September 13, 2022

Brian Guthrie, Chairman
Bixby Public Works Authority
c/o Bea Aamodt, P.E., Public Works Director
City of Bixby
P.O. Box 70
Bixby, Oklahoma 74008-0070

Re: Amendment to Add Biosolids Land Application Sites - Approved
General Permit No. OKLAS2000005
City of Bixby North and South Wastewater Treatment Plants' Lagoons
Facility Nos. S-20438 and S-20407
OPDES Permit Nos. OK0036153 & OK0026913

Dear Mr. Guthrie:

The Oklahoma Department of Environmental Quality (DEQ), Water Quality Division (WQD) issued authorization, No. OKLAS2000005, on May 19, 2020, to operate in compliance with General Permit OK65S for a one-time application of biosolids from the City of Bixby's (City) North and South Wastewater Treatment Plants' (WWTPs) Lagoons. On July 29, 2022, the DEQ received the City's request to add ten (10) land application sites. On August 18, 2022, DEQ received additional information on the site's soil analyses corresponding to the amendment and agronomic rate calculations for the new sites. Approval of the sites is granted based on the information provided.

APPROVED:

Site DL-1: 36 acres located within the NW¼ of Section 6, Township 16 N, Range 14 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site DL-2: 20 acres located within the W¼, SW¼ of Section 31, Township 17 N, Range 14 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site DL-3: 75 acres located within the E½, SW¼ of Section 31, Township 17 N, Range 14 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-1: 12 acres located within the N½, SW¼ of Section 1, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-2: 12 acres located within the N½, SW¼ of Section 1, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-3: 16 acres located within the N½, SW¼ of Section 1, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-4: 4 acres located within the N½, SW¼ of Section 1, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-5: 5 acres located within the N½, SW¼ of Section 1, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-6: 55 acres located within the SE½, SE¼ of Section 2, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

Site JR-7: 25 acres located within the SW¼, SW¼ of Section 2, Township 16 N, Range 13 E of the Indian Meridian, Oklahoma County, Oklahoma.

It should be noted that DEQ regulation prohibits land application on slopes exceeding five percent (5%). Sites application approved is subject to the provisions of City General Permit No. OKLAS2000005 and should be made a part of the permanent record. Any change or deviation from the permit must be approved in writing by DEQ. If you have any questions, please contact me at (405) 702-8132, email Nima.Sharifi@deq.ok.gov, or write to me at the letterhead address.

Sincerely,

Nima Sharifi, District Representative
Municipal Wastewater Enforcement Section
Water Quality Division

NS/MM/hb EDD

cc: Jared Cottle, P.E., City Manager, City of Bixby
Gabe Timby, Director of Environmental-West Region, Denali Water Solutions LLC
Chad Keller, ECLS, Tulsa DEQ Office
Debbie Nichols, Regional Manager, ECLS, DEQ

Denali
WATER SOLUTIONS

3308 Bernice Avenue
Russellville, AR 72802
PO Box 3036 • Russellville, AR 72811
Phone: 479-498-0500

January 31, 2022

Myles Mungle
Permit Engineer
Water Quality Division
OK Dept. of Environmental Quality
PO Box 1677
707 N Robinson
Oklahoma City, Oklahoma 73101-1677

RE: City of Bixby WWTP
Modification of General Permit # OK65S

Dear Myles:

I have updated the Waste Management Plan to add new land for the cleanout of the Lagoons at the North WWTP's for the City of Bixby, Oklahoma.

If there are any issues with the prepared management plan or the other information included with it please let me know by one of the following contacts, please give me a call at (479) 518-1554 or email at gabe.timby@denaliwater.com.

Sincerely,

Gabe Timby

Gabe Timby
Director of Environmental – West Region
Denali Water Solutions LLC

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
APPLICATION FOR AUTHORIZATION TO BE COVERED UNDER GENERAL PERMIT GP NO.-OK65S
FOR LAND APPLICATION OF BIOSOLIDS

FOR DEQ USE ONLY	**Application/Permit Number GP-OK65S** _____ **Date Received** _____ **One Time Land Application** _____, **Minor Facility** _____ **DEQ Biosolids Coordinator** _____

SECTION I

1. **Legal name of applicant:**
   Bixby Public Works Authority Facility
2. **Mailing address of applicant:**
   Street address or PO Box 116 W Needles Ave.
   City Bixby County Tulsa State Oklahoma Zip 74008
   Telephone (918_) 366-4430
3. **Name and address of facility:**
   Facility Name Bixby Public Works Authority South and North Facilities
   City Bixby County Tulsa State Oklahoma Zip 74008
4. **Location of land application site:**
   Legal Description: ___¼, ___¼, _N__¼, Sec 5,6____, T _16_, R _14_. ( ) IM ( ) CM.
   Entry Point: Longitude -95.8665_____, Latitude _35.9005____.
5. **Type Ownership** Public (x) Private ( ) Federal ( ) State ( )
6. **Contact Person:**
   Name & Title _____
   Street address or PO Box 116 W Needles Ave.
   City Bixby County Tulsa State Oklahoma Zip 74008
   Telephone (918) 366-4430
7. **Type of Treatment:**
   Minor Facility: Design Capacity _____ Estimated Sludge Production _____ Dry Tons/Year
   Lagoon: Estimated sludge quantity 1600 Dry Tons
   Other sludge storage facility: Estimated sludge quantity _____ (Dry Tons)
8. **Does Facility Receive Industrial Wastes?** Yes ( ) No (X)
   If "yes", What is the average daily industrial waste flow _____ GPD
   If the facility receives wastewater from a categorical industry, you must submit Section II of this form (attached) for each categorical industrial facility discharging to the sewer system.
9. **Are industrial discharge(s) to the system controlled by ordinance?** Yes ( ) No ( )

10. Sludge generated by the facility:

A. When was the last time sludge was removed from the facility (date) _____N/A_____

B. Was removal authorized by DEQ? Yes ( ) No ( )

C. How was it disposed of (describe the disposal method) _____

_____

_____

D. Location(s) of the disposal site(s) (legal description to the nearest 10 acres) _____

_____

E. Sludge Management Plan, if any:
Sludge Plan ID Number _____approved by the Department of Environmental Quality

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I also certify that I will provide for the operation of this facility in accordance with the Oklahoma Discharge Permits and Pollution Control Regulations and will provide certified operators as required by the Oklahoma Water and Wastewater Operations Certification Act. I further certify that I shall acquire or possess a right to the use of the property or properties on which the land application activities are located as well as the access route thereto. I understand I shall maintain such right of use and access for the duration of the permit term. I am aware that there are significant penalties for submitting false information, including revocation of the permit and the possibility of fine and imprisonment.

Note: Application must be signed by the authorized chief elective or executive officer of the applicant, or by the applicant, if an individual.

Name (print) Brian Guthrie

Title Mayor

Date 7/27/22

Signature [signature]

Subscribed and sworn to before me this 27th *day of* July, 2022.

Brian Guthrie *My commission expires* 7 March 2026

SHANNON N DURAN
Notary Public in and for
STATE OF OKLAHOMA
Commission #22003136
Expires: 7 Mar 2026

This application shall be filed in duplicate with the original and one copy to be submitted to the DEQ, and one copy to be submitted to the local DEQ office.

Please return completed form with attachments to:

Water Quality Division
Department of Environmental Quality
707 N. Robinson, P.O. Box 1677
Oklahoma City, Oklahoma 73102-1677

Table of Contents

City of Bixby WWTP Land List

	Name	Field ID	Section	Township	Range	Lattitude	Longitude	Acres
Origional		VK-1	E1/2,NE1/4, Sec 6	16 N	14 E	35.9005	-95.8665	190
		VK-1	NW1/4 Sec 5	16 N	14 E	35.9003725	-95.8533395	10
		VK-2	E1/2 Sec 31	14 N	17 E	35.6526664	-95.5433593	219
		BH-1	E1/2,NE1/4, Sec 1	16 N	13 E	35.8941331	-95.8751495	126
New		DL-1	NW1/4 Sec 6	16 N	14 E	35.900311	-95.870522	36
		DL-2	W1/4,SW1/4 Sec 31	17 N	14 E	35.902969	-95.865563	20
		DL-3	E1/2,SW1/4 Sec 31	17 N	14 E	35.902342	-95.862712	75
		JR-1	N1/2,SW1/4 Sec 1	16 N	13 E	35.891361	-95.889231	12
		JR-2	N1/2,SW1/4 Sec 1	16 N	13 E	35.891368	-95.882512	12
		JR-3	N1/2,SW1/4 Sec 1	16 N	13 E	35.890316	-95.884273	16
		JR-4	N1/2,SW1/4 Sec 1	16 N	13 E	35.890384	-95.885559	4
		JR-5	N1/2,SW1/4 Sec 1	16 N	13 E	35.891571	-95.889722	5
		JR-6	SE1/2,SE1/4 Sec 2	16 N	13 E	35.889263	-95.892529	55
		JR-7	SW1/4, SW1/4 Sec 2	16 N	13 E	35.887083	-95.905656	25
		Totals:					***TOTAL ACRE:***	***805***

PREFACE

This waste management plan is intended to provide appropriate management for a one-time application of liquid biosolids residuals from the Bixby, Ok WWTP as a soil amendment for agronomic practices. The Biosolids residuals being applied on the subject fields have high plant available nutrients and are recognized by the State of Oklahoma and the EPA as a soil amendment.

It is the policy of Denali Water Solutions LLC to conduct soil amendments application in a manner that is environmentally conscious with regards to clean water and public safety. Land application buffers and boundaries, from surface waters, residences, wells, roads, property lines, or relevant features will be established on these sites. These buffers are depicted and labeled on the site management maps provided. The nutrient budgeting was developed, based on site specific data, to provide land application of soil amendment at the state limit of 27,500 gallon or 136 cubic yards per acre while protecting water quality.

The land application method of these fields is surface application with incorporation. The application rate will not exceed that which can be readily absorbed by the soil based on consistency of residuals and ambient soil conditions. Residuals will not be applied to areas of soil that is saturated, frozen, or highly eroded. Residuals will not be applied during rain/storm events, or when precipitation is imminent.

Denali Water Solutions LLC will evaluate the conditions at each site prior to land applying and implement appropriate measures to ensure runoff, erosion, odors, and site disturbances are avoided.

Any questions or concerns regarding the content of this document should be addressed to Gabe Timby, Director of Environmental – West Region, for Denali Water Solutions, at (479) 518-1554 or gabe.timby@denaliwater.com.

Waste Management Plan
for Land Application of Wastewater Treatment Plant Biosolids
from the Bixby, Ok North and South WWTP's as a
Beneficial Soil Amendment on Farm Sites in Tulsa County

I. INTRODUCTION

The City of Bixby owns and operates a municipal wastewater collection and treatment system. Wastewater processed by the treatment works is primarily of residential origin. This Biosolids management plan outlines the liquids and solids processes at the facility, how Biosolids are managed to meet federal and state requirements, and how the Biosolids land application program is operated.

This plan was written by Denali Water Solutions LLC for the City of Bixby. Denali has over twenty years of experience in land applying waste products from water treatment plants, water treatment plants, food processing facilities, and other waste products at various facilities across the country. Land application of wastewater treatment plant Biosolids has proven to be an environmentally sound method of recycling. The Biosolids, which are high plant-available nutrients and low in metals, are beneficial to crops and pastures as a soil amendment and fertilizer.

II. WASTE CHARACTERISTICS

Wastewater Treatment Plant Biosolids are the sludge's which accumulate at WWTPs that may result from different processes at different facilities. Biosolids contain nutrients and organic matter that can be beneficial to the soil and crop environment, and to the general tilth of the soil.

The City of Bixby operates two aerobic wastewater treatment systems one is located on the East side of the City of Bixby, Ok (closed out 2021), the remaining facility is located on the North side of the city of Bixby in Tulsa County. The origin of the wastewater processed is eighty percent domestic, twenty percent commercial waste. It is estimated that 5,000,000 gallons of biosolids will be removed from the ponds.

Under 40 CFR Part 503 and Oklahoma Rules and Regulations Title 252, Chapter 606, pathogen reduction and vector attraction reduction for biosolids must be met prior to land application. Biosolids are categorized as Class A or Class B depending on the method used to determine pathogen reduction.

III. PATHOGEN REDUCTION

Seven representative samples were collected from various locations in the pond and delivered to a certified laboratory for fecal analysis. The geometric mean of the density of fecal coliform from the results was found to be less than 2 million MPN/gram of total solids on a dry weight basis. This is in compliance with Alternative 1 of 40 CFR Part 503 for Class B pathogen reduction requirements. The lab results can be found in Appendix B.

IV. VECTOR ATTRACTION REDUCTION

The land application on a pasture will include a pasture aerator prior to application and after application. In crop settings the field will be disked in within 6 hours of application, this satisfies Option 10 of 40 CFR Part 503.33(b).

V. TRANSPORTATION

Denali Water will transport, and land apply the biosolids from the wastewater treatment lagoons to authorized land application sites with sealed bob trucks. The bob trucks are operated by Denali Water employees. Denali Water is able to handle the volume of biosolids produced through these transportation practices. Liquid Biosolids are loaded from lagoon into the trucks via a liquid manure pump. (hog pump) Typically a 4" flex hose is attached to the hog pump and equipped with a gate valve. The bob trucks pull up alongside the pump and attach the flex hose to the truck via a quick connect and turn the gate valve on. Once the truck is loaded the gate valve is turned off and the hose is disconnected and placed back inside the pond berm. An aerator will pierce the soil before the biosolids are applied to the surface.

If a spill occurs during the transport of biosolids residuals Denali will:

- Contain the spill.
- Notify proper authorities.
- Remove spilled biosolids residuals with a front end loader or shovel.
- Cover the area with dry lime.
- Apply absorbent (e.g., sand) if needed.
- Transport spilled product to a Department authorized biosolids residuals land application or disposal site.

VI. LAND APPLICATION

The biosolids generated by the City of Bixby WWTP is beneficially used through land application. The following biosolids residuals land application plan outlines agronomic application rate and site crops, where biosolids residuals are land applied, and site and crop management practices.

- Agronomic Application Rate and Site Crops

  Biosolids residuals are required to be land applied to a site at a rate that is equal to or less than the agronomic rate for the site, but not to exceed 27,500 gallons. An agronomic rate is the whole biosolids residuals application rate (dry weight basis) designed to provide the annual total amount of nitrogen needed by a crop or the phosphorus rates for the crop grown. This helps to minimize the amount of nitrogen passing below the root zone of the crop or vegetation to groundwater. Biosolids residuals application rates for the sites were developed based on NRCS crop uptake recommendations.

  The recommended application rate for Winter wheat is 90-140 lbs available N per acre per year and 50 lbs phosphorus (P2O5) per acre per year based on soil test recommendations. The recommended application rate for Mixed Grass Pasture is 180 lbs available N per acre per year and 40 lbs phosphorus (P2O5) per acre per year based on soil test recommendations. The land application sites are wheat and mixed grass pasture. Plant available nitrogen is calculated to determine agronomic loading rates based on the most recent analysis using the following equation:

  PAN = MR (TKN – Ammonia-N) + VR (Ammonia-N) + Nitrate-Nitrite

  Where: MR= Mineralization Rate (Typically 30% (0.30) for organic materials)
  VR = Volatilization Rate (0.5 for surface application)

  The phosphorus application rates are calculated using the total P found in the waste converted to P2O5. (Total P * 2.29)

- Site Inventory of Potential Sites

  The City has obtained approximately 260 new acres bringing the total to 805 acres to land apply biosolids residuals on. Surface application of biosolids residuals is performed using bob trucks equipped with splat plates. Biosolids residuals

shall be incorporated after application on cultivated land utilizing a disk. In pasture situations a pasture aerator will be utilized prior to application and after application. Site maps with the general location and size of the proposed sites are included as Appendix A of this biosolids residuals management plan. There is an adequate land base for the proposed operation based on the proposed application rates and volumes to be land applied. The adjacent land around the proposed application area is a mixture of agricultural crop land, pasture, and woods. The site is posted rural agricultural land with limited access.

- Site Management Practices and Restrictions

  Site access restrictions, management practices, and setbacks will be followed as outlined in this waste management plan. Biosolids residuals land application will not occur in those areas designated as buffer strips and will be achieved through accurate measurement and flagging of the buffer area prior to commencing land application.

  - No application of biosolids residuals can occur on land having a slope exceeding five percent (5%) but less than ten percent (10%) unless erosion or runoff controls are implemented.
  - The owner, generator, or operator must prevent biosolids residuals and mud from a land site from being carried offsite.
  - Biosolids residuals must be land applied in a manner to prevent surface runoff and to control objectionable odors. Do not store or land apply, or allow to run off, sludge or water to wetlands or waters of the state.
  - Biosolids residuals shall be incorporated after application on cultivated land utilizing a disk. In pasture situations a pasture aerator will be utilized prior to application and after application filed will be dragged using a field drag and/or chain harrow.
  - Any site with soil pH of less than 5.5 cannot be used for the land application of biosolids residuals unless the soil pH is amended prior to application of biosolids residuals. Documentation of soil amendments must be placed in the land applier's compliance records.
  - No land application shall occur when the ground is frozen or saturated.
  - Land application cannot occur if it is likely to adversely affect a threatened or endangered species.
  - The material will be applied evenly at good agronomic rates, not to exceed the Plant Available Nitrogen uptake of the cover crop, or other limits imposed by the permit.
  - Biosolids residuals shall not be spread within; 50 feet of property lines; 100 feet of lakes, ponds, springs, wetlands, streams, rock outcrops, and sinkholes; 200 feet of drinking water wells; 300 feet of occupied buildings or bodies of water classified as "extraordinary resource body of water."

VII. BIOSOLIDS RESIDUALS CHARACTERISTICS

The following table is a summary of the biosolids residuals analysis for pollutant characteristics. This data and all previous data indicate that pollutant concentrations for all regulated pollutants have been met.

North Plant

Parameter	Biosolids residuals Analytical Result (mg/kg)	40 CFR §503.13(b)(1) Pollutant Concentration Limits (mg/kg)
Arsenic (As)	10	75
Cadmium (Cd)	1.7	85
Chromium (Cr	22	3,000
Copper (Cu)	620	4,300
Lead (Pb	15	840
Mercury (Hg)	3.1	57
Molybdenum (Mo)	9.1	75
Nickel (Ni)	18	420
Selenium (Se)	7	100
Zinc (Zn)	1600	7,500

South Plant

Parameter	Biosolids residuals Analytical Result (mg/kg)	40 CFR §503.13(b)(1) Pollutant Concentration Limits (mg/kg)
Arsenic (As)	5.7	75
Cadmium (Cd)	0.8	85
Chromium (Cr	12	3,000
Copper (Cu)	140	4,300
Lead (Pb	52	840
Mercury (Hg)	0.43	57
Molybdenum (Mo)	1.9	75
Nickel (Ni)	10	420
Selenium (Se)	7	100
Zinc (Zn)	300	7,500

The following table is a summary of the biosolids residuals analysis for nutrient characteristics and other parameters.

North Plant

Parameter	Unit	Biosolids residuals Analytical Result
Total solids	%	5.3
TKN	%	3.0
NO3-N	%	0.001
NH4	%	0.33
Phosphorus (P)	%	1.4
Potassium (K)	%	0.014

South Plant

Parameter	Unit	Biosolids residuals Analytical Result
Total solids	%	25
TKN	%	.15
NO3-N	%	0.00
NH4	%	0.032
Phosphorus (P)	%	0.25
Potassium (K)	%	0.12

VIII. RECORDKEEPING AND REPORTING

Denali Water will maintain and provide the City of Bixby WWTP with the following records:

- Land application dates.
- Land application locations.
- Quantities of biosolids residuals applied in dry tons per acre per year and in gallons per acre per year.
- Methods of disposal.
- Amounts of nutrients applied.
- Total elements added (in that particular year) in lbs per acre.
- Total elements applied to date.
- Copies of the waste and soil analysis.
- Any other records required by the permit.

