State of New Mexico
Oil Conservation Division

Incident ID	nAPP2218938856
District RP	
Facility ID	
Application ID	

Closure

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

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

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

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

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

☒ N/A Description of remediation activities

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

Printed Name: Jim Raley Title: Environmental Professional

Signature: Jim Raley Date: 9/26/2022

email: jim.raley@dvn.com Telephone: 575-689-7597

OCD Only

Received by: Jocelyn Harimon Date: 09/26/2022

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: 12/14/2022

Printed Name: Robert Hamlet Title: Environmental Specialist - Advanced

VERTEX

September 21, 2022 Vertex Project #: 22E-02677

Spill Closure Report: RDX 17 Federal Com #010H (Section 17, Township 26 South, Range 30 East)
API: 30-015-40640
County: Eddy
Incident ID: nAPP2218938856

Prepared For: **WPX Energy Permian, LLC**
5315 Buena Vista Drive
Carlsbad, New Mexico 88220

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

WPX Energy Permian, LLC (WPX) retained Vertex Resource Services Inc. (Vertex) to conduct a spill assessment and liner inspection for a produced water release that occurred at RDX 17 Federal Com #010H, API 30-015-40640, Incident nAPP2218938856 (hereafter referred to as "RDX"). WPX provided spill notification to the New Mexico Oil Conservation District (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 32.049099, W -103.8962936.

Background

The site is located approximately 14.96 miles southeast of Malaga, New Mexico. The legal location for the site is Section 17, Township 26 South and Range 30 East in Eddy County, New Mexico. The spill area is located on Bureau of Land Management (BLM) property.

The *Geological Map of New Mexico* indicates the surface geology at RDX is comprised of Qep – Eolian and piedmont deposits (Holocene to middle Pleistocene; New Mexico Bureau of Geology and Mineral Resources, 2022). The Natural Resources Conservation Service *Web Soil Survey* characterizes the soil at the site as Pajarity-Dune and Upton-Simona, which is characterized as gravelly fine sandy loam. It tends to be well-drained with a very low to high runoff (United States Department of Agriculture, Natural Resources Conservation Service, 2022). There is medium potential for karst geology at RDX (United States Department of the Interior, Bureau of Land Management, 2018).

The surrounding landscape is associated with plains, interdunes, dunes, ridges and fans typical of elevations of 2,000 to 5,700 feet above sea level. The climate is semi-arid, with average annual precipitation ranging between 6 and 15 inches. Limited to no vegetation is allowed to grow on the compacted facility pad.

Incident Description

The spill occurred on July 7, 2022, due to a pump going down causing the tanks to overflow. The release was reported on July 8, 2022 and involved the release of approximately 150 barrels (bbl.) of produced water into the lined

containment of the tank battery. Approximately 150 bbl. of free fluid was removed during initial spill clean-up. The NMOCD C-141 Report: nAPP2218938856 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 Geological Survey National Water Information Mapping System and Office of the State Engineers Water Rights Database. A 0.5-mile search radius was used to determine groundwater depth. The closest recorded depth to groundwater was determined to be greater than 125 feet below ground surface (bgs) and 0.27 miles from the site. Documentation used in Closure Criteria Determination research is included in Attachment 3.

Closure Criteria Worksheet			
Site Name: RDX 17 Federal Com #010H			
Spill Coordinates:		**32.049099**	**-103.8962936**
Site Specific Conditions		**Value**	**Unit**
1	Depth to Groundwater	**>125**	feet
2	Within 300 feet of any continuously flowing watercourse or any other significant watercourse	29,608	feet
3	Within 200 feet of any lakebed, sinkhole or playa lake (measured from the ordinary high-water mark)	29,570	feet
4	Within 300 feet from an occupied residence, school, hospital, institution or church	82,542	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**	1,425	feet
	ii) Within 1000 feet of any fresh water well or spring	1,425	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	29,451	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	Pajarito-Dune and Upton-Simona Complexes	
12	Ecological Classification	Shallow	
13	Geology	Qep	
	NMAC 19.15.29.12 E (Table 1) Closure Criteria	<50'	<50' 51-100' >100'

