ENVIRONMENTAL ASSESSMENT

APPENDIX E

Section 4(f) De Minimis Evaluation

DRAFT EVALUATION AND DOCUMENTATION OF A *DE MINIMIS* FINDING TO SECTION 4(F) PROPERTY FOR PUBLIC PARKS, RECREATION LANDS, AND WILDLIFE AND WATERFOWL REFUGES

ARDOT Job Number 061705

Bryant Pkwy. Extension (S)

FAP NUMBER STPU-9061(14)

Saline County, Arkansas

Alcoa 40 Park

City of Bryant

November 2020

Federal Highway Administration

Arkansas Department of Transportation

What is Section 4(f)?

Section 4(f) is part of a law that was passed to protect public parks, recreation areas, wildlife/waterfowl refuges, and important historic sites from being harmfully affected by transportation projects.

Does Section 4(f) Apply to Alcoa 40 Park?

The City of Bryant has proposed a project that involves Alcoa 40 Park property in the City of Bryant. Section 4(f) protections are applicable because Alcoa 40 Park is a publicly accessible park managed and used for recreational purposes.

Certain types of Section 4(f) impacts can be recognized as "*de minimis*," which means relatively minor. The intent of this evaluation is to demonstrate that impacts to Alcoa 40 Park will be relatively minor. A *de minimis* finding is allowed on projects that meet the conditions shown in Table 1.

Table 1

When Can We Use A *De Minimis* Finding on Section 4(f) Properties?	Does It Apply To This Project?
Did we specially design the project to protect the Alcoa 40 Park as much as possible? Did we use mitigation and enhancement where it was suitable?	Yes
Did the official(s) with authority over the Alcoa 40 Park have a chance to consider this information and agree that the project will not greatly harm the things that make the park important?	Yes
Did the public have an opportunity to review and comment on the effects of the project on the Alcoa 40 Park and the things that make it important to them?	Yes

What is the Proposed Project?

The City of Bryant is proposing to extend Bryant Parkway from Highway 183 (southern terminus) to Shobe Road (northern terminus), which will span Crooked Creek and the Union Pacific Railroad. A general location (Figure 1) and detailed project map (Figure 2) are attached. This portion of Bryant Parkway is a new proposed roadway and is located outside of, but adjacent to the east side of Alcoa 40 Park.

The project will complete the Bryant Parkway connection from I-30 to Hwy. 183 (Reynolds Road). Two alternative alignments are being evaluated in an Environmental Assessment, both of which

have the same impacts on Alcoa 40 Park. The proposed project includes a new bike/pedestrian trail beginning at the southeast corner of Alcoa 40 Park, extending south across the proposed bridge over Crooked Creek, and ending at Hill Road. A future trail is planned to be constructed through the Park and will connect to the existing trail running along the west side of existing Bryant Parkway on the north end. This trail addition provides an above-grade pedestrian crossing of Crooked Creek and the Union Pacific Railroad. Additionally, it provides a pedestrian connection to serve the eastern side of Bryant and fulfills planned improvements defined in Bryant's *Walk Bike Drive Master Transportation Plan* (2017). The Alcoa 40 Park currently does not have a bike/pedestrian trail connection to other trails or parks in Bryant. The proposed trail will add approximately 2.2 miles to the existing and future trail system in Bryant and enables future bike/pedestrian access to the Alcoa 40 Park. The trail is an important extension and connection location in the City's Walk Bike Drive plan.

Why is the Alcoa 40 Park Important?

The Alcoa 40 Park is located in, and owned and operated by, the City of Bryant. The Alcoa 40 Park property includes recreational baseball and football/multipurpose fields. The main purpose of the Park is to provide recreational amenities to the public and includes the following:

- Three softball fields
- One pee-wee football/multipurpose field

Other amenities supporting these recreational features include: a dog park, restroom facility, meeting room, bridge and deck, paved parking, parking lot and field lighting, fencing, dugouts, press boxes, and bleachers.

Can We Avoid the Park?

Construction of the new roadway and bike/pedestrian trail, as well as the required excavation in order to improve the floodway, requires minor and temporary impacts to Alcoa 40 Park. Avoidance alternatives were considered but none were determined to be feasible and prudent. Design considerations that would avoid impacting the Park are not possible for the below described reasons.

- The proposed project's roadway has been shifted to the east to avoid as many impacts to Alcoa 40 Park as possible. However, as the location of the roadway is constrained between the Park and Cherry Creek Subdivision, the temporary and minor (0.12 acre) impacts from grading are unavoidable on the east edge of the Park.

- The proposed project requires a bridge to be constructed across the regulatory flood zone associated with Crooked Creek. This requires bridge piers to be constructed within the Crooked Creek flood zone. In order to avoid causing a rise in the 100 year Base Flood Elevation, hydraulic improvements are required in order to mitigate for the minor obstruction of flow caused by the bridge pier construction. Multiple elevated areas were identified within the floodplain that obstruct flow during high flow events. The proposed project would excavate to reduce the elevation of these elevated areas in order to improve

flow and not cause a rise in the Base Flood Elevation (BFE) upstream. Approximately 0.18 acres of this excavation (additional impacts) occurs within Alcoa 40 Park.

What Will the Project Do to the Park?

As shown in the attached Figure 3, Alcoa 40 Park occurs in two locations, with the northern-most location containing all the recreational amenities making the Park important. The proposed temporary impacts to the northern portion of Alcoa 40 Park is approximately 0.12 acre (Figure 3). This area will be graded to ensure proper embankment slopes are in place for the roadbed. The limits of the permanent roadway ROW will not extend into the Park property. For the southern portion of the Park, approximately 0.18 acre of Alcoa 40 Park will be graded to Elevation 343.50 feet in order to make the required floodway improvements (Figure 4). Neither of these actions will restrict or inhibit vehicular access to the Park, and both will avoid impacts to any of the Park's recreational features. No temporary or permanent losses of use for the Alcoa 40 Park will occur. The City of Bryant and Arkansas Department of Parks, Heritage, and Tourism (ADPHT) have determined the new roadway and floodplain excavation will not adversely affect the protected features, attributes or activities of Alcoa 40 Park.

What Did We Do to Reduce Harm to the Park?

The following measures were included in the proposed project to reduce harm to the Alcoa 40 Park:

1. Alternative B's roadway alignment was shifted east and the construction footprint was designed to occur outside Park boundaries to the greatest extent possible. However, temporary grading activities will impact currently unused portions of the Park.

2. Roadway design included evaluating aesthetics in regards to both the Park and adjacent Cherry Creek Subdivision to the east. The current design of Alternative B leaves approximately 10 feet of open treed area between the roadway and Park, and approximately 20 feet between the roadway and the subdivision.

3. The roadway will not restrict vehicular access to the Park. The Proposed construction sequencing allows Shobe Road to remain open during all construction phases with no interruption to Park access. The sequencing plan is to construct the roadway and the bike/pedestrian trail concurrently, to help minimize the length of time construction equipment is in the area.

4. Excavation that was required for hydraulic improvements within the floodway was minimized to the extent possible while still staying below the maximum BFE rise required by FEMA. Excavation within the selected areas would provide the most effective lowering of the BFE at a relatively low cost compared to excavation within a different location.

How Did We Involve the Public in This Evaluation?

An open-forum Public Involvement Meeting for the proposed project was held in the cafeteria of Hill Farm Elementary School, 500 Hill Farm Road, Bryant, Arkansas, from 4:00 – 7:00 p.m. on

Thursday, April 26, 2018. Special efforts to involve minorities and the public in the meeting were included.

The public meeting had a total of 46 attendees. A total of nine comments were received, with the following comments regarding Alcoa 40 Park:

- Two individuals mentioned the importance of maintaining the tree barrier on all four sides of the Alcoa 40 Park. Additionally, these individuals commented that there is too much traffic on Shobe Road and Mills Park Road.

- Three comments were made regarding the risks to children's safety of the proposed improvements with respect to Alcoa 40 Park and/or the increased traffic at the elementary school or within a school zone.

Although the Alcoa 40 Park was shown on exhibits and discussed during the public meeting, the 4(f) evaluation was not complete and therefore not presented during the public meeting for comment. The public will be provided an opportunity to review and comment on impacts to Alcoa 40 Park during the Public Hearing held for the project.

Note for Draft: A summary of these comments and comment responses will be included in Appendix B.

The City of Bryant has agreed that this project will not have a harmful effect on the Alcoa 40 Park. A copy of this agreement is included in Appendix A.

What is the Decision?

This evaluation has determined that the proposed roadway improvement will not harm the protected features, qualities, or activities that make the Park important for recreation under Section 4(f), thus qualifying for a *de minimis* finding on Alcoa 40 Park.

Figure 1 – General Location Map

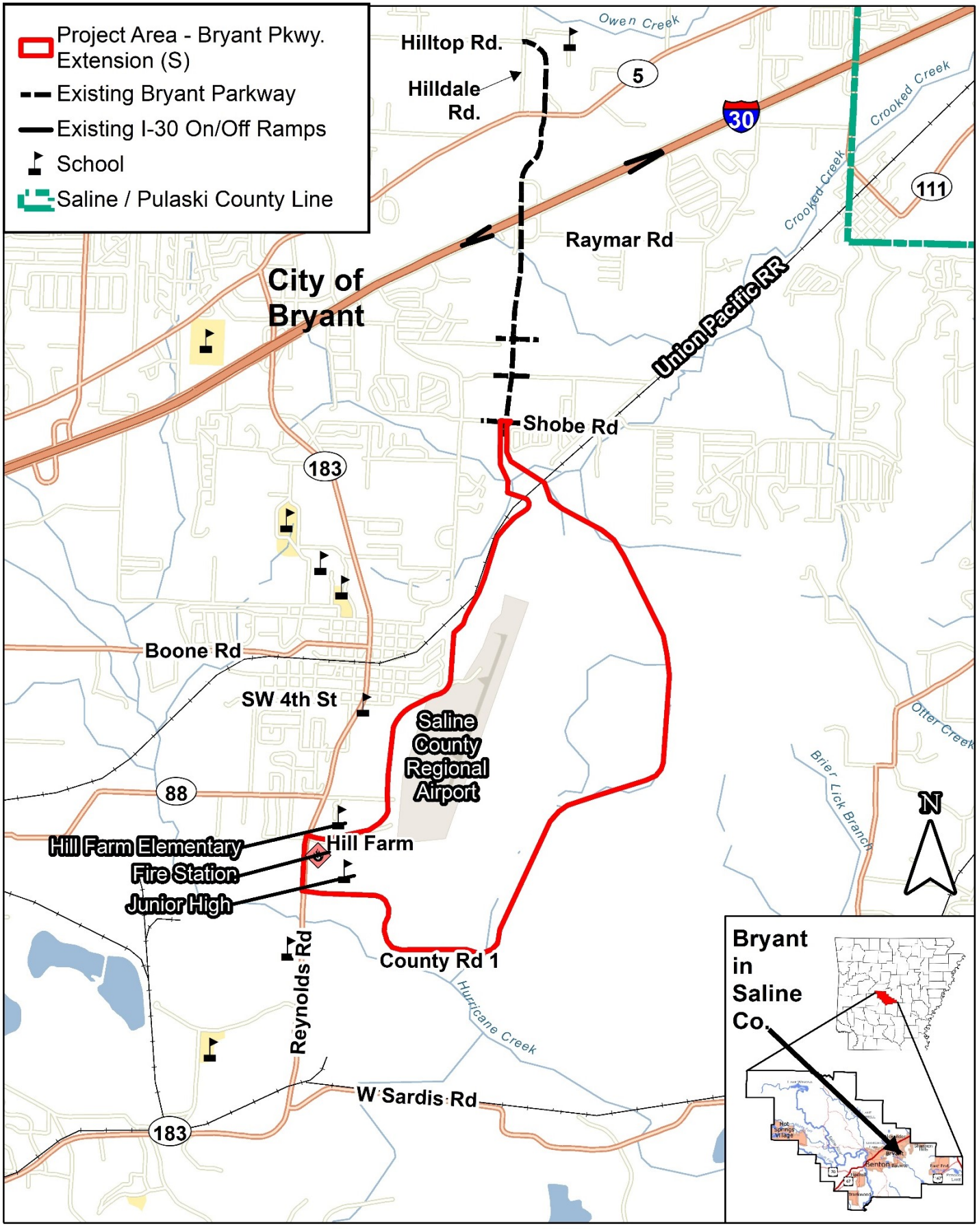


Figure 2 – Bryant Pkwy. Extension (Project 2); Alternative B

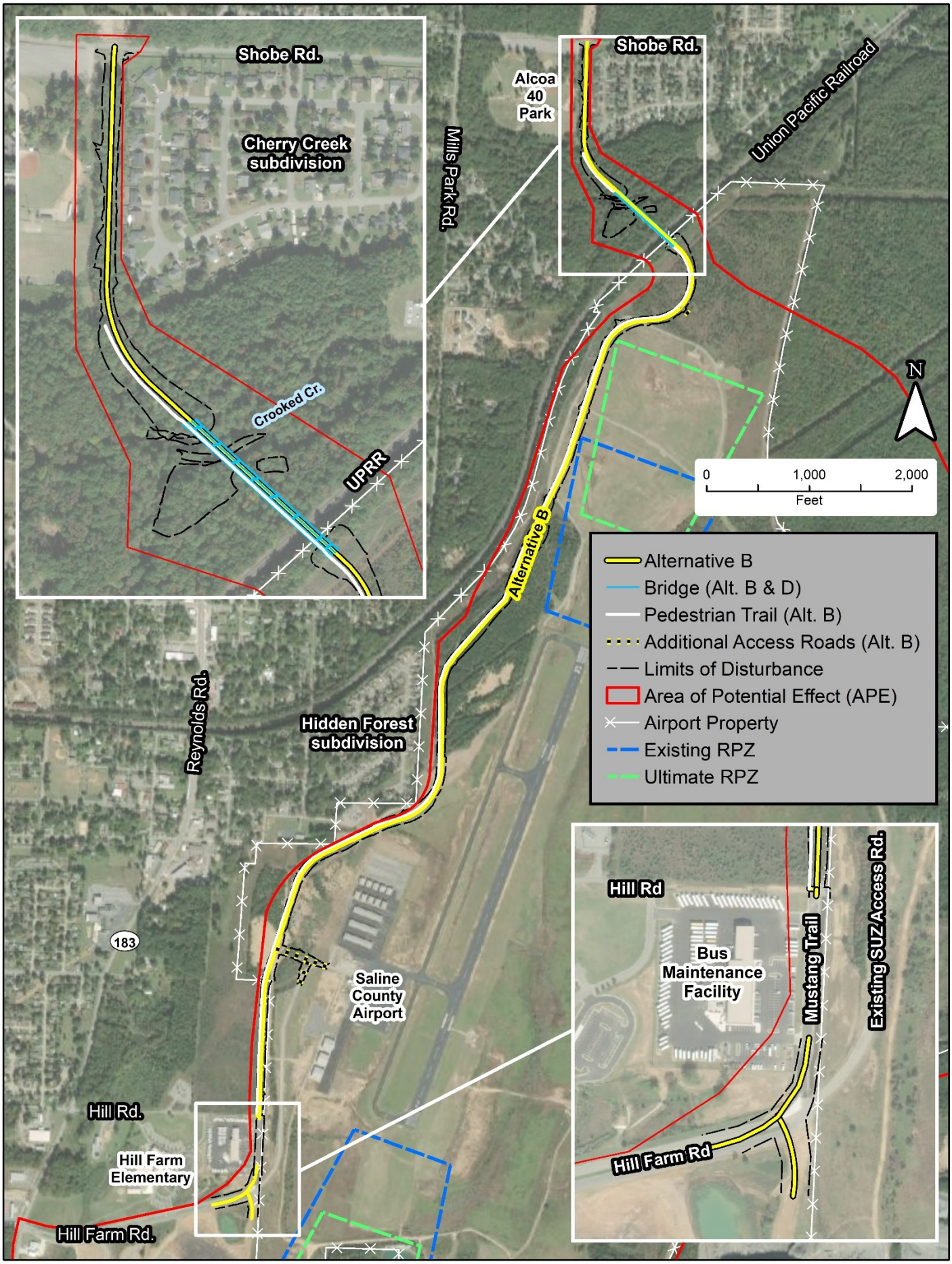


Figure 3 – Disturbances to Alcoa 40 Park

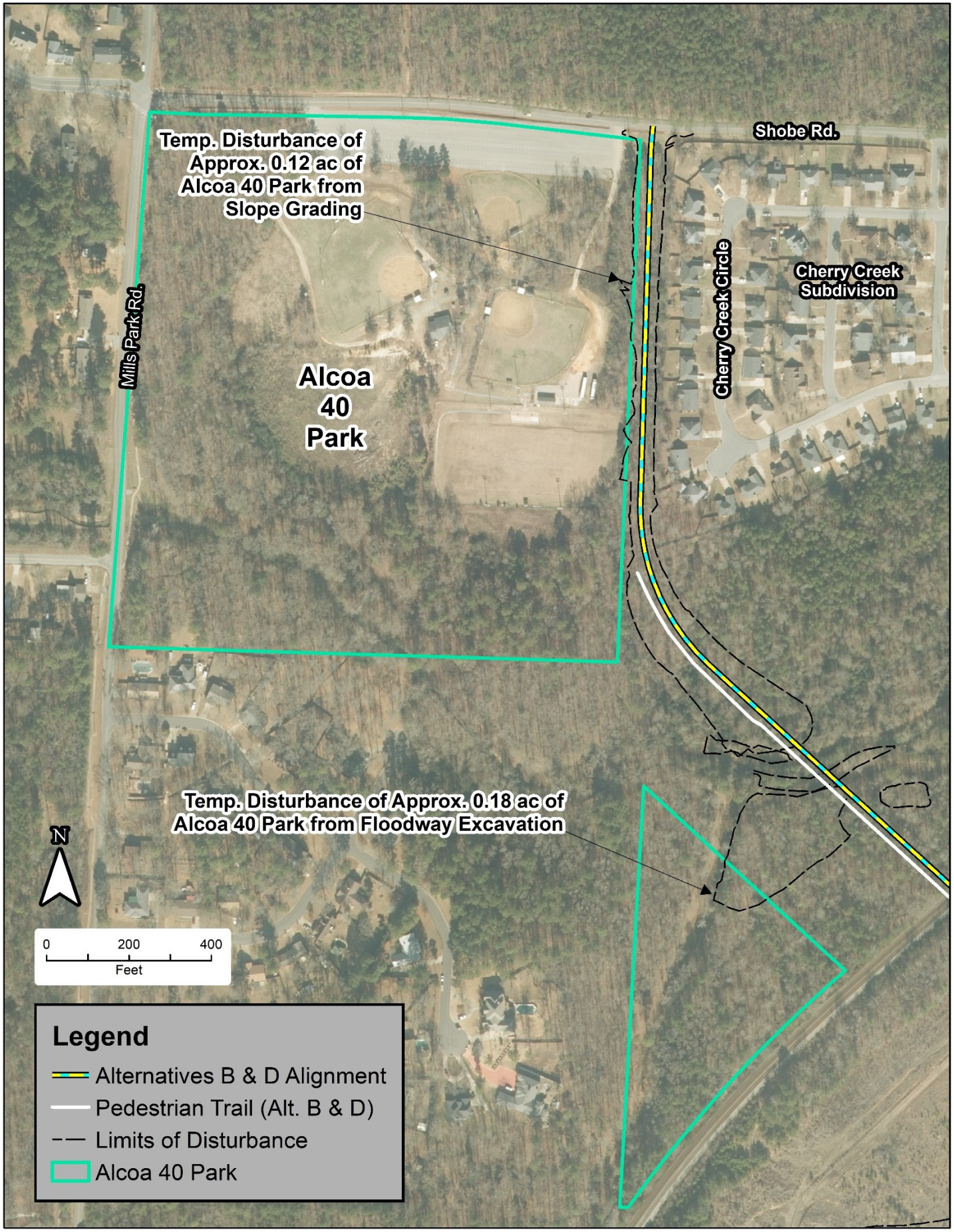
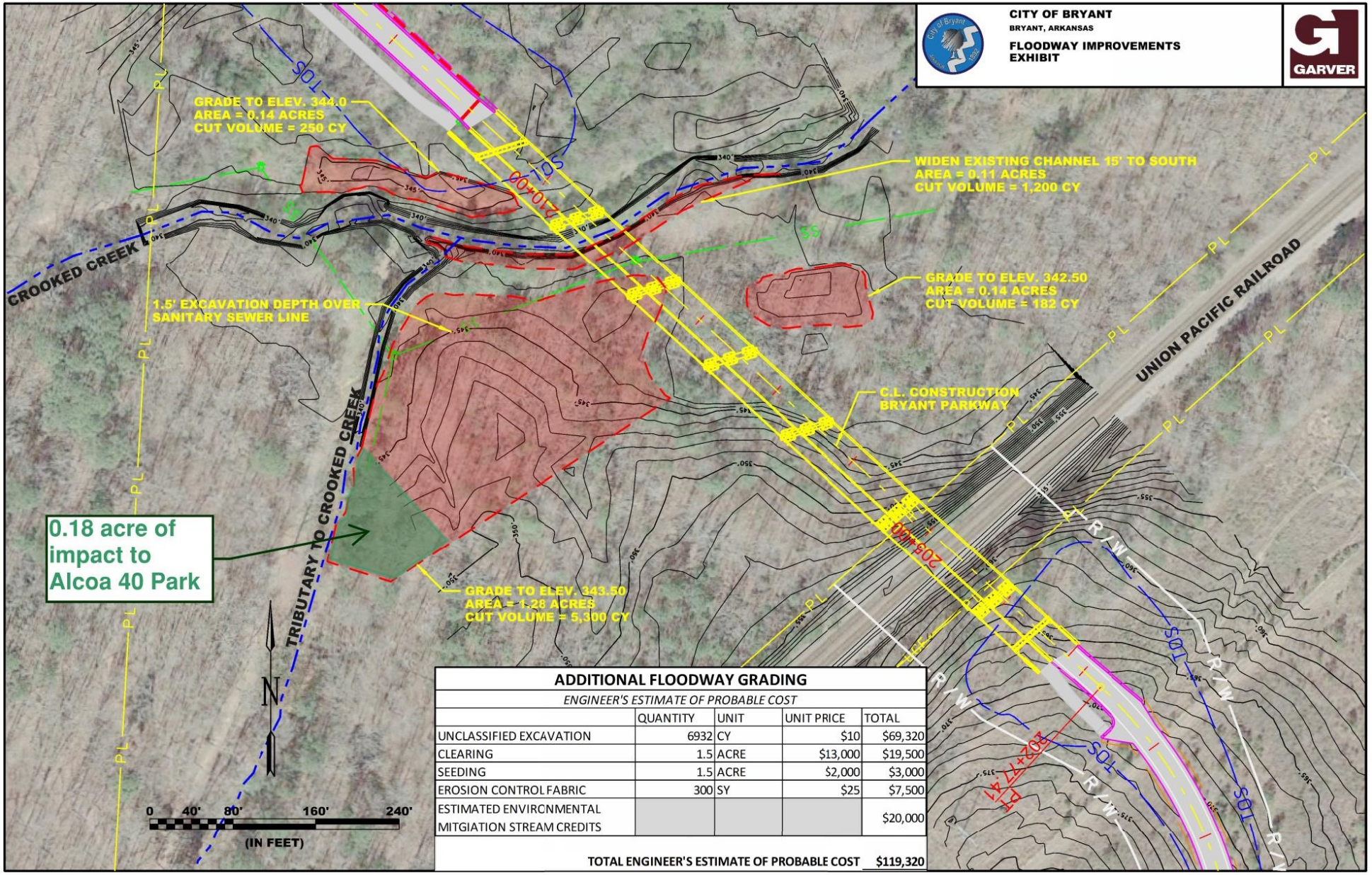


Figure 4 – Proposed Floodway Improvements



ADDITIONAL FLOODWAY GRADING				
ENGINEER'S ESTIMATE OF PROBABLE COST				
	QUANTITY	UNIT	UNIT PRICE	TOTAL
UNCLASSIFIED EXCAVATION	6932	CY	$10	$69,320
CLEARING	1.5	ACRE	$13,000	$19,500
SEEDING	1.5	ACRE	$2,000	$3,000
EROSION CONTROL FABRIC	300	SY	$25	$7,500
ESTIMATED ENVIRONMENTAL MITGIATION STREAM CREDITS				$20,000
TOTAL ENGINEER'S ESTIMATE OF PROBABLE COST				$119,320

APPENDIX A

CITY AGREEMENT

Section 4(f) De Minimis Evaluation for Alcoa 40 Park
May 29, 2020

The City of Bryant is proposing to extend Bryant Parkway from Highway 183 (southern terminus) to Shobe Road (northern terminus) in Saline County, Arkansas. This portion of Bryant Parkway is a new proposed roadway, identified as Bryant Parkway: Hwy. 183 to I-30 (Project 2), that will span Crooked Creek and the Union Pacific Railroad.

