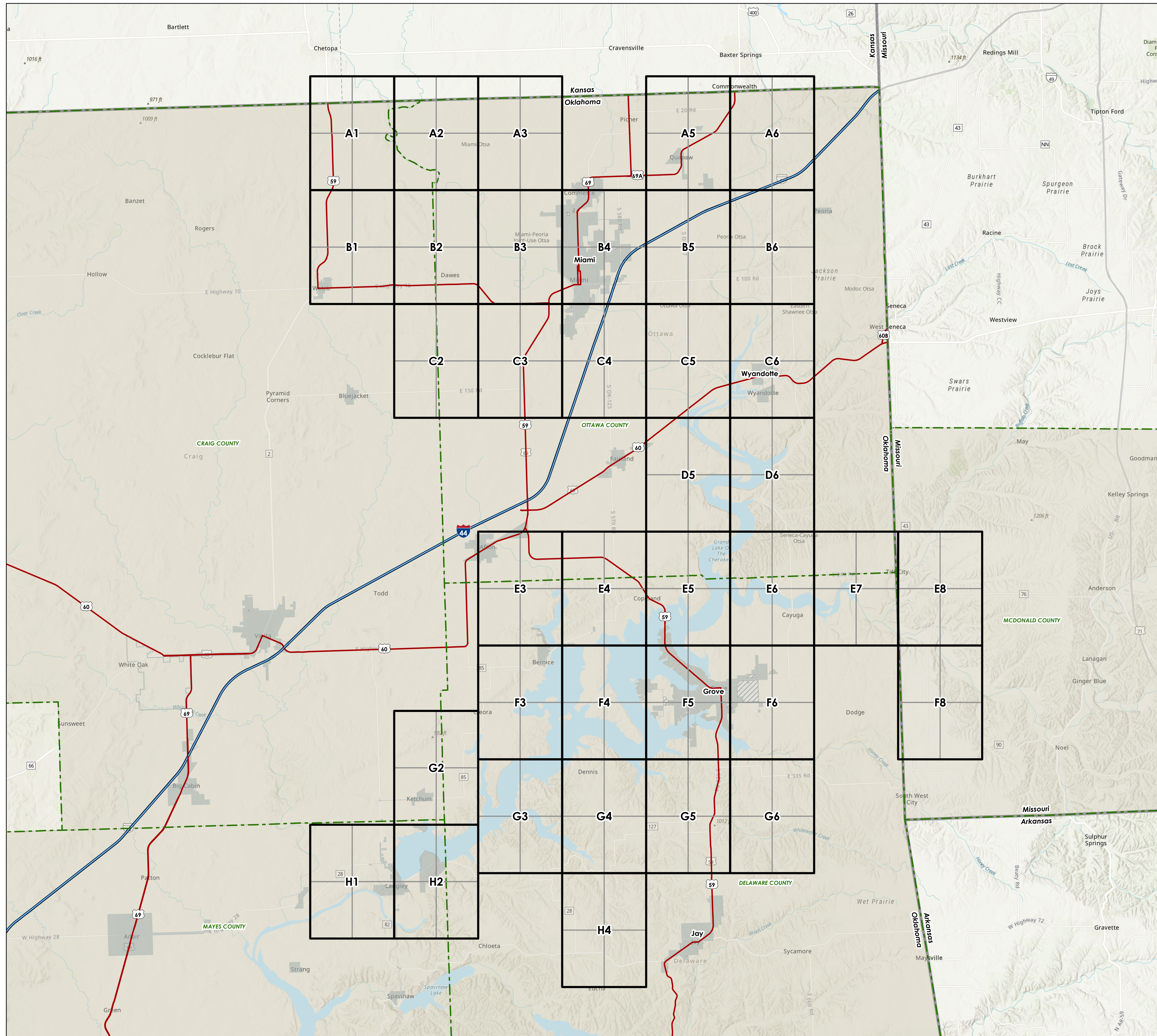

APPENDIX F.4:
OCTOBER 2009 EVENT INUNDATION MAPS

Upstream Model Results Overview Map

Pensacola Dam
GRAND RIVER DAM AUTHORITY
September 2021

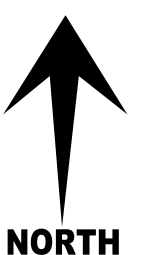
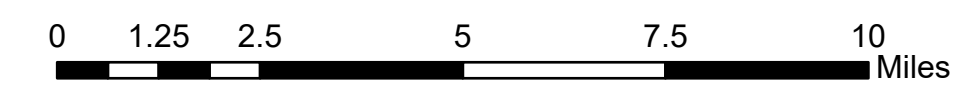
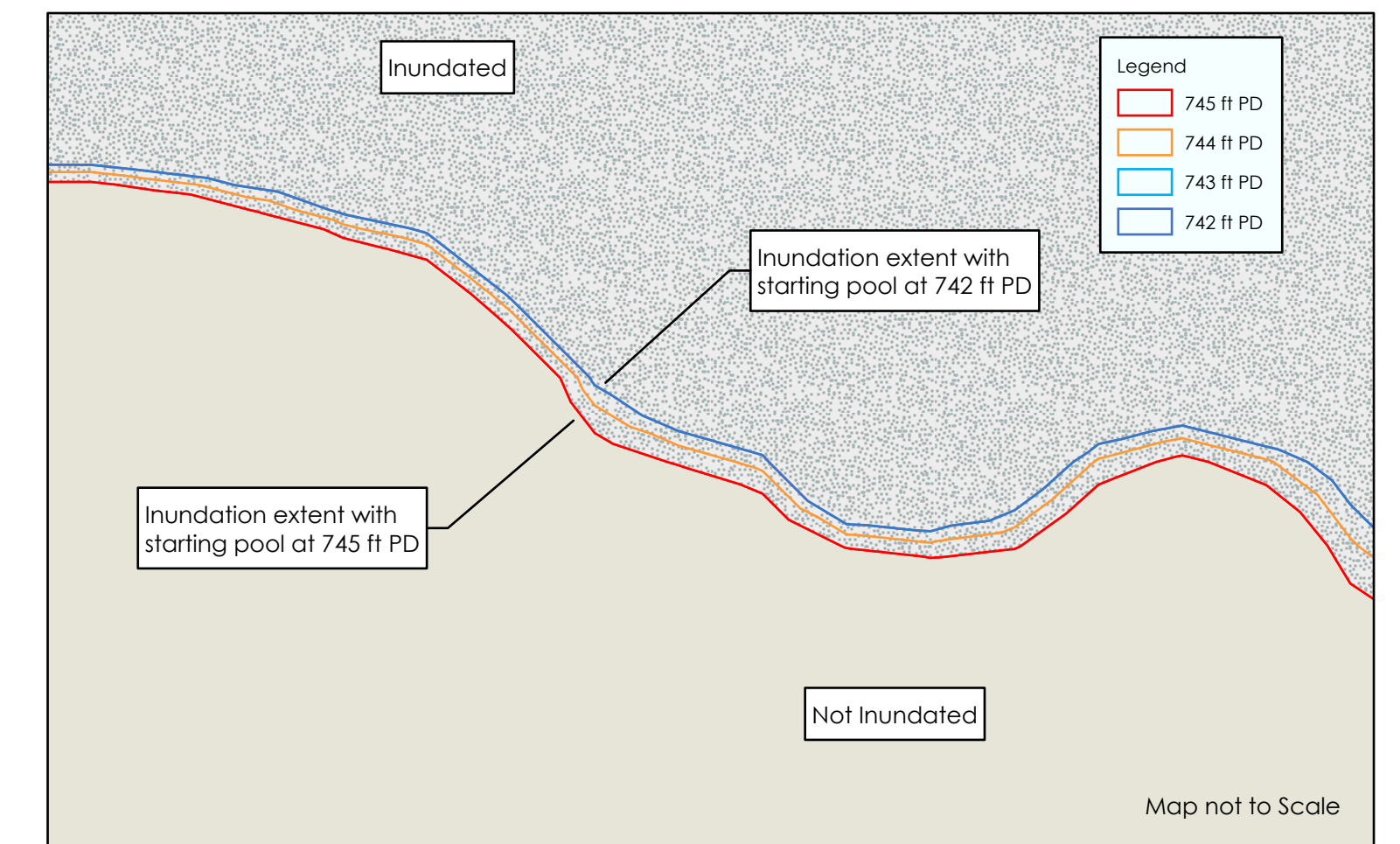


Overview Map Legend

- 1:24,000-scale Map Sheet
- State Boundary
- County Boundary
- Municipality
- Unincorporated
- Road Class**
- Interstate
- US Highway

Inundation Scenario Mapping

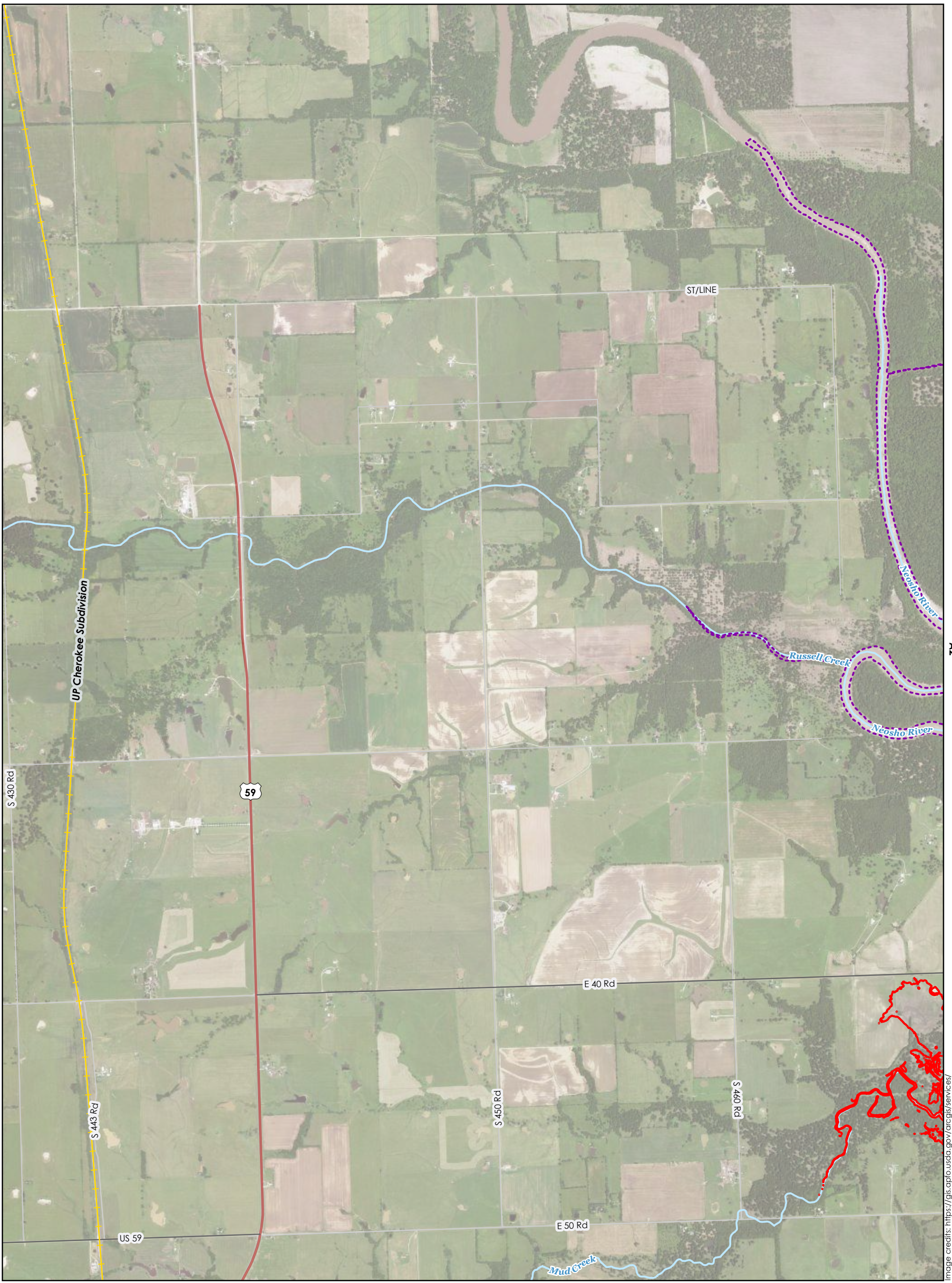
Mapping shows the extent of inundation for the selected hydraulic event under different starting pool elevations: 742 ft PD, 743 ft PD, 744 ft PD, and 745 ft PD.



