State of New Mexico
Oil Conservation Division

Incident ID	nAPP2231359751
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)

☒ X 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: Clinton Talley Title: RES Specialist

Signature: Clint Talley Date: 12/05/2022

email: clinton.talley@matadorresources.com Telephone: 337-319-8398

OCD Only

Received by: Jocelyn Harimon Date: 12/05/2022

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: 3/3/2023

Printed Name: Robert Hamlet Title: Environmental Specialist - Advanced

November 22, 2022 Vertex Project #: 22E-03902

Spill Closure Report: Rustler Breaks SWD #003
Section 24, Township 23 South, Range 27 East
API: 30-015-44303
County: Eddy
Incident Report: nAPP2231359751

Prepared For: **Black River Water Management Company, LLC**
One Lincoln Centre
Dallas, Texas 75240

New Mexico Oil Conservation Division – District 2 – Artesia
811 South 1st Street
Artesia, New Mexico 88210

Black River Water Management Company, LLC (Black River) retained Vertex Resource Services Inc. (Vertex) to conduct a Spill Assessment for a release of produced water into the concrete lined containment at Rustler Breaks SWD #003, API 30-015-44303, Incident nAPP2231359751 (hereafter referred to as "Rustler Breaks"). Black River provided spill notification to the New Mexico Oil Conservation Division (NMOCD) District 2, via submission of an initial C-141 Release Notification (Attachment 1). This letter provides a description of the Spill Assessment and includes a request for Spill Closure. The spill area is located at N 32.2884, W -104.1405.

Background

The site is located approximately 2.61 miles west of Loving, New Mexico (Google Inc., 2022). The legal location for the site is Section 24, Township 23 South and Range 27 East in Eddy County, New Mexico. The spill area is located on private property.

The Geological Map of New Mexico (New Mexico Bureau of Geology and Mineral Resources, 2022) indicates the site's surface geology is comprised primarily of Qp- Piedmont alluvial deposits (Holocene to lower Pleistocene). The Natural Resources Conservation Service *Web Soil Survey* characterizes the predominant soil texture on the site is Karro loam, saline, which is characterized by salt flats and loamy, where soils range from grayish brown loam to strongly calcareous and slightly alkaline. This type of soil tends to be well-drained with medium runoff and high available water storage in the soil profile and erosion is rare and infrequent (United States Department of Agriculture, Natural Resources Conservation Service, 2022). There is medium potential for karst geology to be present near Rustler Breaks (Southwest Geophysical Consulting, LLC, 2021).

The surrounding landscape has historically been associated alluvial fans and plains of mixed alluvium, and is considered farmland of statewide importance. The climate is semi-arid, with average annual precipitation ranging between 10 and 14 inches. The plant community has historically been dominated by black grama and brunchgrasses. While the landscape generally has a grassland aspect, areas of exposed gypsum outcrops harbor little vegetation, and patches of

bare or lichen covered soil surface may be visible between patches of vegetation (United States Department of Agriculture, Natural Resources Conservation Service, 2022).

There is no surface water located on-site. The nearest significant watercourse, as defined in Subsection P of 19.15.17.7 *New Mexico Administrative Code* (NMAC; New Mexico Oil Conservation Division, 2018), is the Pecos River located approximately 3 miles northeast of the site (United States Fish and Wildlife Service, 2020). Multiple dry agricultural water conveyance structures, such as canals and ditches, are present in the vicinity. At Rustler Breaks, there are no continuously flowing watercourses or significant watercourses, lakebeds, sinkholes, playa lakes, or other critical water or community features as outlined in Paragraph (4) of Subsection C of 19.15.29.12 NMAC.

Incident Description

The spill occurred on November 9, 2022, due to valve failure on the tank. The spill was reported on November 9, 2022, and involved the release of approximately 46 barrels (bbl.) of produced water into the concrete lined containment. Approximately 46 bbl. of free fluid was removed during initial spill clean-up. The NMOCD C-141 Report: nAPP2231359751 is included in Attachment 1. The daily field report (DFR) and site photographs are included in Attachment 2.

Closure Criteria Determination

The depth to groundwater was determined using information from the United States Department of the Interior, United States Geological Survey (2022) National Water Information Mapping System. A 0.5-mile search radius was used to determine groundwater depth. The closest recorded depth to groundwater was determined to be 74 feet below ground surface (bgs) and 0.36 miles from the site (New Mexico Office of the State Engineer, New Mexico Water Rights Reporting System, 2022). Documentation used in Closure Criteria Determination research is included in Attachment 3.

Closure Criteria Worksheet			
Site Name: Rustler Breaks SWD #003			
Spill Coordinates:		**X: 32.2884**	**Y: -104.1405**
Site Specific Conditions		**Value**	**Unit**
1	Depth to Groundwater	**74**	feet
2	Within 300 feet of any continuously flowing watercourse or any other significant watercourse	16,864	feet
3	Within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark)	39,032	feet
4	Within 300 feet from an occupied residence, school, hospital, institution or church	800	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**	1,100	feet
	ii) Within 1000 feet of any fresh water well or spring	1,100	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	399	feet
8	Within the area overlying a subsurface mine	No	(Y/N)
9	Within an unstable area (Karst Map)	Medium	Critical High Medium Low
10	Within a 100-year Floodplain	>500	year
11	Soil Type	Karro loam	
12	Ecological Classification	Loamy	
13	Geology	Qp-Piedmont alluvial deposits (Holocene to lower Pleistocene)	
	NMAC 19.15.29.12 E (Table 1) Closure Criteria	51-100'	<50' 51-100' >100'

The closure criteria determined for the site are associated with the following constituent concentration limits as presented in Table 1.

Table 1. Closure Criteria for Soils Impacted by a Release

Minimum depth below any point within the horizontal boundary of the release to groundwater less than 10,000 mg/l TDS	Constituent	Limit
51 feet - 100 feet	Chloride	10,000 mg/kg
	TPH (GRO+DRO+MRO)	2,500 mg/kg
	GRO+DRO	1,000 mg/kg
	BTEX	50 mg/kg
	Benzene	10 mg/kg

TDS - Total dissolved solids , TPH - Total petroleum hydrocarbons = gasoline range organics (GRO) + diesel range organics (DRO) + motor oil range organics (MRO), BTEX - Benzene, toluene, ethylbenzene, and xylenes

Remedial Actions Taken

A site inspection of the spill was completed on November 19, 2022, which identified the area of the spill specified in the initial C-141 Report. The DFR associated with the site inspection is included in Attachment 2.

Notification that a liner inspection was scheduled to be completed was provided to the NMOCD on November 14, 2022. Visual observation of the liner was completed on all sides and the base of the containment, around equipment, and of all seams in the liner. As evidenced in the DFR (Attachment 2), liner integrity was confirmed. The Liner Inspection Notification email is included in Attachment 4.

Closure Request

Vertex recommends no additional remediation action to address the release at Rustler Breaks. 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 (nAPP2231359751) be closed as all closure requirements set forth in Subsection E of 19.15.29.12 NMAC have been met. Black River certifies that all information in this report and the attachments are 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 November 9, 2022, release at Rustler Breaks SWD #003.

Should you have any questions or concerns, please do not hesitate to contact the undersigned at 575.361.9880 or mpeppin@vertex.ca.

Monica Peppin, A.S.
PROJECT MANAGER, REPORTING

November 22, 2022
Date

Attachments

Attachment 1. NMOCD C-141 Report
Attachment 2. Daily Field Reports with Pictures
Attachment 3. Closure Criteria for Soils Impacted by a Release Research Determination Documentation
Attachment 4. Required 48-hr Notification of Liner Inspection to Regulatory Agencies

References

Google Inc. (2022). *Google Earth Pro* (Version 7.3.4) [Software]. Retrieved from http://www.google.com/earth

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

New Mexico Mining and Minerals Division. (2020). *Coal Mine Resources in New Mexico*. Retrieved from http://www.emnrd.state.nm.us/MMD/gismapminedata.html

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

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

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 Homeland Security, FEMA Flood Map Service Center. (2020). *Flood Map 35015C1325D*. Retrieved from https://msc.fema.gov/portal/search?AddressQuery=malaga%20new%20mexico#search resultsanchor

United States Department of the Interior, Bureau of Land Management. (2018). *New Mexico Cave/Karsts.* Retrieved from https://www.blm.gov/programs/recreation/recreation-programs/caves/new-mexico.

United States Fish and Wildlife Service. (2020). *National Wetlands Inventory Surface Waters and Wetland*. Retrieved from https://www.fws.gov/ wetlands/data/Mapper.html.

Limitations

This report has been prepared for the sole benefit of Black River Water Management Company, LLC. This document may not be used by any other person or entity, with the exception of the New Mexico Oil Conservation Division, without the express written consent of Vertex Resource Services Inc. (Vertex) and Black River Water Management Company, LLC. 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	nAPP2231359751
District RP	
Facility ID	
Application ID	

Release Notification

Responsible Party

Responsible Party Black River Water Management Company, LLC	OGRID 371287
Contact Name Clinton Talley	Contact Telephone 337-319-8398
Contact email clinton.talley@matadorresources.com	Incident # *(assigned by OCD)* nAPP2231359751
Contact mailing address One Lincoln Centre Dallas, Texas 75240	

Location of Release Source

Latitude 32.2884 Longitude -104.1405
(NAD 83 in decimal degrees to 5 decimal places)

Site Name Rustler Breaks SWD #003	Site Type SWD
Date Release Discovered 11/09/2022	API# *(if applicable)* 30-015-44303

Unit Letter	Section	Township	Range	County
J	24	23S	27E	Eddy

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) 46 bbls	Volume Recovered (bbls) 46 bbls
	Is the concentration of dissolved chloride 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

Valve failure on tank causing tank overflow. All fluid recovered

Form C-141
Page 2

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2231359751
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? >25 bbls.

If YES, was immediate notice given to the OCD? By whom? To whom? When and by what means (phone, email, etc)?

NOR submitted to NMOCD 11/09/2022 via NMOCD Website

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: Clinton Talley Title: RES Specialist

Signature: Clint Talley Date: 12/05/2022

email: clinton.talley@matadorresources.com Telephone: 337-319-8398

OCD Only

Received by: _____ Date: _____

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2231359751
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?	74 (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
- ☒ 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	nAPP2231359751
District RP	
Facility ID	
Application ID	

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Printed Name: Clinton Talley Title: RES Specialist

Signature: Clint Talley Date: 12/05/2022

email: clinton.talley@matadorresources.com Telephone: 337-319-8398

OCD Only

Received by: Jocelyn Harimon Date: 12/05/2022

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2231359751
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

☒ 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)

☒ 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: Clinton Talley Title: RES Specialist

Signature: Clint Talley Date: 12/05/2022

email: clinton.talley@matadorresources.com Telephone: 337-319-8398

OCD Only

Received by: Jocelyn Harimon Date: 12/05/2022

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: _____ Date: _____

Printed Name: _____ Title: _____

ATTACHMENT 2

Daily Site Visit Report

Client:	Matador Resources	Inspection Date:	11/19/2022
Site Location Name:	Rustler Breaks SWD 003	Report Run Date:	11/20/2022 5:21 PM
Client Contact Name:	Arsenio Jones	API #:	30-015-44303
Client Contact Phone #:	(575)361-4333		
Unique Project ID		Project Owner:	
Project Reference #		Project Manager:	Monica Peppin

Summary of Times

Arrived at Site	11/19/2022 7:43 AM
Departed Site	11/19/2022 7:55 AM

Field Notes

7:44 On site to conduct liner inspection/ containment inspection of battery

7:55 Rubber paint application applied to walls and an approximate foot extending out from wall base.

7:55 No signs of potential breach, entire containment clean.

