Appendix C – Agency and Tribal Coordination

## **Agency Consultation**

Agency consultation letters and exhibits were sent to the following agencies for project coordination. Agency response dates are noted.

Arkansas Department of Health (ADH)

• Response received March 3, 2020

Arkansas Department of Parks, Heritage, and Tourism (ADPHT)

• No response received to date

Arkansas Energy and Environment, Division of Environmental Quality

• Response received June 18, 2020 (from the Arkansas Geological Survey)

Arkansas Game and Fish Commission (AGFC)

• No response received to date

Arkansas Historic Preservation Program (AHPP)

• Response received March 5, 2020

Arkansas Natural Heritage Commission (ANHC)

• Response received May 26, 2020

Federal Emergency Management Agency

- Response received February 19, 2020
- U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)
  - Response received March 23, 2020
- U.S. Army Corps of Engineers (USACE)
  - No response received to date
- U.S. Fish and Wildlife Service (USFWS)
  - Updated Official Species List obtained from IPaC on April 3, 2020 (this is provided in Appendix H)
  - Response received May 4, 2020
  - Response received October 8, 2020
- U.S. Geological Survey (USGS)
  - Response received June 15, 2020





June 18, 2020

Mr. Bill McAbee Environmental Project Manager Garver. LLc. 4701 Northshore Drive North Little Rock, Arkansas 72118

Dear Mr. McAbee:

This is letter is in response to your request for comments on the proposed construction of the Northwest Arkansas National Airport Access road ARDOT No. 090069 & FAP No. NHPP-0004(80). The following comments pertain to the geology of the area of this proposed project.

The entire area is underlain by the Mississippian age Boone Formation. This formation is composed mostly of the carbonate rock limestone with varying amounts of chert. Because limestone is very prone to dissolution by acidic rain water this formation produces what is called karst topography. This includes the formation of numerous sinkholes (which many are visible on the 7.5 topographic maps of the area as small ponds) numerous caves and springs. Also the depth to bedrock can vary by tens of feet over a short horizontal distance.

Because of these potential subsurface issues I would strongly recommend that GPR (Ground Penetrating Radar) be used for potential routes to be able to locate these subsurface geo-hazards and either avoid them or mitigate them before final construction.

If you have any questions please feel free to contact me at 501-683-0117 or by email bill.prior@arkansas.gov.

Sincerely,

William Lee Prior Geology Supervisor 3815 West Roosevelt Road, Little Rock, Arkansas 72204





March 5, 2020

Mr. Bill McAbee Environmental Project Manager Garver, LLC 4701 Northshore Drive North Little Rock, AR 72118

Re: Benton County – General Environmental Assessment Technical Assistance – FHWA Proposed Undertaking – XNA Connector Road Project ARDOT Job Number 090069 AHPP Tracking Number 55434.01

Dear Mr. McAbee:

The staff of the Arkansas Historic Preservation Program (AHPP) reviewed the records for previous investigations and significant archaeological, architectural, and historic resources within or proximal to the proposed study area demarcated on the provided maps. According to our research, there are several archeological and structural resources within the study area that are determined eligible for the National Register of Historic Places (NRHP) or unevaluated for NRHP eligibility. Additionally, the records show few previous cultural resources investigations within the study area.

We look forward to commenting on the recommendations or effect finding from the Federal Highway Administration when that information is available.

Tribes that have expressed an interest in the area include the Cherokee Nation (Ms. Elizabeth Toombs), the Osage Nation (Dr. Andrea Hunter), the Shawnee Tribe (Ms. Tonya Tipton), and the United Keetoowah Band of Cherokee Indians (Ms. Erin Thompson and Charlotte Wolfe). We recommend consultation in accordance with 36 CFR § 800.2(c)(2).

Thank you for the opportunity to review the study area. If you have any questions, please contact Eric Mills of my staff at (501) 324-9784 or eric.mills@arkansas.gov. Please refer to the AHPP Tracking Number above in any correspondence.

