State of New Mexico
Oil Conservation Division

Incident ID	nAPP2207325055
District RP	
Facility ID	
Application ID	

Closure

The responsible party must attach information demonstrating they have complied with all applicable closure requirements and any conditions or directives of the OCD. This demonstration should be in the form of a comprehensive report (electronic submittals in .pdf format are preferred) including a scaled site map, sampling diagrams, relevant field notes, photographs of any excavation prior to backfilling, laboratory data including chain of custody documents of final sampling, and a narrative of the remedial activities. Refer to 19.15.29.12 NMAC.

Closure Report Attachment Checklist: ***Each of the following items must be included in the closure report.***

☒ N/A A scaled site and sampling diagram as described in 19.15.29.11 NMAC

☒ X Photographs of the remediated site prior to backfill or photos of the liner integrity if applicable (Note: appropriate OCD District office must be notified 2 days prior to liner inspection)

☒ N/A Laboratory analyses of final sampling (Note: appropriate ODC District office must be notified 2 days prior to final sampling)

☒ N/A Description of remediation activities

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations. The responsible party acknowledges they must substantially restore, reclaim, and re-vegetate the impacted surface area to the conditions that existed prior to the release or their final land use in accordance with 19.15.29.13 NMAC including notification to the OCD when reclamation and re-vegetation are complete.

Printed Name: Dale Woodall Title: Environmental Professional

Signature: Dale Woodall Date: 4/22/2022

email: dale.woodall@dvn.com Telephone: 575-748-1838

OCD Only

Received by: Robert Hamlet Date: 6/16/2022

Closure approval by the OCD does not relieve the responsible party of liability should their operations have failed to adequately investigate and remediate contamination that poses a threat to groundwater, surface water, human health, or the environment nor does not relieve the responsible party of compliance with any other federal, state, or local laws and/or regulations.

Closure Approved by: Robert Hamlet Date: 6/16/2022

Printed Name: Robert Hamlet Title: Environmental Specialist - Advanced

VERTEX

April 20, 2022 Vertex Project #: 22E-00977

Spill Closure Report: Blue Krait 23 CTB 2
Unit M, Section 23, Township 24 South, Range 33 East
County: Lea
Facility: fAPP2123645122
Tracking Number: nAPP2207325055

Prepared For: Devon Energy Production Company
6488 Seven Rivers Highway
Artesia, New Mexico 88210

New Mexico Oil Conservation Division – District 1 – Hobbs
1625 North French Drive
Hobbs, New Mexico 88240

Devon Energy Production Company (Devon) retained Vertex Resource Services Inc. (Vertex) to conduct a spill assessment and liner inspection for a produced water release that occurred at Blue Krait 23 CTB 2 (hereafter referred to as "Blue Krait"). Devon provided notification of the spill to New Mexico Oil Conservation Division (NMOCD) District 1 and the Bureau of Land Management (BLM), who own the property, on March 14, 2022, via a Notification of Release. The initial C-141 Release Notification was submitted and processed on March 22, 2022 (Attachment 1). The NMOCD tracking number assigned to this incident is nAPP2207325055.

This letter provides a description of the liner inspection and demonstrates that closure criteria established in 19.15.29.12 *New Mexico Administrative Code* (NMAC; New Mexico Oil Conservation Division, 2018) have been met and all applicable regulations are being followed. This document is intended to serve as a final report to obtain approval from NMOCD for closure of this release.

Incident Description

On March 12, 2022, a release occurred at Devon's Blue Krait site when a ¼ inch valve on the circulating pump was left cracked open, resulting in an overflow of the drain pot into the containment. The incident resulted in the release of approximately 18.6 barrels (bbl) of produced water into lined containment. A hydrovac arrived on-site to recover free fluids; approximately 18.6 bbl of produced water were recovered and removed for disposal off-site. The spill was contained within the lined containment on the facility pad. No produced water was released into undisturbed areas or waterways. The Daily Field Report (DFR) and site photographs are included in Attachment 2.

Site Characterization

The release at Blue Krait occurred on federally owned land, N 32.1985742, W 103.5500839, approximately 21 miles west-northwest of Jal, New Mexico. The legal description for the site is Unit M, Section 23, Township 24 South, Range 33 East, Lea County, New Mexico. This location is within the Permian Basin in southeast New Mexico and has historically been used for oil and gas exploration and production, and rangeland. The following sections specifically

describe the area in which the Blue Krait facility is located.

The surrounding landscape is associated with ridges typical of elevations of 3,000 to 4,400 feet above sea level. The climate is semi-arid, with average annual precipitation ranging between 10 and 16 inches. Historically, the plant community was dominated by grasses, which stabilized the potentially erosive sandy soils; however, more recent conditions, resulting from fire suppression and extensive grazing, show increased woody plant abundance. The dominant grass species are black grama, bush muhly, blue grama, sideoats grama, and dropseeds; bluestems, yucca, javalinabush, range ratany, prickly pear and mesquite can be scattered among the grasses. Litter and, to a lesser extent, bare ground are a significant proportion of ground cover while grasses compose the remainder (United States Department of Agriculture, Natural Resources Conservation Service, 2022). Limited to no vegetation is allowed to grow on the compacted facility pad.

The *Geological Map of New Mexico* indicates the surface geology at Blue Krait is comprised of Qp –piedmont alluvial deposits (New Mexico Bureau of Geology and Mineral Resources, 2022). The Natural Resources Conservation Service *Web Soil Survey* characterizes the soil at the site as Simona-Upton association, characterized by shallow, gravelly loam, gravelly fine sandy loam, and fine sandy loam over cemented material. It tends to be well-drained with very low to medium runoff and very low available moisture levels in the soil profile (United States Department of Agriculture, Natural Resources Conservation Service, 2022). There is low potential for karst geology to be present near Blue Krait, though some erosional karst is possible (United States Department of the Interior, Bureau of Land Management, 2018).

There is no surface water located at Blue Krait. The nearest significant watercourse, as defined in Subsection P of 19.15.17.7 NMAC, is an intermittent stream located approximately 0.12 miles west of release area. An emergent wetland is located approximately 0.23 miles east, and a pond is located approximately 4.39 miles southeast of the release site (United States Fish and Wildlife Service, 2022). At Blue Krait, there are no continuously flowing watercourses, lakebeds, sinkholes, playa lakes, or other critical water or community features nearby as outlined in Paragraph (4) of Subsection C of 19.15.29.12 NMAC.

Closure Criteria Determination

The nearest depth to groundwater (DTGW) reference wells to Blue Krait are monitoring wells drilled in 2019, the closest of which is 0.09 miles southeast of the site with recorded DTGW of 47 feet below ground surface (bgs). The nearest active well is 0.78 miles northeast of Blue Krait and identified by the New Mexico Office of the State Engineer as for domestic and livestock water (New Mexico Office of the State Engineer, New Mexico Water Rights Reporting System, 2022). Documentation pertaining to site characterization and depth to groundwater determination is included in Attachment 3.

Using site characterization information, a closure criteria determination worksheet, seen below, and applicable research (Attachment 3) was completed to determine if the release was subject to any of the special case scenarios outlined in Paragraph (4) of Subsection C of 19.15.29.12 NMAC.

Closure Criteria Worksheet			
Site Name: Blue Krait 23 CTB 2			
Spill Coordinates:		**X: 32.1985742**	**Y: -103.5500839**
Site Specific Conditions		**Value**	**Unit**
1	Depth to Groundwater	**47**	feet
2	Within 300 feet of any continuously flowing watercourse or any other significant watercourse	666	feet
3	Within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark)	23,181	feet
4	Within 300 feet from an occupied residence, school, hospital, institution or church	11,135	feet
5	i) Within 500 feet of a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes, **or**	4,130	feet
	ii) Within 1000 feet of any fresh water well or spring		feet
6	Within incorporated municipal boundaries or within a defined municipal fresh water field covered under a municipal ordinance adopted pursuant to Section 3-27-3 NMSA 1978 as amended, unless the municipality specifically approves	No	(Y/N)
7	Within 300 feet of a wetland	1,222	feet
8	Within the area overlying a subsurface mine	No	(Y/N)
9	Within an unstable area (Karst Map)	Low	Critical High Medium Low
10	Within a 100-year Floodplain	Undetermined	year
11	Soil Type	Gravelly loam, gravelly fine sandy loam	
12	Ecological Classification	Shallow sandy, shallow	
13	Geology	Piedmont alluvial deposits	
	NMAC 19.15.29.12 E (Table 1) Closure Criteria	<50'	<50' 51-100' >100'

Based on data included in the closure criteria determination worksheet, the release at Blue Krait would not be subject to the requirements of Paragraph (4) of Subsection C of 19.15.29.12 NMAC and the closure criteria for the site would be

determined to be associated with the following constituent concentration limits based on depth to groundwater (<50 feet bgs).

Table 1. Closure Criteria for Soils Impacted by a Release

Minimum depth below any point within the horizontal boundary of the release to ground water less than 10,000 mg/L TDS[1]	Constituent	Limit
< 50 feet	Chloride	600 mg/kg
	TPH[2] (GRO + DRO + MRO)	100 mg/kg
	BTEX[3]	50 mg/kg
	Benzene	10 mg/kg

[1]Total Dissolved Solids (TDS)

[2]Total petroleum hydrocarbons (TPH) = gasoline range organics (GRO) + diesel range organics (DRO) + motor oil range organics (MRO)

[3]Benzene, toluene, ethylbenzene, and xylenes (BTEX)

Liner Inspection

On March 22, 2022, Vertex provided 48-hour notification of the liner inspection to NMOCD District 1 and the BLM, as required by Subparagraph (a) of Paragraph (5) of Subsection A 19.15.29.11 NMAC (Attachment 4). On April 4, 2022, Vertex was on-site to conduct an inspection of the lined containment and verify that the liner was intact and had the ability to contain the release. The Daily Field Report and associated photographs of the liner inspection are included in Attachment 2. The inspection confirmed the liner remained intact and had the ability to contain the release. This is further evidenced by the amount of fluid released (approximately 18.6 bbl) and recovered (approximately 18.6 bbl).

Closure Request

Vertex recommends no additional remediation action to address the release at Blue Krait. The secondary containment liner was intact and contained the release. There are no anticipated risks to human, ecological or hydrological receptors associated with the release site.

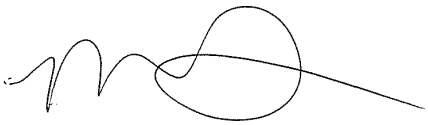
Vertex requests that this incident (nAPP2207325055) be closed as all closure requirements set forth in Subsection E of 19.15.29.12 NMAC have been met. Devon certifies that all information in this report and the attachments is correct, and that they have complied with all applicable closure requirements and conditions specified in Division rules and directives to meet NMOCD requirements to obtain closure on the March 12, 2022, release at Blue Krait 23 CTB 2.

Should you have any questions or concerns, please do not hesitate to contact the undersigned at 701.495.1722 or lpullman@vertex.ca

April 20, 2022

Lakin Pullman, B.Sc.
ENVIRONMENTAL TECHNICIAN, REPORTING

Date



April 20, 2022

Monica Peppin
SR. ENVIRONMENTAL TECHNICIAN, REPORT REVIEW

Date

Attachments

Attachment 1. NMOCD C-141 Release Notification
Attachment 2. Daily Field Report with Photographs
Attachment 3. Closure Criteria Research Determination Documentation
Attachment 4. Required 48-hr Notification of Liner Inspection to Regulatory Agencies

References

New Mexico Bureau of Geology and Mineral Resources. (2022). *Interactive Geologic Map.* Retrieved from http://geoinfo.nmt.edu.

New Mexico Office of the State Engineer, New Mexico Water Rights Reporting System. (2022). *Water Column/Average Depth to Water Report.* Retrieved from http://nmwrrs.ose.state.nm.us/nmwrrs/waterColumn.html.

New Mexico Oil Conservation Division. (2018). *New Mexico Administrative Code – Natural Resources and Wildlife Oil and Gas Releases*. Santa Fe, New Mexico.

United States Department of Agriculture, Natural Resources Conservation Service. (2022). *Web Soil Survey*. Retrieved from https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

United States Department of the Interior, Bureau of Land Management. (2018). *CFO Karst Public*. https://www.nm.blm.gov/shapeFiles/cfo/carlsbad_spatial_data.html

United States Fish and Wildlife Service. (2022). *National Wetlands Inventory*. Retrieved from https://www.fws.gov/wetlands/data/Mapper.html.

Limitations

This report has been prepared for the sole benefit of Devon Energy Production Company (Devon). This document may not be used by any other person or entity, with the exception of the New Mexico Oil Conservation Division or the Bureau of Land Management, without the express written consent of Vertex Resource Services Inc. (Vertex) and Devon. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered as a result of the use of this report are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgement of Vertex based on the data collected during the assessment. Due to the nature of the assessment and the data available, Vertex cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be considered legal advice.

ATTACHMENT 1

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources Department

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 24, 2018
Submit to appropriate OCD District office

Incident ID	
District RP	
Facility ID	
Application ID	

Release Notification

Responsible Party

Responsible Party	OGRID
Contact Name	Contact Telephone
Contact email	Incident # *(assigned by OCD)*
Contact mailing address	

Location of Release Source

Latitude _____ Longitude _____
(NAD 83 in decimal degrees to 5 decimal places)

Site Name	Site Type
Date Release Discovered	API# *(if applicable)*

Unit Letter	Section	Township	Range	County

Surface Owner: ☐ State ☐ Federal ☐ Tribal ☐ Private (*Name:* _____)

Nature and Volume of Release

Material(s) Released (Select all that apply and attach calculations or specific justification for the volumes provided below)

☐ Crude Oil	Volume Released (bbls)	Volume Recovered (bbls)
☐ Produced Water	Volume Released (bbls)	Volume Recovered (bbls)
	Is the concentration of total dissolved solids (TDS) in the produced water >10,000 mg/l?	☐ Yes ☐ No
☐ Condensate	Volume Released (bbls)	Volume Recovered (bbls)
☐ Natural Gas	Volume Released (Mcf)	Volume Recovered (Mcf)
☐ Other (describe)	Volume/Weight Released (provide units)	Volume/Weight Recovered (provide units)
Cause of Release		

Form C-141
Page 2

State of New Mexico
Oil Conservation Division

Incident ID	
District RP	
Facility ID	
Application ID	

Was this a major release as defined by 19.15.29.7(A) NMAC? ☐ Yes ☐ No	If YES, for what reason(s) does the responsible party consider this a major release?
If YES, was immediate notice given to the OCD? By whom? To whom? When and by what means (phone, email, etc)?	

Initial Response

The responsible party must undertake the following actions immediately unless they could create a safety hazard that would result in injury

☐ The source of the release has been stopped.
☐ The impacted area has been secured to protect human health and the environment.
☐ Released materials have been contained via the use of berms or dikes, absorbent pads, or other containment devices.
☐ All free liquids and recoverable materials have been removed and managed appropriately.

If all the actions described above have not been undertaken, explain why:

Per 19.15.29.8 B. (4) NMAC the responsible party may commence remediation immediately after discovery of a release. If remediation has begun, please attach a narrative of actions to date. If remedial efforts have been successfully completed or if the release occurred within a lined containment area (see 19.15.29.11(A)(5)(a) NMAC), please attach all information needed for closure evaluation.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: _____ Title: _____

Signature: Kendra DeHoyos Date: _____

email: _____ Telephone: _____

OCD Only

Received by: Jocelyn Harimon Date: 03/22/2022

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2207325055
District RP	
Facility ID	
Application ID	

Site Assessment/Characterization

This information must be provided to the appropriate district office no later than 90 days after the release discovery date.