Based on data included in the closure criteria determination worksheet, the release at RDX would not be subject to the requirements of Paragraph (4) of Subsection C of 19.15.29.12 NMAC and the closure criteria for the site would be determined to be associated with the following constituent concentration limits based on depth to groundwater. 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
< 50 feet	Chloride	600 mg/kg
	TPH (GRO+DRO+MRO)	100 mg/kg
	BTEX	50 mg/kg
	Benzene	10 mg/kg

TDS – total dissolved solids, TPH – total petroleum hydrocarbons, GRO – gas range organics, DRO – diesel range organics, MRO – motor oil range organics, BTEX – benzene, toluene, ethylbenzene and xylenes

Remedial Actions Taken

An initial site inspection of the spill was completed on September 16, 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 September 12, 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 evidence in the DFR, Attachment 2, liner integrity was confirmed, and the Liner Inspection Notification email is presented in Attachment 4.

Closure Request

Vertex recommends no additional remediation action to address the release at RDX. 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 (nAPP2218938856) be closed as all closure requirements set forth in Subsection E of 19.15.29.12 NMAC have been met. WPX 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 July 7, 2022, release at RDX.

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

Monica Peppin, A.S.
PROJECT MANAGER, REPORTING

September 21, 2022
Date

Attachments

Attachment 1. NMOCD C-141 Report
Attachment 2. Daily Field Report(s) 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

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

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

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

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

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

United States Department of the Interior, United States Geological Survey. (2022). *National Water Information System: Web Interface*. Retrieved from https://nwis.waterdata.usgs.gov/usa/nwis/gwlevels/?site_no=321822104104101.

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

Measured Distance from the Subject Site to Residence. Google Earth Pro, (2022). Retrieved from https://earth.google.com

Limitations

This report has been prepared for the sole benefit of WPX Energy Permian, LLC(WPX). 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 WPX. 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	nAPP2218938856
District RP	
Facility ID	
Application ID	

Release Notification

Responsible Party

Responsible Party WPX Energy Permain, LLC	OGRID 246289
Contact Name Jim Raley	Contact Telephone 575-689-7597
Contact email Jim.Raley@dvn.com	Incident # *(assigned by OCD)* nAPP2218938856
Contact mailing address 5315 Buena Vista Drive, Carlsbad, NM 88220	

Location of Release Source

Latitude 32.049099 Longitude -103.8962936
(NAD 83 in decimal degrees to 5 decimal places)

Site Name RDX 17 FEDERAL COM #010H	Site Type Oil Well
Date Release Discovered 7/7/2022	API# *(if applicable)* 30-015-40640

Unit Letter	Section	Township	Range	County
A	17	26S	30E	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) 150	Volume Recovered (bbls) 150
	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: Pump was down on location. Produced water tanks overflowed into lined secondary containment. Fluids recovered.

Released Volume estimate = Recovered Volume as lined containment.

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2218938856
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? Volume exceeded 25 bbls.
If YES, was immediate notice given to the OCD? By whom? To whom? When and by what means (phone, email, etc)? Adrian Sandoval, Mike Bratcher via email on 7/8/2022.	

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: __Jim Raley_____ Title: ___Environmental Professional_____

Signature: __Jim Raley_____ Date: __7/14/2022_____

email: ___jim.raley@dvn.com_____ Telephone: 575-689-7597_____

OCD Only

Received by: _____ Date: _____

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2218938856
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?	125 (ft bgs)
Did this release impact groundwater or surface water?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	☐ Yes ☒ No
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	☐ Yes ☒ No
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	☐ Yes ☒ No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	☐ Yes ☒ No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a wetland?	☐ Yes ☒ No
Are the lateral extents of the release overlying a subsurface mine?	☐ Yes ☒ No
Are the lateral extents of the release overlying an unstable area such as karst geology?	☐ Yes ☒ No
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes ☒ No
Did the release impact areas **not** on an exploration, development, production, or storage site?	☐ Yes ☒ No