7:55 No major holes / damage to cement containment

Next Steps & Recommendations

1 Send report

Daily Site Visit Report

Site Photos

Viewing Direction: North	**Viewing Direction**: West
	
Northwest corner	North wall
Viewing Direction: West	**Viewing Direction**: East
	
Northwest wall	Ground view in North area

Daily Site Visit Report

Viewing Direction: South	**Viewing Direction**: Southwest
	
Ground view by transfer pumps	Southwest corner
Viewing Direction: North	**Viewing Direction**: East
	
West wall	South wall

Daily Site Visit Report

Viewing Direction: Southeast	**Viewing Direction**: East
	
Southeast corner	East wall
Viewing Direction: North	**Viewing Direction**: West
	
Northeast wall	Base area of containment

Daily Site Visit Report

Viewing Direction: Northeast

Northeast corner

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Austin Harris

Signature: 

Signature

ATTACHMENT 3

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		POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 02004		C	ED		3	4	24	23S	27E	580825	3572378*	359	232	190	42
C 01477		CUB	ED	1	3	3	19	23S	28E	581532	3572484*	648	127	10	117
C 00010		CUB	ED	1	2	2	25	23S	27E	581129	3572075*	677	250	103	147
C 00010 CLW191759	O	CUB	ED	1	2	2	25	23S	27E	581129	3572075*	677	259		
C 00010 ENLGD		CUB	ED	1	2	2	25	23S	27E	581129	3572075*	677	259		
C 00010 CLW191724	O	CUB	ED	2	3	2	25	23S	27E	580926	3571666*	1056	259		
C 01992		C	ED	3	4	1	19	23S	28E	581929	3573094*	1066	232	45	187
C 00276 S		CUB	ED		1	1	24	23S	27E	580017	3573576*	1248	248	130	118
C 00276		CUB	ED	1	1	1	24	23S	27E	579945	3573670	1366	232	70	162
C 03390 POD1		C	ED	1	4	2	23	23S	27E	579511	3573200	1496	200	180	20
C 03082		C	ED	1	3	3	18	23S	28E	581529	3574096*	1498	220	217	3
C 00368		CUB	ED	3	3	3	13	23S	27E	579916	3573877*	1535	250	40	210
C 00368 CLW197578	O	CUB	ED		3	3	13	23S	27E	580017	3573978*	1551	250	40	210
C 00368 S		CUB	ED		3	3	13	23S	27E	580017	3573978*	1551	250	120	130
C 03779 POD1		C	ED	2	3	3	18	23S	28E	581707	3574103	1584	110	70	40

Average Depth to Water: **101 feet**

Minimum Depth: **10 feet**

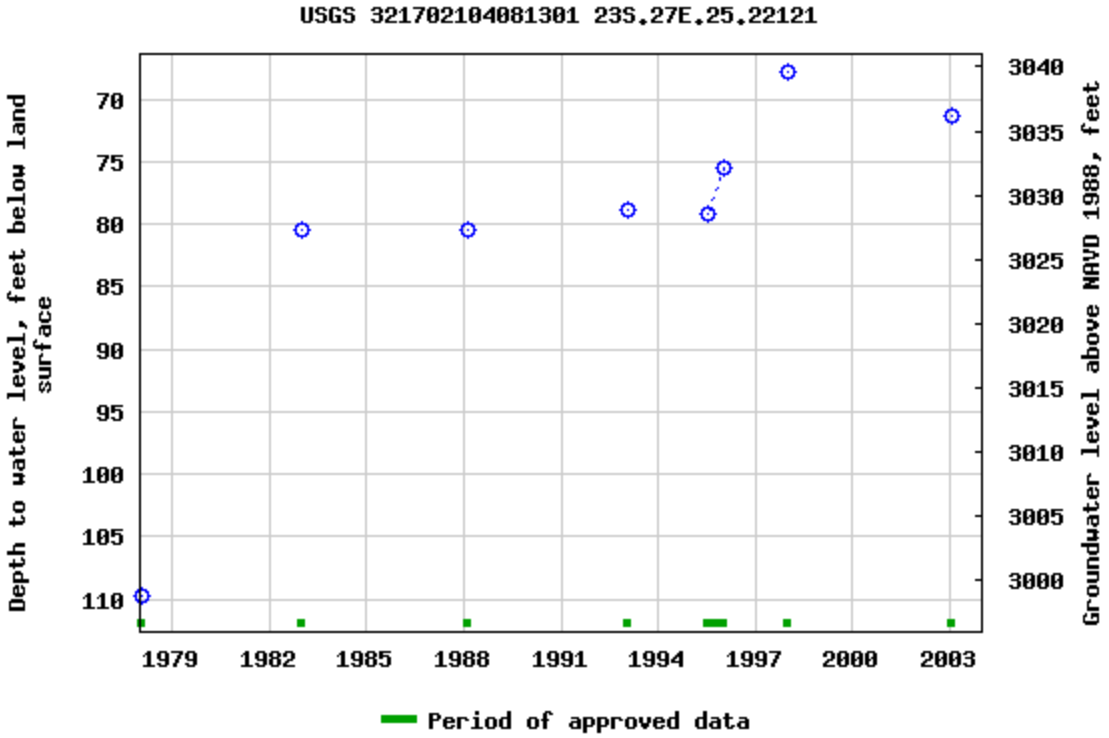
Maximum Depth: **217 feet**

Record Count: 15

UTMNAD83 Radius Search (in meters):

Easting (X): 580928.88 **Northing (Y):** 3572722.66 **Radius:** 1610

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


USGS 321702104081301 23S.27E.25.22121
Depth to water level, feet below land surface
70
75
80
85
90
95
100
105
110
Groundwater level above NAVD 1988, feet
3040
3035
3030
3025
3020
3015
3010
3005
3000
1979
1982
1985
1988
1991
1994
1997
2000
2003
Period of approved data

National Water Information System: Web Interface

USGS Water Resources

Data Category: Groundwater | Geographic Area: United States | GO

Click to hideNews Bulletins

- Introducing The Next Generation of USGS Water Data for the Nation
- Full News

Groundwater levels for the Nation

* IMPORTANT: Next Generation Station Page

Search Results -- 1 sites found

site_no list =

- 321702104081301

Minimum number of levels = 1

Save file of selected sites to local disk for future upload

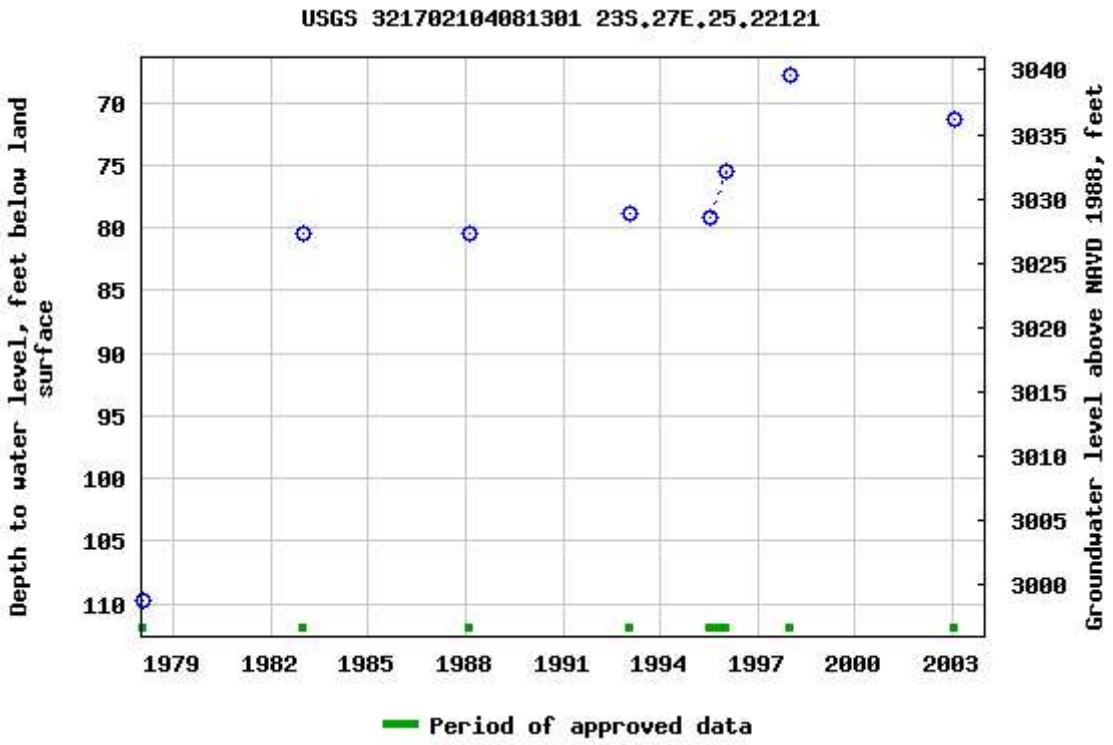
USGS 321702104081301 23S.27E.25.22121

Available data for this site | Groundwater: Field measurements | GO

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°17'02", Longitude 104°08'13" NAD27
Land-surface elevation 3,108 feet above NAVD88
The depth of the well is 250 feet below land surface.
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



Breaks in the plot represent a gap of at least one year between field measurements.
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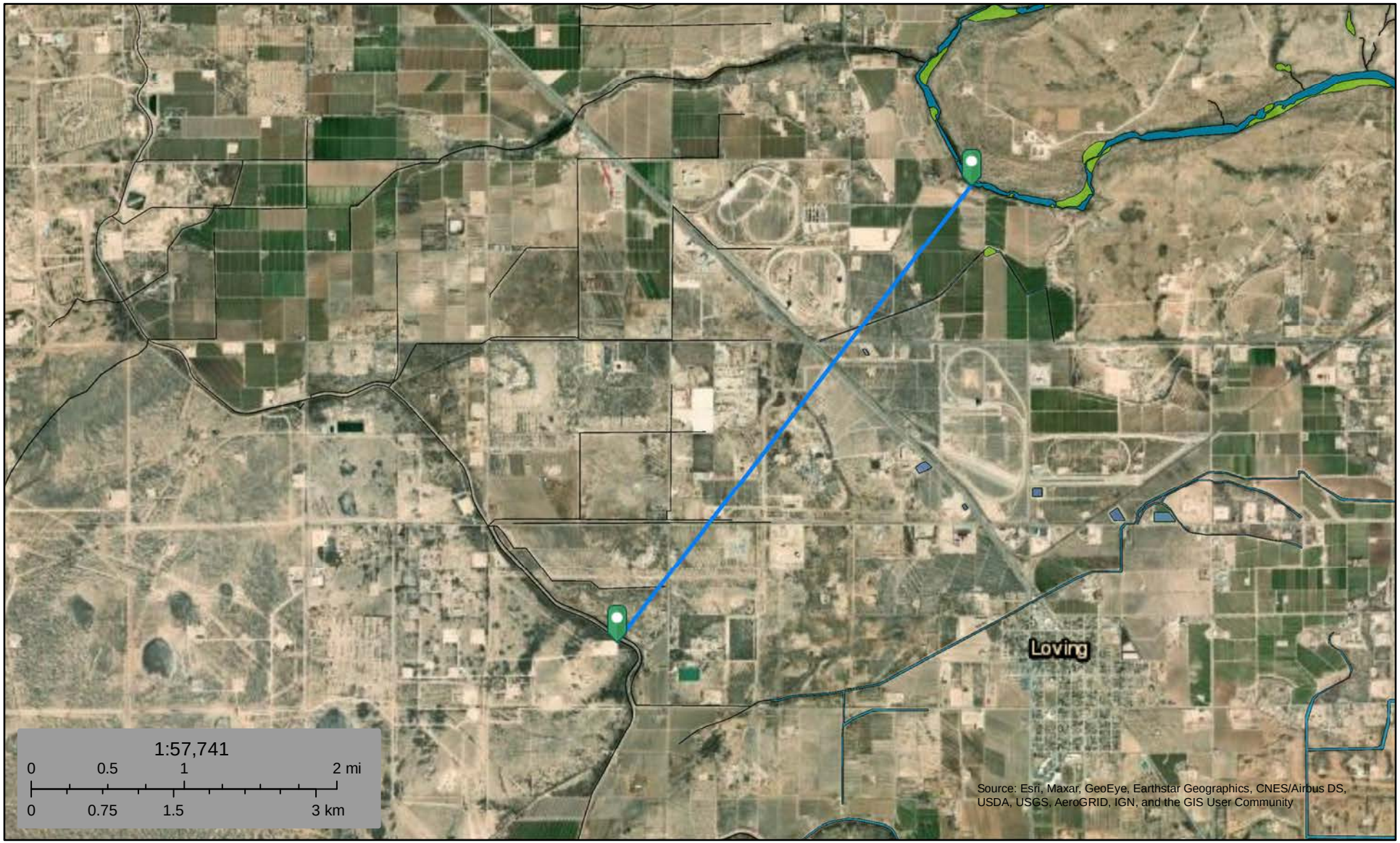
Page Contact Information: USGS Water Data Support Team
Page Last Modified: 2021-02-17 11:46:35 EST
0.67 0.58 nadww02

U.S. Fish and Wildlife Service

National Wetlands Inventory

Watercourse 16, 864 ft.