DENALI WATER SOLUTIONS
RUSSELLVILLE, ARKANSAS

LANDOWNER APPROVAL
OK-Biosolids

Field No.	Approx. Available Acreage*	Section	Township	Range
See Land list				

* **Available acreage is acreage available for land application after subtraction of buffer zones.**

This shall serve to document our approval to use the above described lands for the land application of Biosolids. Land application shall be administered by Denali Water in accordance with a management plan approved by the Oklahoma Department of Environment Quality (ODEQ).

Landowner/tenant agrees to allow Denali Water to take soil sample for each field Biosolids residuals will be land applied. Soil samples are needed annually.

The undersigned hereby certifies that he/she has the signatory authority for the above described lands. The landowner and tenant retain complete control over the lands. This approval may be canceled with written notice of the landowner/tenant.

Dale Green — 1-19-22

Landowner (please print and sign) — **Date**

_____ — _____

Tenant (please print and sign) — **Date**

Please provide the following: Address, phone #

DENALI WATER SOLUTIONS
RUSSELLVILLE, ARKANSAS

LANDOWNER APPROVAL
OK-Biosolids

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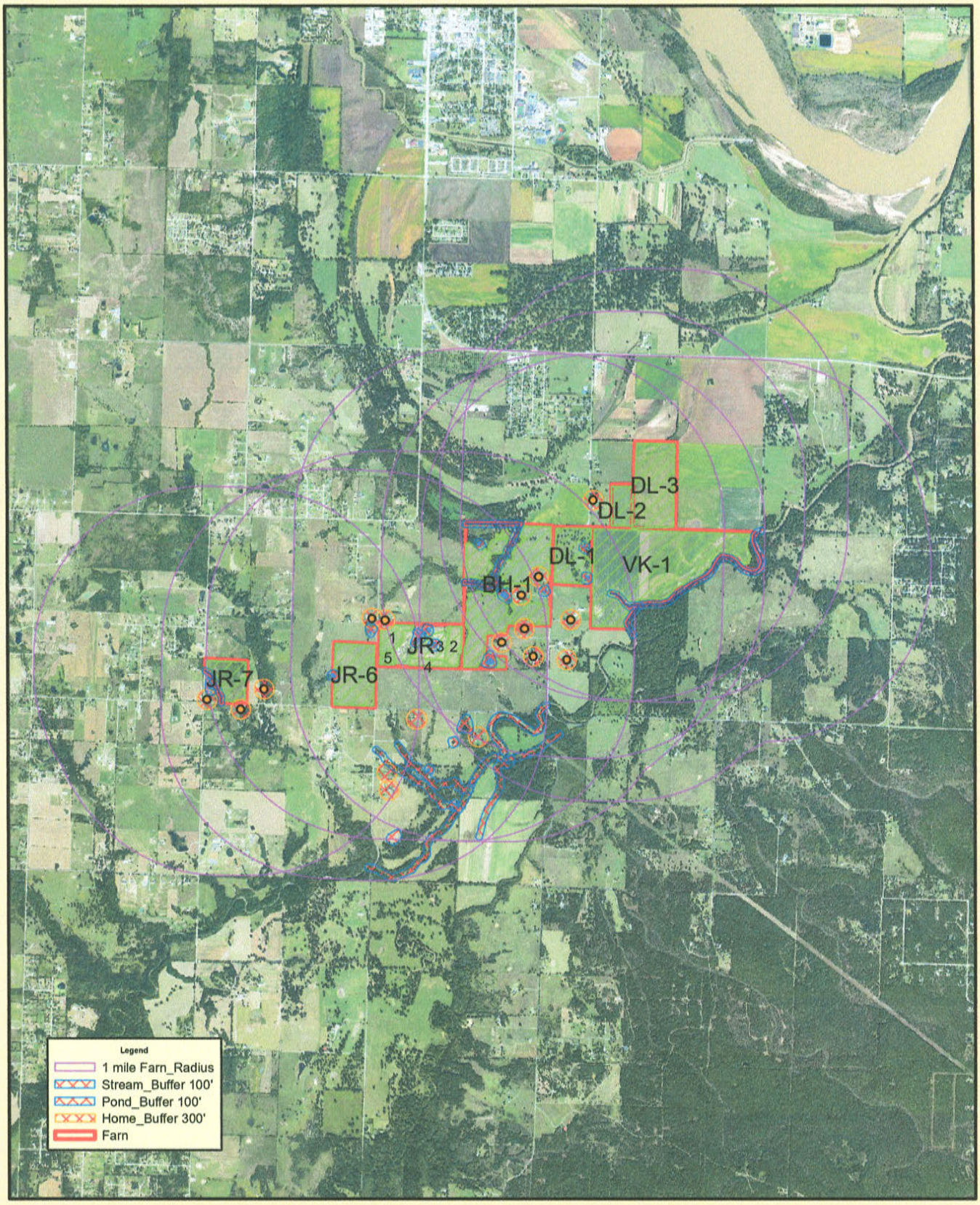
_____ 1-19-22

Landowner (please print and sign) **Date**

_____ _____

Tenant (please print and sign) **Date**

Please provide the following: Address, phone #



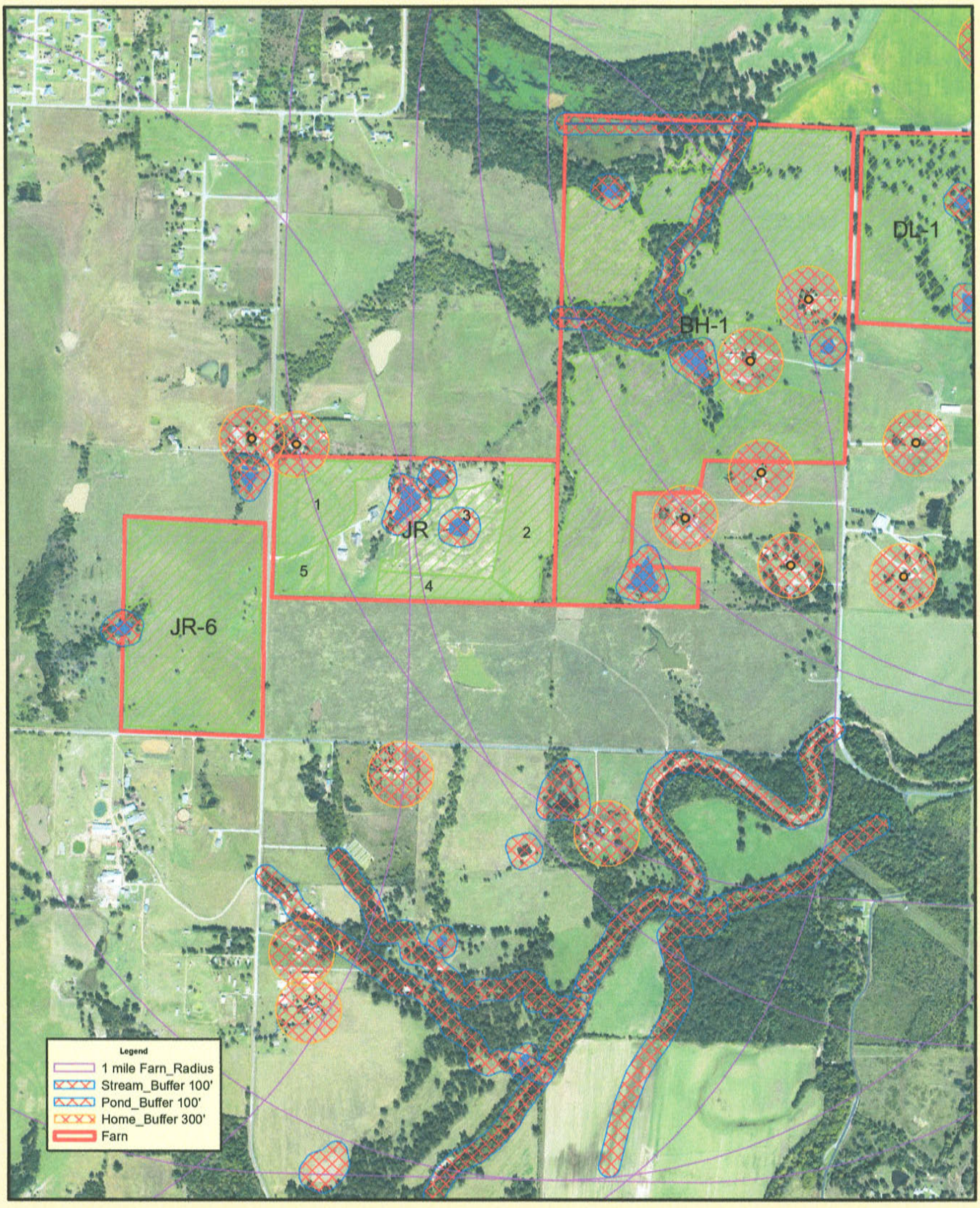
N
W E
S

Bixby WWTP Area Map

0 0.2 0.4 0.8 1.2 1.6
Miles

Albers Projection
Central Meridian: -96
1st Std Parallel: 20
2nd Std Parallel: 60
Latitude of Origin: 40

ESRI



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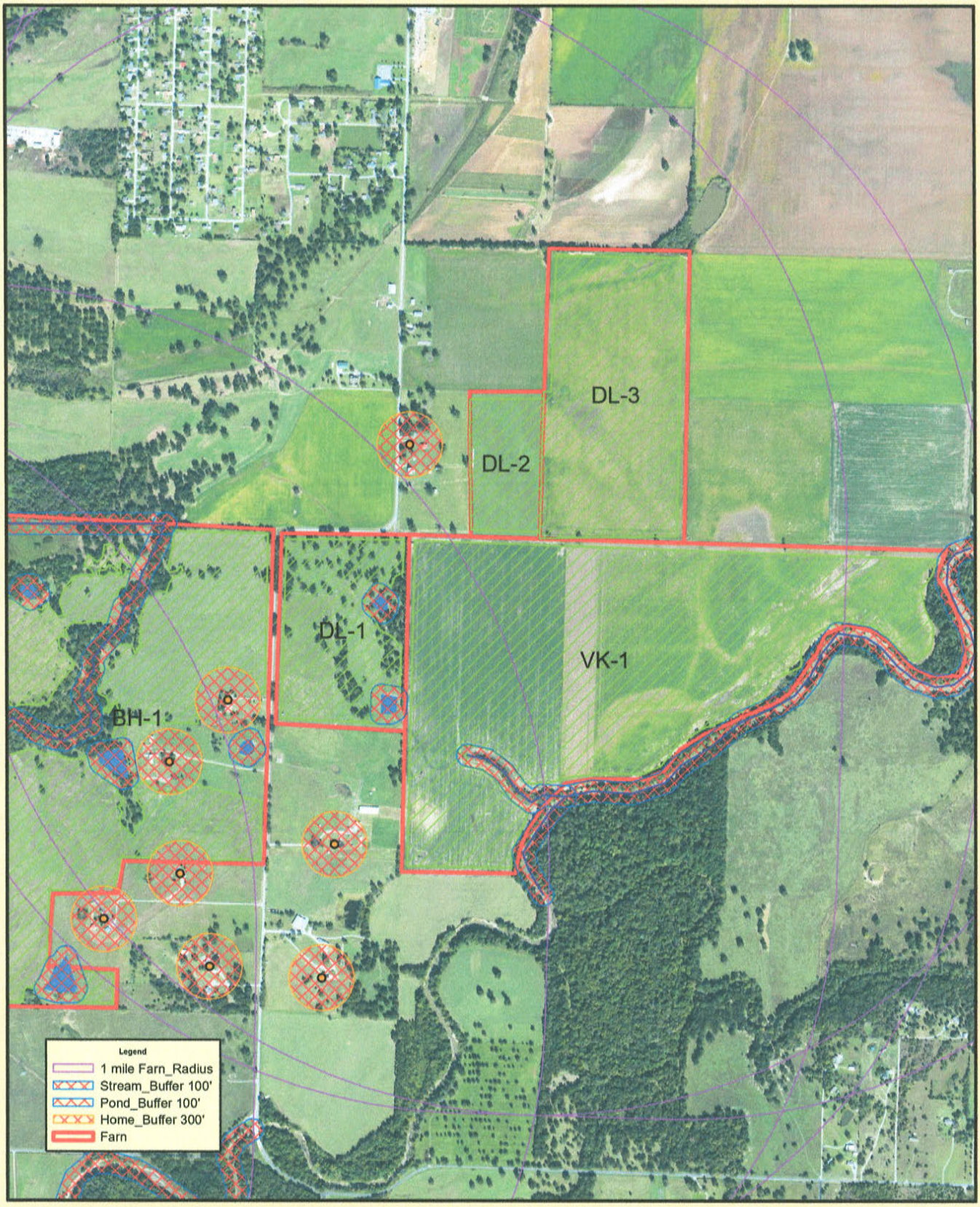
Bixby WWTP Area Map

0 0.05 0.1 0.2 0.3 0.4
Miles

Albers Projection
Central Meridian: -96
1st Std Parallel: 20
2nd Std Parallel: 60
Latitude of Origin: 40

ESRI



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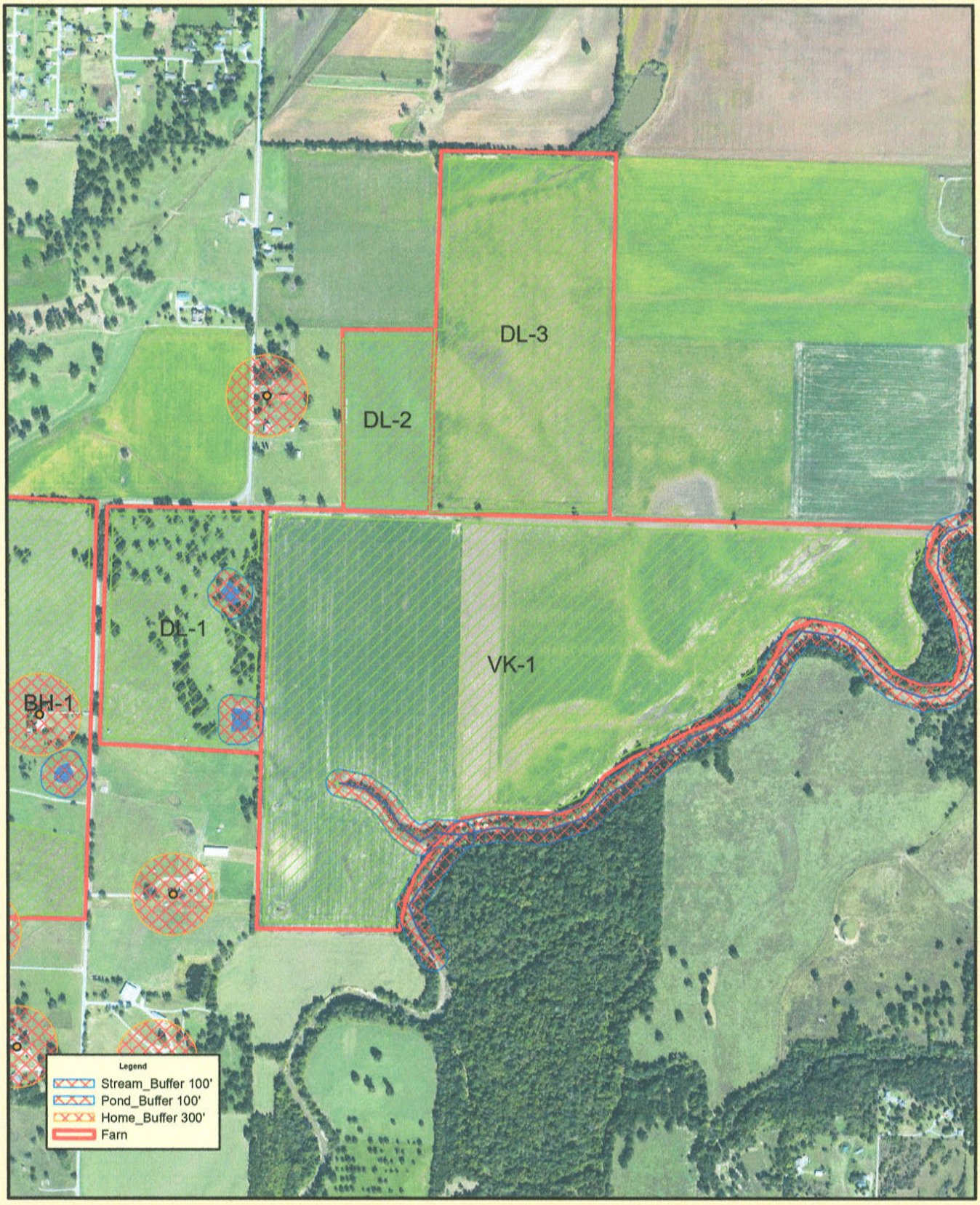

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Bixby WWTP Area Map

0 0.0475 0.095 0.19 0.285 0.38
Miles

Albers Projection
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Latitude of Origin: 40

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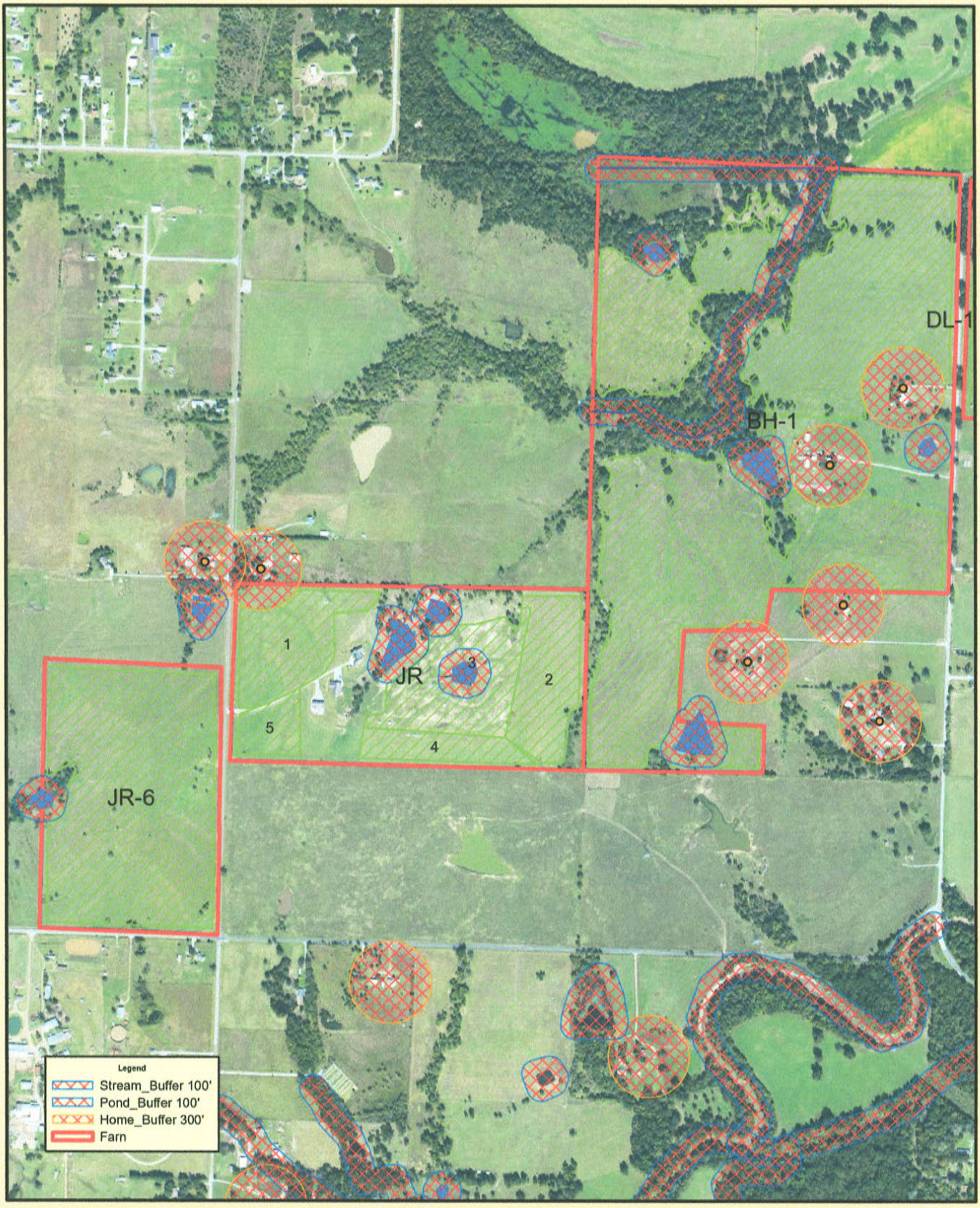