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

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

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

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

Form C-141
Page 4

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2218938856
District RP	
Facility ID	
Application ID	

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Printed Name: Jim Raley Title: Environmental Professional

Signature: Jim Raley Date: 9/26/2022

email: jim.raley@dvn.com Telephone: 575-689-7597

OCD Only

Received by: Jocelyn Harimon Date: 09/26/2022

State of New Mexico
Oil Conservation Division

Incident ID	nAPP2218938856
District RP	
Facility ID	
Application ID	

Closure

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

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

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

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

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

☒ N/A Description of remediation activities

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

Printed Name: Jim Raley Title: Environmental Professional

Signature: Jim Raley Date: 9/26/2022

email: jim.raley@dvn.com Telephone: 575-689-7597

OCD Only

Received by: Jocelyn Harimon Date: 09/26/2022

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:	Devon Energy Corporation	Inspection Date:	9/16/2022
Site Location Name:	RDX Federal COM #010H	Report Run Date:	9/16/2022 6:12 PM
Client Contact Name:	Wes Matthews	API #:	
Client Contact Phone #:	(575) 748-0176		
Unique Project ID		Project Owner:	
Project Reference #		Project Manager:	

Summary of Times

Arrived at Site	9/16/2022 10:34 AM
Departed Site	9/16/2022 10:43 AM

Field Notes

10:34 Arrived on site and surveyed tank battery for potential breach

10:42 No potential breach in tank battery

10:43 Area was surveyed and documented

Next Steps & Recommendations

1 Closer report

Daily Site Visit Report

Site Photos

Viewing Direction: East	**Viewing Direction**: East
	
North wall facing east	South side of tanks facing east
Viewing Direction: West	**Viewing Direction**: West
	
Northwest wall facing west	Northeast wall facing west

Daily Site Visit Report

Viewing Direction: Southeast	**Viewing Direction**: Southeast
	
South wall facing Southeast	Southeast wall facing southeast
Viewing Direction: North	**Viewing Direction**: West
	
Northeast wall facing North	North side of tanks

Daily Site Visit Report

Viewing Direction: South	**Viewing Direction**: East
	
In between tanks facing south	In between tanks facing east

Daily Site Visit Report

Daily Site Visit Signature

Inspector: Jacob Reta

Signature: 

ATTACHMENT 3

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2017 MAY 17 PM 1:58

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NUMBER (WELL NUMBER)	OSE FILE NUMBER(S)
C-4068 POD1	C-4068
WELL OWNER NAME(S)	PHONE (OPTIONAL)
RKI Exploration and Production, LLC	
WELL OWNER MAILING ADDRESS	CITY / STATE / ZIP
3500 One Williams Center MD 35,	Tulsa / OK / 74172

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	2	43.95	N
	LONGITUDE	103	53	39.23	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND
* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS – PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE

NW/4SW/4NW/4 Section 16, Township 26S, Range 30 E, N.M.P.M.

2. DRILLING & CASING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
1249	Jackie D. Atkins	Atkins Engineering Associates, Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
5/11/2017	5/12/2017	n/a	125	none encountered

COMPLETED WELL IS: ☐ ARTESIAN ☑ DRY HOLE ☐ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): n/a

DRILLING FLUID: ☑ AIR ☐ MUD ADDITIVES – SPECIFY:

DRILLING METHOD: ☐ ROTARY ☐ HAMMER ☐ CABLE TOOL ☑ OTHER – SPECIFY: hollow stem auger with air rotary

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
0	125	±6.625	n/a	n/a	n/a	n/a	n/a

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
n/a	n/a	n/a	n/a	n/a	n/a

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 10/29/15)