Sincerely,

Scott Kaufman Director, AHPP

cc: Dr. Ann Early, Arkansas Archeological Survey

Arkansas Historic Preservation Program 1100 North Street • Little Rock, AR 72201 • 501.324.9880 ArkansasPreservation.com





Asa Hutchinson Governor Stacy Hurst Secretary

Date: May 26, 2020 Subject: Elements of Special Concern XNA Connector Road Project Benton County, AR ANHC No.: P-CF..-20-037

Mr. Ryan Mountain Garver 2049 East Joyce Boulevard Suite 400 Fayetteville, AR 72703

Dear Mr. Mountain:

Staff members of the Arkansas Natural Heritage Commission (ANHC) have reviewed our files for records indicating the occurrence of rare plants and animals, outstanding natural communities, natural or scenic rivers, or other elements of special concern within the XNA Connector Road Project Area. The results of this review have been provided as Geographic Information System (GIS) shapefiles. Documentation is provided to help you interpret the information contained in these files.

Our records indicate the occurrence of ten species of conservation concern within the project area. A list of these elements, with habitat information is attached for your reference. The study site falls within a Karst region of the state characterized by caves, springs, and sinkholes. These habitats support a variety of rare species. Most notable in this area are species associated with streams, springs and spring runs. Four fish and two crayfish species listed in the State's Wildlife Action Plan as species of "Greatest Conservation Concern" have been recorded from the main channels, tributaries and spring runs of Osage Creek, Spring Creek, and Little Osage Creek,

Etheostoma cragini, Arkansas Darter Etheostoma microperca, Least Darter Etheostoma mihileze, Sunburst Darter Nocomis asper, Redspot Chub Orconectes meeki brevis, Meek's Short Pointed Crayfish Orconectes nana, Midget Crayfish

Arkansas darter and least darter are limited to very specific habitat in Benton and Washington Counties. Recent information suggests one or both may represent undescribed species. The Arkansas Highway and Transportation Department (ARDOT) has recently purchased property for mitigation within the Healing Springs complex which supports many of these species. This agency is partnering with ARDOT in the management and protection of the Healing Springs site. Placement and construction of a connector road should seek to minimize impact to the sensitive aquatic habitats in this area.

A list of elements of conservation concern recorded within a five-mile radius of the project area is enclosed for your reference. Represented on this list are elements for which we have records in our database. The list has been annotated to indicate those elements known to occur within a one-mile radius of the project site. A legend is enclosed to help you interpret the codes used on this list.

Please keep in mind that the project area may contain important natural features of which we are unaware. Staff members of the Arkansas Natural Heritage Commission have not conducted a field survey of the study site. Our review is based on data available to the program at the time of the request. It should not be regarded as a final statement on the elements or areas under consideration. Because our files are updated constantly, you may want to check with us again at a later time.

Thank you for consulting us. It has been a pleasure to work with you on this study.

Sincerely,

Cindy Osborne

Cindy Osborne Data Manager/Environmental Review Coordinator

Enclosures: GIS shapefiles

Documentation Project Area Element list with Habitat Information Element List Legend Data Sharing Agreement Invoice

U. S. Department of Homeland Security FEMA Region 6 800 North Loop 288 Denton, TX 76209-3698



## FEDERAL EMERGENCY MANAGEMENT AGENCY REGION 6 MITIGATION DIVISION

# RE: XNA Connector Access Road, ARDOT Job Number 090069 & FAP No. NHPP-0004(80), Benton County, Arkansas

## NOTICE REVIEW/ENVIRONMENTAL CONSULTATION

 $\boxtimes$ 

We have no comments to offer.

We offer the following comments:

## WE WOULD REQUEST THAT THE COMMUNITY FLOODPLAIN ADMINISTRATOR BE CONTACTED FOR THE REVIEW AND POSSIBLE PERMIT REQUIREMENTS FOR THIS PROJECT. IF FEDERALLY FUNDED, WE WOULD REQUEST PROJECT TO BE IN COMPLIANCE WITH E011988 & E0 11990.

Kevin Gambrill, FPA Planning Department 905 Northwest Eighth Street Bentonville, AR 72712-4566 (479) 271-1003

**REVIEWER:** 

 $\square$ 

Colleen Sciano Floodplain Management and Insurance Branch Mitigation Division (940) 383-7257

DATE: February 19, 2020



United States Department of Agriculture

March 23, 2020

Bill McAbee Environmental Project Manager Garver 2049 E. Joyce Blvd. Suite 400 Fayetteville, AR 72703

Dear Mr. McAbee,

This letter is in response to your request for information related to Prime Farmland and Farmland of Statewide Importance for the proposed XNA Connector Road alternatives located in Benton County, Arkansas. Please find enclosed form NRS-CPA-106 listing each of the alternatives. A map showing the location of areas of Prime Farmland is also enclosed.