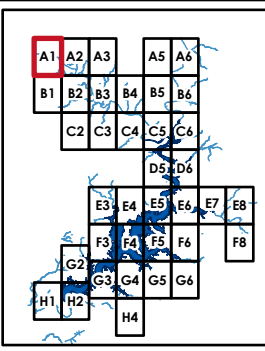
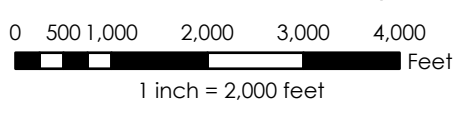
Map Notes

Data Sources for Maps:

1. Base map images from https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019
2. Transportation network (major roads, local roads, and railroads) and county boundaries obtained from the Oklahoma Office of Geographic Information (<http://okmaps.org/cgi/search.aspx>).
3. Parcels owned by GRDA are from GIS parcel data provided by County Assessor's Offices (2020).
4. The displayed Flowage Easement is equal to the 760-foot NGVD29 elevation contour, extracted from 2011 Dewberry LIDAR.



OCTOBER 2009 INUNDATION SCENARIO



- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD

- Legend**
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - █ GRDA Ownership

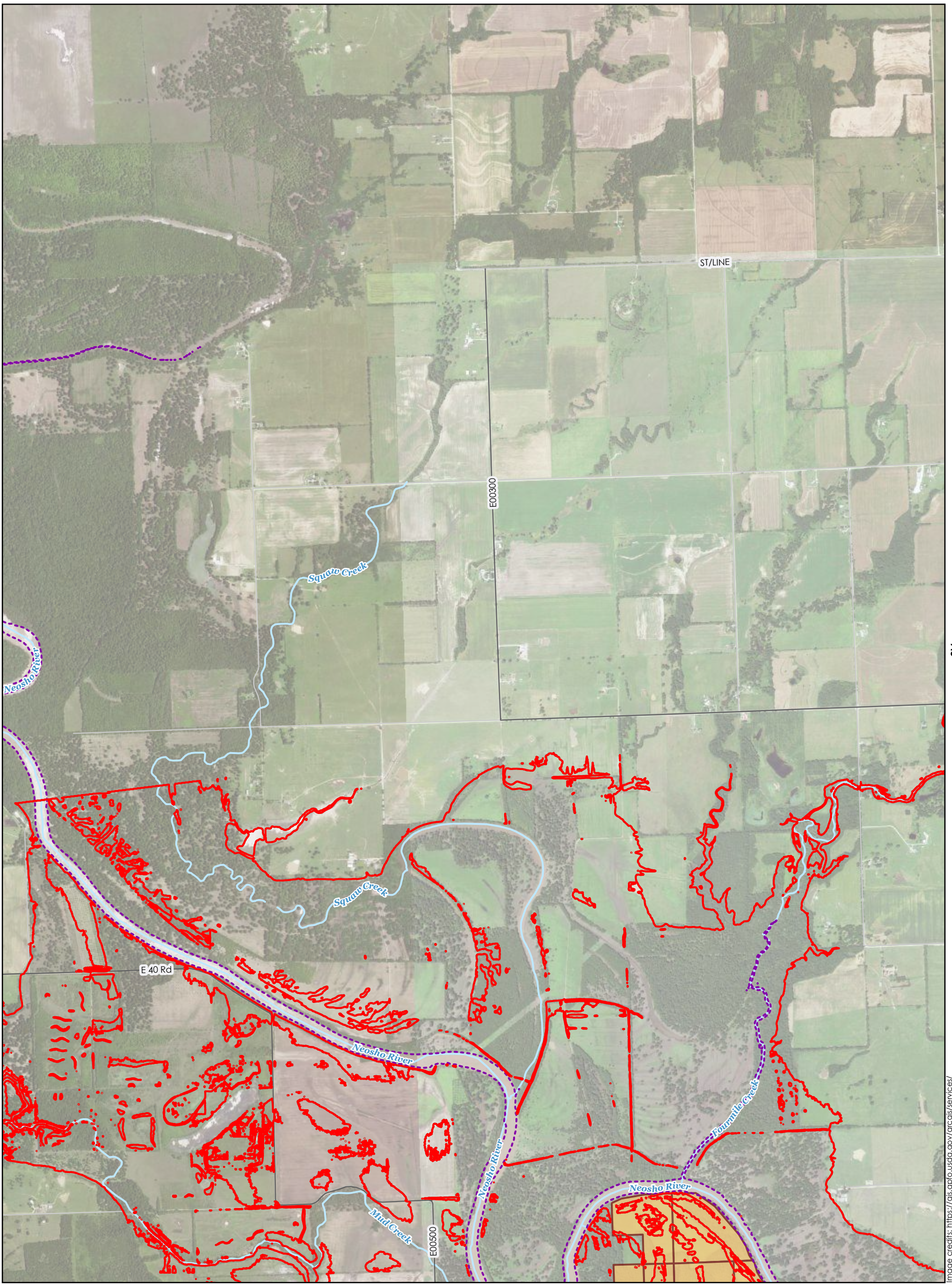
- MAP NOTES**
1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 2. See Overview Map for notes on data sources.

PENSACOLA DAM GRAND RIVER DAM AUTHORITY

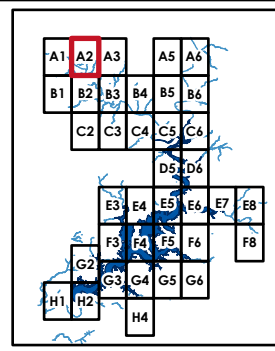
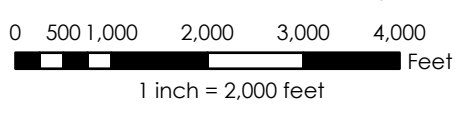
MAP: A1

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021

Image credits: https://gis.dplfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



**OCTOBER 2009
INUNDATION SCENARIO**



Legend

- | | | |
|--|---|-------------------|
| OCT 2009 MAX INUNDATION | ROAD CLASS | Railroad |
| — 745 ft PD | — Interstate | Stream |
| — 744 ft PD | — State Highway | Flowage Easements |
| — 743 ft PD | — US Highway | Project Boundary |
| — 742 ft PD | — Major Collector | GRDA Ownership |
| | — Local Road | |

MAP NOTES

1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
2. See Overview Map for notes on data sources.

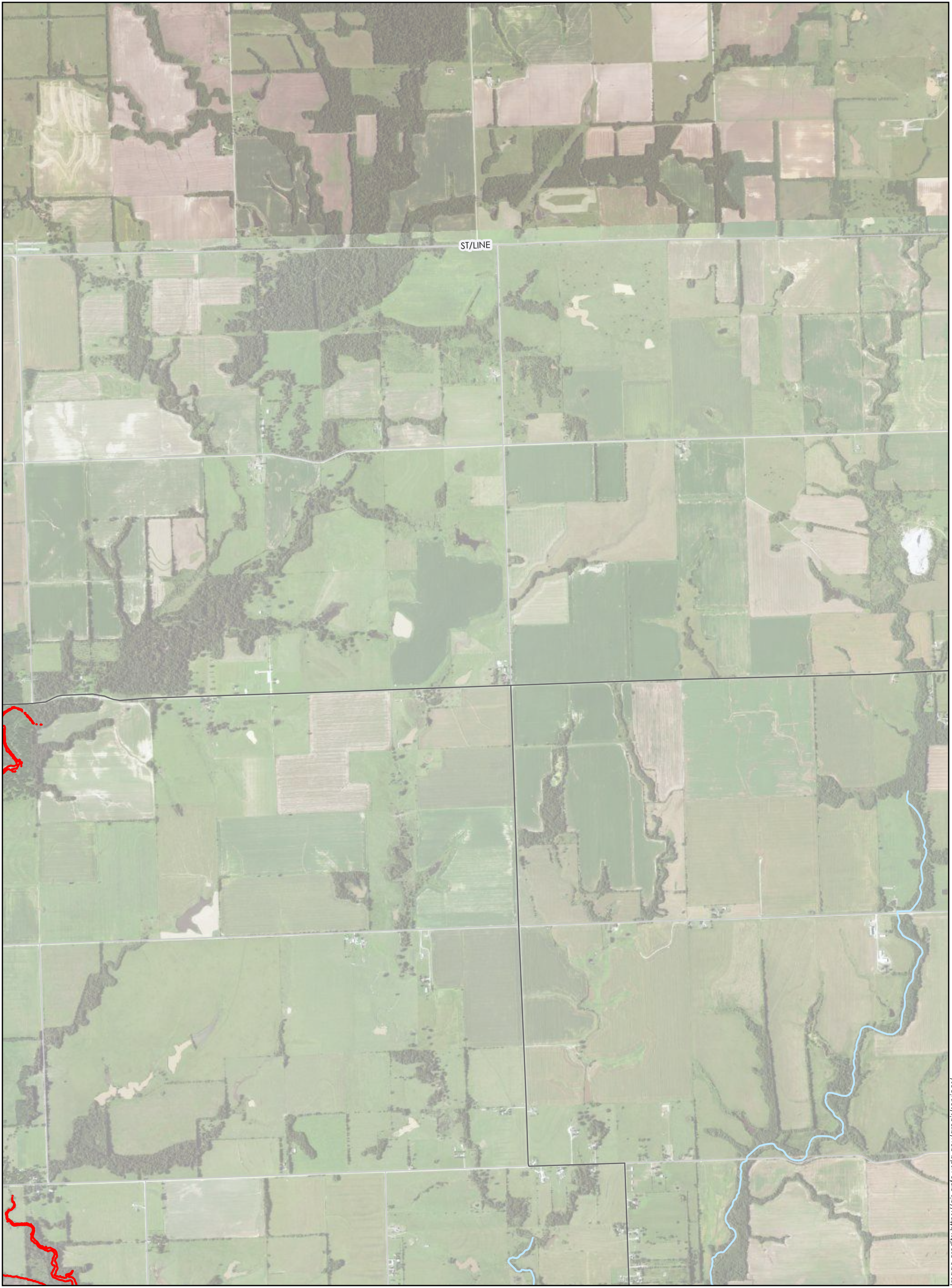
PENSACOLA DAM
GRAND RIVER DAM AUTHORITY

MAP: A2

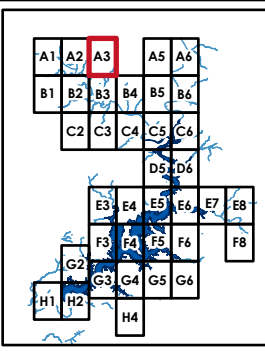
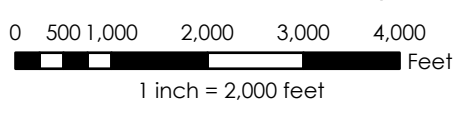
CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA

FERC No. 1494
September 2021

Image credits: https://gis.dplbo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



OCTOBER 2009 INUNDATION SCENARIO



- Legend**
- OCT 2009 MAX INUNDATION**
- 745 ft PD
 - 744 ft PD
 - 743 ft PD
 - 742 ft PD
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- + Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - GRDA Ownership

MAP NOTES

- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
- See Overview Map for notes on data sources.