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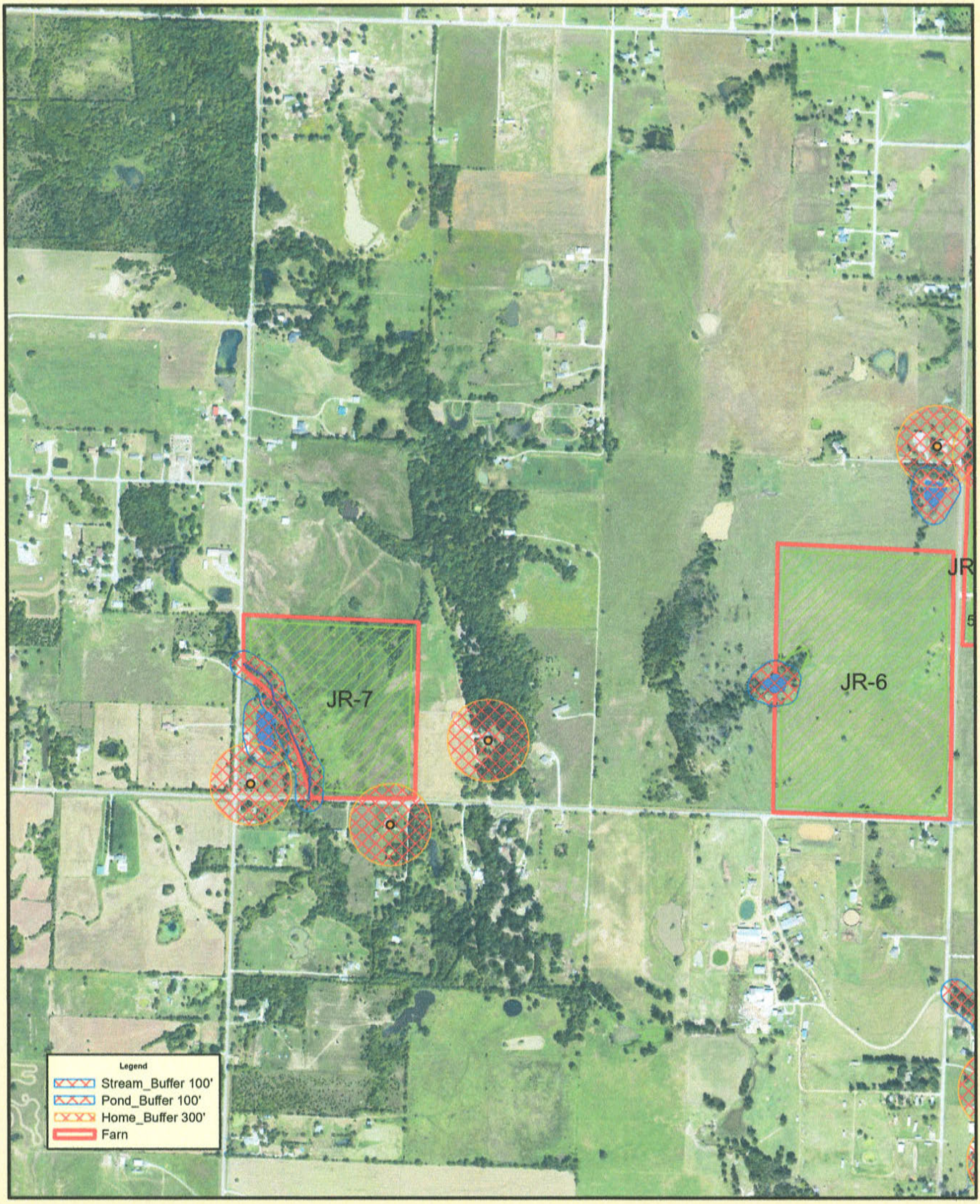

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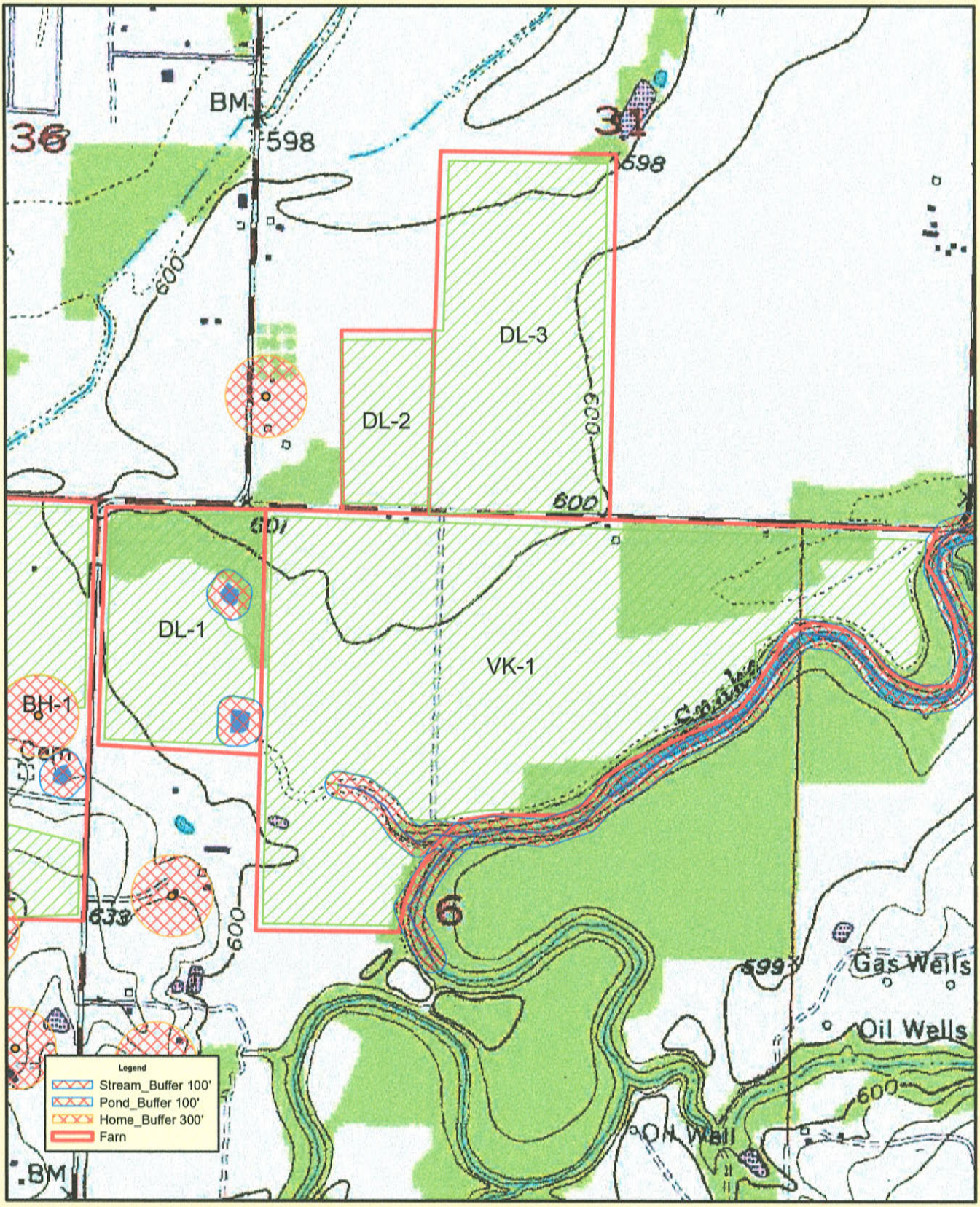

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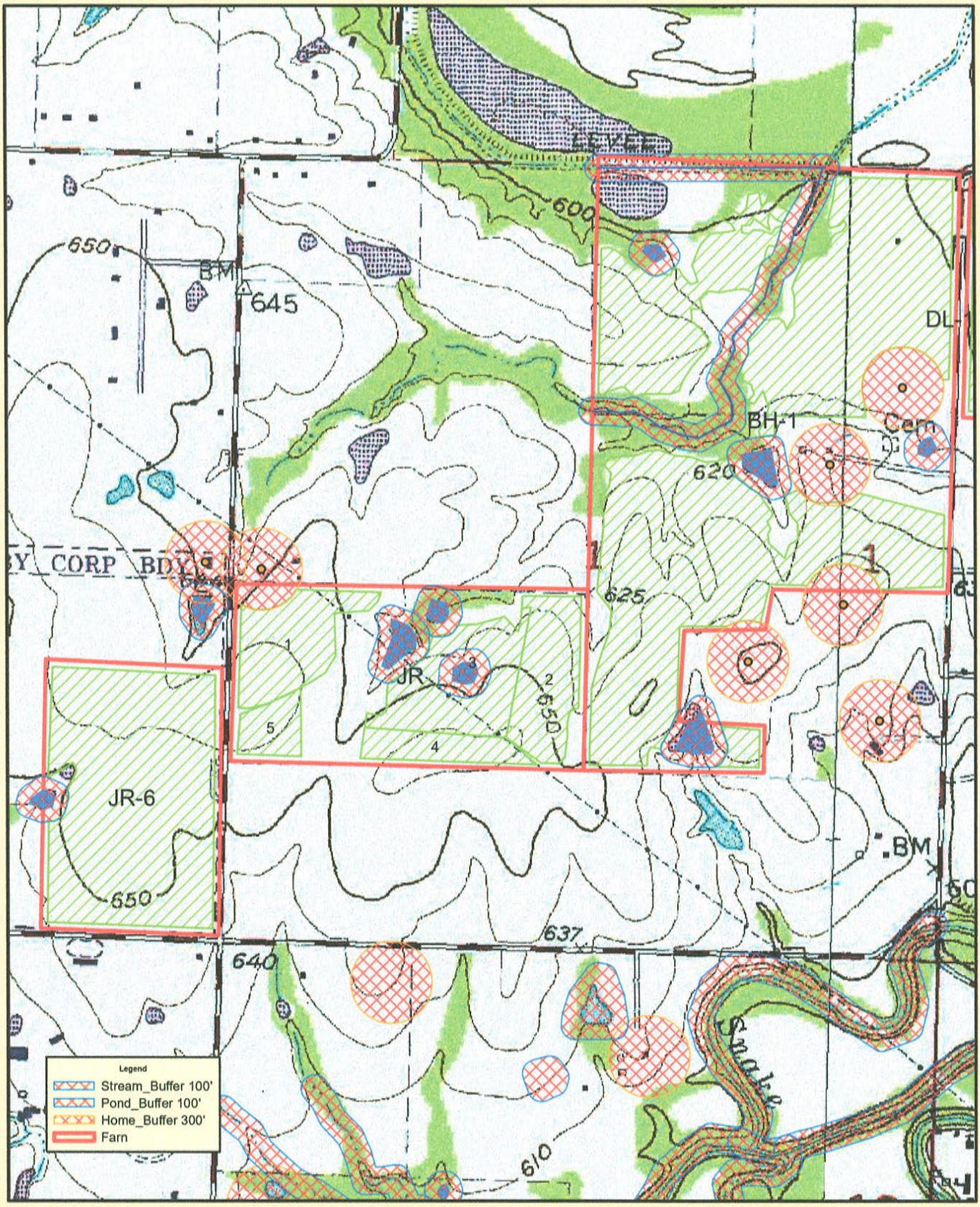

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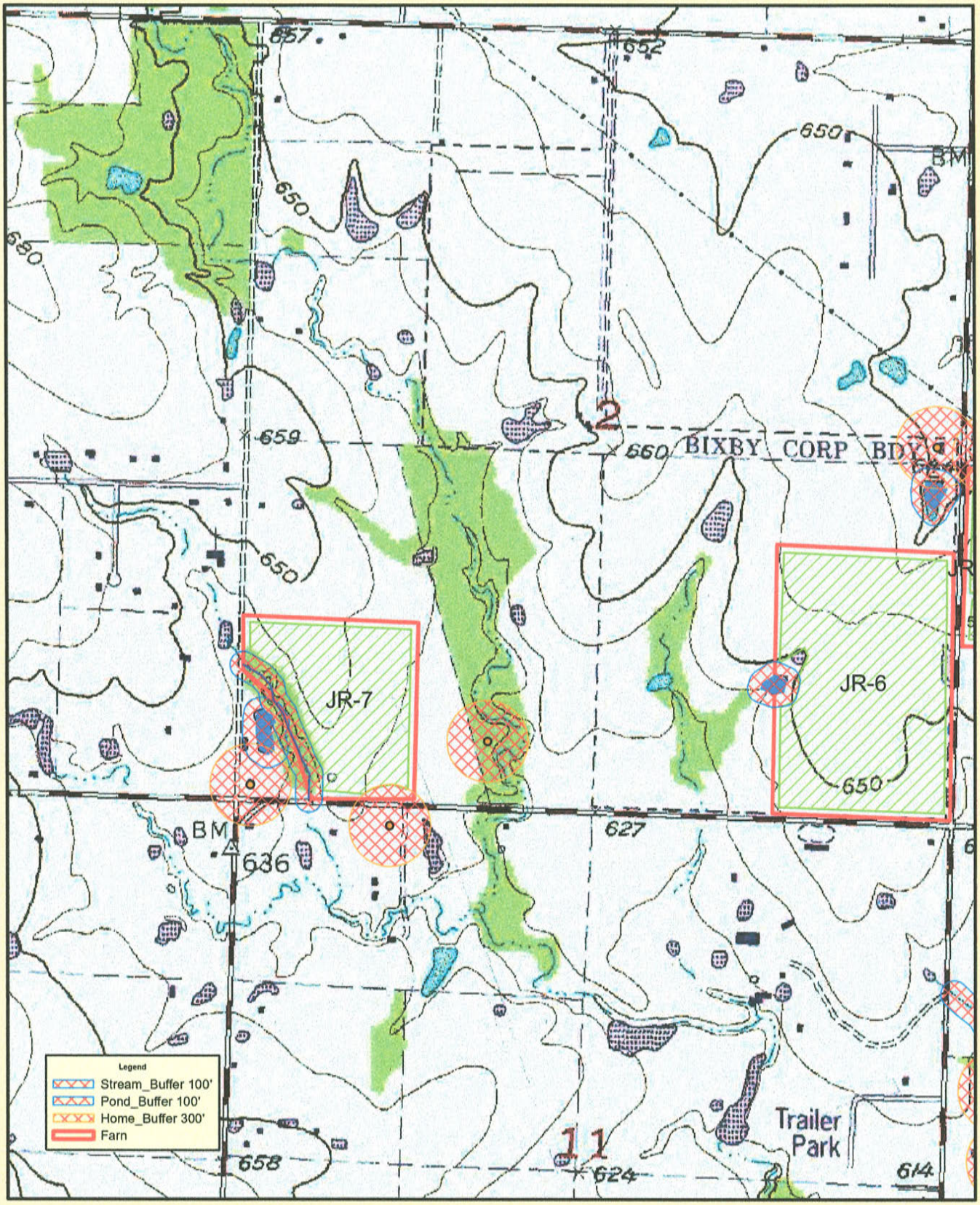
Central Meridian: -96
1st Std Parallel: 20
2nd Std Parallel: 60
Latitude of Origin: 40

ESRI



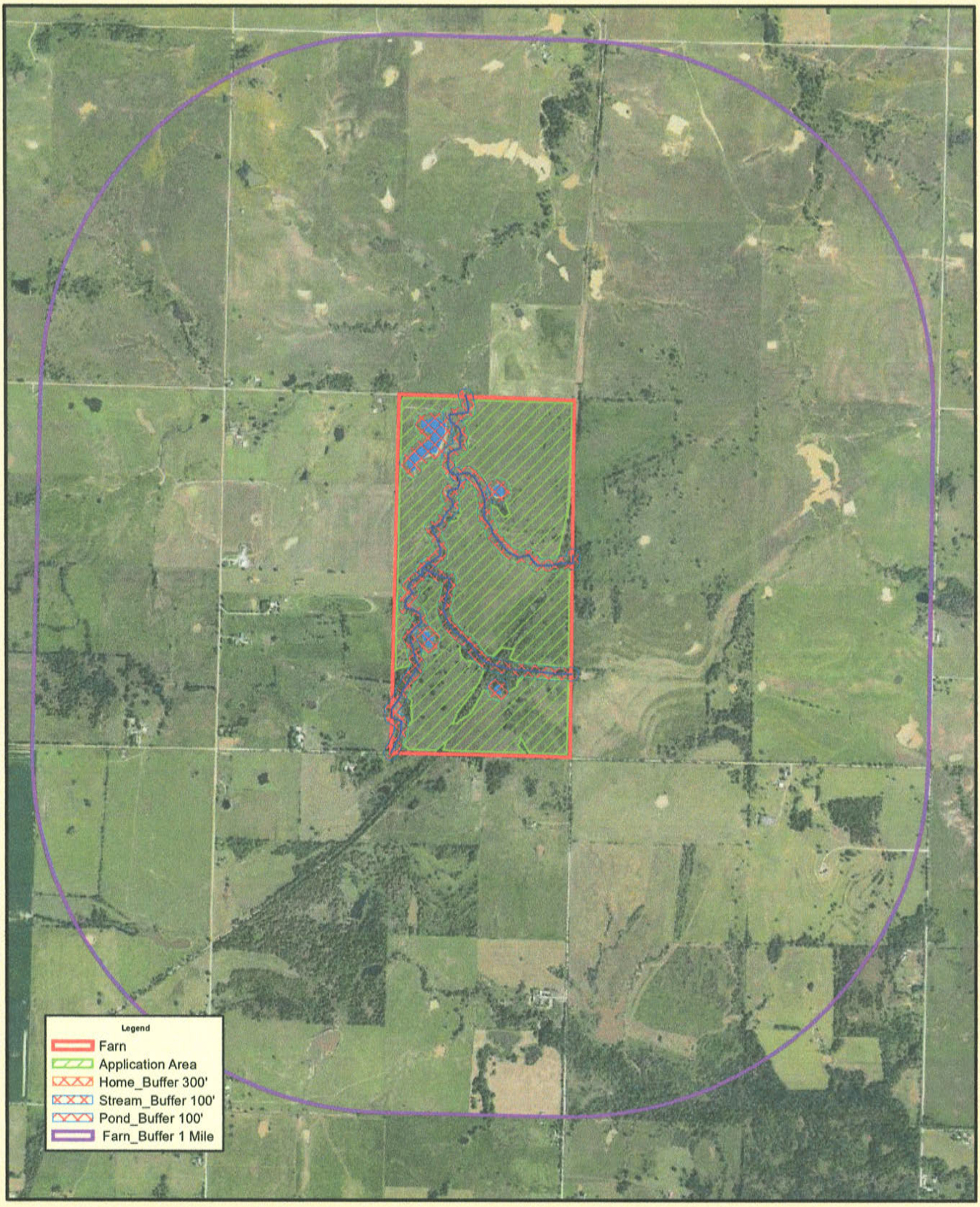
N
W E
S

Bixby WWTP Area Map

0 0.0475 0.095 0.19 0.285 0.38
Miles

Albers Projection
Central Meridian: -96
1st Std Parallel: 20
2nd Std Parallel: 60
Latitude of Origin: 40