February 4, 2021

Wetlands

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

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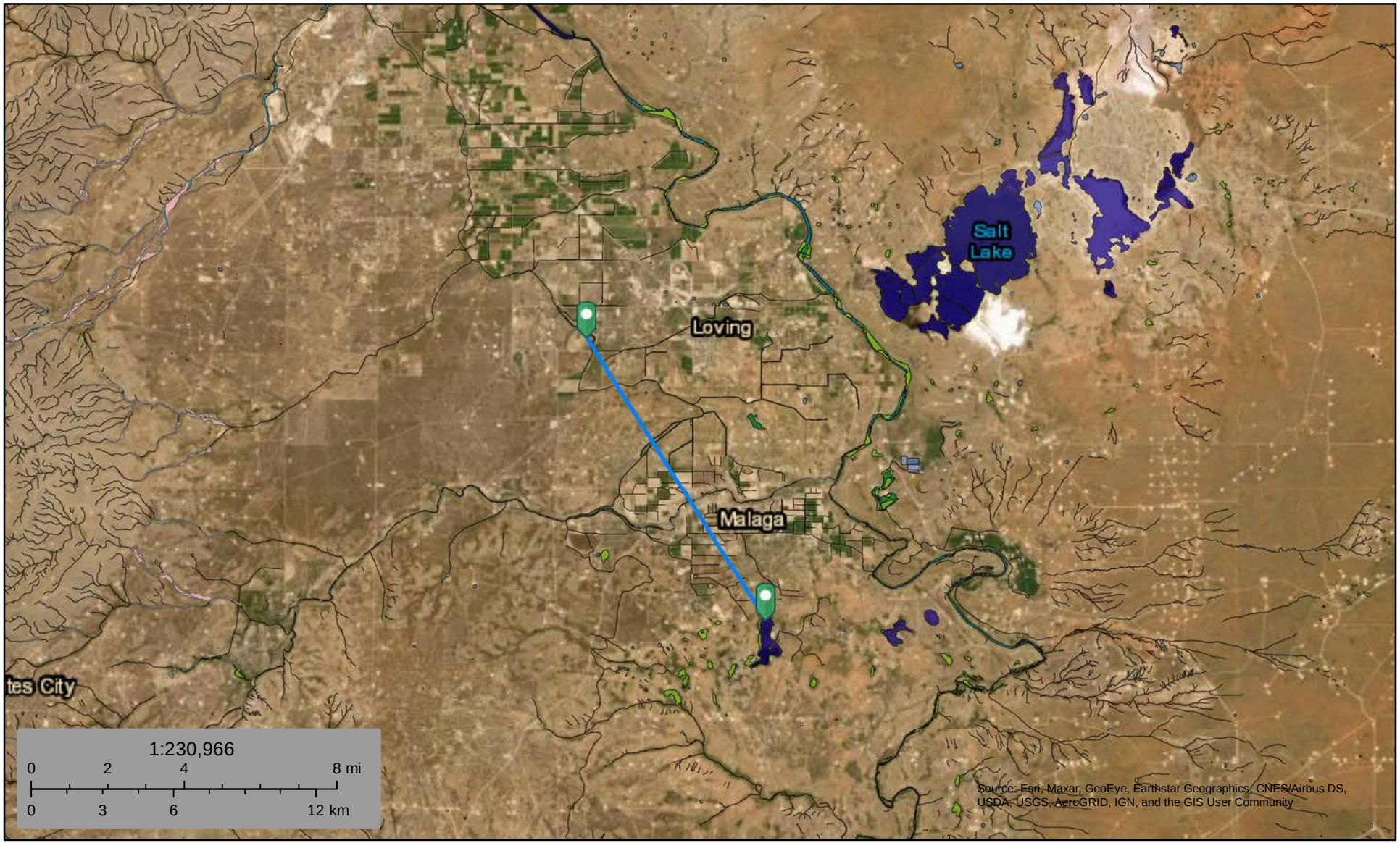
U.S. Fish and Wildlife Service
National Wetlands Inventory

Lake 39,032 ft.



February 4, 2021

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National Wetlands Inventory (NWI)
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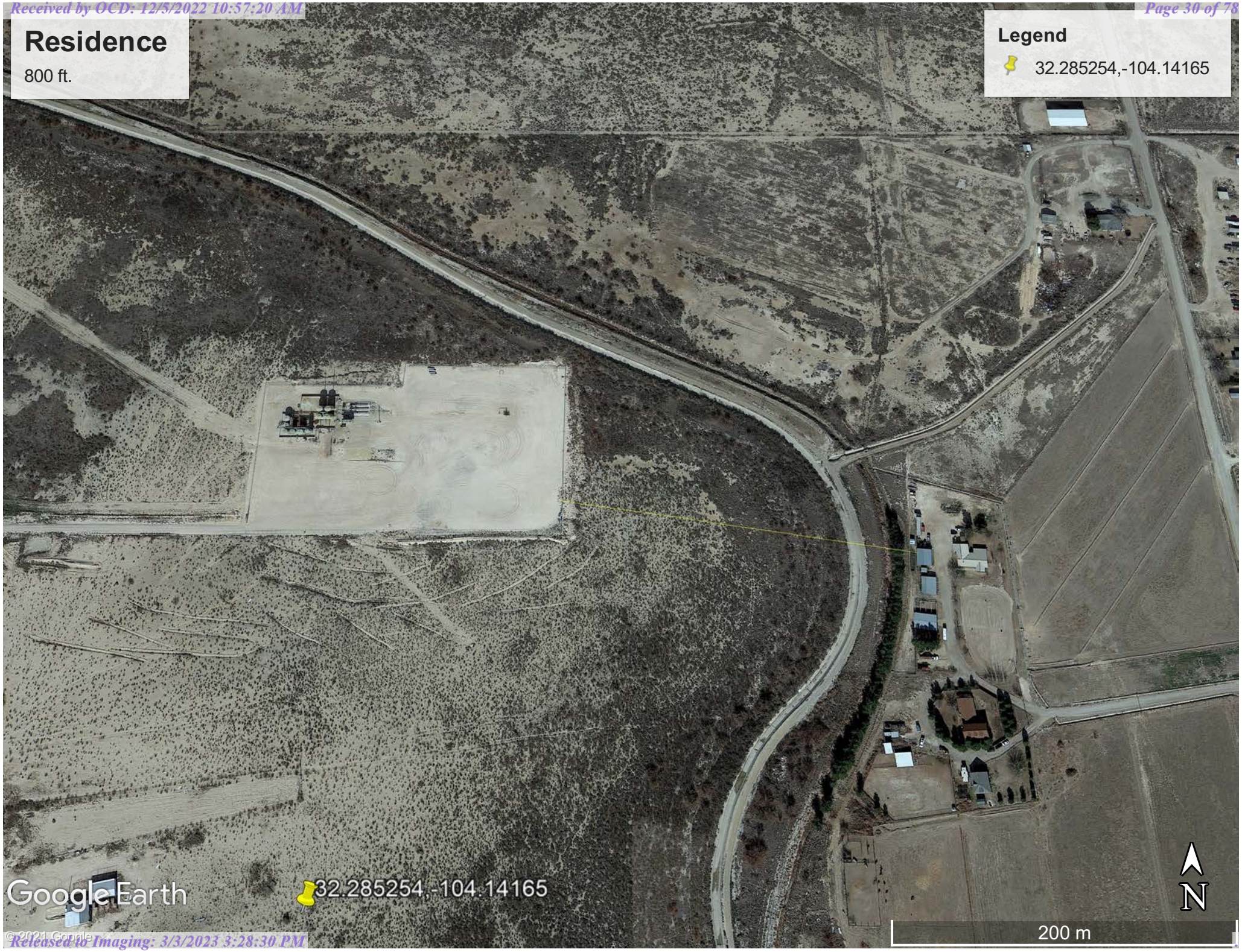

Residence
800 ft.
Legend
32.285254,-104.14165
Google Earth
32.285254,-104.14165
© 2021 Google
N
200 m

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 q q 6416 4	Sec	Tws	Rng	X	Y	Distance
C 02004	C	DOM	3	READ & STEVENS INC	ED	C 02004				Shallow	3 4	24	23S	27E	580825	3572378*	359
C 03197	C	DOL	3	DIANE WALTERS	ED	C 03197					4 4 3	24	23S	27E	580520	3572274*	607
C 01537	C	DOL	0	DALTON R ALLISON	ED	C 01537					1 1 3	19	23S	28E	581531	3572887*	624
C 01477	CUB	IRR	236.238	NEW MEXICO INTERSTATE STREAM COMMISSION	ED	C 01477				Shallow	1 3 3	19	23S	28E	581532	3572484*	648
C 00010 A	CUB	IRR	28.8	WILLIAM E NYMAN	ED	C 00010				Shallow	1 2 2	25	23S	27E	581129	3572075*	677
C 00010 AA	CUB	IRR	375.615	JOHN MORRIS	ED	C 00010 POD5					1 2 2	25	23S	27E	581129	3572075*	677
C 00010 ENLGD	CUB	IRR	90	BRUCE D PARDUE TRUSTEE	ED	C 00010 ENLGD					1 2 2	25	23S	27E	581129	3572075*	677
C 00785	CUB	EXP	0	EDWARDO AREVALO	ED	C 00785					3	19	23S	28E	581834	3572586*	915
C 03196	C	DOL	3	DIANE WALTERS	ED	C 03196					3 1 3	24	23S	27E	579916	3572672*	1014
C 01992	C	PRO	3	READ & STEVENS INC	ED	C 01992				Shallow	3 4 1	19	23S	28E	581929	3573094*	1066
C 00492	CUB	IRR	0	LEWIS L T	ED	C 00492					3 3 4	13	23S	27E	580722	3573887*	1182
C 00231	CUB	IRR	111.6	FARM CREDIT BANK OF WITCHITA	ED	C 00231 S				Shallow	4 4 4	13	23S	27E	581326	3573891*	1233
C 00231 A	CUB	MDW	201.6	MALAGA WATER USERS CO-OP	ED	C 00231 S				Shallow	4 4 4	13	23S	27E	581326	3573891*	1233
C 00231 B	CUB	IRR	149.4	EMILLO R. & PAULINE F. VILLA	ED	C 00231 S				Shallow	4 4 4	13	23S	27E	581326	3573891*	1233
C 00276	CUB	IRR	402.603	NEW MEXICO INTERSTATE STREAM	ED	C 00276 S				Shallow	1 1	24	23S	27E	580017	3573576*	1248
C 00276 A	CUB	IRR	473.585	NEW MEXICO INTERSTATE STREAM	ED	C 00276 S				Shallow	1 1	24	23S	27E	580017	3573576*	1248
C 00231	CUB	IRR	111.6	FARM CREDIT BANK OF WITCHITA	ED	C 00231				Shallow	3 3 3	18	23S	28E	581529	3573896*	1317
C 00231 A	CUB	MDW	201.6	MALAGA WATER USERS CO-OP	ED	C 00231				Shallow	3 3 3	18	23S	28E	581529	3573896*	1317