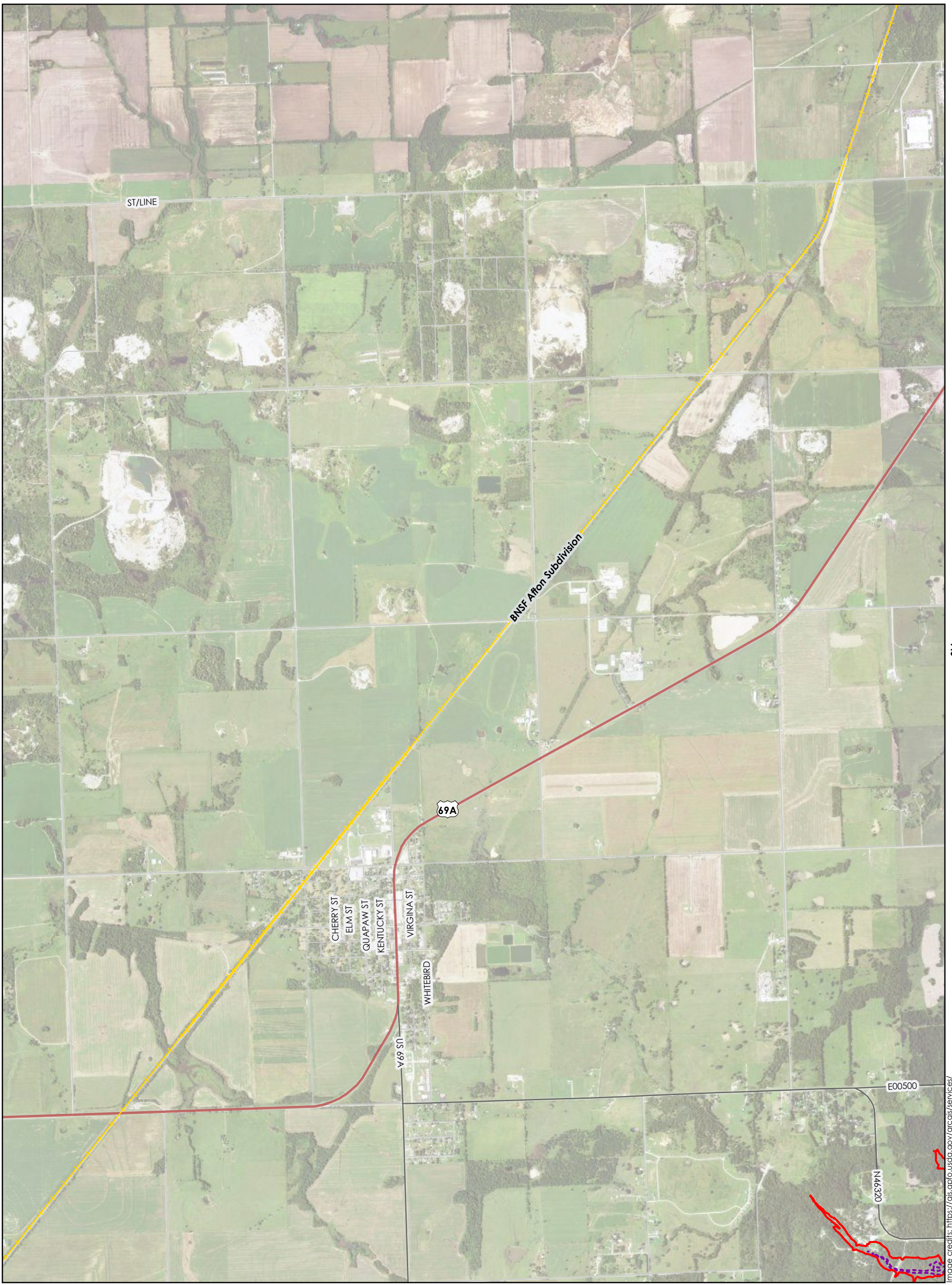
PENSACOLA DAM GRAND RIVER DAM AUTHORITY

MAP: A3

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA

FERC No. 1494
September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



A4

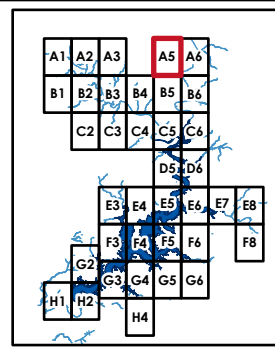
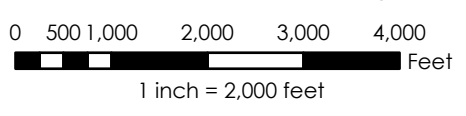
A6

B4

B5

B6

OCTOBER 2009 INUNDATION SCENARIO



- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD

Legend

- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - █ GRDA Ownership

MAP NOTES

1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
2. See Overview Map for notes on data sources.

PENSACOLA DAM

GRAND RIVER DAM AUTHORITY

MAP: A5

CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
 September 2021

Image credits: https://gis.dplfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

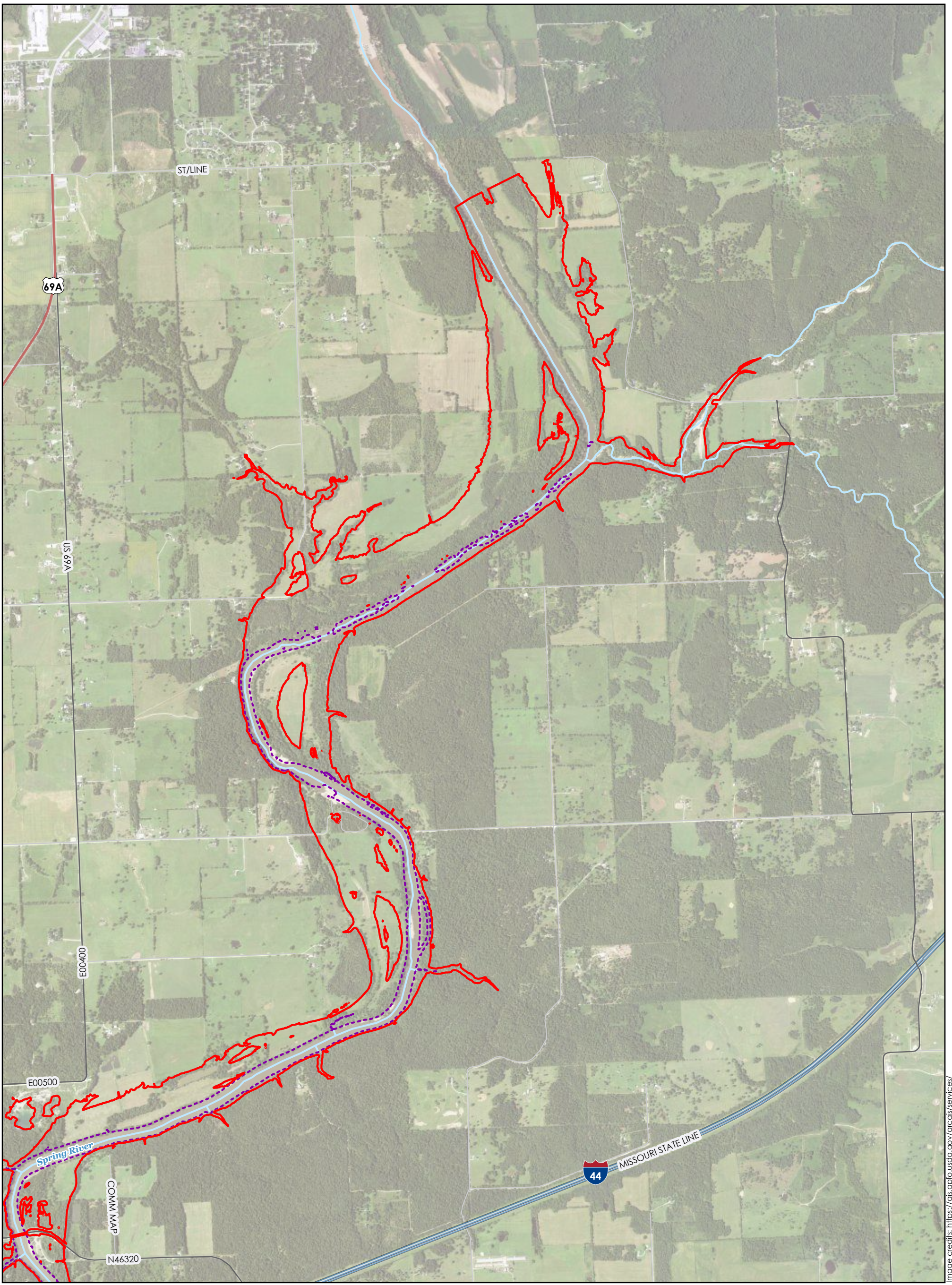
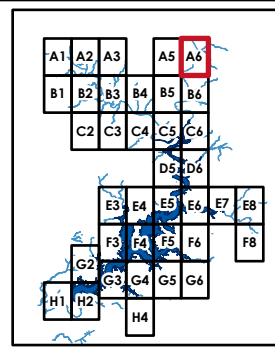
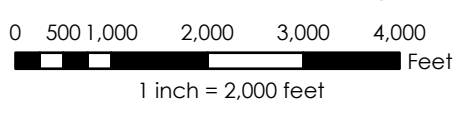


Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

OCTOBER 2009 INUNDATION SCENARIO



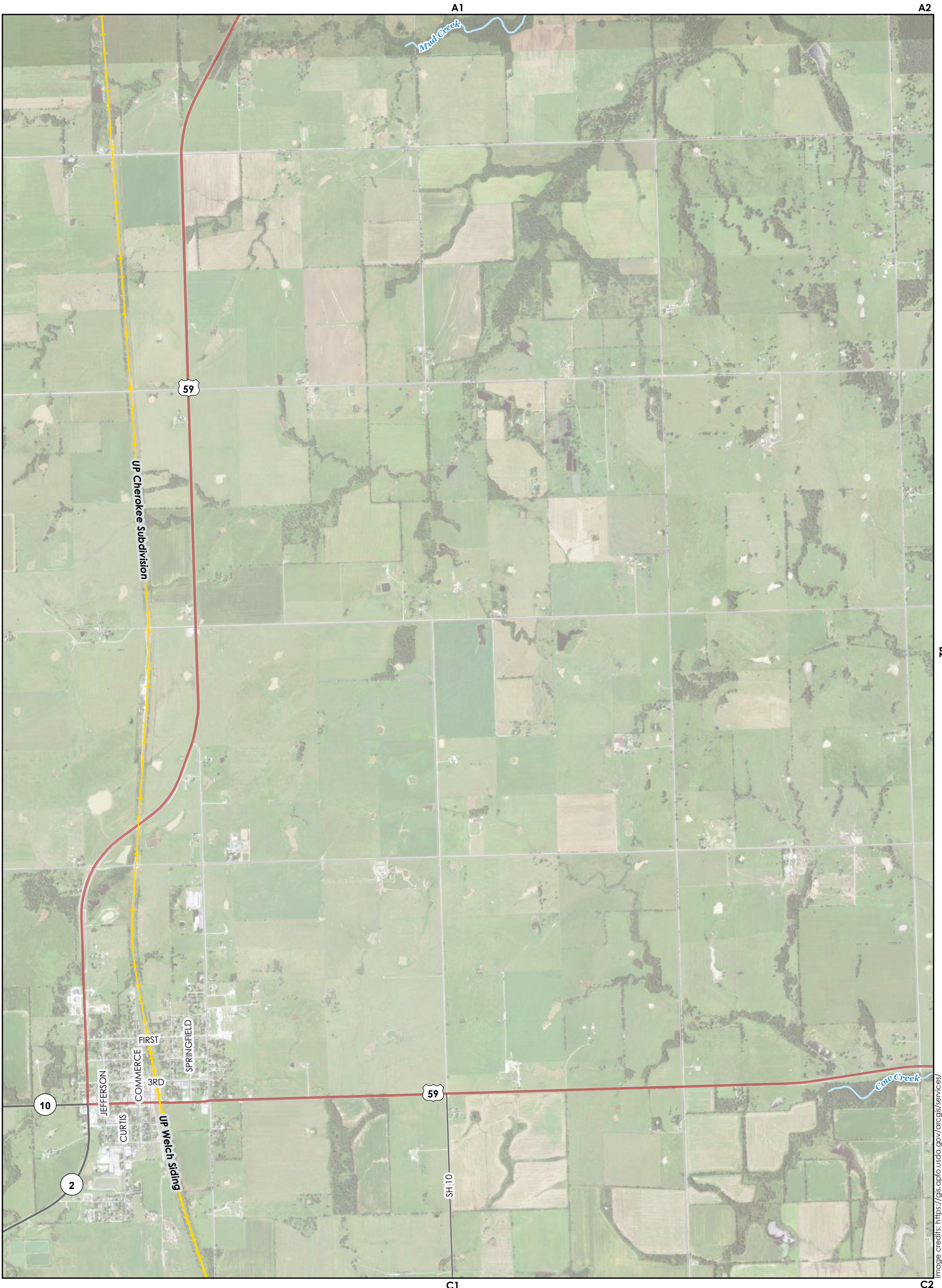
- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD
- Legend**
- | | |
|---|---|
| — Interstate | + Railroad |
| — State Highway | — Stream |
| — US Highway | - - - Flowage Easements |
| — Major Collector | - - - Project Boundary |
| — Local Road | █ GRDA Ownership |