As seen in the enclosed draft evaluation document, this roadway project will require temporary impacts to Alcoa 40 Park, which qualifies for Section 4(f) protection as it is considered a significant public park. Temporary slope grading within approximately 0.12 acre of the northern portion of Alcoa 40 Park and excavation of approximately 0.18 acre for floodway improvements within the southern portion of Alcoa 40 Park will be required by the project in order to construct the proposed roadway. The main purpose of Alcoa 40 Park is recreational activities with such facilities as softball fields and a pee-wee football/multipurpose field. None of these sports fields will be impacted by the proposed improvements.

The determination has been made that the proposed project will not adversely affect the protected features, attributes or activities qualifying the property for protection under Section 4(f), thus qualifying for a *de minimis* finding on the impact to Alcoa 40 Park. The City of Bryant's proposal includes all possible planning to minimize harm to the recreational uses of Alcoa 40 Park. A draft of the Section 4(f) *De Minimis* Evaluation for Alcoa 40 Park is enclosed.

Land acquisition and permanent interruptions to Alcoa 40 Park are avoided to assure that the proposed project does not jeopardize the recreational value of the facility.

A requirement of the Section 4(f) process for a *de minimis* finding is an opportunity for the public to comment on the Section 4(f) Evaluation. This opportunity will be provided through an advertisement published in the Saline County Courier, offering the public an opportunity to review and comment on the draft Section 4(f) Evaluation document. Any comments received from the public will be addressed in the final Section 4(f) *De Minimis* Evaluation and approved by the Federal Highway Administration.

I concur with the assessment and the proposed minimization and mitigation of impacts to Alcoa 40 Park as detailed in the enclosed Evaluation and Documentation of *De Minimis* Findings to Section 4(f) Property for Public Parks, Recreation Lands, and Wildlife and Waterfowl Refuges.


Signature

CITY ENGINEER
Title

7/16/2020
Date

APPENDIX B

PUBLIC COMMENTS AND RESPONSES

Note for Draft: Any public comments received from Public Hearing will be added.

ENVIRONMENTAL ASSESSMENT

APPENDIX F

Cultural Resources

ARKANSAS HERITAGE

Asa Hutchinson
Governor
Stacy Hurst
Secretary

January 10, 2021

Mr. John Fleming
Division Head
Environmental Division
Arkansas Department of Transportation
P.O. Box 2261
Little Rock, AR 72203-2261

Re: Saline County – Bryant
Section 106 Review – FHWA
Bryant Parkway Extension (S)
Cultural Resources Survey – *A Cultural Resources Survey for the Bryant Parkway Extension Project in Saline County, Arkansas*
F.E.A. Project Report 2020-65
ARDOT Job Number 061705
AHPP Tracking Number 100524.02

Dear Mr. Fleming:

The staff of the Arkansas Historic Preservation Program (AHPP) reviewed the cultural resources survey report associated with the above-referenced Arkansas Department of Transportation job in Sections 26, 34, and 35 of Township 1 South; Range 14 West and Section 3 of Township 2 South; Range 14 West in Saline County, Arkansas. As described, the proposed undertaking entails construction of a 1.75-mile road extension. The area of potential effects is 2,810 meters long and 34 meters wide.

Based on the information presented in the report, the AHPP concurs with a finding of **no historic properties affected in accordance with 36 CFR § 800.4(d)(1).**

Tribes that have expressed an interest in the area include the Caddo Nation, the Choctaw Nation of Oklahoma, the Jena Band of Choctaw Indians, the Muscogee (Creek) Nation, the Osage Nation, the Quapaw Nation, and the Shawnee Tribe. We recommend consultation in accordance with 36 CFR § 800.2(c)(2).

If you have any questions, please contact Eric Mills of my staff at (501) 324-9784 or eric.mills@arkansas.gov.

Sincerely,

/s/ Eric Mills for

Scott Kaufman
Director, AHPP

cc: Mr. Randal Looney, Federal Highway Administration
Dr. Melissa Zabecki, Arkansas Archeological Survey

THE DEPARTMENT OF ARKANSAS
HERITAGE

Asa Hutchinson
Governor

Stacy Hurst
Director

Arkansas Arts Council

Arkansas Natural Heritage Commission

Arkansas State Archives

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars Cultural Center

Old State House Museum

ARKANSAS HISTORIC PRESERVATION PROGRAM

1100 North Street
Little Rock, AR 72201

(501) 324-9880
fax: (501) 324-9184
tdd: 711

e-mail:
info@arkansaspreservation.org
website:
www.arkansaspreservation.com

An Equal Opportunity Employer

April 18, 2018

Ms. Cassie Schmidt
Environmental Scientist Garver
2049 E. Joyce Blvd.
Suite 400
Fayetteville, AR 72703

RE: Saline County — Bryant
Section 106 Review — FHWA
Proposed Undertaking: Bryant Parkway, Shobe Rd. to Hwy 183 AHPP
Tracking Number: 100524.01

Dear Ms. Schmidt:

The staff of the Arkansas Historic Preservation Program (AHPP) has reviewed the submitted documents that were submitted regarding the proposed undertaking referenced above.

Based on the submitted information, we find that the proposed undertaking will have no effect on historic properties and that no cultural resource surveys are required.

Tribes that have expressed an interest in the area include the Caddo Nation (Mr. Phil Cross), the Chickasaw Nation (Ms. Karen Brunso), the Choctaw Nation of Oklahoma (Dr. Ian Thompson), the Jena Band of Choctaw Indians (Alina J. Shively), the Osage Nation (Dr. Andrea Hunter), the Quapaw Tribe of Oklahoma (Mr. Everett Bandy), and the Shawnee Tribe of Oklahoma (Ms. Kim Jumper). We recommend that they be consulted in accordance with 36 CFR § 800.2 (c) (2).

Thank you for the opportunity to review this undertaking. Please refer to the AHPP Tracking Number listed above in all correspondence. If you have any questions, please call Tim Dodson of my staff at 501-324-9784.

Sincerely,

Scott Kaufman Director, AHPP

cc: Mr. Randall Looney, Federal Highway Administration
Mr. John Fleming, ArDOT
Dr. Ann Early, Arkansas Archeological Survey

TD:tr

A CULTURAL RESOURCES SURVEY FOR THE BRYANT PKWY. EXTENSION PROJECT IN SALINE COUNTY, ARKANSAS

Sections 26, 34, and 35 of Township 1 South, Range 14 West;
Section 3 of Township 2 South, Range 14 West

Flat Earth Archeology, LLC

F.E.A. PROJECT REPORT 2020-65

A CULTURAL RESOURCES SURVEY FOR THE BRYANT PKWY. EXTENSION PROJECT IN SALINE COUNTY, ARKANSAS

September 2020

Prepared by:

Flat Earth Archeology, LLC
117 Financial Drive
Cabot, AR 72023

Authored by:

Chris Branam, RPA

Chris M. Branam, RPA – Principal Investigator

For:

Garver
4701 Northshore Dr.
North Little Rock, AR 72118

Garver Project No. 16017140

F.E.A. PROJECT REPORT 2020-65

ABSTRACT

At the request of Garver and the City of Bryant, Flat Earth Archeology conducted a cultural resources survey for the proposed Bryant Parkway Extension (S) Alternative B roadway extension, in Bryant, Saline County, Arkansas. The Project Area surveyed on the roadway extension project consisted of four previously undisturbed segments totaling 1.75 miles (2,810 meters).

Flat Earth Archeology created shapefiles of the proposed Project Area utilizing the map provided by the Garver. These data were converted to KMZ files to facilitate the use on handheld electronic mapping devices. Personnel utilized these devices to maintain real-time location data, allowing the archeologists to accurately progress along each prescribed transect within the proposed Project Area. Flat Earth Archeology personnel investigated a total of 278 shovel tests locales within the proposed Project Area. Shovel test locales were investigated at a maximum of 20-m intervals along each transect during the pedestrian survey. All the soils from excavated shovel test locales were screened through ¼ inch hardware mesh. The above-ground and subsurface investigation proved negative for cultural materials.

A review of the AHPP geographic information system (GIS) National Register and Survey Database and the Automated Management of Archeological Site Data in Arkansas (AMASDA) database managed by the Arkansas Archeological Survey (ARAS) indicated there are no historic properties, as defined by 36 CFR 800.16(l)(1), within or proximal to the proposed Project Area.

A review of the AMASDA database produced three previously recorded archeological sites within a 1.6 km (1 mi) radius of the proposed Project Area, but none are within the direct APE of the Project Area.

Flat Earth Archeology conducted the investigation according to the standards prescribed in *A State Plan for the Conservation of Archeological Resources in Arkansas* (Davis, ed. 1994, amended 2010); USACE guidelines found in 33 CFR Part 325, Appendix C; and *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (National Park Service 1983).

In the event of an inadvertent discovery of human remains and/or burial furniture during subsequent development or modification of the Project Area, the proponent should follow the protocols outlined in Act 753 of 1991, as amended (Arkansas Grave Protection Act) and other applicable state and federal laws and regulations. If previously unrecorded buried cultural resources are encountered during project construction, all ground disturbing activities in this area should be halted and the site should be protected until cleared by the appropriate authorities.

Based on the results of the background research and survey, Flat Earth Archeology recommends that the proposed undertaking meets the criteria for a finding of No Historic Properties Affected as per 36 CFR 800.4(d)(1).

Table of Contents

List of Figures

List of Tables

INTRODUCTION

At the request of Garver and the City of Bryant, Flat Earth Archeology conducted a cultural resources survey for the proposed Bryant Parkway Extension (S) Alternative B roadway extension, in Bryant, Saline County, Arkansas (Figure 1). The Project Area surveyed on the roadway extension project consisted of four previously undisturbed segments totaling 1.75 miles (2,810 meters) (Figures 2 through 7). The Project Area corridor was 100 feet (30 meters) in width. The Project Area is situated in Sections 26, 34, and 35 of Township 1 South, Range 14 West and Section 3 of Township 2 South, Range 14 West.

A review of the AHPP GIS National Register and Survey Database and the AMASDA database managed by the ARAS indicated there are no historic properties, as defined by 36 CFR 800.16(l)(1), within or proximal to the proposed Project Area. A review of the AMASDA database produced three previously recorded archeological sites within a 1.6 km (1 mi) radius of the proposed Project Area, but none within the Project Area's Area of Potential Effect (APE).

Flat Earth Archeology conducted the investigation according to the standards prescribed in *A State Plan for the Conservation of Archeological Resources in Arkansas* (Davis, ed. 1994, amended 2010); USACE guidelines found in 33 CFR Part 325, Appendix C; and *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (National Park Service 1983).

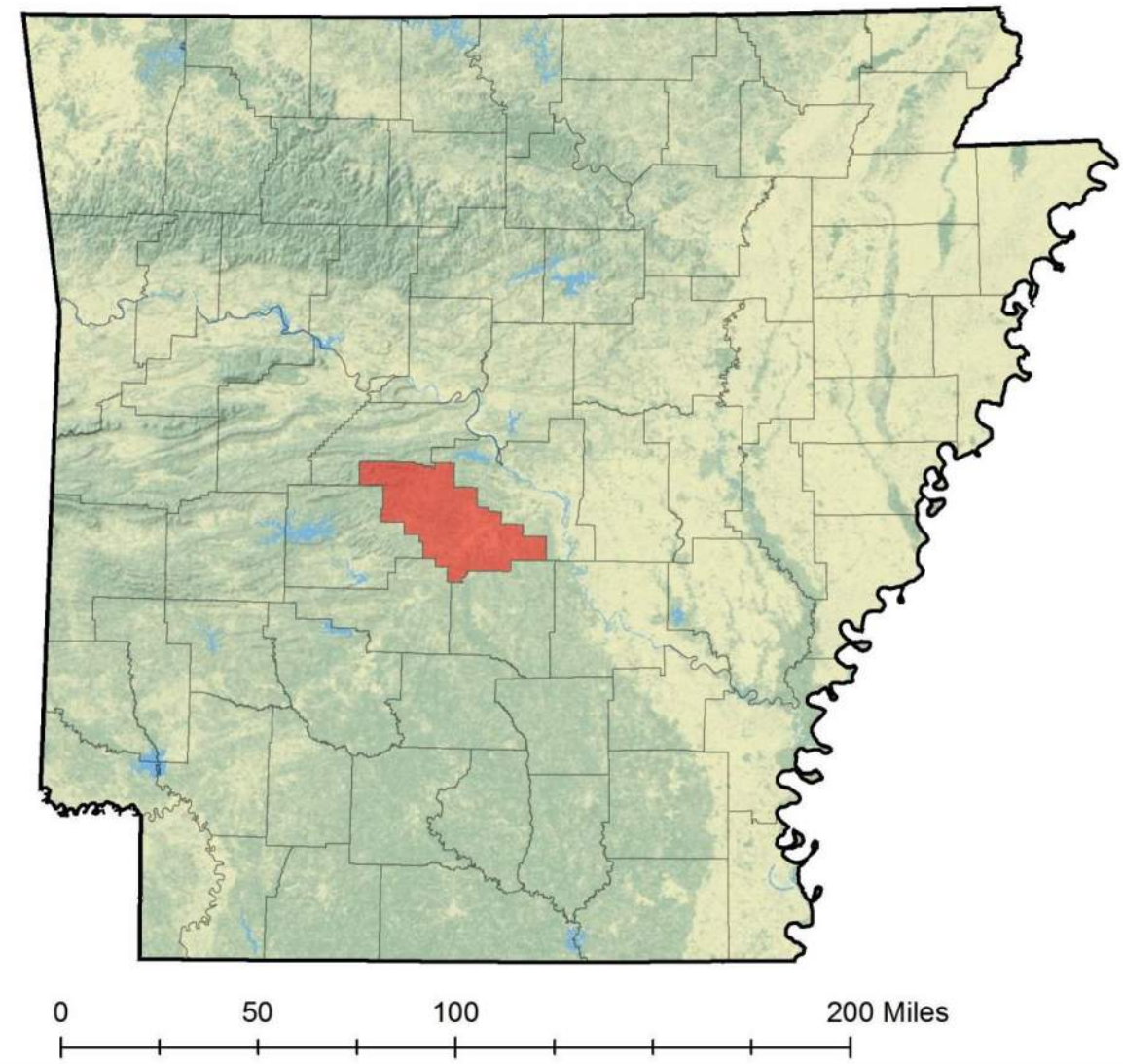


Figure 1. Saline County, Arkansas (highlighted in red)

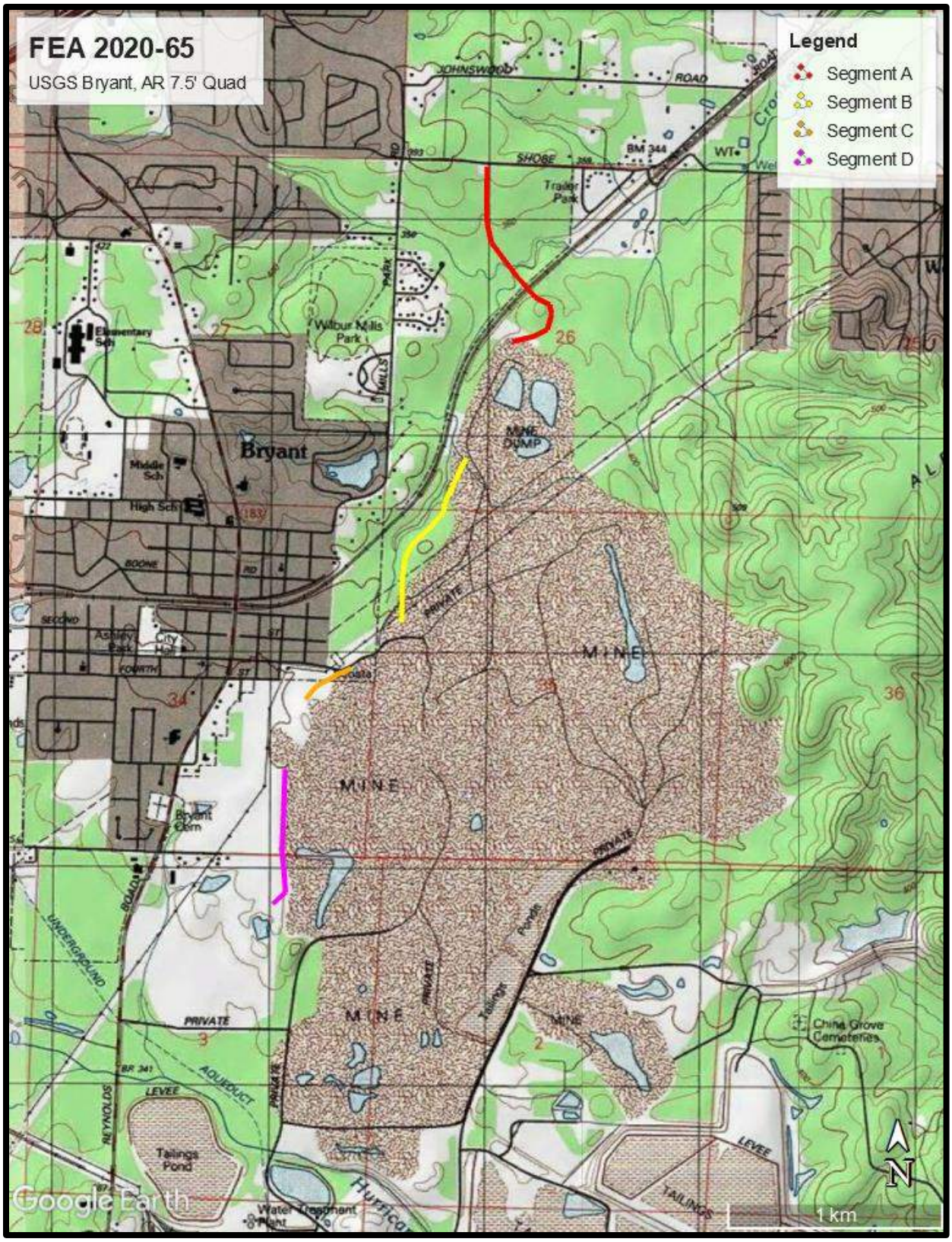


Figure 2. Project Area detailed on United States Geological Survey (USGS) Bryant, AR 7.5' Quadrangle Map (1 km scale)

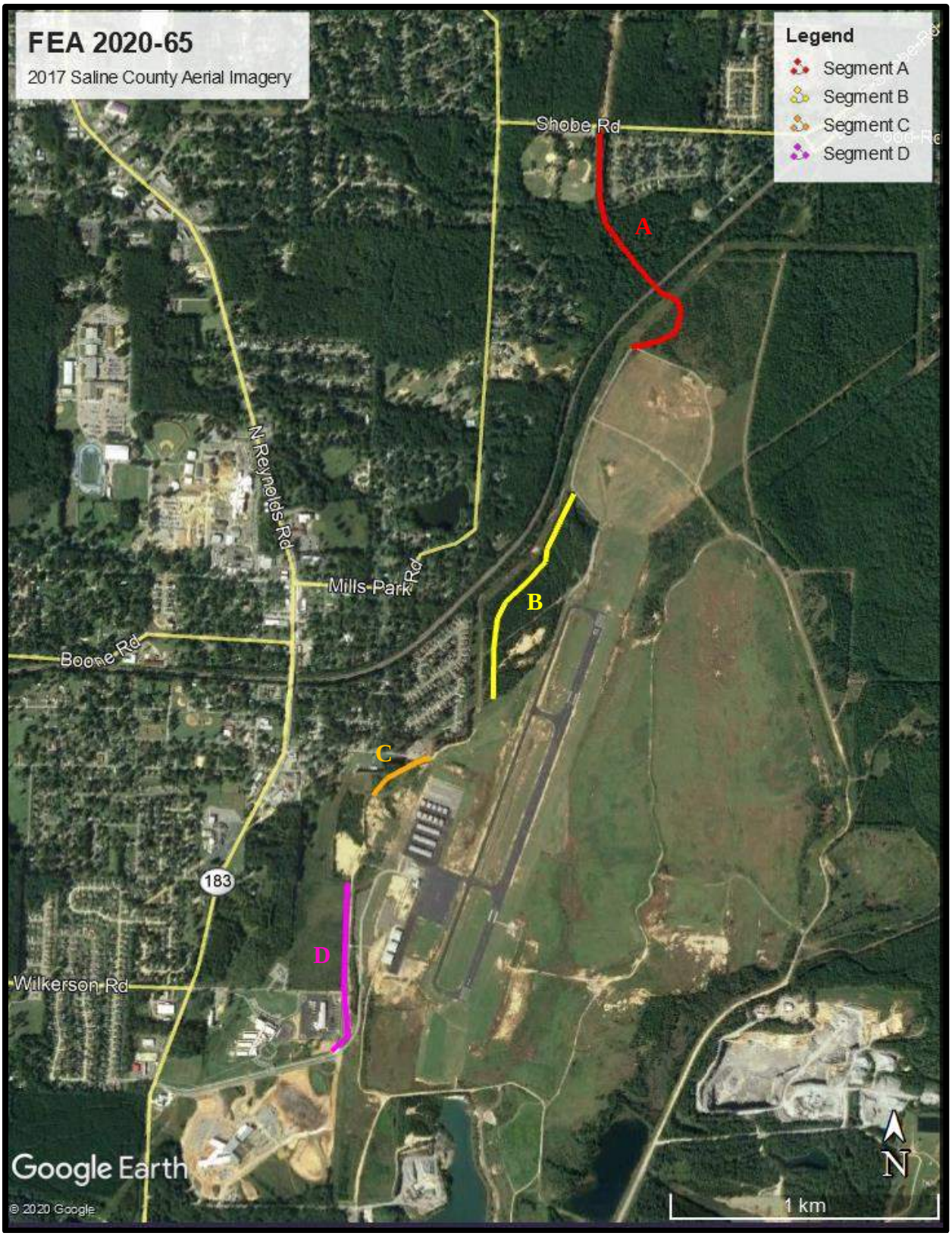


Figure 3. Proposed Development Area detailed on 2017 Aerial Imagery (l km scale)

Figure 4. Segment A of Project Area detailed on 2017 Aerial Imagery (400 m scale)

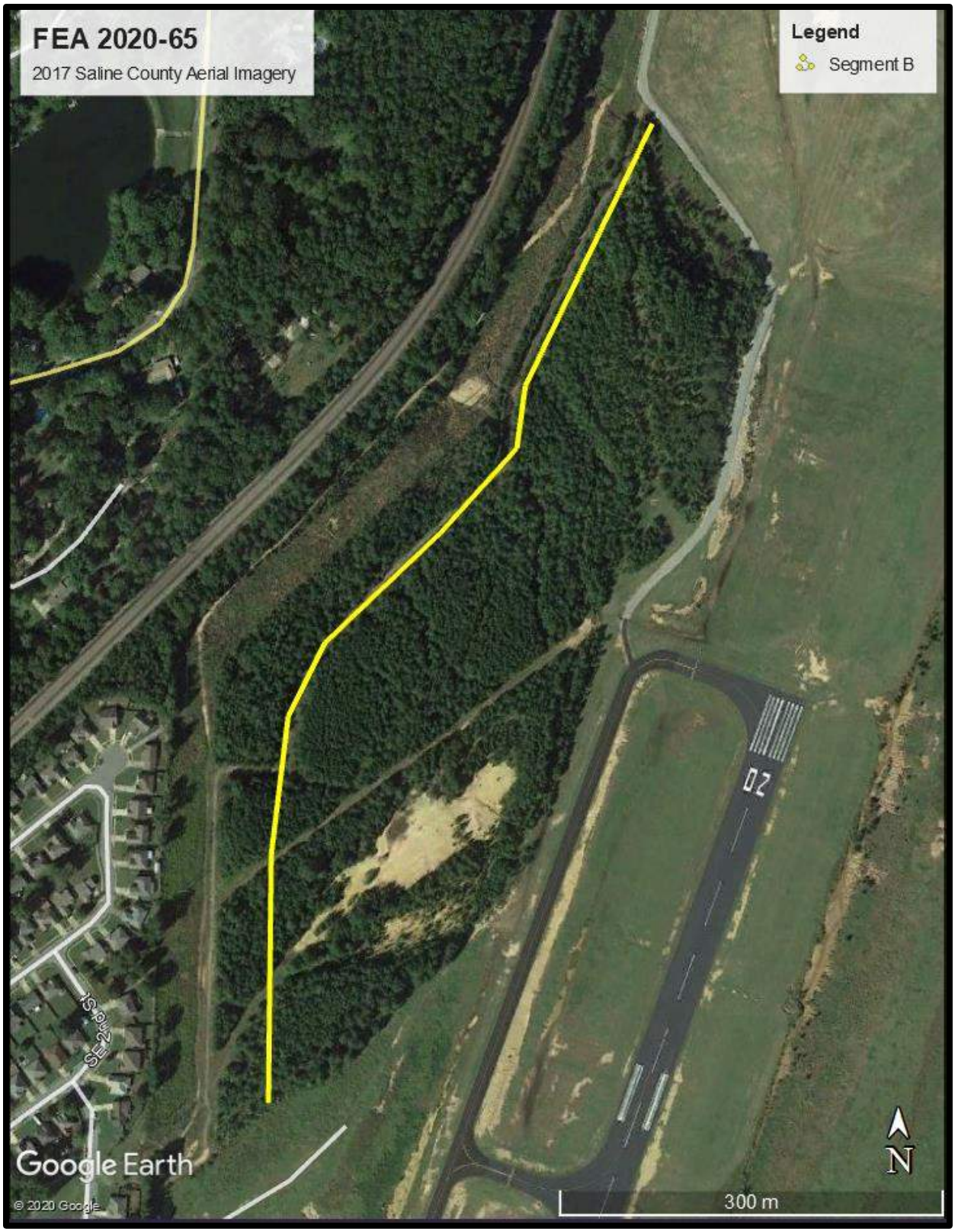


Figure 5. Segment B of Project Area detailed on 2017 Aerial Imagery (300 m scale)