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

(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 6416	q 4	q	Sec	Tws	Rng	X	Y	Distance
C 00231 B	CUB	IRR	149.4	EMILLO R. & PAULINE F. VILLA	ED	C 00231			Shallow	3	3	3	18	23S	28E	581529	3573896*	1317
C 00276	CUB	IRR	402.603	NEW MEXICO INTERSTATE STREAM	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 00276 A	CUB	IRR	473.585	NEW MEXICO INTERSTATE STREAM	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03128	C	PRO	0	YATES PETROLEUM	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03155	C	PRO	0	PATTERSON DRILLING	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03223	C	PRO	0	DUGAN INC.	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03237	C	PRO	0	PATTERSON-UTI DRILLING COMPANY	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03578	C	PRO	0	CASA OPERATING	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03579	C	PRO	0	CASA OPERATING	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 03583	C	PRO	0	CASA OPERATING	ED	C 00276			Shallow	1	1	1	24	23S	27E	579944	3573670	1366
C 00054	CUB	IRR	0	ARTHUR LANCASTER	ED	C 00054				1	1	4	25	23S	27E	580727	3571263*	1473
C 03390	C	DOM	1	MARY SUE MCDONALD	ED	C 03390 POD1			Shallow	1	4	2	23	23S	27E	579511	3573200	1496
C 03082	C	DOM	3	MICHAEL L ROSS	ED	C 03082			Shallow	1	3	3	18	23S	28E	581529	3574096*	1498
C 04363	C	DOM	1	JAIME TORRES	ED	C 04363 POD1	2245F			1	3	3	18	23S	28E	581521	3574121	1518
C 00368	CUB	IRR	385.5	JERRY D ROSE	ED	C 00368			Shallow	3	3	3	13	23S	27E	579916	3573877*	1535
					ED	C 00368 S			Shallow		3	3	13	23S	27E	580017	3573978*	1551
C 00368 A	CUB	IRR	243	IGNACIO G VASQUEZ	ED	C 00368 A					3	3	13	23S	27E	580017	3573978*	1551
C 03779	C	SAN	1	LEONEL TORRES	ED	C 03779 POD1			Shallow	2	3	3	18	23S	28E	581706	3574103	1584

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

Record Count: 36

UTMNAD83 Radius Search (in meters):

Easting (X): 580928.88 **Northing (Y):** 3572722.66 **Radius:** 1610

Sorted by: Distance

Rustler Breaks SWD #003

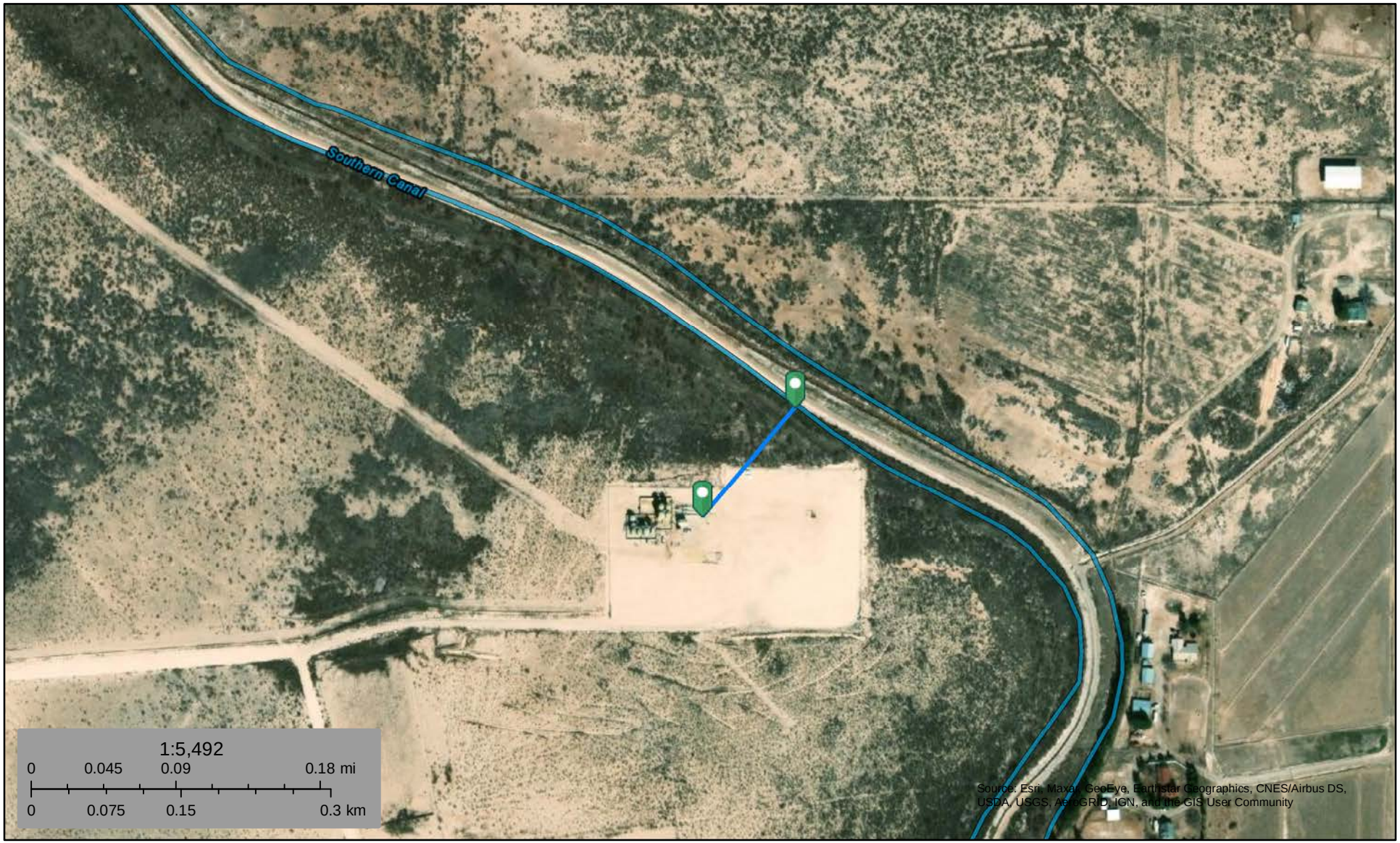
Nearest Town: Loving, New Mexico
Distance: 2.61 miles (13,773 feet)

Legend

- Allsup's Convenience Store
- CIG Logistics Loving, NM
- Corporate Hospitality Housing
- Loving Senior High School
- Onsurez RV
- Rustler Breaks SWD #003

U.S. Fish and Wildlife Service
National Wetlands Inventory

Rustler Breaks SWD #003



February 17, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
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National Wetlands Inventory (NWI)
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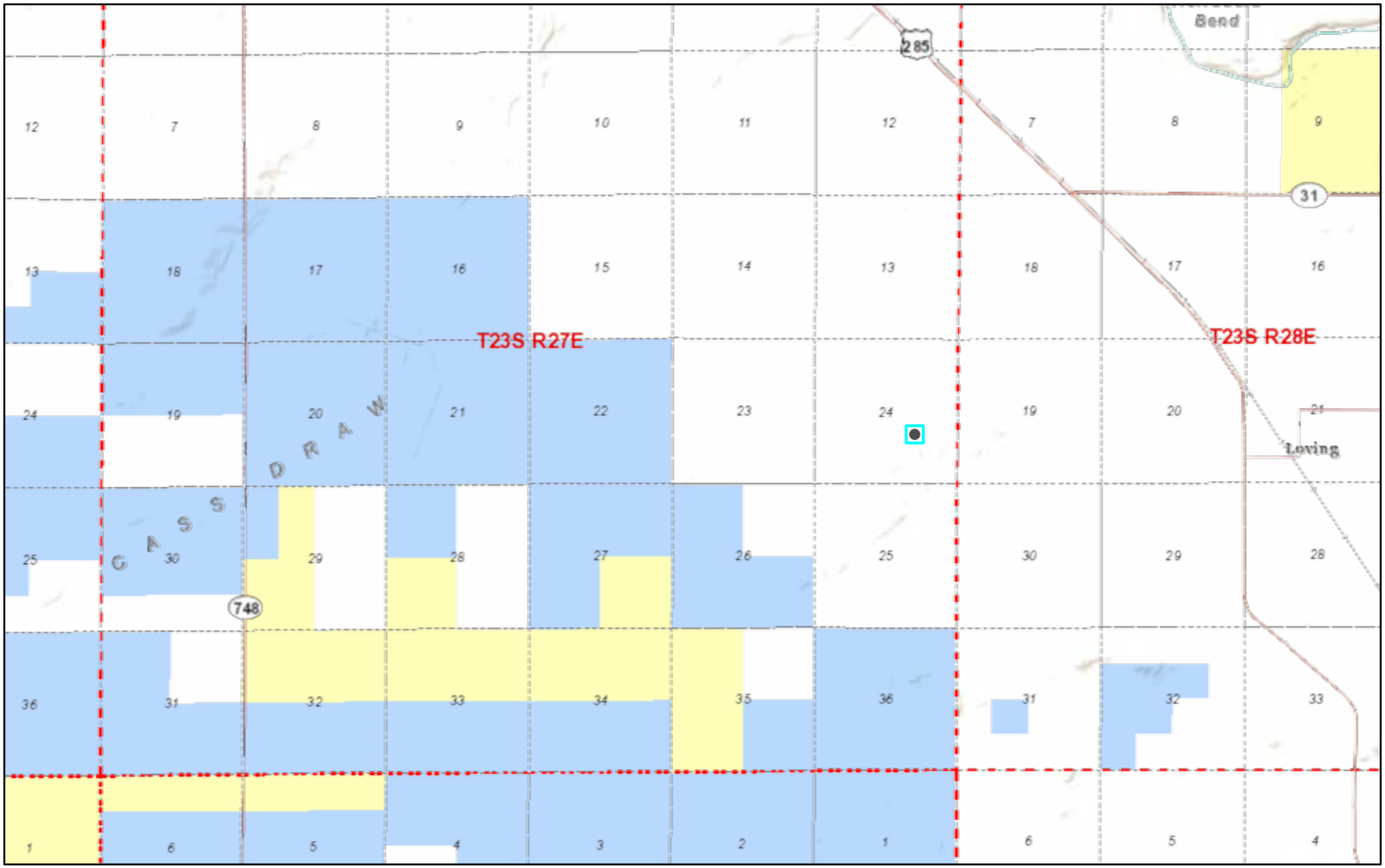
Active Mines in New Mexico