ESRI



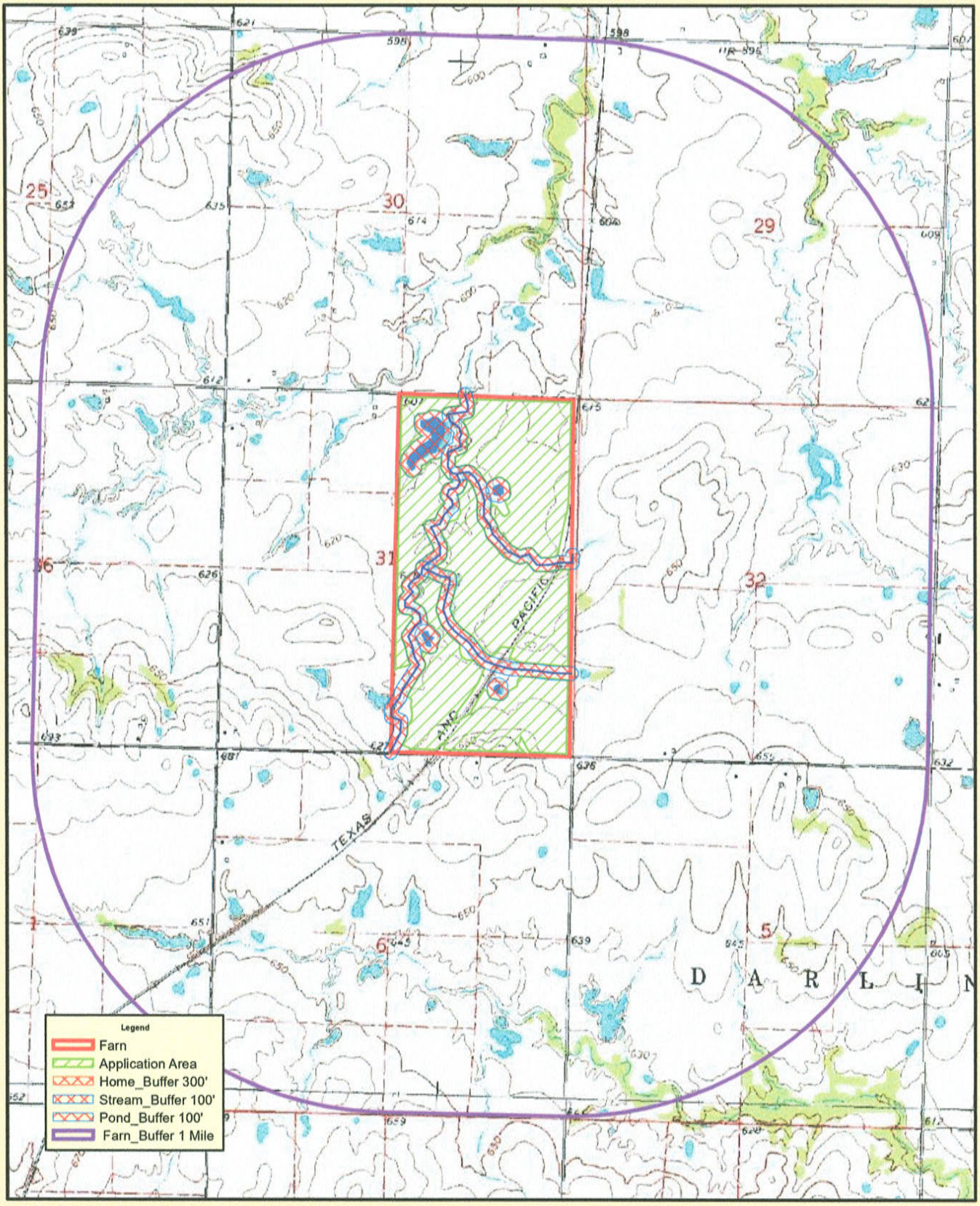
N
W E
S

Bixby WWTP Land
VK-2

0 0.050.1 0.2 0.3 0.4
Miles

Albers Projection
Central Meridian: -96
1st Std Parallel: 20
2nd Std Parallel: 60
Latitude of Origin: 40

ESRI



Bixby WWTP Land
VK-2

0 0.050.1 0.2 0.3 0.4
Miles

Albers Projection
Central Meridian: -96
1st Std Parallel: 20
2nd Std Parallel: 60
Latitude of Origin: 40

ESRI

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Denali Water Solutions
ATTN: Mr. Gabe Timby
Post Office Box 3036
Russellville, AR 72811

This report contains the analytical results and supporting information for the sample received on October 8, 2019. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Chief Operating Officer or a qualified designee.

by LP
John Overbey
Chief Operating Officer

This document has been distributed to the following:

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Russellville, AR 72811

SAMPLE INFORMATION

Project Description:
One (1) sludge sample(s) received on October 8, 2019
Bixby North Plant Lagoons
P.O. No. EVT58

Receipt Details:
A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
238800-1	Biosolids	08-Oct-2019 0930	

Qualifiers:
- D Result is from a secondary dilution factor
- H Analytical holding time exceeded regulatory requirements
- X Spiking level is invalid due to the high concentration of analyte in the spiked sample

Case Narrative:
Analysis of soils/sludges are reported on a dry-weight basis unless otherwise specified.

References:
"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", (SM).
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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Russellville, AR 72811

ANALYTICAL RESULTS

AIC No. 238800-1
Sample Identification: Biosolids 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
TCLP: Solids EPA 1311		**100** Analyzed: 10-Oct-2019 1210 by 100	0.5	% Batch: S47846	
TCLP: Arsenic EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**< 0.3** Analyzed: 11-Oct-2019 1701 by 328	0.3	mg/l Batch: S47860	D Dil: 5
TCLP: Barium EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**0.56** Analyzed: 11-Oct-2019 1701 by 328	0.01	mg/l Batch: S47860	D Dil: 5
TCLP: Cadmium EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**< 0.02** Analyzed: 11-Oct-2019 1701 by 328	0.02	mg/l Batch: S47860	D Dil: 5
TCLP: Chromium EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**< 0.05** Analyzed: 11-Oct-2019 1701 by 328	0.05	mg/l Batch: S47860	D Dil: 5
TCLP: Lead EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**< 0.2** Analyzed: 11-Oct-2019 1701 by 328	0.2	mg/l Batch: S47860	D Dil: 5
TCLP: Selenium EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**< 0.4** Analyzed: 11-Oct-2019 1701 by 328	0.4	mg/l Batch: S47860	D Dil: 5
TCLP: Silver EPA 3010A, 6010D	Prep: 11-Oct-2019 1030 by 100	**< 0.04** Analyzed: 11-Oct-2019 1701 by 328	0.04	mg/l Batch: S47860	D Dil: 5
TCLP: Mercury EPA 7470A	Prep: 11-Oct-2019 1100 by 100	**< 0.008** Analyzed: 11-Oct-2019 1508 by 313	0.008	mg/l Batch: S47861	D Dil: 40
pH EPA 9045D		**7.2** Analyzed: 09-Oct-2019 1011 by 300		Units Batch: W69530	H
Total Solids SM 2540 G 2011	Prep: 10-Oct-2019 1338 by 347	**5.3** Analyzed: 11-Oct-2019 0944 by 347	0.01	wt % Batch: W69549	
Volatile Solids SM 2540 G 2011	Prep: 10-Oct-2019 1339 by 347	**45** Analyzed: 17-Oct-2019 1101 by 347	0.01	wt % Batch: W69549	
Ammonia as N SM 4500-NH3 B,G 2011	Prep: 11-Oct-2019 0910 by 300	**3300** Analyzed: 11-Oct-2019 1452 by 300	200	mg/Kg Batch: W69556	
Total Kjeldahl Nitrogen SM 4500-Norg D 2011	Prep: 09-Oct-2019 1628 by 300	**30000** Analyzed: 11-Oct-2019 1156 by 300	2000	mg/Kg Batch: W69539	
Arsenic EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	**10** Analyzed: 10-Oct-2019 1135 by 328	5	mg/Kg Batch: S47842	
Cadmium EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	**1.7** Analyzed: 10-Oct-2019 1135 by 328	0.4	mg/Kg Batch: S47842	
Chromium EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	**22** Analyzed: 10-Oct-2019 1135 by 328	1	mg/Kg Batch: S47842	
Copper EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	**620** Analyzed: 10-Oct-2019 1303 by 328	10	mg/Kg Batch: S47842	
Lead EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	**15** Analyzed: 10-Oct-2019 1135 by 328	4	mg/Kg Batch: S47842	
Molybdenum EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	**9.1** Analyzed: 10-Oct-2019 1135 by 328	1	mg/Kg Batch: S47842	

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ANALYTICAL RESULTS

AIC No. 238800-1 (Continued)
Sample Identification: Biosolids 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Nickel		**18**	1	**mg/Kg**	
EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	Analyzed: 10-Oct-2019 1135 by 328		Batch: S47842	
Phosphorus		**14000**	1000	**mg/Kg**	
EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	Analyzed: 10-Oct-2019 1329 by 328		Batch: S47842	
Potassium		**1400**	100	**mg/Kg**	
EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	Analyzed: 10-Oct-2019 1135 by 328		Batch: S47842	
Selenium		**< 7**	7	**mg/Kg**	
EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	Analyzed: 10-Oct-2019 1135 by 328		Batch: S47842	
Zinc		**1600**	100	**mg/Kg**	
EPA 3051A, 6010D	Prep: 09-Oct-2019 1050 by 100	Analyzed: 10-Oct-2019 1329 by 328		Batch: S47842	
Mercury		**3.1**	0.1	**mg/Kg**	
EPA 7471B	Prep: 09-Oct-2019 1330 by 100	Analyzed: 09-Oct-2019 1636 by 313		Batch: S47844	
Nitrate as N		**< 10**	10	**mg/Kg**	
EPA 9056A	Prep: 08-Oct-2019 1505 by 235	Analyzed: 08-Oct-2019 1630 by 235		Batch: C22648	
Nitrite as N		**< 10**	10	**mg/Kg**	
EPA 9056A	Prep: 08-Oct-2019 1505 by 235	Analyzed: 08-Oct-2019 1630 by 235		Batch: C22648	
TCLP Chlorinated Herbicides By EPA 3535A,8321B					
TCLP: 2,4,5-TP		**< 0.10**	0.10	**mg/l**	
EPA 3535A,8321B	Prep: 14-Oct-2019 1727 by 07	Analyzed: 14-Oct-2019 2041 by 07		Batch: C22659	
TCLP: 2,4-D		**< 0.20**	0.20	**mg/l**	
EPA 3535A,8321B	Prep: 14-Oct-2019 1727 by 07	Analyzed: 14-Oct-2019 2041 by 07		Batch: C22659	
TCLP Base/Neutral and Acid Compounds By EPA 3510C, 8270D					
TCLP: 2,4,5-Trichlorophenol		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: 2,4,6-Trichlorophenol		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: 1,4-Dichlorobenzene		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: 2,4-Dinitrotoluene		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: Cresols		**< 0.10**	0.10	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: Hexachlorobenzene		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: Hexachlorobutadiene		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: Hexachloroethane		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: Nitrobenzene		**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D	Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	

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Denali Water Solutions
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Russellville, AR 72811

ANALYTICAL RESULTS

AIC No. 238800-1 (Continued)
Sample Identification: Biosolids 08-Oct-2019 0930

Analyte	Result	RL	Units	Qualifier
TCLP Base/Neutral and Acid Compounds By EPA 3510C, 8270D (Continued)				
TCLP: Pentachlorophenol	**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP: Pyridine	**< 0.050**	0.050	**mg/l**	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
Surrogate: TCLP: 2,4,6-Tribromophenol (10.0-125%)	61.0		%	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
Surrogate: TCLP: 2-Fluorobiphenyl (31.0-116%)	66.2		%	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
Surrogate: TCLP: 2-Fluorophenol (14.4-67.6%)	34.6		%	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
Surrogate: TCLP: Nitrobenzene-D5 (10.0-146%)	62.8		%	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
Surrogate: TCLP: Terphenyl-D14 (27.6-119%)	65.6		%	
EPA 3510C, 8270D Prep: 14-Oct-2019 1232 by 271	Analyzed: 14-Oct-2019 2016 by 271		Batch: B11597	
TCLP Volatile Organic Compounds By EPA 5030C, 8260D				
TCLP: 1,2-Dichloroethane	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: 1,1-Dichloroethylene	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Benzene	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Carbon tetrachloride	**< 0.20**	0.20	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Chlorobenzene	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Chloroform	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Methyl ethyl ketone	**< 1.0**	1.0	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Tetrachloroethylene	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Trichloroethylene	**< 0.50**	0.50	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP: Vinyl chloride	**< 0.20**	0.20	**mg/l**	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
Surrogate: TCLP: 4-Bromofluorobenzene (75.0-120%)	96.7		%	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
Surrogate: TCLP: Dibromofluoromethane (85.0-115%)	108		%	
EPA 5030C, 8260D Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	

Denali Water Solutions
Post Office Box 3036
Russellville, AR 72811

ANALYTICAL RESULTS

AIC No. 238800-1 (Continued)
Sample Identification: Biosolids 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
TCLP Volatile Organic Compounds By EPA 5030C, 8260D (Continued)					
Surrogate: TCLP: Toluene-D8 (85.0-120%)		96.3		%	
EPA 5030C, 8260D	Prep: 14-Oct-2019 0905 by 271	Analyzed: 14-Oct-2019 1726 by 271		Batch: V9700	
TCLP Organochlorine Pesticides By EPA 3510C, 8081B					
TCLP: cis-Chlordane		**< 0.00020**	0.00020	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: Endrin		**< 0.00020**	0.00020	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: gamma-BHC		**< 0.00010**	0.00010	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: Heptachlor		**< 0.00005**	0.00005	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: Heptachlor epoxide		**< 0.00010**	0.00010	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: Methoxychlor		**< 0.00020**	0.00020	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: Toxaphene		**< 0.0020**	0.0020	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
TCLP: trans-Chlordane		**< 0.00020**	0.00020	**mg/l**	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
Surrogate: TCLP: Decachlorobiphenyl (10.0-123%)		67.8		%	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
Surrogate: TCLP: Tetrachloro-m-xylene (3.30-120%)		94.4		%	
EPA 3510C, 8081B	Prep: 11-Oct-2019 1100 by 348	Analyzed: 12-Oct-2019 0359 by 338		Batch: G11430	
Polychlorinated Biphenyls (PCBs) By EPA 3550C, 8082A					
PCB 1016		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
PCB 1221		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
PCB 1232		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
PCB 1242		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
PCB 1248		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
PCB 1254		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
PCB 1260		**< 1.9**	1.9	**mg/Kg**	
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	
Surrogate: Decachlorobiphenyl (Diluted Out)		-			
EPA 3550C, 8082A	Prep: 11-Oct-2019 0836 by 338	Analyzed: 12-Oct-2019 0309 by 338		Batch: G11428	

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
pH		238520-1	7.1 Units				09Oct19 1011 by 300		H
	Batch: W69530	Duplicate	7.1 Units	0.282	5.00		09Oct19 1011 by 300		H
Total Solids		238799-1	25 wt %			10Oct19 1338 by 347	11Oct19 0944 by 347		
	Batch: W69549	Duplicate	24 wt %	3.56	10.0	10Oct19 1339 by 347	11Oct19 0944 by 347		
Volatile Solids		238799-1	6.7 wt %			10Oct19 1339 by 347	17Oct19 1101 by 347		
	Batch: W69549	Duplicate	6.6 wt %	1.18	20.0	10Oct19 1339 by 347	17Oct19 1101 by 347		
TCLP Base/Neutral and Acid Compounds									
TCLP: 2,4,5-Trichlorophenol		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	30.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: 2,4,6-Trichlorophenol		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	58.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: 1,4-Dichlorobenzene		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	0.00	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: 2,4-Dinitrotoluene		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	42.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Cresols		238799-1	< 0.10 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.10 mg/l	0.00	7.35	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Hexachlorobenzene		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	55.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Hexachlorobutadiene		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	62.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Hexachloroethane		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	52.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Nitrobenzene		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	62.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Pentachlorophenol		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	86.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Pyridine		238799-1	< 0.050 mg/l			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	< 0.050 mg/l	0.00	30.0	14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: 2,4,6-Tribromophenol (10.0-125%)		238799-1	65.6 %			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	73.8 %			14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: 2-Fluorobiphenyl (31.0-116%)		238799-1	62.0 %			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	71.4 %			14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: 2-Fluorophenol (14.4-67.6%)		238799-1	36.2 %			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	37.2 %			14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Nitrobenzene-D5 (10.0-146%)		238799-1	63.0 %			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	68.4 %			14Oct19 1235 by 271	14Oct19 1901 by 271		
TCLP: Terphenyl-D14 (27.6-119%)		238799-1	70.4 %			14Oct19 1232 by 271	14Oct19 1939 by 271		
	Batch: B11597	Duplicate	69.1 %			14Oct19 1235 by 271	14Oct19 1901 by 271		
Polychlorinated Biphenyls (PCBs)									
PCB 1016		238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
	Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	30.0	11Oct19 0836 by 338	12Oct19 0154 by 338		
PCB 1221		238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
	Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	30.0	11Oct19 0836 by 338	12Oct19 0154 by 338		
PCB 1232		238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
	Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	30.0	11Oct19 0836 by 338	12Oct19 0154 by 338		
PCB 1242		238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
	Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	30.0	11Oct19 0836 by 338	12Oct19 0154 by 338		