What is the shallowest depth to groundwater beneath the area affected by the release?	<50 (ft bgs)
Did this release impact groundwater or surface water?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	☐ Yes ☒ No
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	☐ Yes ☒ No
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	☐ Yes ☒ No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	☐ Yes ☒ No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a wetland?	☐ Yes ☒ No
Are the lateral extents of the release overlying a subsurface mine?	☐ Yes ☒ No
Are the lateral extents of the release overlying an unstable area such as karst geology?	☐ Yes ☒ No
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes ☒ No
Did the release impact areas **not** on an exploration, development, production, or storage site?	☐ Yes ☒ No

Attach a comprehensive report (electronic submittals in .pdf format are preferred) demonstrating the lateral and vertical extents of soil contamination associated with the release have been determined. Refer to 19.15.29.11 NMAC for specifics.

Characterization Report Checklist: ***Each of the following items must be included in the report.***

- ☒ N/A Scaled site map showing impacted area, surface features, subsurface features, delineation points, and monitoring wells.
- ☒ Field data
- ☒ N/A Data table of soil contaminant concentration data
- ☒ Depth to water determination
- ☒ Determination of water sources and significant watercourses within ½-mile of the lateral extents of the release
- ☒ N/A Boring or excavation logs
- ☒ Photographs including date and GIS information
- ☒ N/A Topographic/Aerial maps
- ☒ N/A Laboratory data including chain of custody

If the site characterization report does not include completed efforts at remediation of the release, the report must include a proposed remediation plan. That plan must include the estimated volume of material to be remediated, the proposed remediation technique, proposed sampling plan and methods, anticipated timelines for beginning and completing the remediation. The closure criteria for a release are contained in Table 1 of 19.15.29.12 NMAC, however, use of the table is modified by site- and release-specific parameters.

Form C-141
Page 4

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2207325055
District RP	
Facility ID	
Application ID	

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: Dale Woodall Title: Environmental Professional

Signature: Dale Woodall Date: 4/22/2022

email: dale.woodall@dvn.com Telephone: 575-748-1838

OCD Only

Received by: _____ Date: _____

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2207325055
District RP	
Facility ID	
Application ID	

Closure

The responsible party must attach information demonstrating they have complied with all applicable closure requirements and any conditions or directives of the OCD. This demonstration should be in the form of a comprehensive report (electronic submittals in .pdf format are preferred) including a scaled site map, sampling diagrams, relevant field notes, photographs of any excavation prior to backfilling, laboratory data including chain of custody documents of final sampling, and a narrative of the remedial activities. Refer to 19.15.29.12 NMAC.

Closure Report Attachment Checklist: ***Each of the following items must be included in the closure report.***

☒ N/A A scaled site and sampling diagram as described in 19.15.29.11 NMAC

☒ X Photographs of the remediated site prior to backfill or photos of the liner integrity if applicable (Note: appropriate OCD District office must be notified 2 days prior to liner inspection)

☒ N/A Laboratory analyses of final sampling (Note: appropriate ODC District office must be notified 2 days prior to final sampling)

☒ N/A Description of remediation activities

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations. The responsible party acknowledges they must substantially restore, reclaim, and re-vegetate the impacted surface area to the conditions that existed prior to the release or their final land use in accordance with 19.15.29.13 NMAC including notification to the OCD when reclamation and re-vegetation are complete.

Printed Name: Dale Woodall Title: Environmental Professional

Signature: Dale Woodall Date: 4/22/2022

email: dale.woodall@dvn.com Telephone: 575-748-1838

OCD Only

Received by: _____ Date: _____

Closure approval by the OCD does not relieve the responsible party of liability should their operations have failed to adequately investigate and remediate contamination that poses a threat to groundwater, surface water, human health, or the environment nor does not relieve the responsible party of compliance with any other federal, state, or local laws and/or regulations.

Closure Approved by: _____ Date: _____

Printed Name: _____ Title: _____

ATTACHMENT 2

Daily Site Visit Report

Client:	Devon Energy Corporation	Inspection Date:	4/4/2022
Site Location Name:	Blue Krait 23 CTB 2	Report Run Date:	4/4/2022 9:40 PM
Client Contact Name:	Wes Matthews	API #:	
Client Contact Phone #:	(575) 748-0176		
Unique Project ID		Project Owner:	
Project Reference #		Project Manager:	

Summary of Times

Arrived at Site	4/4/2022 9:20 AM
Departed Site	4/4/2022 10:00 AM

Field Notes

9:36 Arrived on site to complete liner inspection.

9:40 Outside of containment looks clean. No sign of a breach.

9:44 There does not appear to be any significant damage inside or outside the walls of the containment.

9:49 There does not appear to be any areas of concern with the liner between the tanks or around the equipment. Area around the containment is clean and there is no staining.

Next Steps & Recommendations

1 Submit DFR to the client and write closure report.

Daily Site Visit Report

Site Photos

Viewing Direction: East	**Viewing Direction**: West
	
Outside of wall dyke north side.	South side of containment.
Viewing Direction: Northwest	**Viewing Direction**: North
	
Inside containment west side.	Floor between tanks TK-413 and TK-451

Daily Site Visit Report

Viewing Direction: North	**Viewing Direction**: North
	
Floor between tanks TK-451 and TK-452	Floor between tanks TK-452 and TK-453
Viewing Direction: East	**Viewing Direction**: South
	
Outside of wall dyke north side.	Outside of wall dyke east side.

Daily Site Visit Report

Viewing Direction: West	**Viewing Direction**: North
	
Outside of wall dyke south side.	Outside of wall dyke west side.
Viewing Direction: West	**Viewing Direction**: South
	
Inside containment north side.	Inside containment east side.

Daily Site Visit Report

Viewing Direction: Southeast	**Viewing Direction**: Southwest
	
Southeast corner of containment.	Inside wall south side.

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Chance Dixon

Signature: 

Signature

ATTACHMENT 3

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
NA	C 04339 POD1	1	3	3	23	24S	33E	636525	3563309

Driller License: 1575 **Driller Company:** CURRIE DRILLING COMPANY, INC

Driller Name: CURRIE, SHANEG..TY"ENER

Drill Start Date:	08/01/2019	**Drill Finish Date:**	08/02/2019	**Plug Date:**	08/02/2019
Log File Date:	08/22/2019	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**	47 feet	**Depth Water:**	

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
NA	C 04339 POD3	2	4	3	23	24S	33E	637273	3563323

Driller License: 1575 **Driller Company:** CURRIE DRILLING COMPANY, INC

Driller Name: CURRIE, SHANEG..TY"ENER

Drill Start Date:	08/06/2019	**Drill Finish Date:**	08/06/2019	**Plug Date:**	08/06/2019
Log File Date:	08/22/2019	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**	38 feet	**Depth Water:**	

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
NA	C 04339 POD4	2	4	3	23	24S	33E	637273	3563323

Driller License: 1575 **Driller Company:** CURRIE DRILLING COMPANY, INC

Driller Name: CURRIE, SHANEG..TY"ENER

Drill Start Date:	08/06/2019	**Drill Finish Date:**	08/07/2019	**Plug Date:**	08/07/2019
Log File Date:	08/22/2019	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**	47 feet	**Depth Water:**	

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
NA	C 04339 POD7	4	4	2	23	24S	33E	636473	3564011

Driller License: 1575 **Driller Company:** CURRIE DRILLING COMPANY, INC

Driller Name: CURRIE, SHANEG..TY"ENER

Drill Start Date:	07/31/2019	**Drill Finish Date:**	07/31/2019	**Plug Date:**	07/31/2019
Log File Date:	08/22/2019	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**	43 feet	**Depth Water:**	

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
NA	C 04339 POD8	1	1	3	23	24S	33E	636519	3563681

Driller License: 1575 **Driller Company:** CURRIE DRILLING COMPANY, INC

Driller Name: CURRIE, SHANEG..TY"ENER

Drill Start Date:	07/31/2019	**Drill Finish Date:**	07/31/2019	**Plug Date:**	07/31/2019
Log File Date:	08/22/2019	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**	30 feet	**Depth Water:**	

New Mexico Office of the State Engineer
Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters) (In feet)

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 04339 POD2		CUB	LE	2	3	3	23	24S	33E	636789	3563315	136			
C 04339 POD1		CUB	LE	1	3	3	23	24S	33E	636525	3563309	149	47		
C 04339 POD8		CUB	LE	1	1	3	23	24S	33E	636519	3563681	345	30		
C 04339 POD3		CUB	LE	2	4	3	23	24S	33E	637273	3563323	611	38		
C 04339 POD4		CUB	LE	2	4	3	23	24S	33E	637273	3563323	611	47		
C 04339 POD7		CUB	LE	4	4	2	23	24S	33E	636473	3564011	670	43		
C 03600 POD1		CUB	LE	2	2	1	26	24S	33E	637275	3563023	702			
C 04339 POD5		CUB	LE	2	3	4	23	24S	33E	637580	3563328	917	54		
C 04339 POD10		CUB	LE	4	1	4	23	24S	33E	637688	3563503	1033	49		
C 03600 POD4		CUB	LE	3	3	1	26	24S	33E	636617	3562293	1075			
C 03601 POD6		CUB	LE	1	4	4	23	24S	33E	637834	3563338	1171			
C 04339 POD9		CUB	LE	3	4	2	23	24S	33E	637731	3563913	1199	45		
C 03601 POD2		CUB	LE	3	2	4	23	24S	33E	637846	3563588	1203			
C 04339 POD6		CUB	LE	3	1	2	23	24S	33E	637340	3564386	1223	60		
C 03662 POD1		C	LE	3	1	2	23	24S	33E	637342	3564428	1259	550	110	440
C 03601 POD7		CUB	LE	4	4	4	23	24S	33E	637946	3563170	1298			
C 03601 POD5		CUB	LE	2	4	4	23	24S	33E	637988	3563334	1325			
C 03600 POD7		CUB	LE	3	1	3	26	24S	33E	636726	3561968	1400			
C 03601 POD3		CUB	LE	1	3	3	24	24S	33E	638142	3563413	1479			
C 03600 POD3		CUB	LE	3	4	2	26	24S	33E	637784	3562340	1521			
C 03600 POD6		CUB	LE	3	1	4	26	24S	33E	637383	3562026	1522			
C 03601 POD1		CUB	LE	4	4	2	23	24S	33E	638124	3563937	1568			
C 03600 POD5		CUB	LE	3	2	4	26	24S	33E	637857	3562020	1800			
C 03603 POD3		CUB	LE	4	1	1	35	24S	33E	636890	3561092	2286			
C 03603 POD2		CUB	LE	3	1	2	35	24S	33E	637384	3561167	2315			
C 03600 POD2		CUB	LE	4	4	1	25	24S	33E	638824	3562329	2397			
C 03602 POD2		CUB	LE	4	4	1	25	24S	33E	638824	3562329	2397			
C 03603 POD1		CUB	LE	3	2	2	35	24S	33E	637805	3561225	2427			
C 03601 POD4		CUB	LE	3	3	3	24	24S	33E	638162	3561375	2493			
C 03917 POD1		C	LE	4	1	3	13	24S	33E	638374	3565212	2515	600	420	180
C 03603 POD5		CUB	LE	3	3	2	35	24S	33E	636745	3560767	2601			

C 03603 POD6	CUB	LE	3	1	3	35	24S	33E	636749	3560447	2922				
C 03666 POD1	C	LE	2	3	4	13	24S	33E	639132	3565078	3003	650	390	260	
C 02564	CUB	LE	2	4	2	33	24S	33E	634839	3560923*	3050	120			
C 02309	CUB	LE	2	2	2	25	24S	33E	639708	3562997	3067	60	30	30	
C 03603 POD4	CUB	LE	3	2	4	35	24S	33E	637789	3560461	3117				
C 02563	CUB	LE	1	4	2	33	24S	33E	634639	3560923*	3174	120			
C 02310	CUB	LE	2	4	2	33	24S	33E	634420	3560893	3339	120	70	50	
C 02311	CUB	LE	2	3	2	33	24S	33E	634391	3560877	3370	120	70	50	
C 02430	CUB	LE	3	3	3	16	24S	33E	633377	3564732*	3557	643	415	228	
C 02431	CUB	LE	4	4	4	17	24S	33E	633175	3564728*	3743	525	415	110	
C 02432	CUB	LE	4	4	4	17	24S	33E	633175	3564728*	3743	640	415	225	
C 02890	C	LE		2	4	29	24S	33E	633114	3562012*	3799	500			
C 02308	CUB	LE	1	3	1	10	24S	33E	634953	3567364*	4346	40	20	20	

Average Depth to Water: **235 feet**

Minimum Depth: **20 feet**

Maximum Depth: **420 feet**

Record Count: 44

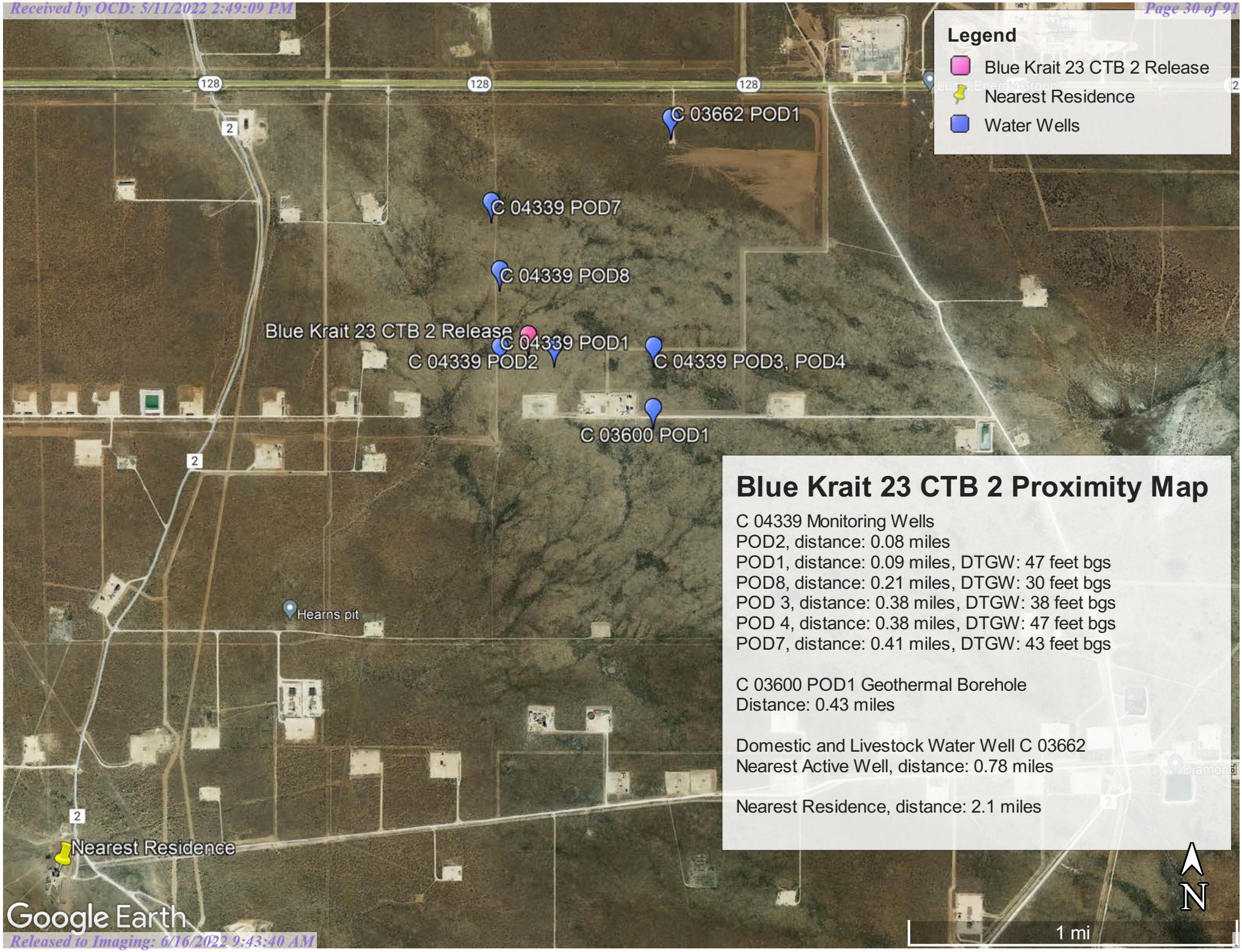
UTMNAD83 Radius Search (in meters):