- MAP NOTES**
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 - See Overview Map for notes on data sources.

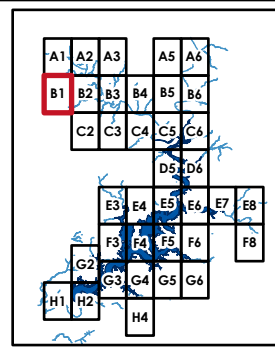
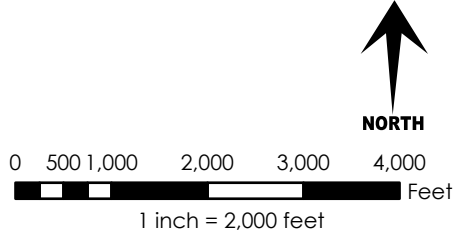
PENSACOLA DAM GRAND RIVER DAM AUTHORITY

MAP: A6

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021



**OCTOBER 2009
INUNDATION SCENARIO**



- Legend**
- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- + Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - █ GRDA Ownership

MAP NOTES

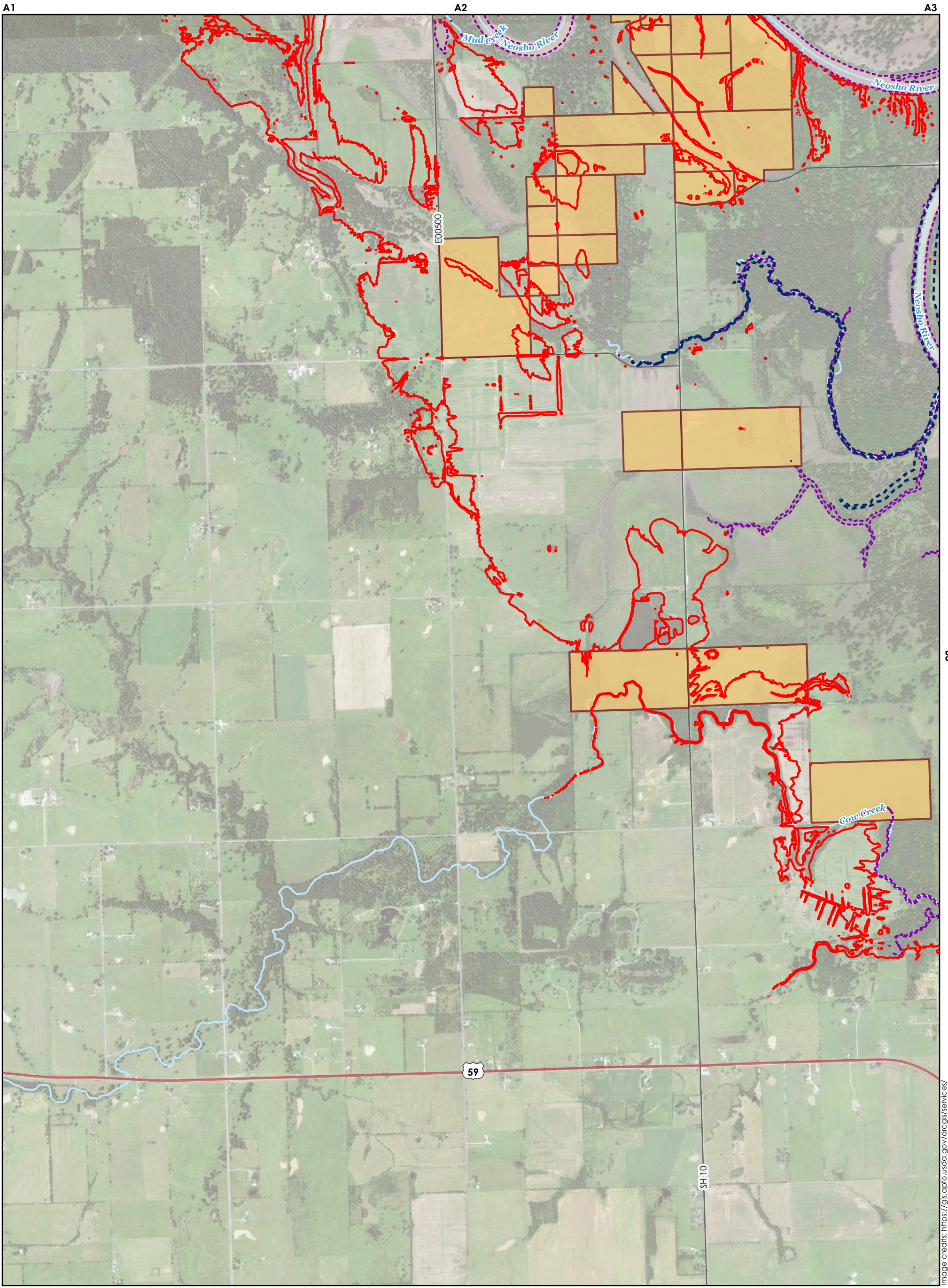
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
- See Overview Map for notes on data sources.

PENSACOLA DAM
GRAND RIVER DAM AUTHORITY

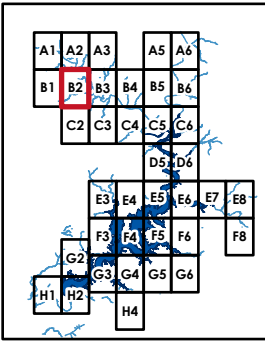
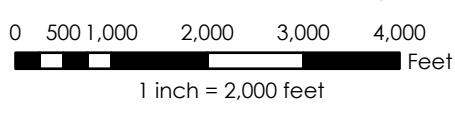
MAP: B1

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021

A1 A2 B2 C1 C2
Image credits: https://gis.dplfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



**OCTOBER 2009
INUNDATION SCENARIO**



- Legend**
- OCT 2009 MAX INUNDATION**
- 745 ft PD
 - 744 ft PD
 - 743 ft PD
 - 742 ft PD
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - GRDA Ownership

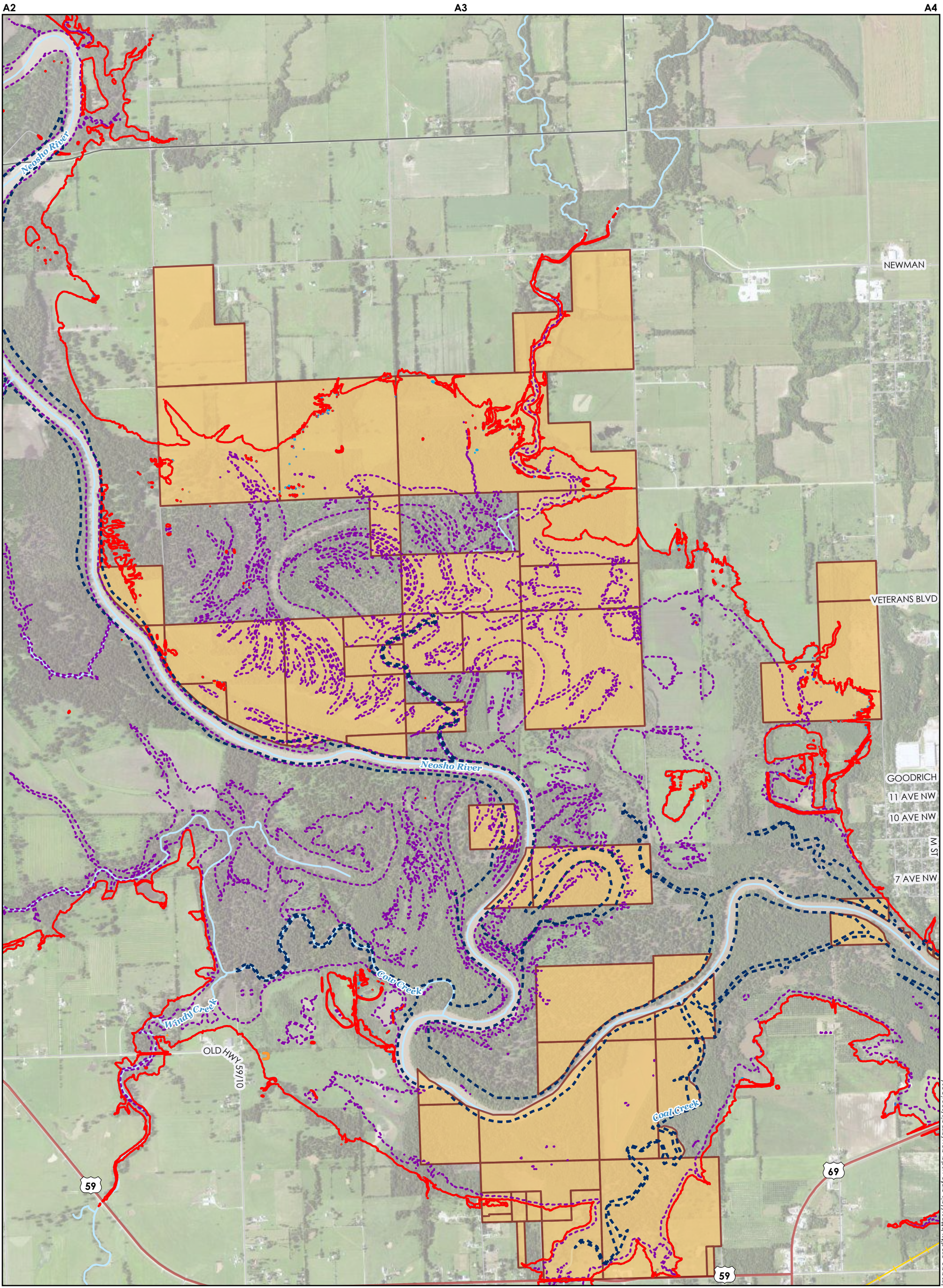
- MAP NOTES**
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 - See Overview Map for notes on data sources.