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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Polychlorinated Biphenyls (PCBs) (Continued)								
PCB 1248	238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	30.0	11Oct19 0836 by 338	12Oct19 0154 by 338		
PCB 1254	238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	20.0	11Oct19 0836 by 338	12Oct19 0154 by 338		
PCB 1260	238801-1	< 1.6 mg/Kg			11Oct19 0836 by 338	12Oct19 0219 by 338		
Batch: G11428	Duplicate	< 1.6 mg/Kg	0.00	30.0	11Oct19 0836 by 338	12Oct19 0154 by 338		
Decachlorobiphenyl (Diluted Out)	238801-1	-			11Oct19 0836 by 338	12Oct19 0219 by 338		
Batch: G11428	Duplicate	-			11Oct19 0836 by 338	12Oct19 0154 by 338		
TCLP Organochlorine Pesticides								
TCLP: cis-Chlordane	238799-1	< 0.00020 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00020 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: Endrin	238799-1	< 0.00020 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00020 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: gamma-BHC	238799-1	< 0.00010 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00010 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: Heptachlor	238799-1	< 0.00005 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00005 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: Heptachlor epoxide	238799-1	< 0.00010 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00010 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: Methoxychlor	238799-1	< 0.00020 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00020 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: trans-Chlordane	238799-1	< 0.00020 mg/l			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	< 0.00020 mg/l	0.00	30.0	11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: Decachlorobiphenyl (10.0-123%)	238799-1	87.4 %			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	88.2 %			11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP: Tetrachloro-m-xylene (3.30-120%)	238799-1	86.9 %			11Oct19 1100 by 348	12Oct19 0334 by 338		
Batch: G11430	Duplicate	101 %			11Oct19 1100 by 348	11Oct19 2259 by 338		
TCLP Volatile Organic Compounds								
TCLP: 1,2-Dichloroethane	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: 1,1-Dichloroethylene	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Benzene	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Carbon tetrachloride	238799-1	< 0.20 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.20 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Chlorobenzene	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Chloroform	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Methyl ethyl ketone	238799-1	< 1.0 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 1.0 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Tetrachloroethylene	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Trichloroethylene	238799-1	< 0.50 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.50 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
TCLP: Vinyl chloride	238799-1	< 0.20 mg/l			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	< 0.20 mg/l	0.00	30.0	14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: 4-Bromofluorobenzene (75.0-120%)	238799-1	96.6 %			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	97.7 %			14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Dibromofluoromethane (85.0-115%)	238799-1	105 %			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	107 %			14Oct19 0905 by 271	14Oct19 1648 by 271		
TCLP: Toluene-D8 (85.0-120%)	238799-1	96.0 %			14Oct19 0905 by 271	14Oct19 1610 by 271		
Batch: V9700	Duplicate	95.4 %			14Oct19 0905 by 271	14Oct19 1648 by 271		

AMERICAN INTERPLEX CORPORATION
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LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
TCLP: Arsenic	2 mg/l	97.7	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Barium	0.1 mg/l	85.2	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Cadmium	0.2 mg/l	93.6	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Chromium	0.2 mg/l	95.4	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Lead	2 mg/l	93.4	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Selenium	2 mg/l	97.0	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Silver	0.04 mg/l	102	85.0-115			S47860	11Oct19 1030 by 100	11Oct19 1646 by 328		
TCLP: Mercury	0.0025 mg/l	86.1	85.0-115			S47861	11Oct19 1100 by 100	11Oct19 1500 by 313		
pH	-	100	98.0-102			W69530		09Oct19 1011 by 300		
Ammonia as N	20.0 mg/Kg	92.3	80.0-120			W69556	11Oct19 0910 by 300	11Oct19 1430 by 300		
Total Kjeldahl Nitrogen	10.0 mg/Kg	109	80.0-120			W69539	09Oct19 1628 by 300	11Oct19 1147 by 300		
Arsenic	200 mg/Kg	101	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Cadmium	20.0 mg/Kg	98.0	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Chromium	20.0 mg/Kg	99.5	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Copper	20.0 mg/Kg	92.5	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Lead	200 mg/Kg	98.5	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Molybdenum	20.0 mg/Kg	102	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Nickel	20.0 mg/Kg	100	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Phosphorus	200 mg/Kg	98.8	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Potassium	400 mg/Kg	100	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Selenium	200 mg/Kg	101	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Zinc	20.0 mg/Kg	102	85.0-115			S47842	09Oct19 1050 by 100	10Oct19 1053 by 328		
Mercury	1.25 mg/Kg	96.7	85.0-115			S47844	09Oct19 1330 by 100	09Oct19 1609 by 313		
Nitrate as N	50.0 mg/Kg	101	90.0-110			C22648	08Oct19 1128 by 235	08Oct19 1436 by 235		
Nitrite as N	50.0 mg/Kg	103	90.0-110			C22648	08Oct19 1128 by 235	08Oct19 1436 by 235		
TCLP Volatile Organic Compounds										
Benzene	20 ug/l	108	80.0-120			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
2-Butanone	40 ug/l	93.2	30.0-150			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Carbon tetrachloride	20 ug/l	105	65.0-140			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Chlorobenzene	20 ug/l	104	80.0-120			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Chloroform	20 ug/l	101	65.0-135			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
1,2-Dichloroethane	20 ug/l	108	70.0-130			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
1,1-Dichloroethene	20 ug/l	104	70.0-130			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Tetrachloroethene	20 ug/l	107	45.0-150			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Trichloroethene	20 ug/l	106	70.0-125			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Vinyl chloride	20 ug/l	108	50.0-145			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
TCLP Volatile Organic Compounds Surrogates:										
4-Bromofluorobenzene	50 ug/l	104	75.0-120			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Dibromofluoromethane	50 ug/l	96.2	85.0-115			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		
Toluene-D8	50 ug/l	100	85.0-120			V9700	14Oct19 0905 by 271	14Oct19 1336 by 271		

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
TCLP Chlorinated Herbicides										
TCLP: 2,4,5-TP	50 mg/l	103	40.0-160			C22659	14Oct19 1727 by 07	14Oct19 1817 by 07		
TCLP: 2,4-D	50 mg/l	103	40.0-160			C22659	14Oct19 1727 by 07	14Oct19 1817 by 07		
TCLP Base/Neutral and Acid Compounds										
TCLP: 2,4,5-Trichlorophenol	20 ug/l	77.2	37.8-112			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: 2,4,6-Trichlorophenol	20 ug/l	78.8	37.0-144			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: 1,4-Dichlorobenzene	20 ug/l	78.2	39.9-84.5			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: 2,4-Dinitrotoluene	20 ug/l	79.8	39.0-139			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Cresols	40 ug/l	64.6	35.0-80.6			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Hexachlorobenzene	20 ug/l	76.6	10.0-152			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Hexachlorobutadiene	20 ug/l	62.2	24.0-120			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Hexachloroethane	20 ug/l	73.6	40.0-120			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Nitrobenzene	20 ug/l	65.1	35.0-180			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Pentachlorophenol	20 ug/l	51.8	14.0-176			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Pyridine	20 ug/l	41.2	0.00-72.0			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP Base/Neutral and Acid Compounds Surrogates:										
TCLP: 2,4,6-Tribromophenol	20 ug/l	78.0	43.0-109			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: 2-Fluorobiphenyl	20 ug/l	76.0	58.0-113			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: 2-Fluorophenol	20 ug/l	51.0	29.1-87.9			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Nitrobenzene-D5	20 ug/l	63.4	51.3-102			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP: Terphenyl-D14	20 ug/l	74.6	50.8-99.0			B11597	14Oct19 1235 by 271	14Oct19 1747 by 271		
TCLP Organochlorine Pesticides										
TCLP: cis-Chlordane	10 ug/l	97.5	65.0-125			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: Endrin	10 ug/l	95.2	55.0-135			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: gamma-BHC	10 ug/l	82.4	25.0-135			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: Heptachlor	10 ug/l	78.3	40.0-130			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: Heptachlor epoxide	10 ug/l	96.8	60.0-130			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: Methoxychlor	10 ug/l	94.4	55.0-150			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: trans-Chlordane	10 ug/l	117	60.0-125			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP Organochlorine Pesticides Surrogates:										
TCLP: Decachlorobiphenyl	20 ug/l	88.8	25.4-112			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
TCLP: Tetrachloro-m-xylene	20 ug/l	87.0	52.6-99.6			G11430	11Oct19 1100 by 348	11Oct19 2210 by 338		
Polychlorinated Biphenyls (PCBs)										
PCB 1016	0.0500 mg/Kg	96.6	40.0-140			G11428	11Oct19 0836 by 338	14Oct19 1529 by 338		
	0.0500 mg/Kg	106	40.0-140	14.6	30.0	G11428	11Oct19 0836 by 338	11Oct19 2120 by 338		
PCB 1260	0.0500 mg/Kg	102	60.0-130			G11428	11Oct19 0836 by 338	14Oct19 1529 by 338		
	0.0500 mg/Kg	103	60.0-130	16.1	30.0	G11428	11Oct19 0836 by 338	11Oct19 2120 by 338		
Polychlorinated Biphenyls (PCBs) Surrogates:										
Decachlorobiphenyl	50.0 ug/Kg	110	55.8-110			G11428	11Oct19 0836 by 338	14Oct19 1529 by 338		
	50.0 ug/Kg	98.7	55.8-110	-	-	G11428	11Oct19 0836 by 338	11Oct19 2120 by 338		

AMERICAN INTERPLEX CORPORATION
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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
TCLP: Arsenic	238736-1	2 mg/l	99.3	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	2 mg/l	99.3	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		0.0501	20.0	S47860				
TCLP: Barium	238736-1	0.1 mg/l	97.3	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	0.1 mg/l	99.6	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		1.97	20.0	S47860				
TCLP: Cadmium	238736-1	0.2 mg/l	92.9	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	0.2 mg/l	95.1	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		2.34	20.0	S47860				
TCLP: Chromium	238736-1	0.2 mg/l	93.7	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	0.2 mg/l	95.0	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		1.43	20.0	S47860				
TCLP: Lead	238736-1	2 mg/l	90.3	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	2 mg/l	92.0	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		1.86	20.0	S47860				
TCLP: Selenium	238736-1	2 mg/l	98.0	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	2 mg/l	100	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		2.36	20.0	S47860				
TCLP: Silver	238736-1	0.04 mg/l	102	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1652 by 328		
	238736-1	0.04 mg/l	102	75.0-125	S47860	11Oct19 1030 by 100	11Oct19 1655 by 328		
	Relative Percent Difference:		0.465	20.0	S47860				
TCLP: Mercury	238736-1	0.0025 mg/l	85.0	75.0-125	S47861	11Oct19 1100 by 100	11Oct19 1501 by 313		
	238736-1	0.0025 mg/l	85.9	75.0-125	S47861	11Oct19 1100 by 100	11Oct19 1503 by 313		
	Relative Percent Difference:		0.992	20.0	S47861				
Ammonia as N	238632-1	95.9 mg/Kg	94.2	80.0-120	W69556	11Oct19 0910 by 300	11Oct19 1435 by 300		
	238632-1	96.8 mg/Kg	92.8	80.0-120	W69556	11Oct19 0910 by 300	11Oct19 1437 by 300		
	Relative Percent Difference:		0.170	25.0	W69556				
Total Kjeldahl Nitrogen	238799-1	98.7 mg/Kg	-	80.0-120	W69539	09Oct19 1628 by 300	11Oct19 1150 by 300		X
	238799-1	95.2 mg/Kg	-	80.0-120	W69539	09Oct19 1628 by 300	11Oct19 1152 by 300		X
	Relative Percent Difference:		5.61	20.0	W69539				
Arsenic	238714-3	200 mg/Kg	87.4	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1106 by 328		
	238714-3	200 mg/Kg	103	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1114 by 328		
	Relative Percent Difference:		15.6	20.0	S47842				
Cadmium	238714-3	20.0 mg/Kg	83.4	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1106 by 328		
	238714-3	20.0 mg/Kg	99.0	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1114 by 328		
	Relative Percent Difference:		15.6	20.0	S47842				
Chromium	238714-3	20.0 mg/Kg	102	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1232 by 328		
	238714-3	20.0 mg/Kg	108	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1238 by 328		
	Relative Percent Difference:		2.42	20.0	S47842				
Copper	238714-3	20.0 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1232 by 328		X
	238714-3	20.0 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1238 by 328		X
	Relative Percent Difference:		0.464	20.0	S47842				
Lead	238714-3	200 mg/Kg	84.1	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1106 by 328		
	238714-3	200 mg/Kg	98.6	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1114 by 328		
	Relative Percent Difference:		14.4	20.0	S47842				
Molybdenum	238714-3	20.0 mg/Kg	76.6	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1106 by 328		
	238714-3	20.0 mg/Kg	103	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1114 by 328		
	Relative Percent Difference:		16.4	20.0	S47842				
Nickel	238714-3	20.0 mg/Kg	100	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1232 by 328		
	238714-3	20.0 mg/Kg	100	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1238 by 328		
	Relative Percent Difference:		0.341	20.0	S47842				

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Denali Water Solutions
Post Office Box 3036
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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Phosphorus	238714-3	200 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1214 by 328		X
	238714-3	200 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1220 by 328		X
	Relative Percent Difference:		0.115		S47842				
Potassium	238714-3	399 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1232 by 328		X
	238714-3	399 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1238 by 328		X
	Relative Percent Difference:		1.12	20.0	S47842				
Selenium	238714-3	200 mg/Kg	85.0	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1106 by 328		
	238714-3	200 mg/Kg	100	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1114 by 328		
	Relative Percent Difference:		16.1	20.0	S47842				
Zinc	238714-3	20.0 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1214 by 328		X
	238714-3	20.0 mg/Kg	-	75.0-125	S47842	09Oct19 1050 by 100	10Oct19 1220 by 328		X
	Relative Percent Difference:		0.00		S47842				
Mercury	238714-3	2.42 mg/Kg	-	75.0-125	S47844	09Oct19 1330 by 100	09Oct19 1641 by 313		X
	238714-3	2.48 mg/Kg	-	75.0-125	S47844	09Oct19 1330 by 100	09Oct19 1644 by 313		X
	Relative Percent Difference:		1.93	20.0	S47844				
Nitrate as N	238768-2	49.3 mg/Kg	99.0	80.0-120	C22648	08Oct19 1128 by 235	08Oct19 1459 by 235		
	238768-2	49.4 mg/Kg	99.7	80.0-120	C22648	08Oct19 1128 by 235	08Oct19 1522 by 235		
	Relative Percent Difference:		0.495	10.0	C22648				
Nitrite as N	238768-2	49.3 mg/Kg	103	80.0-120	C22648	08Oct19 1128 by 235	08Oct19 1459 by 235		
	238768-2	49.4 mg/Kg	103	80.0-120	C22648	08Oct19 1128 by 235	08Oct19 1522 by 235		
	Relative Percent Difference:		0.00690	10.0	C22648				
TCLP Volatile Organic Compounds									
Benzene	238799-1	20 ug/l	98.2	80.0-120	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
2-Butanone	238799-1	40 ug/l	95.5	30.0-150	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Carbon tetrachloride	238799-1	20 ug/l	95.9	65.0-140	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Chlorobenzene	238799-1	20 ug/l	95.4	80.0-120	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Chloroform	238799-1	20 ug/l	96.1	65.0-135	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
1,2-Dichloroethane	238799-1	20 ug/l	101	70.0-130	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
1,1-Dichloroethene	238799-1	20 ug/l	98.6	70.0-130	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Tetrachloroethene	238799-1	20 ug/l	94.8	45.0-150	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Trichloroethene	238799-1	20 ug/l	95.6	70.0-125	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Vinyl chloride	238799-1	20 ug/l	101	50.0-145	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
TCLP Volatile Organic Compounds Surrogates:									
4-Bromofluorobenzene	238799-1	50 ug/l	101	75.0-120	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Dibromofluoromethane	238799-1	50 ug/l	99.8	85.0-115	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
Toluene-D8	238799-1	50 ug/l	98.6	85.0-120	V9700	14Oct19 0905 by 271	14Oct19 1414 by 271		
TCLP Chlorinated Herbicides									
TCLP: 2,4,5-TP	238799-1	50 mg/l	102	40.0-160	C22659	14Oct19 1727 by 07	14Oct19 1853 by 07		
	238799-1	50 mg/l	102	40.0-160	C22659	14Oct19 1727 by 07	14Oct19 1929 by 07		
	Relative Percent Difference:		0.197	20.0	C22659				
TCLP: 2,4-D	238799-1	50 mg/l	102	40.0-150	C22659	14Oct19 1727 by 07	14Oct19 1853 by 07		
	238799-1	50 mg/l	103	40.0-150	C22659	14Oct19 1727 by 07	14Oct19 1929 by 07		
	Relative Percent Difference:		0.195	20.0	C22659				
TCLP Base/Neutral and Acid Compounds									
TCLP: 2,4,5-Trichlorophenol	238799-1	20 ug/l	79.4	35.0-106	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
TCLP Base/Neutral and Acid Compounds (Continued)									
TCLP: 2,4,6-Trichlorophenol	238799-1	20 ug/l	81.6	37.0-144	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: 1,4-Dichlorobenzene	238799-1	20 ug/l	65.2	32.8-92.0	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: 2,4-Dinitrotoluene	238799-1	20 ug/l	76.8	39.0-139	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Cresols	238799-1	40 ug/l	65.2	15.9-96.9	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Hexachlorobenzene	238799-1	20 ug/l	82.4	10.0-152	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Hexachlorobutadiene	238799-1	20 ug/l	64.8	24.0-120	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Hexachloroethane	238799-1	20 ug/l	79.6	40.0-120	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Nitrobenzene	238799-1	20 ug/l	73.0	35.0-180	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Pentachlorophenol	238799-1	20 ug/l	77.6	14.0-176	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Pyridine	238799-1	20 ug/l	30.6	0.00-65.8	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP Base/Neutral and Acid Compounds Surrogates:									
TCLP: 2,4,6-Tribromophenol	238799-1	20 ug/l	82.2	10.0-125	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: 2-Fluorobiphenyl	238799-1	20 ug/l	77.0	31.0-116	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: 2-Fluorophenol	238799-1	20 ug/l	44.2	14.4-67.6	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Nitrobenzene-D5	238799-1	20 ug/l	73.2	10.0-146	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP: Terphenyl-D14	238799-1	20 ug/l	75.2	27.6-119	B11597	14Oct19 1235 by 271	14Oct19 1824 by 271		
TCLP Organochlorine Pesticides									
TCLP: cis-Chlordane	238799-1	10 ug/l	80.7	65.0-125	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: Endrin	238799-1	10 ug/l	75.3	55.0-135	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: gamma-BHC	238799-1	10 ug/l	96.2	25.0-135	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: Heptachlor	238799-1	10 ug/l	97.1	40.0-130	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: Heptachlor epoxide	238799-1	10 ug/l	101	60.0-130	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: Methoxychlor	238799-1	10 ug/l	106	55.0-150	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: trans-Chlordane	238799-1	10 ug/l	93.9	60.0-125	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP Organochlorine Pesticides Surrogates:									
TCLP: Decachlorobiphenyl	238799-1	20 ug/l	64.4	10.0-123	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		
TCLP: Tetrachloro-m-xylene	238799-1	20 ug/l	89.5	3.30-120	G11430	11Oct19 1100 by 348	11Oct19 2235 by 338		

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Denali Water Solutions
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LABORATORY BLANK RESULTS