Easting (X): 636663 **Northing (Y):** 3563368 **Radius:** 5000

***UTM location was derived from PLSS - see Help**

3/28/22 1:32 PM

WATER COLUMN/ AVERAGE DEPTH TO WATER



Blue Krait 23 CTB 2 Proximity Map

C 04339 Monitoring Wells
POD2, distance: 0.08 miles
POD1, distance: 0.09 miles, DTGW: 47 feet bgs
POD8, distance: 0.21 miles, DTGW: 30 feet bgs
POD 3, distance: 0.38 miles, DTGW: 38 feet bgs
POD 4, distance: 0.38 miles, DTGW: 47 feet bgs
POD7, distance: 0.41 miles, DTGW: 43 feet bgs

C 03600 POD1 Geothermal Borehole
Distance: 0.43 miles

Domestic and Livestock Water Well C 03662
Nearest Active Well, distance: 0.78 miles

Nearest Residence, distance: 2.1 miles

U.S. Fish and Wildlife Service

National Wetlands Inventory

Intermittent, 666 feet

March 28, 2022

Wetlands

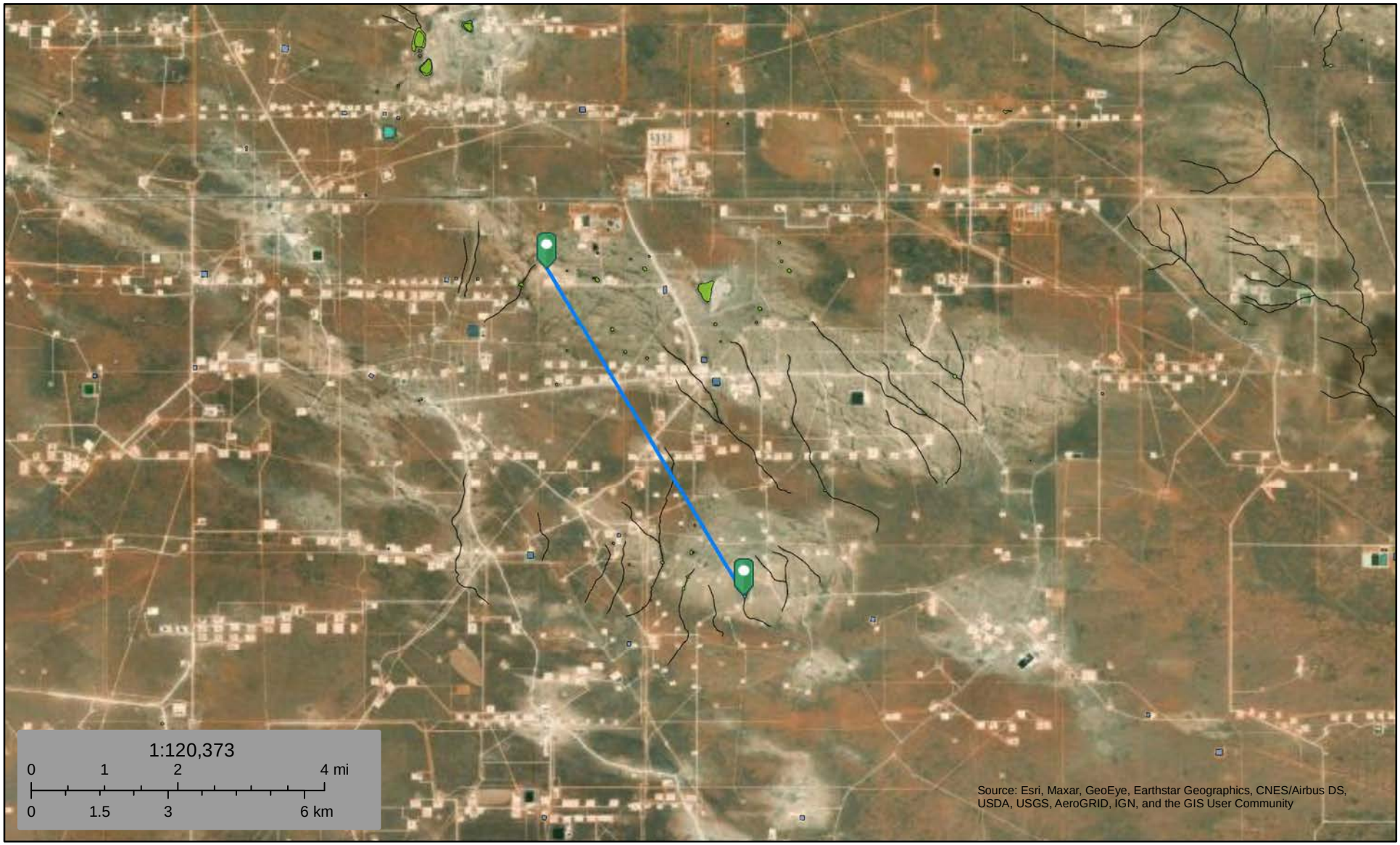
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

U.S. Fish and Wildlife Service
National Wetlands Inventory

Pond, 23181 feet



March 28, 2022

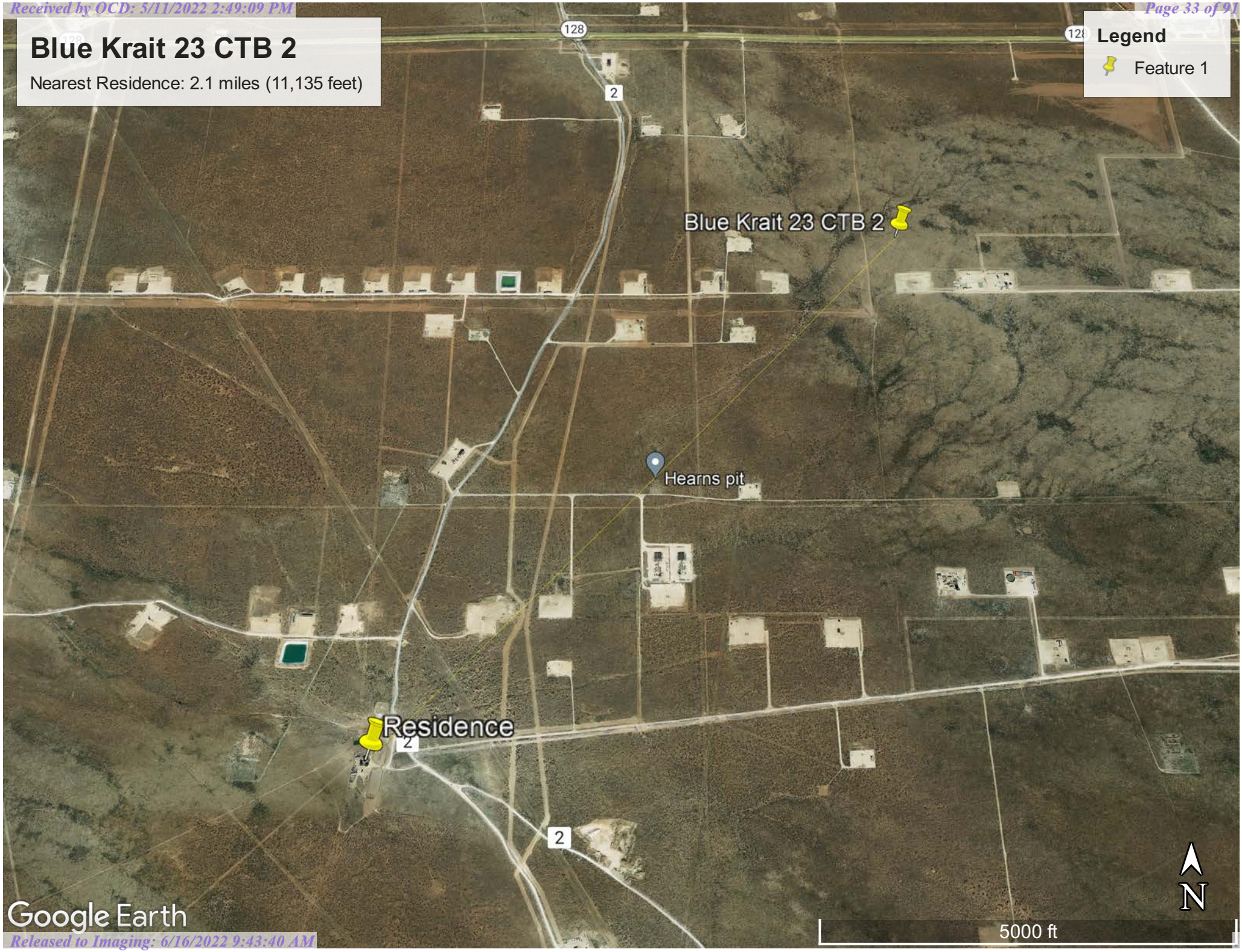
Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Blue Krait 23 CTB 2

Nearest Residence: 2.1 miles (11,135 feet)



New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
	C 03600 POD1	2	2	1	26	24S	33E	637275	3563023

Driller License: 1186 **Driller Company:** ENVIRO-DRILL, INC.

Driller Name: RODNEY HAMMER

Drill Start Date:	01/07/2013	**Drill Finish Date:**	01/07/2013	**Plug Date:**	
Log File Date:	01/30/2013	**PCW Rcv Date:**		**Source:**	Shallow
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**		**Depth Water:**	

New Mexico Office of the State Engineer
Water Right Summary

get image list

WR File Number: C 03600 **Subbasin:** CUB **Cross Reference:** -

Primary Purpose: GEO GEOTHERMAL BOREHOLES

Primary Status:

Total Acres: **Subfile:** - **Header:** -

Total Diversion: 0 **Cause/Case:** -

Owner: INTERCONTINENTAL POTASH CORP

Contact: TOM COPE

Documents on File

	Trn #	Doc	File/Act	Status 1	Status 2	Transaction Desc.	From/ To	Acres	Diversion	Consumptive
get images	518382	EXPL	2012-12-10	PMT	LOG	C 03600	T	0	0	

Current Points of Diversion

(NAD83 UTM in meters)

POD Number	Well Tag	Source	Q 64	Q16	Q4	Sec	Tws	Rng	X	Y	Other Location Desc
C 03600 POD1		Shallow	2	2	1	26	24S	33E	637275	3563023	BH-16
C 03600 POD2		Shallow	4	4	1	25	24S	33E	638824	3562329	BH-17
C 03600 POD3		Shallow	3	4	2	26	24S	33E	637784	3562340	BH-19
C 03600 POD4		Shallow	3	3	1	26	24S	33E	636617	3562293	BH-20
C 03600 POD5		Shallow	3	2	4	26	24S	33E	637857	3562020	BH-21
C 03600 POD6		Shallow	3	1	4	26	24S	33E	637383	3562026	BH-22
C 03600 POD7		Shallow	3	1	3	26	24S	33E	636726	3561968	BH-23

New Mexico Office of the State Engineer
Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Twn	Rng	X	Y
	C 03662 POD1	3	1	2	23	24S	33E	637342	3564428

Driller License: 1654 **Driller Company:** NOT WORKING FOR HIRE--SIRMAN DRILLING AND CONSTRUC

Driller Name:

Drill Start Date:	08/19/2013	**Drill Finish Date:**	08/20/2013	**Plug Date:**	
Log File Date:	09/16/2013	**PCW Rcv Date:**		**Source:**	Shallow
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	10 GPM
Casing Size:	6.00	**Depth Well:**	550 feet	**Depth Water:**	110 feet

Water Bearing Stratifications:	Top	Bottom	Description
	250	275	Sandstone/Gravel/Conglomerate

Casing Perforations:	Top	Bottom
	280	360

New Mexico Office of the State Engineer
Water Right Summary

get image list

WR File Number: C 03662 **Subbasin:** C **Cross Reference:** -

Primary Purpose: DOL 72-12-1 DOMESTIC AND LIVESTOCK WATERING

Primary Status: PMT PERMIT

Total Acres: **Subfile:** - **Header:** -

Total Diversion: 3 **Cause/Case:** -

Agent: MARK MCCLOY (M&M RANCH)

Contact: M STAPLETON, LLC

Agent: GREGORY ROCKHOUSE RANCH INC

Contact: M STAPLETON, LLC

Documents on File

	Trn #	Doc	File/Act	Status 1	Status 2	Transaction Desc.	From/ To	Acres	Diversion	Consumptive
get images	534516	72121	2013-09-24	PMT	LOG	C 03662	T		3	
get images	532103	EXPL	2013-08-13	PMT	APR	C-3662 EXPL	T	0	0	

Current Points of Diversion

(NAD83 UTM in meters)

POD Number	Well Tag	Source	Q64	Q16	Q4	Sec	Tws	Rng	X	Y	Other Location Desc
C 03662 POD1		Shallow	3	1	2	23	24S	33E	637342	3564428	HWY 128 @ 30MM-1/4 MILE SO

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
NA	C 04339 POD2	2	3	3	23	24S	33E	636789	3563315

Driller License: 1575 **Driller Company:** CURRIE DRILLING COMPANY, INC

Driller Name: CURRIE, SHANEG..TY"ENER

Drill Start Date:	08/06/2019	**Drill Finish Date:**	08/06/2019	**Plug Date:**	08/06/2019
Log File Date:	08/22/2019	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**		**Depth Water:**	

New Mexico Office of the State Engineer
Water Right Summary

get image list

WR File Number: C 04339 **Subbasin:** CUB **Cross Reference:** -

Primary Purpose: MON MONITORING WELL

Primary Status: PMT PERMIT

Total Acres: **Subfile:** - **Header:** -

Total Diversion: 0 **Cause/Case:** -

Agent: GORDON ENVIRONMENTAL/PSC

Contact: CLAY KILMER

Owner: OWL LANDFILL SERVICES LLC

Contact: ROGER JOHNSON

x

Documents on File

	Trn #	Doc	File/Act	Status 1	Status 2	Transaction Desc.	From/ To	Acres	Diversion	Consumptive
get images	654344	EXPL	2019-07-11	PMT	APR	C 04339 POD1-10	T	0	0	