**PENSACOLA DAM
GRAND RIVER DAM AUTHORITY**

MAP: B2

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

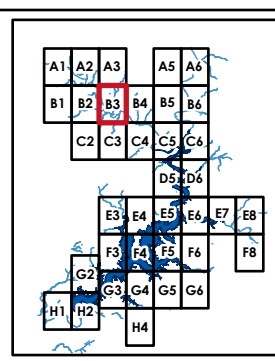


**OCTOBER 2009
INUNDATION SCENARIO**

NORTH

0 500 1,000 2,000 3,000 4,000 Feet

1 inch = 2,000 feet



- Legend**
- OCT 2009 MAX INUNDATION**
- 745 ft PD
 - 744 ft PD
 - 743 ft PD
 - 742 ft PD
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- Railroad
 - Stream
 - Flowage Easements
 - - - Project Boundary
 - GRDA Ownership
- MAP NOTES**
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 - See Overview Map for notes on data sources.

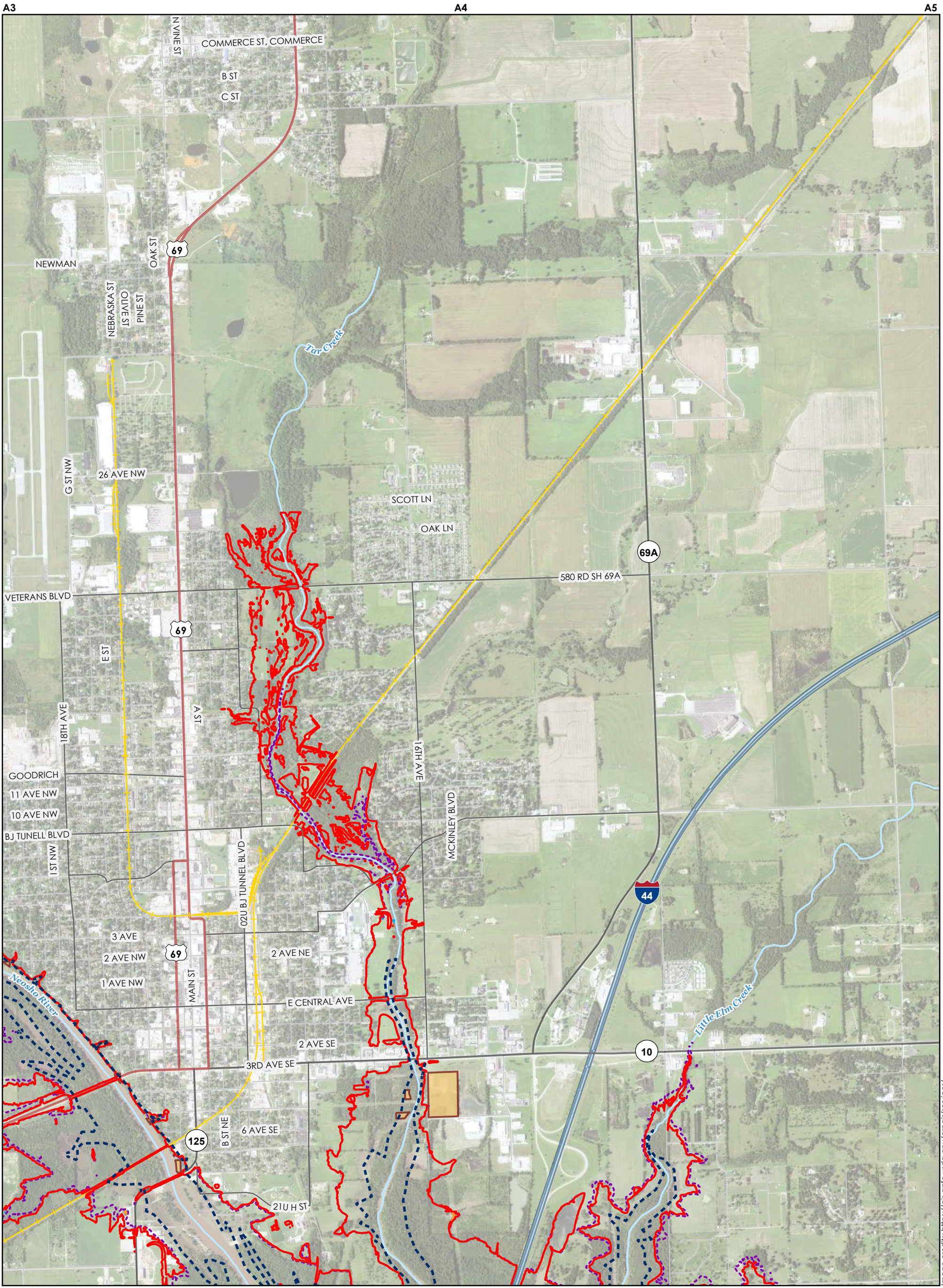
PENSACOLA DAM
GRAND RIVER DAM AUTHORITY

MAP: B3

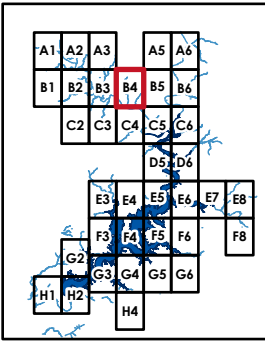
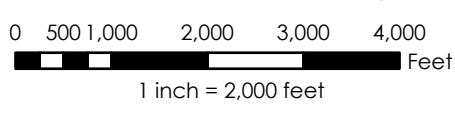
CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA

FERC No. 1494
September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



OCTOBER 2009 INUNDATION SCENARIO



- Legend**
- | | | |
|--------------------------------|-------------------|-------------------|
| OCT 2009 MAX INUNDATION | ROAD CLASS | Railroad |
| 745 ft PD | Interstate | Stream |
| 744 ft PD | State Highway | Flowage Easements |
| 743 ft PD | US Highway | Project Boundary |
| 742 ft PD | Major Collector | GRDA Ownership |
| | Local Road | |

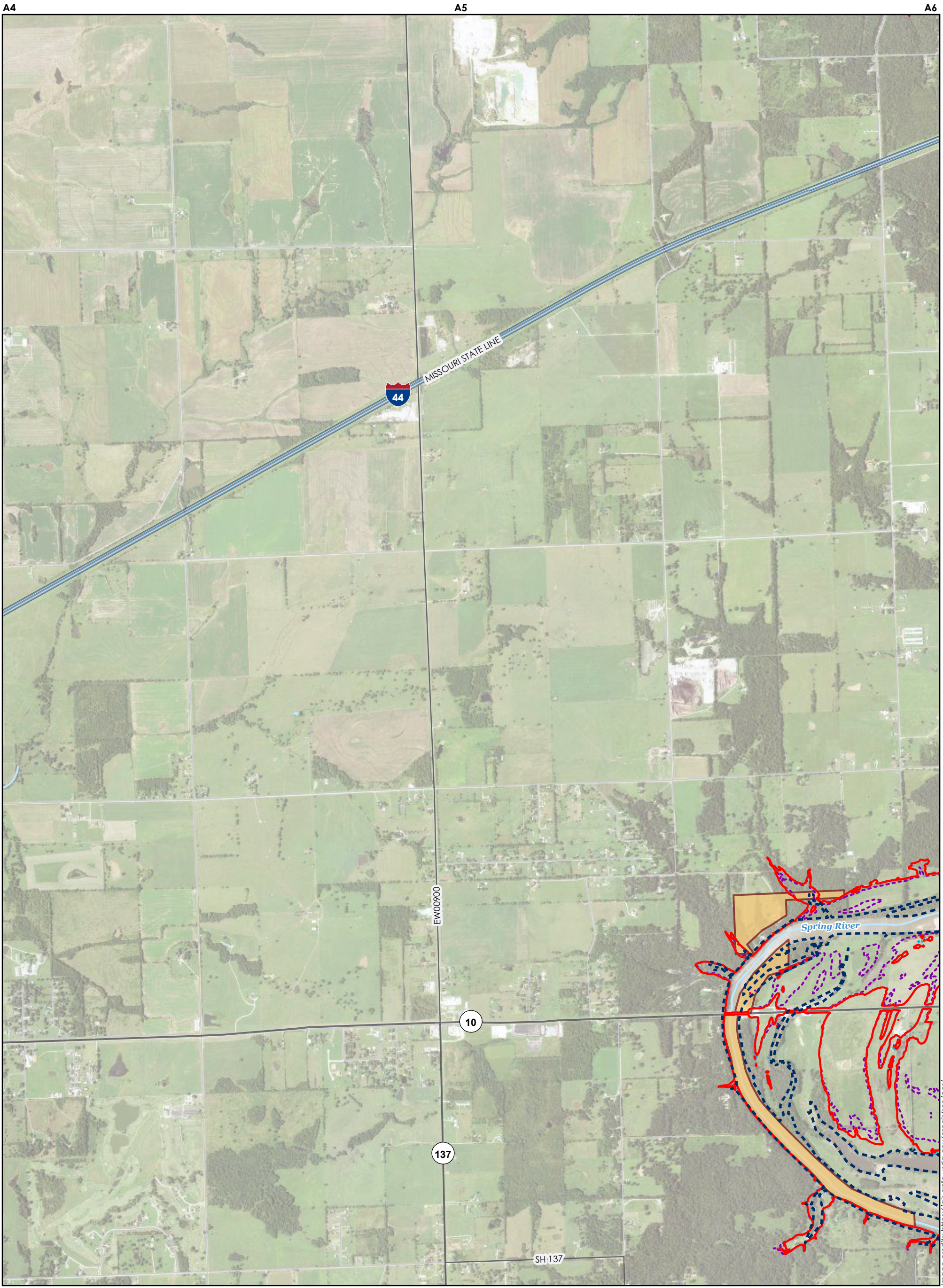
- MAP NOTES**
1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 2. See Overview Map for notes on data sources.

PENSACOLA DAM GRAND RIVER DAM AUTHORITY

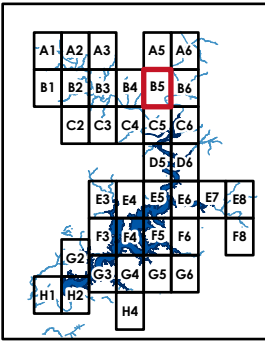
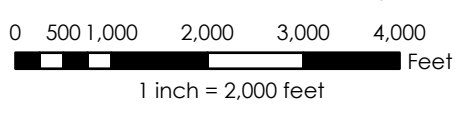
MAP: B4

CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
 September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



**OCTOBER 2009
INUNDATION SCENARIO**



- Legend**
- | | | |
|--|---|-------------------|
| OCT 2009 MAX INUNDATION | ROAD CLASS | Railroad |
| — 745 ft PD | — Interstate | Stream |
| — 744 ft PD | — State Highway | Flowage Easements |
| — 743 ft PD | — US Highway | Project Boundary |
| — 742 ft PD | — Major Collector | GRDA Ownership |
| | — Local Road | |

- MAP NOTES**
1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 2. See Overview Map for notes on data sources.