Should you have any questions or need additional information, please call me at (501) 301-3163 or email at <a href="mailto:edgar.mersiovsky@usda.gov">edgar.mersiovsky@usda.gov</a>.

Sincerely,

Edgar P. Mersiovsky State Soil Scientist

Enclosure





# Farmland Classification of Soils Coordination - Page 8 of 18 XNA Connector Road Benton County, Arkansas



0.5	5	0.2	75	0	0.	55 1.1	1.65	2.2
E						-		Miles

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

### FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

NRCS-CPA-106

(Rev. 1-91)

PART I (To be completed by Fed		3. Date of Land Evaluation Request				4. Sheet 1	4. Sheet 1 of		
1. Name of Project       2. Type of Project				5. Federal Agency Involved					
				6. County and State					
PART II (To be completed by NR		1. Date Request Received by NRCS         2. Pers			2. Perso	on Completing Form			
<ol> <li>Does the corridor contain prime, unio (If no, the FPPA does not apply - Do</li> </ol>	que statewide or local ir not complete additiona	nportant farmland	? YES NO .			4. Acres Irrigated Average Farm Size			
5 Major Crop(s)		6. Farmable La	, nd in Gover	nment Jurisdiction		7. Amoun	t of Farmland As I	Defined in FPPA	
Acres:				%			Acres: %		
. Name Of Land Evaluation System Used 9. Name of Loo			al Site Asse	Site Assessment System 10			0. Date Land Evaluation Returned by NRCS		
PART III (To be completed by Fe	deral Agency)			Alternative Corr			idor For Segment		
TART III (TO be completed by Te	ueral Agency)			New Location A	Partia	I New A	Improve Existing	g Corridor D	
A. Total Acres To Be Converted Dire	ctly								
B. Total Acres To Be Converted Indir	ectly, Or To Receive	Services							
C. Total Acres In Corridor									
PART IV (To be completed by N	RCS) Land Evaluat	ion Informatio	n						
A. Total Acres Prime And Unique Fa	armland								
B. Total Acres Statewide And Local	Important Farmland								
C. Percentage Of Farmland in Coun	ity Or Local Govt. Uni	t To Be Converte	ed						
D. Percentage Of Farmland in Govt.	Jurisdiction With Same	e Or Higher Rela	tive Value						
PART V (To be completed by NRCS	) Land Evaluation Info	ormation Criterio	n Relative						
value of Farmland to Be Serviced of	or Converted (Scale o	of 0 - 100 Points	)						
PART VI (To be completed by Fed	eral Agency) Corrido	or CER 658 5(c))	Maximum						
Assessment Criteria (mese criteri	a ale explained in 7	CFK 038.3(C))	Points						
1. Area in Nonurban Use			15						
2. Perimeter in Nonurban Use	mad		20					+	
3. Percent Of Corridor Being Far	mea		20						
4. Protection Provided By State 7	And Local Governmen	L	20						
5. Size of Present Farm Unit Con	npared to Average		10						
6. Creation Of Nonfarmable Farm	nland		25						
7. Availablility Of Farm Support S	Services		5						
8. On-Farm Investments			20						
9. Effects Of Conversion On Fari	m Support Services		25						
10. Compatibility With Existing Ag	gricultural Use		10						
TOTAL CORRIDOR ASSESSME	ENT POINTS		160						
PART VII (To be completed by Federal Agency)									
Relative Value Of Farmland (From Part V)									
Total Corridor Assessment (From Part VI above or a local site assessment)									
TOTAL POINTS (Total of above 2 lines)									
1. Corridor Selected:	<ol> <li>Total Acres of Farr Converted by Project</li> </ol>	nlands to be ect:	3. Date Of	Selection:	4. Was	A Local Si	te Assessment Us	ed?	
						YES			

5. Reason For Selection:

DATE

## **CORRIDOR - TYPE SITE ASSESSMENT CRITERIA**

The following criteria are to be used for projects that have a linear or corridor - type site configuration connecting two distant points, and crossing several different tracts of land. These include utility lines, highways, railroads, stream improvements, and flood control systems. Federal agencies are to assess the suitability of each corridor - type site or design alternative for protection as farmland along with the land evaluation information.

