Draft Environmental Assessment

C&H Hog Farms

Newton County, Arkansas

Prepared by:

United States Department of Agriculture Farm Service Agency

United States Small Business Administration

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Abbreviations and Acronyms

ADEQ	Arkansas Department of Environmental Quality
AHPP	Arkansas Historic Preservation Program
ANHC	Arkansas Natural Heritage Commission
ANRC	Arkansas Natural Resources Commission
APE	area of potential effect
BCRET	Big Creek Research and Extension Team
bgs	below ground surface
CAFO	Concentrated Animal Feeding Operation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNMP	Certified Nutrient Management Planner
col	fecal bacteria colonies
CWA	Clean Water Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ERI	electrical resistivity imaging
ERW	Extraordinary Resource Waters
ESA	Endangered Species Act
ESW	Ecologically Sensitive Waterbodies
FLP	Farm Loan Program
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
GPR	ground penetrating radar
HDPE	high-density polyethylene
HEL	Highly Erodible Land
HELC	Highly Erodible Land Conservation
HUC	hydrologic unit code
mg/L	milligrams per liter
ml	milliliters
mm	millimeter
MMP	Mortality Management Plan
N	nitrogen
NAWQA	National Water Quality Assessment
NEPA	National Environmental Policy Act
NH_3	ammonia
NH_4	ammonium
NHPA	National Historic Preservation Act
NMP	Nutrient Management Plan
NO_2	nitrite
NO_3	nitrate

NOC	Notice of Coverage
NOI	Notice of Intent
N-org	organic nitrogen
NPEDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSW	Natural and Scenic Waterways
P	phosphorus
P-Index	Phosphorus Index
PL	Public Law
RUSLE-2	revised universal soil loss equation
SBA	Small Business Administration
sf	square foot
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
TMDL	total maximum daily load
TSP	technical service provider
USACE	United States Army Corps of Engineers
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area

1. INTRODUCTION

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) Farm Loan Programs (FLP) and the Small Business Administration (SBA) have jointly prepared this Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) (Public Law [PL] 91-190) in response to the Court's holding in *Buffalo River Watershed Alliance v. United States Dep't of Agriculture*, No. 4-13-cv-450-DPM (Eastern District Arkansas), that the FSA and SBA issued guarantees to Farm Credit Services of Western Arkansas for that bank's loans to C&H Hog Farms for the construction of a privately owned hog farm near Mt. Judea in Newton County, Arkansas, without first fully complying with the NEPA.

Consistent with the Court's ruling, NEPA, the implementing regulations adopted by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500-1508), and FSA and SBA rules and regulations, this EA examines the environmental effects of C&H Hog Farms.

1.1 Background

1.1.1 FSA Farm Loan Programs

The FSA's FLP provides loans and loan guarantees to farmers and ranchers, who are unable to obtain credit elsewhere to start, purchase, sustain, or expand operations. Unlike loans from a commercial lender, FSA loans provide temporary credit, with the goal to aid producers who are unable to obtain a loan without a guarantee, in establishing credit from a commercial lender. The Guaranteed Loan Program loans are made and serviced by commercial lenders. FSA guarantees the lender's loan against loss, up to 95 percent. The FLP requires extensive due diligence including financial and land ownership history investigation, production reporting, and environmental compliance documentation. Administration of the FLP is described in 7 CFR 761, and FSA Handbooks *1-FLP General Program Administration* and *2-FLP Guaranteed Loan Making and Servicing*.

1.1.2 Small Business Administration Loans

The SBA provides a number of financial assistance programs for small businesses that are designed to meet key financing needs. Under the SBA Guaranteed Loan Programs, the SBA does not make direct loans to small businesses but, rather, in accordance with applicable regulations set out in 13 CFR Part 120, issues guarantees to certain private lenders that extend loans to eligible small businesses.

1.1.3 C&H Hog Farms

C&H Hog Farms (AFIN 51-00164, Permit No. ARG590001) is a Concentrated Animal Feeding Operation (CAFO) located approximately 0.7 mile west of Mount Judea in Newton County, Arkansas. Using loans from Farm Credit Services of Western Arkansas backed by guarantees from the SBA and FSA, the owners of C&H Hog Farms purchased 23.43 acres and constructed new facilities on that site including gestational and farrowing barns and two waste holding ponds. Waste from the farm is applied as fertilizer to nearby land. ***Section 2.1*** provides a detailed description of facilities and operations.

The farm site is located on an approximately 23-acre parcel in the southwest ¼ of the northwest ¼ of Section 26, Township 15 North, Range 20 West of Newton County, Arkansas (see Map 1 in Appendix A).

Construction of the facilities began in 2012 and was completed in April 2013. The site is generally flat, with elevations ranging from 940 to 960 feet above mean sea level. Prior to construction, the site was partially wooded. A logging road extended generally south from County Road 6335 through the western third of the site and a number of other smaller roads ran through the tract. Barns and holding ponds were built in a clearing that was enlarged to accommodate the facilities. Approximately 12.5 acres were cleared for facilities construction. Map 2 (Appendix A) shows aerial photographs of the site before and after facilities construction. The facilities are located approximately 355 feet northwest of an unnamed tributary of Big Creek. Big Creek is located approximately 2,150 feet east of the barns and flows into the Buffalo River approximately 6.8 river miles north.

C&H Hog Farms Permitting and Compliance History

Beginning in May of 2000, three of the owners of C&H Hog Farms operated a nearby sow farrowing facility called C&C Hog Barn (AFIN: 51-00020, Permit No. 3540-WR-4) (ADEQ 2012a). That operation used three buildings to house 312 sows and 300 weaner pigs and land applied waste to 616 acres of pasture and hayland (ADEQ 2012b). This facility was closed after the C&H Hog Farms began operation. In March of 2014, the Arkansas Department of Environmental Quality (ADEQ) conducted a compliance inspection of C&C Hog Barn Facilities and documented that the facility was no longer in operation, the holding pond and settling basin had been backfilled and vegetated, and the buildings remained in place (ADEQ 2014a). There were no civil or criminal legal actions involving environmental protection laws or regulations against C&H Hog Farms applicants (ADEQ 2012a).

CAFOs are regulated by the United States Environmental Protection Agency (EPA) under the Clean Water Act (CWA) (PL 107-303) to control the discharge of pollutants into surface waters through issuance of National Pollutant Discharge Elimination System (NPDES) Permits. In Arkansas, the EPA delegates its authority for NPDES permitting to the Arkansas Department of Environmental Quality (ADEQ). In June of 2012, C&H Hog Farms submitted a Notice of Intent (NOI) to ADEQ for coverage under a NPDES General Permit for its facilities and operations (ADEQ 2012a). The NOI included a major construction approval application for facilities including waste holding ponds and gestational and farrowing barns that would house 6,503 swine, which would generate 2,090,181 gallons of waste annually. A description of the facilities, including extensive mitigation and monitoring requirements associated with the permit, is provided in ***Section 2.1***. The application included the following sections:

- Section A: ADEQ Application including NPDES Notice of Intent Application for coverage under a NPDES General Permit ARG59000, NPDES Permit Application Form 1, and EPA Form 2B
- Section B: ADEQ Applicant Disclosure Documentation
- Section C: Design Report including a summary of design, calculations of waste production, and maps
- Section D: Site Specific Information including well logs, results of geotechnical testing
- Section E: Facility Engineering Plans
- Section F: Technical Specifications
- Section G: Operations and Maintenance Guidelines and Facility Logs
- Section H: Nutrient Management Plan (NMP), prepared in accordance with Arkansas Pollution Control and Ecology Commission Regulation 5 and USDA Natural Resources Conservation Service (NRCS) conservation practice standard

The NOI was published on the ADEQ website and was made available for a 30-day public review and comment period in compliance with Section 5.1 of NPDES General Permit ARG59000. No comments were received (ADEQ 2013a). A Notice of Coverage (NOC) for NPDES General Permit ARG590000 was issued by the ADEQ on August 3, 2012 (ADEQ 2012c).

The FSA and the SBA received applications from Farm Credit Services of Western Arkansas requesting guarantees for loans for C&H Hog Farms. The FSA prepared a Class II EA pursuant to its regulations related to providing financial assistance to livestock-holding facilities exceeding certain threshold capacities as defined by 7 CFR 1940.312(c). Class II EAs are prepared for activities, including Farm Loan Program Activities, that do not qualify for a Categorical Exclusion and exceed thresholds set for preparation of Class I EAs, which are prepared for certain small scale activities as defined in 7 CFR 1940.311. The Class II EA process is documented in FSA Handbook *1-EQ (Revision 2), Environmental Quality Programs*. A notice of the availability of the EA was published on August 6 through 8, 2012 in the Arkansas Democrat-Gazette and the draft EA was made available for review until August 23, 2012. A Finding of No Significant Impact (FONSI) was signed by the FSA on August 25, 2012. A notice of the FONSI availability was published in the Arkansas Democrat-Gazette from August 25 through 27, 2012. The length of these review periods was in compliance with FSA policies, procedures, and regulations. The notice announced that the FSA would accept comments on the FONSI and EA through September 11, 2012. No comments were received on the draft EA or the FONSI during the public comment periods.

On November 16, 2012, the SBA issued a 75 percent guarantee to Farm Credit Services for that bank's $2,318,200 loan to C&H Hog Farms. On December 17, 2012, the FSA issued a 90 percent guarantee to Farm Credit Services for that bank's $1,302,000 farm loan to C&H Hog Farms.

The loans were used to purchase land and to construct farrowing and gestational barns and waste holding ponds. Construction began in December of 2012 and was completed in April 2013. Operations began in April of 2013.

In August of 2013, a complaint was filed against the SBA and the FSA in U.S. District Court of the Eastern District of Arkansas, Western Division (4:13-CV-450 DPM) by environmental groups seeking declaratory and injunctive relief on a number of claims. On December 2, 2014, the Court issued an order holding that the SBA and the FSA had failed to comply with the requirements of the Endangered Species Act (ESA [PL 93-205]) and NEPA, and enjoining the Agencies from making payment on their loan guarantees pending compliance with both acts. The order states that although the C&H facility has been constructed and is operational, "the agencies can still take the hard look at C&H's environmental consequences." All other claims set forth in the complaint were dismissed.

Although the Court enjoined the FSA and the SBA from making any payments on loan guarantees should the operators default, the farm operations continue in accordance with the terms of the facility's NPDES General Permit. Its owners have submitted required annual reports of activities in required by that permit.

On February 10, 2014, C&H Hog Farms submitted a Major Modification Request by submitting an NOI and revised Nutrient Management Plan (NMP). The revision was requested to allow a Vacuum Tanker to apply waste to Fields 7-9 (ADEQ 2014b). This method was previously approved for Fields 1-4 and 10-14. Section M of the NMP was revised to reflect this change. ADEQ accepted public comments on the

revised NMP from February 19 to March 24, 2014 and held one public meeting. ADEQ issued a NOC for the Substantial Change effective June 4, 2014 (ADEQ 2014c).

From April 15 through 17, 2014, the EPA Region 6 Compliance Assurance and Enforcement Division made an unannounced inspection to determine compliance with the facility's ADEQ General Permit (Tracking Number ARG590001). The inspection included review of the physical site conditions, required recordkeeping, and soil and water sampling. Waste holding ponds were found to be in good condition, with turf reinforcement mats installed on the inside of the holding ponds to establish vegetative cover and control erosion. The ponds were found to have adequate capacity to contain a 25-year 24-hour storm event. The operators planted approximately 1,000 loblolly pine (*Pinus taeda*) trees around the perimeter of the facility. Water samples were collected from various streams upgradient and downgradient of the facility. Soil samples were taken from all land applications sites that were approved at that time. No areas of concern were identified and it was noted that recordkeeping was well managed and available on-site (EPA 2014).

On February 26, 2015, C&H submitted a Major Modification Request by submitting an NOI and revised NMP (ADEQ 2015a). The revision was requested to allow land application of wastewater via Tank Wagon to be used in Waste Pond 2. This method was previously approved for Waste Pond 1. Section M of the NMP was revised to reflect this change. ADEQ accepted public comments on the revised NMP from March 18, 2015 through April 20, 2015 and held one public meeting. ADEQ issued a NOC for the Substantial Change effective May 12, 2015 (ADEQ 2015b).

On May 7, 2015, C&H Hog Farms submitted a Major Modification Request to ADEQ to install 60-millimeter (mm) high-density polyethylene (HDPE) liners over a geotextile base material in both waste ponds and to install an 80-mm HDPE cover and methane flare system on Pond 1 (ADEQ 2015c). These modifications would reduce the potential for seepage of wastes into groundwater, would control odor, and would convert methane into carbon dioxide, a far less potent greenhouse gas. This voluntary measure by the owners is not a change mandated by ADEQ or any other regulatory agency. As with the farm's previous requests for Major Modifications to the facility's NPDES General Permit, a decision-making process and public comment period will follow the submittal. This process could take up to 180 days to complete.

1.2 Scope of this EA

This EA is being prepared in response to the court's order to take a "hard look" at the environmental impacts of the C&H Hog Farms to aid the SBA and the FSA's decision making related to their loan guarantees. Specifically, the SBA and the FSA have to determine whether to void their existing loan guarantees, to continue to back their guarantees, or to add additional conditions to the guarantees.

The fact that the C&H facility has already been constructed and this analysis is being undertaken after the fact, complicates the presentation of the effects of the No Action and Proposed Action Alternatives. If the SBA and the FSA decide to void the loan guarantees, C&H Hog Farms and its lender, Farm Credit Services of Western Arkansas, are free to continue their financial relationship without Federal guarantees and C&H Hog Farms can continue its operations.

CEQ regulations implementing NEPA require that alternatives considered by agencies "include the alternative of no action" (40 CFR 1502.14(d)). CEQ has further clarified in its *Memorandum to Agencies:*

Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations (CEQ 1981) that:

> "Section 1502.14(d) requires the alternatives analysis in the EIS to "include the alternative of no action." There are two distinct interpretations of "no action" that must be considered, depending on the nature of the proposal being evaluated. The first situation might involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases "no action" is "no change" from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed."

Based on CEQ guidance, the decision to be made by the SBA and the FSA, and the fact that C&H Hog Farms has been built, is in operation, and would likely continue to operate regardless of government guarantees of loans made in 2012 and used for land acquisition and facilities construction in 2012 and 2013, the No Action Alternative and the Proposed Action are, in fact, very similar. If SBA and FSA decision makers decide to void their loan guarantees, the farm will likely continue to operate according to the terms of its NPDES General Permit. Effectively, the operation of the farm in compliance with its Permit, and absent Federal loan guarantees exemplifies CEQ's "ongoing programs initiated under existing legislation and regulations." If the FSA and the SBA continue to back loans, the farm would also continue to operate.

Given that the facilities have been constructed and are currently in operation, it is not possible to conduct fieldwork or sampling to characterize conditions as they were prior to the land acquisition and construction that occurred in 2012 and 2013, and ongoing operations, which commenced in April of 2013. In order to meet the "hard look" mandated by NEPA and show the impact of the C&H facility, Chapter 3 of this document uses historical data, where they are available, to characterize the pre-construction environmental conditions of the tract where C&H facilities were built. Data gathered after that time are used as well to characterize impacts.

By utilizing this approach, this EA takes the mandated "hard look" at the impacts of the facility while acknowledging the fact that the farm is operating under the terms of its ADEQ permit and can continue to operate with or without Federal backing of loans.

1.3 Purpose and Need for Action

The purpose of the Proposed Action is to reinstate FSA and SBA guarantees for loans made to C&H Hog Farms pursuant to those Agencies' mandates for providing assistance to agriculture producers and/or small businesses. The need for the Proposed Action is to fulfil FSA's and SBA's responsibilities where appropriate under 7 CFR 761 (Farm Loan Programs; General Program Administration) and 13 CFR 101 (Business Credit and Assistance: General Administration), respectively. The analysis in this EA, which has been undertaken pursuant to the Court's holding in Buffalo River Watershed Alliance v. United States Dep't of Agriculture, No. 4-13-cv-450-DPM (Eastern District Arkansas), considers the environmental impacts of the C&H Hog Farms facility to assist the Agencies in determining whether the guarantees for the loans to C&H Hog Farms are expected to have significant impacts on the human environment.

1.4 Decision to be Made

Based on the information in this EA, the SBA and the FSA will decide whether:

- To void the loan guarantees
- To continue to back the loan guarantees on the existing terms
- To back the loan guarantees with additional conditions
- To undertake an EIS to further analyze the effects of the loan guarantees

1.5 Regulatory Compliance

The operators of C&H Hog Farms would be required comply with all applicable Federal, State, and local laws and regulations including:

- Clean Air Act, as amended (PL 88-206; 42 USC § 7401 et seq.)
- Clean Water Act, as amended (PL 107-303; 33 USC § 1251, et seq.)
- Endangered Species Act of 1973 (PL 93-205; 16 USC § 1531 et seq.)
- Executive Order 11988 Floodplain Management
- Executive Order 11990 Protection of Wetlands
- Executive Order 12898 Environmental Justice
- Section 106 of the National Historic Preservation Act of 1966 (PL 89-665; 80 Stat. 915; 16 USC 470 et seq.), as amended (implemented under regulations of the Advisory Council on Historic Preservation, 36 CFR Part 800)

1.6 Public Involvement

For this project, the Draft EA was available for public review and comment for 30 days. A public meeting will be held at the Jasper School, located on South Street off Highway 7 in Jasper, AR on Thursday, August 27, 2015 from 6 to 9 p.m. Notice that the Draft EA was available for public review and that a public meeting would be held was published in the Arkansas Democrat-Gazette, the Newton County Times, and the Harrison Daily Times. Copies of the documents are available at the Arkansas State FSA Office, the Boone County (which serves Newton County) FSA Office, the Newton County Library, and on the FSA NEPA website (http://www.fsa.usda.gov/FSA/webapp?area=home&subject=ecrc&topic=nep-cd). Stakeholders and interested parties were notified of the availability of the EA for review and comment by letter in compliance with 7 CRF 1940.331.

Comments will be accepted by mail at: C&H Hog Farms EA, c/o Cardno, Inc., 501 Butler Farm Rd., Suite H, Hampton, VA 23666; and by email at CHHogFarmComments@cardno-gs.com . Comments on the Draft EA will be accepted from August 6 through September 4, 2015.

If a FONSI is warranted, it will be made available for public review for 30 days in compliance with 40 CFR 1501.4(e)(2). Notification of its availability will be published and copies of the FONSI will be made available as with the Public Draft EA.

1.7 Organization of EA

This EA assesses the potential effects of the Proposed Action and the No Action Alternative on environmental and economic resources. Chapter 1.0 provides background information and the purpose and need of the Proposed Action. Chapter 2.0 describes the No Action Alternative and the Proposed Action. Chapter 3.0 describes the existing conditions (i.e., the baseline conditions against which potential impacts of the Proposed Action and alternatives are measured) for each of the potentially affected resources; the potential direct and indirect impacts on these resources; and any necessary mitigation measures required to ensure no significant impacts to resources occur. Chapter 4.0 describes cumulative impacts and irreversible and irretrievable resource commitments. Chapter 5.0 lists the preparers of this document and contains a list of the persons and agencies contacted during the preparation of this document and Chapter 6.0 contains references. Appendix A contains map figures.

2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 No Action Alternative

The C&H Hog Farms facilities have been built with federally backed loans approved in 2012. The facility began operations in April of 2013 and continues to operate. The No Action Alternative would involve the SBA and the FSA decision makers voiding their loan guarantees. In this case, the farm will likely continue to operate. C&H Hog Farms and its lender, Farm Credit Services of Western Arkansas, are free to continue their financial relationship without Federal guarantees and C&H Hog Farms can continue its operations.

2.1.1 C&H Hog Farms

C&H Hog Farms' facilities include an approximately 49,503-square foot (sf) gestation barn and 30,286 sf farrowing barn. The barns can house up to 6,503 swine including 2,503 over 55 pounds (boars, gestating and lactating sows) and 4,000 under 55 pounds (nursery pigs). The barns have slatted floors over 2-foot deep concrete-lined pits. Waste from the barns is washed into the pits under the barns, which empty by pull plugs and gravity drain into Waste Storage Pond 1, which gravity drains through a 15-inch pipe and overflow spillway into Waste Storage Pond 2. The ponds are earthen and are lined with 18 inches of compacted low permeability soil according to engineering technical specifications developed for the site. At installation, liners were tested and met with specifications of ASTM D-698, *Standard Test Methods for Laboratory Compaction Characteristics of Soil*, to ensure that the soil used met engineering specifications for permeability. Ponds are surrounded by fencing that meets local Natural Resources Conservation Service (NRCS) requirements and signs are posted to alert people of the ponds' purpose (ADEQ 2015a).

At maximum capacity, the animals could generate an estimated 2,090,181 gallons of waste annually. Together, the ponds have a storage capacity of 2,735,922 gallons. This capacity equates to 270 days of storage, accounting for maximum capacity of 6,503 animals and 25-year 24-hour rainfall event. This capacity exceeds ADEQ minimum storage requirement of 180 days (ADEQ 2015a).

2.1.2 Land Application of Waste

Periodically, waste from the ponds is pumped down and applied onto nearby fields that are used for pasture and hay production, thus consuming the nutrients in a full cycle system. The fields where wastes are applied are either owned or leased by C&H Hog Farms. Owners of these fields enter land use contracts with C&H Hog Farms. The contracts can include specific guidelines and requirements related to waste application, which can be added by the landowners. None of the landowners specified any such requirement in this instance.