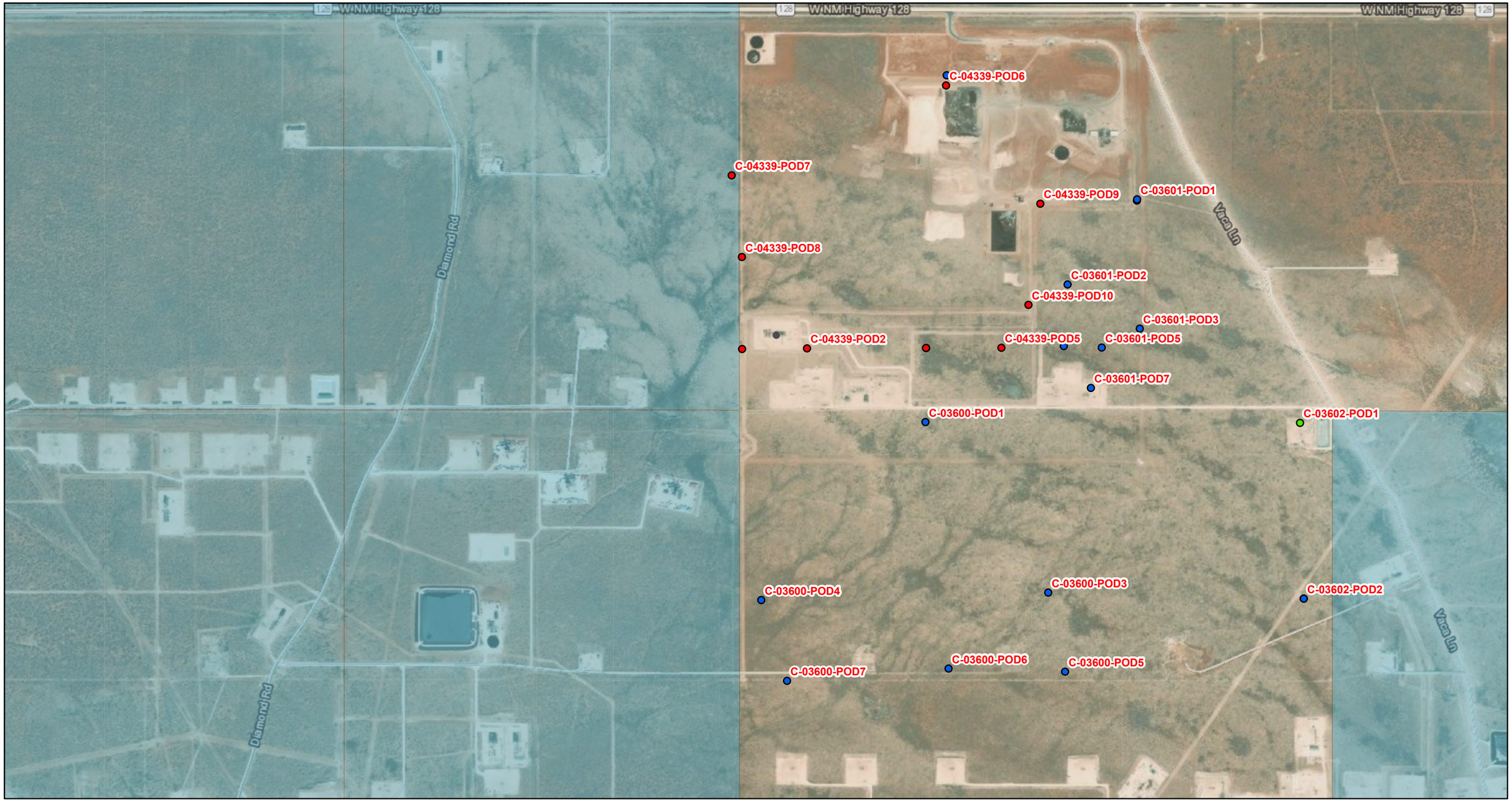
x

Current Points of Diversion

(NAD83 UTM in meters)

POD Number	Well Tag	Source	Q 64	Q16	Q4	Sec	Tws	Rng	X	Y	Other Location Desc
C 04339 POD1	NA		1	3	3	23	24S	33E	636525	3563309	VZ-1
C 04339 POD10	NA		4	1	4	23	24S	33E	637688	3563503	VZ-10
C 04339 POD2	NA		2	3	3	23	24S	33E	636789	3563315	VZ-2
C 04339 POD3	NA		2	4	3	23	24S	33E	637273	3563323	VZ-3
C 04339 POD4	NA		2	4	3	23	24S	33E	637273	3563323	VZ-4
C 04339 POD5	NA		2	3	4	23	24S	33E	637580	3563328	VZ-5
C 04339 POD6	NA		3	1	2	23	24S	33E	637340	3564386	VZ-6
C 04339 POD7	NA		4	4	2	23	24S	33E	636473	3564011	VZ-7
C 04339 POD8	NA		1	1	3	23	24S	33E	636519	3563681	VZ-8
C 04339 POD9	NA		3	4	2	23	24S	33E	637731	3563913	VZ-9

OSE POD Locations Map



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1:18,056

GIS WATERS PODs
- Active
- Pending
- Plugged

OSE District Boundary

Water Right Regulations
- Closure Area

New Mexico State Trust Lands
- Both Estates
- SiteBoundaries

0 0.17 0.35 0.7 mi
0 0.3 0.6 1.2 km

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, U.S. Department of Energy Office of Legacy

Unofficial Online Map
These maps are distributed “as is” without warranty of any kind.

New Mexico Office of the State Engineer

Active & Inactive Points of Diversion

(with Ownership Information)

(acre ft per annum) (R=POD has been replaced and no longer serves this file, C=the file is closed) (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) (NAD83 UTM in meters)

WR File Nbr	Sub basin	Use	Diversion	Owner	County	POD Number	Well Tag	Code	Grant	Source	q 64	q 16	q 4	Sec	Twn	Rng	X	Y	Distance
C 04339	CUB	MON	0	OWL LANDFILL SERVICES LLC	LE	C 04339 POD2	NA				2	3	3	23	24S	33E	636789	3563315	136
					LE	C 04339 POD1					1	3	3	23	24S	33E	636525	3563309	149
					LE	C 04339 POD8					1	1	3	23	24S	33E	636518	3563681	345
					LE	C 04339 POD3					2	4	3	23	24S	33E	637273	3563323	611
					LE	C 04339 POD4					2	4	3	23	24S	33E	637273	3563323	611
					LE	C 04339 POD7					4	4	2	23	24S	33E	636473	3564011	670
C 03600	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03600 POD1				Shallow	2	2	1	26	24S	33E	637275	3563023	702
C 04339	CUB	MON	0	GORDON ENVIRONMENTAL/PSC	LE	C 04339 POD5	NA				2	3	4	23	24S	33E	637579	3563328	917
					LE	C 04339 POD10					4	1	4	23	24S	33E	637687	3563503	1033
C 03600	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03600 POD4				Shallow	3	3	1	26	24S	33E	636617	3562293	1075
C 03601	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03601 POD6				Shallow	1	4	4	23	24S	33E	637833	3563338	1171
C 04339	CUB	MON	0	GORDON ENVIRONMENTAL/PSC	LE	C 04339 POD9	NA				3	4	2	23	24S	33E	637730	3563913	1199
C 03601	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03601 POD2				Shallow	3	2	4	23	24S	33E	637846	3563588	1203
C 04339	CUB	MON	0	GORDON ENVIRONMENTAL/PSC	LE	C 04339 POD6	NA				3	1	2	23	24S	33E	637340	3564386	1223
C 03662	C	DOL	3	GREGORY ROCKHOUSE RANCH INC	LE	C 03662 POD1				Shallow	3	1	2	23	24S	33E	637342	3564428	1259
C 03727	C	PRO	0	EOG RESOURCES INC	LE	C 03662 POD1				Shallow	3	1	2	23	24S	33E	637342	3564428	1259
C 03728	C	PRO	0	EOG RESOURCES INC	LE	C 03662 POD1				Shallow	3	1	2	23	24S	33E	637342	3564428	1259
C 03729	C	PRO	0	ANNETTE MCCLOY	LE	C 03662 POD1				Shallow	3	1	2	23	24S	33E	637342	3564428	1259
C 03601	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03601 POD7				Shallow	4	4	4	23	24S	33E	637946	3563170	1298
					LE	C 03601 POD5				Shallow	2	4	4	23	24S	33E	637988	3563334	1325
C 03600	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03600 POD7				Shallow	3	1	3	26	24S	33E	636726	3561968	1400
C 03601	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03601 POD3				Shallow	1	3	3	24	24S	33E	638141	3563413	1479
C 03600	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03600 POD3				Shallow	3	4	2	26	24S	33E	637784	3562340	1521
					LE	C 03600 POD6				Shallow	3	1	4	26	24S	33E	637382	3562026	1522
C 03580	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03580 POD2						3	1	24	24S	33E	638123	3563932	1565
C 03601	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03601 POD1				Shallow	4	4	2	23	24S	33E	638124	3563937	1568
C 03565	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03565 POD9						4	4	15	24S	33E	636429	3565005	1653
C 03585	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03585 POD6					2	4	4	15	24S	33E	636431	3565007	1655
C 03600	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03600 POD5				Shallow	3	2	4	26	24S	33E	637857	3562020	1800
C 03585	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03585 POD5					1	2	4	15	24S	33E	636245	3565387	2061
C 03602	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03602 POD1					2	2	1	25	24S	33E	638799	3563040	2161
C 03603	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03603 POD3				Shallow	4	1	1	35	24S	33E	636889	3561092	2286
C 03585	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03585 POD3					1	2	3	15	24S	33E	635393	3565270	2287
C 03603	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03603 POD2				Shallow	3	1	2	35	24S	33E	637384	3561167	2315
C 03585	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03585 POD2					1	2	3	15	24S	33E	635418	3565363	2351
C 03600	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03600 POD2				Shallow	4	4	1	25	24S	33E	638824	3562329	2397
C 03602	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03602 POD2				Shallow	4	4	1	25	24S	33E	638824	3562329	2397
C 03603	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03603 POD1				Shallow	3	2	2	35	24S	33E	637804	3561225	2427
C 03601	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03601 POD4				Shallow	3	3	3	24	24S	33E	638161	3561375	2493
C 03917	C	DOM	1	NGL WATER SOLUTIONS PERMIAN	LE	C 03917 POD1	NA			Shallow	4	1	3	13	24S	33E	638373	3565212	2515
C 04192	C	PRO	0	ANNETTE MCCLOY	LE	C 03917 POD1	NA			Shallow	4	1	3	13	24S	33E	638373	3565212	2515
C 04193	C	PRO	0	EOG RESOURCES INC	LE	C 03917 POD1	NA			Shallow	4	1	3	13	24S	33E	638373	3565212	2515
C 04194	C	PRO	0	MARK MCCLOY	LE	C 03917 POD1	NA			Shallow	4	1	3	13	24S	33E	638373	3565212	2515
C 03585	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03585 POD1					3	4	1	15	24S	33E	635368	3565544	2532
C 03565	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03565 POD8						4	1	15	24S	33E	635484	3565610	2533
C 03585	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03585 POD4					4	4	1	15	24S	33E	635485	3565610	2533
C 03603	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03603 POD5				Shallow	3	3	2	35	24S	33E	636745	3560767	2601
					LE	C 03603 POD6				Shallow	3	1	3	35	24S	33E	636749	3560447	2922
C 03666	C	SAN	1	LUCID ENERGY DELAWARE LLC	LE	C 03666 POD1				Shallow	2	3	4	13	24S	33E	639132	3565078	3003

C 02564	CUB	COM	33	NGL WATER SOLUTIONS PERMIAN	LE	C 02564				2	4	2	33	24S	33E	634839	3560923	3050
C 02309	CUB	STK	3	NGL WATER SOLUTIONS PERMIAN	LE	C 02309				2	2	2	25	24S	33E	639708	3562997	3067
C 03603	CUB	GEO	0	INTERCONTINENTAL POTASH CORP	LE	C 03603 POD4			Shallow	3	2	4	35	24S	33E	637789	3560461	3117
C 04384	C	DOM	1	LUCID ENERGY DELAWARE LLC	LE	C 04384 POD1	223DC			4	4	3	13	24S	33E	639412	3564909	3152
C 02563	CUB	COM	33	NGL WATER SOLUTIONS PERMIAN	LE	C 02563				1	4	2	33	24S	33E	634639	3560923*	3174
C 02310	CUB	COM	33	NGL WATER SOLUTIONS PERMIAM	LE	C 02310	NA			2	4	2	33	24S	33E	634419	3560893	3339
C 02311	CUB	DOM	33	NGL WATER SOLUTIONS PERMIAN	LE	C 02311	NA			2	3	2	33	24S	33E	634391	3560877	3370
C 03565	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03565 POD6					3	3	10	24S	33E	635022	3566373	3424
C 03927	CUB	EXP	0	BERT MADERA	LE	C 03927 POD1				4	2	4	13	24S	33E	639601	3565269	3499
C 02430	CUB	COM	64	ANNETTE E MCCLOY	LE	C 02430			Shallow	3	3	3	16	24S	33E	633377	3564732*	3557
C 02431	CUB	COM	15	MARK MCCLOY	LE	C 02431			Shallow	4	4	4	17	24S	33E	633175	3564728*	3743
C 02432	CUB	COM	128	NM COMMISSIONER OF PUBLIC LAND	LE	C 02432			Shallow	4	4	4	17	24S	33E	633175	3564728*	3743
C 02890	C	STK	3	MARK MCCLOY	LE	C 02890					2	4	29	24S	33E	633114	3562012*	3799
C 03565	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03565 POD5					3	4	09	24S	33E	634135	3566496	4021
C 03932	CUB	EXP	0	BRYCE KARGER	LE	C 03932 POD15				1	1	4	19	24S	34E	640660	3563857	4027
C 02308	CUB	STK	3	NGL WATER SOLUTIONS PERMIAN	LE	C 02308				1	3	1	10	24S	33E	634953	3567364*	4346
C 03565	CUB	EXP	0	INTERCONTINENTAL POTASH CORP	LE	C 03565 POD4				4	1		09	24S	33E	633672	3567057	4749

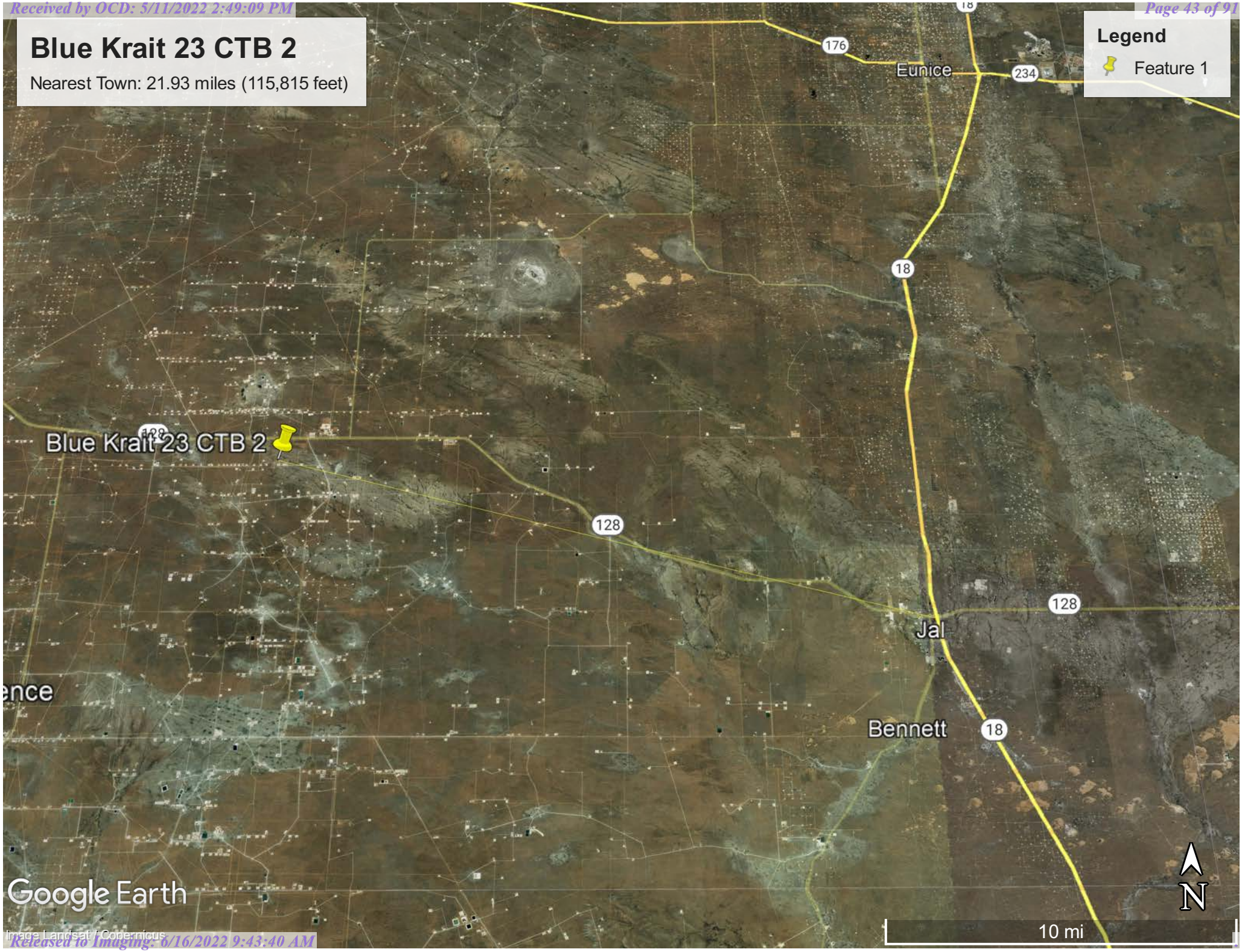
Record Count: 66

UTMNAD83 Radius Search (in meters):