Figure 6. Segment C of Project Area detailed on 2017 Aerial Imagery (200 m scale)

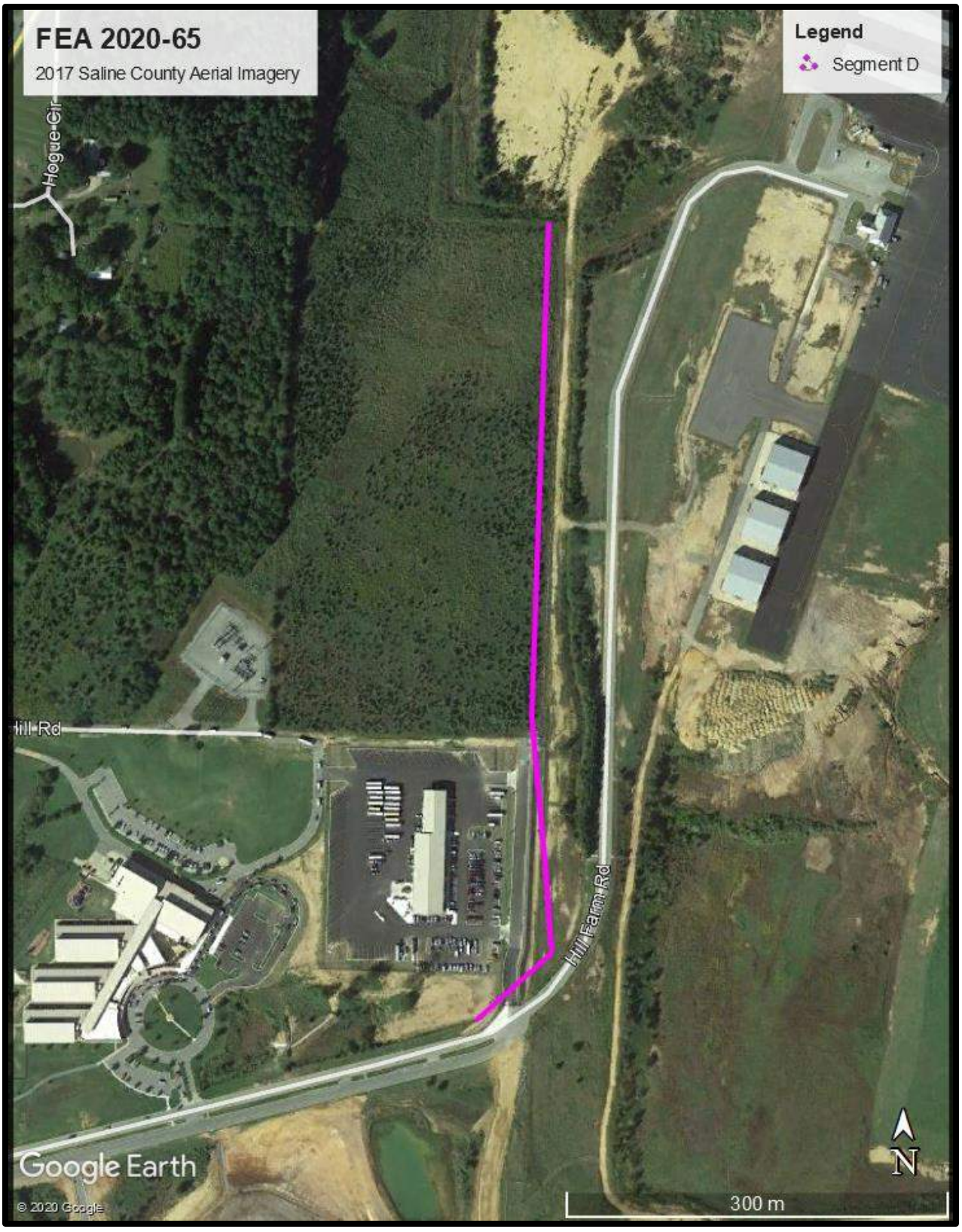


Figure 7. Segment D of Project Area detailed on 2017 Aerial Imagery (300 m scale)

ENVIRONMENTAL SETTING

Geographic Setting

The proposed Project Area lies within the Tertiary Uplands subdivision of the South Central Plains ecoregion (Environmental Protection Agency [EPA] 2014) (Figures 8 and 9).

> Ecoregion 35 is composed of rolling plains that are broken by nearly flat fluvial terraces, bottomlands, sandy low hills, and low cuestas; its terrain is unlike the much more rugged Ouachita Mountains (36) or the flatter, less dissected Mississippi Alluvial Plain (73). Uplands are underlain by poorly-consolidated, Tertiary- through Cretaceous-age, coastal plain deposits and marginal marine sediments (laid down as the Gulf of Mexico opened and North America's southern continental margin subsided). Bottomlands and terraces are veneered with Quaternary alluvium or windblown silt deposits (loess). The lithologic mosaic is distinct from the Paleozoic rocks of Ecoregion 36 and the strictly Quaternary deposits of Ecoregion 73. Potential natural vegetation is oak–hickory–pine forest on uplands and southern floodplain forest on bottomlands. Today, more than 75% of Ecoregion 35 remains wooded. Extensive commercial loblolly pine–shortleaf pine plantations occur. Lumber and pulpwood production, livestock grazing, and crawfish farming are major land uses. Cropland dominates the drained bottomlands of the Red River. Turbidity and total suspended solid concentrations are usually low except in the Red River. Summer flow in many small streams is limited or non-existent but enduring pools may occur. Fish communities typically have a limited proportion of sensitive species; sunfishes are dominant, and darters and minnows are common [Woods et al. 2004].
>
> The rolling Tertiary Uplands are dominated by commercial pine plantations that have replaced the native oak–hickory–pine forest. Ecoregion 35a is underlain by poorly-consolidated Tertiary sand, silt, and gravel; it lacks the Cretaceous, often calcareous rocks of Ecoregion 35d and the extensive Quaternary alluvium of Ecoregions 35b, 35g, and 73. Extensive forests dominated by loblolly and shortleaf pines grow on loamy, well-drained, thermic Ultisols; scattered, stunted, sandhill woodlands also occur. Waters tend to be stained by organics, thus lowering water clarity and increasing total organic carbon and biochemical oxygen demand levels. Most streams have a sandy substrate and a forest canopy. Many do not flow during the summer or early fall. However, in sandhills, spring-fed, perennial streams occur; here, total dissolved solids, total suspended solids, alkalinity, and hardness values are lower than elsewhere in Ecoregion 35. Water quality in forested basins is better than in pastureland. Oil production has lowered stream quality in the south. [Woods et al. 2004].

The Geologic Map of Arkansas (Figure 10) shows the proposed Project Area on the Midway Group and the Wilcox Group of the Tertiary period, Eocene Epic (United States Geological Survey [USGS] 2000).

> The Midway Group sequence exposed in Arkansas represents a marginal marine depositional environment. The lithologies include calcareous shale, arenaceous limestone, calcareous glauconitic sandstone, conglomerate, and light to very dark bluish-gray clay shale. The Midway Group interval is not normally divided into formations in Arkansas; however, various workers have indicated that it is possible to divide the unit into two formations: the lower Clayton Formation and the upper Porters Creek Formation. The Clayton Formation contains most of the calcareous and sandy lithologies, whereas the Porters Creek Formation is chiefly composed of shales and silty shales. The fossils of the Midway Group include a rich fauna of bivalves, gastropods, foraminifera, and ostracods with bryozoa, brachiopods, echinoids, crabs, fish, and crocodile teeth fossils also present. The lower boundary of the Midway Group is unconformable. The thickness ranges from a feather-edge to 130 feet on the outcrop; in the subsurface, the unit is usually much thicker [Arkansas Geological Survey (AGS) 2018].
>
> The Wilcox Group is a thick series of non-marine sands, silty sands, clays, and gravels with some thick deposits of lignite. In central Arkansas, bauxite is found at the base of the Wilcox near Cretaceous syenite knobs that were positive topographic features during Wilcox time. The sands are generally fine- to very fine-grained and light-gray when fresh. The clays are light-gray or brown and often sandy or silty. Frequently, either lithology will be dark brown to black when enough carbonaceous material is included. The lignites occur throughout the sequence, controlled by depositional environment rather than stratigraphic position. Some workers divide the Wilcox Group of Arkansas into three formations: the Berger, the Saline , and the Detonti Formations. Plant remains and trace fossils, associated with the lignites and lignitic clays, are the most common fossils present. The lower contact of the Wilcox is unconformable with the Midway Group and unconformities occur within the sequence. The thickness of the Wilcox Group ranges from a feather edge to as much as 1,025 feet with 850 feet often reported as average [Arkansas Geological Survey (AGS) 2018].

The immediate environment of the proposed Project Area is a mixed hardwood and softwood forest along the edge of a former mine and current airfield. The surrounding environment predominantly consists of areas of mixed hardwoods and softwoods, a municipal airport, and residential and commercial development. In the past, the area was a developed mining operation.

The soil types in the proposed Project Area are varies (see Figures 11 and 12) followed immediately by each soil type's description (Natural Resources Conservation Service [NRCS] 2020).

Climatic conditions in Saline County are characterized by hot summers, cool winters, and variable year-round precipitation. In the winter the average temperature is 41.8 degrees Fahrenheit with an average daily minimum of 29.3 degrees. In the summer the average high temperature is 78.7 degrees Fahrenheit with an average daily minimum temperature of 90.7 degrees. The annual precipitation is 53.18 inches, with the greatest amounts of rainfall occurring during April, May, and November (US Climate Data 2017).

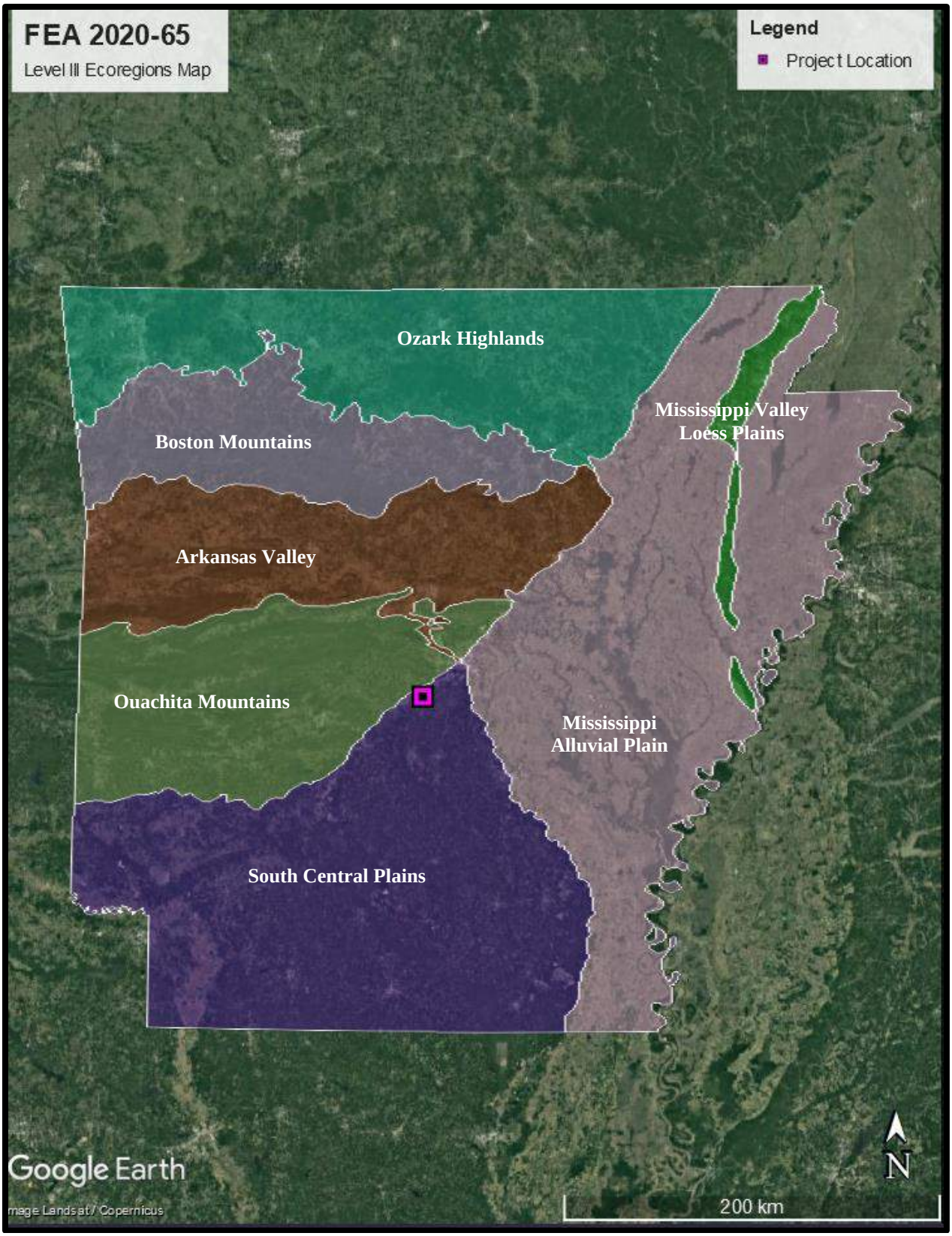


Figure 8. Proposed Project Area Location indicated on Level III Ecoregions map of Arkansas (EPA 2014)

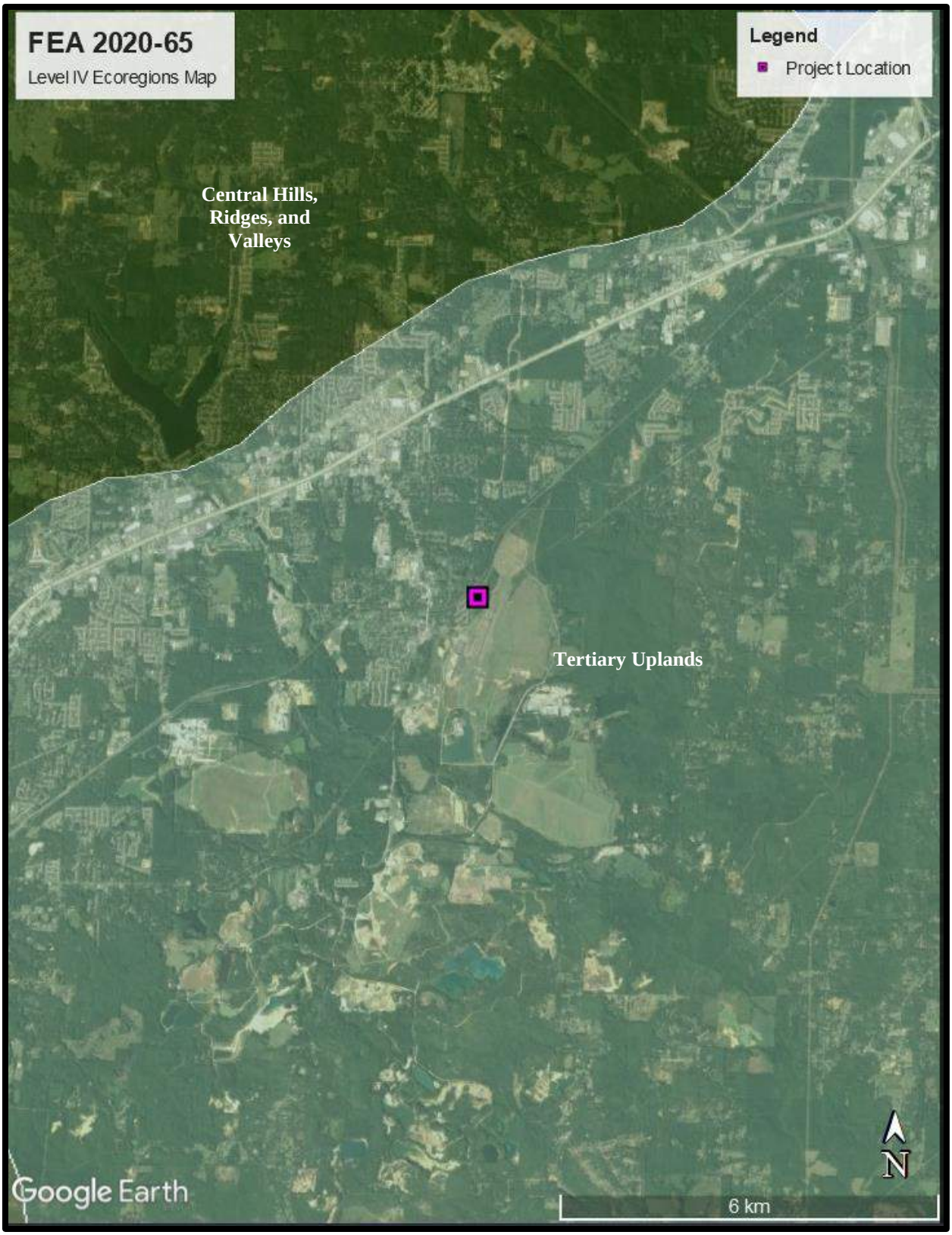


Figure 9. Proposed Project Area Location indicated on Level IV Ecoregions map of Arkansas (EPA 2014)

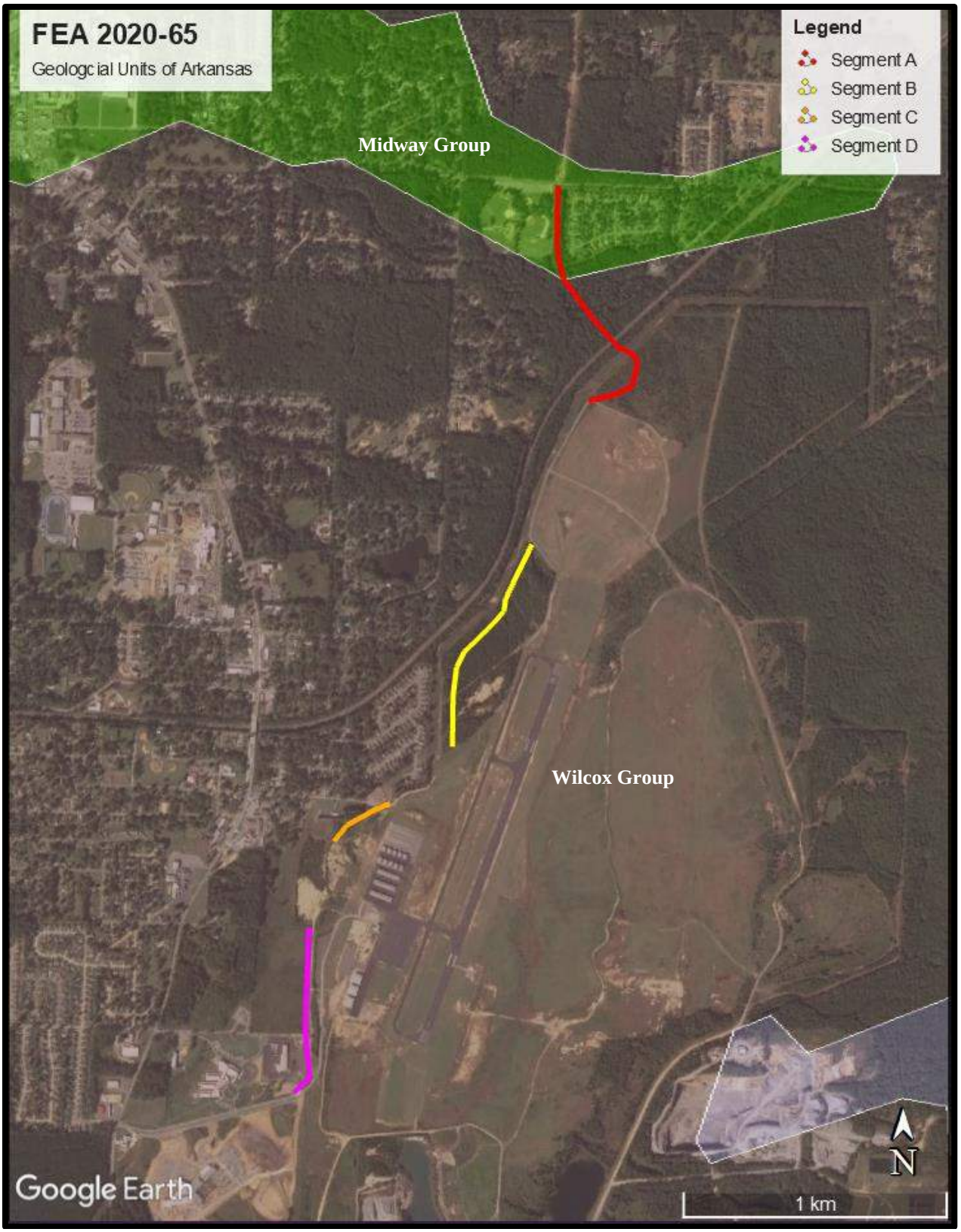


Figure 10. Proposed Project Area Location indicated on the Geologic Map of Arkansas (USGS 2000)

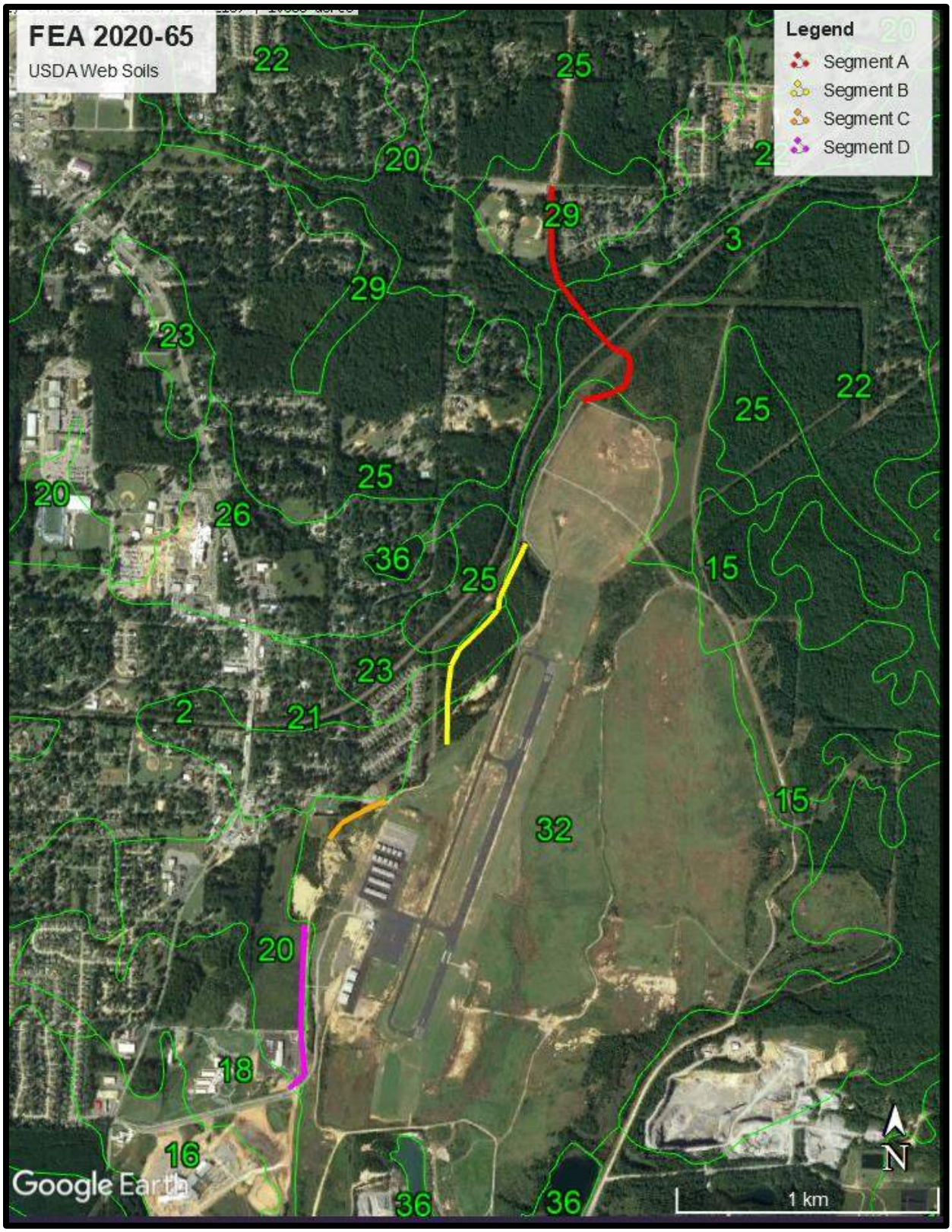


Figure 11. NRCS Soils Map detailing Proposed Project Area (NRCS 2020)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Amy silt loam, 0 to 1 percent slopes	8.9	12.0%
3	Amy silt loam, 0 to 1 percent slopes, frequently flooded	2.7	3.7%
20	Savannah fine sandy loam, 1 to 3 percent slopes	5.9	8.0%
22	Savannah fine sandy loam, 3 to 8 percent slopes	4.4	5.9%
23	Savannah-Urban land complex, 3 to 8 percent slopes	1.6	2.2%
25	Smithdale loamy sand, 3 to 8 percent slopes	7.4	10.0%
29	Tiak silt loam, 3 to 8 percent slopes	7.5	10.1%
32	Udorthents	35.5	48.1%
Totals for Area of Interest		**73.7**	**100.0%**