(1) How much land is in nonurban use within a radius of 1.0 mile from where the project is intended?
 More than 90 percent - 15 points
 90 to 20 percent - 14 to 1 point(s)
 Less than 20 percent - 0 points

(2) How much of the perimeter of the site borders on land in nonurban use?
More than 90 percent - 10 points
90 to 20 percent - 9 to 1 point(s)
Less than 20 percent - 0 points

(3) How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last 10 years?

More than 90 percent - 20 points 90 to 20 percent - 19 to 1 point(s) Less than 20 percent - 0 points

(4) Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland? Site is protected - 20 points

Site is not protected - 0 points

(5) Is the farm unit(s) containing the site (before the project) as large as the average - size farming unit in the County ? (Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage or Farm Units in Operation with \$1,000 or more in sales.) As large or larger - 10 points

Below average - deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more below average - 9 to 0 points

(6) If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?

Acreage equal to more than 25 percent of acres directly converted by the project - 25 points Acreage equal to between 25 and 5 percent of the acres directly converted by the project - 1 to 24 point(s) Acreage equal to less than 5 percent of the acres directly converted by the project - 0 points

(7) Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?
 All required services are available - 5 points
 Some required services are available - 4 to 1 point(s)
 No required services are available - 0 points

(8) Does the site have substantial and well-maintained on-farm investments such as barns, other storage building, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures? High amount of on-farm investment - 20 points Moderate amount of on-farm investment - 19 to 1 point(s) No on-farm investment - 0 points

(9) Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area? Substantial reduction in demand for support services if the site is converted - 25 points Some reduction in demand for support services if the site is converted - 1 to 24 point(s) No significant reduction in demand for support services if the site is converted - 0 points

(10) Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use? Proposed project is incompatible to existing agricultural use of surrounding farmland - 10 points Proposed project is tolerable to existing agricultural use of surrounding farmland - 9 to 1 point(s) Proposed project is fully compatible with existing agricultural use of surrounding farmland - 0 points

## Mountain, Ryan C.

From: Sent: To: Subject:	Lewis, Lindsey <lindsey_lewis@fws.gov> Monday, May 4, 2020 3:05 PM Mountain, Ryan C. Re: [EXTERNAL] Project: XNA Access - NEPA - File Transfer - XNA Connector Rd ARDOT No. 090069 - Request for Technical Assistance</lindsey_lewis@fws.gov>
Follow Up Flag:	Follow up
Flag Status:	Flagged

Ryan,

The Service has reviewed the information you provided in consideration of your request for technical assistance received on Friday, April 24, 2020. We offer the following for your consideration.

We would like to conduct a site visit prior to the finalizing of any determinations in accordance with Section 7 of the Endangered Species Act, so that they Service may adequately assess both the alternatives and any potential mitigation needs related to federally listed species. Our preliminary thoughts, based off the alternative descriptions and aerial/topographic maps, is that option 2, utilizing a mostly existing alignment and having a minimal footprint and effects to listed species, would be preferred. It is likely that cavefish occur within the karst under all three proposed routes. We recommend that all springs and any conduits that are encountered before or during construction be surveyed. The Service offers our assistance with conducting these surveys as soon as we are able to resume field work following the Covid-19 shutdown. If there is a more immediate need to survey these sites and complete the assessment, please let us know and we will make every effort to either participate or coordinate with you on completing the necessary surveys.

Thank you for the opportunity to review this action and provide you with assistance early in the consultation process. Please let me know if you have any questions or if we can be of any further assistance.

Thanks,

Lindsey Lewis Biologist

US Fish & Wildlife Service Arkansas Field Office 110 South Amity Rd., Suite 300 Conway, Arkansas 72032

(501) 513-4489 - voice (501) 513-4480 - fax Lindsey\_Lewis@fws.gov http://www.fws.gov/arkansas-es/

NOTE: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOLA) and may be disclosed to third parties.

From: Ryan Mountain <RCMountain@GarverUSA.com>
Sent: Friday, April 24, 2020 3:40 PM
To: Lewis, Lindsey <lindsey\_lewis@fws.gov>
Subject: [EXTERNAL] Project: XNA Access - NEPA - File Transfer - XNA Connector Rd. - ARDOT No. 090069 - Request for
Technical Assistance

IMPORTANT: Click a link below to access files associated with this transmittal that came in through the Garver Info Exchange web site.