Easting (X): 636663 **Northing (Y):** 3563368 **Radius:** 5000

Sorted by: Distance

***UTM location was derived from PLSS - see Help**


Blue Krait 23 CTB 2
Nearest Town: 21.93 miles (115,815 feet)
Legend
Feature 1
Blue Krait 23 CTB 2
Eunice
Jal
Bennett
176
234
18
128
Google Earth
Image Landsat / Copernicus
10 mi
N

U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetland, 1222 feet

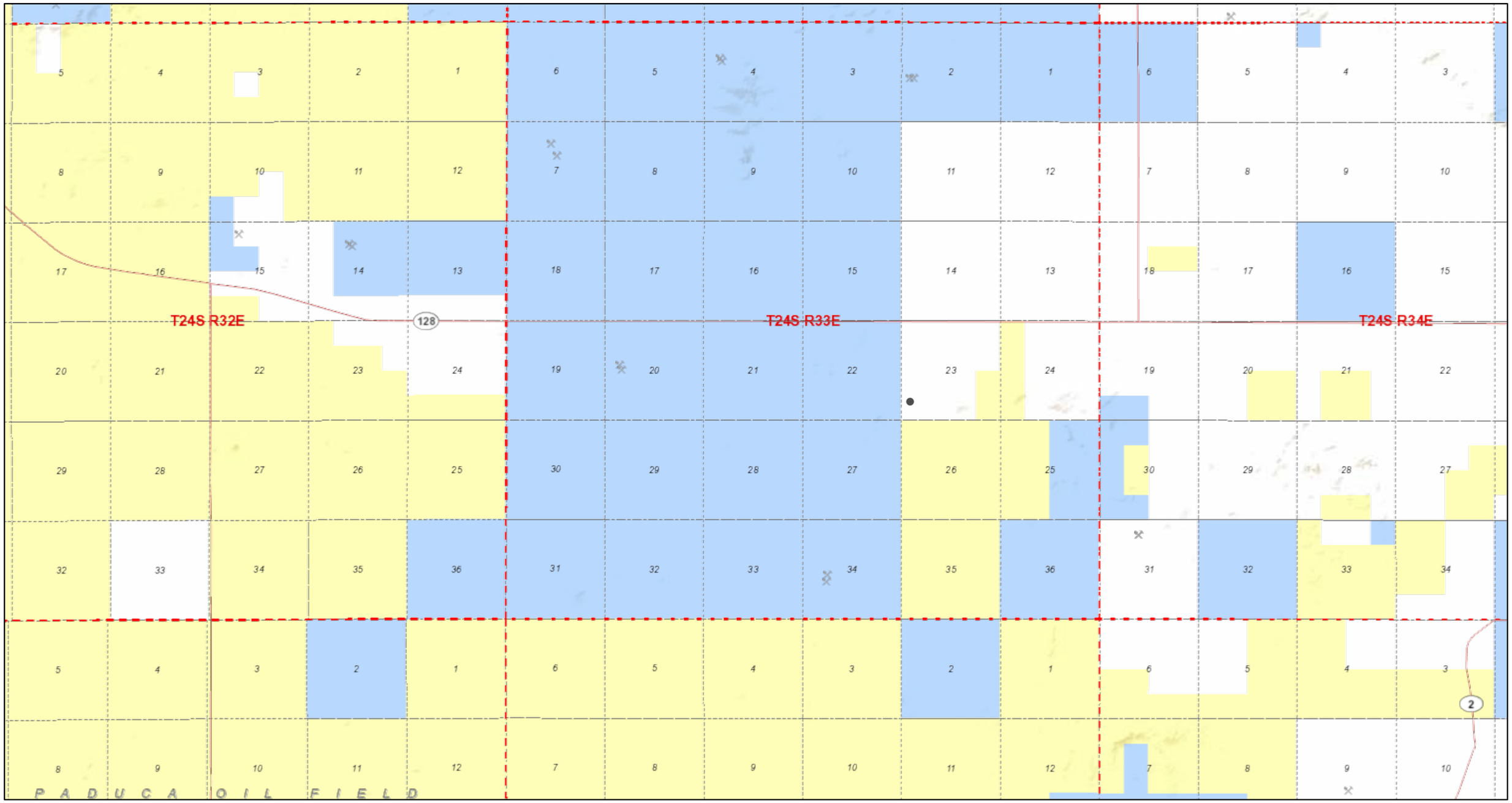
March 28, 2022

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Active Mines in New Mexico



3/28/2022, 4:41:42 PM

1:72,224

Township / Range

Sections

Land Ownership

Bureau of Land Management

Bureau of Reclamation

Department of Agriculture

Department of Defense

Department of Energy

National Park Service

Private Land

State Game and Fish

State Land

State Parks

Tribal

US Fish and Wildlife Service

US Forest Service

Registered Mines

Aggregate, Stone etc.

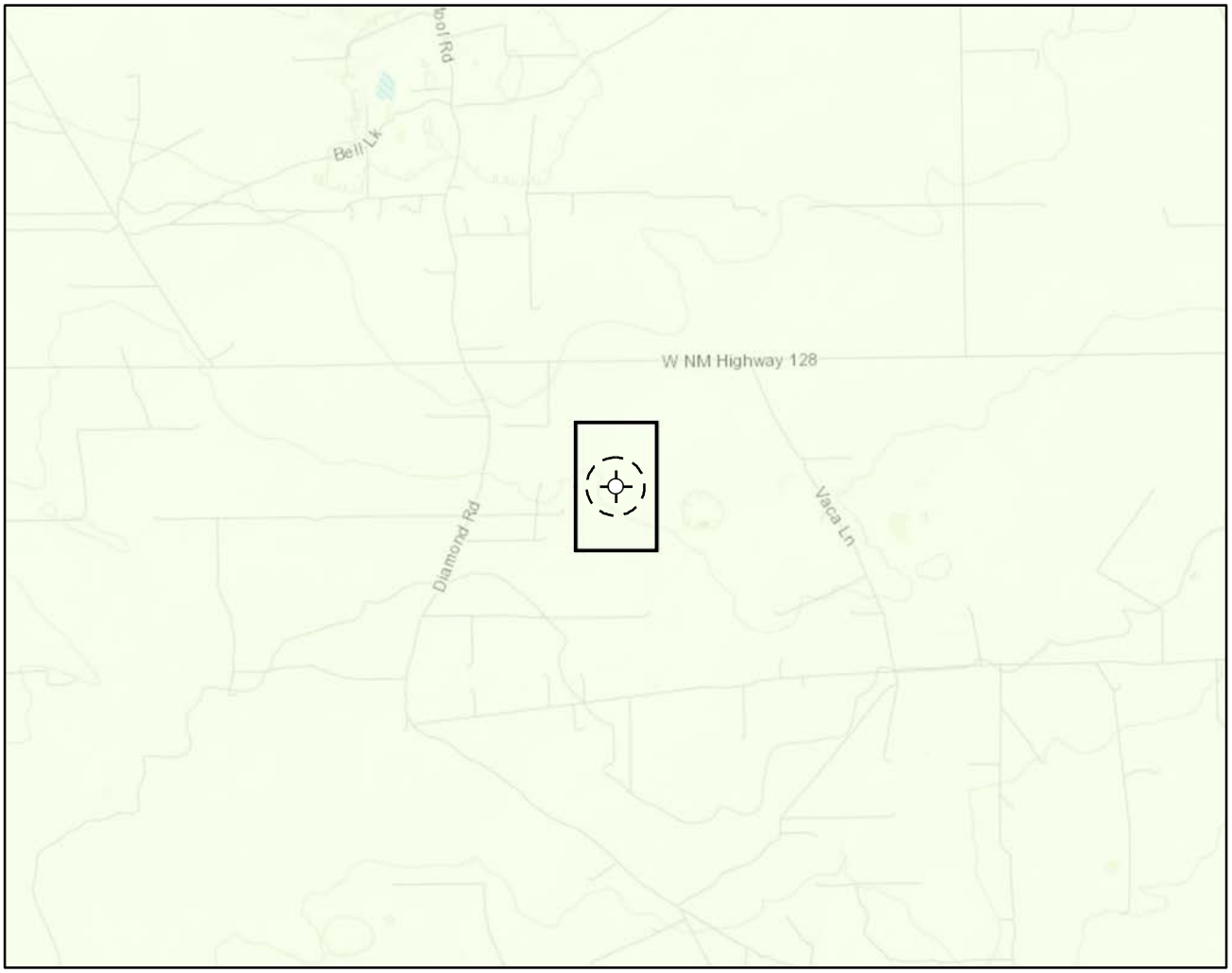
0 0.75 1.5 3 mi

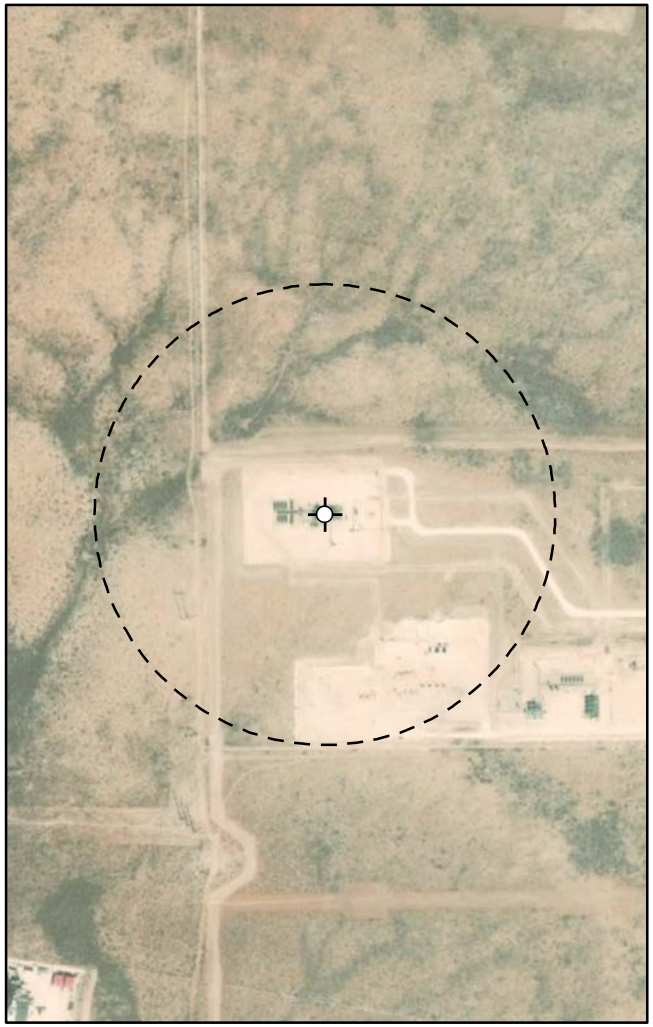
0 1.25 2.5 5 km

U.S. Bureau of Land Management - New Mexico State Office, Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS

EMNRD MMD GIS Coordinator

NM Energy, Minerals and Natural Resources Department (http://nm-emnrd.maps.arcgis.com/apps/webappviewer/index.html?id=1b5e577974664d689b47790897ca2795)





Karst Potential

- Critical
- High
- Medium
- Low

- Site Location
- Site Buffer (1,000 ft.)

Overview Map

0 0.25 0.5 1 mi

Detail Map

0 150 300 600 ft.

VERTEX

Map Center:
Lat/Long: 32.198616, -103.549891

NAD 1983 UTM Zone 13N
Date: Apr 07/22

N

Karst Potential Schematic
Blue Krait 23 CTB 2

FIGURE:
X

devon

Geospatial data presented in this figure may be derived from external sources and Vertex does not assume any liability for inaccuracies. This figure is intended for reference use only and is not certified for legal, survey, or engineering purposes.

Note: Inset Map, ESRI 2021; Overview Map: ESRI World Topographic. Karst potential data sourced from Rosswell Field Office, Bureau of Land Management, 2020 or United States Department of the Interior, Bureau of Land Management. (2018). Karst Potential.

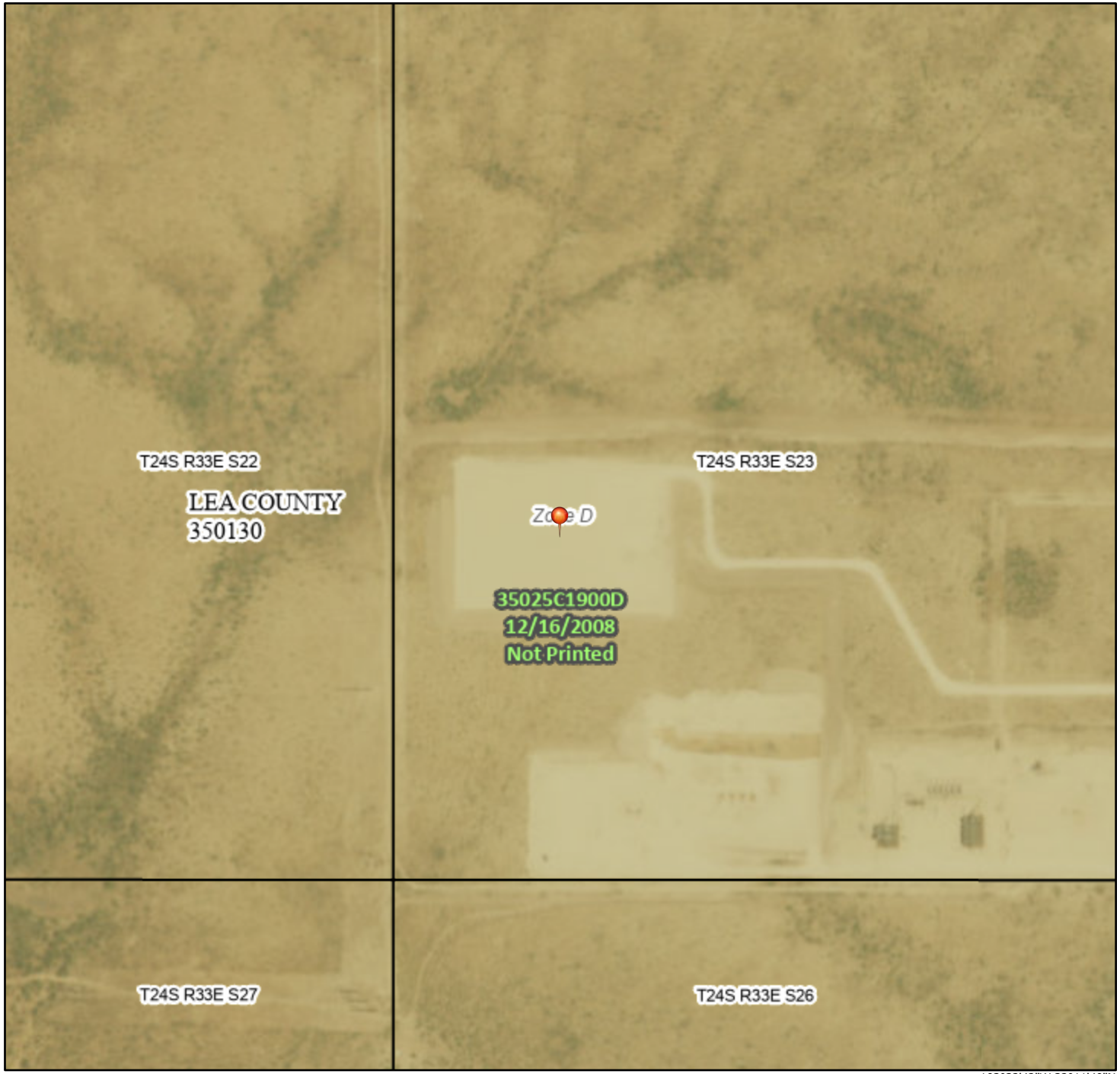
VERSATILITY. EXPERTISE.