Figure 12. NRCS Soils Map Legend (NRCS 2020)

Soil Descriptions from NRCS Web Soils (NRCS 2020):

Map Unit: 2—Amy silt loam, 0 to 1 percent slopes

The Amy component makes up 95 percent of the map unit. Slopes are 0 to 1 percent. This component is on stream terraces, valleys. The parent material consists of Pleistocene Era silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F133BY017TX Loamy Bottomland ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map Unit: 3—Amy silt loam, 0 to 1 percent slopes, frequently flooded

The Amy component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on stream terraces, valleys. The parent material consists of Pleistocene Era silty alluvium derived from sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6

inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F133BY017TX Loamy Bottomland ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map Unit: 20—Savannah fine sandy loam, 1 to 3 percent slopes

The Savannah component makes up 95 percent of the map unit. Slopes are 1 to 3 percent. This component is on upland interfluves, coastal plains. The parent material consists of loamy marine deposits. Depth to a root restrictive layer, fragipan, is 16 to 32 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F133BY005TX Loamy Upland ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map Unit: 22—Savannah fine sandy loam, 3 to 8 percent slopes

The Savannah component makes up 95 percent of the map unit. Slopes are 3 to 8 percent. This component is on upland interfluves, coastal plains. The parent material consists of loamy marine deposits. Depth to a root restrictive layer, fragipan, is 16 to 32 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. This component is in the F133BY005TX Loamy Upland ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map Unit: 23—Savannah-Urban land complex, 3 to 8 percent slopes

The Savannah component makes up 60 percent of the map unit. Slopes are 3 to 8 percent. This component is on interfluves, coastal plains. The parent material consists of loamy marine deposits. Depth to a root restrictive layer, fragipan, is 28 to 36 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March. Organic matter content in the surface horizon is about 1 percent. This component is in the F133BY005TX Loamy Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 25—Smithdale loamy sand, 3 to 8 percent slopes

The Smithdale component makes up 100 percent of the map unit. Slopes are 3 to 8 percent. This component is on interfluves, coastal plains. The parent material consists of loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the F133BY005TX Loamy Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 29—Tiak silt loam, 3 to 8 percent slopes

The Tiak component makes up 100 percent of the map unit. Slopes are 3 to 8 percent. This component is on interfluves, coastal plains. The parent material consists of loamy and clayey marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during January, February, March, November, December. Organic matter content in the surface horizon is about 1 percent. This component is in the F133BY002TX Seasonally Wet Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: 32—Udorthents

The Udorthents component makes up 100 percent of the map unit. Slopes are 3 to 60 percent. This component is on interfluves, hills. The parent material consists of mine spoil or earthy fill. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Past Environment

Eighteen thousand years before present (BP), an ice sheet covering the northern half of North America (down to below the Great Lakes ~40 degrees north latitude) was one of several continental ice sheets that amassed amounts of water sufficient to lower oceanic levels by 100 – 200 meters below present. Air temperatures were 35 to 42 degrees Fahrenheit colder during summer and winter respectively. By 12,000 BP, the climate had begun to moderate, and ice fields and glaciers were beginning to recede, and by about 10,000 BP - at the end of the Pleistocene Epoch - a major climactic change from a glacial to an interglacial period began (Morin 1993:73).

From 18,000 to around 14,000 BP, vegetation patterns remained generally unchanged. The glaciers receded only slightly to around 40 – 42 degrees north latitude by 14,000 BP, and boreal forests consisting primarily of mixed species of spruce (white, black, and red) and some intrusions of oak bordered regions of tundra adjacent to glaciated areas (Morin 1993:76 - 78). Pines (jack/red) were possibly also present until prior to 14,000 BP, becoming extinct in the region thereafter. These forests extended down to approximately central Arkansas, and apparently persisted even further into the southern portion of the continent via the Mississippi Alluvial Plain prior to the Holocene Epoch. From below the boreal forest, mixed conifer and northern hardwoods persisted from 18,000 through 14,000 BP, when warming climactic changes including changes in jet-stream patterns began to hasten glacier recession and influence changes in ecosystems and associated biomasses. Possibly associated with the recession and general shrinkage of the ice-sheets and glaciers, the first major influx of human beings was beginning around this period. One theory is that the new arrivals entered the continent following herds of megafauna via the Bering Land Bridge, an area of land recently exposed by the shrinking ice fields (Miller 2001).

By 10,000 BP, glaciers had receded, and the bulk of southeastern North America had changed into evergreen forests with increases in oak and southern pine species that extended up to deciduous forests. Mixed conifer/hardwood forests transitioned around 40 degrees north latitude. By 6,000 BP, most of the ice sheets had receded to or were approaching northerly limits roughly in the area they occupy today, and northern pine species had become dominant in the mixed conifer forests north of northern Arkansas. Southern species of pine became dominant in the southeastern evergreen forests by 6000 BP (Miller 2001).

When humans entered the region, about 12,000 BP, the last ice age was nearing its end, and boreal forests may have covered much of the region. A gradual warming trend resulted in more temperate forests. By 5,000 BP, conditions had become so warm and dry that grasslands and prairie environments may have been present throughout much of the state. This interval of warmer, drier weather is known as the Hypsithermal. The modern climate is thought to have begun developing about 4,000 years ago resulting in the evolution of the current forest types. These climatic changes and their resulting effects on the floral and faunal communities had a direct bearing on human adaptation in the region. This is clearly reflected in the diversity and range of artifact assemblages contained in the region’s rich archeological record (Miller 2001).

BRIEF CULTURAL HISTORY

The cultural periods represented in this region generally the same as those in the Southeastern United States (i.e. Paleo-Indian, Dalton, Archaic, Woodland, and Mississippian). In this region, particularly along waterways, aboriginal occupation dates from at least 12,000 B.C. to the contact period. Later occupants in the Project Area were probably members of the Quapaw, Caddo, and Osage peoples who lived in southern Arkansas at the time early European explores journeyed west of the Mississippi River.

Paleo-Indian period (ca. 12,000-8500 B.C.)

The earliest evidence of prehistoric occupation in this region is distinct, lanceolate-shaped, fluted projectile points (Clovis, Folsom, and Plano). These artifacts have been identified at several sites in the Ouachita Mountains and Western Coastal Plain regions. Most have been located on promontories or terraces overlooking alluvial river bottomlands (Schambach and Early 1982:SW34). Paleo artifacts have been found at the site of Blakely Mountain Dam 3GA14) on the Ouachita River. No in situ Paleo-Indian sites have been found in this region, although Taylor (1975) suggests that the meandering streams and narrow valleys, such as those of the Ouachita and Caddo Rivers, have depositional histories suitable for the burial of sites of this period.

In other parts of North America, Paleo-Indian points have been found in association with the remains of mammoth, mastodon, giant sloth, and an extinct form of bison. Small groups of people likely moved seasonally to exploit plants and animals. Environmental conditions during the Paleo-Indian period were different from that of today. Martin and Martin (1984) stated that some of the conditions do not have close modern analogs. In general, non-glaciated regions exhibited cooler summers and warmer winters. Almost all of unglaciated North America was forested.

Dalton period (ca. 8500-7500 B.C.)

The Dalton period is considered transitional between the Paleo-Indian and Archaic periods. Sites are distinguished by woodworking tools (i.e. adzes) and a distinct form of projectile point known as the Dalton point. During this period, the megafauna of the Pleistocene were extinct and people engaged in hunting and collecting wild plant foods by utilizing a strategy that adapted to the emerging post-glacial, early Holocene environment. The climate continued to become more moderate as the glaciers receded. Deciduous trees expanded in range, and prairies with grasses replaced the forested areas as temperatures warmed. Dalton projectile points have been found on sites in this region, although they are rare. As is the case with Paleo-Indian artifacts, they are generally surface or isolated finds. Test excavations at Site 3PL340 in the Shady Lake Recreation Area indicated a Dalton component, but the excavated portion of the site was completely deflated.

Archaic period (ca. 8000-500 BC)

The Archaic period can be broken into three subdivisions, the Early Archaic (8000-6000 B.C.); the Middle Archaic (6000-3000 B.C.); and the Late Archaic (3000-500 B.C.). Overall the Archaic period was a time when people still depended on hunting and gathering subsistence strategies, but

projectile point forms changed considerably. In additional site sizes and densities suggest that local populations increased and a more sedentary lifestyle was evolving.

Information regarding Early Archaic occupations in this area is extremely limited. During this time, climatic conditions coincided with the Hypsithermal warming trend (Sabo and Early 1988:55; and Wyckoff 1984:134). Grassland plant communities expanded, while the range of forest species was greatly reduced. Animal species that were common are similar to modern Plains-adapted species such as bison, pronghorn antelope, prairie chicken, and ground squirrel (Sabo and Early 1988:53). Although environmental and geomorphic changes occurred in this region, the nature of these changes is poorly understood. It is also unclear how humans acted in response to these environmental changes. The Hypsithermal warming trend continued and reached its peak during the Middle Archaic period. Evidence of Middle Archaic occupations in this region is limited. Stemmed and notched projectile points such as Johnson, Big Sandy, Frio, Ellis, Edgewood, and Rice lobed have been found in this region, but "there is not a material assemblage or pattern of site distribution that clearly defines any of these hypothetical cultural systems" (Schambach and Early 1982:SW48). Middle Archaic artifacts have generally been found as surface occurrences or in deposits mixed with younger cultural materials (Sabo and Early 1988:55). There may have been increased habitation near larger rivers where the lowland forests remained more stable and the effects of climatic change were buffered (Sabo and Early 1988).

During the Late Archaic period, climatic conditions began to warm until they approximated modern levels. In this region the return to a forested, riverine environment may have been slower than in some other areas (Sabo and Early 1988:64). Much information about this period is lacking. Schambach and Early (1982:SW60) suggest that this may be the result of a population decline during this period. Six sites near the Fancy Hill barite mining district were tested in 1979, and Late Archaic occupations are represented at five of these sites. These sites are located on a variety of landforms, and three site types were identified: 1) upland hunting stations; 2) upland hunting camps; and 3) stream valley hunting camps. Based on these investigations, a settlement/subsistence model was proposed that included seasonal use of upland and lowland resources.

Few sites have been tested and consequently archeologists are only beginning to understand site distribution and use. The Rocky Shoals Site (3MN1708) displayed thin deposits, thirteen prehistoric features, and diagnostic tools. Research at this site indicated that the site was multi-component with lithics dating from the Archaic through the Mississippi periods. At this site, fire-cracked rock (FCR) features were identified along with food processing tolls such as manos, grinding slabs, and a chopping tool. Estimates for depositional rates were hypothesized based on the intermittent use of the landform and the datable artifacts and features. After the occupation responsible for the FCR feature, the lack of sedimentation indicated landform stability. This observation was hypothesized to correspond to a return to mesic climatic conditions similar to today and the last 3000 years. Cooking features became smaller through time and may correspond to a decrease in food processing, perhaps indicating a shift in exploitation. Short-term occupations were represented by alternating episodes of hearth construction, disuse, and recycling.

One site from which there is reliable information regarding the Late Archaic period in this region is the Standridge site. Late Archaic artifacts from Standridge include Bulverde, Donaldson,

Yarborough, and Gary points; along with lithic debris and sandstone cobbles. Early (1988:157) states that the lithic artifacts found and the absence of recognizable Archaic features (i.e. pits and hearths) suggest:

> "…the Archaic period occupation(s) were transient encampments related to hunting and the collection and transport of novaculite from quarries in the surrounding mountains. The association of these non-diagnostic lithics with Archaic activities is only tentative; however, because succeeding Woodland period occupations are closely intermixed with, and immediately overlying, the Archaic materials."

It is probable that although social groupings were more complex than earlier periods, band levels of social integration persisted throughout the Archaic period. Studies suggest the band divided into several family units for hunting and foraging activities. The scarcity of artifacts on Archaic period sites in this region suggests that very small groups, consisting perhaps of small families or a few individuals, stopped temporarily while hunting or foraging at these encampment sites.

Woodland period (ca. 500 B.C. – A.D. 1000)

The Woodland period shows significant cultural elaborations in southeastern North America. Innovations included the development of refined ceramic vessels, the appearance of burial mounds, the introduction of the bow and arrow, the beginnings of long distance trade and exchange of raw materials and exotic goods, and the domestication of native and tropical plants (Schambach and Early 1982). The principal Late Woodland period culture in this region is known as Fourche Maline. Spears et al. (1993:13) wrote:

> Fourche Maline cultural traits were established and well defined by deposits at sites in southwestern Arkansas (Schambach 1982). Sites of this period have dark, organic middens that developed due to increased sedentism. The ceramic industry is characterized by thick-walled, u-shaped decorated bowls and jars with bone, clay, or grit tempering agents (Schambach and Early 1982:SW38). Stone tools include contracting stem Gary points, single and double bitted chipped axes, ground and polished boat stones, pitted cobbles, and siltstone hoes. Arrow point technologies are not associated with this period. The Fourche Maline culture was an important transitional link between hunter-gatherer foragers of the Archaic period with the more agriculturally oriented Mississippi period (Schambach 1982).

Other important distinctions of Fourche Maline sites are mortuary practices and village size, which includes "cremation burials, burial mounds, evidence of a concept of honored dead, burial of most of the dead in the village middens in flexed or extended positions in shallow graves with few or no offerings, and small villages generally covering 0.8 to 2.0 hectares" (Schambach 1982:133). There does not appear to be a great difference between the Archaic adaptations and Fourche Maline middens in terms of subsistence patterns. "There is no direct evidence of gardening in the form of charred domesticated plant or seed remains . . . deer, fish, small mammals, birds, turtles, and mollusks contributed meat to the diet, and nuts; particularly hickory, were also consumed" (Sabo and Early 1988:75). By the end of the Woodland period (ca. A.D. 1000), essentially modern climatic conditions prevailed although fluctuations continued to occur. This region probably

exhibited the same distribution of trees, plants, and animals during this period as was visible before areas were cleared for agriculture and lumbering.

Mississippi period (ca. A.D. 1000-1500)

In the Mississippi period some cultural patterns that emerged during the Late Woodland period continued and were elaborated upon. In many regions of southeastern North America, large civic-ceremonial mound centers were surrounded by dispersed hamlets and farmsteads. Elite consumption of sumptuary goods, hierarchical settlement patterning, and burial patterns indicate a ranked social structure; perhaps with inherited authority or political power. The subsistence was based primarily on maize agriculture, although there was still a dependence on the hunting of game and the collection of wild plants for food. Native cultigens, such as goosefoot, sumpweed, and sunflower were part of the regular diet. Recovery of organic remains from archeological sites reveals that nuts, deer, turkey, raccoon, fish, and waterfowl were exploited. Pottery was generally tempered with crushed mussel shell, which permitted the production of thinner-walled vessels than the earlier periods' grog or sand-tempered pottery. Sabo and Early state, "new vessel forms appear in the shape of bottles and carinated bowls, and red filming as a surface treatment is noted" (1988:105). These vessel forms are extremely prevalent in mortuary assemblages. Decorative techniques on ceramics became varied, and include incising, engraving, burnishing, and brushing.

In southwestern Arkansas, the Mississippi period is represented by the Caddo I-V cultural units (Schambach and Early 1982). People lived in small dispersed farms or hamlets, and several such hamlets were affiliated with a ceremonial center exhibiting one or more mounds. These people continued to focus on the exploitation of a wide variety of wild plants, but they were also maize agriculturalists. Bioarcheological data from sites in the nearby Middle Ouachita Mountains indicates that the ". . . Caddo were full blown agriculturalists with a large portion of their diet constructed of maize, indicated not only by the high caries rates but also by the presence of maize" (Burnett 1988:149).

For millennia, the Caddo people occupied the Red River valley of southwestern Arkansas, northwestern Louisiana, northeastern Texas, and southeastern, Oklahoma (Figure 12). Caddo ancestral populations settled permanent villages in the area circa 500 BCE; they cultivated plants, built mounds, and began to manufacture and use ceramics (Perttula, Lee, and Cast 2008: 81). This ancestral homeland spanned an area of some 180,000 square kilometers (Cast, Gonzalez, Perttula 2010:7).

In the 1500s, European contact with Native American cultural groups marked the end of the precontact period. The Spanish members of the Hernando de Soto expedition found vibrant Caddo communities in southwest Arkansas and eastern Texas in the 1540s. The Caddo survived their encounter with the expedition and continued to live in southwest Arkansas with their cultural traditions intact until the next phase of European contact. In the last century before French settlers established the Louisiana colony, Caddo society was intact. Some communities were still building and using mounds; other traditions such as pottery making were at their most sophisticated and successful. In the Ouachita River valley, Caddo farmers were making salt up to 1700, when they migrated south out of the valley. The Kadohadacho Caddo and their neighbors along the Red River

continued to live in their traditional villages near Texarkana (Miller County) until 1790. What is now southeastern Arkansas was under the control of the Quapaw and Osage when Europeans first arrived in the area.

Figure 13. Detail of 1821 map showing Indian Reservations west of the Mississippi between the Red and Missouri Rivers (Chief of Engineers 1821)

Caddo Nation

Schambach (2002: 91) casts the Woodland period Fourche Maline culture, which arose between 1,000 and 500 BCE, as the predecessor to the circa 800 CE Caddo in the Trans-Mississippi South. One unsolved problem confounding this chronology is the inconsistency between Fourche Maline and Caddo burial traditions. The exceptional complexes of the Early Mississippi Caddo, typified by deep tombs and evidence of social stratification with pottery, textiles, celts, bows, and prestige goods, do not appear to be a continuation of a tradition from the preceding and relatively inconspicuous Fourche Maline. Schambach came to the conclusion that the evidence does not support a contention that one evolved into the other. Sometime toward the end of the first millennium CE., the Fourche Maline practices in the region ceased and the early Caddo practice, typified by Mound C at Crenshaw arose (Schambach 2002: 111-112).

Girard et al. (2014: 131-132) stress the distinction between people living in what they term the Caddo Area and other Mississippian cultures to the east. Aside from the Spiro site in eastern Oklahoma, there appear to be few links between the Caddo and the Southeastern Ceremonial Complex. There is an even greater contrast with the Southern Plains cultures to the west of the Caddo homeland (Girard et al. 2014: 131-132).

From the tenth to the eighteenth century, the Caddo enjoyed a cultural continuity bound by distinct mortuary practices, settlement patterns, and developmental sequences. However, the archeological record indicates a dynamic and complex cultural landscape that included interactions with cultures to the east and west. Nevertheless, the Caddo lived on the margin of the Eastern Woodlands, and warfare, population displacement, and late historic period cultural collapse are some of the defining Mississippian events that did not affect the Caddo (Girard et al. 2014: 132).

When the de Soto expedition traversed the region in 1542, Caddo communities existed along the Red, Sabine, Ouachita, Neches, Trinity, and Brazos Rivers (Caddo Nation 2016). Seventeenth and eighteenth century descriptions of the Caddo recount people living near the Red River Valley in the four-state area. There were three confederations of the Caddo: the Hasinai of east Texas, the Kadohadacho from the Great Bend area of the Red River, and the Natchitoches in northwest Louisiana. The confederations spoke different dialects and exhibited differences in ritual and material culture (Girard et al. 2014: 1).

In the early historic period, the Caddo people's primary European interaction was with French colonials. The French maintained diplomatic, commercial, and personal relations with the Caddo. In 1783, Spain took control of the Louisiana colony and maintained a relatively good relationship with the Caddo, using the French system as a model (Lee 2014). The Caddo maintained a substantial level of influence among the French and Spanish colonials, building alliances that strengthened them against invading Osage and facilitated trade. The Hasinai lived in the southern Spanish territory that would become Mexico. The Kadohadacho to the north became the focus of the United States as a regional ally (Meredith 2009).

After a brief return to French control in 1800, the territory came under the aegis of the United States after the Louisiana Purchase in 1803. Within five years, thousands of American settlers had moved in the territory; they cleared land, built sugar and cotton plantations, and maintained a thriving slave trade. In time, the American settlers recognized the agricultural promise of the Caddo homeland in the Red River valley. This led to increasing pressure, marginalization of the Caddo, and ultimately, removal (Lee 2014).

> Bounded on the west by the north and south line which separates the said United States from the Republic of Mexico, between the Sabine and Red rivers wheresoever the same shall be defined and acknowledged to be by the two governments. On the north and east by the Red river from the point where the said north and south boundary line shall intersect the Red river whether it be in the Territory of Arkansas or the State of Louisiana, following the meanders of the said river down to its junction with the Pascagoula bayou. On the south by the said Pascagoula bayou to its junction with the Bayou Pierre, by said bayou to its junction with Bayou Wallace, by said bayou and Lake Wallace to the mouth of the Cypress bayou thence up said bayou to the point of its intersection with the first mentioned north and south line following the meanders of the said water- courses: But if the said Cypress bayou be not clearly definable so far then from a point which shall be definable by a line due west till it intersects the said first mentioned north and south boundary line, be the content of land within said boundaries more or less (Kappler 1904).

As per the conditions of Article 2 of the Treaty, the Caddo removed at their own expense within a year beyond the boundaries of the United States and territories and to "never more return to settle or establish themselves as a nation tribe or community of people within the same." The agreement stipulated the Caddo Indians receive thirty thousand dollars in goods and horses upon the signing, ten thousand dollars "within one year from the first day of September next" and ten thousand dollars per year for the following four years, for a total sum of eighty thousand dollars (Kappler 1904).

In 1845, The Kadohadacho and Hasinai confederacies moved to the Brazos Reservation in the western part of the state of Texas. The Texas Revolution added additional adversity after the removal to the Texas province of Mexico. In 1859, the tribe removed again to Indian Territory, a relocation that was again soon complicated by conflict, the American Civil War. During Reconstruction, the Caddo lived on a reservation between the Canadian and Washita Rivers; they received federal trust land in 1902. The passage of the Indian Welfare Act in 1936 allowed for the Caddo confederacies to coalesce as the Caddo Tribe of Oklahoma in 1938 (Meredith 2009).

In 1938 the tribe adopted the Constitution for the Caddo Indians of Oklahoma and became an established government. Eight members compose the Tribal Council. The representatives come from four districts based on population of Caddo people. Representatives advocate for their constituencies and contribute to decisions that affect the entire tribe. The Caddo Nation maintains national headquarters in Binger, Oklahoma (Caddo Nation 2016).

Choctaw Nation of Oklahoma

The Choctaw ancestral homeland is in Mississippi and some sections of Alabama. European accounts from the seventeenth century place the locus in modern day Kemper, Lauderdale, and Neshoba Counties in the east-central section of Mississippi. However, the settlement appears to have covered a much larger area that includes Clarke, Jasper, Newton, and Wayne Counties. At the time of contact with Europeans, the Choctaw were among the largest of the southeast Native American societies (Voss and Blitz 1988: 125-127).

The Choctaw are likely descendants of the Mississippian chiefdoms that controlled the southeast from the tenth to sixteenth centuries. Although the de Soto expedition made cursory contact with Mississippian cultures in 1540-41, noting their complexity and hierarchical elements, the first sustained interaction did not occur until French colonization of the region in the seventeenth century. By that time, the Mississippian city-states had collapsed, resulting in what some believe may have been a coalescing of chiefdoms and the formation of the Choctaw tribe (Lambert 2007: 21; Hinton et al. 2014).

The history of the tribe's presence in western Arkansas and Oklahoma extends from 1820 and the signing of the Treaty of Doak's Stand on the Natchez Road. Under the terms of the agreement, the Choctaw ceded "for a small part of their land here [Mississippi], a country beyond the Mississippi River, where all. who live by hunting and will not work, may be collected and settled together" (Kidwell 2009; Kappler 1904a). The treaty described the ceded tract as follows:

> Beginning on the Choctaw boundary, East of Pearl River, at a point due South of the White Oak spring, on the old Indian path; thence north to said spring; thence northwardly to a black oak, standing on the Natchez road, about forty poles eastwardly from Doake's fence, marked A. J. and blazed, with two large pines and a black oak standing near thereto, and marked as pointers; thence a straight line to the head of Black Creek, or Bouge Loosa; thence down Black Creek or Bouge Loosa to a small Lake; thence a direct course, so as to strike the Mississippi one mile below the mouth of the Arkansas River; thence down the Mississippi to our boundary; thence around and along the same to the beginning (Kappler 1904a).