**PENSACOLA DAM
GRAND RIVER DAM AUTHORITY**

MAP: B5

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

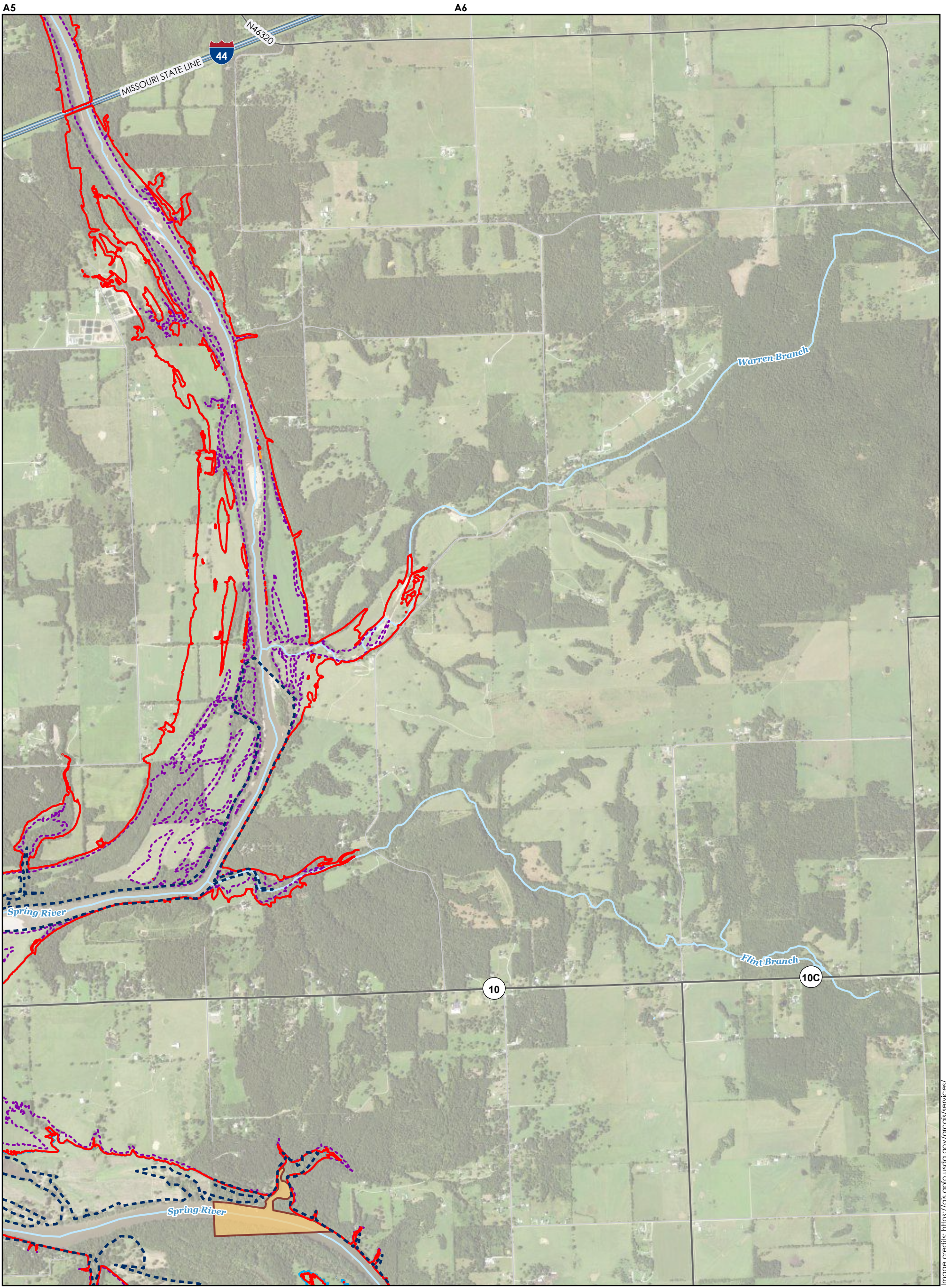
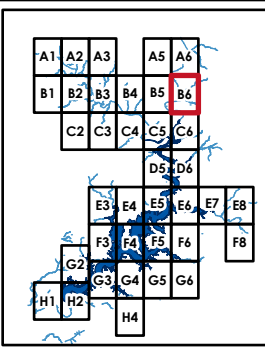
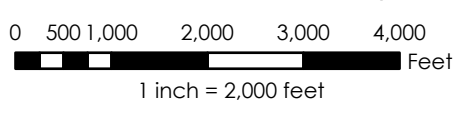


Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

OCTOBER 2009 INUNDATION SCENARIO



- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD

- Legend**
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- + Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - █ GRDA Ownership

- MAP NOTES**
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 - See Overview Map for notes on data sources.

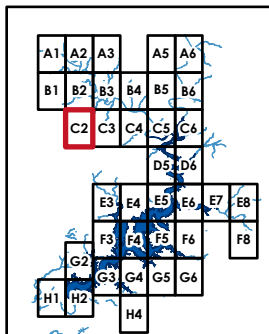
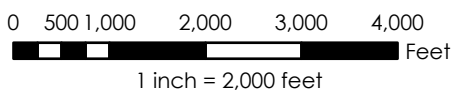
PENSACOLA DAM GRAND RIVER DAM AUTHORITY

MAP: B6

CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021



**OCTOBER 2009
INUNDATION SCENARIO**



Legend

- OCT 2009 MAX INUNDATION**
- 745 ft PD
 - 744 ft PD
 - 743 ft PD
 - 742 ft PD

- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road

- Railroad
- Stream
- Flowage Easements
- Project Boundary
- GRDA Ownership

MAP NOTES

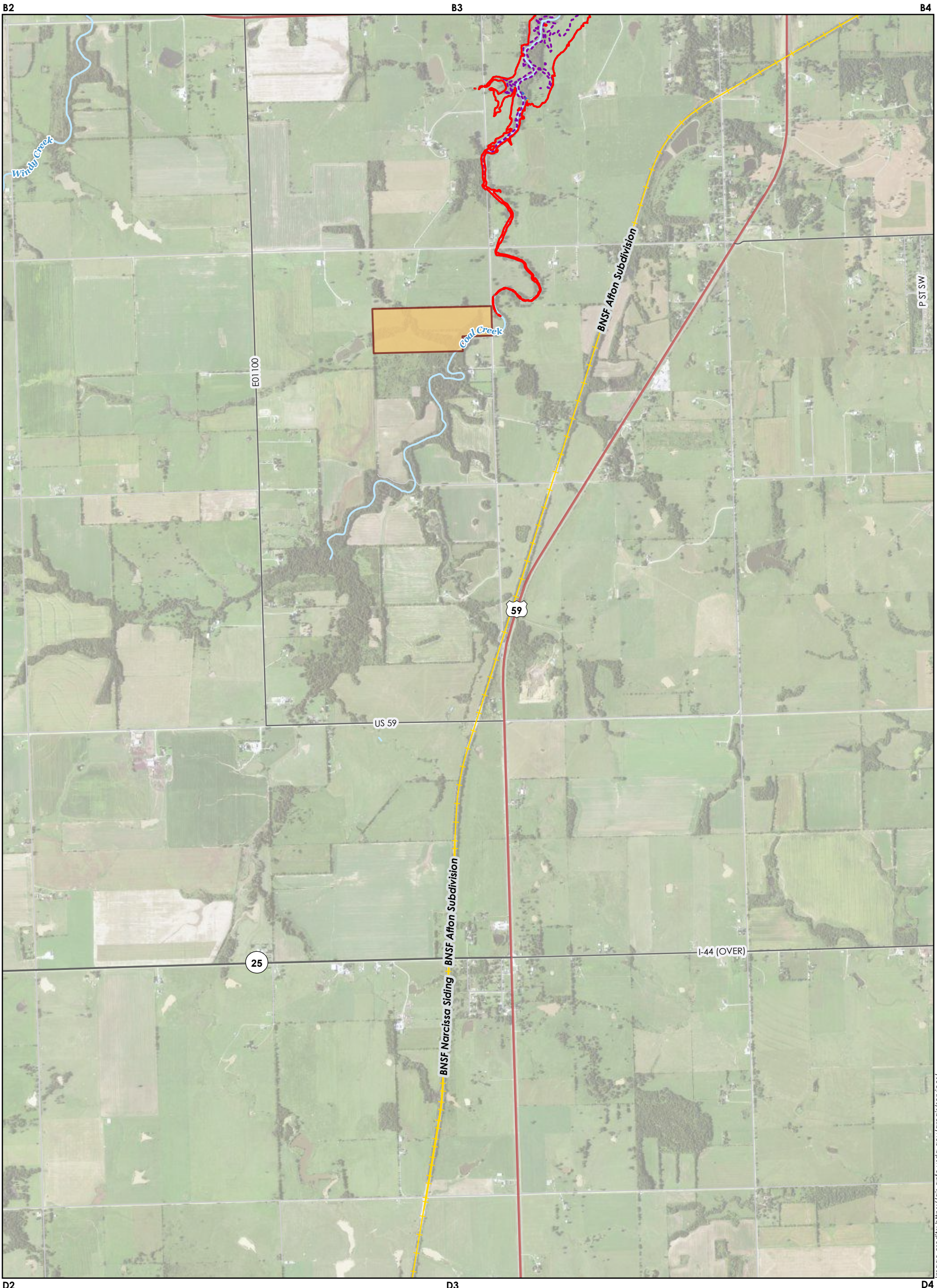
1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
2. See Overview Map for notes on data sources.

PENSACOLA DAM
GRAND RIVER DAM AUTHORITY

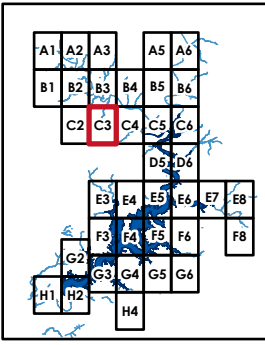
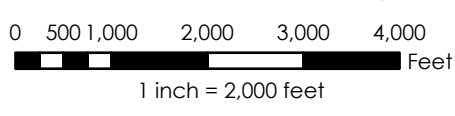
MAP: C2

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA

FERC No. 1494
September 2021



OCTOBER 2009 INUNDATION SCENARIO



- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD
- Legend**
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- Railroad
 - Stream
 - Flowage Easements
 - Project Boundary
 - █ GRDA Ownership

MAP NOTES

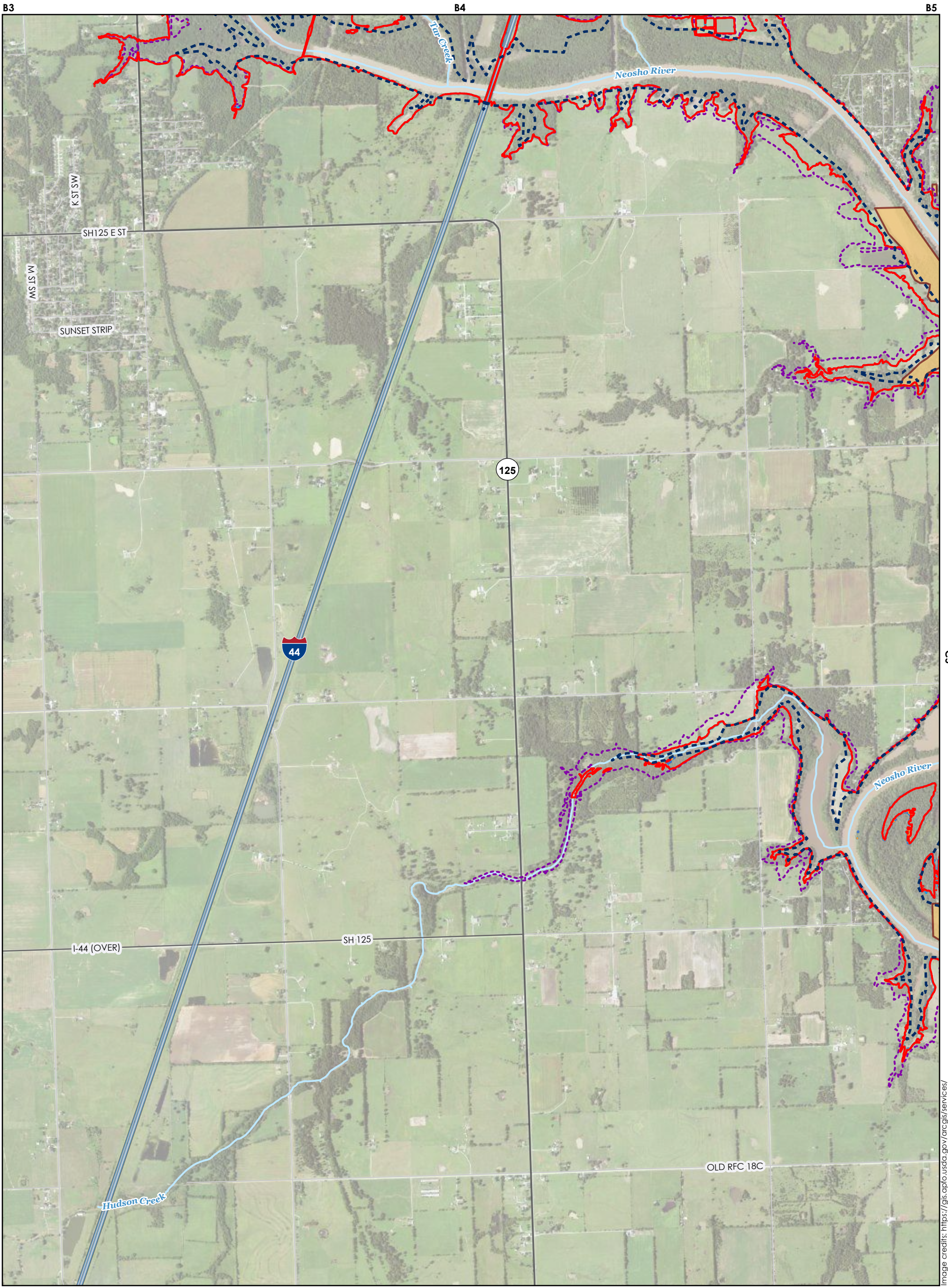
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
- See Overview Map for notes on data sources.