Document Path: G:\1-Projects_US PROJECTS\Devon Energy Corporation\2022\22E-00977 - Blue Krait 23 CTB 2 Liner\Figure X Karst Potential Schematic Blue Krait 23 CTB 2 Liner (22E-00977).mxd

National Flood Hazard Layer FIRMette

FEMA

103°33'19"W 32°12'10"N



103°32'42"W 32°11'40"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2022 at 5:43 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lea County, New Mexico

March 28, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

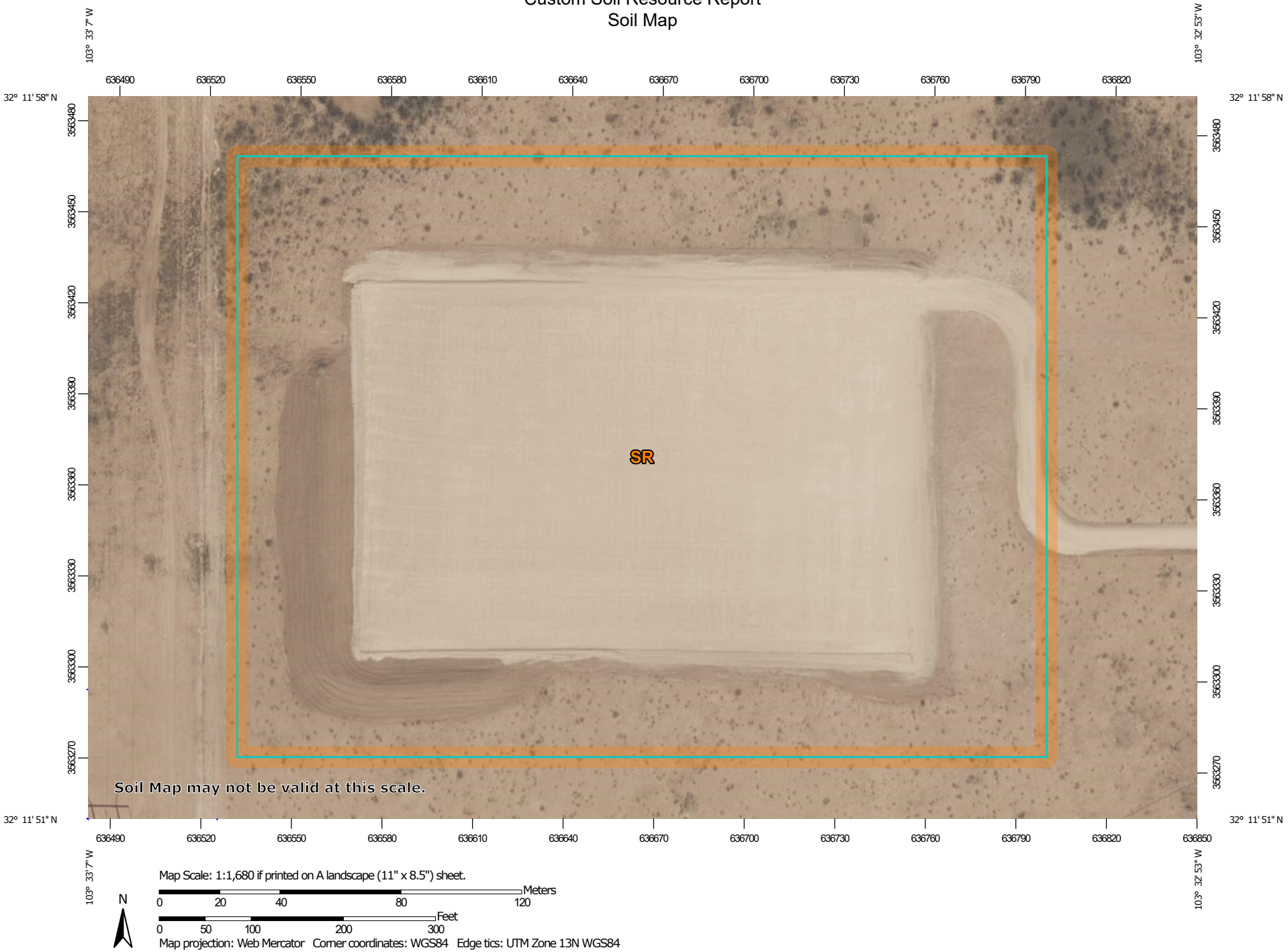
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



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 1:20,000.

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: Lea County, New Mexico
Survey Area Data: Version 18, Sep 10, 2021

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

Date(s) aerial images were photographed: Feb 7, 2020—May 12, 2020

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
SR	Simona-Upton association	13.2	100.0%
Totals for Area of Interest		**13.2**	**100.0%**

Map Unit Descriptions

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, along with the maps, can be used to determine the composition and properties of a unit.

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.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lea County, New Mexico

SR—Simona-Upton association

Map Unit Setting

National map unit symbol: dmr3
Elevation: 3,000 to 4,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Simona and similar soils: 50 percent
Upton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Simona

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Calcareous eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 8 inches: gravelly fine sandy loam
Bk - 8 to 16 inches: fine sandy loam
Bkm - 16 to 26 inches: cemented material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R042XC002NM - Shallow Sandy
Hydric soil rating: No

Description of Upton

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Calcareous eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 8 inches: gravelly loam
Bkm - 8 to 18 inches: cemented material
BCk - 18 to 60 inches: very gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 75 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R042XC025NM - Shallow
Hydric soil rating: No

Minor Components

Kimbrough

Percent of map unit: 6 percent
Ecological site: R077CY037TX - Very Shallow 16-21" PZ
Hydric soil rating: No

Stegall

Percent of map unit: 5 percent
Ecological site: R077CY028TX - Limy Upland 16-21" PZ
Hydric soil rating: No

Slaughter

Percent of map unit: 4 percent
Ecological site: R077CY028TX - Limy Upland 16-21" PZ
Hydric soil rating: No

Custom Soil Resource Report

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USDA Natural Resources Conservation Service

Ecological site R042XC002NM
Shallow Sandy

Accessed: 03/28/2022

General information

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R042XC004NM	**Sandy** Sandy sites often occur in association or in a complex with Shallow Sandy Sites.

Similar sites

R042XC004NM	**Sandy** Sandy ecological sites are similar to Shallow Sandy sites in species composition and Transition pathways.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occures on plains, alluvial fans, uplands, or fan piedmonts. The parent material consists of mixed loamy alluvium or eolian material derived from igneous and sedimentory bedrock. The petrocalcic layer is at a depth of 10 to 25 inches and undulating.

Slopes are nearly level to undulating, usually less than 9 percent. Elevations range from 2,842 to 4,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Fan piedmont (3) Alluvial fan
Elevation	2,842–4,500 ft
Slope	1–9%
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation ranges from 8 to 13 inches. Variations of 5 inches, more or less, are common. Over 80 percent of the precipitation falls from April through October. Most of the summer precipitation comes in the form of high intensity – short duration thunderstorms.
Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is 61 degrees with extremes of 25 degrees below zero in the winter to 112 degrees in the summer.
The average frost-free season is from 207 to 220 days. The last killing frost is in late March or early April, and the first killing frost is in late October or early November.
Temperature and rainfall both favor warm season perennial plant growth. In years of abundant spring moisture, annual forbs and cool season grasses can make up an important component of the site. The vegetation of this site can take advantage of the moisture and the time it falls. Because of the soil profile, little moisture can be stored in the soil for any length of time. Moisture is readily available to the plants from the time it falls. Strong winds from the southwest blow from January through June which rapidly dries out the soil profile during a critical period for plant growth.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

Table 3. Representative climatic features

Frost-free period (average)	221 days
Freeze-free period (average)	240 days
Precipitation total (average)	13 in

Influencing water features

This site is not influenced from water from wetlands or streams.

Soil features

Soils are very shallow to shallow, less than 20 inches in depth. Surface and subsurface textures are gravelly loamy sand, gravelly fine sandy loam or fine sandy loam.

An indurated calache layer occurs at depths of 6 to 25 inches and is at an average of 15 inches from the surface. Underlying material textures are very gravelly fine sandy loam, very gravelly sandy loam, gravelly fine sandy loam. Gravels are calcium carbonate concretions, calcium carbonate content ranges from 30 to 65 percent.

The indurated caliche layer typically holds water up in the profile for short periods within the root zone of plants. These soils will blow if left unprotected by vegetation.

Minimum and maximum values listed below represent the characteristic soils for this site.

Characteristic soils are:
Simona
Jerag

Table 4. Representative soil features

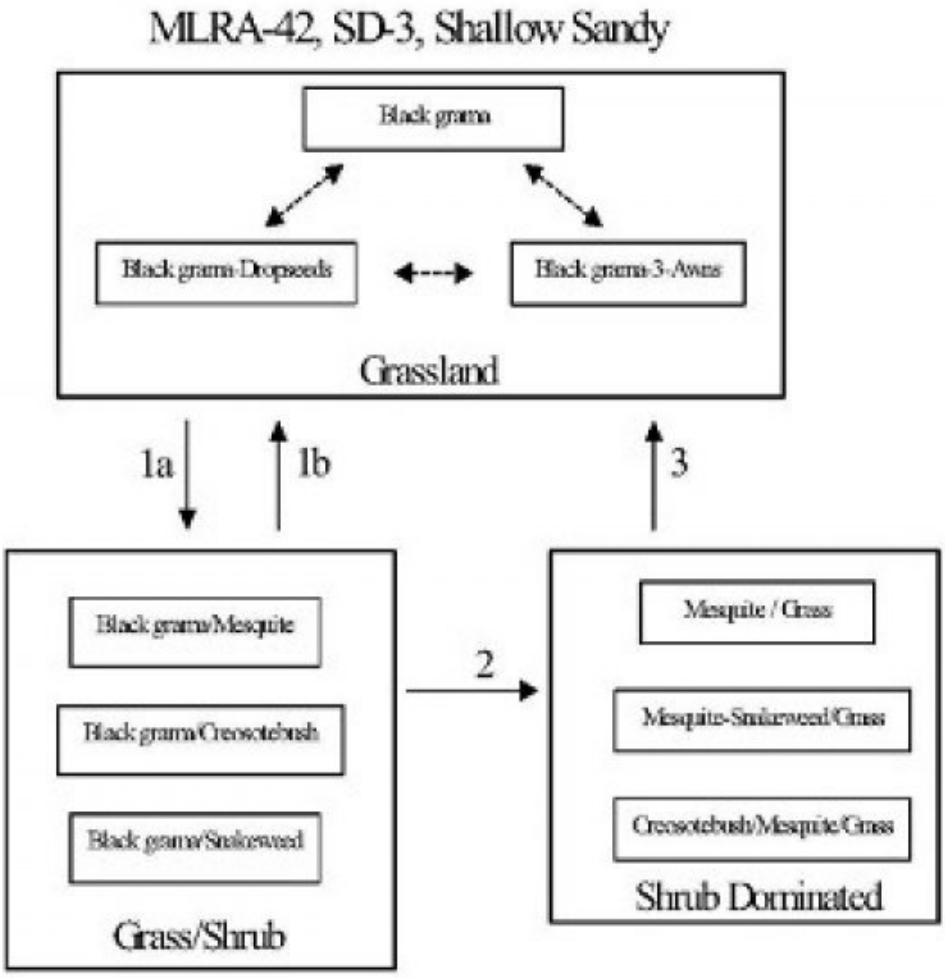
Surface texture	(1) Fine sandy loam (2) Loamy fine sand (3) Gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to moderately well drained
Permeability class	Moderately slow to moderate
Soil depth	7–24 in
Surface fragment cover <=3"	5–25%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1–2 in
Calcium carbonate equivalent (0-40in)	5–15%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8
Subsurface fragment volume <=3" (Depth not specified)	5–25%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Overview
The Shallow Sandy site occurs on upland plains, and tops of low ridges and mesas, associated with Sandy, Loamy Sand, and Shallow sites. Coarse to moderately coarse soil surface textures, shallow depth (<20 inches) to an indurated caliche layer (petrocalcic horizon), and an overwhelming dominance by black grama help to distinguish this site. The historic plant community of the Shallow Sandy site is a black grama dominated grassland sparsely dotted with shrubs. Shrubs, especially mesquite and creosotebush can increase or colonize due to the dispersal of shrub seeds by livestock or wildlife. This increase in mesquite and colonization of creosotebush may be enhanced by proximity to areas with existing high shrub densities. Fire suppression, and the loss of grass cover due to overgrazing or drought may facilitate the increase and encroachment of shrubs. Persistent loss of grass cover, competition for resources by shrubs, and periods of climate with increased winter precipitation and dry summers, may initiate the transition to a shrub-dominated state.

State and transition model

Plant Communities and Transitional Pathways (diagram)



1a. Seed dispersal, drought, overgrazing, fire suppression.
1b. Prescribed fire, brush control, prescribed grazing.

2. Persistent loss of grass cover, resource competition, increased winter precipitation.

3. Brush control, range seeding, prescribed grazing.

Figure 4.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Grassland: This site responds well to management and is resistant to state change, due to the shallow depth to petrocalcic horizon and sandy surface textures. The sandy surface textures allow rapid water infiltration and the petrocalcic horizon helps to keep water perched and available to shallow rooted grasses. Black grama is the dominant species in the historic plant community, averaging 50 to 60 percent of the total production for this site. Bush muhly, blue grama, and dropseeds are present as sub-dominants. Typically, yucca, javalinabush, range

ratany, prickly pear, and mesquite are sparsely dotted across the landscape. Leatherweed croton, cutleaf happlopappus, wooly groundsel, and threadleaf groundsel are common forbs. Continuous heavy grazing or extended periods of drought will cause a loss of grass cover characterized by a decrease in black grama, bush muhly, blue and sideoats grama, plains bristlegrass, and Arizona cottontop. Dropseeds and or threeawns may increase and become sub-dominant to black grama. Continued loss of grass cover in conjunction with dispersal of shrub seeds and fire suppression is believed to cause the transition to a state with increased amounts of shrubs (Grass/Shrub state).

Diagnosis: Black grama is the dominant grass species. Grass cover uniformly distributed. Shrubs are a minor component averaging only two to five percent canopy cover. Litter cover is high (40-50 percent of area), and litter movement is limited to smaller size class litter and short distances (<. 5m).