FILE NUMBER	C-4068	POD NUMBER	1	TRN NUMBER	6006777
LOCATION	26S. 30E. 16.1.3.1			EXPL	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES **(attach supplemental sheets to fully describe all units)**	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	5	5	white caliche small gravel	Y ✓ N	
5	20	15	light brown fine sand with small gravel	Y ✓ N	
20	40	20	tan sand, medium gravel, sandstone	Y ✓ N	
40	50	10	white tannish sand/sandstone	Y ✓ N	
50	90	40	tannish very fine sandstone	Y ✓ N	
90	110	20	fine reddish tan sandstone	Y ✓ N	
110	125	15	fine reddish sandstone with small layers of reddish clay	Y ✓ N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☐ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm): 0.00

5. TEST; RIG SUPERVISION

WELL TEST: TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD

MISCELLANEOUS INFORMATION: Log adapted from Souder Miller & Associates oversight. Boring to determine presence/absence of water. Boring advanced with combination of air rotary and hollow stem auger tooling. No water encountered. Boring not converted to well. Boring abandoned see plugging record.

PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE:

Guadalupe "Lupe" Leyba, Shane Eldridge

6. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

Jackie D. Atkins — 5/17/2017

SIGNATURE OF DRILLER / PRINT SIGNEE NAME — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 10/29/2015)

FILE NUMBER	C-4068	POD NUMBER	1	TRN NUMBER	6006777
LOCATION	26S.30E.16.1.3.1			EXPL	PAGE 2 OF 2

Tom Blaine, P.E.
State Engineer

Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER

Trn Nbr: 606777
File Nbr: C 04068
Well File Nbr: C 04068 POD1

Jun. 12, 2017

JUSTIN BARMORE
RKI EXPLORATION AND PRODUCTION LLC
3500 ONE WILLIAMS CENTER MD 35
TULSA, OK 74172

Greetings:

The above numbered permit was issued in your name on 05/08/2017.

The Well Record was received in this office on 05/17/2017, stating that it had been completed on 05/12/2017, and was a dry well. The well is to be plugged or capped or otherwise maintained in a manner satisfactory to the State Engineer.

Please note that another well can be drilled under this permit if the well is completed and the well log filed on or before 05/15/2018.

If you have any questions, please feel free to contact us.