PENSACOLA DAM GRAND RIVER DAM AUTHORITY

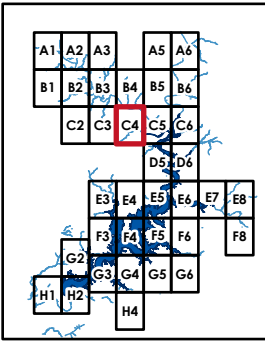
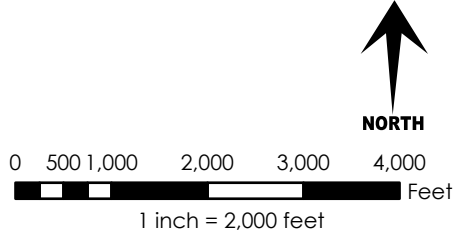
MAP: C3

CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021

Image credits: https://gis.dplfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



**OCTOBER 2009
INUNDATION SCENARIO**



- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD

- Legend**
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- + Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - █ GRDA Ownership

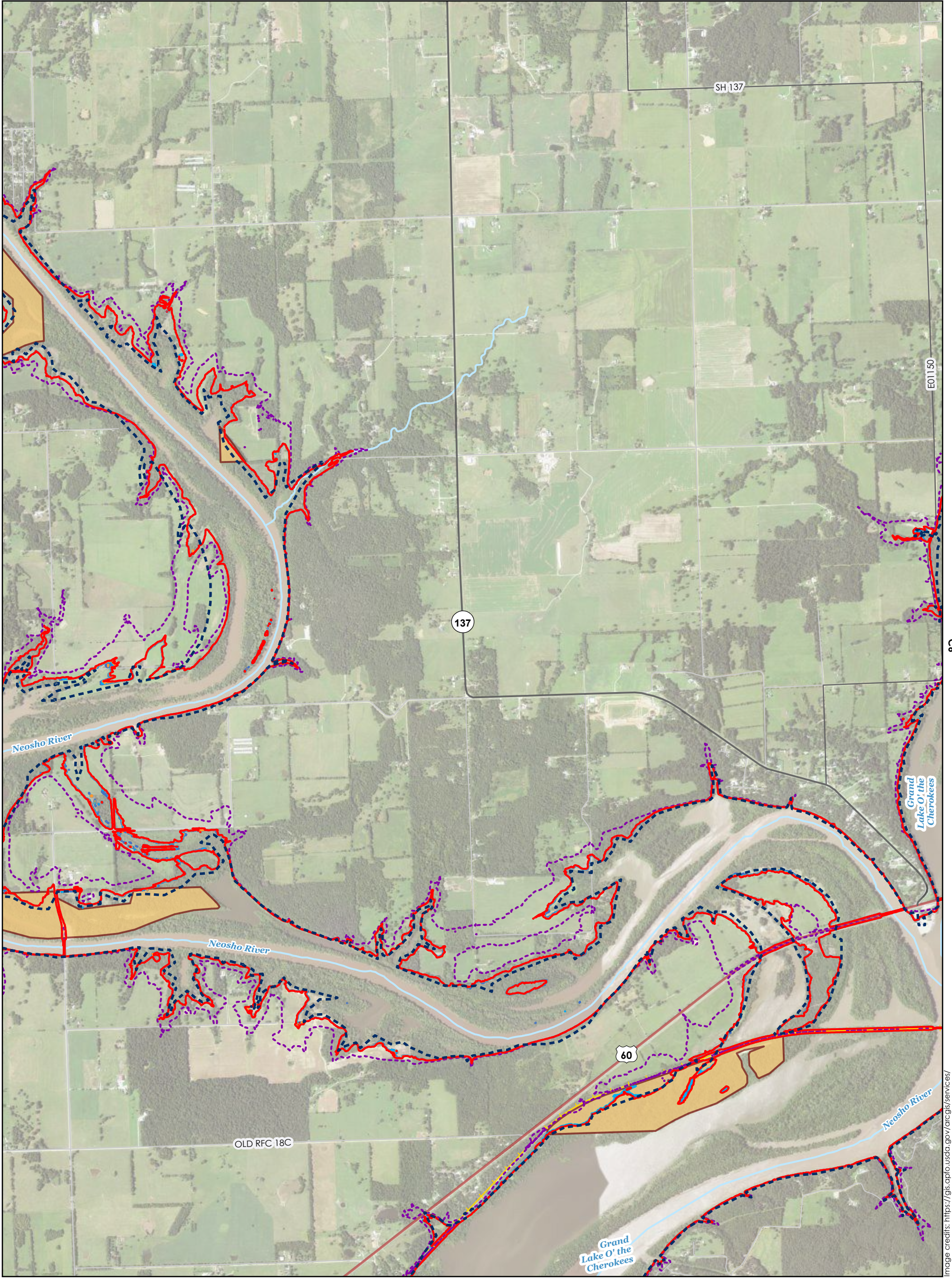
- MAP NOTES**
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 - See Overview Map for notes on data sources.

**PENSACOLA DAM
GRAND RIVER DAM AUTHORITY**

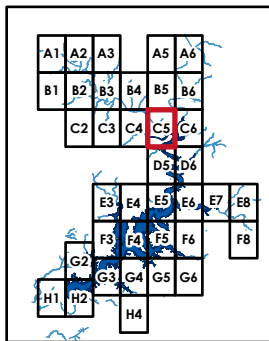
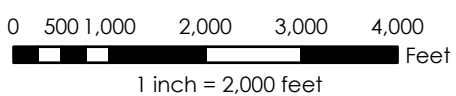
MAP: C4

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021

Image credits: https://gis.dplfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



OCTOBER 2009 INUNDATION SCENARIO



Legend

OCT 2009 MAX INUNDATION

- █ 745 ft PD
- █ 744 ft PD
- █ 743 ft PD
- █ 742 ft PD

ROAD CLASS

- Interstate
- State Highway
- US Highway
- Major Collector
- Local Road

- + Railroad
- Stream

- - - Flowage Easements
- - - Project Boundary
- █ GRDA Ownership

MAP NOTES

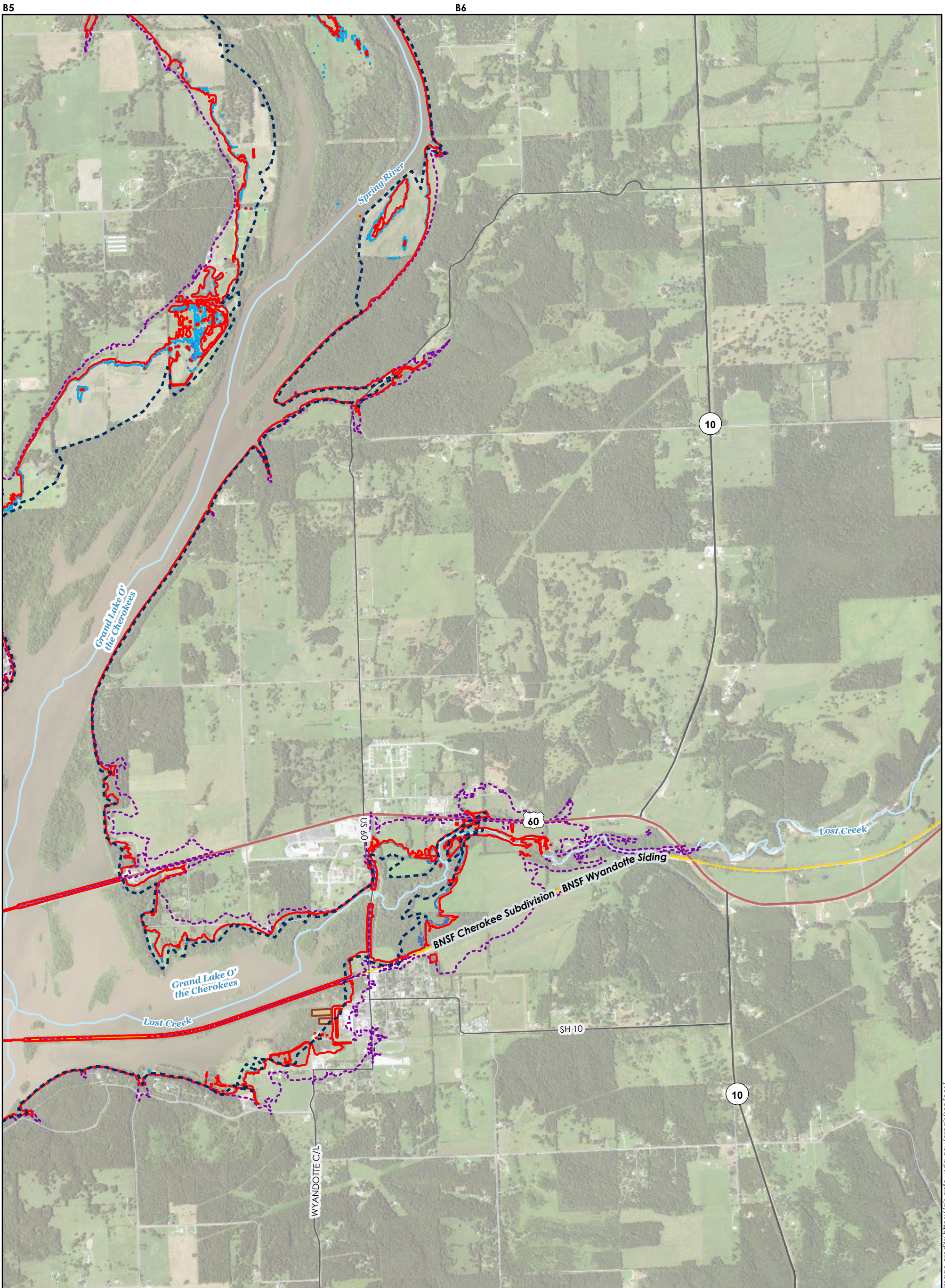
1. For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
2. See Overview Map for notes on data sources.