### Download all associated files

Additional links: Reply to All

Project Name:	XNA Access - NEPA
Project Number:	17017600
From:	Ryan Mountain (Garver)
То:	Lindsey Lewis (US Fish and Wildlife Service)
CC:	Kayti.Ewing@ardot.gov; Bill McAbee (Garver)
Subject:	XNA Connector Rd ARDOT No. 090069 - Request for Technical Assistance
Purpose:	For your review and comment
Sent via:	Info Exchange
Expiration Date:	6/23/2020
Remarks:	Lindsey,
	Attached is the Request for Technical Assistance for this XNA Connector Road project. Please let us know if you have any questions or need additional information. Maybe when things get back to normal we can meet you out there.
	Have a good weekend.
	Thanks! Ryan

### **Transferred Files**

NAME	ТҮРЕ	DATE	TIME	SIZE
Transmittal - 00003.pdf	PDF File	4/24/2020	3:39	68 KB
			PM	
XNA Connector Rd USFWS	PDF File	4/24/2020	1:24	24,727
2020-4-24 RTA.pdf			PM	КВ



Appendix C: Agency & Tribal Coordination - Page 13 of

# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Arkansas Ecological Service Field Office 110 South Amity Road, Suite 300 Conway, Arkansas 72032

October 8, 2020

Consultation Code: 04ER1000-2020-SLI-0029

**Ryan** Mountain Senior Environmental Scientist Garver, LLC 2049 E. Joyce Blvd. Suite 400 Fayetteville, Arkansas 72703

Dear Mr. Mountain,

The U.S. Fish and Wildlife Service (Service) is responding to your request for technical assistance dated April 24, 2020, regarding the Environmental Assessment (EA) for the XNA Connector Road project located near Cave Springs, Benton County, Arkansas. The project was described and assessed as follows (abbreviated):

The Federal Highway Administration (FHWA), in cooperation with the Arkansas Department of Transportation (ARDOT), are proposing to prepare an environmental Assessment (EA) for approximately four miles of new highway for a connector road from the Springdale Northern Bypass to the Northwest Arkansas National Airport (XNA). The project is currently in the planning stages of its development and ARDOT has retained Garver to conduct a habitat assessment and complete environmental documentation. This report summarizes our findings.

Site investigations of the study corridors for three alternatives being evaluated in the EA were conducted between late January and early February 2020. All areas where construction and/or physical disturbance may occur for each alternative are included in the study corridors (i.e., within the proposed right-of-way) as shown in Figures 1-3. The corridors were visually inspected for the New Location Alternative and Partial New Alternative. The corridor associated with the Improve the Existing Highways Alternative was evaluated from existing public right-of-way. This habitat assessment did not include official surveys for federally listed species; however, two occurrences of threatened and endangered species adjacent to the existing alignment of State Highway 264 has been documented in the Cave Springs Area Karst Resources Conservation Initiative. Several springs and seeps were identified during the field investigation. Additionally, losing streams have been documented in Benton County. The official species list indicates that no critical habitat is located within the study area.

#### Mr. Ryan Mountain

The U.S. Fish and Wildlife Service (Service) has reviewed the EA and performed an on-site assessment of the proposed alignments. Based on the information you provided and our assessment, we believe that all three of the alternatives have the potential to impact federally listed species and karst habitats. Each of the proposed alignments will cross through areas having karst features, such as springs, caves, and losing streams. We have no records of listed species presence on any of the three proposed routes; however, these areas are surrounded on all sides by Ozark Cavefish (*Amblyopsis rosae*) populations and we have Benton County Cave Crayfish (*Cambarus aculabrum*) records to the southeast. Therefore, the best option for minimizing the effects and avoiding species would be to follow an existing alignment to the greatest extent possible where previous habitat modifications and on-going disturbances have already occurred and currently exist.