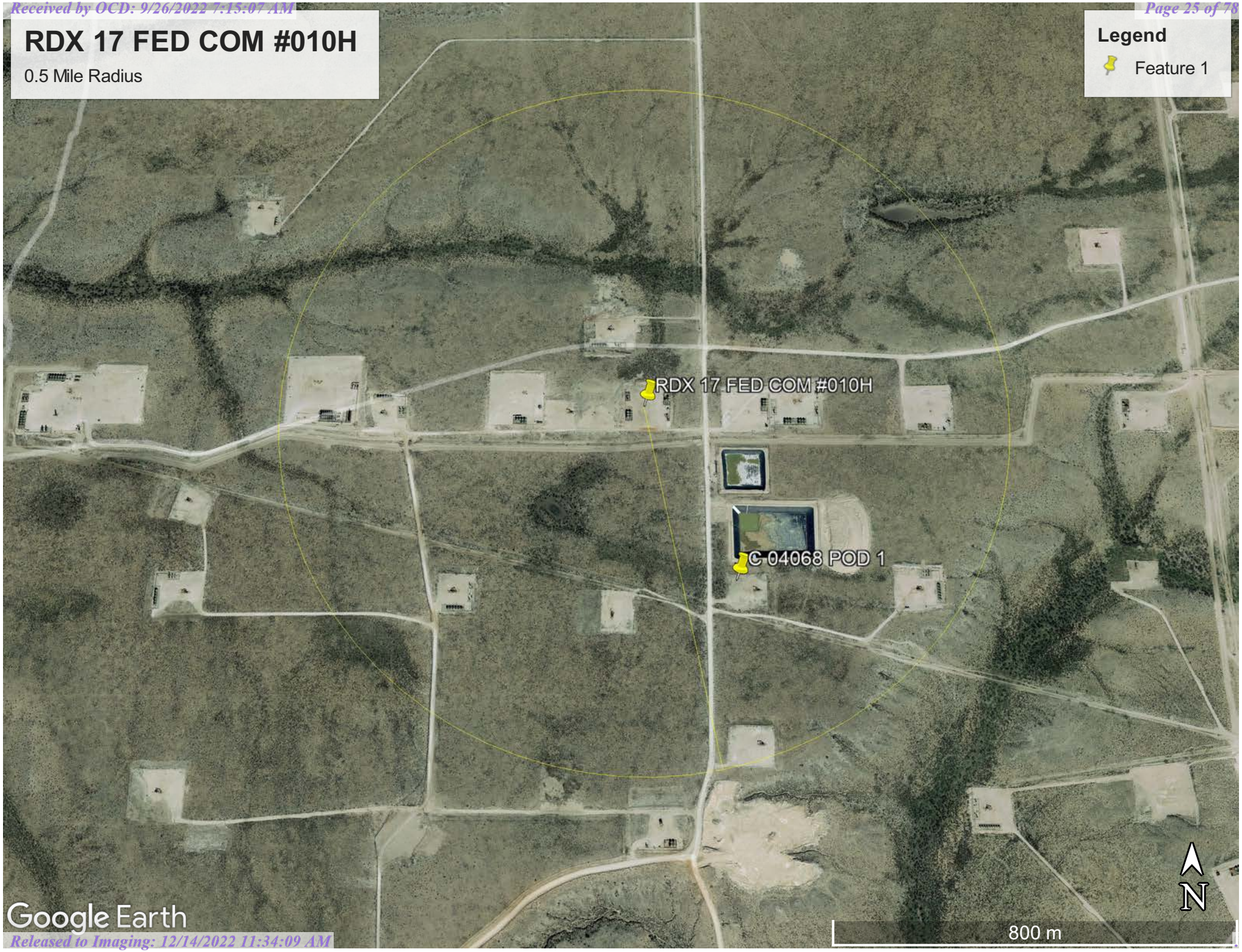
Sincerely,

Deborah Dunaway
(575)622-6521

drywell

RDX 17 FED COM #010H

0.5 Mile Radius



RDX 17 FED COM #010H

Closest Water Well C 04068 POD 1 (0.27 Miles)

New Mexico Office of the State Engineer

Point of Diversion Summary

Well Tag	POD Number	(quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) Q64	Q16	Q4	Sec	Tws	Rng	(NAD83 UTM in meters) X	Y
	C 04068 POD1	1	3	1	16	26S	30E	604397	3546018

Driller License:	1249	**Driller Company:**	ATKINS ENGINEERING ASSOC. INC.		
Driller Name:	JACKIE D ATKINS				
Drill Start Date:	05/11/2017	**Drill Finish Date:**	05/12/2017	**Plug Date:**	
Log File Date:	05/17/2017	**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	
Casing Size:		**Depth Well:**		**Depth Water:**	

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

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

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

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

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 04068 POD1		CUB	ED	1	3	1	16	26S	30E	604397	3546018	439			
C 03483		C	ED	4	4	4	05	26S	30E	604296	3548251	1843	700	200	500
C 03581 POD1		CUB	ED	4	4	4	05	26S	30E	604298	3548291	1883	800	320	480
C 01361		CUB	ED	3	4	3	05	26S	30E	603240	3548157	1992	775	184	591
C 01360		CUB	ED	4	3	3	05	26S	30E	602997	3548152	2115	770	173	597

Average Depth to Water: **219 feet**
Minimum Depth: **173 feet**
Maximum Depth: **320 feet**