2/4/2021, 4:08:18 PM

1:72,224

0 0.5 1 2 mi

0 0.75 1.5 3 km

Township / Range

Sections

Land Ownership

Bureau of Land Management

Bureau of Reclamation

Department of Agriculture

Department of Defense

Department of Energy

National Park Service

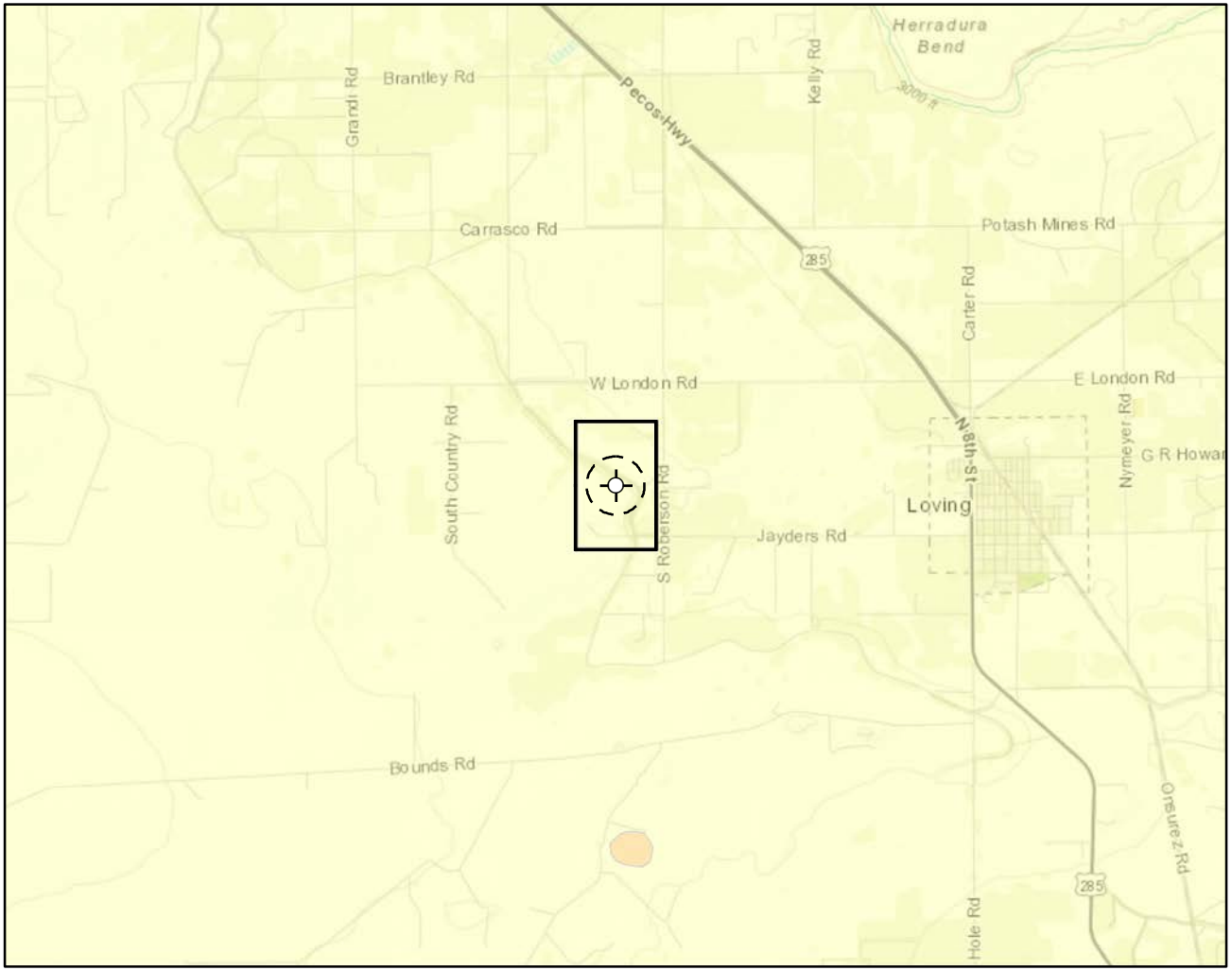
Private Land

State Game and Fish

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

EMNRD MMD GIS Coordinator

NM Energy, Minerals and Natural Resources Department (http://nm-emnrd.maps.arcgis.com/apps/webappviewer/index.html?id=1b5e57974664d689b47790897ca2795)



Karst Potential

- Critical
- High
- Medium
- Low

Site

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: 32.288365, -104.140529

NAD 1983 UTM Zone 13N
Date: Feb 07/21

N

Karst Potential
Rustler Breaks SWD #003

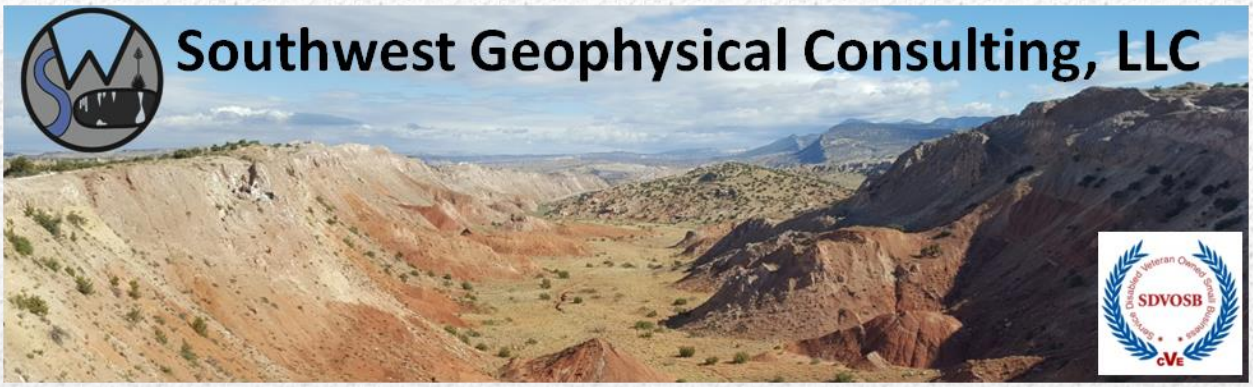
FIGURE:
X

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 20XX; Overview Map: ESRI World Topographic

VERSATILITY. EXPERTISE.

Document Path: G:\1-Projects_US PROJECTS\Matador Resources\21E-000870003 Rustler Breaks SWD #001\Fig X Karst Potential Rustler Breaks SWD #003.mxd



Cave and Karst Resource Inventory Report
Rustler Breaks SWD Pad #003
Eddy County, New Mexico

Vertex Resource Group, Ltd
3101 Boyd Drive
Carlsbad, NM 88220

☐ **Positive – HKOZ remediation process required**

☑ **Negative – Oil Conservation Division may approve MKOZ remediation process at their discretion**

September 27, 2021

VERT-001-20210915

Published by:
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5117 Fairfax Dr. NW
Albuquerque, NM 87114
(505) 585-2550
www.swgeophys.com

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Carlsbad, NM 88220

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MMXXI

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1.0 INTRODUCTION

A pedestrian surface karst survey was commissioned by Vertex Resources Group, Ltd. (hereinafter referred to as "the client") on September 15, 2021, for the purpose of determining what, if any, karst-related surface features are present near the Rustler Breaks SWD Pad #003 (hereinafter termed “RSTB”) and to provide guidance on the level of remediation required.

As indicated in section ***1.3 Affected Environment***, the bedrock and overlying soil at the survey site are susceptible to sinkhole development and karst features may be hidden beneath the existing soil stratum. Risk associated with sinkhole formation can be minimized during development with proper foundation design and construction, and the control of site hydrology. The owner/developer must recognize, however, that a risk of sinkhole-induced damage to infrastructure does exist. The owner/developer must evaluate the risks and attendant costs of not performing a geophysical survey prior to development and must be willing to accept these risks if it is decided that a surface karst survey is sufficient. Southwest Geophysical Consulting, LLC, can provide a geophysical survey. If the decision is made to conduct a geophysical survey, a cost estimate and timeline will be provided upon request.

1.1 Goals of this Study

To provide the client with the location, description, photos, and boundaries of any surface karst-related features within a 200-meter buffer surrounding the RSTB project site as provided by the client via e-mail (**Schematic for karst survey.pdf**) on September 15, 2021, and provide guidance to the Oil Conservation Division on the applicability of downgrading the area from a high karst occurrence zone to a medium karst occurrence zone based on the number of surface karst features located for the purpose of determining the amount of remediation required.

1.2 Summary of Findings

No surface karst features were located within the pedestrian survey area; however, subsurface karst development may exist, and caution should be exercised during any remediation efforts.

1.3 Affected Environment

The proposed RTSB project is located in evaporite karst terrain, a landform that is characterized by underground drainage through solutionally enlarged conduits. Evaporite karst terrain may contain sinkholes, sinking streams, caves, and springs. Sinkholes leading to

underground drainages and voids are common. These karst features, as well as occasional fissures and discontinuities in the bedrock, provide the primary sources for rapid recharge of the groundwater aquifers of the region.

The Bureau of Land Management (BLM) categorizes all areas within the Carlsbad Field Office (CFO) zone of responsibility as having either low, medium, or high cave potential based on geology, occurrence of known caves, density of karst features, and potential impacts to freshwater aquifers[1]. These designations are also recognized by the New Mexico State Land Office (NMSLO). This project occurs within both **HIGH** (HKOZ) and **MEDIUM** (MKOZ) karst occurrence zones (**Figure 1**).

A high karst occurrence zone is defined as an area in known soluble rock types that contains a high frequency of significant caves and karst features such as sinkholes, bedrock fractures that provide rapid recharge of karst aquifers, and springs that provide riparian habitat[2].

A medium karst occurrence zone is defined as an area in known soluble rock types that may have a shallow insoluble overburden. These areas may contain isolated karst features such as caves and sinkholes. Groundwater recharge may not be wholly dependent on karst features, but the karst features still provide the most rapid aquifer recharge in response to surface runoff.

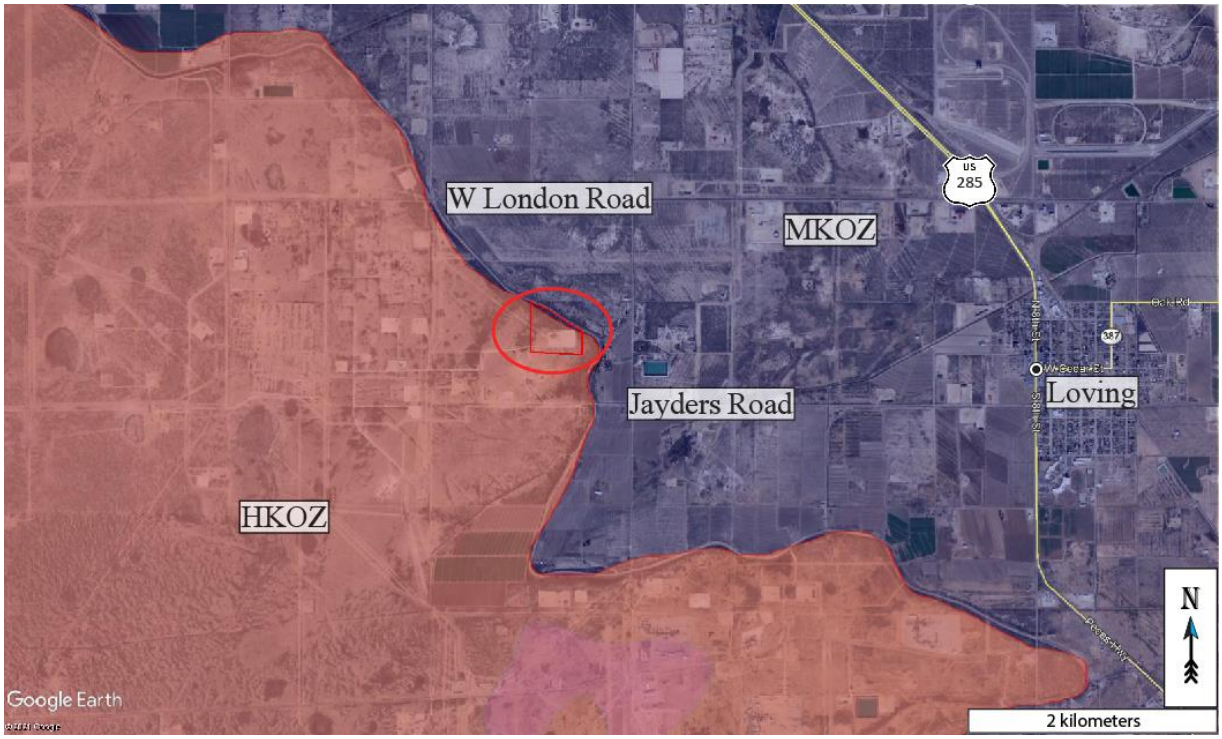

Figure 1: Karst occurrence overview. Red transparent area is a high karst occurrence zone. Blue transparent area is a medium karst occurrence zone. Study area is the red polygon within the red ellipse in the middle portion of the image. Background image: Google Earth. Image date: December 21, 2019. Datum: WGS-84.

2.0 LOCATION AND DESCRIPTION OF STUDY AREA

2.1 Description of Site

The RTSB project site is located in Eddy County, New Mexico, 4.0 kilometers (2.5 miles) west of Loving, New Mexico, between West London and Jayders Roads (**Figure 1** and **Figure 2**). The site is located within section 24 of NM T23S R27E. The region is semi-arid with an average annual precipitation of approximately 13 inches, of which about two-thirds falls as rain during summer thunderstorms from June to October. Summers are hot and sunny while winters are generally mild, with an average maximum temperature of 96°F in July and an average minimum temperature of 28°F in January[3]. This area is within the Chihuahuan Desert Thornscrub as defined by the Southwestern Regional ReGAP Vegetation map[4] and the vegetation consists mostly of areas of grass, mesquite, acacia, sparse creosote, and sparse yucca with good visibility in most locations. See section ***2.2 Local Geology*** for the geology of the area. Eighty-six percent of the survey is within an HKOZ and the remaining 14% is within an MKOZ (**Figure 1**); the entirety of the survey is located on privately managed land (**Figure 2**).