Further, this region has been experiencing rapid growth and development and it is expected to only increase into the near future. In addition to the proposed XNA connector road, we have received proposals for widening Highway 112, construction of a bypass around Cave Springs, and building a wastewater line from the city of Cave Springs to the Northwest Arkansas Conservation Authority (NACA). The cumulative effects of these developments and the supporting infrastructure is a concern for conservation and protection of at-risk species. Therefore, considering the potential effects of all three alignments, the Service recommends that in order to minimize impacts to listed species, ARDOT should coordinate the paths of the Cave Springs Bypass, widening of Highway 112, and construction of the XNA connector road to overlap as much as possible and follow alignments being proposed for other actions, such as NACA. In addition, we recommend following karst best management practices consistent with those previously developed for the Cave Springs Cave Recharge area.

The Service appreciates the opportunity to provide early comments on this proposed action and looks forward to assisting you further as the project development and environmental review progresses. For further assistance or if you have any questions, please contact Lindsey Lewis at (501) 513-4489 or lindsey lewis@fws.gov.

Sincerely,

Melvin L. Tobin Field Supervisor

cc: Project File Read File

Filename: C:\Users\lilewis\Documents\PROJECTS\FY2021\ARDOT\XNA\AFO Letter - XNA EA - Comments.docx



United States Department of the Interior U.S. GEOLOGICAL SURVEY Lower Mississippi Gulf Water Science Center Fayetteville Office 700 West Research Center Blvd. Fayetteville, Arkanas 72701

Date:15 June 2020

Phillip D. Hays, Ph.D. Hydrologist, U.S. Geological Survey 216 Gearhart Hall University of Arkansas Fayetteville, AR 72701

Mr. Bill McAbee Environmental Project Manager Garver LLC 4701 Northshore Drive North Little Rock, Arkansas 72118

Dear Mr. McAbee:

We tender this letter in response to your request for comments on the proposed construction of the Northwest Arkansas National Airport Access road ARDOT No. 090069 & FAP No. NHPP-0004(80). Our comments relate to the hydrogeology of the proposed project area.

The U.S. Geological Survey is a science agency and has no policy or regulatory responsibility or authority in NEPA or other determinations. As such, USGS has no position on activities such as road construction but can collect and provide data to inform and aid planning of policy, resource-protection, management, and development approaches and can provide science-based interpretations on potential environmental/hydrologic effects as requested. As our partner agency, the Arkansas Geological Survey, has commented, the area of interest is an area of karst terrane. Karst terrane is defined by the presence of soluble bedrock, in this case limestone, in which water flowing along pre-existing porous zones presented by bedding planes, faults, fractures, and other features has enhanced porosity to create a groundwater hydrologic system that includes an important component of focused, conduit flow. Karst groundwater flow is distinct from typical, diffuse-flow groundwater systems in that karst groundwater flow velocities can be orders of magnitude greater, often exceeding hundreds to thousands of feet per day. Groundwater in karst terrane is in close connection with surface water, with abundant exchange back and forth between the surface-water and groundwater regimes (Hays and others, 2016). Karst development exerts important controls over patterns of groundwater and ultimately surface-water flow. The karst terrane of the area of interest defines the nature of potential environmental concerns.

Numerous studies and data-collection efforts near the potential highway alignments have focused on Benton and Washington Counties and recharge areas of some springs delineated by dye tracing, including studies specifically driven by construction and development efforts. Thomas Aley has conducted many of these investigations, including studies relating to the Northwest Arkansas Regional Airport (Aley (1992); six alternative highway corridors connecting the airport to nearby cities (Aley and others, 2001); recharge area delineation of Cave Spring and Civil War Cave (Aley and others, 2014); and Centerton Fish Hatchery Spring recharge area delineation (Aley and Aley, 2014). Dr. Van Brahana has conducted and supervised research in the wider area including karst inventories and recharge delineations (Brahana, 1995; Brahana, 1997; Brahana and others, 1999; Brahana and others, 2000; Peterson and others, 2002). Borehole geophysical data were presented by Stanton (1999). Arkansas Water Resources Center conducts periodic water-quality monitoring in the area on Osage and Spring Creeks (see Haggard, 2010; https://arkansas-water-center.uark.edu/research/nwa-monitoring.php) and Cave Springs Lake (https://arkansas-water-center.uark.edu/research/cave-springs.php). Unpublished University of Arkansas graduate research theses (Williams, 1991; Gillip, 2007) contain relevant karst recharge characteristics and groundwatersurface water interaction data, as do USGS published reports by Gillip and others (2009), Freiwald (1987) and Moix and others (2003). These reports document the well-developed karst nature of the area, although comprehensive data are not available for the complete area defined by the current proposed highway alignments. Groundwater for human use is of secondary importance in the area of interest; public water supply from Beaver Lake addresses most all domestic and commercial water-use needs there. Groundwater is used on a relatively minor scale for agricultural and home-garden type applications. Groundwater in the area of interest is very important from an environmental and ecosystem-service standpoint, although this has not been economically quantified. Good groundwater quality is essential in maintaining stream, spring, and karst cave environments that support healthy ecosystems, endangered species, recreational, and esthetic values.