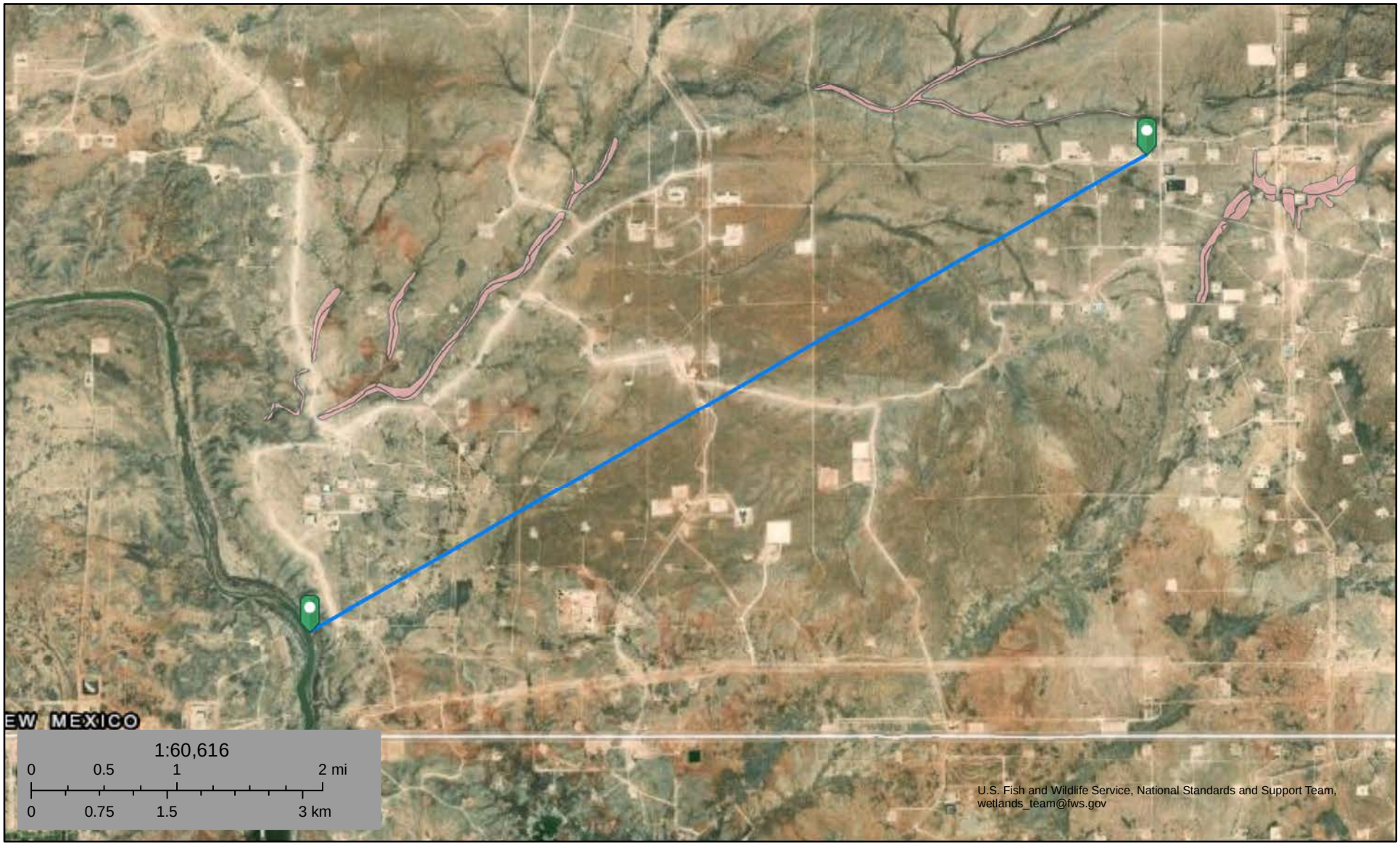
Record Count: 5

UTMNAD83 Radius Search (in meters):