Other grasses that could appear on this site would include: six-weeks grama, fluffgrass, false-buffalograss, hairy grama, little bluestem, bristle panicum, cane bluestem, Indian ricegrass, tridens spp., and red lovegrass.

Other woody plants include: pricklypear, cholla, fourwing saltbush, catclaw mimosa, winterfat, American tarbush and mesquite.

Other forbs include: globemallow, verbena, desert holly, senna, plains blackfoot, trailing fleabane, fiddleneck, deerstongue, wooly Indianwheat, and locoweed.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	474	652	830
Forb	78	107	136
Shrub/Vine	48	66	84
Total	**600**	**825**	**1050**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	30-35%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	40-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	15-25%

Figure 6. Plant community growth curve (percent production by month). NM2802, R042XC002NM-Shallow Sandy-HCPC. SD-3 Shallow Sandy - Warm season plant community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	5	10	10	25	30	12	5	0	0

State 2

Grass/Shrub

Community 2.1
Grass/Shrub

Grass/Shrub: This state is characterized by the notable presence of shrubs, especially mesquite, broom snakeweed, and/or creosotebush, however grasses remain as the dominant species. Black grama is the dominant grass species. Threeawns and or dropseeds are sub-dominant. The susceptibility of the Shallow Sandy site to shrub encroachment may be higher when located adjacent to other sites with high densities of mesquite or creosotebush. Retrogression within this site is characterized by decreases in grass cover and increasing densities of shrubs.

Diagnosis: Black grama remains as the dominant grass species. Grass cover varies in response to the amount of shrub increase, ranging from uniform to patchy. Shrubs are found at increased densities relative to the grassland state, especially mesquite, creosotebush, or broom snakeweed.

Transition to Grass/Shrub (1a) Historically fire may have kept mesquite and other shrubs in check by completely killing some species and disrupting seed production cycles and suppressing the establishment of shrub seedlings in others. Fire suppression combined with seed dispersal by livestock and wildlife is believed to be the factors responsible for the establishment and increase in shrubs.1, 3 Loss of grass cover due to overgrazing, prolonged periods of drought, or their combination, reduces fire fuel loads and increases the susceptibility of the site to shrub establishment.

Key indicators of approach to transition:
Increase in the relative abundance of dropseeds and threeawns
Presence of shrub seedlings
Loss of organic matter—evidenced by an increase in physical soil crusts 8

Transition back to Grassland (1b) Brush control is necessary to initiate the transition back to the grassland state. If adequate fuel loads remain, possibly the reintroduction of fire as a management tool will assist in the transition back, however, mixed results have been observed concerning the effects of fire on black grama grasslands.6 Prescribed grazing will help ensure adequate rest following brush control and will assist in the establishment and maintenance of grass cover capable of sustaining fire.

State 3
Shrub Dominated

Community 3.1
Shrub Dominated

Shrub-Dominated: Across the range of soil types included in the Shallow Sandy site, mesquite is typically the dominant shrub, but it does occur as a co-dominant or sub-dominant species with creosotebush or broom snakeweed. Mesquite tends to dominate when the Shallow Sandy site occurs as part of a complex or in association with Sandy or Loamy Sand sites. Creosotebush tends to dominate on Shallow Sandy sites that occur as part of, or adjacent to Shallow Sites. Broom snakeweed increases in response to heavy grazing, but tends to cycle in and out depending on timing of rainfall. However, once the site is dominated by shrubs and snakeweed becomes well established, it tends to remain as a major component in the shrub dominated state.

Diagnosis: Mesquite, creosotebush, or snakeweed cover is high, exceeding that of grasses. Grass cover is patchy with large connected bare areas present. Black grama, threeawns, or dropseeds may be the dominant grass. Evidence of accelerated wind erosion in the form of pedestalling of plants, and soil deposition around shrub bases may be common.

Transition to Shrub-Dominated (2) Persistent loss of grass cover and the resulting increased competition between shrubs and remaining grasses for dwindling resources (especially soil moisture) may drive this transition.5 Additionally periods of increased winter precipitation may facilitate periodic episodes of shrub expansion and establishment. 4

Key indicators of approach to transition:
Increase in size and frequency of bare patches.
Loss of grass cover in shrub interspaces.
Increased signs of erosion, evidenced by pedestalling of plants, and soil and litter deposition on leeward side of plants. 7

Transition back to Grassland (3) Brush control is necessary to reduce competition from shrubs and reestablish grasses. Range seeding may be necessary if insufficient grasses remain, The benefits, and costs, will vary depending upon the degree of site degradation, and adequate precipitation following seeding.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm Season**			413–495	
	black grama	BOER4	*Bouteloua eriopoda*	413–495	–
2	**Warm Season**			41–83	
	bush muhly	MUPO2	*Muhlenbergia porteri*	41–83	–
3	**Warm Season**			41–83	
	blue grama	BOGR2	*Bouteloua gracilis*	41–83	–
4	**Warm Season**			25–41	
	sideoats grama	BOCU	*Bouteloua curtipendula*	25–41	–
5	**Warm Season**			41–83	
	spike dropseed	SPCO4	*Sporobolus contractus*	41–83	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	41–83	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	41–83	–
6	**Warm Season**			17–41	
	threeawn	ARIST	*Aristida*	17–41	–
7	**Warm Season**			41–83	
	Arizona cottontop	DICA8	*Digitaria californica*	41–83	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	41–83	–
8	**Warm Season**			41–83	
	mat sandbur	CELO3	*Cenchrus longispinus*	41–83	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	41–83	–
9	**Other Perennial Grasses**			25–41	
	Grass, perennial	2GP	*Grass, perennial*	25–41	–
Shrub/Vine					
10	**Shrub**			8–25	
	javelina bush	COER5	*Condalia ericoides*	8–25	–
11	**Shrub**			8–25	
	yucca	YUCCA	*Yucca*	8–25	–
12	**Shrub**			8–25	
	jointfir	EPHED	*Ephedra*	8–25	–
	littleleaf ratany	KRER	*Krameria erecta*	8–25	–
13	**Shrub**			8–25	

	featherplume	DAFO	*Dalea formosa*	8–25	–
14	**Shrub**			8–25	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	8–25	–
15	**Other Shrubs**			25–41	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	25–41	–
Forb					
16	**Forb**			17–41	
	leatherweed	CRPOP	*Croton pottsii var. pottsii*	17–41	–
	Goodding's tansyaster	MAPIG2	*Machaeranthera pinnatifida ssp. gooddingii var. gooddingii*	17–41	–
17	**Forb**			17–41	
	woolly groundsel	PACA15	*Packera cana*	17–41	–
	threadleaf ragwort	SEFLF	*Senecio flaccidus var. flaccidus*	17–41	–
18	**Forb**			8–25	
	whitest evening primrose	OEAL	*Oenothera albicaulis*	8–25	–
19	**Other Forbs**			8–25	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	8–25	–

Animal community

This site provides habitats which support a resident animal community that is characterized by pronghorn antelope, swift fox, black-tailed jackrabbit, spotted ground squirrel, Ord’s kangaroo rat, northern grasshopper mouse, coyote, horned lark, meadowlark, lark bunting, scaled quail, morning dove, side-blotched lizard, round-tailed horned lizard, marbled whiptail, prairie rattlesnake and ornate box turtle.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series Hydrologic Group
Jarag D
Simona D

Recreational uses

This site offers recreation for hiking, horseback riding, nature observation and photography, and quail and dove hunting. During years of abundant spring moisture, this site displays a riot of color from wildflowers during May and June. A few summer and fall flowers also occur.

Wood products

The natural potential plant community of this site affords little or no wood products. Where the site has been invaded by mesquite or cholla cactus the roots and stems of these plants provide attractive material for a variety of curiosities, such as lamps and small furniture.

Other products

This site is suitable for grazing by all kinds and classes of livestock during all seasons of the year. Because of the sandy textures and shallow profile, this site will respond rapidly to management. As this site deteriorates, plants such as black grama, bush muhly, blue and sideoats grama, plains bristlegrass and Arizona cottontop, will decrease and be replaced by plants such as threeawns, mesquite, creosote bush, and broom snakeweed. This also causes a decrease in ground cover, leaving the soil to blow. This site responds best to a system of management that rotates the season of use.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index Ac/AUM
100 - 76 2.5 – 3.5
75 – 51 3.2 – 4.6
50 – 26 4.5 – 7.5
25 – 0 7.6 +

Inventory data references

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Eddy County, Lea County, and Chaves County.

Other references

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Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

---

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

---

14. **Average percent litter cover (%) and depth (in):**

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

---

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

---

17. **Perennial plant reproductive capability:**

USDA Natural Resources Conservation Service

Ecological site R042XC025NM
Shallow

Accessed: 03/28/2022

General information

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on knolls, ridges, hillslopes alluvial fans and escarpments. Slopes range fro 0 to 25 percent and average about 7 percent. Direction of slope varies and is usually not significant. Elevations range from 2,842 to 4,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Fan piedmont
Flooding frequency	None
Ponding frequency	None
Elevation	2,842–4,500 ft
Slope	0–25%
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation ranges from 8 to 13 inches. Variations of 5 inches, more or less, are common. Over 80 percent of the precipitation falls from April through October. Most of the summer precipitation comes in the form of high intensity – short duration thunderstorms.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is 61 degrees with extremes of 25 degrees below zero in the winter to 112 degrees in the summer.

The average frost-free season is 180 to 220 days. The last killing frost is late March or early April, and the first killing frost is in late October or early November.

Temperature and rainfall both favor warm season perennial plant growth. In years of abundant spring moisture, annual forbs and cool season grasses can make up an important component of this site. Because of the shallow soil depth, the vegetation on this site can take advantage of moisture almost anytime it falls. Strong winds that blow from the west and southwest blow from January through June, which accelerates soil drying at a critical time for cool season plant growth.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

Table 3. Representative climatic features

Frost-free period (average)	220 days
Freeze-free period (average)	240 days
Precipitation total (average)	13 in

Influencing water features

This site is not influenced from water from wetlands or streams.

Soil features

The soils of this site are shallow to very shallow. Soils are derived from mixed calcareous eolian deposits derived from sedimentary rock. Surface layers are very cobbly loam, very gravelly loam, gravelly loam, cobbly loam, gravelly fine sandy loam or gravelly sandy loam.

There is an indurated caliche layer or limestone bedrock that occurs within 20 inches and averages less than 10 inches. Limestone or caliche layer may be the restrictive layer.

Minimum and maximum values listed below represent the characteristic soils for this site.

Characteristic soils:

Lozier
Potter
Tencee
Upton
Ector
Kimbrough

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Extremely gravelly loam (3) Extremely cobbly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	4–20 in
Surface fragment cover <=3"	15–40%
Available water capacity (0-40in)	1 in
Calcium carbonate equivalent (0-40in)	15–60%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	13–42%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

Overview:
The Shallow site is associated with and Limestone Hills, Loamy, and Shallow Sandy sites. When associated with Limestone Hills, the Shallow site occurs on the summits, foot slopes and toeslopes of hills. Loamy sites often occur as areas between low elongated hills with rounded crests (Shallow site). When the Shallow Sandy site and Shallow site occur in association, the Shallow Sandy soils occupy the tops of low ridges and the Shallow site soils occur on the steeper sideslopes of the ridge. The historic plant community of the Shallow site has the aspect of a grassland/shrub mix, dominated by grasses, but with shrubs common throughout the site. Black grama is the dominant grass species; creosotebush, mesquite, and catclaw mimosa are common shrubs. Overgrazing and or extended drought can reduce grass cover, effect a change in grass species dominance, and may result in a shrub-dominated state. 1

State and transition model

Plant Communities and Transitional Pathways (diagram)

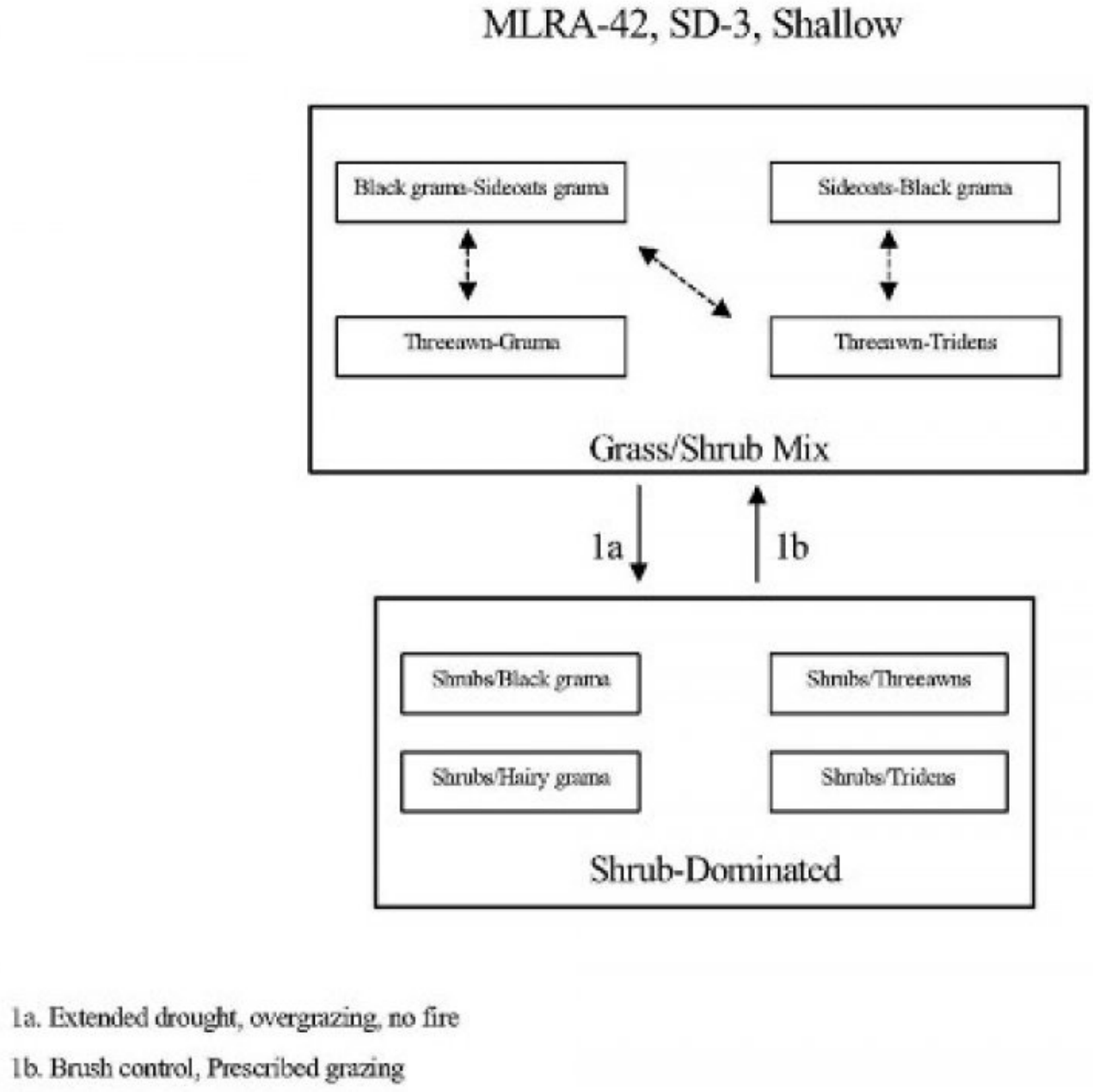


Figure 4.