Figure 2: Land ownership overview. Red polygon highlights the survey area. Yellow transparent area is BLM-CFO managed land. Blue transparent areas are NMSLO managed lands. No color is privately managed land. Background image credit: Google Earth. Image date: December 21, 2019. Datum: WGS-84.

2.2 Local Geology

The area surveyed for the RTSB project is located in Cass Draw at an elevation of 950 meters (3,117 feet), ± 2 meters (6.56 feet), within an area underlain by the Permian Rustler Formation (Pru). The area is mantled by gypsiferous soils and Quaternary aeolian sands (Qal) and alluvial gravels (Qp)[5] of an undetermined depth (**Figure 3**). The Rustler Formation is an evaporite facies and is composed mainly of thin siltstones and sandstones interbedded with claystones, dolomite and gypsum[6], and contains both karst-forming strata (the Forty-niner and Tamarisk Members) and two shallow aquifers (the Magenta and Culebra Dolomite Members). The Pru overlies the Permian Salado Formation (Psl, not shown in the below image as it does not outcrop at the surface in this area), a layer of extremely soluble halite which can easily be dissolved to create caves, sinkholes, and other karst features[7]. The Rustler Formation may be subject to collapse if a void has developed beneath it in the Salado Formation[8]. The surrounding area is moderately karstified and has occasional sinkholes, swallets, caves, and other karst features. The survey area is covered by the Geologic Map of New Mexico (2003) at 1:500,000 scale[5].

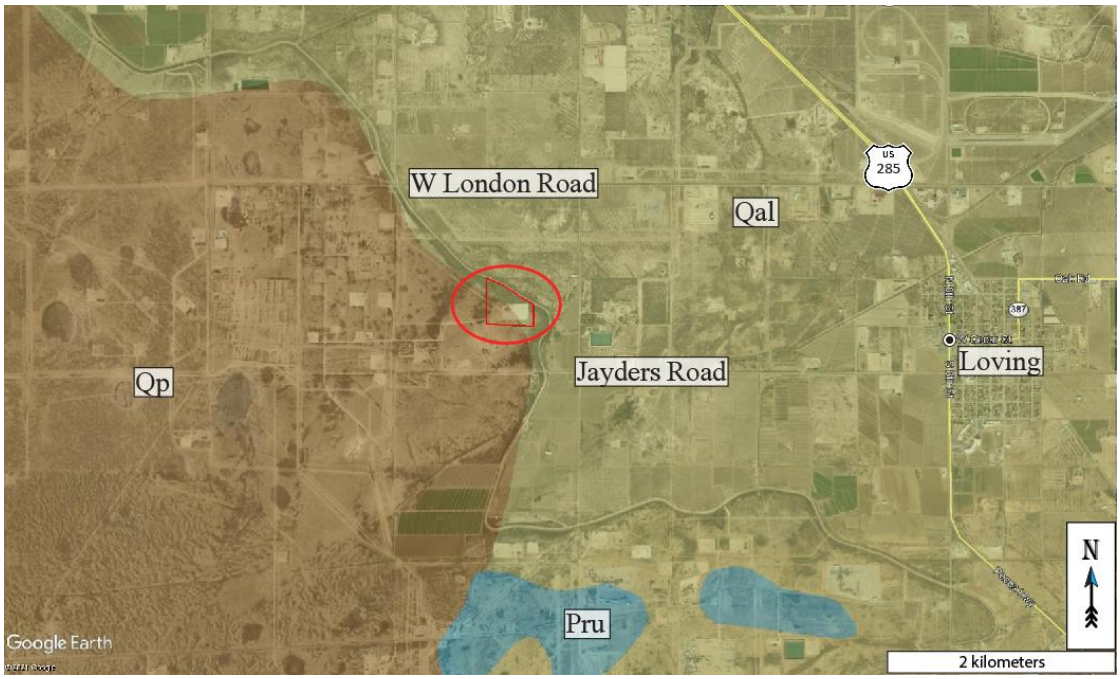

Figure 3: Geology overview. Red polygon highlights the survey area. Pru: Permian Rustler Formation. Qp: Quaternary piedmont deposits. Qal: Quaternary alluvium. Map credit: Geologic Map of New Mexico, scale: 1:500,000 (2003), and Google Earth. Image date: December 21, 2019. Datum: WGS-84.

2.3 Description of Survey

For this survey, four lines were walked in raster pattern at 25-meter (82-foot) intervals in the designated area, providing 90 to 100% coverage for features greater than 50 centimeters (20 inches) in diameter (**Table 1** and **Figure 4**).

The survey was completed by Garrett Jorgensen on September 21, 2021. The total distance walked was 4.0 kilometers (2.5 miles) and the total area covered was 0.1 square kilometers (24 acres).

Table 1: Pedestrian Survey Track Data Files

File Name	Surveyor	Date	Length (km/miles)	Area (km^2/Ac)
RTSBSrv_D1S1A.kmz	Jorgensen	09/21/2021	4.03/2.5	0.10/24.4

Figure 4: Survey overview. Red polygon is the study area. Transparent yellow area is the approximate spill location. Blue wavy lines are the actual survey lines. Background image credit: Google Earth. Image date: December 21, 2019. Datum: WGS-84.

2.4 Description of Karst Features

No surface karst features were located within the boundary of the pedestrian survey area for the RTSB project; however, caution should be exercised during any remediation efforts since this area is prone to surface collapse.

3.0 RECOMMENDATIONS

No surface karst features were located during this survey. Based on these findings and the nearby MKOZ, considering the use of medium karst occurrence zone (versus high karst occurrence zone) spill remediation procedures by the Oil Conservation Division is appropriate within the survey area. Confirmation to use a lower remediation level should be received from the Oil Conservation Division before proceeding.

This area is prone to rapid karst formation in the underlying stratigraphy and warrants careful planning and engineering to mitigate karst-forming processes that could be accelerated by poor design considerations. Proper engineering of petroleum-related facilities following karst guidelines should be implemented during any brush clearing or excavation. Mitigation measures for any karst features revealed during excavation should be approved by the Bureau of Land Management – Carlsbad Field Office and follow the Natural Resources Conservation Service Conservation Practice Standard for Karst Sinkhole Treatment, Code 527, or the Bureau of Land Management Cave and Karst Management Handbook, H-8380-1.

Keep in mind that any flow of gypsum-undersaturated waters into a small crack or crevice can rapidly dissolve the underlying gypsum and cause failure of any impoundment or infrastructure within a matter of months to a few years. It is imperative that any dikes, buffers, or liners installed are checked regularly for integrity, with repairs made immediately upon discovery of failure.

Vigilance during construction is paramount. If voids are encountered during remediation, contact the Bureau of Land Management Karst Division at (575) 234-5972, the New Mexico State Land Office Surface Resources Division at (505) 827-5768, or a specialist from the BLM-CFO Approved Cave and Karst Contractors list, depending on the location of the feature, and request an on-site investigation from a karst expert if one is not already on site. A karst consultant can generally be available in Eddy County within five hours. Employing an on-site karst consultant during excavation in this area should be considered. Monitoring services, as well as cave surveys and geophysical surveys are available from Southwest Geophysical Consulting.

4.0 REFERENCES

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4. Whitehead, W. and C. Flynn, *Plant Utilization in Southeastern New Mexico: Botany, Ethnobotany, and Archaeology.* 2017, Carlsbad, NM: Bureau of Land Management, Carlsbad Field Office.
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6. Johnson, K.S., *Evaporite Karst in the United States.* Carbonates and Evaporites, 1997. **12(1)**: p. 2-14.
7. Martinez, J.D., K.S. Johnson, and J.T. Neal, *Sinkholes in Evaporite Rocks.* American Scientist, 1998. **86(1-2)**: p. 38-51.
8. Vine, J.D., *Surface Geology of Nash Draw Quadrangle Eddy County New Mexico,* 1963.

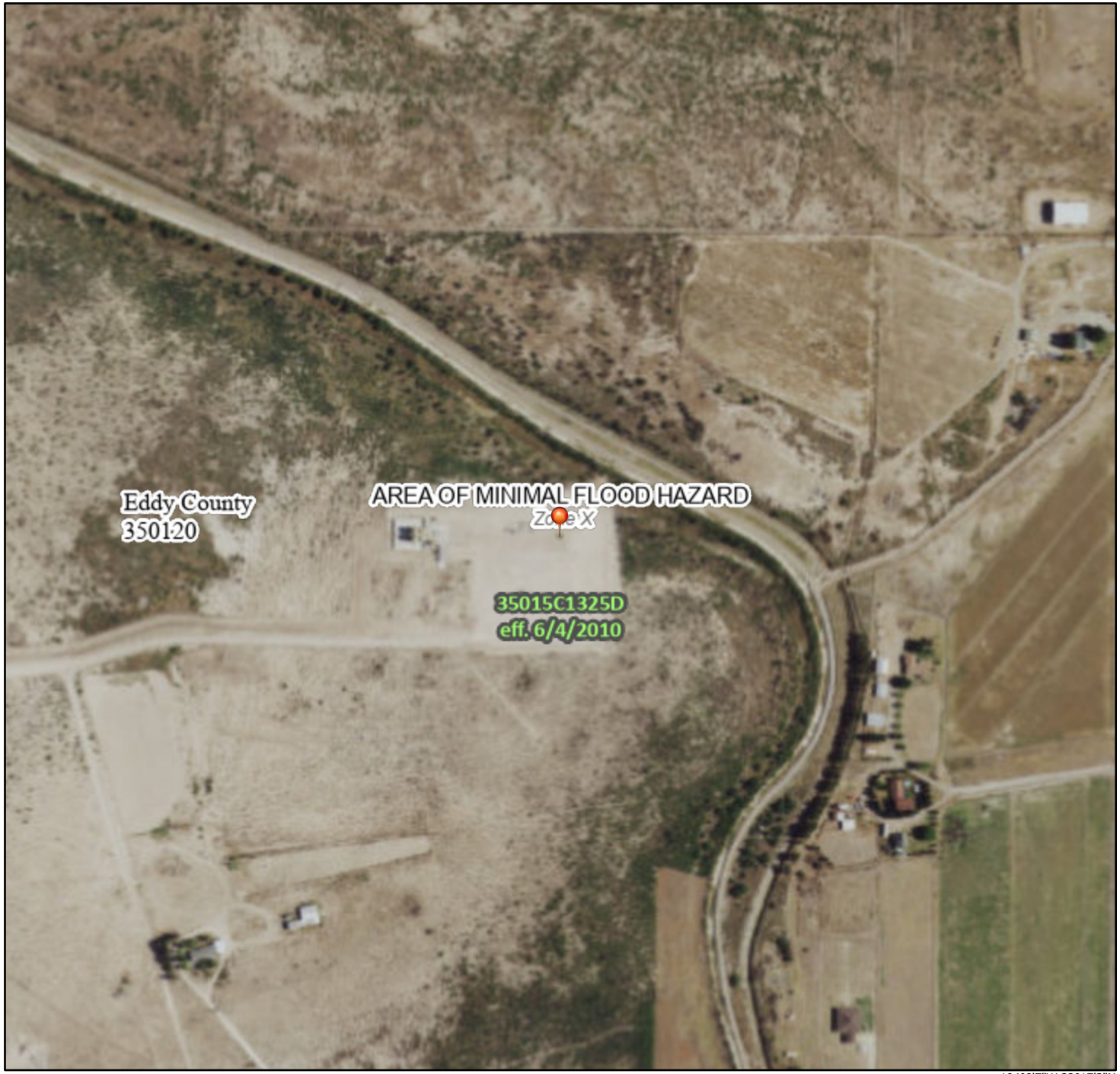
5.0 GLOSSARY OF TERMS

BLM-CFO	Bureau of Land Management - Carlsbad Field Office
caprock-collapse sinkhole	Collapse of roof-spanning rock into a cave or void.
cave	Natural opening at the surface large enough for a person to enter.
cover-collapse sinkhole	Raveling of soil into a pre-existing void or fracture.
GPS	Global Positioning System
NMSLO	New Mexico State Land Office
playa lake	A natural depression on the surface that collects rainwater. Some contain swallets and/or caves, others do not.
Pru	Permian Rustler Formation
Psl	Permian Salado Formation
Qal	Quaternary alluvium
Qp	Quaternary piedmont deposits
swallet	A natural opening in the surface, too small for a person, that drains water to an aquifer. Some are "open," meaning a void can be seen below; some are "closed, "meaning they are full of sediment.
WGS	World Geodetic System

National Flood Hazard Layer FIRMette

FEMA

104°8'45"W 32°17'33"N



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

1:6,000

104°8'7"W 32°17'3"N

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 2/4/2021 at 6:21 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 Eddy Area, New Mexico

February 4, 2021

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.