In 1830, the Treaty of Dancing Rabbit Creek ceded the remaining Choctaw lands in Mississippi as well as reservation land in western Arkansas to the United States (Littlefield and Parins 2011: 244; Kappler 1904b). The Treaty described the conveyed lands in Indian Territory as follows:

> The United States under a grant specially to be made by the President of the U.S. shall cause to be conveyed to the Choctaw Nation a tract of country west of the Mississippi River, in fee simple to them and their descendants, to inure to them while they shall exist as a nation and live on it, beginning near Fort Smith where the Arkansas boundary crosses the Arkansas River, running thence to the source of the Canadian fork; if in the limits of the United States, or to those limits; thence due south to Red River, and down Red River to the west boundary of the Territory of Arkansas; thence north along that line to the beginning. The boundary of the same to be agreeably to the Treaty made and concluded at Washington City in the year 1825. The grant to be executed as soon as the present Treaty shall be ratified (Kappler 1904b).

Following its signing, the Choctaw removal to Indian Territory would take place over the next three years as stipulated in the treaty which stated, "that as many as possible of their people not exceeding one half of the whole number, shall depart during the falls of 1831 and 1832; the residue to follow during the succeeding fall of 1833" (Kappler 1904b; Horne 2006). During the first year of removals, a number of Choctaw parties were supervised by private contractors; but, the United States Army would later supervise the removal of the parties (Horne 2006). The close quarters of the removal parties endured by the Choctaw caused the outbreak of numerous communicable diseases to intensify (Foreman 1972:76-78).

Throughout the late 1830s and 1840s, after the termination of the provisions of the Treaty of 1830, small parties of Choctaw people continued to remove to Indian Territory (Horne 2006). Between March 23 and May 12, 1838, Captain S.T. Cross travelled with a party of 177 Choctaw people, largely via the Arkansas River. From 1845 to 1847, more than 4,000 Choctaw removed from their homeland. Smaller parties followed over the next few years (Horne 2006). Figure 14 shows lands ceded by and to the Choctaw Nation in Arkansas and Indian Territory. In June 1984, the Choctaw Nation adopted a constitution that provides for a tri-branch system that includes a balance of power between executive, legislative, and judicial branches. At the turn of the twenty-first century, tribal enrollment totaled approximately 127,000. The Choctaw Nation maintains on-going and significant programs promoting Choctaw language, heritage, and traditions. Tribal national headquarters are in Durant, Oklahoma (Choctaw Nation 2016; Kidwell 2009).

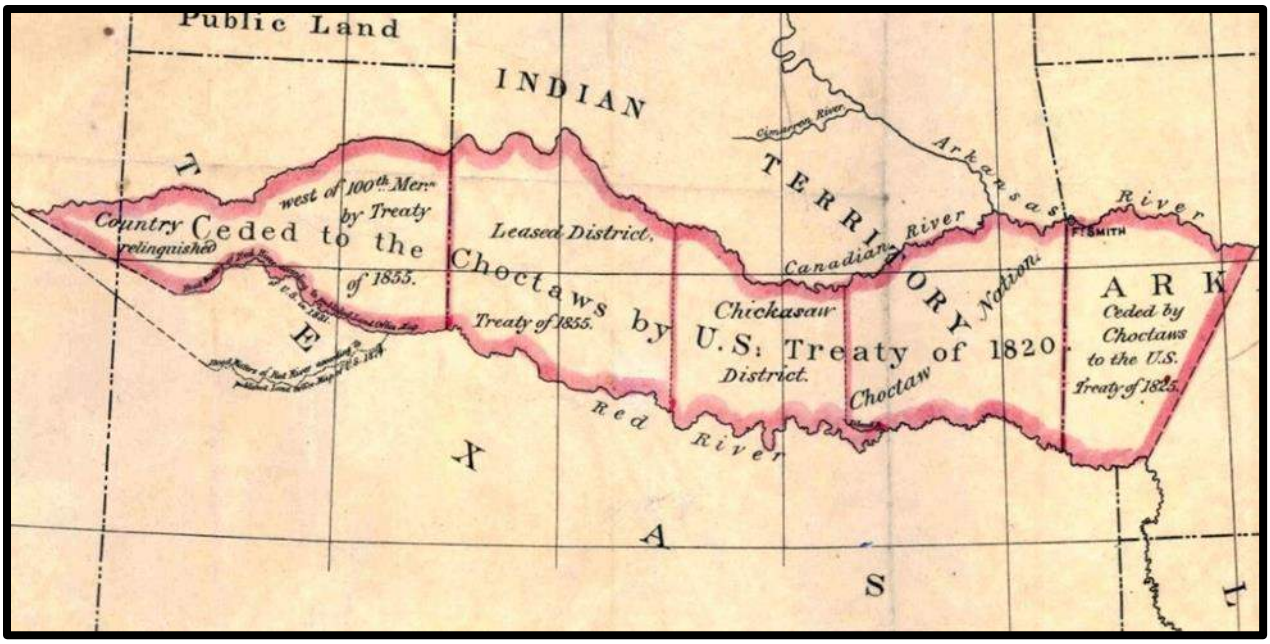


Figure 14**.** Detail of 1882 Map of Land Ceded by and to the Choctaw Nation (U.S. General Land Office 1882)

The Mississippi Band of Choctaw Indians

The following brief tribal history is from "Mississippi Band of Choctaw Indians," an entry by the Florida Department of Transportation (2019) on the *Florida Department of Transportation* website.

> The Choctaw are part of the Muskhogean linguistic family which includes Creek, Chickasaw, Seminole, Apalachi, and other smaller groups. There are currently more than 9,100 enrolled members of the Mississippi Choctaw. Ancestral lands of the Mississippi Choctaw included present day Mississippi, Alabama, and the western Florida panhandle. The Mississippi Choctaw reservation contains some 35,000 acres of tribal lands located in ten different Mississippi counties.
>
> There are seven officially recognized communities within the tribe which include the Pearl River, Red Water, Bogue Chitto, Standing Pine, Tucker, Conehatta, and Bogue Homa communities. The Pearl River community is the largest and is the site of the Mississippi Choctaw government headquarters. The Mississippi Choctaw government structure has been in place since 1943 when a tribal constitution was ratified and a representative, democratic form of government was established with equal representation among all seven Mississippi Choctaw communities. The tribe was federally recognized in 1945.
>
> The Mississippi Band of Choctaw Indians have the largest unified Indian K-12 school system in the United States. Additional information on the Mississippi Band of Choctaw Indians is available on their website: http://www.choctaw.org/.

Osage Nation

The Kaw, Omaha, Osage, Ponca, and Quapaw, a Dhegiha-Siouan division of the Hopewell cultures, originally lived together as one people in the lower Ohio River Valley (Dorsey 1886; Hunter et al. 2013). During the Middle Woodland period, circa A.D. 200 to A.D. 600, the group travelled west toward the confluence of the Mississippi and Ohio Rivers. During the Late Woodland Period, A.D. 600 to A.D. 900, the Quapaw continued down the Mississippi to the confluence with the Arkansas River while the Kaw, Osage, Ponca, and Omaha moved through the Mississippi River Valley to the St. Louis area as well as various river drainages in parts of present-day Missouri and Illinois. The Ponca and Omaha moved northwest to present-day eastern Nebraska during the beginning of the Mississippian period; the Kaw separated and traveled up the Missouri River during this time as well, circa A.D. 1200-1250 (Hunter et al. 2013). By the end of the Mississippian period, A.D. 1300, the group who would become the Osage left the St. Louis area and traveled westward to central and western Missouri to eventually settle along the Osage and Missouri Rivers (Hunter et al. 2013). There are many historical references to Osage settlements along the Neosho and Verdigris Rivers in Oklahoma and Kansas (Berry 1944).

Sabo (1992) described Osage tribal culture as being divided into two clans: Sky people and Earth people. Osage settlement patterns established villages on an east-west road with members of the Sky people to the north, and members of the Earth people to the south. Subsistence strategies included hunting, gathering, and gardening (Sabo et al. 1990, Sabo 1992). Villages had two leaders, and a council of advisors selected from the two clans. Daily life followed the rules and customs established by a group of elders. These elders underwent training that lasted from boyhood though seven stages of learning. The Osage traded with American settlers. Through these trade relationships, the Osage were able to acquire guns and horses that dramatically expanded their territory and control (Sabo 1992).

According to early colonial reports from the region, the Osage controlled much of present-day Kansas, Missouri, Oklahoma, and Arkansas. The French distinguished between the Osage living along the Missouri River and those living proximal to the Osage River, referring to them as the Little and Great Osage respectively (Dennison 2014: 5; Rollings 1992: 55). Many of the treaties make this distinction, although this is a simplification of the actual number and relationship of divisions recorded in colonial descriptions and in Osage accounts of five divisions (Rollings 1992: 56).

Under the terms of the Treaty of 1808 (Treaty of Fort Clark), the Osage people ceded a large swath of land that included sections of Arkansas and Missouri, bounded by the Arkansas River to the south, the Mississippi River to the east, the Missouri River to the north, and a west boundary formed by a longitudinal line from Fort Clark south to the Arkansas River. The cession also included a “tract of two leagues square” (3.49 hectares) comprising Fort Clark. In exchange for the relinquished lands, the Osage were to receive “every species of merchandise, which their comfort may hereafter require” and the services of Fort Clark, located “on the right bank of the Missouri (River), a few miles above the Fire Prairie.” The intent of the garrison was “to afford them (the Osage) every assistance in their power, and to protect them from the insults and injuries of other tribes of Indians, situated near the settlements of the white people” (Kappler 1904c). The treaty effectively ended Osage dominion in much of Arkansas and Missouri.

According to the stipulations of the 1825 Treaty with the Osage, the tribe ceded "all their right, title, interest, and claim, to lands" in Missouri and Arkansas, as well as lands west of those states, north and west of the Red River, south of the Kansas River, and "east of a line to be drawn from the head sources of the Kansas, southwardly through the Rock Saline." However, within the ceded country, the Little and Great Osage Nations received a diminished reserve with the following limits and stipulations:

> Beginning at a point due East of White Hair's Village, and twenty-five miles West of the Western boundary line of the State of Missouri, fronting on a North and South line, so as to leave ten miles North, and forty miles South, of the point of said beginning, and extending West, with the width of fifty miles, to the Western boundary of the lands hereby ceded and relinquished by said Tribes or Nations; which said reservations shall be surveyed and marked, at the expense of the United States, and upon which, the Agent for said Tribes or Nations and all persons attached to said agency, as, also, such teachers and instructors, as the President may think proper to authorize and permit, shall reside, and shall occupy, and cultivate, without interruption or molestation, such lands as may be necessary for them. And the United States do, hereby, reserve to themselves, forever, the right of navigating, freely, all water courses and navigable streams, within or running through, the tract of country above reserved to said Tribes or Nations (Kappler 1904d).

However, in 1865 the United States government removed the Nation once again and provided for the sale of their Kansas reservation (Burns 2004; Hunter et al. 2015). The Treaty of 1865 stipulated the United States would pay a sum of $300,000 for the lands. The sum would be placed to the credit of the tribe in the Treasury of the United States. The federal government was to disburse interest payments at five percent per annum "in money, clothing, provisions, or such articles of utility as the Secretary of the Interior may, from time to time direct." The Osage received the sum after the survey and sale of the reservation lands and the United States' reimbursement for facilitating the same (Kappler 1904e).

Soon thereafter, the Osage people settled in Oklahoma in 1872 (Sabo et al. 1990). They used proceeds from the sale of their Kansas reservation to purchase 1,470,559 acres in that territory from the Cherokee Nation. The Osage are the only tribe in the country to purchase their own reservation (Burns 2004; Hunter et al 2015).

The Osage Nation national headquarters are in Pawhuska, Osage County, Oklahoma. The boundaries of the county are coterminous with the Osage Nation Reservation. Under the Osage Allotment Act of 1906, 2,229 original allotees divided Osage County, excluding mineral rights, which are held in federal trust and managed by the Bureau of Indian Affairs (Hunter et al. 2015). The state's population surged in the mid to late 19th century. In 1820, the state's population was only 14,255. By 1840 the population had grown to 97,574 and by 1890 the population was 1,125,385 (Chism 1891:328-329).

Quapaw Tribe of Oklahoma

Quapaw ancestral origins are in the Ohio River Valley, where they lived as one people with other Dhegiha Sioux speaking people that included the Osage, Ponca, Kaw (Kansa), and Omaha. By the mid-seventeenth century, the Quapaw relocated to lands south of the Ohio River. The Quapaw name derives from Ogazpa, translated as "downstream people" due to the southerly journey of their ancestors through the Mississippi River Valley to the confluence with the Arkansas River (Quapaw Tribe 2015).

In 1673, French explorers Marquette and Joliet encountered five villages at the confluence of the two rivers: Tourima, Osotory, Tongigua, Kappa, and Imaha or Southois (Quapaw Tribe 2015a; Sabo et al. 1990:122-123). Quapaw social organization centered on a patrilineal system that united families into clans named after animals, heavenly bodies, or natural phenomena. The clans were linked through descent from a common ancestor, a factor that supported mutual obligation for the members (Wilson and Sabo 1990:1). The tribe divided into 21 clans, each divided into a "sky" and "earth" division; each clan division had a specific set of ritualistic responsibilities (Sabo 1992).

According to early ethnographic accounts, the Quapaw were village farmers that lived in permanent settlements. Like many southeastern tribes, Quapaw villages were composed of houses arranged around a central plaza. Each village had a communal structure, and an open- sided covered structure built on a platform. Quapaw houses were constructed of arched poles covered in bark. Agriculture centered on squash, beans, corn, pumpkins, and tobacco. Deer, bear, and buffalo were hunted year-round with seasonal hunting of fowl and fish (Sabo et al. 1990, Sabo 1992).

The Quapaw people maintained a close alliance with the French in colonial Louisiana. Likewise, during the Spanish governance of the colony, the Quapaw provided valuable assistance by helping protect the colony from the English and their allies. The tribe attempted to persist with a policy of coexistence after the Louisiana Purchase. Early treaties recognized Quapaw ownership of lands along the Arkansas River. However, following the Louisiana Purchase, they were forced to repeatedly move. (Wilson and Sabo c.a. 1990:2; Quapaw Tribe 2015a; Sabo et al. 1990).

The Quapaw ceded all their lands in Arkansas and present-day Oklahoma under the terms of the treaties of 1818 and 1824. By the Treaty with the Quapaw dated August 24, 1818, the Quapaw Tribe relinquished to the United States millions of acres extending from the mouth of the Arkansas River, following the Arkansas River west to the Canadian River fork and south to the Red River, and eastward again to the Mississippi River thirty leagues (approximately 100 miles) below the mouth of the Arkansas. The treaty retained a relatively small reserve for the Quapaw people, extending from Arkansas Post near the confluence of the Arkansas and White Rivers, due south to the Washita River, up that river to the Saline Fork and following that waterway to a point where a due north transect would intersect the Arkansas River at Little Rock (Kappler 1904f).

A stone marker erected in 1936 by the Captain Basil Gaither Chapter of the Daughters of the American Revolution at the corner of 9th St. and Commerce Streets in Little Rock, marks the western Quapaw Line. Survey markers set in the pavement follow the line through the Little Rock Quapaw Quarter neighborhood to the terminus at the Junction Bridge and the" Little Rock" at the Arkansas River.

The Treaty of November 15, 1824 ceded the small reserve to the United States and thus terminated Quapaw claim to any of their ancestral lands in Arkansas and south of the Arkansas and Canadian Rivers in Oklahoma. Under the terms of the treaty, the Quapaw people were "concentrated and confined" to a district with the Caddo Indians, so that they could form a part of the tribe. The Quapaw were directed to begin removing to the Caddo lands by January 20th, 1826 (Kappler 1904g). They later settled among the Creek Indians in Oklahoma in 1839 and in the 1860s groups from the tribe joined with the Shawnee, Osage, and Ottawa (Quapaw Tribe 2015a; Sabo et al. 1990).

Under the 1833 Treaty with the Quapaw, the United States agreed to the following:

> to convey to the Quapaw Indians one hundred and fifty sections of land west of the State line of Missouri and between the lands of the Senecas and Shawnees, not heretofore assigned to any other tribe of Indians, the same to be selected and assigned by the commissioners of Indian affairs west, and which is expressly designed to be [in] lieu of their location on Red River and to carry into effect the treaty of 1824, in order to provide a permanent home for their nation; the United States agree to convey the same by patent, to them and their descendants as long as they shall exist as a nation or continue to reside thereon, and they also agree to protect them in their new residence, against all interruption or disturbance from any other tribe or nation of Indians or from any other person or persons whatever (Kappler 1904h).

The treaty cites the reason for the conveyance as the deplorable conditions of their previous location of removal on the Bayou Treache on the south side of the Red River on land provided by the Caddo Indians.

Their crops were destroyed by the water year after year, and which also proved to be a very sickly country and where in a short time, nearly one-fourth of their people died, and whereas they could obtain no other situation from the Caddoes [sic] and they refused to incorporate them and receive them as a constituent part of their tribe as contemplated by their treaty with the United States, and as they saw no alternative but to perish if they continued there, or to return to their old residence on the Arkansas, they therefore chose the latter; and whereas they now find themselves very unhappily situated in consequence of having their little improvements taken from them by the settlers of the country (Kappler 1904h).

In 1956, the Quapaw Tribe established a business committee to serve as the governing body. A chair, vice-chair, secretary-treasurer, and four council members compose the committee that serves a two-year term. In designated years, the tribe holds elections on the fourth of July. General council meetings are held on that same day annually. The Quapaw Tribe of Oklahoma national headquarters are located in Quapaw, Oklahoma (McCollum 2009).

Shawnee Tribe of Oklahoma

The following tribal history is from "History," an entry by The Shawnee Tribe (2017) on the *Shawnee Tribe* website.

> The Shawnees are an Eastern Woodlands tribe pushed west by white encroachment. In 1793, some of the Shawnee Tribe's ancestors received a Spanish land grant at Cape Girardeau, Missouri. After the 1803 Louisiana Purchase brought this area under American control, some Cape Girardeau Shawnees went west to Texas and Old Mexico and later moved to the Canadian River in southern Oklahoma, becoming the Absentee Shawnee Tribe.
>
> The 1817 Treaty of Fort Meigs granted the Shawnees still in northwest Ohio three reservations: Wapakoneta, Hog Creek, and Lewistown. By 1824, about 800 Shawnees lived in Ohio and 1,383 lived in Missouri. In 1825, Congress ratified a treaty with the Cape Girardeau Shawnees ceding their Missouri lands for a 1.6 million-acre reservation in eastern Kansas. After the Indian Removal Act of 1830, the Ohio Shawnees on the Wapakoneta and Hog Creek reservations signed a treaty with the US giving them lands on the Kansas Reservation.
>
> The Lewistown Reservation Shawnees, together with their Seneca allies and neighbors, signed a separate treaty with the federal government in 1831 and moved directly to Indian Territory (Oklahoma). The Lewistown Shawnees became the Eastern Shawnee Tribe of Oklahoma, while their Seneca allies became the Seneca-Cayuga Tribe of Oklahoma.
>
> In 1854, the US government decimated the Kansas Reservation to 160,000 acres. This, coupled with the brutal abuses perpetrated against them by white settlers during and after the Civil War, forced the Kansas Shawnees to relocate to Cherokee Nation in northeastern Oklahoma. The 1854 Shawnee Reservation in Kansas was never formally extinguished and some Shawnee families retain their Kansas allotments today.
>
> The federal government caused the former Kansas Shawnees and the Cherokees to enter into a formal agreement in 1869, whereby the Shawnees received allotments and citizenship in Cherokee Nation.
>
> The Shawnees settled in and around White Oak, Bird Creek (Sperry), and Hudson Creek (Fairland), maintaining separate communities and separate cultural identities. Known as the Cherokee Shawnees, they would also later be called the Loyal Shawnees. Initial efforts begun in the 1980s to separate the Shawnee Tribe from Cherokee Nation culminated when Congress enacted Public Law 106-568, the Shawnee Tribe Status Act of 2000, which restored the Shawnee Tribe to its position as a sovereign Indian nation.

Tunica-Biloxi Tribe of Louisiana

According to Michael P. Hoffman, "there is fairly good evidence that the Tunica speakers dominated east-central and northeastern Arkansas in the 1540s" (Hoffman 1994:67). Linguistic and ethnohistorical research strongly suggests that the Tunica people were associated with several of the Mississippian Chiefdoms that de Soto encountered in the early 1540s. Linguistic data suggests that "Tunica-related peoples were present on the Lower Arkansas River in the seventeenth century" (Hoffman 1994:64), recent research suggests that the Tunica were pushed from their original homes on the Mississippi River by other tribes migrating into the area (Hoffman 1994:66-68).

Historically, the Tunica are known as sedentary agriculturists that depended primarily on corn and squash. Unlike most native cultures, the men were responsible for farming (gardening) while the women primarily gathered wild foodstuffs. As with contemporaneous cultures, the Tunica had a well-developed spiritual system related to the natural world. The Tunica believed in the supernatural power of the four cardinal directions and that natural elements were important supernatural forces. The Tunica also believe that the natural world formed a separation between the upper and lower supernatural worlds (Sabo 1992). This belief system is similar in many ways to those of southeastern Indians; however, a belief that the sun was a female deity and that fire was a deity in itself, and not merely a symbol of the sun, is unique to the Tunica (Sabo 1992).

The Tunica were organized into villages with circular houses arranged around an open plaza where a temple structure located. The Temple contained a sacred fire and was maintained by priests that would maintain favor with the supernatural world. Villages had hereditary leaders, but special leaders were appointed during times of warfare (Sabo 1992).

According to French accounts, unlike most other Southeastern Indians, the Tunica were not involved in trade with early British colonists, but they did trade with the French (Sabo 1992). By 1706, the Tunica had abandoned their villages and moved to the mouth of the Red River. Trade intensified as the Tunica became military allies of the French. This relationship made the Tunica the targets of retribution by other local tribes. Continued pressure from white settlers, diseases, and hostile Indians groups forced the Tunica to migrate several times before they eventually settled among the Biloxi Indians along the Red River near present-day Marksville, Louisiana (Sabo 1992).

United Keetoowah Band of Cherokee Indians

In the 1780s and 1790s, contingents of Cherokee people began voluntarily migrating to Arkansas due to internal divisions and external pressures from America, Britain, France, and Spain (Cornsilk 1997; Smithers 2015: 48-49). These Cherokee settlers sought to leave their eastern homeland, separate themselves from the Cherokee Nation, and establish an independent government west of the Mississippi. Under the terms of the Treaty of 1817, the Cherokee settlers exchanged their lands in the east for equitable acreage between the Arkansas River and White River in Arkansas Territory and gained recognition as a separate nation (Cornsilk 1997; Kappler 1904i). Littlefield and Parins (2011:13) noted this as the first official stage toward Indian removal to the territory.

Due to prolonged contact with Euro-American settlers, the historic Cherokee culture has been described as "like those of Euro-American Pioneers throughout the frontier South; plantations and

farms were established with neat log houses, run by the Cherokee immigrants who brought with them slaves, horses, wagons, plows, and a variety of agriculture and household implements" (Markman 1972:132). In 1819, the naturalist Thomas Nutall ascended the Arkansas River and gave the following description of the settlements:"...both banks of the river, as we proceeded, were lined with the houses and farms of the Cherokee, and though their dress was a mixture of indigenous and European taste, yet in their houses, which are decently furnished, and in their farms, which were well fenced and stocked with cattle, we perceive a happy approach toward civilization. Their numerous families, also, well fed and clothed, argue a propitious progress in their population. Their superior industry either as hunters or farmers increases the value of property among them, and they are no longer strangers to avarice and the distinctions created by wealth. Some of them are possessed of property to the amount of many thousands of dollars, have houses handsomely and conveniently furnished, and their tables spread with our dainties and luxuries." (United Keetoowah Band 2017). As a result, Cherokee farmsteads are very difficult to distinguish from Euro-American farmsteads archeologically (Sabo et al. 1990).

Many Cherokee settlers resided in the newly organized Arkansas territory until the Treaty of 1828. The treaty fully divested them of their lands there in exchange for seven million acres of land along the Arkansas and Canadian and Grand Rivers in Indian Territory (Cornsilk 1997; Kappler 1904i; UKB 2017). This relocation also formed the resettlement of the Shawnee and Delaware further west (Williamson 1999).

Local Histories

The following local history is from "Saline County," an entry by Eddie G. Landreth (2018) in the *Encyclopedia of Arkansas History and Culture*.

> Saline County is one of the state's oldest counties, having been formed in 1835 when Arkansas was still a territory. Named for the salt works that were established in the area during the county's early years, it was a key county in the mid-twentieth century and served as a center of activity for workers from the Aluminum Company of America (Alcoa) and Reynolds mining operations. At one time, the mines produced more than ninety percent of all aluminum ore produced in the United States. Saline County contains a diverse geography, ranging from the mountainous areas of the northwest to the flatter plain areas of the southeast. The Saline River runs roughly north to south; its tributaries are in the hills of the northern part of the county.
>
> European Exploration and Settlement through Early Statehood
> Spanish explorer Hernando de Soto visited the area in 1541. When de Soto journeyed down the North Fork of the Saline River to present-day Benton, he found the area heavily populated with Native Americans.
>
> White settlers entered the area twenty years before the county's creation, when William Lockhart (sometimes spelled Lockert) and his family arrived in 1815 from North Carolina. The area was still part of Missouri Territory, which had been created from Louisiana Territory in 1812. The Lockharts settled on the banks of the Saline, where the Southwest Trail crossed the river four miles below Benton.