A NRCS Certified Nutrient Management Planner (CNMP) and Technical Service Provider (TSP)—DeHaan, Grabs and Associates—prepared the NPDES General Permit application including an NMP. The application was submitted to ADEQ on June 7, 2012. Infiltration capabilities of soils were assessed for each field by the TSP. The University of Arkansas, Division of Agriculture, conducted an assessment of baseline soil chemistry. In addition, NRCS Revised Universal Soil Loss Equation (RUSLE-2) was used to predict erosion. Manure sampling and analysis are conducted prior to each land application by

laboratories identified in the NMP. Based on an assessment of soil and manure chemistry, application rates are calculated prior to each application. Details of soil and manure sampling can be found in the NMP (ADEQ 2015a). Buffer strips are maintained between fields where waste is applied and streams (100 feet), property boundaries (50 feet), and occupied dwellings (500 feet). This and other elements of the design described in ***Section 2.1.3*** are designed to prevent runoff of wastes into surrounding areas.

It is not known how these fields were managed and maintained prior to their inclusion in C&H Hog Farms NMP. Because they lie outside the area identified by the Arkansas General Assembly as a Nutrient Surplus Area, development of NMPs is not required (Arkansas Code § 15-20-1104). It is likely that they were periodically seeded, cut, tilled, and fertilized to maximize forage value. Because the fields were not governed by terms of an NMP, soil testing prior to application of fertilizer was not required nor were setbacks, timing restrictions, or any of the operating requirements that C&H Hog Farms must follow (see ***Section 2.1.3***). The frequency, application rate, location, timing, and application method of fertilizer not derived from C&H Hog Farms is not known.

Table 2-1 describes the location, use, and size of fields identified in the NMP where wastes could be applied (ADEQ 2015a). These are also shown on Map 3 (Appendix A). The acreages given represent the total acreage of each field. Required buffers and setbacks reduce the area where waste can be applied.

The ADEQ Compliance Assistance Inspections have documented issues with three fields. The NMP contains a mapping discrepancy for Field 5 and land use contracts were not available for all of Fields 12 and 16. Until these issues are corrected in the NMP, these fields are not being used for land application of wastes. ADEQ has stated that adding application fields to the NPDES General Permit would be considered a non-substantial change and would therefore not require public notice or comment (ADEQ 2014d). However, the fields are included in this EA to ensure that the full scope of potential impacts related to the operation of the farm are assessed.

Table 2-1. Location and size of fields where wastes from C&H Hog Farms are applied

Field	Use	Legal Location	Area (acres)
1	Rotational Grazing	SW ¼ of Section 25, Township 15N, Range 20W	15.6
2	Rotational Grazing	SW ¼ of Section 25, Township 15N, Range 20W	17.0
3	Hayland	SW ¼ of Section 25, Township 15N, Range 20W	13.6
4	Rotational Grazing	NW ¼ of Section 36, Township 15N, Range 20W	8.8
5*	Hayland	NE ¼ of Section 26, Township 15N, Range 20W	23.8
6	Hayland	NE ¼ of Section 26, Township 15N, Range 20W	34.5
7	Hayland	E ½ of Section 26, Township 15N, Range 20W	74.3
8	Hayland	NE ¼ of Section 35, Township 15N, Range 20W	15.5

Field	Use	Legal Location	Area (acres)
9	Hayland	NE ¼ of Section 35, Township 15N, Range 20W	41.2
10	Hayland	NE ¼ of Section 35, Township 15N, Range 20W	33.2
11		N ½ of Section 35, Township 15N, Range 20W	20.7
12*	Hayland	SE ¼ of Section 35, Township 15N, Range 20W	23.7
13	Hayland	S ½ of Section 35, Township 15N, Range 20W N ½ of Section 2, Township 14N, Range 20W	61.6
14	Hayland	SW ¼ of Section 35, Township 15N, Range 20W	18.0
15	Hayland	NE ¼ of Section 2, Township 14N, Range 20W	61.0
16*	Hayland	Section 2 and SE ¼ of Section 3, Township 14N, Range 20W	79.6
17	Hayland	NE ¼ of Section 3 and S 1/2 of Section 34, Township 15N, Range 20W	88.7
		TOTAL	**630.7**

*Currently entirely or partially unavailable for land application of wastes. See text above.

Note: SW = southwest; N = north; W = west; NE = northeast; E = east; SE = southeast; S = south.

2.1.3 Operating Requirements

Operating requirements are elements of an activity designed to reduce or eliminate adverse impacts. These include standard operating procedures, best management practices, permitting requirements, and other design specifications. For detailed descriptions of operating requirements, refer to the NMP (ADEQ 2015a) and Attachment G (Operation and Maintenance Guidelines) of the C&H Hog Farms NPDES NOI (ADEQ 2012a). For C&H Hog Farms, standard operating requirements include, but are not limited to, the following.

Inspections, Reporting, and Recordkeeping

- Develop and implement a NMP based on a field-specific assessment. A professional engineer registered in the State of Arkansas and approved by the ADEQ prepared the NMP. For C&H Hog Farms, an NMP was prepared by DeHaan, Grabs & Associates, CNMP. The NMP was submitted on June 7, 2012 to the ADEQ as part of a comprehensive NPDES General Permit application and was updated in February of 2014 and March of 2015 to modify equipment used to remove wastes from ponds and apply it to fields.

- The facility NMP is reviewed annually by the operator. An updated waste management plan must be submitted to the ADEQ when significant changes are made or as required by the Department. Significant changes are defined as:
    - A greater than 10 percent increase in the volume of animal waste, as excreted, generated by the facility over what was allowed by the original permit or the last major modification for an increase in volume
    - Addition of land application sites
    - Change in waste treatment, type, handling, or disposal
- Any accidental discharge from the waste management system or land application sites must be reported no more than 24 hours after discovery to the ADEQ.
- Any accidental discharge must be sampled and analyzed for the parameters listed in the NPDES General Permit.
- All required inspections must be recorded on ADEQ forms, maintained on-site, and made available to ADEQ upon request including:
    - Daily recording of measureable precipitation
    - Dates livestock are brought to or removed from facility
    - During land application of waste, for each date waste is applied to each field, record temperature, wind speed and direction, condition of field, type of crop, method of application, waste weight and/or volume, the rate and the acreage over which the waste/wastewater is applied, condition of equipment being used, condition of pond liner and embankment when wastes are pumped down
    - Weekly inspection of risers and pipes to ensure they are not plugged or damaged
    - Weekly inspection of ponds for signs of leaking or seeping, excessive settling, vegetation growth or damage
    - Weekly inspection of fences and signage
    - Weekly recording of livestock mortalities and carcass disposal pursuant to the Mortality Management Plan
    - Annual soil and waste/wastewater nutrient testing conducted as outlined in the NMP and as required by ADEQ Regulation 5
- Annual reporting to ADEQ must include the following: waste/wastewater analyses conducted; locations, volumes, and application rates for the previous year; methods of application; and types of crops grown on each land application site.
- Maintain on-site a current copy of the approved General Water Pollution Control Permit for CAFO Application and the NMP.
- Maintain on-site the previous 5 years of reports of all required inspections, soil and manure nutrient tests, calculations of allowable manure application rates and actual rates applied; documentation of any action taken to correct deficiencies; documentation of any discharge, steps taken to correct.

Facilities Operations and Maintenance

- Vehicular travel is confined to designated areas to prevent erosion and damage to vegetation.
- Growth of trees around holding ponds is prevented. Vegetation growth in the holding ponds below the Must Pumpdown level is controlled to prevent damage to pond liner.
- Components of the waste management system are maintained to ensure all contaminated runoff enters containment ponds.
- The containment ponds are designed, constructed, operated, and maintained to contain all waste/wastewater including the runoff and the direct precipitation from a 25-year, 24-hour rainfall event.
- Pens are maintained to prevent or minimize standing water.
- A pesticide program is undertaken to control insects, if necessary, following EPA standards and consistent with manufacturing labels and guidelines.
- Mortalities are disposed of promptly in accordance with the Mortality Management Plan
- Land application of waste is planned and carried out to prevent holding pond levels from rising above the Must Pumpdown level.

Land Application of Waste

- Waste/wastewater is not applied to land classified as highly erodible, saturated, or frozen ground, or during rainfall events.
- When possible, land application is downwind from residences and will avoid calm and humid days when conditions restrict the dispersal and dilution of odors.
- Land application avoids, when possible, weekends and holidays when people are more likely to be outdoors.
- Wastes are not applied on snow or frozen ground unless unavoidable. If unavoidable, such application must comply with conditions specified in ADEQ Regulation 5.
- Wastes are not applied immediately after rain or within 12 hours of forecasted rain unless it can be immediately incorporated into the soil. A vacuum tanker may be used to knife inject the nutrients for soil incorporation.
- Waste/wastewater is evenly distributed over application sites at the rates specified in the site management plan. Weather conditions and nutrient holding capacity of the soil determine the timing and rate of waste application. All land application areas receive application at rates consistent with infiltration capabilities of the native soil such that there is no runoff to surrounding areas.
- Liquid manure is applied at agronomic rates for nitrogen (N). Phosphorus application follows the Arkansas Nutrient Management Planner phosphorous index risk assessment to ensure there is no risk of surface water pollution.
- Waste/wastewater is not applied within 100 feet to any downgradient surface waters, open tile line intake structures, sinkholes, agricultural wellheads, or other conduits to surface waters.
- Waste application does not occur within 100 feet of any water well.
- Application of waste/wastewater is not made within 50 feet of property lines or 500 feet of neighboring occupied buildings existing as of the date of the permit. The restrictions regarding

property lines or neighboring occupied buildings do not apply if the adjoining property is also approved as a land application site under a permit issued by the ADEQ or if the adjoining property owner consents in writing.

Other

- Operators notify the appropriate fish and wildlife agency in the event of fish, wildlife, or migratory bird or endangered species kill or die-off on or near a retention pond or in the fields where waste has been applied and which could reasonably have resulted from waste management at the facility.

2.1.4 Proposed Modifications

On May 7, 2015, C&H submitted a Major Modification Request to the ADEQ to install 60-mm HDPE liners over a geotextile base material in both waste ponds and to install an 80-mm HDPE cover and methane flare system on Pond 1 (ADEQ 2015c). These modifications would address concerns about potential seepage of wastes into groundwater, would control odor, and would convert methane into carbon dioxide, a far less potent greenhouse gas. As with the farm's previous requests for Major Modifications to the facility NPDES General Permit, a decision-making process and public comment period will follow the submittal. This process could take up to 180 days to complete and it is not clear when or whether the changes would be approved. However, since the modifications requested in the 2015 NOI have the potential to occur, this document will discuss potential impacts with and without the requested modification.

2.2 Proposed Action

The Proposed Action would continue the Federal guarantees from the SBA and the FSA to loans made to C&H Hog Farms. Operations, land application of waste, maintenance, reporting requirements, and design features would be the same as those described for the No Action Alternative in accordance with the ADEQ requirements.

3. EXISTING ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the environment affected by implementation of the alternatives described in Chapter 2 and describes the potential for direct and indirect impacts as well as mitigation measures required to ensure that significant environmental and social impacts do not occur. Since it is not possible to conduct fieldwork or sampling to characterize pre-construction conditions at the C&H Hog Farm site, historic data are included, where they are available, in the existing environment sections for each resource.

3.1 Issues Eliminated from Consideration

CEQ regulations (40 CFR 1501.7) state that the lead agency shall identify and eliminate from detailed study the issues that are not significant or that have been covered by prior environmental review, narrowing the discussion of these issues in the document to a brief presentation of why they would not have a significant effect on the human or natural environment or providing a reference to their coverage elsewhere. For C&H Hog Farms, such issues include the following.

Cultural Resources

As part of the Class II EA process and in compliance with Section 106 of the NHPA, the Arkansas Historic Preservation Program (AHPP) was consulted and on July 27, 2012, the Deputy State Historic Preservation Officer (SHPO) issued a statement that no known historic properties would be affected by the undertaking (AHPP 2012). In April of 2013, the SHPO provided comments on the FSA's EA. The letter stated again that no known historic properties would be affected by the undertaking and clarified that discoveries of unknown archaeological sites encountered during construction must be reported to SHPO and any affected Tribal Historic Preservation Officer (THPO) within 48 hours in compliance with 36 CFR 800.13, *Protection of Historic Properties* (AHPP 2013a). In a letter to the FSA dated May 8, 2013, the SHPO requested topographic maps of the fields where wastes from C&H Hog Farms would be applied, stating that these areas are also part of the Area of Potential Effect (APE) in addition to the site where facilities were constructed (AHPP 2013b). On May 16, 2013, the FSA provided a response with additional information (FSA 2013a). On May 22, 2013, SHPO responded that although the exact boundaries of the waste disposal fields was not known, there are three archaeological sites and two structures in or adjacent to the APE, which includes both the 23-acre farm site and the lands where waste could be applied. The letter stated that two sites are eligible for inclusion in the National Register of Historic Places (NRHP) and two are potentially eligible and recommended that the eligible and potentially eligible sites be avoided and protected (AHPP 2013c). On June 5, 2013, a letter from the FSA to the SHPO documented ongoing discussions with SHPO office staff, which confirmed that the two potentially eligible sites are actually located outside the APE, and are thus avoided. One of the two NRHP-eligible sites—a cemetery—lies approximately 255 feet south of Field 7, which is separated by a wooded area and road. This site lies west-northwest of Field 8 and is separated from Field 8 by the 500-foot buffer around an adjacent occupied dwelling, as required by the NPDES General Permit. The other potentially eligible site is a 19th century Arkansas vernacular structure, which is also protected by a 500-foot buffer by the terms of its NPDES General Permit. Thus, all known NRHP-eligible and potentially eligible sites are protected from potential impacts of the operations of C&H Hog Farms (FSA 2013b). On June 13, 2013, a letter from FSA provided the Osage Nation THPO with background information on C&H Hog Farms project and requested input, constraints, and concerns (FSA 2013c). No response was received (pers.

comm. Linda Newkirk 2015). If loans were not federally backed or if Federal guarantees are voided, consultation in compliance with Section 106 of the NHPA would not be required.

Floodplains

As part of the Class II EA process, both USDA Form RD 1940-20 and the Nutrient Management Plan for C&H Hog Farms (ADEQ 2012a) documented that there are no floodplains present at the facility or in the fields where waste would be applied. Additionally, application of manure will not occur within 100 feet of any downgradient surface waters in compliance with the NPDES General Permit setbacks.

Wilderness Areas, Coastal Barriers, and Coastal Zones

There are no designated Wilderness Areas, Coastal Barriers, or Coastal Zones in or near C&H Hog Farms.

Noise

Construction and operation of C&H Hog Farms would not permanently increase ambient noise levels at or adjacent to the farm site or fields where wastes are land applied. It is likely that increased noise levels were associated with construction of the farm facilities, but this noise was temporary and localized. The farm site is surrounded by forest and is located 0.7 mile from Mt. Judea School, the nearest occupied dwelling. Newton County is rural, the vicinity of the farm and land application fields are sparsely populated. The land application fields were hay and pasture land prior to being used as part of C&H Hog Farms NMP, and they continue to be used for that purpose. Noise from heavy equipment is common on agricultural lands.

Air Quality

C&H Hog Farms lies in the Northwest Arkansas Intrastate Air Quality Control Region, which is in attainment for all criteria pollutants established by the EPA in compliance with the CAA. Air emission sources associated with C&H Hog Farms include the rearing unit, incinerator, and land application of manure. Each of these sources are regulated by operating and maintenance requirements included in the NPDES General Permit and associated NMP. For C&H Hog Farms, air emissions from the rearing unit including ammonia and methane are controlled by guidelines for operations and maintenance outlined in ***Section 2.1.3***. Combustion emissions from the incinerator are controlled by the Mortality Management Plan (MMP), which meets standards set by the Arkansas Livestock & Poultry Commission's regulations for the disposal of large animal carcasses (ALPC 2004). Best management practices included in the NMP controls dust emissions from land application of manure. The NMP, MMP, and the Operation and Maintenance Guidelines for C&H Hog Farms are part of the NPDES General Permit. Therefore, air quality is regulated by the Permit and compliance with this Permit prevent significant air quality impacts associated with permitted operations. The proposed major modification to C&H Hog Farm's NPDES General Permit would reduce air emissions from operations by capturing combusting methane in a flare. This would effectively convert methane emissions to combustion emissions such as water and carbon dioxide, thus reducing greenhouse gas emissions from the CAFO operations.

Vegetation and Wildlife

Vegetation and Wildlife are the flora and fauna, both native and introduced that characterize an area. Approximately 12.5 acres of the 23-acre tract purchased for construction of the C&H Hog Farms facilities were cleared to accommodate the facilities. Vegetation on the site was primarily a mix of coniferous and

deciduous trees common to the area with some open areas including a logging road that ran north to south through the eastern third of the tract. See Map 2 in Appendix A for aerial photography before and after the facilities construction. Fields where wastes could be land applied have been cleared of native vegetation at some time in the past. Prior to inclusion in the C&H Hog Farms NMP, the hay and pasture were established on these fields, which have been managed for forage production. Wildlife that characterize the north central Arkansas including the Boston Mountains ecoregion vegetation community include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), bobcat (*Lynx rufus*), mink (*Neovison vison*), black bear (*Ursus americanus*), and beaver (*Castor canadensis*) along with increasing numbers of feral pigs (*Sus scrofa*) (USDA/FSSR 2005). Elk (*Cervus canadensis*) populations have slowly increased since their re-introduction in the Buffalo National River in 1981 and 1985 and have since expanded into the adjacent Gene Rush Wilderness and some private lands (Arkansas Game and Fish Commission 2015). Construction of the C&H Hog Farms facilities resulted in the loss of approximately 12.5 acres of vegetation and wildlife habitat. Ongoing operations of C&H Hog Farms would not affect any vegetation or wildlife on the waste application fields, as these fields have been historically managed for forage production.

3.2 Water Resources

For this assessment, water resources include surface water, wetlands, and groundwater including sole source aquifers.

Surface Water

Surface waters include rivers, streams, creeks, lakes, reservoirs, and other impoundments that support everyday life through provision of water for drinking and other public uses, irrigation, and industry. The principal law governing pollution of the nation's surface water resources is the CWA of 1977. The CWA utilizes water quality standards, permitting requirements, and monitoring to protect water quality. The EPA sets the standards for water pollution abatement for all Waters of the U.S. under the CWA programs, but in most cases, gives qualified states the authority to issue and enforce water quality certification permits. Arkansas' water quality standards (Regulation 2) are based on the physical, chemical, and biological characteristics of least disturbed streams within ecoregions established using landforms, potential natural vegetation, soils types, and land uses.

The EPA has established conditions under which separate storm sewers and CAFOs are considered point sources of pollution subject to NPDES General Permit requirements. Operators of point source discharges must obtain a permit specifying allowable amounts and constituents of effluents. Most agricultural activities are not point sources of pollution subject to NPDES permits. In Arkansas, the EPA delegates its authority for NPDES permitting to ADEQ. The NPDES program is guided by the State's Water Quality Management Plan and the State's Surface Water Quality Standards.

Animal waste can impact surface water quality from organic matter, nutrients, and fecal bacteria. Arkansas water quality standards for nutrients (phosphorus [P] and N) are:

> "Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair any designated use of the waterbody. Impairment of a waterbody from excess nutrients are dependent on the natural waterbody characteristics such as stream flow,

residence time, stream slope, substrate type, canopy, riparian vegetation, primary use of waterbody, season of the year and ecoregion water chemistry. Because nutrient water column concentrations do not always correlate directly with stream impairments, impairments will be assessed by a combination of factors such as water clarity, periphyton or phytoplankton production, dissolved oxygen values, dissolved oxygen saturation, diurnal dissolved oxygen fluctuations, pH values, aquatic-life community structure, and possibly others. However, when excess nutrients result in an impairment, based upon Department assessment methodology, by any established, numeric water quality standard, the waterbody will be determined to be impaired by nutrients."

The EPA standard for nitrate (NO_3) in drinking water is 10 milligrams per liter (mg/L). There is no limiting criteria for nitrates for surface water. The EPA standard to protect aquatic life from un-ionized ammonia (NH_3) is 0.02 mg/L; the concentration of which is related to pH and water temperature. The EPA ammonia toxicity criterion is 4 mg/L. The EPA recommended water quality criteria for total P in streams not discharging into lakes or impoundments should not exceed 0.10 mg/L (EPA 2000).

The Arkansas standard for bacteria is calculated as a geometric mean. A geometric mean is a type of mean (or average) that indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean, which uses their sum). Bacteria concentrations can be highly variable, thus using a geometric mean reduces the effects of the higher and lower values. The EPA and ADEQ calculate the geometric mean from at least five samples collected within 30 days at evenly spaced time intervals during the 30-day period.

The Arkansas water quality standard for bacteria is:

A. Primary Contact Waters – Between May 1 and September 30, the maximum allowable fecal coliform criteria, calculated as a geometric mean, shall be 200 fecal bacteria colonies (col)/100 milliliters (ml) and the single-sample maximum shall be 400 col/100 ml. Alternatively, in these waters, the maximum allowable *Escherichia coli* (*E. coli*) criteria, calculated as a geometric mean, shall be 126 col/100 ml and the single-sample maximum shall be 298 col/100 ml in lakes, reservoirs, Extraordinary Resource Waters (ERW), Ecologically Sensitive Waterbodies (ESW), and Natural and Scenic Waterways (NSW), or 410 col/100 ml in all other rivers and streams. During the remainder of the calendar year, these criteria may be exceeded, but at no time shall these counts exceed the level necessary to support secondary contact recreation (below).
B. Secondary Contact Waters – The maximum allowable fecal coliform criteria, calculated as a geometric mean, shall be 1000 col/100 ml and the single-sample maximum shall be 2000 col/100 ml. Alternatively, the maximum allowable *E. coli* criteria, calculated as a geometric mean, shall be 630 col/100 ml and the single-sample maximum shall be 1490 col/100 ml for lakes, reservoirs, ERWs, ESWs, and NSWs or 2050 col/100 ml for all other rivers and streams.
C. For assessment of ambient waters as impaired by bacteria, the above listed applicable values for *E. coli* shall not be exceeded in more than 25 percent of samples in no less than eight (8) samples taken during the primary contact season or during the secondary contact season.