PENSACOLA DAM GRAND RIVER DAM AUTHORITY

MAP: C5

CRAIG, DELAWARE, MAYES, AND
OTTAWA COUNTIES, OKLAHOMA

FERC No. 1494
September 2021

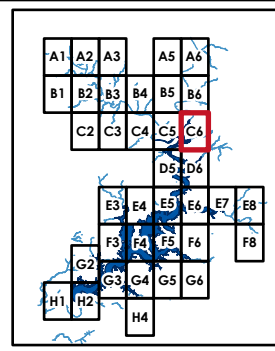


**OCTOBER 2009
INUNDATION SCENARIO**

NORTH

0 500 1,000 2,000 3,000 4,000 Feet

1 inch = 2,000 feet



- Legend**
- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD
- ROAD CLASS**
- Interstate
 - State Highway
 - US Highway
 - Major Collector
 - Local Road
- + Railroad
 - Stream
 - - - Flowage Easements
 - - - Project Boundary
 - █ GRDA Ownership
- MAP NOTES**
- For areas where only the highest starting elevation inundation boundary is visible, the inundation from other starting elevations is nearly identical.
 - See Overview Map for notes on data sources.

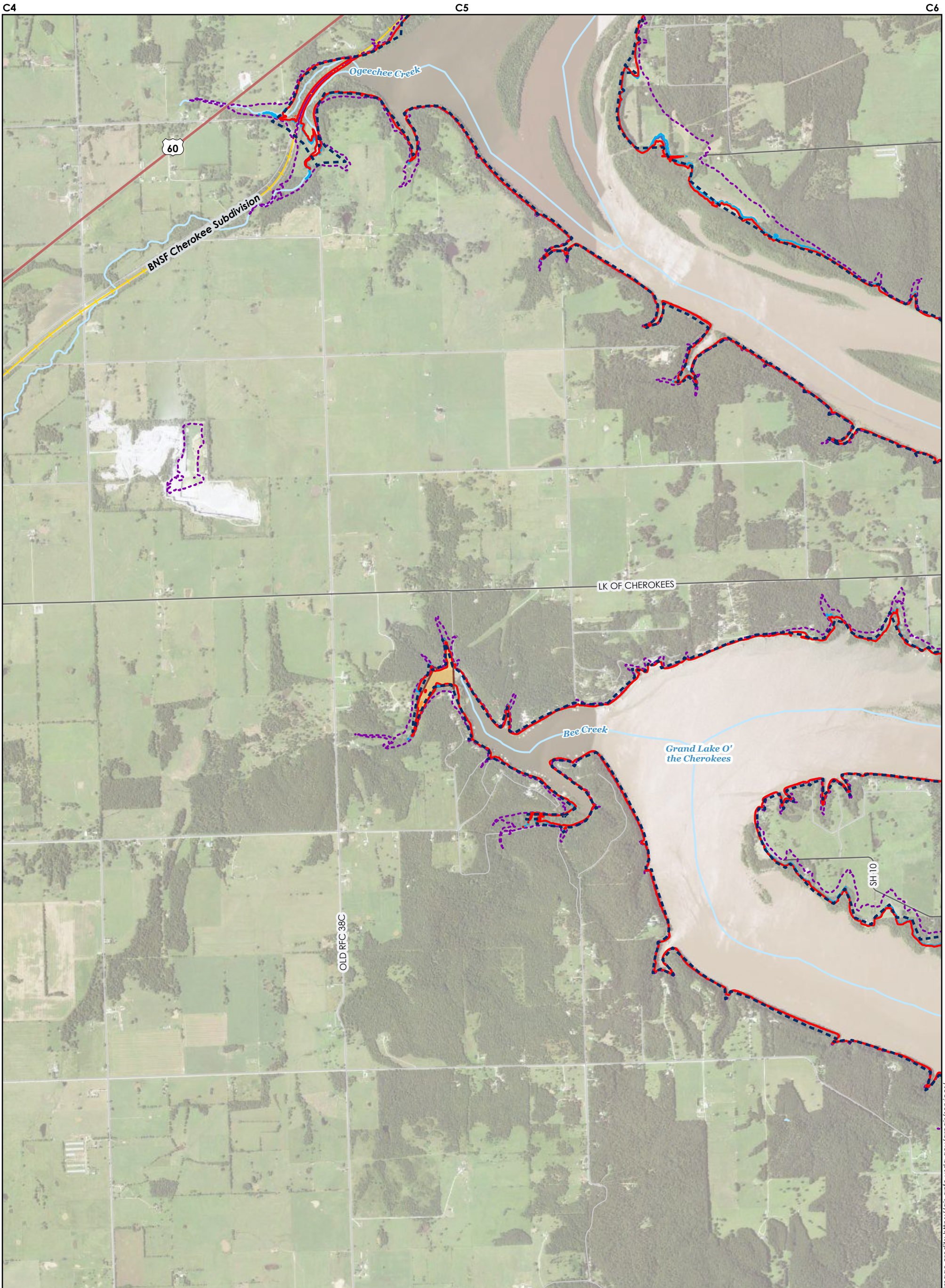
PENSACOLA DAM
GRAND RIVER DAM AUTHORITY

MAP: C6

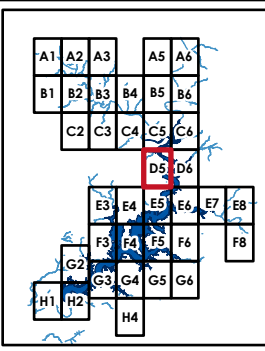
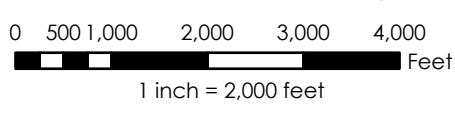
CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA

FERC No. 1494
September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019



OCTOBER 2009 INUNDATION SCENARIO



- OCT 2009 MAX INUNDATION**
- █ 745 ft PD
 - █ 744 ft PD
 - █ 743 ft PD
 - █ 742 ft PD
- Legend**
- | | |
|---|---|
| — Interstate | + Railroad |
| — State Highway | — Stream |
| — US Highway | - - - Flowage Easements |
| — Major Collector | - - - Project Boundary |
| — Local Road | █ GRDA Ownership |

MAP NOTES

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- See Overview Map for notes on data sources.

PENSACOLA DAM GRAND RIVER DAM AUTHORITY

MAP: D5

CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
 September 2021

Image credits: https://gis.apfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

C5

C6

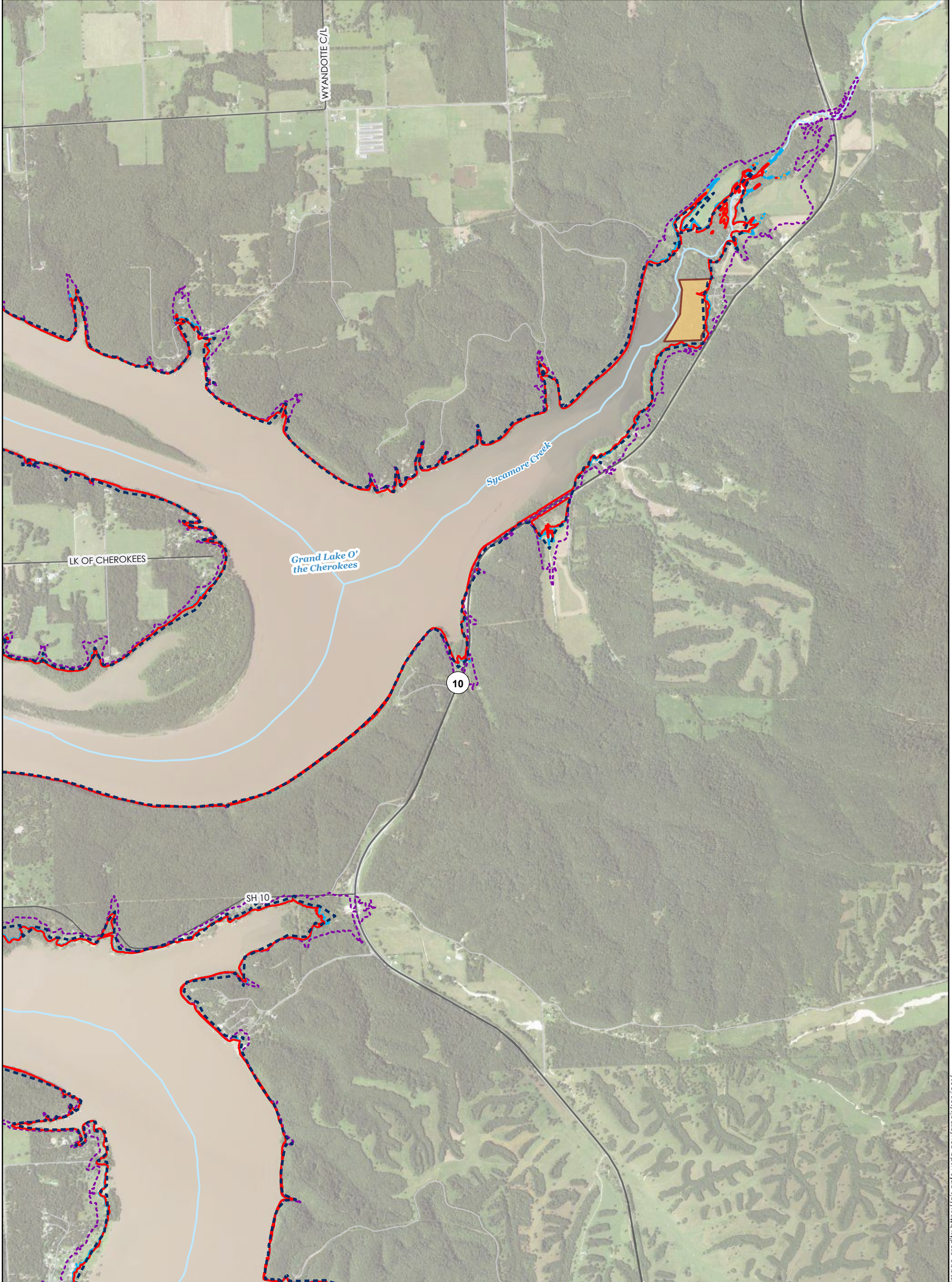


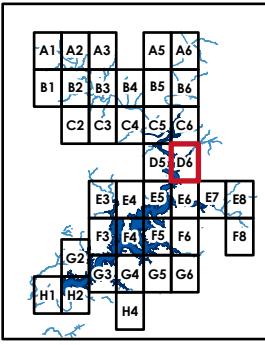
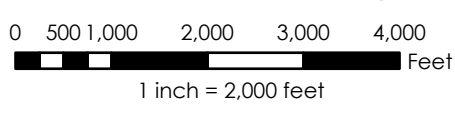
Image credits: https://gis.dplfo.usda.gov/arcgis/services/NAIP/USDA_CONUS_PRIME/ImageServer, 2019

E5

E6

E7

OCTOBER 2009 INUNDATION SCENARIO



Legend

OCT 2009 MAX INUNDATION

- █ 745 ft PD
- █ 744 ft PD
- █ 743 ft PD
- █ 742 ft PD

ROAD CLASS

- Interstate
- State Highway
- US Highway
- Major Collector
- Local Road

- + Railroad
- Stream
- - - Flowage Easements
- - - Project Boundary
- █ GRDA Ownership

MAP NOTES

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- See Overview Map for notes on data sources.

PENSACOLA DAM GRAND RIVER DAM AUTHORITY

MAP: D6

CRAIG, DELAWARE, MAYES, AND OTTAWA COUNTIES, OKLAHOMA
FERC No. 1494
September 2021