Near their settlement in the river bottoms were buffalo and other wild game. Although some local historians have spoken of an Indian settlement in the area, no artifacts or remnants of a village have been found, and none is mentioned in the Territorial Papers. The Lockharts were the only white settlers until 1817, and the population remained small in the early years.

Allen M. Oakley established a salt works in 1827, followed by William E. Woodruff's competing operation. The salt from these works supplied almost all of the salt used in Arkansas Territory, and some was exported to other states. In addition to these early examples of commerce, a water mill was erected on the Saline River northwest of Benton in 1825. It ground settlers' corn, which beforehand had been ground by hand or taken to Little Rock (Pulaski County).

Other small communities—such as Collegeville, Lindsey, and Kentucky—began to form with the influx of settlers. These areas were settled with groups of families that had traveled to the area together.

In 1831, Lockhart was granted the exclusive rights to build and operate a toll bridge over the Saline, although those who wanted to ford the river could still do so free of charge. The same year, the first post office was established at Saline Crossing with Lockhart as postmaster.

Benton, named after U.S. Senator Thomas Hart Benton of Missouri, was established in 1833 and named the county seat because of its central location on the Southwest Trail and heavier population.

Saline County was formed on November 2, 1835, as Arkansas's thirty-fourth county from part of the western edge of Pulaski County. At the time, it included a large portion of what would become Grant, Perry, and Garland counties. It was named for the Saline River, which has its source in the multiple tributaries in the upland areas of the county.

With a growing population in the county, schools were established. By 1850, there were twenty schools, supported by tuition; 500 students were enrolled. A countywide public school system was established in 1872, with each of the fifteen townships having a free public school.

Civil War through Reconstruction

Like other areas of Arkansas and the South, Saline County had a slave population at the outbreak of the Civil War in 1861. The 1860 U.S. Census indicates that there were 749 slaves in the county at that time, representing eleven percent of the county's population. These slaves were owned by 156 individual slave owners. Throughout the war, about 1,300 Saline County men were called to service for the Confederate cause. Of the seventeen companies of soldiers raised in the county, two of them served with the Union, although there is no single predominant source for that Union sentiment. It evolved from a variety of sources, including pacifist

leanings, religious feelings, and cultural backgrounds.

While the county saw no full-scale battles, there were several skirmishes near Benton in 1863 and 1864. During the occupation of Benton by Union forces in 1863, Fort Bussy was used to house and garrison the Union soldiers. The officers quartered themselves in the John F. Shoppach House, which is the oldest standing building in Benton; it was built circa early 1850s.

After the war, the railroad played a major role in the county's recovery by bringing development. In the early 1870s, the St. Louis and Iron Mountain Railroad reached Bryant. Commerce and development followed where the rails were laid, and businesses developed along the right of way. Traskwood also saw rapid development with the arrival of the St. Louis and Iron Mountain in 1876. The Chicago, Rock Island, and Pacific Railroad would enter the county in the early 1900s, providing the county with a second rail service.

Post Reconstruction through the Early Twentieth Century
The county had small pottery works by the late 1800s, but this changed when John F. Hyten established the Hyten Pottery Works. His son and successor, Charles D. "Bullet" Hyten, renamed the company Eagle Pottery. Its pottery became renowned throughout the world. By the early 1900s, Charles Hyten was experimenting with a new pottery method that mixed colors of clay randomly on the potter's wheel. This unique style became known as Niloak, which was "kaolin" spelled backward (kaolin was the form of clay used in the process). This form of pottery came to be known as "mission swirl" and reflects the Arts and Crafts movement. Niloak pottery production continued into the 1930s and is highly collectible. The company transitioned from Niloak production to a more utilitarian glazed castware in the 1930s to the 1950s and was reorganized as the Winburn Tile Company.

Construction of the landmark Saline County Courthouse began in 1901 with the laying of the cornerstone by Dr. Dewell Gann Sr., a popular Benton physician and master of the Benton Masonic Lodge No. 34. The structure was completed in 1902 and has been in continuous use ever since. It is the third courthouse to have been used by the county. It was placed on the National Register of Historic Places in 1976 because of its unique architectural design and historic significance.

The discovery of bauxite ore near Hurricane Creek in Saline County in 1887 by the state geologist, John C. Branner, changed the economic outlook for the county throughout the 1900s, moving it away from an agricultural economy toward an industrial one. In 1893, the Pittsburg Reduction Company (later known as Alcoa) established the company town of Bauxite in the bauxite mining area where thousands of workers from the area were employed.

World War II through the Modern Era
World War II created a demand for aluminum to feed the war effort, and two major firms, Alcoa and Reynolds Metals Company, built major mining operations in the

county. Throughout the war, the mines were kept in constant operation. After the war, the plants were updated and expanded, raising the standard of living throughout Saline County. The ore deposits were eventually depleted, and mining ceased in 1990. The Reynolds plant was dismantled and the mining pits reclaimed. The Alcoa plant continues to process bauxite ore that is shipped into the county by rail.

Hot Springs Village, a gated community stretching across the Garland-Saline county line, was established in 1970 by John A. Cooper Sr., who had previously developed similar communities, such as Cherokee Village (Sharp County) and Bella Vista (Benton County). By the 2010 Census, it had 12,807 residents (Garland County and Saline County combined). The town is known for its recreational facilities, especially its golf courses.

Since the 1950s, the population of the county has more than quadrupled as Saline County has become a bedroom community for neighboring Pulaski County. The town of Bryant has seen an explosive growth, being closer than Benton to Pulaski County, with its school enrollment now surpassing that of Benton.

In November 2014, voters approved the sale of alcohol in the formerly dry county. Employment in the county has seen the highest growth in the educational services area in recent years. Retail trade, health care and social assistance, and manufacturing industries account for the largest share of employment in the county, with retail trade providing the most employment at twenty percent of the total county workforce.

BACKGROUND RESEARCH

Flat Earth Archeology reviewed the records in the AMASDA database maintained by the ARAS in Fayetteville to check for previously recorded archeological sites within 1.6 km (1 mi) from the proposed Project Area. There are three previously recorded archeological sites within this search area (Table 1) (AMASDA 2020). None of the previously recorded archeological sites are within or proximal to the direct APE of the current project. The nearest recorded site to the Project Area is 3SA0372, recorded as 0.34 miles from the Project Area.

Table1. Previously Recorded Sites Within 1 Mile

Site Number	Date	Site National Register Eligibility	Site Artifact Material	Site Cultural Affiliation	Site Historic Function	Site Non-structural Features
3SA0166	1988	------	20--Lithics, Aboriginal	142--Unknown Cultural Affiliation		
3SA0331	2005	1--72114--Undetermined--2010-03-03	24--Ceramics, Historic 29--Human Skeletal Remains, Aboriginal	72--Prehistoric		
3SA0372	2013	------		96--Historic Period 98--(AT) Dev Settl, Rural, Agriculture	CEMETERY	BURIALS, Historic

A review of the AMASDA database produced seven previously conducted archeological projects within one mile of the proposed Project Area (Table 2) (AMASDA 2020). None of the previous investigations were in the APE of the current project.

Table 2. Previous Investigations Within 1 Mile

Project Name	Year	Investigating Entity	Sponsor	Project archeologists	Project work type
Hurricane Creek Bridge & Approaches, County Road 43/same as 2252	1983	Arkansas Highway & Transportation Department	AHTD	122--McClurkan, Burney B.	41--Field Reconnaissance, Intensive
Hurricane Creek Bridge and Apprs, County Road 43, same as 926	1983	Arkansas Highway & Transportation Department	AHTD	122--McClurkan, Burney B.	41--Field Reconnaissance, Intensive
Hurricane Creek - Lindsay Development	2001	Historic Preservation Associates	White-Daters & Associates, Inc.	104--Klinger, Timothy C.	41--Field Reconnaissance, Intensive
Hurricane Creek Structures and Approaches (PIF)	20050	Arkansas Highway & Transportation Department	AHTD	430--Hughes, Milton	41--Field Reconnaissance, Intensive
Hwy 183 Str Removal (E. of Bauxite and S of Bryant) Arkansas (PIF)	2007	Arkansas Highway & Transportation Department	AHTD	430--Hughes, Milton	41--Field Reconnaissance, Intensive

Table 2. Previous Investigations Within 1 Mile					
Project Name	**Year**	**Investigating Entity**	**Sponsor**	**Project archeologists**	**Project work type**
Hwy. 183 Jumpstart Project	2016	Flat Earth Archeology, LLC	Garver, LLC	486--Branam, Chris	41--Field Reconnaissance, Intensive

Personnel conducted a records check on the AHPP GIS Historic Properties database and AMASDA database. According to the AHPP and AMASDA databases, there are no historic properties as defined by 36 CFR 800.16(l)(1) within or proximal to the proposed Project Area (AHPP 2020, AMASDA 2020).

The First Land Patents records and the General Land Office (GLO) maps were also reviewed for information regarding the history of land ownership of the project area. The Bureau of Land Management First Land Patent records contain many of the names of the initial legal landowners for tracts. These records generally contain other information such as how the land was obtained (i.e. homestead, cash entry, scrip warrant, etc.), the acreage obtained in the patent, the legal description of the land, and the date of the patent issuance. Moreover, GLO maps may show areas with historical development, often depicting improvements such as agricultural fields, roads, or structures, along with names of landowners. The GLO original survey maps for Township 1 South, Range 14 West and Township 2 South, Range 14 West, both approved in 1822, details no historical improvements within or proximal to the proposed Project Area (Figures 15 and 16) (GLO 2020).

There was no information on the SW ¼ of Sections 26 and 34, Township 1 South, Range 14 West in the First Land Patents records (GLO 2020). Robert R. Ferguson was recorded as the first legal landowner in the First Land Patent records via a homestead entry in 1882 for 80 acres including the NW¼ of the NW¼ of Section 35 in Township 1 South, Range 14 West. William Wills was recorded as the first legal landowner in the First Land Patent records via a homestead entry in 1882 for 80 acres including the SW¼ of the NW¼ of Section 35 in Township 1 South, Range 14 West. Cecil O. Farabee was recorded as the first legal landowner via a homestead entry in 1882 for 76.43 acres including the NW¼ of the NE¼ of Section 3 in Township 2 South, Range 13 West.

Survey maps produced throughout the nineteenth and twentieth centuries by the United States Geological Survey (USGS) were also reviewed for historical improvements within or proximal to the proposed Project Area. The 1893 Little Rock, AR Topographic Map (Figure 17) and the 1954 (edited 1971) Bryant, AR Topographic Quadrangle Map (Figure 18) details no historical improvements within or proximal to the proposed Project Area aside from railroads and roadways (USGS 2020).

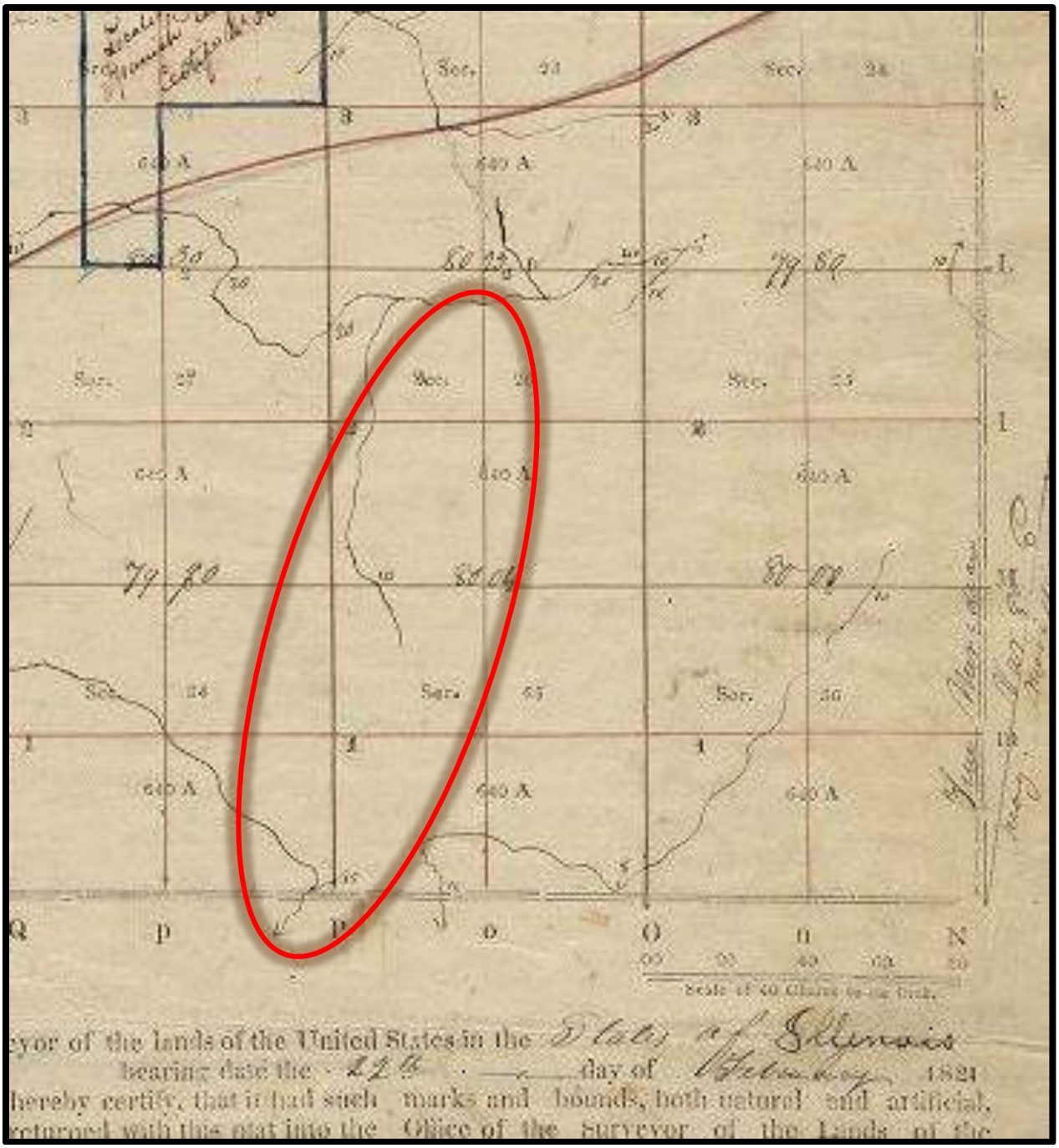


Figure 15. Vicinity of Project Area detailed on 1822 GLO Original Survey Map for T1S, R14W (GLO 2020)

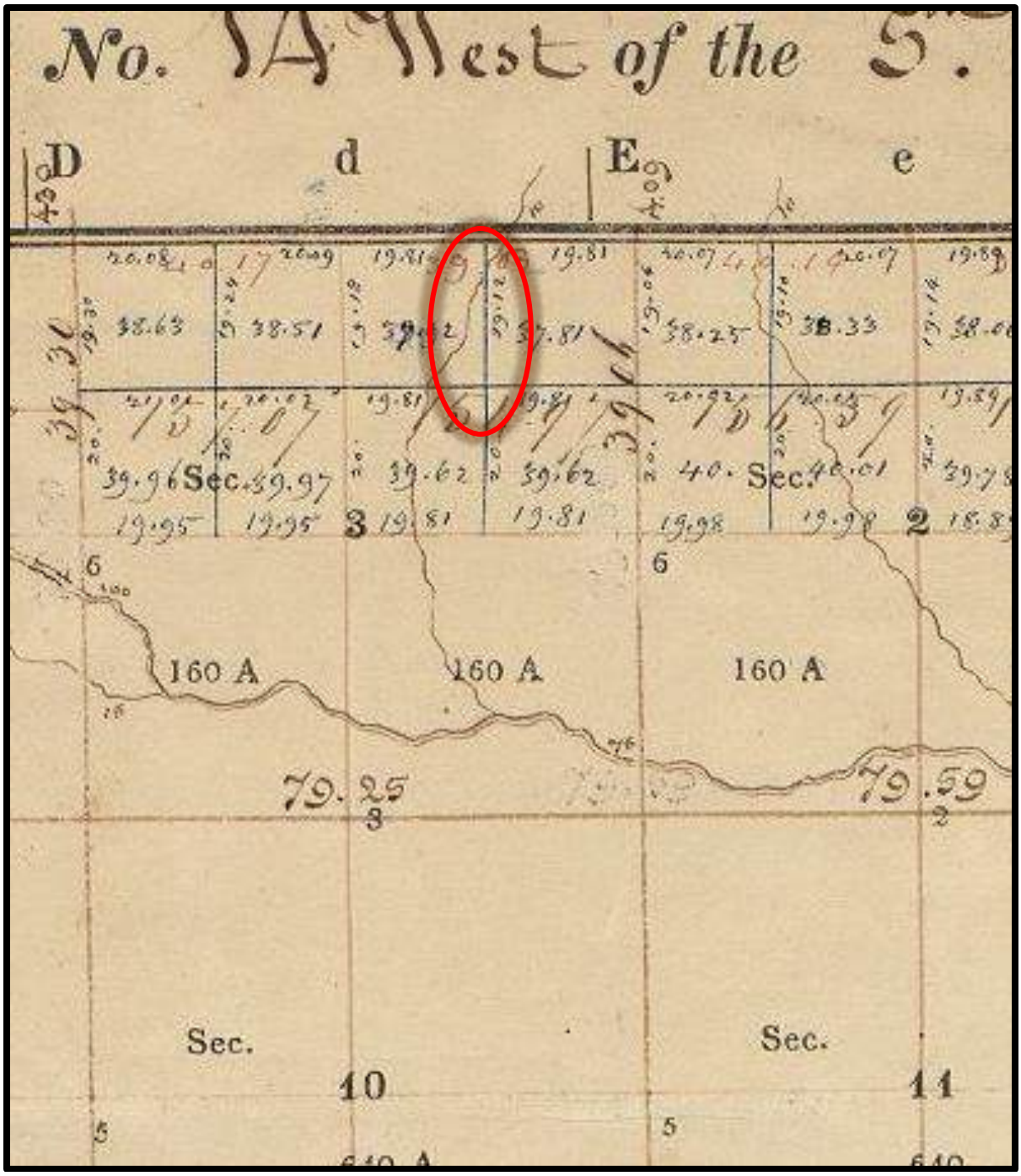


Figure 16. Vicinity of Project Area detailed on 1822 GLO Original Survey Map for T2S, R14W (GLO 2020)

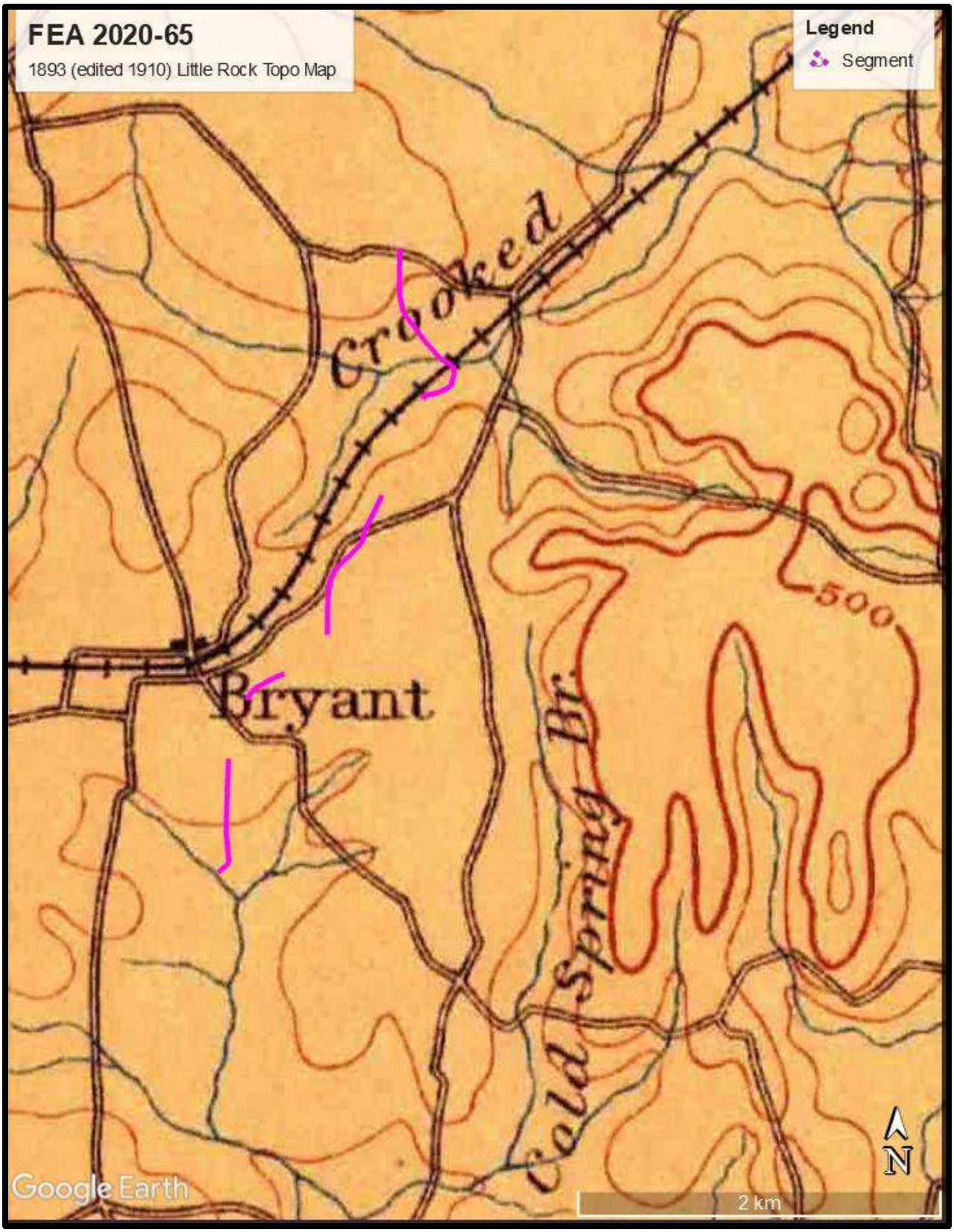


Figure 17. Proposed Project Area detailed on 1893 (edited 1910) Little Rock, AR Topographic Map (USGS 2020)

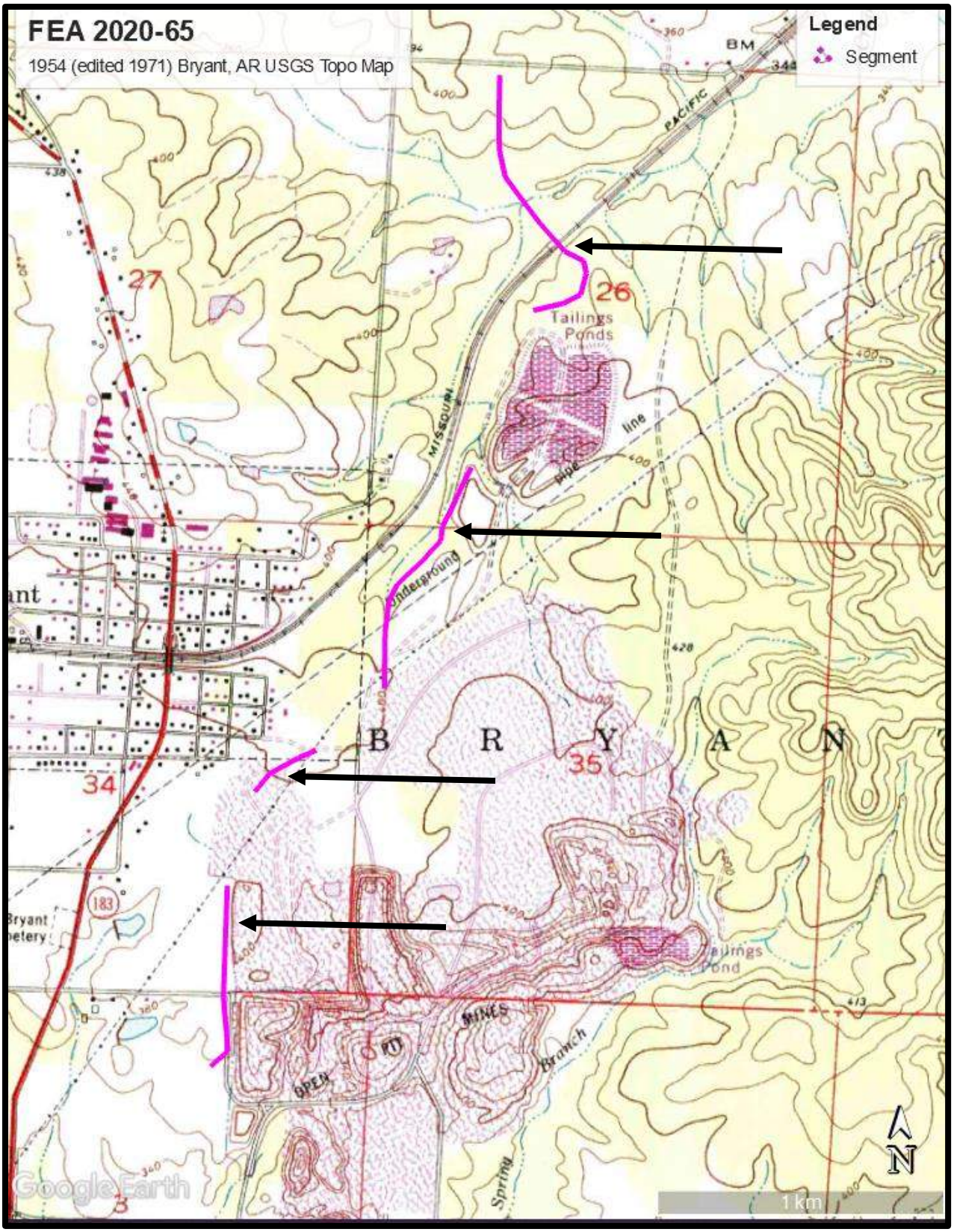


Figure 18. Proposed Project Area detailed on USGS 1954 (edited 1971) Bryant, AR Topographic Quadrangle Map (USGS 2020)

INVESTIGATION METHODS AND RESULTS

At the request of Garver, a cultural resources survey was conducted by Flat Earth Archeology along Segments A, B, C, and D of the Project Area associated with the Bryant Parkway Expansion Project in Saline County. The archeological fieldwork was conducted by archeologists Lyndsay Ballew, MSc, Ryan Adams, BA, and Brandon Tully, BA. Field work was conducted on August 24 and 25, 2020. Garver provided Flat Earth Archeology with maps detailing the proposed Project Area prior to the commencement of fieldwork. Flat Earth Archeology created shapefiles of the proposed Project Area utilizing the map provided by Garver. These data were converted to KMZ files to facilitate the use on handheld electronic mapping devices. Field data was recorded using custom fillable PDF forms on portable devices. The forms provided fields for transect, shovel test number, meters on the transect, notes, and result of the test.