Under section 303(d) of the CWA, States, territories, and authorized tribes are required to develop lists of impaired waters. These waters do not meet water quality standards that have been set for them, even after point sources of pollution have installed the minimum required levels of pollution control

technology. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop estimates of the Total Maximum Daily Load (TMDL) for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards.

Wetlands

Wetlands are defined by United States Army Corp of Engineers (USACE) as those areas characterized by a prevalence of vegetation adapted to saturated soil conditions and that are identified based on specific soil, hydrology, and vegetation criteria defined by USACE (USACE 1987, 2010). Wetlands associated with running water systems and typically found along rivers, creeks, and drainage ways, with a defined channel and floodplain are referred to as riparian wetlands. The CWA established a program to regulate the discharge of dredged or fill material into wetlands. The CWA further provides for regulations and procedures for the protection of wetlands and compensation for unavoidable impacts. Executive Order (EO) 11990 provides another layer of wetland protection. The purpose of EO 11990 is to "minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, the EO requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The EO applies to the acquisition, management, and disposition of Federal lands and facilities construction and improvement projects that are undertaken, financed or assisted by Federal agencies; any Federal activities and programs affecting land use.

Groundwater

Groundwater is water that is stored underground in natural geologic formations called aquifers. The Safe Drinking Water Act is the main Federal law that protects the quality of drinking water. The EPA designates “sole source” aquifers that supply at least 50 percent of the drinking water consumed in an area overlying the aquifer. Under the Safe Drinking Water Act, the EPA sets standards for drinking water quality and oversees the States, localities, and water suppliers who implement those standards.

This analysis focuses on groundwater quality and quantity. Arkansas relies on several programs to protect and maintain groundwater use and quality. These include programs established under the Arkansas Ground Water Protection and Management Act (§15-22-901 et seq.) (ANRC 2015a), the major statute dealing with groundwater use and management at the State level, as well as other programs and actions taken under the State law and regulations. In addition, the State cooperates with the Federal government on various groundwater pollution control programs derived from Federal mandates. For instance, the ADEQ issues environmental permits as authorized by the EPA (40 CFR §122.28).

3.2.1 Affected Environment

Surface Water

C&H Hog Farms is located in the Buffalo Watershed (8-digit hydrologic unit code [HUC] 11010005) draining approximately 1,340 square miles. As shown on Map 4 (Appendix A), the entire farm and the fields where wastes are applied are contained within the Headwaters Big Creek-Buffalo River sub-watershed (12 digit HUC 110100050302), which encompasses approximately 45 square miles. Big Creek drains the Headwaters Big Creek-Buffalo River sub-watershed and is fed by several perennial or intermittent tributaries including Dry, Campbell, Cow, and Tilly creeks. Nutrient management fields 3, 5,

6, 7, 8, 9, 10, and 12 are located adjacent to Big Creek. Fields 1, 2, and 4 are located near two unnamed tributaries of Big Creek. The Waste Ponds 1 and 2 are located approximately 2,200 feet west of Big Creek (Map 2; Appendix A). Big Creek flows into the Buffalo River approximately 6.8 river miles north of the C&H barns and ponds.

In the Buffalo Watershed, surface water quality and streamflow are monitored by ADEQ, the United States Geological Survey (USGS), and the National Park Service (NPS). As shown on Map 5 (Appendix A), there are 79 monitoring stations in the Buffalo watershed. There are two USGS gaging stations located within the Headwaters Big Creek-Buffalo River sub-watershed both of which are downstream of the farm. There is one NPS water quality monitoring site (BUFT06) located on Big Creek approximately 6 miles downstream of the farm. The NPS began monitoring water quality on the Buffalo River and its tributaries within the boundaries of the park in 1985. Between 1985 and 1990, water quality monitoring for metals and nutrients was conducted once each season. Between 1991 and 1995, sites were sampled every other month. Since 1996, most sites have been consistently sampled on a quarterly basis (Mott and Laurans 2004, Usrey 2013).

The Buffalo River has been designated as an Outstanding National Resource Water and Extraordinary Resource Water; therefore, it is subject to more stringent water quality standards than undesignated streams. In 2008, two segments of the Buffalo River were assessed and listed on the State 303(d) list. Stream segment 1 was found to be impaired for temperature and stream segment 5 was found to be impaired for dissolved oxygen (ADEQ 2008). The State's 303(d) Reports for 2010, 2012, and 2014 are still in draft, as the EPA has not approved them. In 2010, the ADEQ proposed removing Segment 5 and in 2012 proposed removing Segment 1 from the list of impaired waters. The EPA has not approved the removal of these stream segments from the 303(d) list; therefore, they are still considered impaired. Stream segment 5 is located approximately 83 river miles downstream of the confluence of Big Creek (adjacent to the farm) and the Buffalo River. Stream segment 1 is located approximately 94 river miles downstream of the confluence of Big Creek and Buffalo River.

A Nutrient Surplus Area is an area that has been designated by the Arkansas General Assembly as having such high concentrations of one or more nutrients that continued unrestricted application of the nutrient could negatively impact soil fertility and waters of the State. In Nutrient Surplus Areas private land-owners who plan to fertilize an area of 2.5 acres or more with litter, sewage sludge, or commercial fertilizer are required to prepare a NMP and become certified as a private applicator or hire a commercial applicator to apply the nutrients. Regulations requiring NMPs in Nutrient Surplus Areas were implemented to eliminate or minimize the transport of nutrients into waterways and reduced soil fertility from over application. The Buffalo Watershed is not identified as a Nutrient Surplus Area.

Buffalo River water quality is generally very good with the exception of the two stream segments listed on the 303(d) list (ADEQ 2008). Nutrient and bacteria levels monitored in the river are well below state water quality standards (Mott and Laurans 2004, Usrey 2013). Mott and Laurans (2004) reported that nitrate concentrations tended to increase near the middle of the river and may be attributed to land use. However, only two monitoring sites near the headwaters of the river had a statistically supported increase in nitrate concentrations over time (between 1985 and 2001). Spring discharge may be contributing to increased nitrate levels at these sites. There is evidence to indicate that nitrate contamination may be coming from sources outside the river's surface water drainage area. Ammonia

and orthophosphate values have been found to be minimal and no significant changes over time were observed for these parameters (Mott and Laurans 2004).

Tributaries to the river discharge at lower volumes and land use tends to be more concentrated along these streams. Therefore, there is greater potential for higher concentrations of contaminants in tributaries such as Big Creek. As of 2012, NPS recorded *E. coli* concentrations in the Buffalo River are well below the state standards. While *E. coli* concentrations in some tributaries were found to be twice as high as those recorded in the mainstem, the concentrations are also well below the state water quality standards (Usrey 2013).

Although the NPS water quality monitoring program may indicate chronic conditions or long-term trends, quarterly sampling for nutrients and bacteria is insufficient data to capture actual conditions in the dynamic stream system, particularly given the highly variable concentrations of nutrients and bacteria in relation to stream flow volumes (Usrey 2013). The nearest NPS sampling site (BUFFT06) located on Big Creek is approximately 6 river miles downstream of C&H Hog Farms and is located in the Outlet Big Creek-Buffalo River sub-watershed (HUC 110100050304) which encompasses approximately 40 square miles. Approximately 6 square miles of the Outlet Big Creek-Buffalo river sub-watershed drains directly into Big Creek above the sampling site and the eastern portion of the Piercetown community occurs within that drainage area. Additionally, the entire Left Fork Creek sub-watershed (HUC 110100050301) encompassing approximately 38 square miles, empties into Big Creek above the sampling site. Therefore, land use and development occurring in these sub-watersheds (or portions of) are contributing to the concentrations of nutrients and bacteria sampled at the BUFT06 monitoring site. Thus, any increase in concentrations—whether statistically significant or not—of nutrients or bacteria recorded at the BUFFT06 sampling site cannot be directly attributed to the C&H Hog Farms.

To accurately assess the potential point source impacts from C&H Hog Farms on water quality, concentrations of nutrients and bacteria would need to be monitored at and adjacent to the site and the fields where nutrients are applied. By monitoring immediately upstream and downstream of the farm and at the fields, any measurable increase in nutrient or bacteria concentrations discharging from the operations would be recorded and the contribution from other sources would be eliminated or minimized.

An independent, in-depth case study of C&H Hog Farms is currently being conducted by scientists from the University of Arkansas System Division of Agriculture. The Big Creek Research and Extension Team (BCRET) is comprised of faculty and staff from the Division, USGS specialists, Newton County Extension agents, and several technicians. The team includes the region's foremost experts in the fields of agricultural impacts to water quality, livestock nutrient management, soil quality and sustainability, and ecosystems. The team members and their qualifications can be accessed on the BCRET website: http://cars.uark.edu/bcret_home/bios/.

The first year of the 5-year study was funded by the State of Arkansas. Research began in October 2013. The BCRET report their findings on a quarterly basis to the ADEQ and the Governor's office (BCRET 2013). The quarterly reports can be accessed online at http://www.bigcreekresearch.org/. The study was designed to evaluate the potential impact and sustainable management of the C&H Hog Farms operation. The major study tasks are: to monitor the fate and transport of N, P, sediment, and bacteria from land-applied swine effluent to pastures; to assess the potential impact of farming operations on the water quality of Big Creek below the farm; and to determine the effectiveness and sustainability of

alternative manure management techniques (BCRET 2014a). The study has been peer-reviewed by a panel of four independent, out of state water quality experts (BCRET 2014b).

While the BCRET study does have limited baseline data, it has been ongoing for 21 months, was developed to specifically evaluate C&H Hog Farms potential impacts to water quality, and is considered the best available scientific information.

The BCRET study currently has eight monitoring stations that are sampled on a weekly basis and following storm flow events (Map 5). Ten stations have been established over the course of the study; however, one was abandoned following vandalism and one due to access issues. The two locations upstream and downstream of the farm on Big Creek and the spring located below Field 1 have been sampled since September 2013. Runoff from three of the application fields is also sampled; Field 1 (pasture/slurry applied), Field 12 (hay/slurry applied), and Field 5a (hay/no slurry applied) (BCRET 2014b). Field 5a somewhat serves as a control since no slurry from the farm is applied, but it is likely the landowner does fertilize the field on a routine basis using chicken litter and/or Triple 19 or another commercial product (pers. comm. Sharpley 2015). Field 5a is not a natural baseline but can be compared to the fields where slurry is applied at a managed rate to evaluate the differences in nutrient or bacteria contributions to surface water. The three fields give a range in landscape position, topography, and soil fertility levels and are considered a representative strata of all the fields where C&H Hog Farms is permitted to apply nutrients (BCRET 2013). An interceptor trench to sample water quality and flow was installed below the manure-holding ponds in the summer of 2014 (BCRET 2014b). A water well adjacent to the barns is also sampled (BCRET 2014c).

In May/June 2015, an additional monitoring station was established in Left Fork as it enters Big Creek and the USGS has installed height gage at that location (USGS 07055792). Nutrient and bacteria concentrations from this location, which drains a watershed similar to Big Creek but does not contain a CAFO operation, can be compared to the concentrations sampled at the site downstream of the farm (BCRET 2015b).

BCRET water quality sampling methodology uses EPA approved sampling protocols and analyses. Samples are analyzed for dissolved P, total P, ammonia, nitrate, total N, total suspended solids, dissolved organic carbon*, E. coli*, and total coliform (bacteria).

As part of the BCRET study, the USGS gaging station on Big Creek (07055790) was instrumented with continuous flow gaging equipment and a nitrate sensor, which provides real-time flow, water temperature, water nitrate, and precipitation data. Stream data recordation began in April 2014 and the additional parameter data recordation began in February 2015 (BCRET 2014b). The data are available online at: http://nwis.waterdata.usgs.gov/nwis/uv?cb_00065=on&cb_00010=on&cb_00631=on&format=gif_mult_parms&site_no=07055790&period=&begin_date=2015-01-01&end_date=2015-06-11. Streamflow, nitrate plus nitrite concentrations, and temperature from the site from January 1 through July 16, 2015 are shown in Figure 3-1 (USGS 2015).

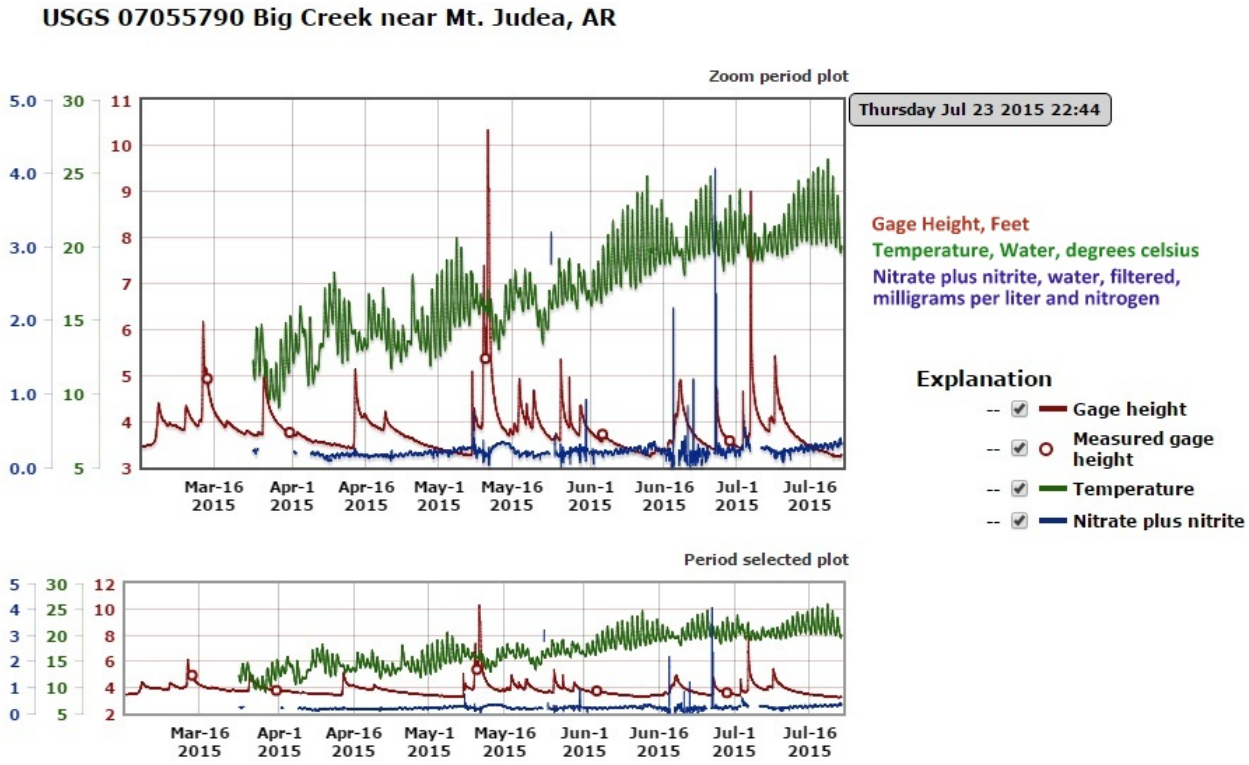


Figure 3-1. USGS 07055790 Big Creek near Mt. Judea, AR station data from January to July 16, 2015

Wetlands

The USDA is committed to not adversely impacting wetlands by having a conservation plan in place when indicated. As part of the original compliance for the C&H Hog Farm, the FSA and the owner completed a Form AD 1026 (Highly Erodible Land Conservation and Wetland Conservation Certification) for each field where wastes were applied. NRCS is responsible for verifying whether farms include highly erodible lands or wetlands. Any wetlands or farmed wetlands must have a determination for setback requirements and all fields permitted to receive nutrients must have a completed Form AD 1026 on file.

Groundwater

Regional Groundwater Supply and Sources

C&H Hog Farms is located in the Ozark Plateau aquifer system, which consists of three regional aquifers: from shallowest to deepest, the regional aquifers are the Springfield Plateau, the Ozark, and the St. Francois aquifers (Imes and Emmett 1994; Adamski et al. 1995; Renken 1998). Specifically, the farm is located on the regional Springfield Plateau aquifer system.

The Springfield Plateau aquifer crops out along the southern and western perimeter of the Springfield Plateau as a narrow belt 5- to 10-miles wide in north-central Arkansas, but it exposed in a more than 50-mile wide band in northwestern Arkansas (Renken 1998). Springfield Plateau aquifer generally ranges from 200- to 400-feet thick throughout northern Arkansas and is composed entirely of limestones and cherty limestones of the Mississippian-age Boone Formation and its basal member, the St. Joe Limestone (Adamski et al. 1995).

The surface of the unconfined Springfield Plateau aquifer generally reflects overlying topography (Imes and Emmett 1994; Adamski et al. 1995). The unconfined Springfield Plateau aquifer is recharged nearly everywhere by precipitation. Groundwater flows mostly laterally and then discharges into springs and seeps along streams (Adamski et al. 1995).

The highly soluble nature of the cherty limestones of the Boone Formation has given rise to the development of karst terrain and pervasive occurrence of karst features, such caves, sinkholes and springs (see ***Section 3.3*** for description of Geology). There is a hydraulic connection of surface water and groundwater that typifies the Boone Formation (Kresse et al. 2014).

The aquifer is characterized by high secondary porosity and relatively high permeability. Karst features and springs are more abundant in the nonchert-bearing limestones, such as the St. Joe Limestone of the Boone Formation. The number of sinkholes in the Springfield Plateau generally averages less than 1 per 100 miles^2, except near the city of Springfield, Missouri, where there are more than 10 sinkholes per 100 miles^2 (Adamski et al. 1995).

Groundwater flow rates are difficult to model and quantify in karst systems due to complex dissolution features and preferential flow. As reported by Soto (2014), groundwater dye trace studies have been conducted in eight watershed areas around the area of the Buffalo National River to determine the sources of water that feed the river. Groundwater flow in karst systems often crosses the surface watershed boundaries, and does not correspond with surficial drainage basin divides (Soto 2014).

The eight watershed areas involved in the studies included (1) the Mitch Hill Spring Research Area, (2) the Fitton Cave and Van Dyke Spring Recharge Area, (3) Springs in the Mill Creek Topographic Area, (4) the Dogpatch Springs Topographic Basin, (5) the Davis Creek Topographic Area, (6) the John Eddings Cave/Elm Spring Recharge Area, (7) the Gilbert Spring and the Gilbert Community, and (8) the Tomahawk Creek Area. All the watersheds studied are located on the north side of the Buffalo National River, except for the John Eddings Cave/Elm Spring Recharge Area (Soto 2014). Results of the Buffalo National River dye trace studies indicate that not all caves and /or springs in the Buffalo area appear to share watersheds (Soto 2014). In 1999, field observations and dye-tracer studies conducted in the Buffalo National River indicated that water discharged from some springs in the Buffalo River watershed originated in the Bull Shoals Lake watershed and traveled at velocities exceeding 640 meters per day (Murray and Hudson 2002).

Wells drilled into the Springfield Plateau aquifer generally have yields of less than 20 gallons/minute; therefore, most wells are used primarily for domestic water supply and for watering livestock (Imes and Emmett 1994).

The Springfield Plateau aquifer is not part of an EPA Sole Source Aquifer (EPA 2015a), nor an Arkansas Natural Resources Commission's (ANRC) Critical Groundwater Area (ANRC 2015b). A Sole Source Aquifer is located in an area with few or no alternative sources to groundwater resources. A Critical Groundwater Area is an area determined by the Arkansas Natural Resources Commission to have significant groundwater depletion or degradation and would be subject to limitations of withdrawals.

Regional Groundwater Quality

The importance of the Ozark Plateau aquifers led to their inclusion as one of the initial study units in the USGS National Water-Quality Assessment (NAWQA), a program with the goal of describing the status

and trends in the quality of the Nation's water resources. The results of the sampling program indicated that dissolved solids were less than the NAWQA national median; pesticides were detected less frequently than other aquifers; and nitrate concentrations in parts of the Springfield Plateau were higher than in most other aquifers and were attributed to agricultural areas and chicken houses (Cox et al. 1980; Peterson et al. 1998).

Because much of the Bull Shoals watershed is covered by agricultural land, consisting mostly of livestock operations, it is possible that nutrient contaminants from these agricultural activities reach the Buffalo River by interbasin transfer of groundwater (Murray and Hudson 2002).

Site Groundwater Quality and Use

The BCRET study conducted a Ground Penetrating Radar of Fields 1, 5, and 12 (BCRET 2013, 2014a). However, due to the sensitivity of the equipment and the dampening effect of clay particles the results were inconclusive in confirming the presence of karst features (pers. comm. A. N. Sharpley 2015). An electrical resistivity imaging (ERI) analysis of Fields 5a and 12 was initiated in December 2014 by Dr. Hallihan, School of Geology, Oklahoma State University. The preliminary analysis showed that additional data were needed and a second field effort was conducted in May 2015. No results are currently available for the ERI analysis but are expected later in 2015 (BCRET 2014c, pers. comm. A. N. Sharpley 2015). Piezometers were installed in the three monitored fields by the BCRET team. These were flooded in the spring and currently the private landowner has denied access. There are no quality data available for this study effort (pers. comm. A. N. Sharpley 2015).