Easting (X): 604198.27 **Northing (Y):** 3546410.57 **Radius:** 5000

U.S. Fish and Wildlife Service
National Wetlands Inventory

Closest Flowing Watercourse Pecos River



August 3, 2022

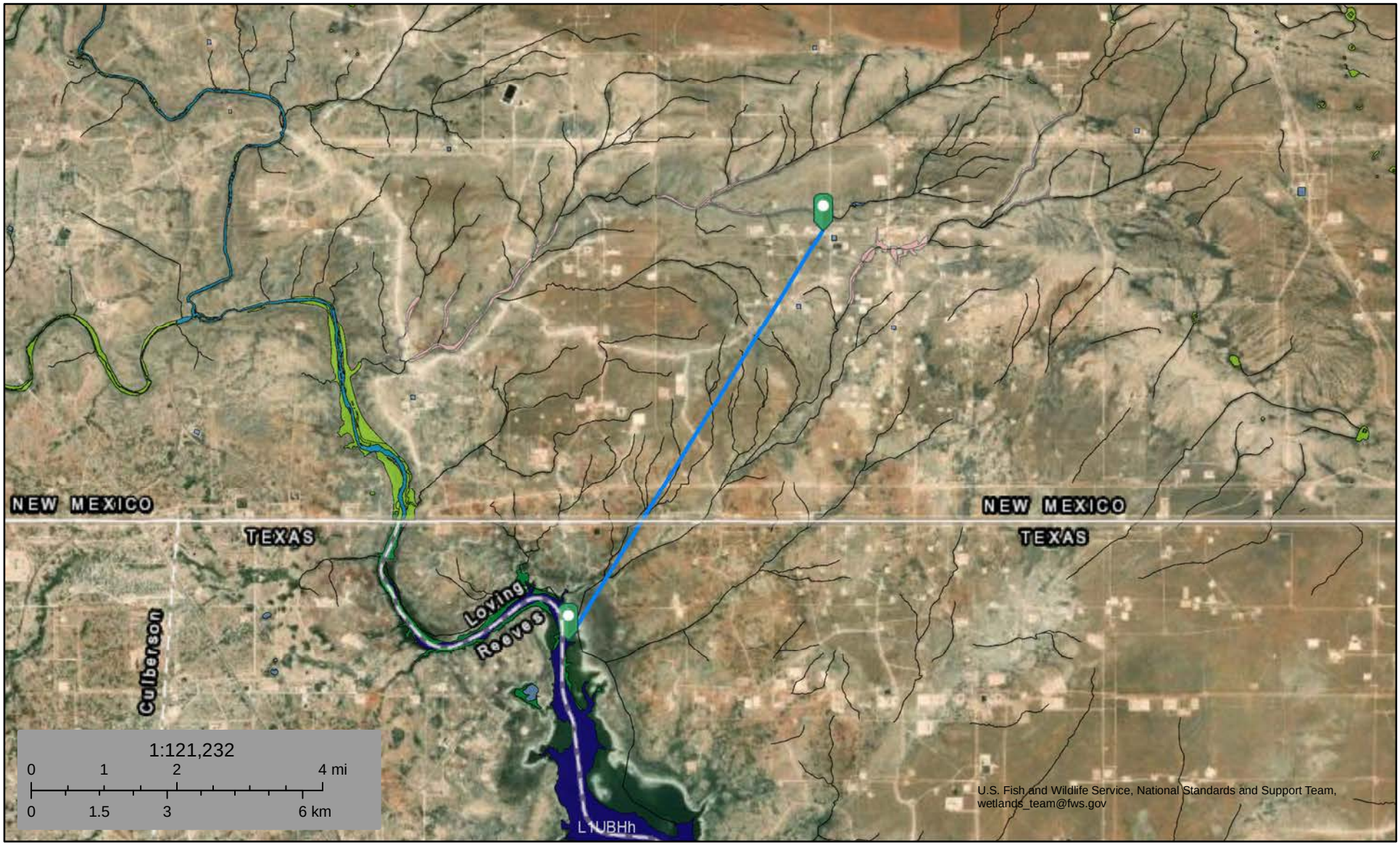
Wetlands

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

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