Analyte	Result	RL	LOQ	QC Sample	Preparation Date	Analysis Date	Qual
TCLP: Arsenic	< 0.05 mg/l	0.05	0.05	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Barium	< 0.002 mg/l	0.002	0.002	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Cadmium	< 0.004 mg/l	0.004	0.004	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Chromium	< 0.01 mg/l	0.01	0.01	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Lead	< 0.04 mg/l	0.04	0.04	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Selenium	< 0.07 mg/l	0.07	0.07	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Silver	< 0.007 mg/l	0.007	0.007	S47860-2	11Oct19 1030 by 100	11Oct19 1640 by 328	
TCLP: Mercury	< 0.0002 mg/l	0.0002	0.0002	S47861-2	11Oct19 1100 by 100	11Oct19 1458 by 313	
Total Solids	< 0.01 wt %	0.01	0.01	W69549-1	10Oct19 1339 by 347	11Oct19 0944 by 347	
Volatile Solids	< 0.01 wt %	0.01	0.01	W69549-1	10Oct19 1339 by 347	17Oct19 1101 by 347	
Ammonia as N	< 8 mg/Kg	8	10	W69556-1	11Oct19 0910 by 300	11Oct19 1428 by 300	
Total Kjeldahl Nitrogen	< 7.6 mg/Kg	7.6	10	W69539-1	09Oct19 1628 by 300	11Oct19 1145 by 300	
Arsenic	< 4 mg/Kg	4	5	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Cadmium	< 0.3 mg/Kg	0.3	0.4	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Chromium	< 0.7 mg/Kg	0.7	1	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Copper	< 0.7 mg/Kg	0.7	1	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Lead	< 2 mg/Kg	2	4	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Molybdenum	< 0.6 mg/Kg	0.6	1	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Nickel	< 0.5 mg/Kg	0.5	1	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Phosphorus	< 7 mg/Kg	7	10	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Potassium	< 50 mg/Kg	50	100	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Selenium	< 7 mg/Kg	7	7	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Zinc	< 0.6 mg/Kg	0.6	1	S47842-1	09Oct19 1050 by 100	10Oct19 1047 by 328	
Mercury	< 0.05 mg/Kg	0.05	0.1	S47844-1	09Oct19 1330 by 100	09Oct19 1607 by 313	
Nitrate as N	< 0.03 mg/Kg	0.03	0.5	C22648-1	08Oct19 1128 by 235	08Oct19 1413 by 235	
Nitrite as N	< 0.03 mg/Kg	0.03	0.5	C22648-1	08Oct19 1128 by 235	08Oct19 1413 by 235	
TCLP Chlorinated Herbicides							
TCLP: 2,4,5-TP	< 0.050 mg/l	0.050	0.1	C22659-1	14Oct19 1727 by 07	14Oct19 1741 by 07	
TCLP: 2,4-D	< 0.10 mg/l	0.10	0.2	C22659-1	14Oct19 1727 by 07	14Oct19 1741 by 07	
TCLP Base/Neutral and Acid Compounds							
TCLP: 2,4,5-Trichlorophenol	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: 2,4,6-Trichlorophenol	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: 1,4-Dichlorobenzene	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: 2,4-Dinitrotoluene	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Cresols	< 0.10 mg/l	0.10	0.10	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Hexachlorobenzene	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Hexachlorobutadiene	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Hexachloroethane	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Nitrobenzene	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Pentachlorophenol	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Pyridine	< 0.050 mg/l	0.050	0.050	B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP Base/Neutral and Acid Compounds Surrogates:							
TCLP: 2,4,6-Tribromophenol (43.0-109%)	67.1 %			B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: 2-Fluorobiphenyl (58.0-113%)	94.6 %			B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: 2-Fluorophenol (29.1-87.9%)	50.9 %			B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Nitrobenzene-D5 (51.3-102%)	79.3 %			B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP: Terphenyl-D14 (50.8-99.0%)	74.4 %			B11597-1	14Oct19 1235 by 271	14Oct19 1710 by 271	
TCLP Volatile Organic Compounds							
TCLP: 1,2-Dichloroethane	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Denali Water Solutions
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LABORATORY BLANK RESULTS

Analyte	Result	RL	LOQ	QC Sample	Preparation Date	Analysis Date	Qual
TCLP Volatile Organic Compounds							
TCLP: 1,1-Dichloroethylene	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Benzene	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Carbon tetrachloride	< 0.0020 mg/l	0.0020	0.0020	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Chlorobenzene	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Chloroform	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Methyl ethyl ketone	< 0.010 mg/l	0.010	0.010	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Tetrachloroethylene	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Trichloroethylene	< 0.0050 mg/l	0.0050	0.0050	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Vinyl chloride	< 0.0020 mg/l	0.0020	0.0020	V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP Volatile Organic Compounds Surrogates:							
TCLP: 4-Bromofluorobenzene (75.0-120%)	97.4 %			V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Dibromofluoromethane (85.0-115%)	104 %			V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP: Toluene-D8 (85.0-120%)	96.3 %			V9700-1	14Oct19 0905 by 271	14Oct19 1531 by 271	
TCLP Organochlorine Pesticides							
TCLP: cis-Chlordane	< 0.00002 mg/l	0.00002	0.00002	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: Endrin	< 0.00002 mg/l	0.00002	0.00002	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: gamma-BHC	< 0.00001 mg/l	0.00001	0.00001	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: Heptachlor	< 0.000005 mg/l	0.000005	0.000005	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: Heptachlor epoxide	< 0.00001 mg/l	0.00001	0.00001	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: Methoxychlor	< 0.00002 mg/l	0.00002	0.00002	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: Toxaphene	< 0.00020 mg/l	0.00020	0.00020	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: trans-Chlordane	< 0.00002 mg/l	0.00002	0.00002	G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP Organochlorine Pesticides Surrogates:							
TCLP: Decachlorobiphenyl (25.4-112%)	110 %			G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
TCLP: Tetrachloro-m-xylene (52.6-99.6%)	96.7 %			G11430-1	11Oct19 1100 by 348	11Oct19 2145 by 338	
Polychlorinated Biphenyls (PCBs)							
PCB 1016	< 0.0037 mg/Kg	0.0037	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
PCB 1221	< 0.0037 mg/Kg	0.0037	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
PCB 1232	< 0.0037 mg/Kg	0.0037	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
PCB 1242	< 0.0037 mg/Kg	0.0037	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
PCB 1248	< 0.0037 mg/Kg	0.0037	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
PCB 1254	< 0.0037 mg/Kg	0.0037	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
PCB 1260	< 0.0022 mg/Kg	0.0022	0.010	G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	
Polychlorinated Biphenyls (PCBs) Surrogates:							
Decachlorobiphenyl (55.8-110%)	75.1 %			G11428-1	11Oct19 0836 by 338	14Oct19 1504 by 338	

AMERICAN INTERPLEX CORPORATION
LABORATORIES

8600 Kanis Road
Little Rock, AR 72204-2322
(501) 224-5060
FAX (501) 224-5072

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: Denali Water Solutions, ACCT# 2618
Project Reference: Bixby North Plant Lagoons
Project Manager: Gabe
Sampled By: Gabe

PO No.

SAMPLE MATRIX: WATER, SOIL, Sludge

NO OF BOTTLES: See Attached

ANALYSES REQUESTED

AIC CONTROL NO: 4,238800
AIC PROPOSAL NO:
Carrier:
Received on Ice (4°C)? YES NO 0.8
Remarks

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL	Sludge	NO OF BOTTLES	See Attached	Remarks
	Biosolids	10-8-19/0930	X				1	1	X	
		Container Type								Field pH calibration
		Preservative								on _____ @ _____
										Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN ____ DAYS
Expedited results requested by: _____
Who should AIC contact with questions: Gabe
Phone: 479-518-1554 Fax: _____
Report Attention to: _____
Report Address to: _____

Relinquished By:	Date/Time	Received By:	Date/Time
	10-8-19 1410		
Relinquished By:	Date/Time	Received in Lab By: D. Brown	Date/Time 10-8-19 1410

Comments:

5/01

FORM 0060

Biosolids MUST be analyzed for the following nutrients and pollutants listed below.

Nutrient Analysis
Total Kjeldahl Nitrogen (TKN)
Ammonium Nitrogen (NH4-N)
Nitrate Nitrogen (NO3-N)
Nitrite Nitrogen (NO2-N)
Phosphorous (P)
Potassium (K)
% Total Solids (TS)
% Volatile Solids
pH

Pollutant	Max. Concentration
Arsenic (As)	75 mg/kg
Cadmium (Cd)	85 mg/kg
Chromium (Cr)	3000 mg/kg
Copper (Cu)	4300 mg/kg
Lead (Pb)	840 mg/kg
Mercury (Hg)	57 mg/kg
Molybdenum (Mo)	75 mg/kg
Nickel (Ni)	420 mg/kg
Selenium (Se)	100 mg/kg
Zinc (Zn)	7500 mg/kg
PCB (ppm)	2 ppm

TCLP REQUIREMENTS

CONSTITUENT	MAXIMUM CONCENTRATION (mg/l)
TCLP METALS	
ARSENIC	5.0
BARIUM	100.0
CADMIUM	1.0
CHROMIUM	5.0
LEAD	5.0
MERCURY	0.2
SELENIUM	1.0
SILVER	3.0
TCLP SEMI-VOLATILES	
CRESOL	200.0
M-CRESOL	200.0
O-CRESOL	200.0
P-CRESOL	200.0
2,4-DINITROTOLUENE	0.13
HEXACHLOROBENZENE	0.13
HEXACHLOROBUTADIENE	0.5
HEXACHLOROETHANE	3.0
NITROBENZENE	2.0
PENTACHLOROPHENOL	100.0
PYRIDINE	5.0
2,4,5-TRICHLOROPHENOL	400.0
2,4,6-TRICHLOROPHENOL	2.0
TCLP VOLATILES	
BENZENE	0.5
CARBON TETRACHLORIDE	0.5
CHLOROBENZENE	100.0
CHLOROFORM	6.0
1,2-DICHLOROETHANE	0.5
1,1-DICHLOROETHYLENE	0.7
1,4-DICHLOROBENZENE	7.5
METHYL ETHYL KETONE	200.0
TETRACHLOROETHYLENE	0.7
TRICHLOROETHYLENE	0.5
VINYL CHLORIDE	0.2
TCLP PESTICIDES	
CHLORDANE	0.03
ENDRIN	0.02
HEPTACHLOR (+ EPOXIDE)	0.008
LINDANE	0.4
METHOXYCHLOR	10.0
TOXAPHENE	0.5
TCLP HERBICIDES	
2,4-D	10.0
2,4,5-TP (SILVEX)	1.0

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Denali Water Solutions
ATTN: Mr. Mike Cook
Post Office Box 3036
Russellville, AR 72811

This report contains the analytical results and supporting information for samples received on October 8, 2019. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Chief Operating Officer or a qualified designee.

by LP
John Overbey
Chief Operating Officer

This document has been distributed to the following:

PDF cc: Denali Water Solutions
ATTN: Mr. Mike Cook
mike.cook@denaliwater.com

Denali Water Solutions
ATTN: Mr. Gabe Timby
gabe.timby@denaliwater.com

Denali Water Solutions
ATTN: Mr. Billy Staton
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Terra Renewal, LLC.
ATTN: Ms. Vanya Colburn
vanya.colburn@terrarenewal.com

Denali Water Solutions
ATTN: Mr. Will Hodges
will.hodges@Denaliwater.onmicrosoft.com

Denali Water Solutions
ATTN: Ms. Alyssa Frickle
alyssa.frickle@denaliwater.com

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Denali Water Solutions
Post Office Box 3036
Russellville, AR 72811

SAMPLE INFORMATION

Project Description:
Seven (7) sludge sample(s) received on October 8, 2019
Bixby North Plant Lagoons
P.O. No. EVT60

Receipt Details:
A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
238797-1	Fecal - 1	08-Oct-2019 0930	
238797-2	Fecal - 2	08-Oct-2019 0930	
238797-3	Fecal - 3	08-Oct-2019 0930	
238797-4	Fecal - 4	08-Oct-2019 0930	
238797-5	Fecal - 5	08-Oct-2019 0930	
238797-6	Fecal - 6	08-Oct-2019 0930	
238797-7	Fecal - 7	08-Oct-2019 0930	

Case Narrative:
Analysis of soils/sludges are reported on a dry-weight basis unless otherwise specified.

References:
"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", (SM).
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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LABORATORIES

Denali Water Solutions
Post Office Box 3036
Russellville, AR 72811

ANALYTICAL RESULTS

AIC No. 238797-1
Sample Identification: Fecal - 1 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**7.1**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**2800**	2800	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

AIC No. 238797-2
Sample Identification: Fecal - 2 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**7.5**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**5300**	3000	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

AIC No. 238797-3
Sample Identification: Fecal - 3 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**7.1**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**< 3000**	3000	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

AIC No. 238797-4
Sample Identification: Fecal - 4 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**7.1**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**< 3000**	3000	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

AIC No. 238797-5
Sample Identification: Fecal - 5 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**7.4**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**< 3000**	3000	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

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Denali Water Solutions
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Russellville, AR 72811

ANALYTICAL RESULTS

AIC No. 238797-6
Sample Identification: Fecal - 6 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**6.4**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**41000**	3000	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

AIC No. 238797-7
Sample Identification: Fecal - 7 08-Oct-2019 0930

Analyte		Result	RL	Units	Qualifier
Total Solids		**6.2**	0.01	**wt %**	
SM 2540 G 2011	Prep: 09-Oct-2019 1534 by 330	Analyzed: 10-Oct-2019 1105 by 330		Batch: W69536	
Fecal Coliform		**18000**	3000	**MPN/g**	
SM 9221 C, E 2006		Analyzed: 08-Oct-2019 1458 by 343		Batch: M8029	

AMERICAN INTERPLEX CORPORATION
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Denali Water Solutions
Post Office Box 3036
Russellville, AR 72811

DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Solids	238797-7	6.2 wt %			09Oct19 1534 by 330	10Oct19 1105 by 330		
Batch: W69536	Duplicate	6.4 wt %	3.24	10.0	09Oct19 1534 by 330	10Oct19 1105 by 330		

LABORATORY BLANK RESULTS

Analyte	Result	RL	LOQ	QC Sample	Preparation Date	Analysis Date	Qual
Total Solids	< 0.01 wt %	0.01	0.01	W69536-1	09Oct19 1534 by 330	10Oct19 1105 by 330	

AMERICAN INTERPLEX CORPORATION
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CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: Denali Water Solutions, ACCT# 2618
Project Reference: Bixby North Plant Lagoons
Project Manager: Gabe
Sampled By: Gabe

PO No.

SAMPLE MATRIX: WATER, SOIL, Sludge

NO OF BOTTLES

ANALYSES REQUESTED: 7 Geometric Mean Fecal Coliform; % Total Solids

AIC CONTROL NO: 238797
AIC PROPOSAL NO:
Carrier:
Received on Ice (4°C)? YES NO
0.8°
Remarks

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL	Sludge	NO OF BOTTLES	7 Geometric Mean Fecal Coliform	% Total Solids
1	Fecal - 1	10-8-19 0930	x				x	1	x	x
2	Fecal - 2		x				x	1	x	x
3	Fecal - 3		x				x	1	x	x
4	Fecal - 4		x				x	1	x	x
5	Fecal - 5		x				x	1	x	x
6	Fecal - 6		x				x	1	x	x
7	Fecal - 7	10-8-19 0920	x				x	1	x	x
		Container Type								
		Preservative								

Field pH calibration
on _____ @ _____
Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN ____ DAYS
Expedited results requested by: _____
Who should AIC contact with questions: Gabe
Phone: 479-518-1554 Fax: _____
Report Attention to: _____
Report Address to:

Relinquished By:	Date/Time 10-8-19 1410	Received By:	Date/Time
Relinquished By:	Date/Time	Received in Lab By: D. Brown	Date/Time 10-8-19 1410

Comments:

5/01

FORM 0060

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www.waypointanalytical.com

SOIL ANALYSIS

Client :
Denali Water Solutions
Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

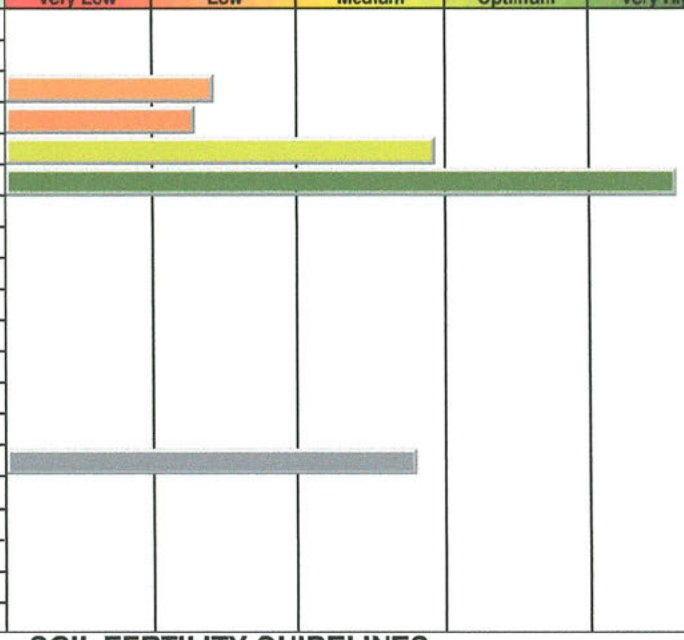
Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 1 of 10

Lab No: 56816 **Field:** **Sample ID:** DL-1

Test	Method	Results
Soil pH	1:1	6.5
Buffer pH		
Phosphorus (P)	M3	8 mg/kg
Potassium (K)	M3	78 mg/kg
Calcium (Ca)	M3	1974 mg/kg
Magnesium (Mg)	M3	364 mg/kg
Sulfur (S)		
Boron (B)		
Copper (Cu)		
Iron (Fe)		
Manganese (Mn)		
Zinc (Zn)		
Sodium (Na)		
Soluble Salts		
Organic Matter	LOI	4.7mç
Estimated N Release		138 lbs/acre
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity: **14.2 meq/100g**

%Saturation

	%sat	meq
K	1.4	0.2
Ca	69.5	9.9
Mg	21.4	3.0
H	7.7	1.1

K/Mg Ratio: 0.06
Ca/Mg Ratio: 3.25

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

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SOIL ANALYSIS

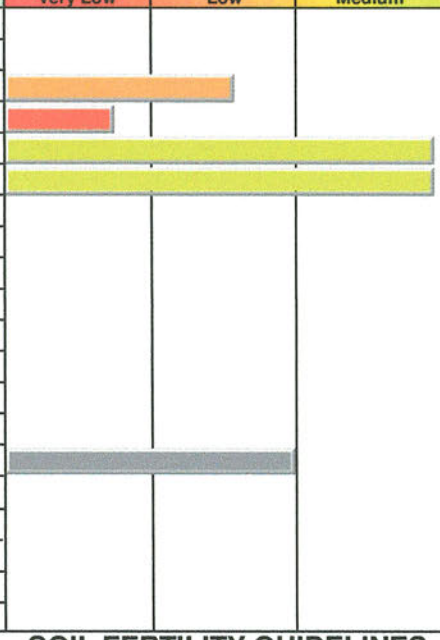
Client :
Denali Water Solutions
Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 2 of 10

Lab No: 56817 **Field:** **Sample ID:** DL-2

Test	Method	Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	6.1	
Buffer pH			
Phosphorus (P)	M3	9 mg/kg	
Potassium (K)	M3	37 mg/kg	
Calcium (Ca)	M3	1090 mg/kg	
Magnesium (Mg)	M3	144 mg/kg	
Sulfur (S)			
Boron (B)			
Copper (Cu)			
Iron (Fe)			
Manganese (Mn)			
Zinc (Zn)			
Sodium (Na)			
Soluble Salts			
Organic Matter	LOI	3.0mç	
Estimated N Release		104 lbs/acre	
Nitrate Nitrogen			



Calculated Cation Exchange Capacity

7.8 meq/100g

%Saturation

	%sat	meq
K	1.2	0.1
Ca	69.9	5.5
Mg	15.4	1.2
H	14.1	1.1

K/Mg Ratio: 0.07

Ca/Mg Ratio: 4.54

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

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SOIL ANALYSIS

Client :	Grower :	
Denali Water Solutions Ms. Vanya Colburn P.O. Box 3036 Russellville AR 72802	EVT-Bixby OK WWTP	Report No: 22-021-0971 Cust No: 11675 Date Printed: 01/22/2022 Date Received : 01/21/2022 PO: Page : 3 of 10

Lab No: 56818 **Field:** **Sample ID:** DL-3

Test	Method	Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	6.6	
Buffer pH			
Phosphorus (P)	M3	6 mg/kg	
Potassium (K)	M3	39 mg/kg	
Calcium (Ca)	M3	1173 mg/kg	
Magnesium (Mg)	M3	174 mg/kg	
Sulfur (S)			
Boron (B)			
Copper (Cu)			
Iron (Fe)			
Manganese (Mn)			
Zinc (Zn)			
Sodium (Na)			
Soluble Salts			
Organic Matter	LOI	2.0mç	
Estimated N Release		84 lbs/acre	
Nitrate Nitrogen			