A groundwater characterization, karst inventory, and a fluorescent dye tracing study are being conducted on Big Creek. However, no data or results are available from these studies (Soto 2014). As part of the NPDES General Permit application, a geologic investigation of the barn and pond locations was conducted by Geotechnical & Testing Services. The geologic investigation bored test holes to depths ranging from 11.5 to 18.5 feet. No water was encountered in the boreholes. No limestone was encountered (ADEQ 2015a). The geotechnical investigation showed no evidence of karst features beneath the C&H Hog Farms facilities. It is unknown whether there are karst features beneath the field where wastes are applied.

The BCRET study team has installed an interceptor trench below the ponds and is sampling water quality at that location (BCRET 2014b, 2014c). The data collected from the trench is expected to provide an indication of whether the holding ponds are leaking. There are few methods to accurately quantify potential pond leakage and the methodology is confounded given the small amount of potential leakage. The study team is now collecting electrical conductivity tests during water quality sampling, which may help determine whether the water sampled is groundwater or wastewater (pers. comm. A. N. Sharpley 2015).

One groundwater well (ID# 930439555) is located adjacent to the farm buildings and supports farm operations (ANRC 2015c). The well was completed in 2013. It was drilled to a total depth of 325 feet below ground surface (bgs), and the static water level in the well was 1,138 feet bgs. The well yields 30 gallons per minute. The upper three formations were water bearing (ANRC 2015c). According to the state Water Well Construction Commission, there are four other water wells located within a ½ mile of the C&H Hog Farms and application fields. These wells have all been drilled since 1997. The wells (#9303573554 #9204073553, 9305173554, and 9304683553) were drilled to depths ranging from 205

feet to 1,035 feet bgs with static water levels ranging from 65 feet to 310 feet below bgs. The wells yield from 8 to 100 gallons per minute (ANRC 2015d). The water well yielding 100 gallons per minute with a static water level of 65 feet bgs is located approximately 2 miles south (upstream) of the C&H Hog Farms.

3.2.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

Surface Water

Nutrients, fecal bacteria, and organic matter are the primary constituents of animal waste that can impact surface water. Nitrogen and P are the principal nutrients of concern.

Nitrogen is found in soils, water, and air and is part of all living organisms. Nitrogen is converted between its various chemical forms through the nitrogen cycle. The conversion process is usually the result of bacterial processes. In the environment, N is present in the organic nitrogen (N-org), ammonium (NH_4), nitrite (NO_2), nitrate (NO_3) as well as other forms. In water quality analyses, total N includes N-org, total ammonia (NH_3 + NH_4), NO_2, and NO_3. The nitrite form of N is a transitory phase and very little is normally detected in soil or most natural waters. Nitrogen is essential for plants, but elementary N cannot be taken up directly. Nitrogen must first be bound and converted. During the nitrification process, which is carried out by bacteria, ammonia and ammonium are converted to NO_2 and NO_3. Nitrates are readily mobile in soils (USDA 2012).

Phosphorus is also part of all living organisms and is required for plant growth. Organic P is the principal form found in the wastes of most animals. Soluble P is the form used by all plants and is also subject to leaching. Attached P includes those compounds that are formed when negative charged forms of dissolved P become attached to cations, such as iron, aluminum, and calcium. Attached P includes labile (or loosely bound) and fixed (or tightly adsorbed) forms on or within individual soil particles. Loosely bound P remains in equilibrium with soluble P. Therefore, when the concentration of soluble P is reduced (removed by plants) some of the labile P is converted to a soluble form. Over time, if organic P is applied at rates that exceed the uptake rate of plants, P levels will accumulate. This results in increased concentrations of both soluble and labile P, which can either leach downward to a zone that has more attachment sites and then be converted to labile or fixed P or it can be transported off the land in surface runoff (USDA 2012).

The EPA has identified eutrophication as the main cause of impaired surface water quality (EPA 1996). Together N and P support the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish, and other aquatic organisms. Excess nutrients can promote excessive algae growth. As the algae die and decompose, high levels of organic matter can deplete dissolved oxygen concentrations, reduce transparency, and change the biotic community composition. Eutrophication can also increase the incidence of harmful algal blooms, which may endanger human health through the production of toxins that can contaminate drinking water sources (EPA 2015b).

Human waterborne diseases often result from exposure to water that is contaminated with the feces of warm-blooded animals, including humans. *E. coli* is a bacterial species commonly found in the feces of humans and warm-blooded animals. Most varieties of *E. coli* are harmless, but certain strains can cause

serious human illness. Other bacteria, viruses, and organisms may be present in fecal sources that can also cause illness. Most fecal pathogens from human and animal waste usually die very quickly. Two to three months is sufficient in most cases to reduce pathogens to negligible numbers once they have been excreted or land-applied in animal wastes (Mubiru et al. 2000)

A comprehensive NMP plan was prepared and approved for the operation of C&H Hog Farms. The site-specific plan calculated a nutrient budget for N and P that considered all potential sources of nutrients and the estimated crop yield. A field-specific assessment was conducted to designate the form, source, amount, timing, and method of application of manure on each field in order to minimize the potential for any discharge to surface waters. Testing of both soil and manure prior to field application is required, so the application rates can be adjusted to levels of nutrients that can be completely taken up by plants and utilized for growth. The land application rates are based on the Arkansas Phosphorus Index (P-Index), which takes into consideration the concentration of P in the soil and waste. The soil P concentration is only one of the factors taken into consideration when evaluating runoff potential. Other factors include soil erosion, soil runoff, flooding, application method and timing, and best management practices are also included in the P-Index calculation for a site. The P-Index, as a risk-based calculator, takes a worst-case scenario approach of assuming that no P is lost and all is applied. All land application areas receive application at rates consistent with infiltration capabilities of the native soil such that there is no runoff to surrounding areas. Buffer strips (100 feet) are maintained between fields where waste is applied and streams to prevent waste runoff into surrounding areas. Wastes/wastewater are not applied to land classified as highly erodible, saturated, or frozen ground, or during rainfall events or when it is likely to rain.

The ADEQ General Permit imposes a rigorous series of recordkeeping and inspection requirements for CAFOs like the C&H Hog Farms operation. C&H Hog Farms is operating in compliance with the ADEQ General Permit. It is possible that over time a P imbalance in one or more of the fields could occur. A P imbalance is a condition where soil P levels are greater than the output in farm production. In this situation, there is the potential that excess P could be mobilized off-site during precipitation events. Some management options to address the potential for a P imbalance could include:

- Feed additives to increase nutrient utilization by animals
- Changes in land application techniques to redistribute P through the soil
- Manure amendments to reduce P
- Soil amendments
- Resting fields for greater periods since the farm has 630.7 acres of pasture/cropland permitted to apply wastes and only an estimated 251 acres is needed based on the amount of wastes being produced
- Cover crops/residues
- Off-site transport of wastes

In April 2014, EPA Region 6 Compliance Assurance and Enforcement Division made an unannounced inspection. The inspection included review of the physical site conditions, records required by the NPDES General Permit, and soil and water sampling. Waste holding ponds were found to be in good condition, with turf reinforcement mats installed on the inside of the holding ponds to establish vegetative cover and control erosion. Water samples were collected from various streams up- and

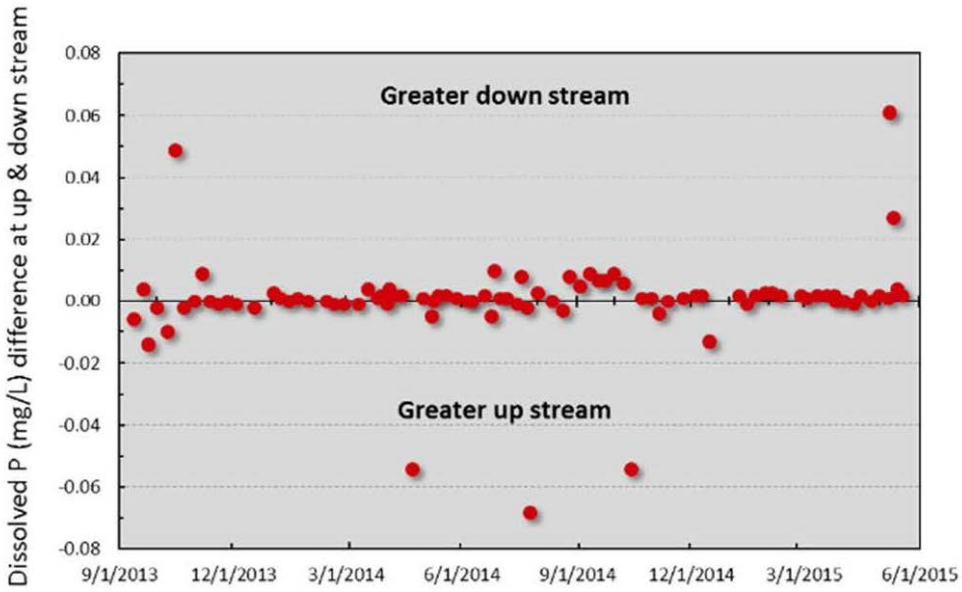
down-gradient of the facility. Soil samples were taken from all currently approved land applications sites. No areas of concern were identified and it was noted that recordkeeping was well managed and available on-site (EPA 2014).

Since C&H Hog Farms and the fields where wastes are applied are located along a perennial waterway, it is reasonable to assume that there is localized recharge and discharge of surface and groundwater in the area. If the waste ponds were leaking, or nutrients or bacteria applied to fields were leaching into upper alluvial groundwater, any measurable contribution of those pollutants would be realized at the downstream water quality monitoring station or the field monitoring stations.

The concentration of dissolved P, total P, nitrate-N, total N, *E. coli*, and total coliform measured in Big Creek above (upstream) and below (downstream) C&H Hog Farms from the beginning of the BCRET study (September 12, 2013) through March 31, 2015 are presented graphically in Figures 3-2 through 3-7. The figures show variations in concentration over time and the difference between upstream and downstream concentrations for the same sampling date. These measurements were taken during base flow (normal flow) and storm flow following precipitation events or snowmelt. The measurements have been more routinely taken after installation of samplers at the USGS gaging station was completed in March 2014.

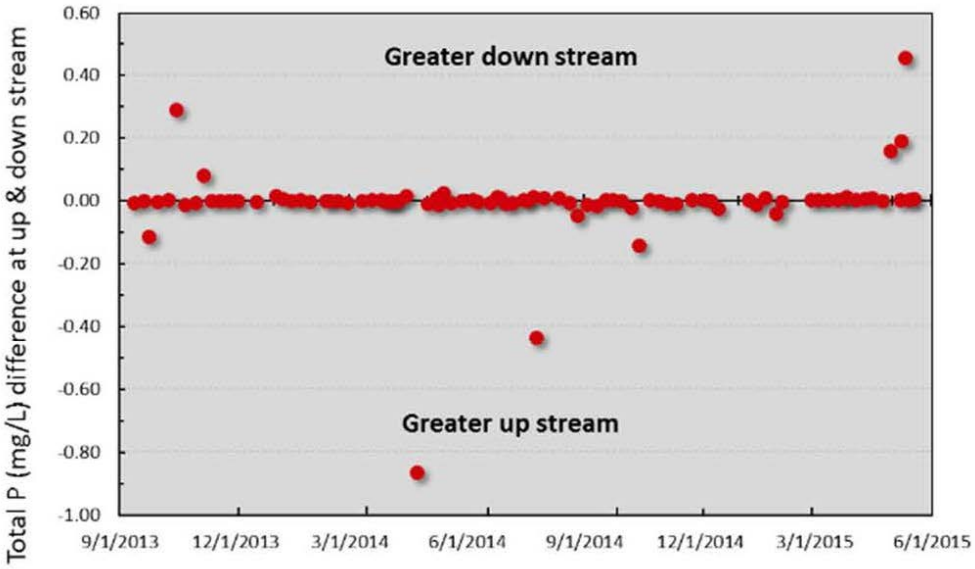
Figures 3-2 and 3-3 show the difference between the upstream and the downstream concentrations of dissolved P and total P, respectively. As in all the Figures, the x-axis is time from the beginning of BRCET water quality sampling (September 2013) to the June 1, 2015. The y-axis is the concentration of the sampled parameter. Each point represents the difference in paired numbers (data set). Two data sets are paired when there is a one-to-one relationship between the values. In this case, the relationship is the concentration of the nutrient or bacteria sampled on the same day at the upstream site and at the downstream site. On the figures, the farther a point is from zero concentration the greater the difference between the two numbers. The smaller the difference the closer the point is to zero. For each paired set of water quality samples, the points above zero are those where the concentration was greater downstream while those below zero are the samples where the concentration was greater upstream.

No significant difference has been found between dissolved or total P when comparing the upstream and downstream sites (BCRET 2014c, 2015b). Phosphorus concentrations did not change over time upstream or downstream of C&H Hog Farms (BCRET 2014c, 2015b). Over the course of the monitoring, with the exception of a few outliers, the concentrations of dissolved P have been below 0.02 mg/L. The concentrations of total P have been consistently below 0.10 mg/L both upstream and downstream of the C&H Hog Farms (BCRET 2015b). Outliers are sample points that are distant from other observations, and can occur by chance in any dataset and are usually due to variability in the measurement or experimental error.



Source: BCRET 2015b.

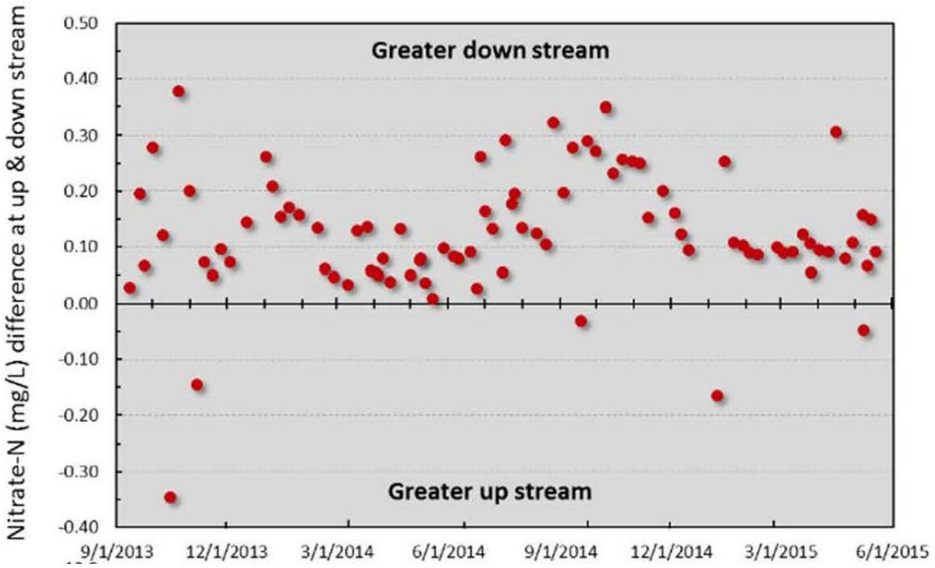
Figure 3-2. Difference in dissolved P concentrations in Big Creek downstream and upstream of C&H Hog Farms between September 15, 2013 and June 1, 2015



Source: BCRET 2015b.

Figure 3-3. Difference in total P concentrations in Big Creek downstream and upstream of C&H Hog Farms between September 15, 2013 and June 1, 2015

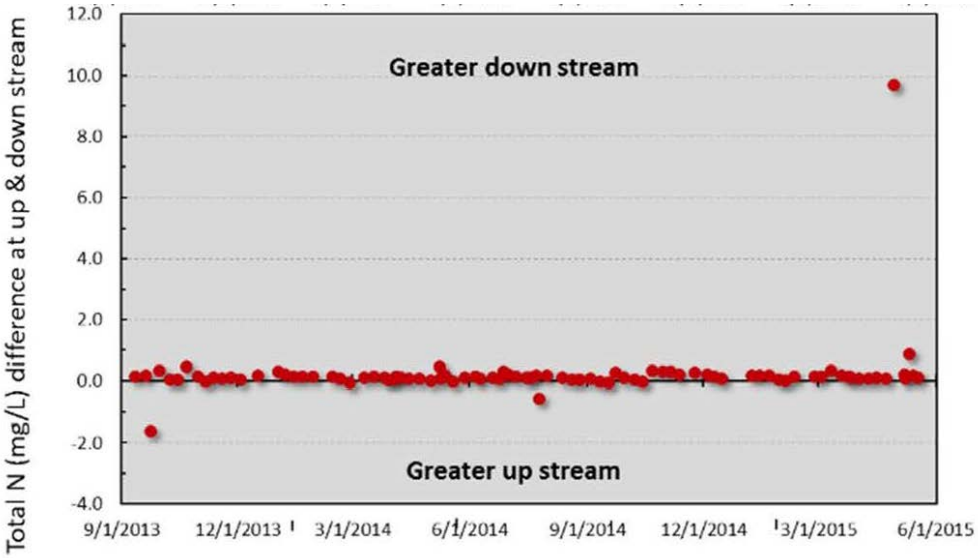
As shown in Figure 3-4, nitrate concentrations are greater (0.1 mg/L) downstream from the application fields and the higher concentration is probably reflective of the land use continuum and historic management of the greater catchment area that drains into and is monitored at the downstream site.



Source: BCRET 2015b.

Figure 3-4. Difference in nitrate-N concentrations in Big Creek downstream and upstream of C&H Hog Farms between September 15, 2013 and June 1, 2015

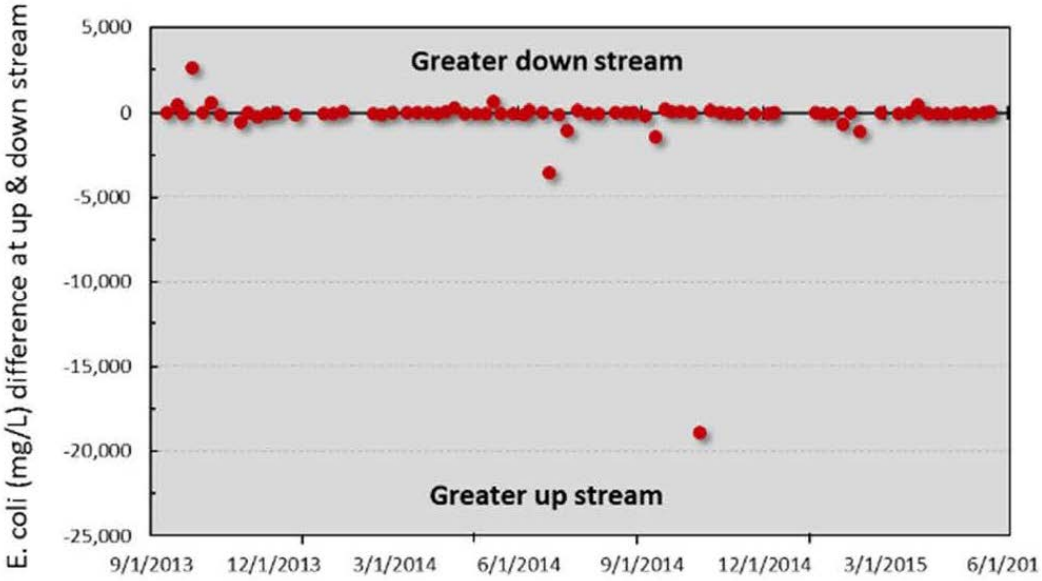
Prior to land application of wastes (September 2013 through December 27, 2013), results from the BCRET water quality sampling calculated the average N concentrations from all samples at less than 0.6 mg/L. Based on water chemistry after the application of wastes to fields January 2014 to December 31, 2014, the study found that N concentrations decreased upstream and downstream reflecting seasonal variability, which is typical in streams draining the Ozark and Boston Mountains. The difference in total nitrogen concentrations sampled at the upstream and the downstream site are shown in Figure 3-5.



Source: BCRET 2015.

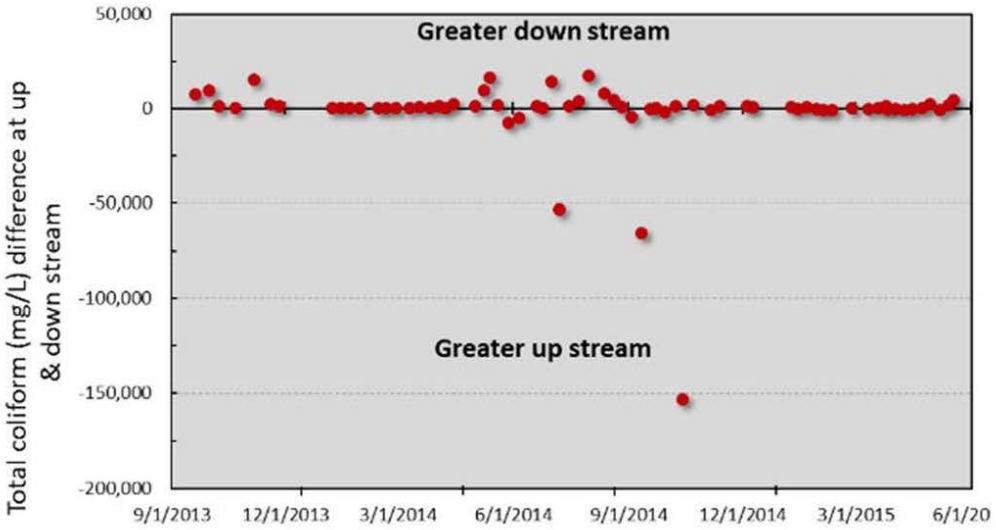
Figure 3-5. Difference in total N concentrations in Big Creek downstream and upstream of C&H Hog Farms between September 15, 2013 and June 1, 2015

In the BCRET December 2014 quarterly report, the study found no statistically significant difference in *E. coli* or total coliform concentrations when comparing upstream to downstream monitoring sites. *E. coli* concentrations were high in the trench flow samples collected on October 13, 2014 below the waste holding ponds. These high levels appeared to be isolated at the time and likely resulted from construction contamination flushing. Additionally, there are limited data regarding water quality sampling at the trench (BCRET 2014c, 2015b). During the sampling period between December 2014 and June 1, 2015. No consistent differences in the trends in concentrations at the downstream site on Big Creek compared with the upstream site were evident over that period (BCRET 2015b). Figure 3-6 shows the difference in *E. coli* concentrations between the upstream and downstream sampling sites from the beginning of sampling through June 1, 2015. Figure 3-7 shows the difference in total coliform concentrations over the same sampling period.