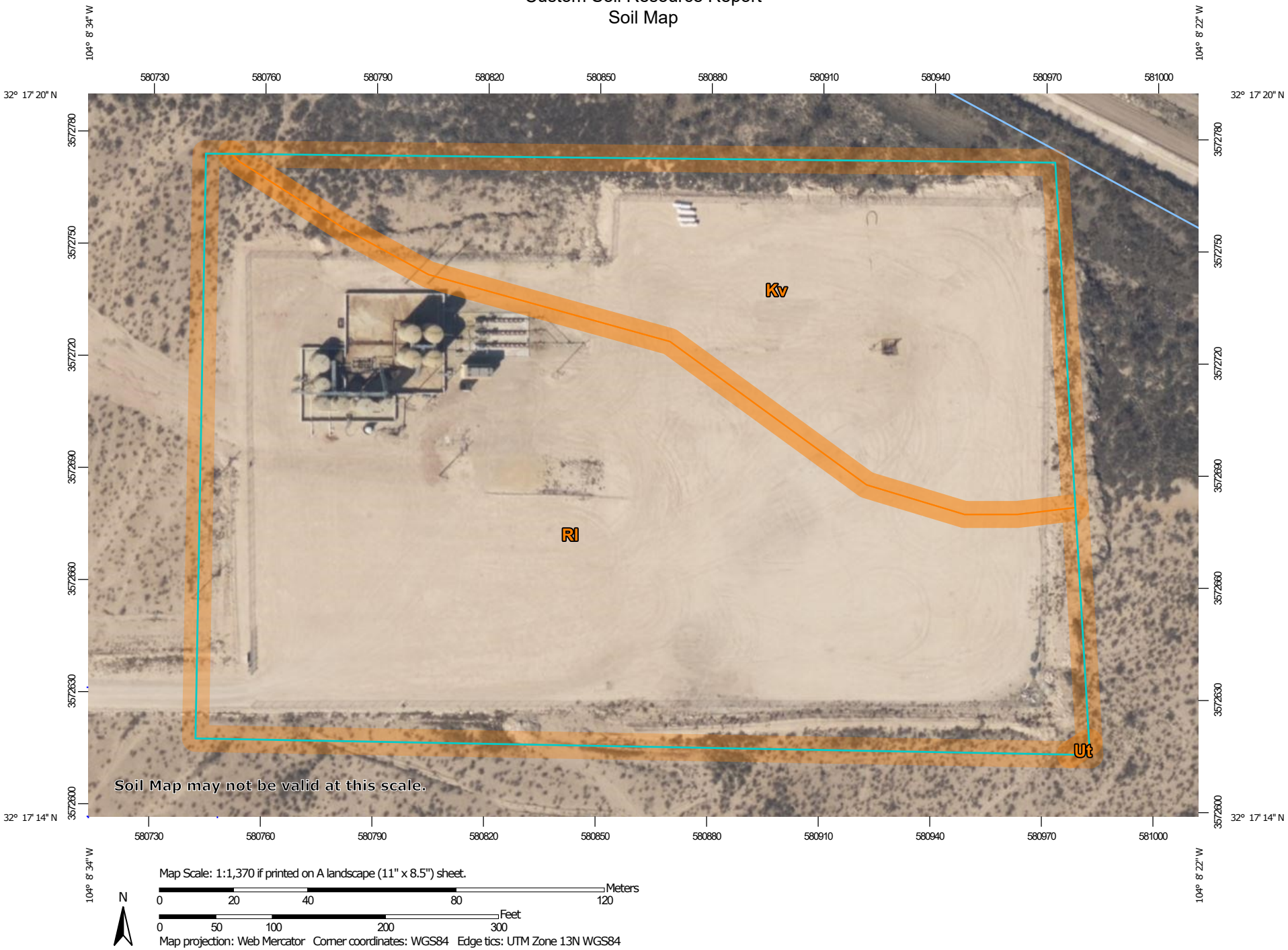
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

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

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 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
Kv	Karro loam, saline, 0 to 1 percent slopes	3.0	32.6%
Rl	Reeves loam, 0 to 1 percent slopes	6.2	67.4%
Ut	Upton soils, 1 to 3 percent slopes	0.0	0.0%
Totals for Area of Interest		**9.2**	**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.

Eddy Area, New Mexico

Kv—Karro loam, saline, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w4x
Elevation: 3,000 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 60 to 64 degrees F
Frost-free period: 200 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Karro and similar soils: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Karro

Setting

Landform: Alluvial fans, plains
Landform position (three-dimensional): Riser, rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 90 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 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: 60 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: R042XC036NM - Salt Flats
Hydric soil rating: No

Minor Components

Reeves

Percent of map unit: 1 percent

Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

RI—Reeves loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w5p
Elevation: 1,250 to 4,800 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 120 to 225 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Reeves and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Reeves

Setting

Landform: Hills, plains, ridges
Landform position (two-dimensional): Backslope, footslope, shoulder, toeslope
Landform position (three-dimensional): Crest, nose slope, side slope, head slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Residuum weathered from gypsum

Typical profile

Ap - 0 to 8 inches: loam
H2 - 8 to 32 inches: clay loam
H3 - 32 to 60 inches: gypsiferous material

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
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: 25 percent
Gypsum, maximum content: 80 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

Minor Components

Cottonwood
Percent of map unit: 1 percent
Ecological site: R042XC006NM - Gyp Upland
Hydric soil rating: No

Karro
Percent of map unit: 1 percent
Ecological site: R042XC030NM - Limy
Hydric soil rating: No

Ut—Upton soils, 1 to 3 percent slopes

Map Unit Setting
National map unit symbol: 1w69
Elevation: 1,100 to 4,400 feet
Mean annual precipitation: 7 to 14 inches
Mean annual air temperature: 60 to 70 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Upton and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Upton

Setting
Landform: Fans, ridges
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile
H1 - 0 to 8 inches: gravelly loam
H2 - 8 to 12 inches: gravelly loam
H3 - 12 to 21 inches: cemented
H4 - 21 to 60 inches: very gravelly loam

Properties and qualities
Slope: 1 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
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R042XC025NM - Shallow
Hydric soil rating: No

Minor Components

Upton

Percent of map unit: 1 percent
Ecological site: R042XC025NM - Shallow
Hydric soil rating: No

Atoka

Percent of map unit: 1 percent
Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

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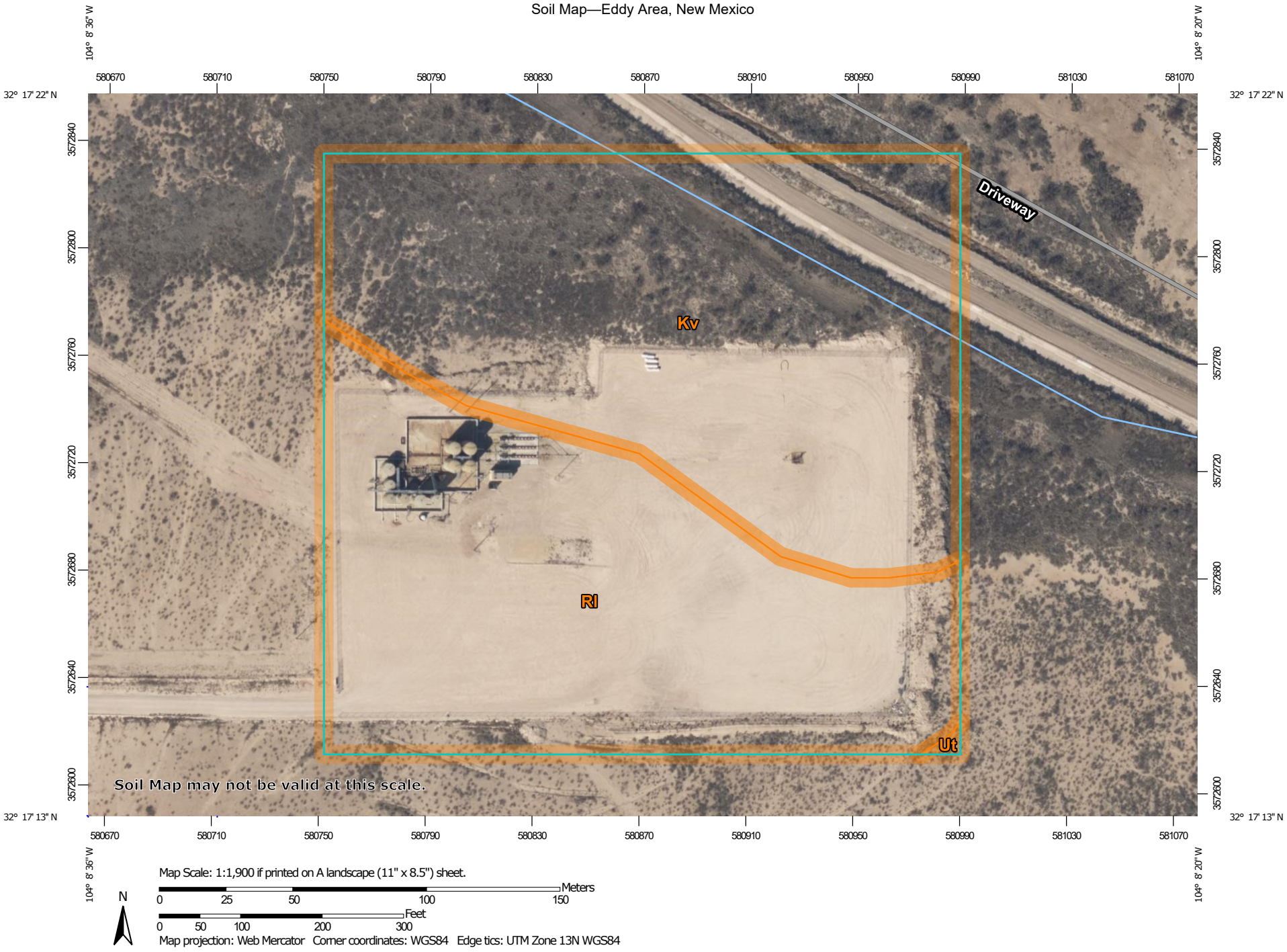
Soil Map—Eddy Area, New Mexico



MAP LEGEND

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

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- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
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- 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: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

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

Date(s) aerial images were photographed: Feb 27, 2020—Feb 28, 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
Kv	Karro loam, saline, 0 to 1 percent slopes	7.0	53.0%
Rl	Reeves loam, 0 to 1 percent slopes	6.2	46.9%
Ut	Upton soils, 1 to 3 percent slopes	0.0	0.1%
Totals for Area of Interest		**13.2**	**100.0%**

Eddy Area, New Mexico

Kv—Karro loam, saline, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1w4x
Elevation: 3,000 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 60 to 64 degrees F
Frost-free period: 200 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Karro and similar soils: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Karro

Setting

Landform: Alluvial fans, plains
Landform position (three-dimensional): Riser, rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 90 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 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: 60 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: R042XC036NM - Salt Flats

Hydric soil rating: No

Minor Components

Reeves

Percent of map unit: 1 percent
Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

Data Source Information

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 16, Jun 8, 2020

Ecological Reference Worksheet

Author(s) / participant(s): John Tunberg,

Contact for lead author : 505-761-4488 **Reference site used? Yes/No** No

Date: 2/12/2010 **MLRA:** 42.3 **Ecological Site:** Loamy This *must* be verified based on soils and climate (see Ecological Site Description). Current plant community *cannot* be used to identify the ecological site.