The proposed Project Area segments' corridors were 100 feet (34 meters) in width. For adequate coverage of the Project Area, two transects, spaced 20 meters apart (roughly 10 meters on each side of the given centerline) were established on each segment (Figure 19). Flat Earth Archeology personnel investigated a total of 278 shovel test locales along the transects in the Project Area. Shovel test locales were investigated at a maximum of 20-m intervals along each transect during the pedestrian survey.

In Segment A, Transect 1 began at the southern extent of Segment A on the east side of the center line at 548097mE, 3829443 and moved north for 304 meters to a large fence, at which point the Transect moved west 20 meters and returned in a southern direction parallel to the project centerline for 304 meters (Figure 19). A total of 33 shovel test locales were investigated on Transect 1 in Segment A. Transect 2 of Segment A began at the northern extent of Segment A on the east side of the center line at 547979mE, 3830247mN and moved in a southern direction for 730 meters to the fence encountered on Transect 1 (Figure 19). Transect 2 was moved 20 meters west and walked in a northern direction parallel to the center line for 730 meters. A total of 75 shovel test locales were investigated on Transect 2 in Segment A.

In Segment B, Transects 1 and 2 were established 20 meters apart, beginning on the southern extent of Segment B at 547887mE, 3828903mN (Figure 19). Transects 1 and 2 were each 860 meters in length. A total of 45 shovel tests locales were investigated on Transect 1 in Segment B and 45 shovel tests locales were investigated on Transect 2 in Segment B.

In Segment C, Transects 1 and 2 were established 20 meters apart, beginning on the northern/eastern extent of Segment C at 547358mE, 3827930mN (Figure 19). Transects 1 was roughly 230 meters in length and Transect 2 was approximately 260 meters in length. The discrepancy was due to a fenced area near the beginning of the segment. A total of 10 shovel tests locales were investigated on Transect 1 in Segment C and 14 shovel tests locales were investigated on Transect 2 in Segment C.

In Segment D, Transects 1 and 2 were established 20 meters apart, beginning on the northern/eastern extent of Segment D at 547056mE, 3827458mN (Figure 19). Transects 1 was roughly 440 meters in length and Transect 2 was approximately 520 meters in length. Because the Segment crossed from inside the airport property to the outside of the property, Transect 1 was

cut short and Transect 3 was started outside of the airport, but Transect 3 was in a largely developed area, the transect was confined to a strip of soil between a sidewalk and buried utility cables. A total of 21 shovel tests locales were investigated on Transect 1 in Segment D, a total of 25 shovel tests locales were investigated on Transect 2 in Segment D, and a total of 10 shovel test locales were investigated on Transect 3 in Segment D.

Ground surface visibility was poor within wooded areas, varying between 0 percent and 25 percent due to vegetation and leaf litter, and good within the cleared areas, varying between 50 and 75 percent visibility with sparse grasses on the surface. Representative views of the landscape within the proposed Project Area are shown in Figures 20 through 25.

All the soils from excavated shovel test locales were screened through ¼ inch hardware cloth. Shovel tests were a minimum of 30 centimeter (cm) in diameter. Subsurface investigations typically extended 50 cm below the ground surface, 20 cm into culturally sterile subsoil, or an obstruction prohibited further excavation. The soil stratigraphy was recorded for each shovel test using Munsell color charts and standard soil textural descriptions. Representative samples of shovel test profiles are shown in Figures 26 through 34. A shovel test inventory for the project is listed in Table 3. The above-ground and subsurface investigation proved negative for cultural materials.

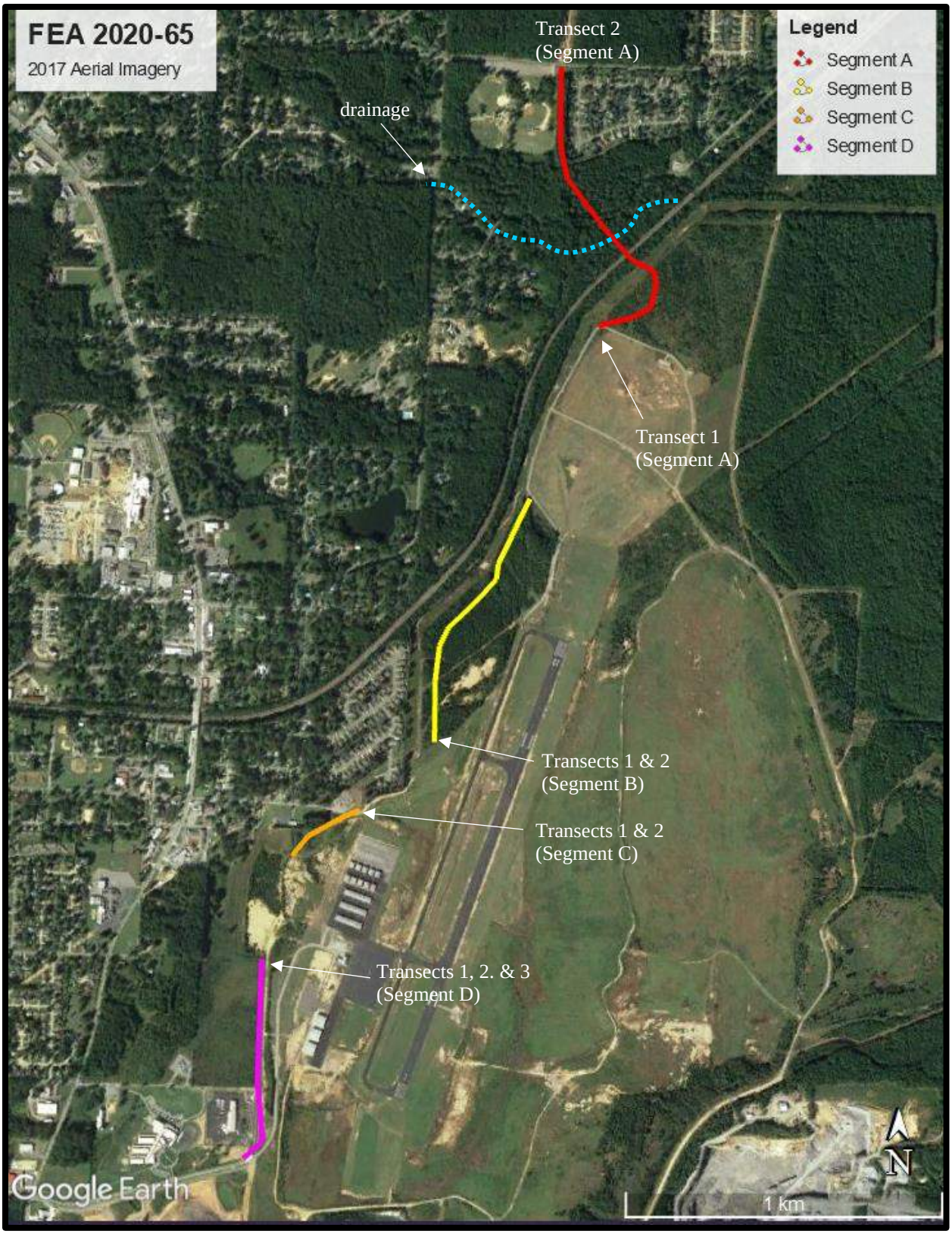


Figure 19. Transect Locations (arrows point to beginning of transects)

Figure 20. View from Transect 1, ST 1 in Segment A (facing northeast)

Figure 21. View from Transect 2, ST 24 in Segment A (facing north)

Figure 22. View from Transect 1, ST 5 in Segment B (facing northeast)

Figure 23. View from Transect 1, ST 1 in Segment C (facing southwest)

Figure 24. View from Transect 1, ST 4 in Segment D (facing north)

Figure 25. View from Transect 3, ST 4 in Segment D (facing south)