Y-axis has been expanded to show variability. Source: BCRET 2015b.

Figure 3-6. Difference in *E. coli* concentrations in Big Creek downstream and upstream of C&H Hog Farms between September 15, 2013 and June 1, 2015



Y-axis has been expanded to show variability. Source: BCRET 2015b.

Figure 3-7. Difference in total coliform concentrations in Big Creek downstream and upstream of C&H Hog Farms between September 15, 2013 and June 1, 2015

To date there have been no exceedances of state water quality standards for nutrients or bacteria. There are no observable trends related to the timing of slurry applications and nutrient or bacterial concentrations recorded during water quality sampling (BCRET 2014c, pers. comm. A. N. Sharpley 2015). During the April 1 to June 30, 2015 (2nd quarter 2015) monitoring period, there were no consistent differences in the trends in concentrations at the downstream site on Big Creek compared with the upstream site (BCRET 2015b).

There are no data or other evidence to indicate that the operation of C&H Hog Farms is adversely affecting surface water quality. While it is recognized that the available data are somewhat limited, these data are considered sufficient to conclude that if the farm's operation over the last 18 months was contributing measureable concentrations of nutrients or bacteria then it would be apparent in the water quality monitoring data collected to date, or be observed in emerging trends.

Since the application of manure to up to 630 acres of fields utilized by C&H Hog Farms is more closely managed under the NPDES General Permit stipulations, there is the potential for improved water quality conditions as historically those fields have been fertilized at un-managed rates and without buffers near waterways or the implementation of other BMPs.

The ADEQ's CAFO NPDES General Permit prohibits, with a narrow exception, all discharge of manure or process wastewater from the production facilities into the waters. Consistent with the EPA's CAFO regulations, the General Permit makes an exception for discharges resulting from an overflow caused by precipitation, so long as the facility has been designed and constructed with the capacity to hold all effluent generated by the facility as well as the water generated by a once-every 25-year, 24-hour rainfall event. As designed, the C&H facility has approximately 50 percent more liquid waste holding capacity then ADEQ requires for a facility of this size.

While it is highly unlikely, there could be a permitted discharge from the waste ponds should a 50-year or 100-year heavy rainfall event occur at a time when the ponds are at capacity. A discharge during a significant rainfall event would have short-term impacts to surface water quality since nutrients and bacteria concentrations would dilute or be available for biological uptake during downstream transport through the system. It is also possible there could be an accidental discharge of waste, which could reach surface waters that may result in short-term impacts to surface water quality. These types of discharges would not result in long-term (chronic) or significant impacts to surface water quality.

In summary, C&H Hog Farms operates in compliance with its approved NPDES General Permit. Under the terms and conditions of the permit, a site-specific comprehensive NMP plan was prepared. The NMP is a flexible management tool designed to avoid impacts to surface water and requires testing of both soil and manure prior to field application so that application rates can be adjusted to the levels where plant uptake completely uses the nutrients. All land application areas receive application at rates consistent with infiltration capabilities of the native soil such that there is no runoff to surrounding areas. Numerous BMPs are implemented to protect surface water including buffer strips (100 feet) maintained between fields where waste is applied and streams and no applications to land classified as highly erodible, saturated, or frozen ground, or during rainfall events or when it is likely to rain. The fertilization of the waste application fields is more carefully managed under the NMP as opposed to the historical management. The ponds were engineered to specifications to minimize leakage. The proposed modification that would line the waste holding ponds would further protect water quality from increased nutrient and bacterial concentrations.

An intensive scientific study has been ongoing since September 2013 to determine if the C&H Hog Farms operation is adversely affecting surface water quality. Water quality samples are taken weekly and following storm events at eight locations on the farm, including three of the fields, nearby waterways, and a spring. The monitoring sites include sites on Big Creek upstream and downstream of the operation. To date there have been no exceedances of state water quality standards for nutrients or bacteria. There are no observable trends related to the timing of slurry applications and nutrient or bacterial concentrations recorded during water quality sampling (BCRET 2014c, pers. comm. A. N. Sharpley 2015). There have been no consistent or significant differences in the concentrations of nutrients or bacteria between the upstream and downstream sites. There have been no measurable increases in the concentrations of nutrients or bacteria downstream of the operation (BCRET 2014c, 2015b).

There is the possibility of a discharge of waste from the holding ponds in the unlikely event of a significant rainfall (greater than 50 or 100-year) or an accidental spill of waste. There are extensive safeguards and BMPs to minimize the risk of discharges off-site and into waterways. These types of discharges would not result in long-term (chronic) or significant impacts to surface water quality.

Wetlands

Setbacks from wetlands or farmed wetlands were identified in the NPDES General Permit application approved in 2012. These setbacks were implemented to avoid impacts to wetlands from land application of nutrients. Testing of both soil and manure prior to field application is required, so the application rates can be adjusted to insure all nutrients are utilized by plant growth. Therefore, runoff of nutrients into wetland areas is unlikely. With the implementation of the NPDES General Permit stipulations, no direct or indirect impacts to wetlands are anticipated.

Groundwater

The waste storage ponds are designed per the USDA-NRCS National Engineering Handbook Part 651 Agricultural Waste Management Field Handbook in accordance with the Arkansas Pollution Control and Ecology Commission Regulation 6.202(B) (ADEQ 2013b). The NPDES General Permit limits potential seepage from the waste holding ponds to 5,000 gallons/acre/day, which equates to 0.0013 inch/day. At pond installation, liners were tested and met with specifications of ASTM D-698, *Standard Test Methods for Laboratory Compaction Characteristics of Soil*, to ensure that soil used met engineering specifications for impermeability. While the General Permit has a limit for potential seepage that does not necessarily mean the C&H Hog Farms waste ponds are seeping fluids at that rate or at any rate. To date there are no data available to determine whether the ponds are leaking at a measurable rate. The geotechnical investigations indicated that there were no karst features or topography in the area where the buildings or holding ponds were constructed. No water bearing soils or formations were encountered during the geotechnical investigation. There is no evident conduit for groundwater to reach surface water in the area. Any nutrients that might be leaking from the holding ponds would likely be bound to soil particles, particularly undeveloped soils, minimizing the potential for them to eventually enter groundwater. Concentrations of *E. coli* would naturally decline over time given their limited survivability.

In May 2015, C&H submitted a Major Modification Request to ADEQ to install 60-mm HDPE liners over a geotextile base material in both waste ponds and to install an 80-mm HDPE cover and methane flare system on Pond 1 (ADEQ 2015c). These design modifications would further minimize the potential seepage of wastes into groundwater from the ponds.

The farm's NPDES General Permit contains numerous provisions that are designed to protect groundwater, including the development and implementation of a site-specific nutrient management plan that meets the requirements of 40 CFR §§122 and 412 that was developed in accordance with the NRCS Practice Standard Code 590, including the Arkansas P-Index (FSA 2013d). Waste and nutrient application rates on the fields do not exceed the plant uptake pursuant to the engineering operations plan and soil tests conducted in accordance with Arkansas guidelines and application rates (FSA 2013d). Therefore, no nutrients are expected to leach into groundwater from the application of wastes to fields in the area.

No direct or indirect impacts to groundwater quality are expected since it is protected by rigid adherence to the farm's NPDES General Permit requirements and BMPs.

Mitigations

No significant impacts to water resources are anticipated and no mitigation measures are required.

3.2.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

Impacts to surface waters, wetlands, and groundwater would be the same as those described under Alternative A. The terms of the facility NPDES General Permit apply to its operations—regardless of the status of Federal backing of loans.

Mitigations

As with Alternative A, no significant impacts to water resources are anticipated and no mitigation measures are required.

3.3 Soils and Geology

Soils

Soil is composed of minerals and organic matter formed from the weathering of bedrock and other parent materials, as well as decaying plant matter. Soil properties include color, texture, particle size, moisture, and chemistry. The national system of soil classification identifies sets of soil properties and groups them into 12 taxonomic orders, which are further divided into groups, families, and series.

The Highly Erodible Land Conservation (HELC) provisions aim to reduce soil loss on erosion-prone lands. These provisions apply to all highly erodible land (HEL) that is owned or farmed by persons voluntarily participating in USDA programs, including FSA loans. To comply with HELC provisions, producers must complete form AD-1026 certifying that they will not plant or produce an agricultural commodity on HEL without an NRCS-approved conservation system. These forms were completed by the owners of C&H Hog Farms and signed by the FSA in 2012. For all fields where waste would be land applied, the USDA RUSLE-2 was used to estimate rates of soil erosion caused by rainfall and overland flow. RUSLE-2 calculates average annual soil loss based on the following inputs: rainfall and runoff, soil erodibility, slope length, slope steepness, cover and management, and support practice.

Geology

Geology is the study of the composition and configuration of the Earth's surface and subsurface features The makeup of geology in any given physiographic region influences the occurrence of vegetation types, the presence of mineral and energy resources, the presence of groundwater resources, and the potential for seismic activity.

3.3.1 Affected Environment

Soils

Soil at the site of C&H Hog Farms is Noark very cherty silt loam, 3 to 8 percent slopes. Table 3-1 contains a summary of soils data from the RUSLE-2 Erosion Calculation Records for the fields where waste from C&H Hog Farms could be land applied. This information is included in Section C of the facility NMP (ADEQ 2015a). Following the table are descriptions of the soil map units derived from the Soil Survey of Newton County, Arkansas (USDA 1988).

Table 3-1. Soil types, location, and average slope in the project area

Field	Primary Map Unit	Field Average Slope (%)
1	Noark very cherty silt loam, 3-8 % slope/ Noark very gravelly silt loam	5.5
2	Noark very cherty silt loam, 8-20 % slope, Noark very gravelly silt loam	14

Field	Primary Map Unit	Field Average Slope (%)
3	Razort loam, occasionally flooded/Razort loam	1.5
4	Noark very cherty silt loam, 8-20 % slope/Noark very gravelly silt loam	14
5	Razort loam, occasionally flooded/Razort loam	0.010
6	Razort loam, occasionally flooded/ Razort loam	0.010
7	Razort loam, occasionally flooded,/Razort loam	3
8	Spadra loam, 2-5% slopes/Spadra loam	3.5
9	Spadra loam, occasionally flooded/Spadra loam	1
10	Spadra loam, 2-5% slopes/Spadra loam	3.5
11	Noark very cherty silt loam, 8-20% slop/Noark very gravelly silt loam	14
12	Spadra loam, occasionally flooded/Spadra loam	2
13	Noark very cherty silt loam, 8-20% slope/Noark very gravelly silt loam	14
14	Noark very cherty silt loam, 8-20% slope/Noark very gravelly silt loam	14
15	Noark very cherty silt loam, 8-20% slope/Noark very gravelly silt loam	14
16	Spadra loam, occasionally flooded/Spadra loam	2
17	Arkana very cherty silt loam, 3-8% slopes/Arkana very gravelly silt loam	2

- Arkana very cherty silt loam, 3-8 percent slopes is a moderately deep, gently sloping, and well-drained soil. Permeability is moderate and runoff is medium to rapid. Natural fertility of the soil is moderate. Soils are primarily suited for pasture.
- Noark very cherty silt loam, 3-8 percent slope is a deep, gently sloping, and well-drained soil. Permeability is moderate and runoff is rapid. Natural fertility of the soil is low. Soils are suited for woodland and pasture.
- Noark very cherty Silt loam is a deep, strongly sloping to moderately steep, and well-drained soil. Permeability is moderate and runoff is rapid. Natural fertility of the soil is low. Soils are suited for woodland and pasture.
- Razort loam is a deep level to nearly level and well-drained soil. Permeability is moderate and runoff is slow to medium. Natural fertility is moderate. Soils are suited to use as pasture.
- Spadra loam, occasionally flooded is a deep nearly level and well-drained soil. Permeability is moderate and runoff is medium. Natural fertility is moderate. Soils are suited to use as pasture.
- Spadra loam, 2-5 percent slopes is a deep nearly level to gently sloping and well-drained soil. Permeability is moderate and runoff is medium. Natural fertility is moderate. Soils are suited to use as pasture.

Producers who receive funding from the USDA are required to commit to highly erodible lands conservation practices (7 CFR 12). As part of the original environmental compliance for the C&H Hog Farm, a Form AD 1026 (Highly Erodible Land Conservation and Wetland Conservation Certification) for each field where wastes could be applied was completed by FSA and the owner. NRCS is responsible for verifying whether farms include highly erodible lands. The C&H Hog Farms NMP specifies that liquid manure will not be applied to HEL in compliance with the Federal Food Security Act of 1985.

As part of the NPDES General Permit application, a geologic investigation of the barn and pond locations was conducted by Geotechnical & Testing Services. Laboratory tests were conducted on the soil core samples and the results for the sandy lean clay soils are listed in Table 3-2. This information is included in Section C of the facility NMP (ADEQ 2015a).

Table 3-2. Soil laboratory results from the C&H Hog Farms geologic investigation

Boring Number	Depth (feet)	Description	Liquid Limit	Plastic Limit	Plasticity Index
2	3.0-4.5	Silty lean clay	38	22	16
2	4.5-6.0	Sandy lean clay	44	24	20
2	7.0-8.5	Fat clay w/sand	93	38	55
2	9.5-11	Sandy fat clay	64	23	41
3	7-8.5	Fat clay w/sand	58	36	22
3	9.5-11	Clayey gravel with sand	81	44	37

The soil used for the holding pond liner was the fat clay with sand identified at depths of 7 to 11 feet in bore numbers 2 and 3.

Geology

The farm is located in the northeastern part of the Boston Mountains and the southern part of the Springfield Plateau in the Ozark Plateaus. The Ozark Plateaus are an ancient, variably karstified region that has more than 8,000 reported caves and tens of thousands of springs, and a wide and diverse suite of accompanying karst landforms (Imes and Emmet 1994).

Surface geology in and near the farm ranges from alluvium (clay, silt, sand, and gravel) along streams and rivers to a thick sequence of limestone bedrock. Surficial deposits underlying the farm consist of an approximate 4-foot thick veneer of soil and alluvium (BCRET 2014a). Bedrock underlying the soil and alluvium consists of the 300- to 350-feet thick Mississippian-age Boone Formation and the basal St. Joe Limestone, which ranges in thickness from a feather edge to over 110 feet in thickness (McFarland 1998; Braden and Ausbrooks 2003).

The Boone Formation, a major karst formation in the region, consists of gray, fine- to coarse-grained fossiliferous limestone interbedded with chert. Some sections may be predominantly limestone or chert. The quantity of chert varies considerably both vertically and horizontally. The Boone Formation is well known for dissolutional features such as sinkholes, caves, and enlarged fissures (McFarland 1998; Braden and Ausbrooks 2003).

The St. Joe Limestone is a fine-grained crinoidal limestone that may contain some smooth bedded chert in limited places (McFarland 1998; Braden and Ausbrooks 2003).

Structurally, bedrock in the farm area is nearly flat lying. Dips are typically less than 3-degrees except for locations where faulting has occurred. Uplift is observed to increase near the Buffalo River National River where river bluffs and vertical cave entrances are consistent with uplift from tens to hundreds of meters compared with the same formations in nearby counties (Tennyson et al. 2008).

As part of the NPDES General Permit application, Geotechnical & Testing Services conducted a geologic investigation of the barn and pond locations. Table 3-2 above lists the soil laboratory results from the investigation. The geologic investigation bored test holes to depths ranging from 11 to 18.5 feet. No water was encountered in the boreholes. No limestone was encountered (ADEQ 2015a).

In November 2013, the BCRET conducted a series of ground penetrating radar (GPR) transects across Fields 5 and 1 to characterize the subsurface conditions that could potentially contribute to preferential flow of groundwater and contaminants in the fields (BCRET 2013). In March 2014, the GPR of Field 12 was completed (BCRET 2014a). The survey indicated changes in subsurface strata, interpretations such as gravel lenses and dissolution cavities. No ground truthing with invasive observation coring has been conducted. The GPR survey did demonstrate that soil properties, such as soil depth to bedrock, were consistent with NRCS soil mapping unit descriptions. The GPR results indicated that at least 49 inches of soil overlies any bedrock. The results of the GPR survey were inconclusive regarding the presence of karst features given the sensitivity of the field equipment and the underlying clay soil (BCRET 2013, 2014a).

In December 2014, Oklahoma State University, as part of the BCRET study, conducted ERI across Fields 5 and 12 to locate potential fractures or karst features. The initial ERI analysis indicated that additional ERI transects were needed, and a second round of ERI transects were surveyed in May 2015. The results from the second ERI survey may indicate that still more ERI transects are needed. Currently there are no available data from the ERI study (A. N. Sharpley personal comm. 2015; BCRET 2015b).

3.3.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

Soils

Construction of the C&H Hog Farms facilities resulted in excavation and mixing of soils on the site. The slopes of the holding ponds have been seeded and matted to reduce erosion in compliance with the General Permit. The area around the barns has been planted with loblolly pine seedlings to reclaim lands cleared to accommodate the facilities. This reclamation will stabilize soils and reduce runoff.

The fields where wastes from C&H Hog Farms could be land applied as fertilizer were actively managed for forage production prior to their inclusion in the C&H Hog Farms NMP. Impacts from such management include soil disturbance, mixing, and compaction.

Soils at C&H Hog Farms facilities and fields where wastes are land applied are protected by the terms of the NPDES General Permit as outlined in the NMP, including operating requirements listed in ***Section 2.1.3***. The C&H Hog Farms NMP specifies that liquid manure will not be applied to HEL in compliance with the Federal Food Security Act of 1985. Therefore, no impacts to HEL would result from operations of the C&H Hog Farm. Fields where wastes could be land applied as fertilizer were assessed using RUSLE-2 to ensure management practices would minimize soil loss to erosion and avoid the discharge of nutrients or other contaminants.

Waste holding ponds were lined with 18 inches of compacted low permeability soil to meet technical specifications for the site. These specifications were designed to ensure seepage does not exceed rates

set by ADEQ and minimize risk of soil contamination. The proposed lining of the waste holding ponds would further protect soils from increased nutrient concentrations.

Geology

Application of wastes to fields would have no effects to geology. The results of the geotechnical investigations indicate there are no karst features within the C&H Hog Farms parcel. There would be no direct and indirect impacts to geology since disruption of underlying bedrock would not occur from farm operations.

Mitigations

No significant impacts to soils or geology are anticipated and no mitigation measures are required.

3.3.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The terms of C&H Hog Farms NPDES General Permit would apply to operations regardless of the source of funding used to construct and operate the facility. Therefore, impacts to soils and geology are the same as those described for Alternative A.

Mitigations

As with Alternative A, no significant impacts to soils or geology are anticipated and no mitigation measures are required.

3.4 Threatened and Endangered Species

Threatened and Endangered species are those species federally designated as threatened or endangered under the ESA and their designated Critical Habitat, and species that are considered candidates for being listed as threatened or endangered. Critical habitat is an area, defined by the United States Fish and Wildlife Service (USFWS), that contains features essential to the conservation of a threatened or endangered species and that may require special management and protection.

The ESA requires Federal agencies to ensure that the actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of their critical habitat.

3.4.1 Affected Environment

On June 26, 2012, Farm Credit Services of Western Arkansas contacted the USFWS to initiate consultation over the proposed C&H Hog Farms facility (reference # TA0629). On July 5, 2012, USFWS advised Farm Credit Services that two federally listed species—the gray bat (*Myotis grisescens*) and the Indiana bat (*Myotis sodalis*)—and one candidate for listing—the rabbitsfoot mussel (*Quadrula cylindrical cylindrical*)—are known to occur in this region. On February 8, 2013, the USFWS responded again to the 2012 request to include the potential for snuffbox (*Epioblasma triquetra*) to occur in the region and the proposed critical habitat designation for the Buffalo River.

In May 2015, requests for species occurrence records and other data or information were made to the USFWS Arkansas Ecological Services Office and the NPS. An information request was submitted to the Department of Arkansas Natural Heritage Commission (ANHC) to obtain species occurrence data. The ANHC has no records of any federally listed or other special status species of concern occurring on the C&H Hog Farms (ANHC No.: P-CF..-15-031). The Arkansas Game and Fish Commission was also contacted for information related to federally listed species occurrence records within the area.