Indicators: For each indicator, describe the potential for the site. Where possible, **(1)** use numbers, **(2)** include expected range of values for above and below average years for **each** community within the reference state, when appropriate & **(3)** site data. Continue description on separate sheet.

1. Number and extent of rills : There should not be any rills.

After wildfires, or abnormally high human or herbivore impacts or extended drought or combinations of these disturbances rills may double in number on steeper slopes at the margins of this site after high-intensity summer thunderstorms. Any rills formed should not be long lived or interconnected and should heal rapidly.

2. Presence of water flow patterns: There can be evidence of sheet flow.

There can be a few flow patterns that should be short and discontinuous. There can be some sheet flow. Water flow patterns should only be present following intense storm events on upper slope limits at the margins of this site. Numerous obstructions alter flow paths. Flow pattern length and numbers may double after wildfires, or abnormally high human or herbivore impacts or extended drought or combinations of these disturbances.

3. Number and height of erosional pedestals or terracettes: Pedestals should be rare. Terracettes can occure and should be discontinuous.

There can be a few pedestals that should be less than 1 inch high. Terracettes can be common and should be discontinuous. If present plant or rock pedestals and terracettes are almost always in flow patterns. Wind caused pedestals are rare and only would be on the site following after wildfires, or abnormally high human or herbivore impacts or extended drought or combinations of these disturbances. These would show signs of healing within 1 year after event.

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

Bare ground can make up to 50% of the ground cover on this site according to the ESD. Bare patch size should be small.

5. Number of gullies and erosion associated with gullies:

Gullies and erosion associated with gullies should be rare are infrequent. Typically, gullies if present will only follow the micro topography. Natural drainages with little to no active cutting are common on this site. There should not be any accelerated erosion. After high-intensity summer thunderstorms or after wildfire, or abnormally high human or herbivore impacts or extended drought or combinations of these disturbances then gully formation would be accelerated for a year or two. Evidence of healing within 1 year of event and continuing after that.

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

There should not be any wind scoured, blowouts and/or depositional areas. However there can be potential for depositional areas. Wind erosion is minimal when the site is in a well vegetated condition. Significant wind erosion would only be present following high-intensity summer thunderstorms, after wildfire, or abnormally high human or herbivore impacts or extended drought or combinations of these disturbances. After rain events, exposed soil surfaces form physical crusts that tend to reduce wind erosion. Deposition from off site sources can be common on this site and is in fact a primary soil forming process. This site is succeptable to wind erosion when vegetation is removed or significantly decreased.

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

Litter should be small (less than "1 in diameter) and its movement should be minimal. This site has adequate vegetation to stop litter movement after short distances. Most of the litter movement on this site will be litter that has been transported onto the site from adjacent sites. Litter produced on this site stays on the site and only travels short distances.

8. Soil surface (top few mm) resistance to erosion (stability) values are averages - most sites will show a range of values for both plant canopy and interspaces, if different) :

This site can be susceptible to alluvial erosion. Stability values are estimated to be 1-2 in interspaces and 3-5 at bases of vegetation. This would be

9. Soil surface structures and SOM content (include type and strength of structure, and A-horizon color and thickness for both plant canopy and interspaces, if different) :

The SOM content should be less than 1%. A--0 to 6 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky; surface 1/2 to 2 inches has weak thin to medium platy structure; common very fine and fine pores; common very fine, fine and medium roots; strongly calcareous; slightly alkaline (pH 7.6); clear smooth boundary. (4 to 8 inches thick)

10. Effect of plant community composition (relative proportion of different functional groups) & spatial distribution on infiltration & runoff:

Overall, infiltration rates should be slow for this site but can be higher around bases of grasses than in interspaces and around bases of shrubs. The soils of this site are deep to moderately deep. The moderately deep soils have either a petrocalcic, petrogypsic or gypsum horizon between 30 and 40 inches. Surface textures are loam, silt loam, very fine sandy loam, or clay loam. Substratum textures are loam, silty clay loam, clay loam, or silt loams. Subsoil textures are silt loam , clay loam silty clay loam, gravelly loam, gravelly clay loam or very gravelly loam. Permeability is moderate to slow and the available water holding capacity is high to moderate.

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

There should not be any compaction layers on this site. There are soil profile features in the top 9 inches of the soil profile that would be mistaken for a management induced soil compaction layer. Management induced compaction layers will be more difficult to penetrate than clay lenses.

12. Functional/Structural Groups (list in order of descending dominance by above-ground weight using symbols: indicate much greater than (>>) , greater than (>) , and equal to (=) :

black grama >> tobosa > C 4 bunch grasses (dropseeds) > C4 midgrasses (threeawns) >= soaptree yucca, ephedra, fourwing saltbush >= forbs (croton, desert marigold, globemallow, > broom snakeweed, prickly pear, = other forbs.

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

Black grama and bunchgrasses can show decadence in centers of plants.

14. Average percent litter cover (_____ %) and depth (_____ inches).

Average 15% cover and 0.75 inch deep. (As per ESD)

15. Expected annual production (this is <u>TOTAL</u> above-ground production, not just forage production):

(Low Production 650 lbs./ac.) (Average RV Production 925 lbs./ac.) (High Production 1200 lbs./ac.) After wildfires, high herbivore impacts, extended drought, or combinations of these disturbances, can cause production to be significantly reduced (100-200 lbs per ac. the first growing season following a wildfire) and recover slowly under below average precipitation regimes.

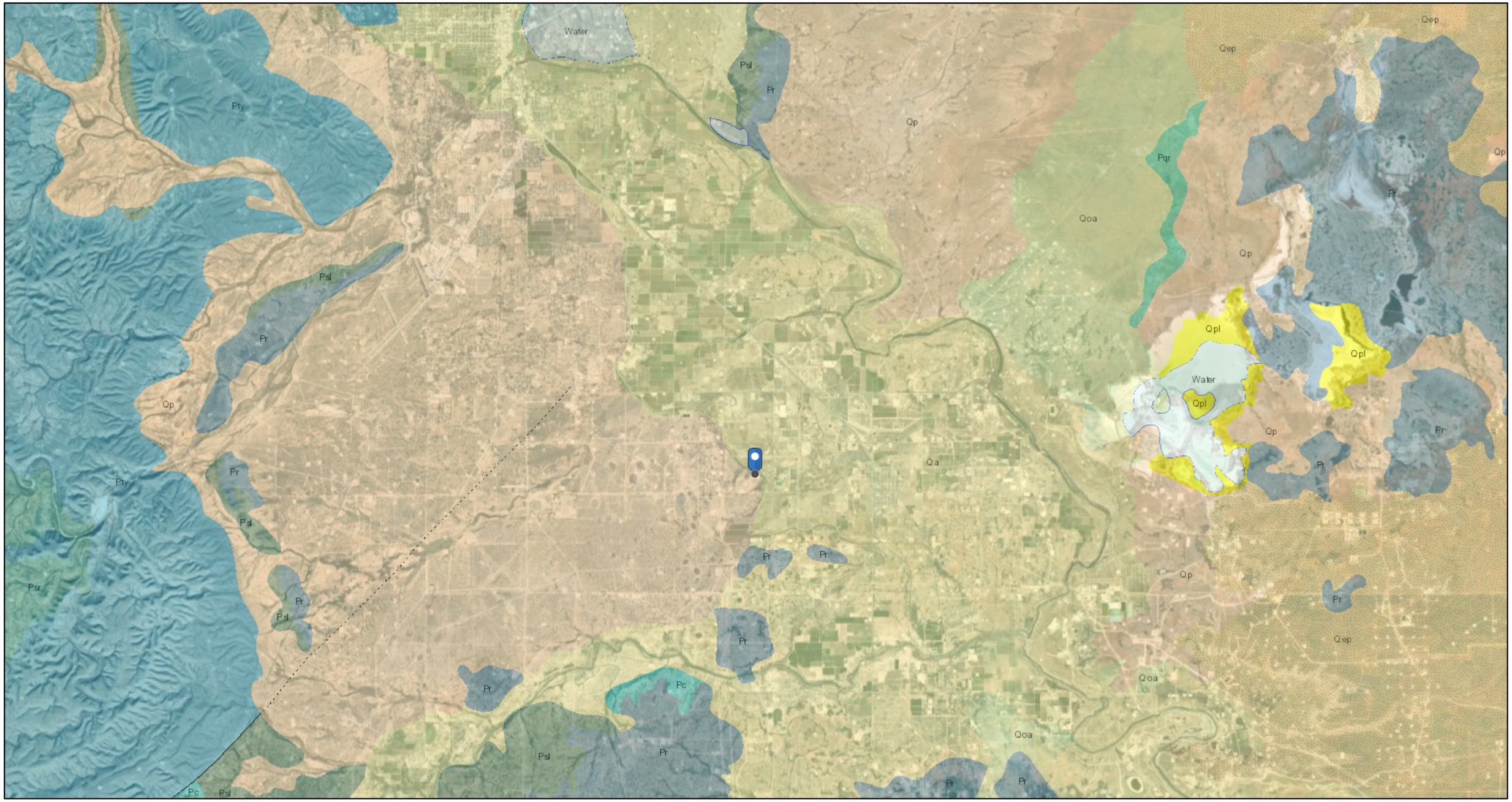
16. Potential invasive (including noxious) species (native and non-native). List species which characterize degraded states and which, after a threshold is crossed, "can, and often do , continue to increase regardless of the management of the site and may eventually dominate

Tarbush, creosote and mesquite can be invaders to this site. Invasive plants should not occur in reference plant community. However, lovegrass, Russian thistle, kochia, and other nonnative annuals may initialy invade following extended disturbance. Mesquite and tarbush and creosote and lovegrass are the greatest threat to dominate this site in the long term after disturbance (primarily following wildfire exclusion but also includes high human or herbivore impacts and extended drought). Mesquite and tarbush and creosote and lovegrass are most likely to retain dominance if allowed to alter natural fire regime (this alteration may require poor land management combined with years of wet winter-spring; dry summer-fall conditions). Any of these invaded communities represent a departure from the reference state.

17. Perennial plant reproductive capability :

Black grama reproduces by seed sporadically and reproduction by tiller and stolon can be common. The C4 midgrasses should have high reproductive potential and rapidly recover from drought in the absence of additional stresses (grazing).

Rustler Breaks SWD #003



2/16/2021, 6:51:58 PM

1:144,448

Faults

- Fault, Exposed
- Fault, Intermittent
- Fault, Concealed
- Shere Zone

0 1.5 3 6 mi

0 2.5 5 10 km

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, NMBGMR

ATTACHMENT 4

Gmail Dhugal Hanton <vertexresourcegroupusa@gmail.com>

48 HR Notice Liner Inspection Rustler Breaks SWD #3

1 message

Dhugal Hanton <vertexresourcegroupusa@gmail.com> Mon, Nov 14, 2022 at 8:22 AM
To: "Enviro, OCD, EMNRD" <OCD.Enviro@state.nm.us>
Cc: Arsenio Jones <arsenio.jones@matadorresources.com>, clinton.talley@matadorresources.com

All,

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

nAPP2231359751 DOR: 11/9/2022 Site Name: Rustler Breaks SWD #003

This work will be completed on behalf of Black River Water Management Company, LLC

On Saturday, November 19, 2022 at approximately 8:00 a.m., Austin Harris will be on site to conduct a liner inspection. She can be reached at 432-250-5003. 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 575-361-9880.

Thank you,

Monica Peppin, A.S.
Project Manager

Vertex Resource Services Inc.
3101 Boyd Drive,
Carlsbad, NM 88220

P 575.725.5001 Ext. 711
C 575.361.9880
F

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District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
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 163761

CONDITIONS

Operator: MATADOR PRODUCTION COMPANY One Lincoln Centre Dallas, TX 75240	OGRID: 228937
	Action Number: 163761
	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 #NAPP2231359751 RUSTLER BREAKS SWD #003, thank you. This closure is approved.	3/3/2023