Figure 26. View of Shovel Test Locale 5 profile on Transect 1, Segment A

Figure 27. View of Shovel Test Locale 30 profile on Transect 2, Segment A

Figure 28. View of Shovel Test Locale 2 profile on Transect 1, Segment B

Figure 29. View of Shovel Test Locale 5 profile on Transect 1, Segment B

Figure 30. View of Shovel Test Locale 12 profile on Transect 1, Segment B

Figure 31. View of Shovel Test Locale 15 profile on Transect 1, Segment B

Figure 32. View of Shovel Test Locale 29 profile on Transect 1, Segment B

Figure 33. View of Shovel Test Locale 5 profile on Transect 1, Segment C

Figure 34. View of Shovel Test Locale 15 profile on Transect 1, Segment D

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	1	1	40	Stratum I: (0-30cmbs) dark grayish brown (10YR4/2) silty clay loam Stratum II: (30-40cmbs) brownish yellow (10YR6/8) silty clay *terminated due to impenetrable rock	Negative
A	1	2	-	No Dig - Gravel Road	-
A	1	3	35	Stratum I: (0-15cmbs) dark grayish brown (10YR4/2) silty clay loam Stratum II: (15-35cmbs) brownish yellow (10YR6/8) silty clay *terminated due to impenetrable rock	Negative
A	1	4	50	Stratum I: (0-30cmbs) very pale brown (10YR7/3) sandy silt Stratum II: (30-50cmbs) yellowish brown (10YR5/8) sand	Negative
A	1	5	50	Stratum I: (0-9cmbs) very pale brown (10YR7/3) sandy silt Stratum II: (9-50cmbs) yellowish brown (10YR5/8) sand	Negative
A	1	6	46	Stratum I: (0-26cmbs) very pale brown (10YR7/3) sandy silt Stratum II: (26-46cmbs) yellowish brown (10YR5/8) sand	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	1	7	31	Stratum I: (0-10cmbs) very pale brown (10YR7/3) sandy silt Stratum II: (10-17cmbs) dark yellowish brown (10YR4/6) mottled with brown (10YR4/4) silty loam Stratum III: (17-31cmbs) gray (10YR6/1) silty loam, compact *terminated due to compact soil	Negative
A	1	8	28	Stratum I: (0-28cmbs) gray (10YR6/1) silty loam, compact *terminated due to compact soil	Negative
A	1	9	32	Stratum I: (0-12cmbs) gray (10YR6/1) silty loam, compact Stratum II: (12-32cmbs) light yellowish brown (10YR6/4) silty clay loam *terminated due to compact soil	Negative
A	1	10	30	Stratum I: (0-10cmbs) gray (10YR6/1) silty loam, compact Stratum II: (10-30cmbs) light yellowish brown (10YR6/4) silty clay loam	Negative
A	1	11	15	Stratum I: (0-11cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (11-15cmbs) yellowish brown (10YR5/8) silty sandy clay, compact *terminated due to compact soil	Negative
A	1	12	31	Stratum I: (0-11cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (11-31cmbs) yellowish brown (10YR5/8) silty sandy clay, compact	Negative
A	1	13	30	Stratum I: (0-20cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (20-30cmbs) yellowish brown (10YR5/8) silty sandy clay, compact *terminated due to compact soil	Negative
A	1	14	32	Stratum I: (0-12cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (12-32cmbs) yellowish brown (10YR5/8) silty sandy clay, compact	Negative
A	1	15	34	Stratum I: (0-14cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (14-34cmbs) yellowish brown (10YR5/8) silty sandy clay, compact	Negative
A	1	16	50	Stratum I: (0-30cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (30-50cmbs) yellowish brown (10YR5/8) silty sandy clay, compact	Negative
A	1	17	13	Stratum I: (0-13cmbs) very pale brown (10YR7/3) silty sand, compact *terminated due to impenetrable rock	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	1	18	25	Stratum I: (0-15cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (15-25cmbs) yellowish brown (10YR5/8) silty sandy clay, compact *terminated due to compact soil	Negative
A	1	19	22	Stratum I: (0-22cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to impenetrable rock	Negative
A	1	20	11	Stratum I: (0-11cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to impenetrable rock	Negative
A	1	21	30	Stratum I: (0-10cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (10-30cmbs) yellowish brown (10YR5/8) silty sandy clay, compact	Negative
A	1	22	16	Stratum I: (0-16cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to compact soil	Negative
A	1	23	25	Stratum I: (0-15cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (15-25cmbs) yellowish brown (10YR5/8) silty sandy clay, compact *terminated due to compact soil	Negative
A	1	24	18	Stratum I: (0-18cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to compact soil	Negative
A	1	25	14	Stratum I: (0-14cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to compact soil	Negative
A	1	26	35	Stratum I: (0-15cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (15-35cmbs) yellowish brown (10YR5/8) silty sandy clay, compact	Negative
A	1	27	20	Stratum I: (0-13cmbs) very pale brown (10YR7/3) silty sand, compact Stratum II: (13-20cmbs) yellowish brown (10YR5/8) silty sandy clay, compact *terminated due to compact soil	Negative
A	1	28	16	Stratum I: (0-16cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to compact soil	Negative
A	1	29	40	Stratum I: (0-15cmbs) very pale brown (10YR7/3) silty sand Stratum II: (15-40cmbs) yellowish brown (10YR5/8) sand, moderate gravels	Negative
A	1	30	20	Stratum I: (0-20cmbs) very pale brown (10YR7/3) silty sand *terminated due to impenetrable root	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	1	31	35	Stratum I: (0-15cmbs) very pale brown (10YR7/3) silty sand Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sand, moderate gravels	Negative
A	1	32	25	Stratum I: (0-5cmbs) very pale brown (10YR7/3) silty sand Stratum II: (5-25cmbs) yellowish brown (10YR5/8) sand, moderate gravels	Negative
A	1	33	22	Stratum I: (0-10cmbs) very pale brown (10YR7/3) silty sand Stratum II: (10-22cmbs) yellowish brown (10YR5/8) sandy clay, heavy gravels *terminated due to compact soil and gravels	Negative
A	2	1	23	Stratum I: (0-10cmbs) very pale brown (10YR7/3) silty sand, heavy gravels Stratum II: (10-23cmbs) yellowish brown (10YR5/8) sandy clay loam, heavy gravels *terminated due to compact soil and gravels	Negative
A	2	2	30	Stratum I: (0-30cmbs) very pale brown (10YR7/3) silty sand, heavy gravels *terminated due to compact gravels	Negative
A	2	3	18	Stratum I: (0-12cmbs) very pale brown (10YR7/3) silty sand, heavy gravels Stratum II: (12-18cmbs) yellowish brown (10YR5/8) sandy clay loam, heavy gravels *terminated due to compact soil and gravels	Negative
A	2	4	28	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt, compact Stratum II: (20-28cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	5	40	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	6	50	Stratum I: (0-20cmbs) yellowish brown (10YR5/8) sandy clay loam Stratum II: (20-50cmbs) light brownish gray (10YR6/2) sandy silt *disturbed, broken concrete slabs on ground surface approximately 1.5 meters southwest	Negative
A	2	7	40	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	8	40	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	9	12	Stratum I: (0-12cmbs) light brownish gray (10YR6/2) sandy silt *terminated due to impenetrable root	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	2	10	17	Stratum I: (0-12cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (12-17cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable root	Negative
A	2	11	28	Stratum I: (0-28cmbs) light brownish gray (10YR6/2) sandy silt, compact *terminated due to compact soil	Negative
A	2	12	40	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt, compact Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam, compact	Negative
A	2	13	29	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt, compact Stratum II: (20-29cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	14	30	Stratum I: (0-10cmbs) light brownish gray (10YR6/2) sandy silt, compact Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy clay loam, compact	Negative
A	2	15	33	Stratum I: (0-13cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (13-33cmbs) yellowish brown (10YR5/8) sandy clay loam, compact	Negative
A	2	16	25	Stratum I: (0-12cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (12-25cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	17	6	Stratum I: (0-6cmbs) light brownish gray (10YR6/2) sandy silt *terminated due to impenetrable root	Negative
A	2	18	39	Stratum I: (0-18cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (18-39cmbs) yellowish brown (10YR5/8) sandy clay loam, compact	Negative
A	2	19	35	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (20-35cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	20	32	Stratum I: (0-30cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (30-32cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to impenetrable root	Negative
A	2	21	43	Stratum I: (0-23cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (23-43cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	22	40	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	2	23	28	Stratum I: (0-5cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (5-28cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	24	50	Stratum I: (0-10cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (10-50cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	25	-	No Dig - Drainage	-
A	2	26	-	No Dig - Sewer Corridor and Push Piles	-
A	2	27	40	Stratum I: (0-10cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (10-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	28	38	Stratum I: (0-18cmbs) light brownish gray (10YR6/2) sandy silt Stratum II: (18-38cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	29	42	Stratum I: (0-22cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (22-42) light yellowish brown (10YR6/4) sandy loam	Negative
A	2	30	57	Stratum I: (0-18cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (18-57cmbs) light yellowish brown (10YR6/4) sandy loam	Negative
A	2	31	38	Stratum I: (0-18cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (18-38cmbs) light yellowish brown (10YR6/4) sandy loam	Negative
A	2	32	45	Stratum I: (0-25cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (25-45cmbs) light yellowish brown (10YR6/4) sandy loam	Negative
A	2	33	11	Stratum I: (0-5cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (5-11cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	34	40	Stratum I: (0-20cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	35	38	Stratum I: (0-18cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (18-38cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	36	10	Stratum I: (0-10cmbs) grayish brown (10YR5/2) silty sandy loam, compact *terminated due to compact soil	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	2	37	35	Stratum I: (0-15cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	38	30	Stratum I: (0-10cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	39	37	Stratum I: (0-17cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (17-37cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	40	29	Stratum I: (0-11cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (11-29cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable root	Negative
A	2	41	33	Stratum I: (0-30cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (30-33cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable root	Negative
A	2	42	-	No Dig - Railroad	-
A	2	43	38	Stratum I: (0-18cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (18-38cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	44	42	Stratum I: (0-22cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (22-42cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	45	40	Stratum I: (0-20cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	46	40	Stratum I: (0-19cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (19-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	47	35	Stratum I: (0-12cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (12-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	48	8	Stratum I: (0-8cmbs) grayish brown (10YR5/2) silty sandy loam *terminated due to impenetrable root	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	2	49	50	Stratum I: (0-25cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (25-50cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	50	38	Stratum I: (0-18cmbs) grayish brown (10YR5/2) silty sandy loam Stratum II: (18-38cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	51	30	Stratum I: (0-10cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	52	40	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	53	44	Stratum I: (0-24cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (24-44cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	54	40	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	55	-	*Drainage	-
A	2	56	20	Stratum I: (0-20cmbs) light brownish gray (10YR6/2) silty loam *terminated due to impenetrable rock	Negative
A	2	57	35	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	58	31	Stratum I: (0-23cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (23-31cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	59	35	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	60	35	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	61	35	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	62	35	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	63	30	Stratum I: (0-10cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
A	2	64	9	Stratum I: (0-3cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (3-9cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	65	24	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-24cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	66	46	Stratum I: (0-26cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (26-46cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	67	29	Stratum I: (0-29cmbs) light brownish gray (10YR6/2) silty loam *terminated due to impenetrable rock	Negative
A	2	68	40	Stratum I: (0-19cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (19-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	69	50	Stratum I: (0-30cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (30-50cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
A	2	70	50	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-50cmbs) yellowish brown (10YR5/8) sandy clay loam mottled with light brownish gray (10YR6/2) silty clay loam	Negative
A	2	71	18	Stratum I: (0-18cmbs) light brownish gray (10YR6/2) silty loam, compact *terminated due to compact soil	Negative
A	2	72	24	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-24cmbs) yellowish brown (10YR5/8) sandy clay loam, compact *terminated due to compact soil	Negative
A	2	73	22	Stratum I: (0-22cmbs) light brownish gray (10YR6/2) silty loam *terminated due to impenetrable rock	Negative
A	2	74	-	No Dig - Gravel/old parking pad	-
A	2	75	-	No Dig - Gravel and Utilities	-
B	1	1	28	Stratum I: (0-28cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	1	2	50	Stratum I: (0-8cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (8-50cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	3	25	Stratum I: (0-3cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (3-25cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	4	28	Stratum I: (0-4cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (4-28cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	5	34	Stratum I: (0-18cmbs) brown (10YR4/3) brown silty loam Stratum II: (18-34cmbs) yellowish red (5YR4/6) sandy clay loam, heavy gravels from 31-34 cmbs *terminated due to impenetrable gravels, disturbed	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
B	1	6	25	Stratum I: (0-3cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (3-25cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	7	25	Stratum I: (0-2cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (2-25cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	8	8	Stratum I: (0-2cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (2-8cmbs) yellowish brown (10YR5/8) silty loam *terminated due to impenetrable root	Negative
B	1	9	30	Stratum I: (0-2cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (2-30cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	10	34	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (14-34cmbs) light gray(10YR7/1) silty loam	Negative
B	1	11	50	Stratum I: (0-5cmbs) dark gray (10YR4/1) silty loam Stratum II: (5-50cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam and strong brown (7.5YR5/8) silty loam	Negative
B	1	12	52	Stratum I: (0-7cmbs) dark gray (10YR4/1) silty loam Stratum II: (7-52cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam and strong brown (7.5YR5/8) silty loam	Negative
B	1	13	32	Stratum I: (0-12cmbs) dark gray (10YR4/1) silty loam Stratum II: (12-32cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam and strong brown (7.5YR5/8) silty loam	Negative
B	1	14	32	Stratum I: (0-12cmbs) dark gray (10YR4/1) silty loam Stratum II: (12-32cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam and strong brown (7.5YR5/8) silty loam	Negative
B	1	15	50	Stratum I: (0-50cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam, strong brown (7.5YR5/8) silty clay loam, and yellowish red (5YR4/6) silty clay *disturbed	Negative
B	1	16	5	Stratum I: (0-5cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam, strong brown (7.5YR5/8) silty clay loam, and yellowish red (5YR4/6) silty clay *disturbed, compact	Negative
B	1	17	12	Stratum I: (0-12cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam, strong brown (7.5YR5/8) silty clay loam, and yellowish red (5YR4/6) silty clay *disturbed, compact	Negative
B	1	18	25	Stratum I: (0-25cmbs) yellowish brown (10YR5/8) silty loam mottled with gray (10YR6/1) silty loam, strong brown (7.5YR5/8) silty clay loam, and yellowish red (5YR4/6) silty clay *disturbed, compact	Negative
B	1	19	20	Stratum I: (0-20cmbs) light gray (10YR7/1) silty loam	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
B	1	20	25	Stratum I: (0-3cmbs) dark gray (10YR4/1) sandy loam Stratum II: (3-25cmbs) light gray (10YR7/1) silty loam	Negative
B	1	21	22	Stratum I: (0-2cmbs) dark gray (10YR4/1) sandy loam Stratum II: (2-22cmbs) light gray (10YR7/1) silty loam	Negative
B	1	22	22	Stratum I: (0-2cmbs) dark gray (10YR4/1) sandy loam Stratum II: (2-22cmbs) light gray (10YR7/1) silty loam	Negative
B	1	23	20	Stratum I: (0-20cmbs) light gray (10YR7/1) silty loam	Negative
B	1	24	20	Stratum I: (0-20cmbs) light gray (10YR7/1) silty loam	Negative
B	1	25	20	Stratum I: (0-20cmbs) light gray (10YR7/1) silty loam	Negative
B	1	26	20	Stratum I: (0-20cmbs) light gray (10YR7/1) silty loam	Negative
B	1	27	25	Stratum I: (0-2cmbs) dark gray (10YR4/1) sandy loam Stratum II: (2-25cmbs) light gray (10YR7/1) silty loam	Negative
B	1	28	22	Stratum I: (0-2cmbs) dark gray (10YR4/1) sandy loam Stratum II: (2-22cmbs) light gray (10YR7/1) silty loam	Negative
B	1	29	40	Stratum I: (0-10cmbs) pale brown (10YR6/3) silty loam Stratum II: (10-20cmbs) light yellowish brown (10YR6/4) silty loam Stratum III: (20-40cmbs) strong brown (7.5YR5/8) silty clay	Negative
B	1	30	18	Stratum I: (0-10cmbs) pale brown (10YR6/3) silty loam Stratum II: (10-18cmbs) light yellowish brown (10YR6/4) silty loam *terminated due to impenetrable rock	Negative
B	1	31	25	Stratum I: (0-3cmbs) grayish brown (10YR5/2) silty loam Stratum II: (3-25cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	32	30	Stratum I: (0-10cmbs) grayish brown (10YR5/2) silty loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	33	35	Stratum I: (0-15cmbs) grayish brown (10YR5/2) silty loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	34	30	Stratum I: (0-10cmbs) grayish brown (10YR5/2) silty loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	1	35	5	Stratum I: (0-5cmbs) grayish brown (10YR5/2) silty loam mottled with yellowish brown (10YR5/8) silty loam, disturbed *terminated due to impenetrable rock	Negative
B	1	36	15	Stratum I: (0-15cmbs) grayish brown (10YR5/2) silty loam mottled with yellowish brown (10YR5/8) silty loam, disturbed, compact *terminated due to compact soil	Negative
B	1	37	30	Stratum I: (0-30cmbs) grayish brown (10YR5/2) silty loam mottled with yellowish brown (10YR5/8) silty loam, disturbed, compact *terminated due to compact soil	Negative
B	1	38	28	Stratum I: (0-28cmbs) grayish brown (10YR5/2) silty loam mottled with yellowish brown (10YR5/8) silty loam, disturbed, compact *terminated due to compact soil	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
B	1	39	31	Stratum I: (0-20cmbs) dark gray (10YR4/1) sandy loam Stratum II: (20-31cmbs) light gray (10YR7/1) silty loam *terminated due to impenetrable root	Negative
B	1	40	32	Stratum I: (0-20cmbs) dark gray (10YR4/1) sandy loam Stratum II: (20-32cmbs) light gray (10YR7/1) silty loam *terminated due to impenetrable root	Negative
B	1	41	30	Stratum I: (0-20cmbs) dark gray (10YR4/1) sandy loam Stratum II: (20-30cmbs) light gray (10YR7/1) silty loam, compact *terminated due to compact soil	Negative
B	1	42	30	Stratum I: (0-25cmbs) dark gray (10YR4/1) sandy loam Stratum II: (25-30cmbs) light gray (10YR7/1) silty loam, compact *terminated due to compact soil	Negative
B	1	43	23	Stratum I: (0-20cmbs) dark gray (10YR4/1) sandy loam Stratum II: (20-23cmbs) light gray (10YR7/1) silty loam, compact *terminated due to compact soil	Negative
B	1	44	27	Stratum I: (0-27cmbs) grayish brown (10YR5/2) silty clay loam *terminated due to impenetrable root	Negative
B	1	45	15	Stratum I: (0-15cmbs) grayish brown (10YR5/2) silty clay loam *terminated due to impenetrable root	Negative
B	2	1	23	Stratum I: (0-23cmbs) grayish brown (10YR5/2) sandy loam	Negative
B	2	2	27	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (14-27cmbs) light gray (10YR7/1) sandy loam *terminated due to impenetrable rock	Negative
B	2	3	27	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (14-27cmbs) light gray (10YR7/1) sandy loam *terminated due to impenetrable rock	Negative
B	2	4	45	Stratum I: (0-24cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (24-45cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	5	30	Stratum I: (0-10cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	6	10	Stratum I: (0-10cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	7	23	Stratum I: (0-23cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	8	25	Stratum I: (0-25cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	9	12	Stratum I: (0-12cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (12-32cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	10	34	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (14-34cmbs) yellowish brown (10YR5/8) silty loam	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
B	2	11	17	Stratum I: (0-17cmbs) yellowish brown (10YR5/8) sandy loam mottled with gray (10YR6/1) sandy loam and strong brown (7.5YR5/8) sandy loam *terminated due to impenetrable rock	Negative
B	2	12	46	Stratum I: (0-26cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (26-46cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	13	25	Stratum I: (0-20cmbs) dark gray (10YR4/1) sandy loam Stratum II: (20-25cmbs) light gray (10YR7/1) silty loam *terminate due to impenetrable rock	Negative
B	2	14	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/8) sandy clay	Negative
B	2	15	37	Stratum I: (0-17cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (17-37cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	16	35	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (14-35cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	17	13	Stratum I: (0-13cmbs) light gray (10YR7/1) silty loam	Negative
B	2	18	46	Stratum I: (0-26cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (26-46cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	19	46	Stratum I: (0-26cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (26-46cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	20	50	Stratum I: (0-25cmbs) dark gray (10YR4/1) sandy loam Stratum II: (25-50cmbs) light gray (10YR7/1) silty loam	Negative
B	2	21	50	Stratum I: (0-25cmbs) dark gray (10YR4/1) sandy loam Stratum II: (25-50cmbs) light gray (10YR7/1) silty loam	Negative
B	2	22	50	Stratum I: (0-25cmbs) dark gray (10YR4/1) sandy loam Stratum II: (25-50cmbs) light gray (10YR7/1) silty loam	Negative
B	2	23	21	Stratum I: (0-15cmbs) dark gray (10YR4/1) sandy loam Stratum II: (15-21cmbs) light gray (10YR7/1) silty loam *terminated due to impenetrable rock	Negative
B	2	24	50	Stratum I: (0-21cmbs) dark gray (10YR4/1) sandy loam Stratum II: (21-50cmbs) light gray (10YR7/1) silty loam	Negative
B	2	25	35	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (14-35cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	26	50	Stratum I: (0-21cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (21-50cmbs) light gray (10YR7/1) silty loam	Negative
B	2	27	10	Stratum I: (0-10cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	28	10	Stratum I: (0-10cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	29	14	Stratum I: (0-14cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	30	12	Stratum I: (0-12cmbs) grayish brown (10YR5/2) sandy loam *terminated due to impenetrable rock	Negative
B	2	31	35	Stratum I: (0-15cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	32	35	Stratum I: (0-15cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) silty loam	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
B	2	33	-	No Dig - slope	-
B	2	34	-	No Dig - slope	-
B	2	35	-	No Dig - slope	-
B	2	36	50	Stratum I: (0-50cmbs) light gray (10YR7/1) sandy clay mottled with grayish brown (10YR5/2) sandy clay, disturbed	Negative
B	2	37	50	Stratum I: (0-50cmbs) light gray (10YR7/1) sandy clay mottled with grayish brown (10YR5/2) sandy clay, disturbed	Negative
B	2	38	50	Stratum I: (0-50cmbs) light gray (10YR7/1) sandy clay mottled with grayish brown (10YR5/2) sandy clay, disturbed	Negative
B	2	39	50	Stratum I: (0-21cmbs) light gray (10YR7/1) sandy clay mottled with grayish brown (10YR5/2) sandy clay, disturbed Stratum II: (21-50cms) yellowish brown (10YR5/8) silty loam	Negative
B	2	40	50	Stratum I: (0-50cmbs) light gray (10YR7/1) sandy clay mottled with strong brown (7.5YR5/8) sandy clay, disturbed	Negative
B	2	41	50	Stratum I: (0-50cmbs) light gray (10YR7/1) sandy clay mottled with strong brown (7.5YR5/8) sandy clay, disturbed	Negative
B	2	42	37	Stratum I: (0-17cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (17-37cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	43	40	Stratum I: (0-20cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (20-40cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	44	42	Stratum I: (0-22cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (22-42cmbs) yellowish brown (10YR5/8) silty loam	Negative
B	2	45	40	Stratum I: (0-20cmbs) grayish brown (10YR5/2) sandy loam Stratum II: (20-40cmbs) yellowish brown (10YR5/8) silty loam	Negative
C	1	1	13	Stratum I: (0-13cmbs) grayish brown (10YR5/2) sandy loam, moderate gravels, compact	Negative
C	1	2	15	Stratum I: (0-15cmbs) grayish brown (10YR5/2) sandy loam, moderate gravels, compact	Negative
C	1	3	10	Stratum I: (0-10cmbs) grayish brown (10YR5/2) sandy loam, moderate gravels, compact	Negative
C	1	4	10	Stratum I: (0-10cmbs) grayish brown (10YR5/2) sandy loam, moderate gravels, compact	Negative
C	1	5	21	Stratum I: (0-8cmbs) brown (10YR4/3) silty loam Stratum II: (8-21cmbs) yellowish red (5YR58) silty sandy clay, compact *terminated due to compact clay	Negative
C	1	6	22	Stratum I: (0-10cmbs) brown (10YR4/3) silty loam Stratum II: (10-22cmbs) yellowish red (5YR58) silty sandy clay, compact *terminated due to compact clay	Negative
C	1	7	18	Stratum I: (0-16cmbs) brown (10YR4/3) silty loam Stratum II: (16-18cmbs) yellowish red (5YR58) silty sandy clay, compact *terminated due to compact clay	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
C	1	8	21	Stratum I: (0-8cmbs) brown (10YR4/3) silty loam Stratum II: (8-21cmbs) yellowish red (5YR58) silty sandy clay, compact *terminated due to compact clay	Negative
C	1	9	12	Stratum I: (0-12cmbs) brown (10YR4/3) silty loam *terminated due to compact clay	Negative
C	1	10	15	Stratum I: (0-10cmbs) brown (10YR4/3) silty loam Stratum II: (10-15cmbs) yellowish red (5YR58) silty sandy clay, compact *terminated due to compact clay	Negative
C	2	1	-	No Dig - Gravel Road	-
C	2	2	40	Stratum I: (0-19cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (19-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
C	2	3	40	Stratum I: (0-19cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (19-40cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
C	2	4	36	Stratum I: (0-15cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (15-36cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
C	2	5	10	Stratum I: (0-10cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable rock	Negative
C	2	6	10	Stratum I: (0-10cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable rock	Negative
C	2	7	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable rock	Negative
C	2	8	45	Stratum I: (0-25cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (25-45cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
C	2	9	14	Stratum I: (0-14cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable rock	Negative
C	2	10	35	Stratum I: (0-35cmbs) yellowish brown (10YR5/8) sandy clay loam *terminated due to impenetrable rock	Negative
C	2	11	30	Stratum I: (0-10cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
C	2	12	33	Stratum I: (0-13cmbs) light brownish gray (10YR6/2) silty loam Stratum II: (13-33cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
C	2	13	30	Stratum I: (0-5cmbs) light brownish gray (10YR6/2) sandy loam Stratum II: (5-30cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
C	2	14	30	Stratum I: (0-5cmbs) light brownish gray (10YR6/2) sandy loam Stratum II: (5-30cmbs) yellowish brown (10YR5/8) sandy clay loam	Negative
D	1	1	20	Stratum I: (0-20cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	2	17	Stratum I: (0-17cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	3	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	4	25	Stratum I: (0-25cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	5	21	Stratum I: (0-21cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	6	14	Stratum I: (0-14cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	7	20	Stratum I: (0-20cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	8	20	Stratum I: (0-20cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	9	23	Stratum I: (0-23cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	10	15	Stratum I: (0-15cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	11	20	Stratum I: (0-20cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	12	18	Stratum I: (0-18cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	13	25	Stratum I: (0-25cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
D	1	14	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	15	26	Stratum I: (0-26cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	16	35	Stratum I: (0-35cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	17	15	Stratum I: (0-15cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	18	24	Stratum I: (0-24cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	19	18	Stratum I: (0-18cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	20	25	Stratum I: (0-25cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	1	21	22	Stratum I: (0-22cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	2	1	30	Stratum I: (0-30cmbs) brown (10YR5/3) sandy clay loam, compact *terminated due to compact soil	Negative
D	2	2	30	Stratum I: (0-5cmbs) very pale brown (10YR7/3) sandy silt Stratum II: (5-30cmbs) yellowish brown (10YR5/8) sand	Negative
D	2	3	40	Stratum I: (0-20cmbs) very pale brown (10YR7/3) sandy silt Stratum II: (20-40cmbs) yellowish brown (10YR5/8) sand	Negative
D	2	4	12	Stratum I: (0-12cmbs) brown (10YR5/3) sandy clay loam mottled with strong brown (7.5YR5/8) silty clay, compact *terminated due to compact soil	Negative
D	2	5	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	2	6	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	2	7	30	Stratum I: (0-30cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	2	8	20	Stratum I: (0-20cmbs) brown (10YR5/3) sandy clay loam, compact *terminated due to compact soil	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
D	2	9	20	Stratum I: (0-20cmbs) brown (10YR5/3) sandy clay loam, compact *terminated due to compact soil	Negative
D	2	10	30	Stratum I: (0-10cmbs) brown (10YR5/3) sandy loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	11	20	Stratum I: (0-20cmbs) brown (10YR5/3) sandy clay loam, compact *terminated due to compact soil	Negative
D	2	12	35	Stratum I: (0-15cmbs) brown (10YR5/3) sandy loam Stratum II: (15-35cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	13	20	Stratum I: (0-20cmbs) brown (10YR5/3) sandy clay loam, compact *terminated due to compact soil	Negative
D	2	14	30	Stratum I: (0-10cmbs) brown (10YR5/3) sandy loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	15	10	Stratum I: (0-10cmbs) brown (10YR5/3) sandy clay loam, compact, heavy small gravels *terminated due to compact soil and gravels	Negative
D	2	16	20	Stratum I: (0-20cmbs) brown (10YR5/3) sandy clay loam, compact, heavy small gravels *terminated due to compact soil and gravels	Negative
D	2	17	41	Stratum I: (0-21cmbs) brown (10YR5/3) sandy loam Stratum II: (21-41cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	18	30	Stratum I: (0-10cmbs) brown (10YR5/3) sandy loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	19	30	Stratum I: (0-10cmbs) brown (10YR5/3) sandy loam Stratum II: (10-30cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	20	30	Stratum I: (0-8cmbs) brown (10YR5/3) sandy loam Stratum II: (8-30cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	21	30	Stratum I: (0-9cmbs) brown (10YR5/3) sandy loam Stratum II: (9-30cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	22	25	Stratum I: (0-5cmbs) brown (10YR5/3) sandy loam Stratum II: (5-25cmbs) yellowish brown (10YR5/8) sandy loam	Negative
D	2	23	15	Stratum I: (0-15cmbs) yellow (10YR7/6) silty loam mottled with gray (10YR6/1) silty clay loam and strong brown (7.5YR5/8) silty clay loam, compact *terminated due to compact soil	Negative
D	2	24	17	Stratum I: (0-17cmbs) yellow (10YR7/6) silty loam mottled with gray (10YR6/1) silty clay loam and strong brown (7.5YR5/8) silty clay loam, compact *terminated due to compact soil	Negative
D	2	25	20	Stratum I: (0-20cmbs) yellow (10YR7/6) silty loam mottled with gray (10YR6/1) silty clay loam and strong brown (7.5YR5/8) silty clay loam, compact *terminated due to compact soil	Negative

Table 3. Shovel Test Inventory					
Segment	**Transect**	**S.T. #**	**Depth (cmbs)**	**Soil Description**	**Results**
D	3	1	10	Stratum I: (0-10cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	2	13	Stratum I: (0-13cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	3	5	Stratum I: (0-5cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	4	14	Stratum I: (0-14cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	5	13	Stratum I: (0-13cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	6	12	Stratum I: (0-12cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	7	5	Stratum I: (0-5cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	8	10	Stratum I: (0-10cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	9	10	Stratum I: (0-10cmbs) yellowish brown (10YR5/4) silty clay loam, compact *terminated due to compact soil	Negative
D	3	10	27	Stratum I: (0-15cmbs) light yellowish brown (10YR6/4) silty loam Stratum II: (15-27cmbs) strong brown (7.5YR5/8) silty clay loam, compact *terminated due to compact soil	Negative

SUMMARY AND RECOMMENDATIONS

At the request of Garver and the City of Bryant, Flat Earth Archeology conducted a cultural resources survey for the proposed Bryant Parkway Extension (S) Alternative B roadway extension, in Bryant, Saline County, Arkansas. The Project Area surveyed on the roadway extension project consisted of four previously undisturbed segments totaling 1.75 miles (2,810 meters).

Flat Earth Archeology personnel investigated a total of 278 shovel tests locales within the proposed Project Area. Shovel test locales were investigated at a maximum of 20-m intervals along each transect during the pedestrian survey. All the soils from excavated shovel test locales were screened through ¼ inch hardware mesh. The above-ground and subsurface investigation proved negative for cultural materials aside from a galvanized pale found on the surface without providence or context.

A review of the AHPP GIS National Register and Survey Database and the AMASDA database managed by the ARAS indicated there are no historic properties, as defined by 36 CFR 800.16(l)(1), within or proximal to the proposed Project Area. A review of the AMASDA database produced three previously recorded archeological sites within a 1.6 km (1 mi) radius of the proposed Project Area although none were in close proximity to the current project's APE.

Based on the results of the background research and survey, Flat Earth Archeology recommends that the proposed undertaking meets the criteria for a finding of No Historic Properties Affected as per 36 CFR 800.4(d)(1).

In the event of an inadvertent discovery of human remains and/or burial furniture during subsequent development or modification of the Project Area, the proponent should follow the protocols outlined in Act 753 of 1991, as amended (Arkansas Grave Protection Act) and other applicable state and federal laws and regulations. If previously unrecorded buried cultural resources are encountered during project construction, all ground disturbing activities in this area should be halted and the site should be protected until cleared by the appropriate authorities.

DISCLAIMER

There is a realistic limitation involved with standard survey field methodology. Shovel testing is most effective in finding certain types of sites, those with relatively high artifact densities, or those with abnormal soil development such as middens. Thin artifact scatters are often difficult to identify in areas where surface visibility is poor. Furthermore, deeply buried sites are difficult to identify using standard survey methodology. Flat Earth Archeology made a good faith effort to locate cultural resources in the Project Area, but this is not a guarantee that no other cultural resources are present.

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Appendix A: Qualifications for Archeologist

Chris M. Branam, RPA

117 Financial Drive
Cabot, AR 72023
Phone: 501.286.7124 Email: chrisb@flateartharcheology.com

EDUCATION

A.B.D. History Ph.D. University of Arkansas Fayetteville, Arkansas
Dissertation Topic: Small-Scale Slaveholders and Slaves in the Early Twentieth Century Trans-Mississippian West, a Social History of Non-Plantation Slavery in Arkansas and Missouri.

December 2003 University of Arkansas Fayetteville, Arkansas
M.A. in Anthropology (Historic Archeology Emphasis)
Thesis: A Database of Steamboat Wrecks on the Arkansas River between Fort Smith, Arkansas, and Arkansas Post, Arkansas, from 1830-1900.

December 1997 University of Arkansas at Little Rock Little Rock, Arkansas
B.A. in Anthropology
Minor in Philosophy/Religious Studies

RESEARCH INTERESTS

- Historic archeology and nautical archeology
- Research of historic river transportation in Arkansas and the Southeastern United States
- Early American Ceramics
- Late-eighteenth to mid-nineteenth century settlement patterns, economics, cultures, and land use in the American South
- Small-Scale Slaveholders and Slaves in the early nineteenth century Trans-Mississippian West, an Examination of Non-Plantation Slavery in Arkansas and Missouri.
- Eighteenth and nineteenth century distilling processes, drinking habits, and taverns in the southern Colonies/States and Territories (as a part of an Arkansas Humanities Council grant to Black River Technical College located in Pocahontas, Arkansas)
- Class issues and social history related to small-scale slavery in the Old Southwest, particularly in the Arkansas and Missouri Territories (as a part of an Arkansas Humanities Council grant to Black River Technical College and PhD Dissertation)

WORK EXPERIENCE

August 2008 to present **Flat Earth Archeology, LLC** Cabot, Arkansas
Principal Investigator/Archeologist

- Perform archeological surveys and background research for cultural resource management projects in Arkansas and surrounding states
- Perform Phase II testing and Phase III mitigation for cultural resource management projects
- Author reports resulting in archeological investigations and aiding clients with Section 106 or other compliance needs

December 2008 to September 2011 **Arkansas Highway and Transportation Department**
Archeologist

- Perform archeological studies and surveys for various projects in Arkansas
- Research for and author reports resulting from archeological work performed, giving recommendations regarding archeological clearance and site evaluations
- Evaluate and comment on reports by archeological consultants contracted by AHTD

- Give archeological presentations to public and academic conferences

January 2005 to December 2008 **SPEARS, Inc.** West Fork, Arkansas
Archeological Field Supervisor

- Supervised and directed various Section 106 (archeological survey) projects throughout Arkansas, directed fieldwork and research, and authored technical reports for the projects
- Analyzed, researched, and wrote descriptions regarding the cultural significance of selected historic artifacts from the Jacob Wolf House excavations

May 2004 to January 2005 **SPEARS, Inc.** West Fork, Arkansas
Archeological Field Technician

- Worked on a Phase III Archeological Mitigation of four Late Woodland/Early Mississippian sites in Northeastern Arkansas

May 1999 – March 2000 **R. Christopher Goodwin & Assoc.** New Orleans, Louisiana
and May 2002 – August 2002 (seasonal)
Archeological Field Crew Chief

- Worked on various Phase I archeological survey projects for Highway and Pipeline projects in Alabama, Arkansas, Florida, Georgia, Mississippi, Louisiana, South Carolina, Tennessee, and Texas.
- Worked on a Phase III Archeological Mitigation for a Prehistoric site in Northern Tennessee on the Cumberland River for the United States Army Corps of Engineers.

TEACHING EXPERIENCE

- ANTH 2310: Cultural Anthropology. An introduction to the field of cultural anthropology with emphasis on basic anthropological concepts, the nature of culture, the development of civilizations, human social behavior, and the study of people and customs around the world. Pulaski Technical College, North Little Rock, Arkansas.
  (Fall 2005; Spring and Fall 2006; Spring, Summer, and Fall 2007; Spring, Summer, and Fall 2008; Spring, Summer, and Fall 2009; Spring, Summer, and Fall 2010)
- HIST 1113: World Civilizations I. Introduces the major civilizations of the world in their historical context to 1500. University of Arkansas, Fayetteville, Arkansas. (Fall 2008)

PRESENTATIONS

Branam, Chris

2009 *AHTD Policies Regarding Historic Cemeteries and Burials*. Presented at the Memorial in May Cemetery Preservation Conference held in Jonesboro, Arkansas.

2008 *Examining the Motives, Means, and Rhetoric of Disfranchisement in Arkansas, 1888 – 1892*. Paper presented at the Mid-American Conference for History held in Springfield, Missouri.

2008 *The Lubricant That Allowed America to Move West: The Role of Distilled Spirits in the Trans-Mississippian Region during the Early Nineteenth Century*. Paper presented at the Arkansas Historical Association Sixty-Seventh Annual Conference held in Eureka Springs, Arkansas.

2002 *Steamboat Wrecks on the Arkansas River between Fort Smith and Arkansas Post*. Paper presented at the Arkansas Archeological Survey, Fayetteville, Arkansas

1997 *Evolution of the Trireme*. Paper presented at the University of Arkansas at Little Rock Anthropology Symposium held in Little Rock, Arkansas

OTHER TEACHING & WORK-RELATED EXPERIENCE

- History Graduate Teaching Assistant: University of Arkansas, Western Civilization II, Spring 2008
- History Graduate Teaching Assistant: University of Arkansas, Western Civilization I, Fall 2007
- Seasonal Interpreter: Toltec Mounds Archeological State Park, 1997
- Graduate Teaching Assistant: University of Arkansas at Little Rock, Archeology Field School, 1997
- Teaching Assistant: University of Arkansas at Little Rock, Archeology Field School, 1996

AWARDS

2008 Recipient of the Mary D. Hudgins Fellowship in Arkansas History from the University of Arkansas History Department.

1997 Recipient of the Student Fieldwork in Anthropology Award (now known as the Mark J. Hartmann Anthropology Student Fellowship) from the University of Arkansas at Little Rock.

CURRENT PROFESSIONAL MEMBERSHIPS

- Registry of Professional Archaeologists
- Archaeological Institute of America
- Arkansas Historical Association
- Southern Historical Association

PUBLICATIONS

Branam, Chris

2010 "Rethinking Disfranchisement in Arkansas: The Election Law of 1891 and The Poll Tax Amendment of 1892" *Arkansas Historical Quarterly*, Fall 2010.

Branam, Chris

2009 *Slave Codes*. Entry in The Encyclopedia of Arkansas History and Culture. *http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?search=1&entryID=5054*

Branam, Chris

2008 *Election Law of 1891*. Entry in The Encyclopedia of Arkansas History and Culture. *http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?search=1&entryID=4033*

ARCHEOLOGICAL REPORTS AND UNPUBLISHED WORK

Over 500 archeological reports authored and co-authored to date from projects in Alabama, Arkansas, Georgia, Florida, Illinois, Iowa, Kansas, Louisiana, Mississippi, Missouri, Oklahoma, Tennessee, and Texas. Sample reports are available upon request.