Currently, the USFWS Arkansas Ecological Services Office lists eight threatened and endangered species with the potential to occur in Newton County. A current list of species was obtained from the USFWS IPaC-Information, Planning, and Conservation System (USFWS 2015). Table 3-3 lists these species, their conservation status, habitat associations, and their potential to occur in the project area. No federally listed species have been recorded as occurring within a 2-mile radius of C&H Hog Farms and associated fields.

Impacts to listed species from the C&H Hog Farms operations would be limited to the potential for adverse changes to water quality from increased nutrients that could lead to eutrophication of aquatic habitats.

Of the eight listed species, four are bats, which are terrestrial species. Prior to the construction of the C&H Hog Farms, vegetation on the site was primarily a mix of coniferous and deciduous trees common to the area with some open areas including a logging road that ran north to south through the eastern third of the tract. This type of vegetation would not have been considered suitable roosting habitat for the four listed bat species based on its fragmented nature, previous disturbance, and tree age and overall composition. There are no caves within the C&H Hog Farms parcel. The C&H Hog Farms operation is not expected to inhibit or modify the movement of foraging bat species that may incidentally occur in the area. Since there would be no effects to the four bat species, they are addressed in Table 3-3, but are not analyzed further in this document.

Table 3-3. Federally listed species with the potential to occur in Newton County, Arkansas and C&H Hog Farms

Species	Status	Habitat Associations	Potential to Occur in the Project Area	Eliminated from Detailed Consideration
Clams				
Rabbitsfoot mussel (*Quadrula cylindrical cylindrical*)	Threatened with Designated Critical Habitat	Found in small to medium sized streams and some larger rivers. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity. May occupy deep water runs, 9 to 12 feet of water. Bottom substrates generally include gravel and sand (Federal Register 2012c).	From the confluence with Big Creek, the nearest rabbitsfoot mussel recorded occurrence is approximately 26.6 river miles downstream on the Buffalo River.	No
Snuffbox mussel (*Epioblasma triquetra*)	Endangered	Found in small- to medium-sized creeks to larger rivers, and in lakes. Occurs in swift currents of riffles and shoals and wave-washed shores of lakes over gravel and sand with occasional cobble and boulders (Federal Register 2012a).	From the confluence with Big Creek, the nearest snuffbox mussel recorded occurrence is approximately 81 river miles downstream on the Buffalo River.	No
Spectaclecase (mussel) (*Cumberlandia monodonta*)	Endangered	Generally inhabits large rivers, and is found in microhabitats sheltered from the main force of current. Usually found in firm mud between large rocks in quiet water very near the interface with swift currents (Federal Register 2012b).	Historically, recorded as occurring in the Mulberry River in Franklin County. The Mulberry River is not located within the Buffalo Watershed. This species has not been recorded in the Buffalo River.	Yes
Fishes				
Ozark cavefish (*Amblyopsis rosae*)	Threatened	A true troglobitic stygofauna species. Lives groundwater pools in dark parts of caves or wells. Ozark cavefish are restricted to the Springfield plateau geologic province of the Ozark ecoregion (Federal Register 1984).	There is no suitable habitat within the C&H Hog Farms facilities. The land application of animal waste from swine as managed under the terms and conditions of the NPDES General Permit would not be considered an adverse impact to this species (Federal Register 1984).	Yes

Species	Status	Habitat Associations	Potential to Occur in the Project Area	Eliminated from Detailed Consideration
Mammals				
Gray bat (*Myotis grisescens*)	Endangered	Inhabits caves year-round. Occupies cold hibernating caves or mines in winter and warmer caves during summer (USFWS 2009).	There are no caves within the C&H Hog Farms facilities including the application fields. The nearest recorded location used by transient gray bats is approximately 2.75 miles from the farm.	Yes
Indiana bat (*Myotis sodalis*)	Endangered	Hibernate during winter in caves or, occasionally, in abandoned mines. During summer roosts under the peeling bark of dead and dying trees (Federal Register 2007).	There are no caves or contiguous old-growth forests within the within the C&H Hog Farms facilities including the application fields. This species has not been recorded as occurring within 10 miles of the farm.	Yes
Northern long-eared bat (*Myotis septentrionalis*)	Threatened	Summer roost habitat is generally correlated with old growth forests composed of trees 100 years old or older with low edge-to-interior rations. Hibernates in caves or inactive mines (Federal Register 2011).	There is no suitable roosting or hibernacula habitat within the C&H Hog Farms facilities. The nearest hibernaculum location used is approximately 4 miles from the farm.	Yes
Ozark big-eared bat (*Corynorhinus [=Plecotus] townsendii ingens*)	Endangered	Associated with caves, cliffs, and rock ledges in well-drained, oak-hickory Ozark forests (USFWS 1995).	There is no suitable roosting or hibernacula habitat within C&H Hog Farms facilities. This species recorded approximately 3.8 miles from the farm in December 2014.	Yes

Rabbitsfoot Mussel

Description and Life History

The rabbitsfoot is a medium to large mussel, elongated and rectangular, reaching 6 inches in length. The external shell surface is generally smooth and yellowish, greenish, or olive in color becoming darker and yellowish-brown with age and usually covered with dark green or nearly black chevrons and triangles pointed ventrally. Adults are filter feeders that siphon water into their shells and across four gills that are specialized for respiration and food collection. Food items include algae, bacteria, detritus (disintegrated organic debris), and microscopic animals (Federal Register 2012c).

Sperm is released by the males and are siphoned in by the females during feeding and respiration. Fertilization occurs inside the shell, and success is apparently influenced by mussel density and water flow conditions. The eggs are retained in the gills of the female until they develop into mature larvae called glochidia. The glochidia then have a parasitic stage during which they attach to the gills, fins, or skin of a fish to transform into a juvenile mussel. Blacktail shiner (*Cyprinella venusta*), cardinal shiner (*Luxilus cardinalis*), red shiner (*C. lutrensis*), spotfin shiner (*C. spiloptera*), and bluntface shiner (*C. camura*) have been identified as host fish (Federal Register 2012c).

Habitat

The rabbitsfoot mussel is found in small to medium sized streams and some larger rivers. It usually occurs in shallow water areas along the bank and adjacent runs and shoals with reduced water velocity. It may also occupy water runs 9 to 12 feet deep. Bottom substrates generally include gravel and sand (Federal Register 2012c). Population density is greatest in areas where velocity and flow is low allowing sediments to remain stable during flooding. Since rabbitsfoot mussels remain in the same general location for their life span these refuge areas are highly important. The rabbitsfoot typically does not burrow like other freshwater mussels making it more susceptible to displacement into unsuitable habitat during high flows (Federal Register 2012c).

Primary threats to the rabbitsfoot include impoundments, channelization, sedimentation, chemical contaminants, mining, oil and natural gas development, invasive non-indigenous species, temperature, and climate change (Federal Register 2015).

Distribution and Status

Rabbitsfoot historically occurred in 140 streams within the lower Great Lakes Subbasin and Mississippi River Basin. The Buffalo River is a western White River tributary. Historically, 13 rivers within the White River system contained rabbitsfoot populations. Since 1985, live or fresh dead individuals have been recorded in 9 of 13 rivers in the White River system. At one time, the main stem of White River and 11 of its tributaries had a large metapopulation of rabbitsfoot. A metapopulation is a group of spatially separated populations of the same species, which interact at some level. The Black, Spring, and Strawberry rivers may still contain a metapopulation. Declining populations are reported from the Buffalo, Black, Spring, and South Fork Spring tributaries. Many of the tributaries to these streams appear to have declining populations (Federal Register 2012c).

Rabbitsfoot was first documented in the Buffalo River in 1910 with nearly all specimens located in the lower reaches within Searcy County, Arkansas. In comprehensive surveys in 1995 and 2004 to 2005, live

rabbitsfoot specimens were found concentrated between Arkansas Highway 7 in Newton County to near the Cedar Creek confluence downstream of Rush, Arkansas. NPS staff collected four live rabbitsfoot in 2008 from a site near the Cedar Creek. In 2011, the same site was surveyed; however, due to changes in channel morphology, few live individuals were recorded. Two live individuals and 23 weathered shells were located at a site downstream. In 2011, two live rabbitsfoot were collected at two sites located between Arkansas Highway 7 and U.S. Highway 65. Populations in the Buffalo River are small and susceptible to extirpation (Federal Register 2012c).

The current population status of rabbitsfoot is declining. It is estimated that the species has been extirpated from approximately 64 percent of its historical range. Of the 51 populations where the species remains, only 11 (8 percent) are viable, 23 populations (45 percent) are at risk of extirpation, and 17 populations (33 percent) show limited recruitment with little evidence of sustainability. The last observation on the Buffalo River was 1995 (Federal Register 2012c).

Designated Critical Habitat

Approximately 1,437 river miles in the Arkansas River system has been designated as critical habitat for the rabbitsfoot mussel. Approximately 70.6 river miles of the Buffalo River from Cove Creek confluence southeast of Erbie, Arkansas, downstream to U.S. Highway 65 west of Gilbert, Arkansas and Highway 14 southeast of Mull, Arkansas downstream to Leatherwood Creek confluence in the lower Buffalo Wilderness Area are designated critical habitat (Federal Register 2015). The Buffalo River and critical habitat occurs approximately 6.7 miles downstream of the C&H Hog Farms as shown on Map 6 (Appendix A).

Primary constituent elements are those specific elements of the physical or biological features that provide for a species' life history processes and are essential to the conservation of these species. For the rabbitsfoot the primary constituent elements are:

1. Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).
2. A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussels' and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.
3. Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.
4. The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the

Neosho mucket and rabbitsfoot. Suitable fish host for rabbitsfoot may include, but are not limited to, blacktail shiner from the Black and Little River and cardinal shiner, red shiner, spotfin shiner, bluntface shiner, rainbow darter (*Etheostoma caeruleum*), rosyface shiner (*Notropis rubellus*), striped shiner (*L. chrysocephalus*), and emerald shiner (*N. atherinoides*).

5. Competitive or predaceous invasive (nonnative) species in quantities low enough to have minimal effect on survival of freshwater mussels.

Snuffbox Mussel

Description and Life History

The snuffbox is a small- to medium-sized mussel, with males reaching up to 2.8 inches in length. The maximum length of females is about 1.8 inches. The shape of the shell is somewhat triangular (females), oblong, or ovate (males), with the valves solid, thick, and very inflated. The external shell is generally smooth and yellowish or yellowish-green in young individuals, becoming darker with age. Green, squarish, triangular, or chevron-shaped marks cover the umbone (the inflated area of the shell along the dorsal margin), but become poorly delineated stripes with age (Federal Register 2012a).

The snuffbox is a freshwater mussel with a similar life history to the rabbitsfoot mussel. Adults are suspension-feeders spending their entire lives partially or completely buried within the stream bottom. They generally burrow deep into the substrate, except when spawning or attempting to attract a host. They feed on algae, bacteria, detritus, microscopic animals, and dissolved organic material. There is evidence to indicate that they may also deposit-feed on particles in sediment. Juvenile mussels employ foot (pedal) feeding, consuming settled algae and detritus. Little is known about the specific life-history requirements of the snuffbox. In laboratory tests, juvenile snuffboxes have successfully transformed on logperch (*Percina caprodes*), blackside darter (*P. maculata*), rainbow darter, Iowa darter (*E. exile*), blackspotted topminnow (*Fundulus olivaceus*), mottled sculpin (*Cottus bairdii*), banded sculpin (*C. carolinae*), Ozark sculpin (*C. hypselurus*), largemouth bass (*Micropterus salmoides*), and brook stickleback (*Culaea inconstans*) (Federal Register 2012a).

The age of sexual maturity is unknown, but for other freshwater mussels, it can be highly variable ranging from between 0 to 9 years and can be sex dependent. The snuffbox is thought to brood from September to May (Federal Register 2012a).

Primary threats to the snuffbox include impoundments, dredging and channelization, chemical contaminants, mining, oil and natural gas development, siltation, fragmentation and isolation of populations, and exotic species invasion (Federal Register 2012a).

Habitat

The snuffbox is found in small- to medium-sized creeks, to larger rivers, and in lakes. It occurs in swift currents of riffles and shoals and wave-washed shores of lakes over gravel and sand with occasional cobble and boulders (Federal Register 2012a). As with other bivalves, refuge areas are highly important. Species-specific ecological requirements have not been determined (e.g., minimum water flow and effects of particular pollutants). The snuffbox reproductive biology, such as age and size at earliest maturity, reproductive longevity, and the level of recruitment needed for species' survival and long-term viability are unknown (Federal Register 2012a).

Distribution and Status

Historically, the snuffbox occurred in 210 streams and lakes in 18 states and one Canadian province. Remaining populations occur in 79 streams in 14 states and one Canadian province. In Arkansas, the species is found in the Buffalo, Spring, and Strawberry rivers. The species status has declined significantly range-wide at an estimated 62 percent. Populations are highly fragmented and restricted to short reaches. Approximately 32 percent of streams where populations remain are represented by only one or two recent live or fresh dead individuals (Federal Register 2012a).

The remaining populations have been categorized into three groups. Stronghold populations are defined as having sizeable populations generally distributed over a significant and more or less contiguous length of stream (30 river miles or greater), with ample evidence of recent recruitment, and currently considered viable. Significant populations are defined as small generally restricted populations with limited recent recruitment and viability. Marginal populations are defined as those which are very small and highly restricted, with no evidence of recent recruitment, of questionable viability, and that may be on the verge of extirpation in the immediate future. Based on these criteria, there are 7 stronghold populations, 24 significant populations, and 48 marginal populations of snuffbox (Federal Register 2012a).

The species status in the Buffalo River is marginal. Snuffbox was last observed in 2006 in the Buffalo in a small population. The population trend and viability in the Buffalo River is unknown. (Federal Register 2012a).

3.4.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

From the confluence with Big Creek, the nearest rabbitsfoot mussel recorded occurrence is approximately 26.6 river miles downstream, on the Buffalo River. The rabbitsfoot has not been recorded as occurring within Big Creek. However, it is considered suitable habitat since it is a free-flowing perennial stream that exhibits stable channel morphology and appropriate substrates. There is no designated critical habitat within or adjacent to C&H Hog Farms or the application fields.

Snuffbox mussel has not been recorded as occurring in Big Creek; however, it is considered suitable habitat as the specific physical and biological features of snuffbox habitat are unknown.

C&H Hog Farms has been in operation (waste applied to fields) for more than 18 months and water quality sampling has been ongoing. There are no data to suggest the operation is negatively affecting water quality by increasing the concentrations of nutrients in Big Creek. Refer to ***Section 3.2.2*** for further information on surface and groundwater quality. The application of wastes to fields adjacent to Big Creek is closely managed under the terms and conditions of the NPDES General Permit.

A NMP was prepared by C&H Hog Farms and approved by ADEQ for the operation of the C&H Hog Farms. The site-specific plan calculated a nutrient budget for N and P that considered all potential sources of nutrients and the estimated crop yield. A field-specific assessment was conducted to designate the form, source, amount, timing, and method of application of manure on each field in order to minimize the potential for any discharge to surface waters. Testing of both soil and manure prior to field application is required, so the application rates can be adjusted so that all nutrients are utilized by

plant growth. All land application areas receive application at rates consistent with infiltration capabilities of the native soil such that there is no runoff to surrounding areas. Buffer strips (100 feet) are maintained between fields and streams where waste is applied to prevent waste runoff into surrounding areas. Wastes/wastewater are not applied to land classified as highly erodible, saturated, or frozen ground, or during rainfall events or when it is likely to rain.

Since the application of manure to up to 630 acres of fields utilized by C&H Hog Farms is more stringently managed under the General Permit stipulations, there is the potential for improved water quality conditions since historically those fields have been fertilized at un-managed rates and without buffers near waterways or the implementation of other BMPs.

The farm's General Permit contains numerous provisions that are designed to protect groundwater, including the development and implementation of a site-specific NMP. Waste and nutrient application rates on the fields do not exceed the plant uptake pursuant to the engineering operations plan and soil tests conducted in accordance with Arkansas guidelines and application rates (FSA 2013d). Therefore, no nutrients are expected to leach into groundwater from the application of wastes to fields in the area.

While it is highly unlikely, there could be a permitted discharge from the waste ponds should a 50-year or 100-year heavy rainfall event occur at a time when the ponds are near capacity. A discharge during a significant rainfall event would have short-term impacts to surface water quality since nutrients concentrations would dilute or be available for biological uptake during downstream transport through the system. It is also possible that there could be an accidental discharge of waste that could reach surface waters that may result in short-term impacts to surface water quality. These types of discharges would not result in long-term (chronic) impacts to surface water quality.

The NPDES General Permit limits potential seepage from the waste holding ponds to 5,000 gallons/acre/day, which equates to 0.0013 inch/day. At pond installation, liners were tested and met with specifications to ensure that soil used met engineering specifications for permeability. While the NPDES General Permit has a limit for potential seepage that does not necessarily mean the C&H Hog Farms waste ponds are seeping fluids at that rate or at any rate. To date there are no data available to determine whether or not the ponds are leaking. There is no evident conduit for groundwater to reach surface water in the area. Any nutrients that might be leaking from the holding ponds would likely be bound to soil particles, particularly undeveloped soils, minimizing the potential for them to eventually enter groundwater. Concentrations of *E. coli* would naturally decline over time given their limited survivability.

In May 2015, C&H submitted a Major Modification Request to ADEQ to install 60-mm HDPE liners over a geotextile base material in both waste ponds and to install an 80-mm HDPE cover and methane flare system on Pond 1 (ADEQ 2015c). These design modifications would further minimize the potential seepage of wastes into groundwater from the ponds.

It is unknown if karst features underlie the application fields. The results of the geotechnical investigations did not encounter any limestone or water-bearing formations, which would indicate karst topography (see ***Sections 3.2.2 and 3.3.2*** for more details). How surface water and groundwater discharge/recharge within the C&H Hog Farms and application fields is also unclear. However, even with the assumptions that localized recharge and discharge of surface and groundwater occurs in the area,

no adverse impacts to groundwater quality are anticipated given the requirements of the NPDES General Permit and the rigorously managed farm operations.

Based on the potential for short-term changes in water quality from an accidental discharge, the Proposed Action may affect but is not likely to adversely affect rabbitsfoot mussel. The Proposed Action may affect but is not likely to adversely affect designated critical habitat for rabbitsfoot mussel.

Based on the potential for short-term changes in water quality from an accidental discharge, the Proposed Action may affect but is not likely to adversely affect snuffbox mussel.

Mitigations

No significant impacts to threatened and endangered species are anticipated and no mitigation measures are required.

3.4.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The terms of C&H Hog Farms NPDES General Permit would apply to operations regardless of the source of funding used to construct and operate the facility. Therefore, potential impacts to threatened and endangered species and designated critical habitat are the same as those described for Alternative A.

Mitigations

As with Alternative A, no significant impacts to threatened and endangered species are anticipated and no mitigation measures are required.

3.5 Buffalo National River

The Buffalo National River, managed by the NPS, was established in 1972 as the first national river for "purposes of conserving and interpreting an area containing unique scenic and scientific features, and preserving as a free flowing stream an important segment of the Buffalo River in Arkansas" (PL 92-237). The Buffalo River Enabling Act provides that:

> "no department or agency of the United States shall assist by loan, grant, license, or otherwise in the construction of any water resources project that would have direct and adverse effect on the values for which such river is established, as determined by the Secretary."

The District Court's Order (Case 4:13-cv-00450-DP, Document 58) noted that C&H Hog Farms is not a Federal water resources project:

> "The farm doesn't withdraw anything from the river or discharge anything into it. The farm is just too far from the Buffalo to qualify as a water resources project."

As such, the construction and operation of C&H Hog Farms, with or without Federal loan guarantees, does not violate the Buffalo River Enabling Act.

3.5.1 Affected Environment

The Buffalo National River encompasses 135 miles of the Buffalo River, one of the few undammed rivers in the lower 48 states, from its headwaters in the Boston Mountains to its confluence with the White River to the east. The Park includes more than 94,000 acres divided into three management districts. Three Wilderness Areas—the Upper Buffalo Wilderness Area, the Ponca Wilderness Area, and the Lower Buffalo Wilderness Area—are located within the park boundaries.

Park visitation is estimated to be approximately 800,000 visitors per year. Recreational opportunities include water-based activities such as swimming, tubing, canoeing, kayaking, and fishing as well as land-based activities like hiking and horseback riding along more than 100 miles of trail, hunting, wildlife viewing, photography, camping, and ranger led programs. There are sixteen campgrounds in the park ranging from primitive sites to those that accommodate horses, some with vault toilets, and some with full restrooms and water systems. One location offers cabins, a lodge, and restaurant. Three of the campgrounds are located on gravel bars in the river. There are 21 boat launch locations along the river within the park. Development of a General Management Plan for the Buffalo National River was initiated in 2009; however, the plan and associated NEPA analysis were not completed due to budget cuts.

C&H Hog Farms is located approximately 2,200 feet west of Big Creek, a tributary of the Buffalo River. The Buffalo National River lies approximately 6.8 river miles north of C&H Hog Farms. Fields where waste is land applied lie along Big Creek and unnamed tributaries of Big Creek.

3.5.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

If Federal loan guarantees were voided, the facility would likely continue to operate in accordance with the environmental protections specified in its NPDES General Permit. C&H Hog Farms has been in operation and wastes have been land applied for more than 18 months. Water quality sampling has been ongoing. ***Section 3.2*** of this document presents a discussion of water quality baseline conditions and potential impacts to surface waters resulting from the operation of C&H Hog Farms in accordance with the terms of its NPDES General Permit and the operating requirements. There are no data to suggest the operation is negatively affecting water quality by increasing the concentrations of nutrients or bacteria in Big Creek, a tributary to the Buffalo National River. The application of wastes to fields adjacent to Big Creek is closely managed to ensure levels of nutrients can be taken up by vegetation and are not applied near surface waters.