State 1
Grass/Shrub Mix

Community 1.1
Grass/Shrub Mix

Grassland/Shrub Mix: The historic plant community is dominated by black grama with sideoats grama as the sub-dominant. Blue grama, hairy grama, bush muhly, and sand dropseed also occur in significant amounts. Sideoats grama can occur as the dominant grass with black grama as sub-dominant on the western side of the Land Resource Unit SD-3. This may be due to higher average elevation on the west side. Retrogression within this state due to extended drought or overgrazing will cause a decrease in species such as black grama, sideoats grama, blue grama, and bush muhly. Threeawns may become the dominant grass species due to a decline in more palatable grasses or because of its ability to quickly recover following drought. Continued loss of grass cover and associated increase in amount of bare ground may result in a shrub-dominated state. Decreased fire frequencies may also be

an important component in the cause of this transition.

Diagnosis: Grass cover is fairly uniform, however, surface gravel, cobble, and bare ground make up a large percent of total ground cover, and grass production during unfavorable years may only average 150-175 pounds per acre. Shrubs are common with canopy cover averaging five to ten percent. Evidence of erosion such as rills and gullies are rare, but may occur on slopes greater than eight percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	168	352	536
Shrub/Vine	63	131	200
Forb	20	42	64
Total	**251**	**525**	**800**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-8%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40-60%

Figure 6. Plant community growth curve (percent production by month). NM2825, R042XC025NM Shallow HCPC. R042XC025NM Shallow HCPC Warm Season Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	5	10	10	25	30	12	5	0	0

State 2
Shrub-Dominated

Community 2.1
Shrub-Dominated

Shrub-Dominated: This state is characterized by an increase in shrubs and a decrease in grass cover relative to grassland/shrub mix. As grass cover decreases shrubs increase, especially creosotebush, catclaw mimosa, whitethorn acacia, and mesquite. Each of these shrub species may become dominant in localized areas or across the site, depending on the spatial variability in soil characteristics and landscape position. Black grama, threeawns, hairy grama, or hairy tridens may be the dominant grass species. Fluffgrass, burrograss and broom snakeweed increase in representation. The Shallow site is resistant to state change, due to the natural rock armor of the soil and a shallow impermeable layer. The amount of rock fragments on the soil surface assist in retarding erosion. On Shallow sites with low slope, the shallow depth to either a petrocalcic layer or limestone bedrock helps to keep water perched and available to shallow rooted grasses for extended periods. 2

Diagnosis: Shrubs are the dominant species, especially creosotebush, catclaw mimosa, whitethorn acacia, or mesquite. Grass cover is variable ranging from patchy with large connected bare areas present to sparse with only a limited amount in shrub inter-spaces.

Transition to Shrub-Dominated (1a) Overgrazing and or extended periods of drought, and suppression of natural fire regimes are thought to cause this transition. As grass cover is lost, soil fertility and available soil moisture decline, due to the reduction of organic matter and decreased infiltration.3 Shrubs have the ability to extract nutrients and water from a greater area of soil than grasses and are better able to utilize limited water. Competition by shrubs for water and nutrients limits grass recruitment and establishment. Fire historically may have played a part in suppressing shrub expansion; fire suppression may therefore facilitate shrub expansion.

Key indicators of approach to transition:
*Decrease or change in composition or distribution of grass cover.
*Increase in size and frequency of bare patches.
*Increase in amount of shrub seedlings.

Transition back to Grassland/Shrub Mix (1b) Brush control is necessary to re-establish grasses. Prescribed grazing will help to ensure proper forage utilization and sustain grass cover. Once the transition is reversed and grass cover is re-established, periodic use of prescribed fire may assist in maintaining the Grassland/Shrub state.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				105–158	
	black grama	BOER4	*Bouteloua eriopoda*	105–158	–
2				79–105	
	sideoats grama	BOCU	*Bouteloua curtipendula*	79–105	–
3				79–105	
	blue grama	BOGR2	*Bouteloua gracilis*	79–105	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	79–105	–
4				26–53	
	bush muhly	MUPO2	*Muhlenbergia porteri*	26–53	–
5				16–26	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	16–26	–
6				26–53	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	26–53	–
7				16–26	
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	16–26	–
8				5–16	
	ear muhly	MUAR	*Muhlenbergia arenacea*	5–16	–
9				5–16	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	5–16	–
10				5–16	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	5–16	–
11				16–26	
	Grass, perennial	2GP	*Grass, perennial*	16–26	–

Forb					
12				11–26	
	stemless four-nerve daisy	TEACE	*Tetraneuris acaulis var. epunctata*	11–26	–
13				5–16	
	woolly groundsel	PACA15	*Packera cana*	5–16	–
14				5–16	
	globemallow	SPHAE	*Sphaeralcea*	5–16	–
15				5–16	
	bladderpod	LESQU	*Lesquerella*	5–16	–
16				5–16	
	cassia	CASSI	*Cassia*	5–16	–
17				11–26	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	11–26	–
Shrub/Vine					
18				5–16	
	littleleaf sumac	RHMI3	*Rhus microphylla*	5–16	–
19				5–16	
	creosote bush	LATR2	*Larrea tridentata*	5–16	–
20				5–16	
	littleleaf ratany	KRER	*Krameria erecta*	5–16	–
21				5–16	
	javelina bush	COER5	*Condalia ericoides*	5–16	–
22				5–16	
	American tarwort	FLCE	*Flourensia cernua*	5–16	–
23				5–16	
	crown of thorns	KOSP	*Koeberlinia spinosa*	5–16	–
24				11–26	
	honey mesquite	PRGL2	*Prosopis glandulosa*	11–26	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	11–26	–
25				5–16	
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	5–16	–
26				5–16	
	pricklypear	OPUNT	*Opuntia*	5–16	–
27				11–26	
	mariola	PAIN2	*Parthenium incanum*	11–26	–
	mariola	PAIN2	*Parthenium incanum*	11–26	–
28				5–16	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	5–16	–
29				16–26	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	16–26	–

Animal community

This site provides habitats which support a resident animal community that is characterized by desert cottontail, spotted ground squirrel, Merriam's kangaroo rat, cactus mouse, white-throated woodrat, gray fox, spotted skunk, roadrunner, Swainson's hawk, white-necked raven, cactus wren, pyrrhuloxia, lark sparrow, mourning dove, scaled quail, leopard lizard, round-tailed horned lizard, prairie rattlesnake, marbled whiptail, and greater earless lizard. Where associated with limestone hills, mule deer utilize this site.

Where large woody shrubs occur, most resident birds and scissor-tailed flycatcher, morning dove, lark sparrow and Swainson's hawk nest.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series-------- Hydrologic Group
Lozier---------- D
Potter---------- C
Tencee---------- D
Upton---------- C
Kimbrough---------- D
Upton---------- D
Ector---------- D

Recreational uses

This site offers recreation potential for hiking, horseback riding, rock hunting, nature photography and bird hunting and birding. During years of abundant spring moisture, a colorful array of wild flowers is displayed during May and June. A few summer and fall flowers also occur.

Wood products

This site has no potential for wood production.

Other products

This site is suited for grazing by all kinds and classes of livestock during all seasons of the year. Missmanagement will cause a decrease in black grama, sideoats grama, and blue grama, bush muhly and New Mexico feathergrass. A corresponding increase in bare ground will occur. There will also be an increase in muhlys, fluffgrass, creosotebush, javalinabush, catclaw, and mesquite. This site will respond best to a system of management that rotates the season of use.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index-------- Ac/AUM
100 - 76---------- 3.7 – 4.5
75 – 51---------- 4.3 – 5.5
50 – 26---------- 5.3 – 10.0
25 – 0---------- 10.1 +

Inventory data references

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico (SD-3). This site has been mapped and

correlated with soils in the following soil surveys. Eddy County, Lea County, and Chaves County.

Other references

Literature Cited:

1. Humphrey, R.R. 1974. Fire in the deserts and desert grassland of North America. In: Kozlowski, T. T.; Ahlgren, C. E., eds. Fire and ecosystems. New York: Academic Press: 365-400.

2. Hennessy, J.T., R.P. Gibbens, J.M. Tromble, and M. Cardenas. 1983. Water properties of caliche. J. Range Manage. 36: 723-726.

3. U.S. Department of Agriculture, Natural Resources Conservation Service. 2001. Soil Quality Information Sheets. Rangeland Soil Quality—Infiltration, Organic Matter, Rangeland Sheets 5,6. [Online]. Available: http://www.statlab.iastate.edu/survey/SQI/range.html

Contributors

David Trujillo
Don Sylvester

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

---

2. **Presence of water flow patterns:**

---

3. **Number and height of erosional pedestals or terracettes:**

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

---

5. **Number of gullies and erosion associated with gullies:**

---

6. **Extent of wind scoured, blowouts and/or depositional areas:**

---

7. **Amount of litter movement (describe size and distance expected to travel):**

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

---

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

---

14. **Average percent litter cover (%) and depth (in):**

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

---

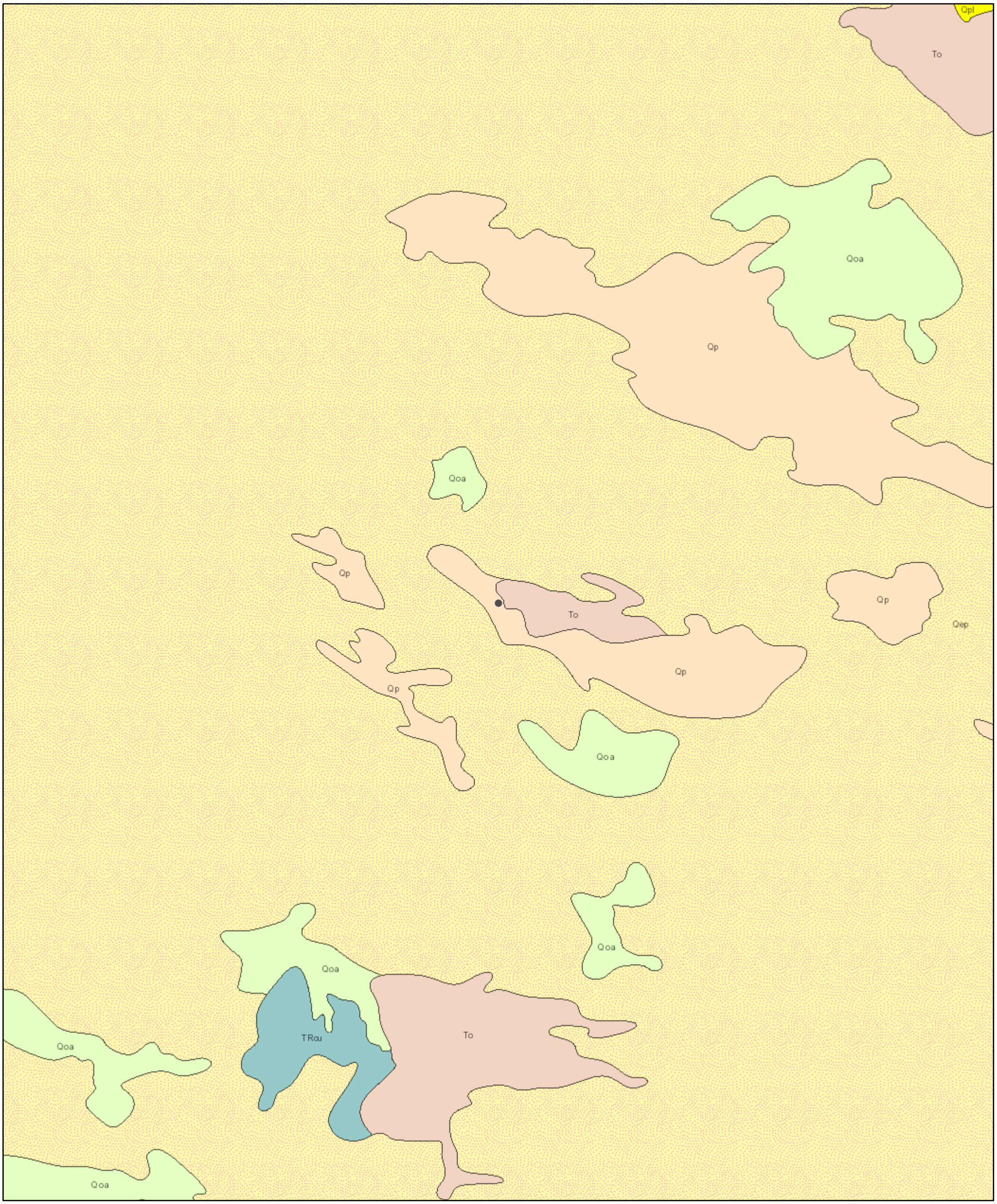
16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if**

their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

---

17. **Perennial plant reproductive capability:**

ArcGIS Web Map



3/28/2022, 5:07:53 PM

Lithologic Units

- Playa——Alluvium and evaporite deposits (Holocene)
- Water——Perenial standing water
- Qa——Alluvium (Holocene to upper Pleistocene)

1:144,448

0 1.25 2.5 5 mi

0 2.25 4.5 9 km

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data;

ArcGIS Web AppBuilder

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset,

ATTACHMENT 4

Lakin Pullman

From: Hamlet, Robert, EMNRD <Robert.Hamlet@state.nm.us>
Sent: March 23, 2022 9:35 AM
To: Dhugal Hanton
Cc: Brandon Schafer; dale.woodall@dvn.com; Bratcher, Mike, EMNRD; Hensley, Chad, EMNRD; Velez, Nelson, EMNRD; Nobui, Jennifer, EMNRD
Subject: RE: [EXTERNAL] 48-hr Liner Inspection Notice: Blue Krait 23 CTB 2 (nAPP2207325055)

Brandon,

Thank you for the notification. Please include a copy of this and all notifications in the remedial and/or closure reports to ensure the notifications are documented in the project file.

Robert Hamlet ● Environmental Specialist - Advanced
Environmental Bureau
EMNRD - Oil Conservation Division
811 S. First Street | Artesia, NM 88210
575.909.0302 | robert.hamlet@state.nm.us
http://www.emnrd.state.nm.us/OCD/

From: Dhugal Hanton <vertexresourcegroupusa@gmail.com>
Sent: Tuesday, March 22, 2022 2:16 PM
To: Enviro, OCD, EMNRD <OCD.Enviro@state.nm.us>; EMNRD-OCD-District1spills <EMNRD-OCD-District1spills@state.nm.us>; CFO_Spill, BLM_NM <blm_nm_cfo_spill@blm.gov>
Cc: bschafer@vertex.ca; dale.woodall@dvn.com
Subject: [EXTERNAL] 48-hr Liner Inspection Notice: Blue Krait 23 CTB 2 (nAPP2207325055)

All,

Please accept this email as 48-hr notification that Vertex Resource Services has scheduled a liner inspection to be conducted for the following releases:

nAPP2207325055 DOR: 3/12/22 Site Name: Blue Krait 23 CTB 2

This work will be completed on behalf of Devon Energy Production Company.

On Monday, April 4, 2022 at approximately 9:30 a.m., Chance Dixon will be on site to conduct a liner inspection. He can be reached at 575-988-1472. If you need directions to the site, please do not hesitate to contact him. If you have any questions or concerns regarding this notification, please give me a call at 701-301-1564.

Thank you,

Brandon Schafer
Project Manager

Vertex Resource Services Inc.

P 701.645.3111 Ext. 706
C 701.301.1564
F 780.464.3731

www.vertex.ca

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
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District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 106151

CONDITIONS

Operator: DEVON ENERGY PRODUCTION COMPANY, LP 333 West Sheridan Ave. Oklahoma City, OK 73102	OGRID: 6137
	Action Number: 106151
	Action Type: [C-141] Release Corrective Action (C-141)

CONDITIONS

Created By	Condition	Condition Date
rhamlet	We have received your closure report and final C-141 for Incident #NAPP2207325055 BLUE KRAIT 23 CTB 2, thank you. This closure is approved.	6/16/2022