Calculated Cation Exchange Capacity

7.9 meq/100g

%Saturation

	%sat	meq
K	1.3	0.1
Ca	74.2	5.9
Mg	18.4	1.5
H	6.3	0.5

K/Mg Ratio: 0.06

Ca/Mg Ratio: 4.03

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

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www.waypointanalytical.com

SOIL ANALYSIS

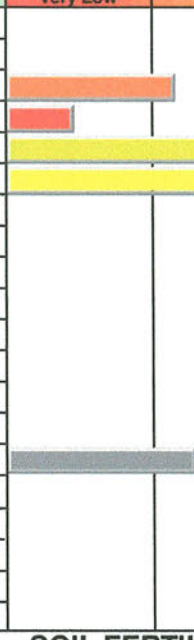
Client :
Denali Water Solutions
Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 4 of 10

Lab No: 56819 **Field:** **Sample ID:** JR-1

Test	Method	Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	5.7	
Buffer pH	SMP	6.85	
Phosphorus (P)	M3	5 mg/kg	
Potassium (K)	M3	13 mg/kg	
Calcium (Ca)	M3	468 mg/kg	
Magnesium (Mg)	M3	69 mg/kg	
Sulfur (S)			
Boron (B)			
Copper (Cu)			
Iron (Fe)			
Manganese (Mn)			
Zinc (Zn)			
Sodium (Na)			
Soluble Salts			
Organic Matter	LOI	2.3mç	
Estimated N Release		90 lbs/acre	
Nitrate Nitrogen			



Calculated Cation Exchange Capacity: **3.7** meq/100g

%Saturation

	%sat	meq
K	0.9	0
Ca	63.2	2.3
Mg	15.5	0.6
H	21.6	0.8

K/Mg Ratio: 0.05
Ca/Mg Ratio: 4.08

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

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SOIL ANALYSIS

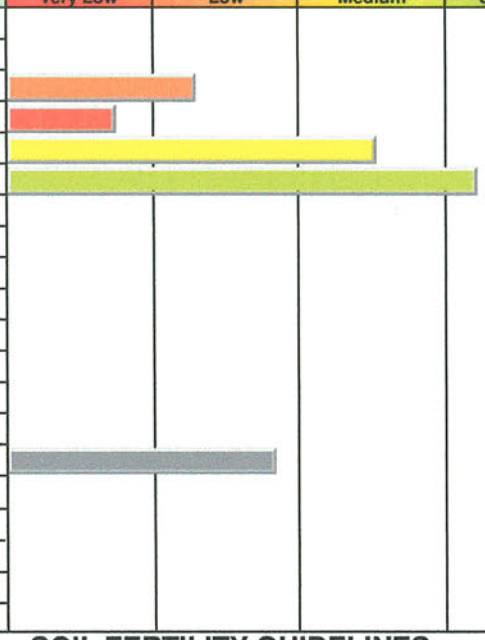
Client :
Denali Water Solutions
Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 5 of 10

Lab No: 56820 **Field:** **Sample ID:** JR-2

Test	Method	Results
Soil pH	1:1	6.1
Buffer pH		
Phosphorus (P)	M3	6 mg/kg
Potassium (K)	M3	37 mg/kg
Calcium (Ca)	M3	724 mg/kg
Magnesium (Mg)	M3	154 mg/kg
Sulfur (S)		
Boron (B)		
Copper (Cu)		
Iron (Fe)		
Manganese (Mn)		
Zinc (Zn)		
Sodium (Na)		
Soluble Salts		
Organic Matter	LOI	2.9mç
Estimated N Release		102 lbs/acre
Nitrate Nitrogen		



Calculated Cation Exchange Capacity: **5.8** meq/100g

%Saturation

	%sat	meq
K	1.6	0.1
Ca	62.4	3.6
Mg	22.1	1.3
H	13.8	0.8

K/Mg Ratio: 0.07
Ca/Mg Ratio: 2.82

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

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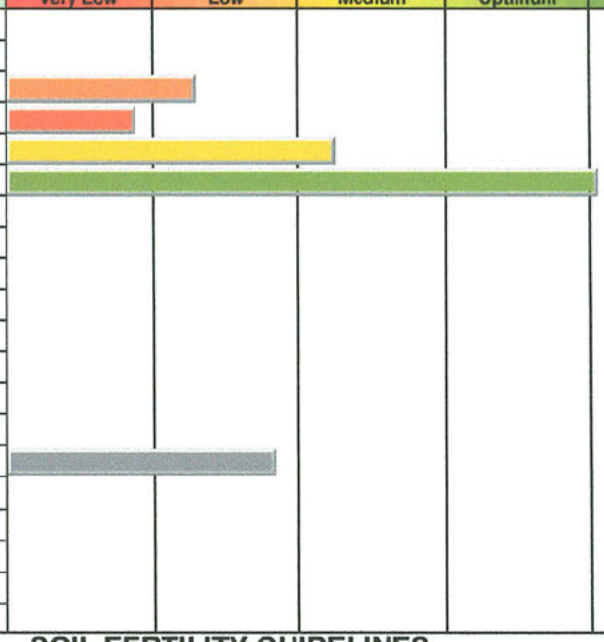
SOIL ANALYSIS

Client :	Grower :	
Denali Water Solutions Ms. Vanya Colburn P.O. Box 3036 Russellville AR 72802	EVT-Bixby OK WWTP	Report No: 22-021-0971 Cust No: 11675 Date Printed: 01/22/2022 Date Received : 01/21/2022 PO: Page : 6 of 10

Lab No: 56821 **Field:** **Sample ID:** JR-3

Test	Method	Results
Soil pH	1:1	5.6
Buffer pH	SMP	6.81
Phosphorus (P)	M3	6 mg/kg
Potassium (K)	M3	31 mg/kg
Calcium (Ca)	M3	554 mg/kg
Magnesium (Mg)	M3	108 mg/kg
Sulfur (S)		
Boron (B)		
Copper (Cu)		
Iron (Fe)		
Manganese (Mn)		
Zinc (Zn)		
Sodium (Na)		
Soluble Salts		
Organic Matter	LOI	2.8mç
Estimated N Release		100 lbs/acre
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity

4.9 meq/100g

%Saturation

	%sat	meq
K	1.6	0.1
Ca	56.5	2.8
Mg	18.4	0.9
H	24.5	1.2

K/Mg Ratio: 0.08

Ca/Mg Ratio: 3.07

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

Waypoint ANALYTICAL
2790 Whitten Road, Memphis, TN 38133
Main 901.213.2400 ° Fax 901.213.2440
www.waypointanalytical.com

"Every acre...Every year®"

SOIL ANALYSIS

Client :
Denali Water Solutions
Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

Grower :
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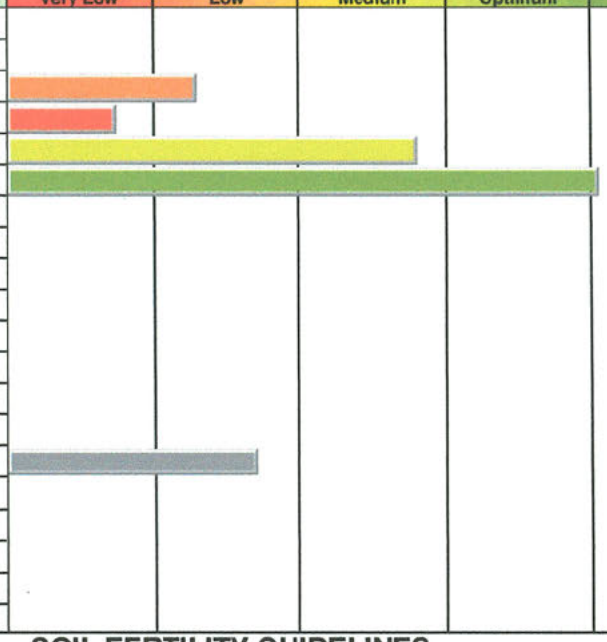
Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 7 of 10

Lab No: 56822 **Field:** **Sample ID:** JR-4

Test	Method	Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	6.1	
Buffer pH			
Phosphorus (P)	M3	6 mg/kg	
Potassium (K)	M3	24 mg/kg	
Calcium (Ca)	M3	609 mg/kg	
Magnesium (Mg)	M3	105 mg/kg	
Sulfur (S)			
Boron (B)			
Copper (Cu)			
Iron (Fe)			
Manganese (Mn)			
Zinc (Zn)			
Sodium (Na)			
Soluble Salts			
Organic Matter	LOI	2.7mç	
Estimated N Release		98 lbs/acre	
Nitrate Nitrogen			



Calculated Cation Exchange Capacity: **4.6** meq/100g

%Saturation

	%sat	meq
K	1.3	0.1
Ca	66.2	3.0
Mg	19.0	0.9
H	13.0	0.6

K/Mg Ratio: 0.07
Ca/Mg Ratio: 3.48

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

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SOIL ANALYSIS

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Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
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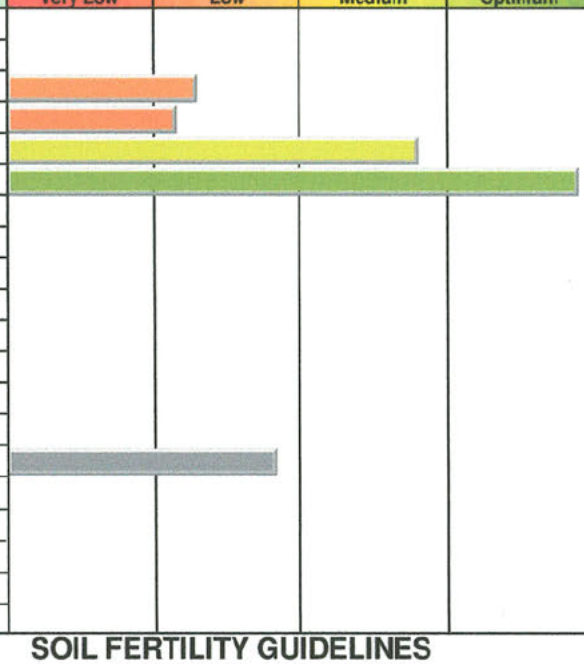
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 8 of 10

Lab No: 56823 **Field:** **Sample ID:** JR-5

Test	Method	Results
Soil pH	1:1	6.0
Buffer pH		
Phosphorus (P)	M3	7 mg/kg
Potassium (K)	M3	43 mg/kg
Calcium (Ca)	M3	653 mg/kg
Magnesium (Mg)	M3	100 mg/kg
Sulfur (S)		
Boron (B)		
Copper (Cu)		
Iron (Fe)		
Manganese (Mn)		
Zinc (Zn)		
Sodium (Na)		
Soluble Salts		
Organic Matter	LOI	2.8mç
Estimated N Release		100 lbs/acre
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity: **4.9 meq/100g**

%Saturation

	%sat	meq
K	2.3	0.1
Ca	66.6	3.3
Mg	17.0	0.8
H	14.3	0.7

K/Mg Ratio: 0.13
Ca/Mg Ratio: 3.92

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

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SOIL ANALYSIS

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Denali Water Solutions
Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

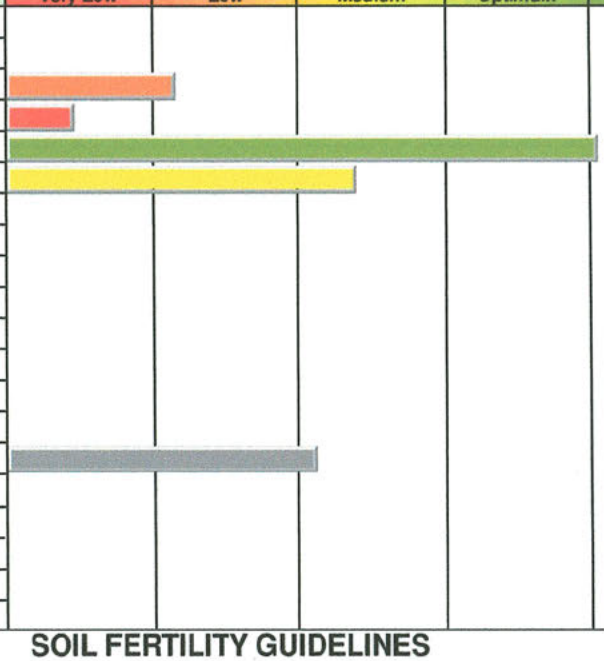
Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 9 of 10

Lab No: 56824 **Field:** **Sample ID:** JR-6

Test	Method	Results
Soil pH	1:1	6.6
Buffer pH		
Phosphorus (P)	M3	4 mg/kg
Potassium (K)	M3	17 mg/kg
Calcium (Ca)	M3	926 mg/kg
Magnesium (Mg)	M3	92 mg/kg
Sulfur (S)		
Boron (B)		
Copper (Cu)		
Iron (Fe)		
Manganese (Mn)		
Zinc (Zn)		
Sodium (Na)		
Soluble Salts		
Organic Matter	LOI	3.1 mg
Estimated N Release		106 lbs/acre
Nitrate Nitrogen		

SOIL TEST RATINGS: Very Low | Low | Medium | Optimum | Very High



Calculated Cation Exchange Capacity: **5.7** meq/100g

%Saturation

	%sat	meq
K	0.8	0
Ca	81.2	4.6
Mg	13.5	0.8
H	5.3	0.3

K/Mg Ratio: 0.05
Ca/Mg Ratio: 6.01

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

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SOIL ANALYSIS

Client :
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Ms. Vanya Colburn
P.O. Box 3036
Russellville AR 72802

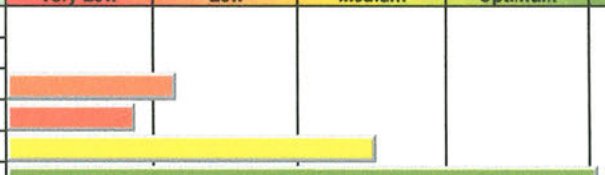
Grower :
EVT-Bixby OK WWTP

Report No: 22-021-0971
Cust No: 11675
Date Printed: 01/22/2022
Date Received : 01/21/2022
PO:
Page : 10 of 10

Lab No: 56825 **Field:** **Sample ID:** JR-7

Test	Method	Results
Soil pH	1:1	6.1
Buffer pH		
Phosphorus (P)	M3	5 mg/kg
Potassium (K)	M3	41 mg/kg
Calcium (Ca)	M3	847 mg/kg
Magnesium (Mg)	M3	186 mg/kg
Sulfur (S)		
Boron (B)		
Copper (Cu)		
Iron (Fe)		
Manganese (Mn)		
Zinc (Zn)		
Sodium (Na)		
Soluble Salts		
Organic Matter	LOI	3.1 mc
Estimated N Release		106 lbs/acre
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity: **6.9** meq/100g

%Saturation

	%sat	meq
K	1.5	0.1
Ca	61.4	4.2
Mg	22.5	1.6
H	14.5	1.0

K/Mg Ratio: 0.06
Ca/Mg Ratio: 2.73

SOIL FERTILITY GUIDELINES

Crop : **Rec Units:**

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe

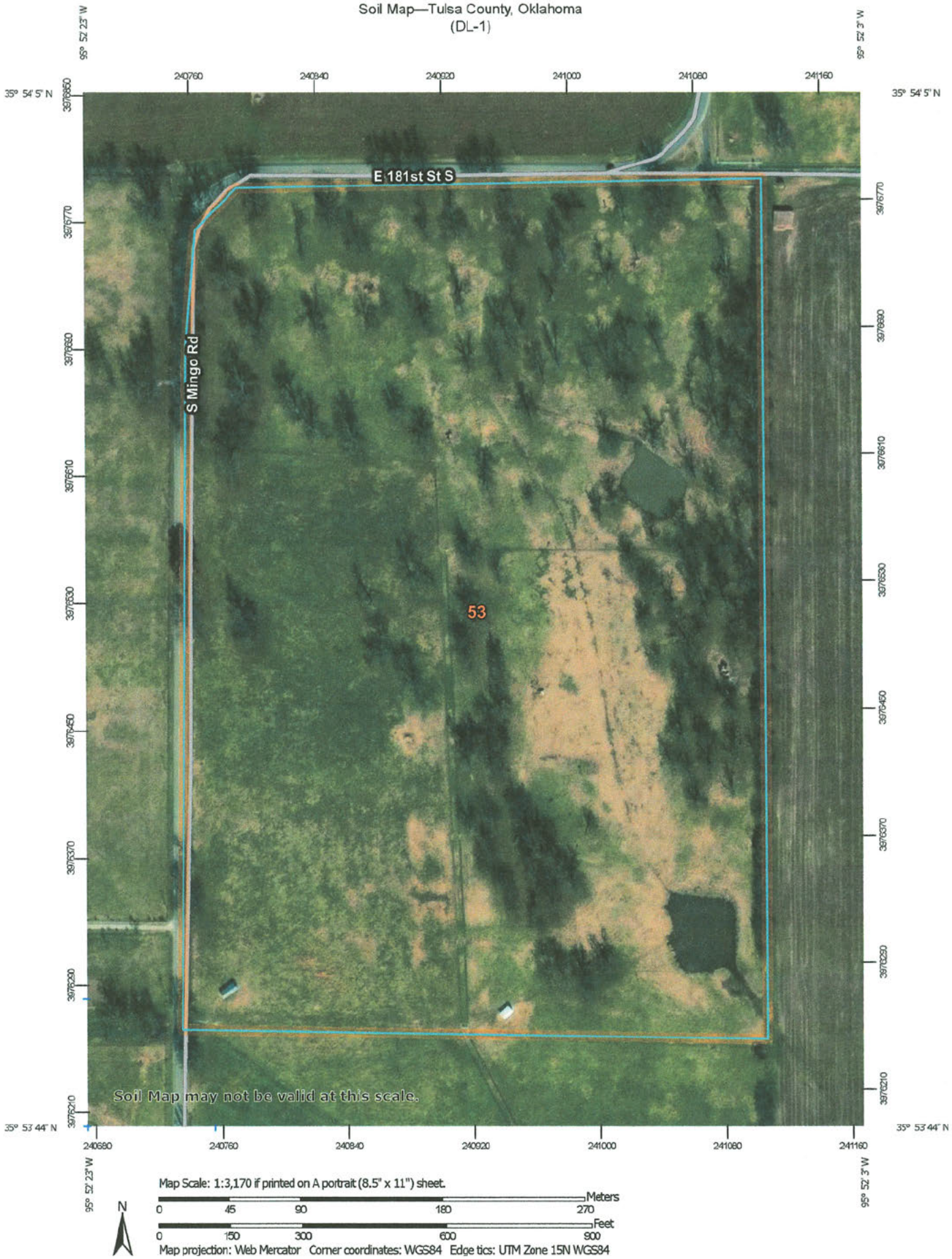
Crop : **Rec Units:**

Comments :

SMP - SMP Buffer pH M3 - Mehlich 3 LOI - Loss On Ignition 1:1 - Water pH

Analysis prepared by: Waypoint Analytical Tennessee, Inc.