Installation of liners in waste storage ponds would provide further protection to surface and groundwater beyond those practices currently employed on the facility and waste application fields.

Mitigations

No significant impacts to the Buffalo National River are anticipated and no mitigation measures are required.

3.5.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The direct and indirect impacts associated with the Proposed Action would be the same as those described for Alternative A.

Mitigations

As with Alternative A, no significant impacts to the Buffalo National River are anticipated and no mitigation measures are required.

3.6 Odor

Odor is a subjective issue often regulated under nuisance ordinances or the use of exclusionary zoning at the local level. No such ordinances exist in Newton County, Arkansas. The State of Arkansas' Right to Farm Law (Ark. Code Ann. § 24101) protects farming operations from nuisance claims when they meet certain conditions including operations that employ "methods or practices that are commonly or reasonably associated with agricultural production."

3.6.1 Affected Environment

Newton County is a sparsely populated rural area where agriculture, including CAFOs and livestock grazing and haying operations, is common. The tract of land where the C&H Hog Farms facilities were built was partially wooded prior to construction. The land application fields were previously grazed and managed for pasture and forage production, which included application of fertilizers. Because the area is not designated a Nutrient Surplus Area by the Arkansas General Assembly, an NMP was not required prior to the use of fertilizer from C&H Hog Farms. Therefore, the historical type, source, frequency and location of fertilizer or manure application is not known.

3.6.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

Odor sources associated with the operation of C&H Hog Farms include the gestational and farrowing barns, waste storage ponds, and fields where land application of wastes occurs. The Mt. Judea School is the closest occupied dwelling to the farm barns and waste ponds. It is located approximately 0.7 mile east, separated by two forested areas and Field 7. The fields where wastes could be land applied as fertilizer are shown in Map 3 in Appendix A. The owners of each tract of land where wastes could be land applied entered Land Use Contracts with the operators of C&H Hog Farms. The contracts specified wastes would be applied according to the NMP and ADEQ guidelines and allowed owners to add additional requirements. None were specified by any of the landowners (ADEQ 2012a).

Section L of the NMP (ADEQ 2015a) and Operation and Maintenance Guidelines for C&H Hog Farms (ADEQ 2012a) include operating procedures designed to reduce odor at the farm facilities and land application sites. These are summarized in ***Section 2.1.3*** of this document and include setbacks from occupied buildings and property lines, timing and weather restrictions to reduce impacts to neighboring residents. At the farm, standing water is minimized, pipes and other components of the facility are inspected regularly, and a mortality management plan is in place to provide for the prompt disposal of

carcasses. C&H Hog Farms has planted approximately 1,000 loblolly pine trees around the operations to further minimize odor.

Compliance with the terms of the General Permit would prevent significant odor impacts from operations. The proposed major modification to the NPDES General Permit, which would allow for installation of a floating cover and methane flare system, would further reduce odor at the C&H Hog Farms' waste storage ponds.

Mitigations

No significant odor impacts are anticipated and no mitigation measures are required. The terms of the facility NPDES General Permit apply to its operations—regardless of the status of Federal backing of loans.

3.6.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The direct and indirect impacts associated with the Proposed Action would be the same as those described for Alternative A.

Mitigations

As with Alternative A, no significant odor impacts are anticipated and no mitigation measures are required.

3.7 Socioeconomics

Social and economic indicators are used to measure the effects of projects to the human environment. Socioeconomic analyses evaluate how the conditions of a community or region are affected by a project through changes in the rate of population growth, changes in the demographic characteristics, and changes to employment and income in the affected area.

3.7.1 Affected Environment

The affected area for socioeconomic impacts is defined by the communities where the enterprise and its employees reside, make purchases, and generate tax revenues. For this EA, the affected area for socioeconomics is Newton County, Arkansas. Baseline social and economic indicators including rate of population growth and changes to employment and income are evaluated to determine socioeconomic impacts. These baseline indicators are compared to results for each alternative and to the North Arkansas Region that includes Carroll, Boone, Marion, Newton, and Searcy counties as well as the State as a whole to determine the level of effects. The location of these counties are shown in Map 1 in Appendix A.

Population and Demographics

Newton County currently has a population of about 8,000 and while the North Arkansas Region has been growing, Newton County reduced population by 5 percent between 2010 and 2014 (USCB 2015). Table 3-4 includes population estimates and projections for Newton County, North Arkansas Region, and Arkansas as a whole for 2012, 2017, and 2030. The North Arkansas Region includes less than 4 percent

of the total population of Arkansas in more than 6 percent of the land area. This highlights the rural nature of this part of the State.

Table 3-4. Population and Demographics Summary

Location	2012 Population	2017 Population	2030 Population	Percent of population that is white (2013)	Percent of population below poverty (2005-2009)
Newton County	8,484	8,484	8,484	95.8	23
North Arkansas Region	100,014	103,352	112,032	n/a	21
Arkansas	2,945,656	3,066,705	3,381,433	79.9	18

Source: Population – (UA 2015). Race – (USCB 2015). Poverty – (NARMC 2013).

Table 3-4 also shows that the population of Newton County has a much lower minority population than the rest of Arkansas (USCB 2015). The North Arkansas region and Newton County have higher poverty rates than the rest of the State.

Employment

In 2010, total employment in Newton County was just over 1,000 with more than half of the jobs in service-producing industries such as education and health services (NARMC 2013). Unlike the North Arkansas Region, more than a third of the jobs in Newton County were in local government. This is reflected in the top employers that include Mt. Judea School District, Jasper School District, Newton County Nursing Home, Western Grove School District, and Bob's Markets, Inc. In the rest of the North Arkansas region, local government averages about 15 percent of total jobs. Some of the counties in the North Arkansas region have large single employers including Federal Express in Boone County (1,000 employees) and Tyson Foods, Inc. in Carroll County (2,500 employees) (NARMC 2013). These large employers can skew some of the regional employment comparisons and make these relatively small populations vulnerable to large employment swings based on a single company's decisions. Table 3-5 summarizes employment and income statistics for Newton County, the region and the State.

Table 3-5. Employment and Income Summary

Location	Total Employment 2010	Unemployment Rate 2006 (%)	Unemployment Rate 2011 (%)	Median Household Income 2012	Median Household Income 2017
Newton County	1,011	5.3	7.8	$27,800	$28,600
North Arkansas Region	29,722	5.0	7.9	$32,279	$32,945
Arkansas	n/a	5.3	8.0	$37,982	$38,933
U.S.	n/a	4.6	9.0	$49,581	$50,850

Source: NARMC 2013

Like the State and region, unemployment in Newton County increased substantially between 2006 and 2011 as shown in Table 3-5. The unemployment rate in Newton County increased from 5.3 percent in 2006 to 7.8 percent in 2011 (NARMC 2013). Because the number of businesses in Newton County is so small, data on employment changes by industry sector is incomplete because data for sectors with fewer than 10 businesses is not reported to protect privacy. Employment trends in Newton County between 2001 and 2010 show that the manufacturing and farm and farm services sector lost the most jobs (200), while service industries including professional and other services gained almost 400 jobs during the same period (UA 2013).

Income

As shown in Table 3-5, median household income in Newton County is almost 15 percent lower than the North Arkansas Region, 27 percent lower than the State average and almost half the national average (NARMC 2013). This lower household income is likely due to the shift in employment from higher wage manufacturing industries to lower wage service jobs (UA 2013).

Focusing on the farm and farm service sector, this sector provided about 20 percent of the jobs in Newton County but less than 5 percent of the earnings in 2010 (UA 2013). Livestock and products sales were the major source of farm income for Newton County farmers. Farm income from livestock sales in Newton County increased from $13 million in 1994 to $20 million in 2010 (UA 2013). The farm sector in Newton County has experienced substantial consolidation. The number of farms in Newton County was reduced by 25 percent between 1964 and 2007 to about 626 farms (UA 2013). Two-thirds of these farms generated less than $10,000 in annual farm sales or about 5 percent of total farm sales of $19 million in 2007 (UA 2013). That same year, 63 farms in Newton County generated two-thirds of total farm sales (UA 2013). Overall, the employment and income trend in the farm sector in Newton County is that larger farm operations are generating the bulk of farm sales.

Government Revenues and Expenditures

In Newton County, property tax is the major revenue source for school districts, county, and city governments (UA 2012). Property taxes generated about $3.3 million in revenue for Newton County in 2011 (UA 2012). Most of these property taxes (86 percent) were used to fund the Newton County school district. Because of relatively low property assessments, Arkansas relies less on property tax than any other State for education or government funding (UA 2012). In Newton County, property taxes fund 16 percent of Newton County school district needs and comprise only 6 percent of the total Newton County government revenue (UA 2012). As a result, school districts in Newton County get their funding from a mix of sources including property taxes (16 percent), foundation funding (31 percent), Federal sources (23 percent), State sources (24 percent), and others sources (UA 2012).

3.7.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

The socioeconomic impacts of C&H Hog Farms are related to its contribution to employment, income, and tax revenues in Newton County. C&H Hog Farms operations provide employment of nine employees. According to the Newton County Assessor's Office, C&H Hog Farms pays about $7,000 per year in property taxes (pers. comm. Newton County Assessor. May 29, 2015). The majority of these tax payments would be used to fund Newton County schools (UA 2012).

As a livestock rearing operation, C&H Hog Farms is part of the Farm and Farm Service sector in Newton County. Through its NMP, C&H Hog Farms also contributes to the local farm economy by providing fertilizer to nearby producers, with whom they have agreements, thus providing local options and reducing input costs to those producers.

Mitigations

No significant socioeconomic impacts are anticipated and no mitigation measures are required.

3.7.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The direct and indirect socioeconomic impacts associated with the Proposed Action would be the same as those described for Alternative A.

Mitigations

As with Alternative A, no significant socioeconomic impacts are anticipated and no mitigation measures are required.

3.8 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was enacted to ensure that the environmental effects of Federal actions do not fall disproportionately on low-income and minority populations.

The CEQ guidance (CEQ 1997) on incorporating environmental justice into NEPA analysis notes, "In order to determine whether a Proposed Action is likely to have disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes, agencies should identify a geographic scale for which they will obtain demographic information on the potential impact area. Minority populations should be identified where the minority population percentage of the affected area is meaningfully greater than the minority population in the general population or other appropriate unit of geographic analysis." The same guidance is given for measuring low-income populations. Usually, this is measured by comparing the individual poverty rate and the minority population composition for the affected area to a comparison area.

3.8.1 Affected Environment

The affected environment for environmental justice impacts is Newton County, Arkansas as compared to the North Arkansas Region including Boone, Carroll, Marion, Newton, and Searcy counties as well as the State as a whole. As shown in Table 3-1, Newton County has a lower minority population than the region or State. However, between 2005 and 2009, Newton County had a higher poverty rate (23 percent) than the region (21 percent) and the State (18 percent) as shown in Table 3-1. Therefore, it is important to consider potential disproportionate impacts to low-income populations.

3.8.2 Impacts from Alternative A: No Action Alternative

Direct and Indirect Impacts

There would be no disproportionate effects to low-income populations because C&H Hog Farms must operate within the terms of its NPDES General Permit and other environmental regulations to protect public health and welfare. In addition, the relatively small socioeconomic impacts of C&H Hog Farms operations on county tax revenues and employment benefit the entire County with no distinction for low-income residents. Surrounding farmers that participate in the NMP, benefit from free soil amendment for their haying and grazing operations. Since C&H Hog Farms would not change operations under the No Action Alternative, employment and tax revenues would be the same as baseline conditions. There would be no effects to low-income or the rest of the population in the Newton County.

Mitigations

No impacts to minority or low-income populations are anticipated and no mitigation measures are required.

3.8.3 Impacts from Alternative B: Proposed Action

Direct and Indirect Impacts

The direct and indirect environmental justice impacts for the Proposed Action would be same as those described for Alternative A.

Mitigations

As with Alternative A, no impacts to minority or low-income populations are anticipated and no mitigation measures are required.

4. CUMULATIVE IMPACTS AND IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

CEQ regulations stipulate that cumulative effects impacts analysis consider the potential environmental impacts resulting from the incremental impacts of a Proposed Action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions. Cumulative effects impacts most likely arise when a relationship exists between a Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide in time, even partially, tend to have the potential for cumulative effects impacts.

4.1 Past, Present, and Reasonably Foreseeable Actions

Federal, State, local, and private activities that are currently taking place, have occurred in the past, or may reasonably be assumed to take place in the future in Newton County and the Buffalo Watershed are listed below. Approximately 39 percent of the land in the Buffalo Watershed is within the boundaries of the Buffalo National River (11 percent), Ozark National Forest (27 percent), or is managed by the Arkansas Game and Fish Commission (1 percent). The remaining 61 percent of the land in the watershed is privately owned. Of this land, approximately 73 percent (686,782 acres) is forest; 25 percent (214,955 acres) is agriculture; 1.5 percent (13,058 acres) is urban, barren, transportation, power or communication infrastructure, and less than 1 percent is water (2,812 acres) (NPS 2004).

Buffalo National River

The Buffalo National River, managed by the NPS, lies north of the farm. It encompasses approximately 94,000 acres surrounding 135 miles of the Buffalo River. The park hosts approximately 800,000 visitors per year and provides 16 campground facilities ranging from primitive to full service, cabins and a lodge, a restaurant, multiple boat launches and river access sites, and miles of hiking, and horse and off road trails. According to the NPS Planning, Environment, and Public Comment Website (NPS 2015), there are six recent or ongoing projects at the Buffalo National River that require NEPA compliance:

1. Development of a General Management Plan for the Buffalo National River was initiated in 2009; however, the plan and associated NEPA analysis were not completed due to budget cuts. Therefore, a comprehensive plan of development, operations, and maintenance activities is not available.
2. An Elk Management Plan is under development.
3. A facilities improvement EA was completed in 2010 to assess the impacts of road, trail, and parking lot construction and maintenance, and installation of vault toilets at a river access site.
4. An EA was completed in 2013 to assess the impacts of repairs to the Lost Valley Trail and Campground, including replacement of a bridge over Clark Creek and improvements to trails and parking areas, following damage caused by flooding.
5. Repair and safety improvements to Highway 7 passing lanes are planned.
6. Repairs of the Woolum Highbanks Road are planned.

The Park also has a Water Resources Management Plan that provides a summary of water management within the park and an assessment of contributors to water quality issues in the river's watershed (NPS 2004).

Prescribed burning and timber harvesting are used to reduce hazardous fuels and maintain ecosystem health and diversity.

Ozark National Forest

The Ozark National Forest lies south of the farm, encompassing 1.2 million acres including the southern portion of Newton County. Visitors to the Forest enjoy camping, hiking, biking, and horseback riding along 230 miles of trail, camping, hunting and fishing, swimming, and scenic drives. Like all National Forests, the Ozark is managed for multiples uses. Cattle grazing, timber harvests, firewood cutting, natural gas development, and related projects take place in the Forest. The Revised Land and Resource Management Plan for the Ozark-St. Francis National Forests (USDA/FSSR 2005) describes the strategy for and objectives of managing Forest resources including vegetation, wildlife, recreation, soil, water, air, cultural as well as transportation and access, education, law enforcement, fire management, and commodities (timber and minerals) management. The U.S. Forest Service's Schedule of Proposed Actions (USFS 2015) provides a summary of activities that are currently planned, being undertaken, or have occurred in the recent past. These include recreation projects, vegetation management, fuels management, invasive species treatments, timber sales, natural gas well development, and pipeline installation. A summary of activities occurring in the Ozark National Forest in Newton County follows.

1. Big Piney Fuels Management Project EA would reduce fuels, improve forest health, and restore ecosystems. This project includes activities such as prescribed burning, commercial and noncommercial thinning, herbicide use to control non-native invasive species and to control understory species. Expected implementation: October 2015.
2. Bee Ridge Forest Health, Timber Project EA would harvest pine and hardwood, provide wildlife habitat fishery improvements, road stability, protection of heritage resources, fuel reduction, and non-native invasive species control. Expected implementation: October 2017.
3. Pleasant Hill Wildlife Habitat Improvement EA would include fuel treatments, vegetation improvements, species habitat improvements, noxious weed treatments, and watershed improvements. The project decision was signed on March 4, 2015.
4. Categorical Exclusions for 13 different linear special use requests that are existing but have not been permitted by a Special Use Permit include access roads, water lines, and power lines. Expected implementation: April 2014.
5. Categorical Exclusion for re-issuance of electric highline utility right-of-way. The project decision was signed: March 22, 2013.

Gene Rush Wildlife Management Area

The Gene Rush Wildlife Management Area (WMA) lies northeast of the farm and is bordered on the north by the Buffalo National River and by the Ozark National Forest on the south. It is managed by the Arkansas Game and Fish Commission. Activities include primitive camping, horseback riding, wildlife viewing, and hunting (primarily deer, black bear, wild turkey, elk, rabbit and squirrel). Wildlife habitat in the WMA is managed using timber harvest, controlled burning, stand improvement, and creation of canopy openings and waterholes.

Agriculture

The Buffalo National River Water Resources Management Plan (NPS 2004) cites conversion of land to pasture in the Buffalo Watershed and increasing poultry production and use of waste as land applied fertilizer as factors affecting water quality in the Buffalo Watershed. The 2012 Census of Agriculture profile for Newton County documents 648 farms in the county totaling more than 114,000 acres of land in 2012 (USDA 2012). These numbers represent 2 percent increase in the number of farms and a 1 percent increase in the farmland acreage over 2007 data. By area, 41 percent of farmland is pastureland. The top crop, based on market value, is forage land. The top livestock is turkey, followed by cattle and calves. There are also broiler, layer, and rooster operations in the county, though numbers are withheld in the report to avoid disclosing data on individual operations. According to the ADEQ Water Division Final Permits website (ADEQ 2015d), there are four other swine CAFOs and one dairy in Newton County all of which are permitted to land apply wastes in accordance with the terms of their CAFO permits.

Development and Industry

The ADEQ Water Division's 2004 Integrated Water Quality Monitoring and Assessment Report (ADEQ 2004) identifies a number of sources of surface and groundwater contamination including centralized and decentralized municipal water and waste water facilities, septic systems, food processing, industrial facilities, landfills, underground storage tanks, and petroleum development. Such facilities in Newton County that require permits from the ADEQ Water Division include five sawmills and lumberyards, a car wash, municipal water and wastewater treatment plants including the City of Jasper and the Deer, Marble Falls and Nail-Swain Water Associations, a number of road improvement and construction projects, and the septic system for Mt. Judea schools. The municipal water and wastewater treatment facilities handle waste products in a number of ways including hauling to municipal landfill and land application. Permit information is accessible on the ADEQ Water Division Final Permit website (ADEQ 2015d). The Buffalo National River Water Resources Management Plan (NPS 2004) lists septic tanks that are poorly constructed, malfunctioning, or constructed in cherty soils or in karst areas as potential sources of contamination of groundwater. The Arkansas Oil and Gas Commission has records of 20 oil and gas wells, mostly abandoned, in Newton and Searcy Counties, most of which lie in the Buffalo Watershed (AOGC 2015).

4.2 Cumulative Impacts

As detailed in Chapter 3, no significant direct or indirect negative impacts to natural or social resources resulted from the construction of C&H Hog Farms nor are any expected to result from its continuing operation in compliance with the terms of its NPDES General Permit. The General Permit conditions, detailed in ***Section 2.1.3***, are designed to prevent impacts to environmental resources, including surface and groundwater quality.

4.3 Irreversible and Irretrievable Resource Commitments

NEPA requires that environmental analysis include identification of any irreversible and irretrievable commitments of resources, which would be involved should an action be implemented. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources has on future generations. Irreversible effects primarily result from the

use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored because of the action. The construction and ongoing operation of the C&H Hog Farms did not and is not expected to result in any irreversible or irretrievable resource commitments.