Karst groundwater systems are susceptible to changes in recharge caused by changes in land-surface cover and changes in drainage; these systems are also susceptible to surface-derived contamination because focused flow paths—including karst features such as sinkholes, losing-stream segments, and vug and cave conduits—rapidly transmit surface water to groundwater aquifers (Adamski and others, 1997; Knierim and others; 2015; Hays and others, 2016).

Environmental concerns focus on two areas: 1) potential physical hydrologic effects on recharge, groundwater levels, and associated down-gradient impacts on maintenance of stream flow and spring discharge; and 2) potential water-quality effects. Regarding effects on physical hydrologic characteristics and groundwater recharge, reductions of recharge could result from construction of impermeable surfaces and drainage structures, changes in areal distribution or elevations of recharge, and changes in land use and land cover. Such changes can alter groundwater flow or change the proportion of groundwater moving by diffuse flow pathways versus focused-flow pathwaysaltering the fundamental karst hydrologic budget, reduce groundwater levels in cave and conduit systems, reduce spring flows, increase stream flow during high-flow and flood events, reduce stream flow during dry season, and reduce maintenance of stream temperatures year-round. Such effects can be brought about not only directly by road construction, but by land development that can follow construction of a new road—particularly if numerous exits or full access are available. Engineering practices are available that minimize impacts to groundwater recharge. Although not complete, the ASTM Draft D18.90 Karst Standards--Geotechnical Characterization of Karst for Construction Activities may offer guidance for these approaches after these standards are finalized. Regarding potential water-quality impacts, the denudation and modification of land associated with construction and development, alteration of karst land cover and surfaces, exposure of plugged sinkholes and covered fractures, the introduction of new potential contamination sources and roadway spills, can greatly impact groundwater and connected surface-water quality, and karst environments. Sediment is a major karst subsurface and stream contaminant. Gillip (2007) observed deposition of up to 8 ft of sediment during individual storm events through large sections of Civil War Cave during periods of active construction and development and road building in the recharge area. Nutrient, organic, and trace-metal contaminants can also be of concern during and after construction. These contaminants may impact the karst hydrologic system on a chronic time scale as contaminants are added over time to ultimately overcome the system's natural holding and processing capacity such is often the case for nutrients or trace metals, or contaminants can be introduced on an acute scale such is the case for many roadway spills. The physical alterations that change flow characteristics of the karst system can exacerbate the already high susceptibility to water-quality impacts.

A final set of concerns may be considered proximate rather than direct and are related to the availability of knowledge needed to best understand impacts. In general concern exists regarding the lack of existing data for the specific area of the potential alignments area. Questions that should be addressed prior to construction: Will a focused karst inventory be conducted? Has a comprehensive assimilation of available data been conducted? Will a data-gap analysis be conducted?

Thank you for the opportunity to interact with you during the process and provide comment on potential environmental effects. We would be glad to provide additional detail if needed. Please feel free to contact me at 479-236-1166 or <u>pdhays@usgs.gov</u>.

Best regards,

Phillip D. Hays, Ph.D.

#### References

- Adamski, J.C., Petersen, J.C., Freiwald, D.A., and Davis, J.V., 1995, Environmental and hydrologic setting of the Ozark Plateaus study unit, Arkansas, Kansas, Missouri, and Oklahoma: U.S. Geological Survey Water-Resources Investigation Report 94-4022, 9 p.
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## **Tribal Consultation**

Tribal consultation letters and exhibits were sent to the following tribes for the project. Tribal response dates are noted.

Caddo Nation

• No response received to date

Osage Nation

• Response received January 11, 2020. Letter not included due to sensitive historic property information.

Shawnee Tribe

• No response received to date

United Keetoowah Band of Cherokee Indians in Oklahoma

• No response received to date