Soil Map—Tulsa County, Oklahoma
(DL-1)



Map Scale: 1:3,170 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021

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

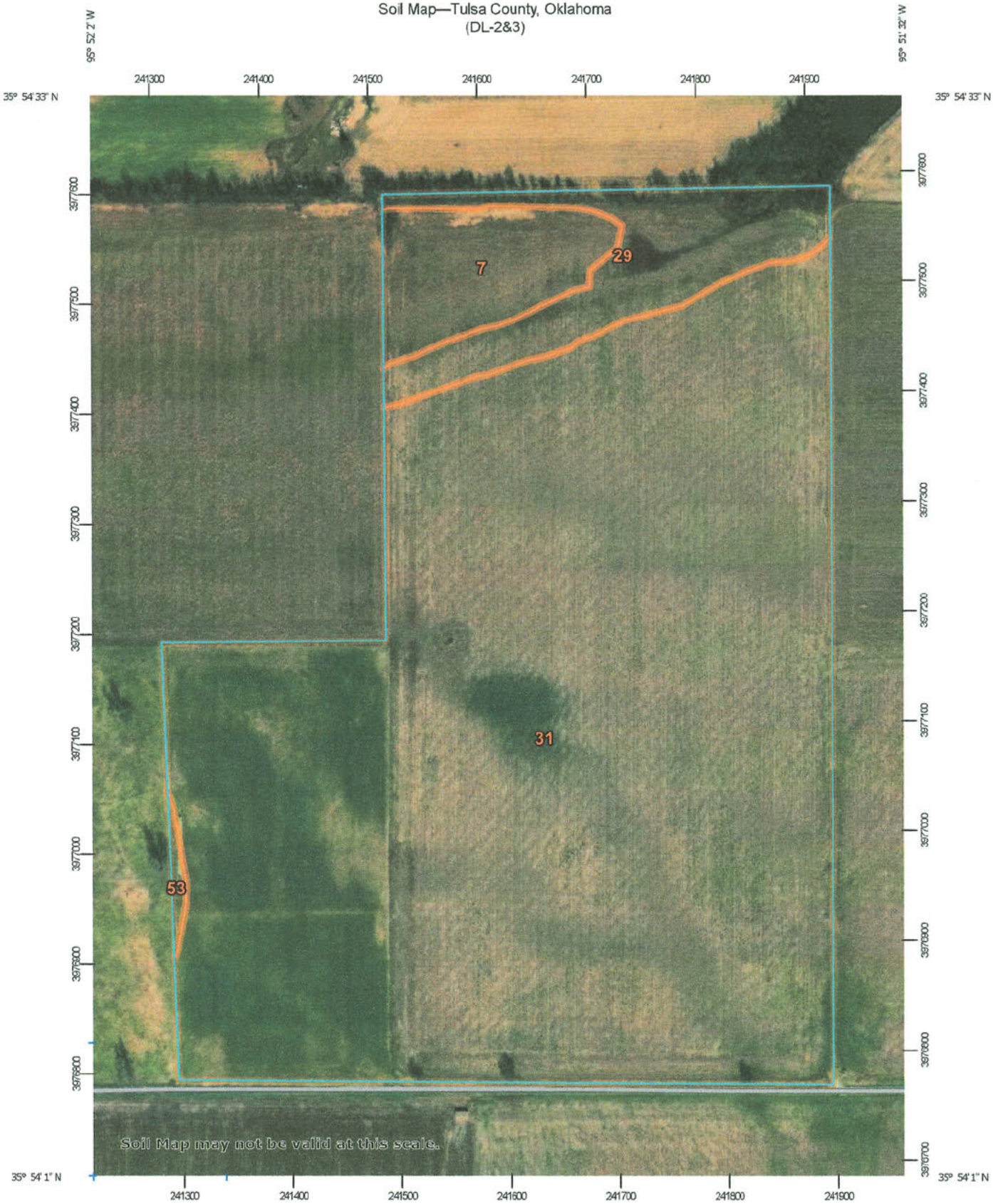
Date(s) aerial images were photographed: Mar 10, 2015—Nov 19, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
53	Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded	48.7	100.0%
Totals for Area of Interest		**48.7**	**100.0%**

Soil Map—Tulsa County, Oklahoma
(DL-2&3)



Map Scale: 1:4,790 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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Survey Area Data: Version 16, Aug 27, 2021

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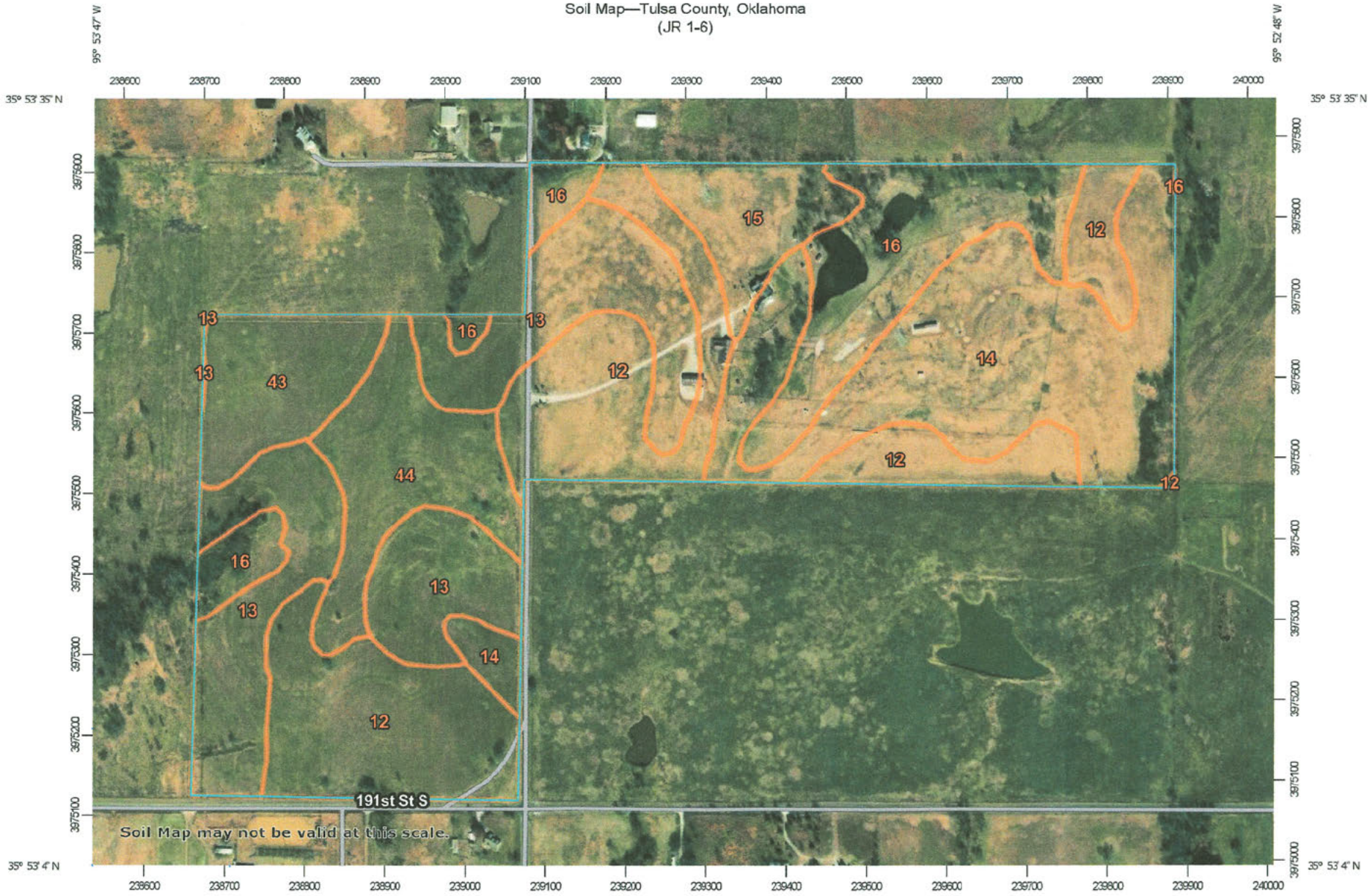
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7	Choska very fine sandy loam, 0 to 1 percent slopes, rarely flooded	5.4	5.3%
29	Latanier clay, 0 to 1 percent slopes, occasionally flooded	7.4	7.3%
31	Mason silt loam, 0 to 1 percent slopes, rarely flooded	88.9	87.2%
53	Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded	0.3	0.3%
Totals for Area of Interest		**102.0**	**100.0%**

Soil Map—Tulsa County, Oklahoma
(JR 1-6)



Map Scale: 1:6,730 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021

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

Date(s) aerial images were photographed: Mar 10, 2015—Nov 19, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Dennis silt loam, 1 to 3 percent slopes	35.2	25.1%
13	Dennis silt loam, 3 to 5 percent slopes	29.1	20.7%
14	Dennis silt loam, 3 to 5 percent slopes, eroded	30.6	21.8%
15	Dennis-Pharoah complex, 1 to 3 percent slopes	6.7	4.8%
16	Dennis-Radley complex, 0 to 12 percent slopes	18.6	13.3%
43	Okemah silt loam, 0 to 1 percent slopes	8.5	6.0%
44	Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes	11.6	8.3%
Totals for Area of Interest		**140.3**	**100.0%**

Soil Map—Tulsa County, Oklahoma
(JR-7)

Map Scale: 1:3,380 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
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Background
- Aerial Photography

MAP INFORMATION

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

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

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

Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021

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

Date(s) aerial images were photographed: Mar 10, 2015—Nov 19, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Dennis silt loam, 1 to 3 percent slopes	5.9	18.4%
14	Dennis silt loam, 3 to 5 percent slopes, eroded	14.9	46.7%
16	Dennis-Radley complex, 0 to 12 percent slopes	3.4	10.8%
44	Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes	7.7	24.2%
Totals for Area of Interest		**32.0**	**100.0%**

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Tulsa County, Oklahoma

Map Unit: 53—Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded

Component: Wynona (90%)

The Wynona component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy and silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY124KS Wet Floodplain ecological site. Nonirrigated land capability classification is 4w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Osage (5%)

Generated brief soil descriptions are created for major soil components. The Osage soil is a minor component.

Component: Mason (3%)

Generated brief soil descriptions are created for major soil components. The Mason soil is a minor component.

Component: Verdigris (2%)

Generated brief soil descriptions are created for major soil components. The Verdigris soil is a minor component.

Data Source Information

Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Tulsa County, Oklahoma

Map Unit: 7—Choska very fine sandy loam, 0 to 1 percent slopes, rarely flooded

Component: Choska (92%)

The Choska component makes up 92 percent of the map unit. Slopes are 0 to 1 percent. This component is on stream terraces on flood plains on river valleys. The parent material consists of calcareous loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY123KS Loamy Terrace ecological site. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Severn (5%)

Generated brief soil descriptions are created for major soil components. The Severn soil is a minor component.

Component: Latanier (3%)

Generated brief soil descriptions are created for major soil components. The Latanier soil is a minor component.

Map Unit: 29—Latanier clay, 0 to 1 percent slopes, occasionally flooded

Component: Latanier (80%)

The Latanier component makes up 80 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on valleys. The parent material consists of calcareous clayey alluvium over calcareous loamy alluvium. Depth to a root restrictive layer, strongly contrasting textural stratification, is 20 to 44 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY124KS Wet Floodplain ecological site. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Moreland (10%)

Generated brief soil descriptions are created for major soil components. The Moreland soil is a minor component.

Component: Mason (5%)

Generated brief soil descriptions are created for major soil components. The Mason soil is a minor component.

Component: Choska (5%)

Generated brief soil descriptions are created for major soil components. The Choska soil is a minor component.

Map Unit: 31—Mason silt loam, 0 to 1 percent slopes, rarely flooded

Component: Mason (90%)

The Mason component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on stream terraces on river valleys. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY123KS Loamy Terrace ecological site. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Verdigris (6%)

Generated brief soil descriptions are created for major soil components. The Verdigris soil is a minor component.

Component: Osage (2%)

Generated brief soil descriptions are created for major soil components. The Osage soil is a minor component.

Component: Wynona (2%)

Generated brief soil descriptions are created for major soil components. The Wynona soil is a minor component.

Map Unit: 53—Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded

Component: Wynona (90%)

The Wynona component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy and silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY124KS Wet Floodplain ecological site. Nonirrigated land capability classification is 4w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Osage (5%)

Generated brief soil descriptions are created for major soil components. The Osage soil is a minor component.

Component: Mason (3%)

Generated brief soil descriptions are created for major soil components. The Mason soil is a minor component.

Component: Verdigris (2%)

Generated brief soil descriptions are created for major soil components. The Verdigris soil is a minor component.

Data Source Information

Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Tulsa County, Oklahoma

Map Unit: 12—Dennis silt loam, 1 to 3 percent slopes

Component: Dennis (82%)

The Dennis component makes up 82 percent of the map unit. Slopes are 1 to 3 percent. This component is on interfluves on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (5%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Eram (5%)

Generated brief soil descriptions are created for major soil components. The Eram soil is a minor component.

Component: Parsons (5%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Component: Kenoma (2%)

Generated brief soil descriptions are created for major soil components. The Kenoma soil is a minor component.

Component: Pharoah (1%)

Generated brief soil descriptions are created for major soil components. The Pharoah soil is a minor component.

Map Unit: 13—Dennis silt loam, 3 to 5 percent slopes

Component: Dennis (85%)

The Dennis component makes up 85 percent of the map unit. Slopes are 3 to 5 percent. This component is on hillslopes on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (5%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Collinsville (4%)

Generated brief soil descriptions are created for major soil components. The Collinsville soil is a minor component.

Component: Parsons (3%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Component: Eram (3%)

Generated brief soil descriptions are created for major soil components. The Eram soil is a minor component.

Map Unit: 14—Dennis silt loam, 3 to 5 percent slopes, eroded

Component: Dennis (82%)

The Dennis component makes up 82 percent of the map unit. Slopes are 3 to 5 percent. This component is on hillslopes on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (8%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Collinsville (5%)

Generated brief soil descriptions are created for major soil components. The Collinsville soil is a minor component.

Component: Parsons (3%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Component: Eram (2%)

Generated brief soil descriptions are created for major soil components. The Eram soil is a minor component.

Map Unit: 15—Dennis-Pharoah complex, 1 to 3 percent slopes

Component: Dennis (70%)

The Dennis component makes up 70 percent of the map unit. Slopes are 1 to 3 percent. This component is on interfluves on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Pharoah (20%)

The Pharoah component makes up 20 percent of the map unit. Slopes are 1 to 3 percent. This component is on paleoterraces on uplands. The parent material consists of old clayey alluvium over residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY102KS Clayey Upland ecological site. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 9 within 30 inches of the soil surface.

Component: Parsons (10%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Map Unit: 16—Dennis-Radley complex, 0 to 12 percent slopes

Component: Dennis (60%)

The Dennis component makes up 60 percent of the map unit. Slopes are 3 to 12 percent. This component is on hillslopes on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Radley (30%)

The Radley component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on drainageways, plains. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY120MO Loamy Upland Drainageway ecological site. Nonirrigated land capability classification is 5w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (2%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Osage (2%)

Generated brief soil descriptions are created for major soil components. The Osage soil is a minor component.

Component: Apperson (2%)

Generated brief soil descriptions are created for major soil components. The Apperson soil is a minor component.

Component: Okemah (2%)

Generated brief soil descriptions are created for major soil components. The Okemah soil is a minor component.

Component: Wynona (2%)

Generated brief soil descriptions are created for major soil components. The Wynona soil is a minor component.

Map Unit: 43—Okemah silt loam, 0 to 1 percent slopes

Component: Okemah (85%)

The Okemah component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces, plains. The parent material consists of clayey and loamy colluvium or alluvium over clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Summit (5%)

Generated brief soil descriptions are created for major soil components. The Summit soil is a minor component.

Component: Parsons (5%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Component: Pharoah (5%)

Generated brief soil descriptions are created for major soil components. The Pharoah soil is a minor component.

Map Unit: 44—Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes

Component: Okemah (50%)

The Okemah component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on plains. The parent material consists of clayey and loamy colluvium or alluvium over clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Parsons (30%)

The Parsons component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on plains. The parent material consists of loess over clayey alluvium and/or clayey residuum weathered from clayey shale. Depth to a root restrictive layer, abrupt textural change, is 9 to 17 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY101KS Claypan Upland ecological site. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 5 within 30 inches of the soil surface.

Component: Pharoah (20%)

The Pharoah component makes up 20 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on plains. The parent material consists of old clayey alluvium over residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY102KS Clayey Upland ecological site. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 9 within 30 inches of the soil surface.

Data Source Information

Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021

Map Unit Description (Brief, Generated)

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Report—Map Unit Description (Brief, Generated)

Tulsa County, Oklahoma

Map Unit: 12—Dennis silt loam, 1 to 3 percent slopes

Component: Dennis (82%)

The Dennis component makes up 82 percent of the map unit. Slopes are 1 to 3 percent. This component is on interfluves on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (5%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Eram (5%)

Generated brief soil descriptions are created for major soil components. The Eram soil is a minor component.

Component: Parsons (5%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Component: Kenoma (2%)

Generated brief soil descriptions are created for major soil components. The Kenoma soil is a minor component.

Component: Pharoah (1%)

Generated brief soil descriptions are created for major soil components. The Pharoah soil is a minor component.

Map Unit: 14—Dennis silt loam, 3 to 5 percent slopes, eroded

Component: Dennis (82%)

The Dennis component makes up 82 percent of the map unit. Slopes are 3 to 5 percent. This component is on hillslopes on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (8%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Collinsville (5%)

Generated brief soil descriptions are created for major soil components. The Collinsville soil is a minor component.

Component: Parsons (3%)

Generated brief soil descriptions are created for major soil components. The Parsons soil is a minor component.

Component: Eram (2%)

Generated brief soil descriptions are created for major soil components. The Eram soil is a minor component.

Map Unit: 16—Dennis-Radley complex, 0 to 12 percent slopes

Component: Dennis (60%)

The Dennis component makes up 60 percent of the map unit. Slopes are 3 to 12 percent. This component is on hillslopes on plains. The parent material consists of silty and clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches during March. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Radley (30%)

The Radley component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on drainageways, plains. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY120MO Loamy Upland Drainageway ecological site. Nonirrigated land capability classification is 5w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Bates (2%)

Generated brief soil descriptions are created for major soil components. The Bates soil is a minor component.

Component: Osage (2%)

Generated brief soil descriptions are created for major soil components. The Osage soil is a minor component.

Component: Apperson (2%)

Generated brief soil descriptions are created for major soil components. The Apperson soil is a minor component.

Component: Okemah (2%)

Generated brief soil descriptions are created for major soil components. The Okemah soil is a minor component.

Component: Wynona (2%)

Generated brief soil descriptions are created for major soil components. The Wynona soil is a minor component.

Map Unit: 44—Okemah-Parsons-Pharoah complex, 0 to 1 percent slopes

Component: Okemah (50%)

The Okemah component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on plains. The parent material consists of clayey and loamy colluvium or alluvium over clayey residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY103KS Loamy Upland ecological site. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Parsons (30%)

The Parsons component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on plains. The parent material consists of loess over clayey alluvium and/or clayey residuum weathered from clayey shale. Depth to a root restrictive layer, abrupt textural change, is 9 to 17 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. This component is in the R112XY101KS Claypan Upland ecological site. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 5 within 30 inches of the soil surface.

Component: Pharoah (20%)

The Pharoah component makes up 20 percent of the map unit. Slopes are 0 to 1 percent. This component is on paleoterraces on plains. The parent material consists of old clayey alluvium over residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 2 percent. This component is in the R112XY102KS Clayey Upland ecological site. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 9 within 30 inches of the soil surface.

Data Source Information

Soil Survey Area: Tulsa County, Oklahoma
Survey Area Data: Version 16, Aug 27, 2021