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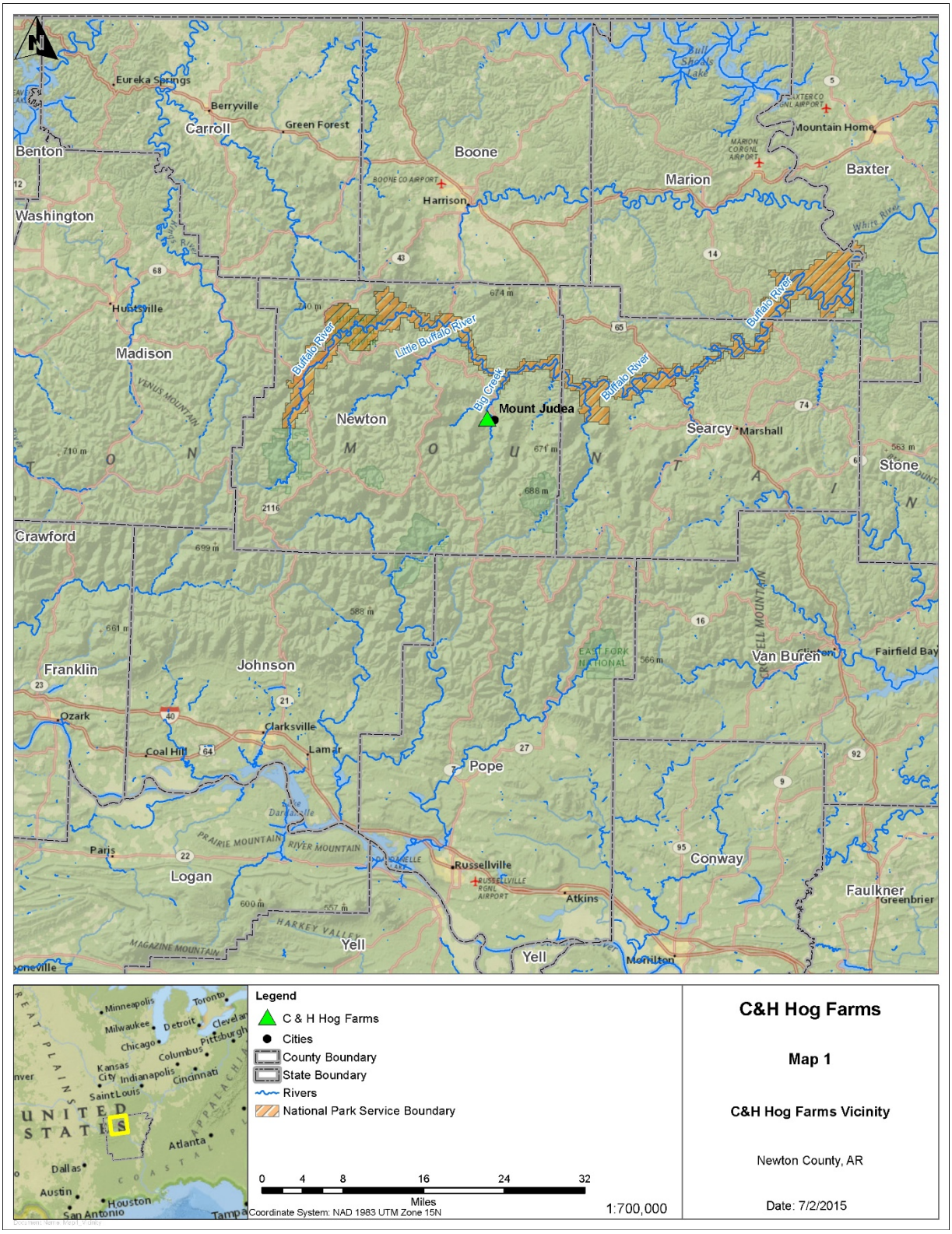
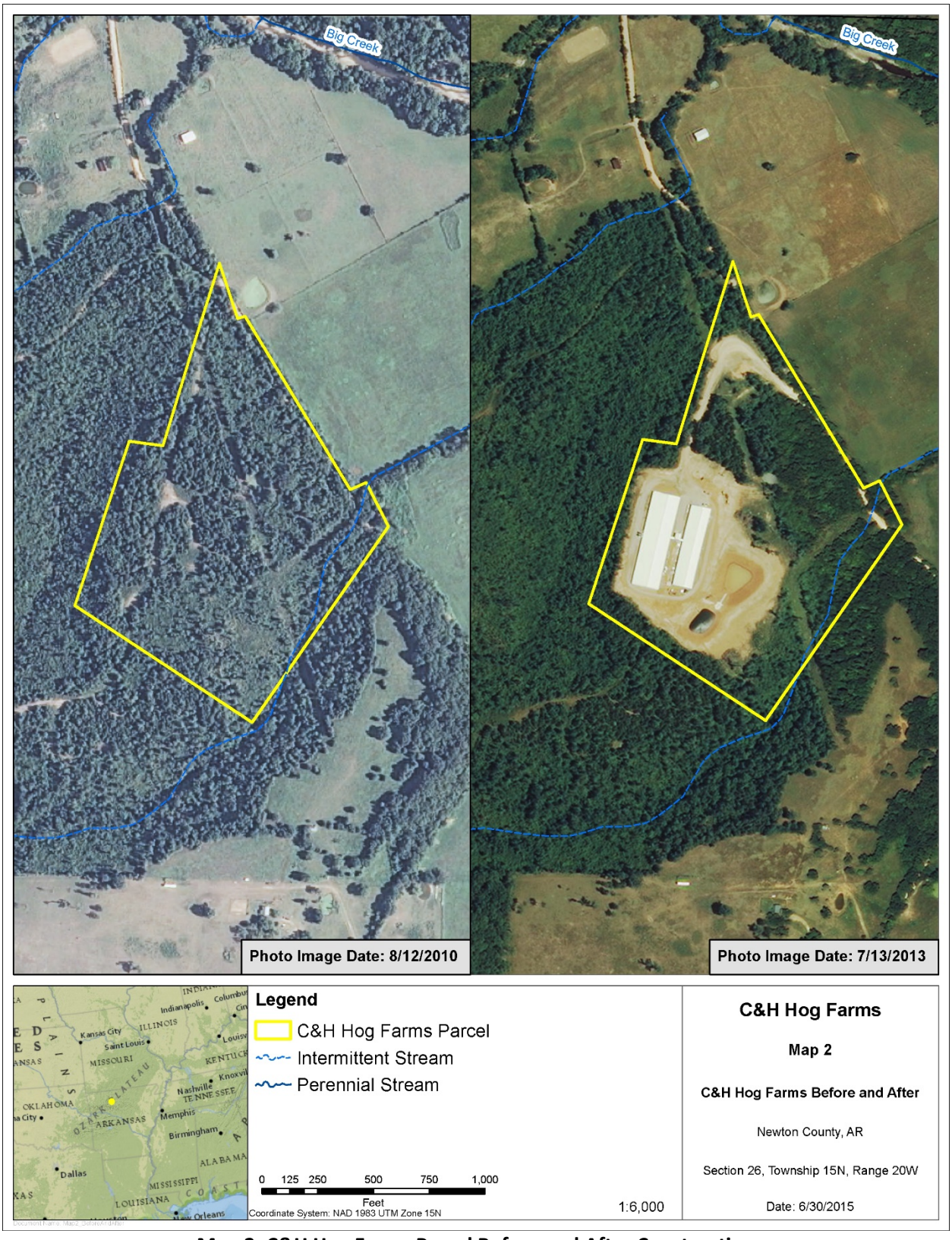
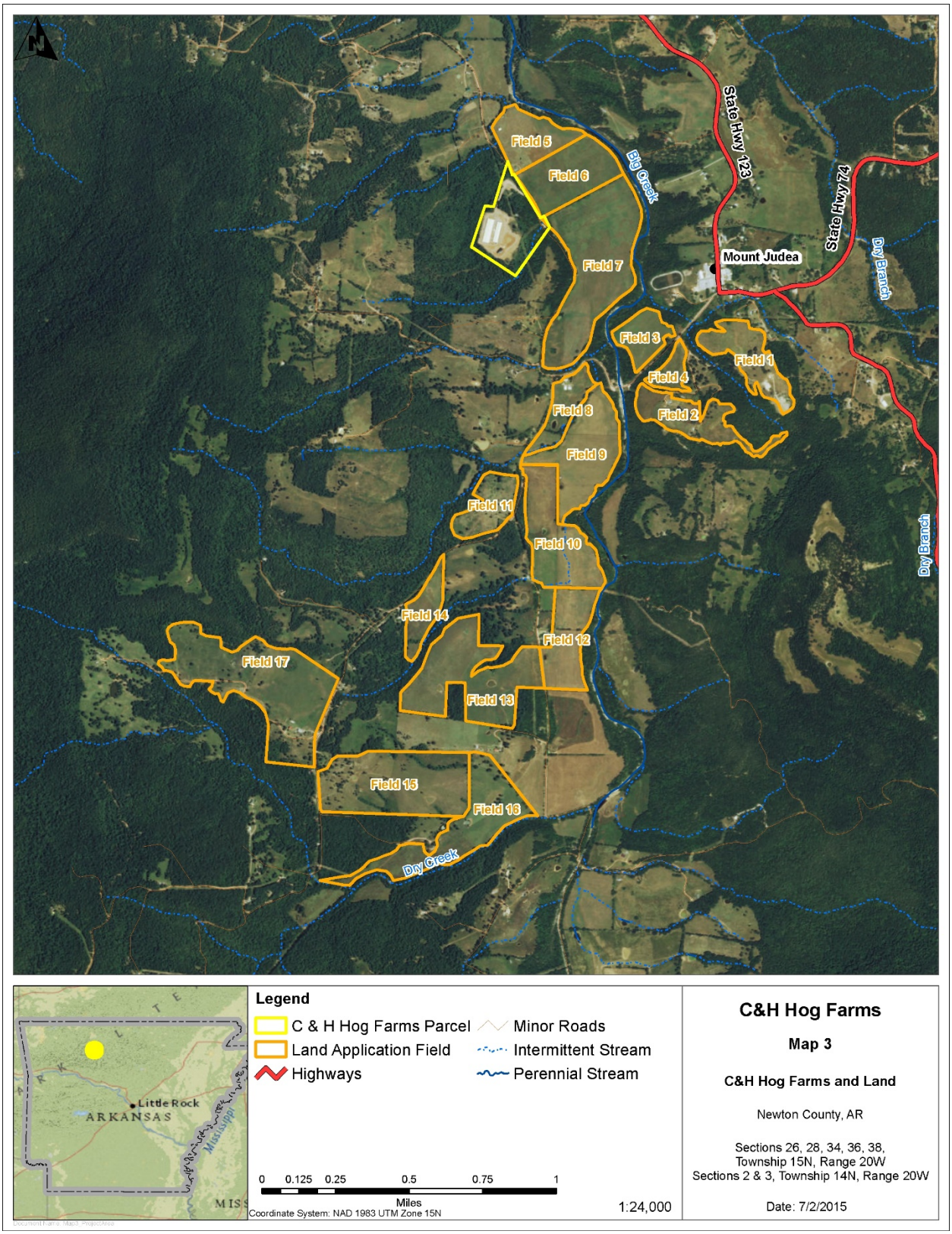
Appendix A – Maps



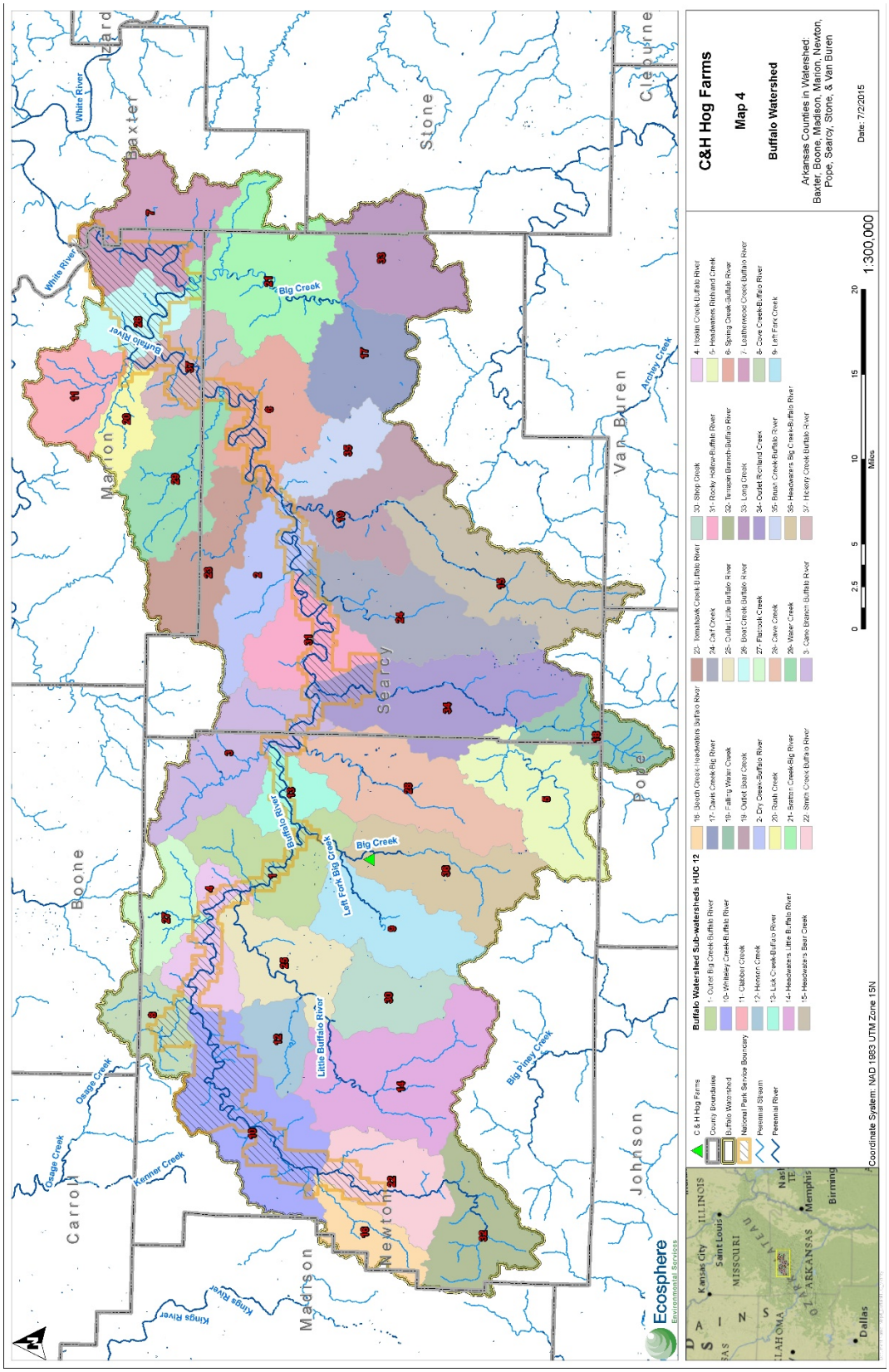
Map 1. C&H Hog Farms Vicinity Map



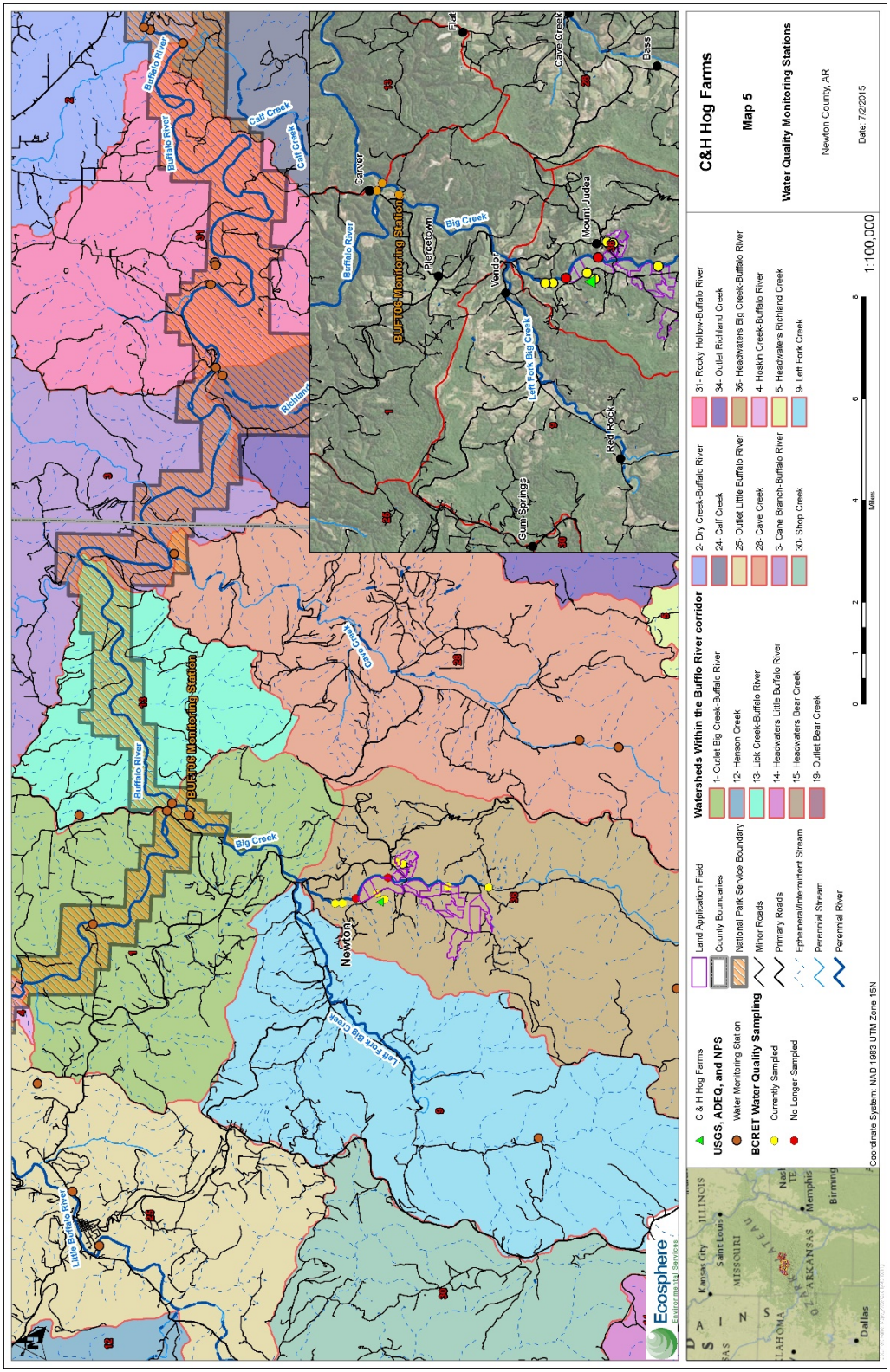
Map 2. C&H Hog Farms Parcel Before and After Construction



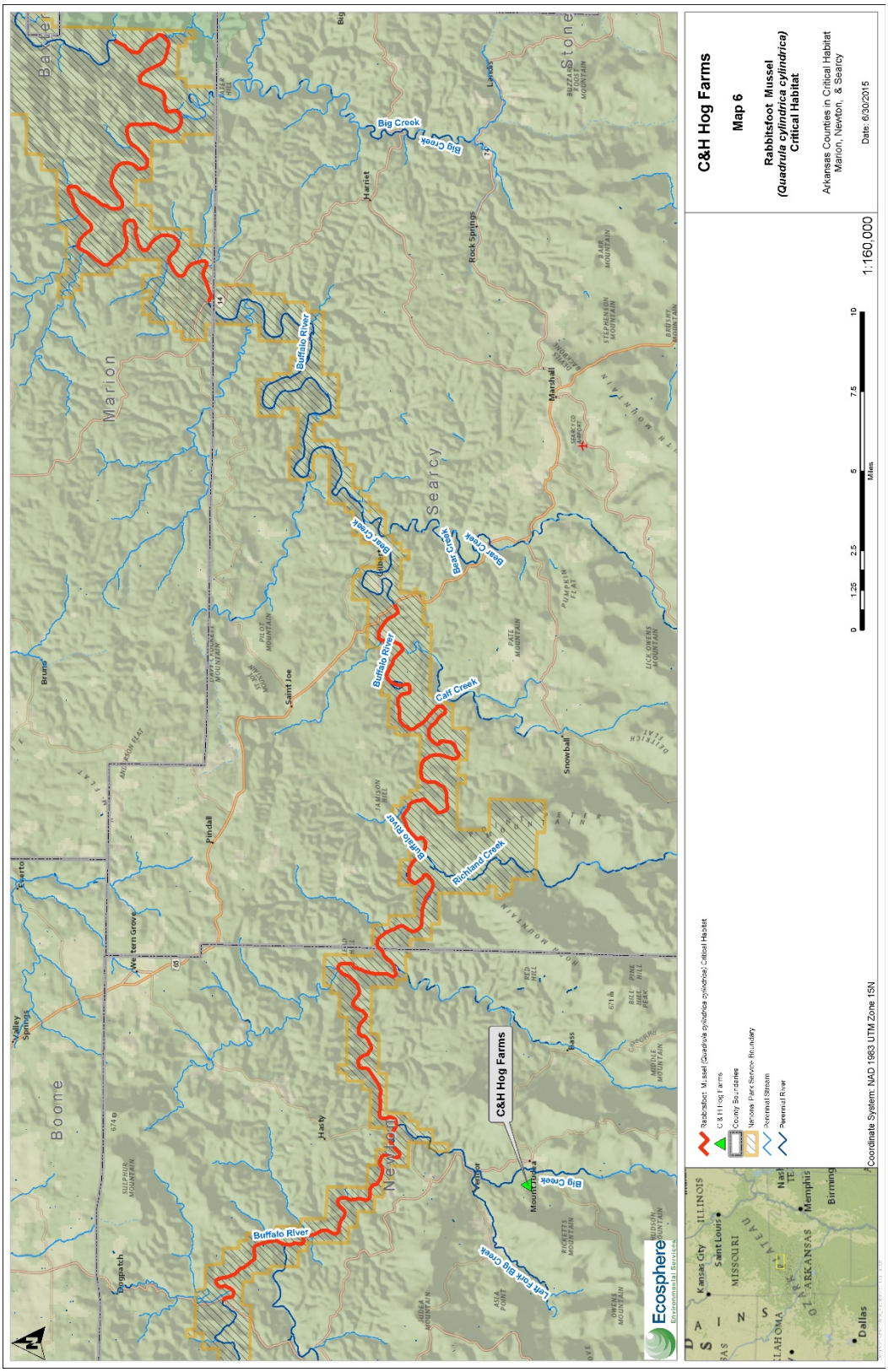
Map 3. Project Area



Map 4. Buffalo River Watershed



Map 5. Water Quality Monitoring Stations



Map 6. Rabbitsfoot Mussel Critical Habitat