U.S. Fish and Wildlife Service
National Wetlands Inventory

Nearest Lakebed 5.6 Miles Southwest



August 5, 2022

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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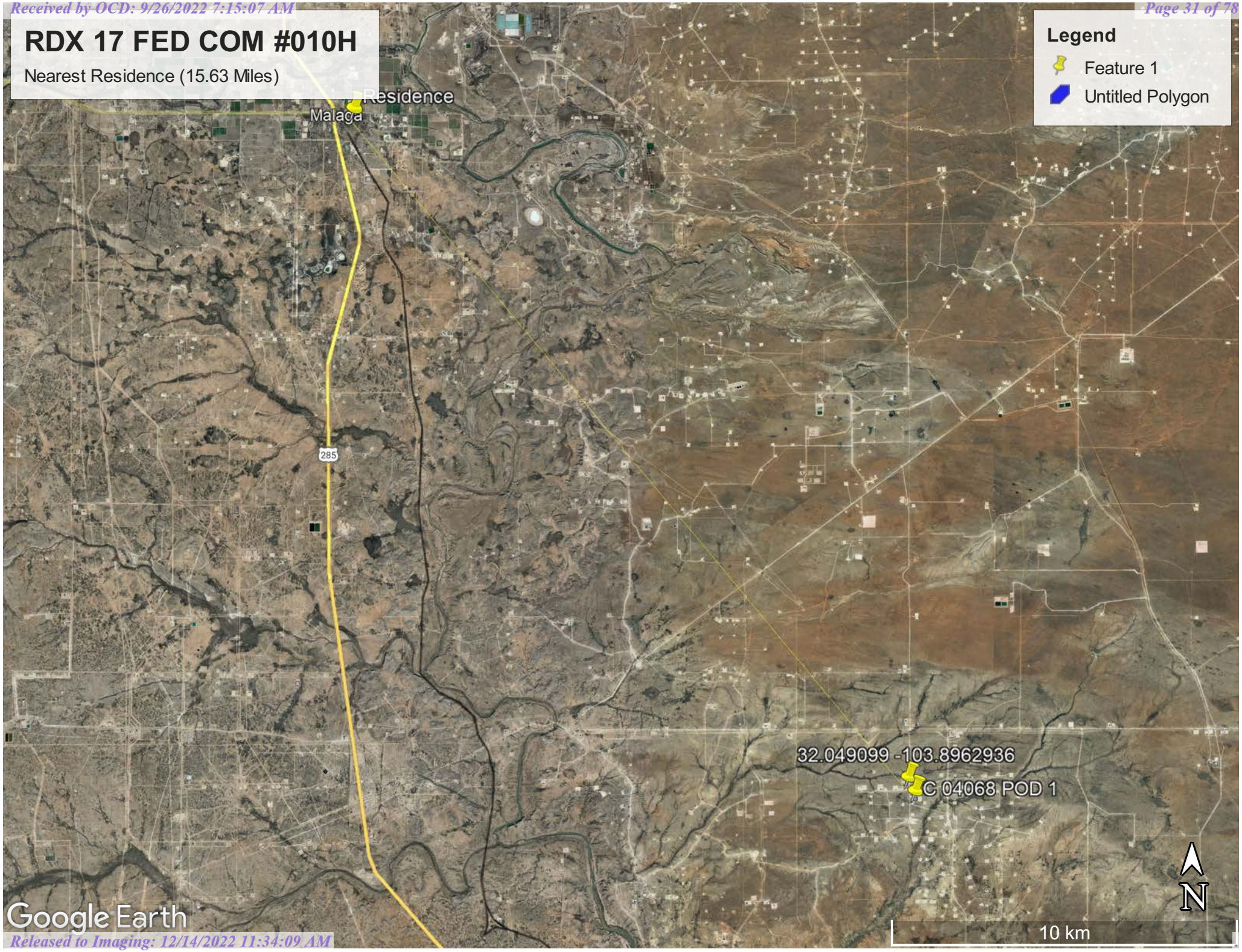
RDX 17 FED COM #010H

Nearest Residence (15.63 Miles)

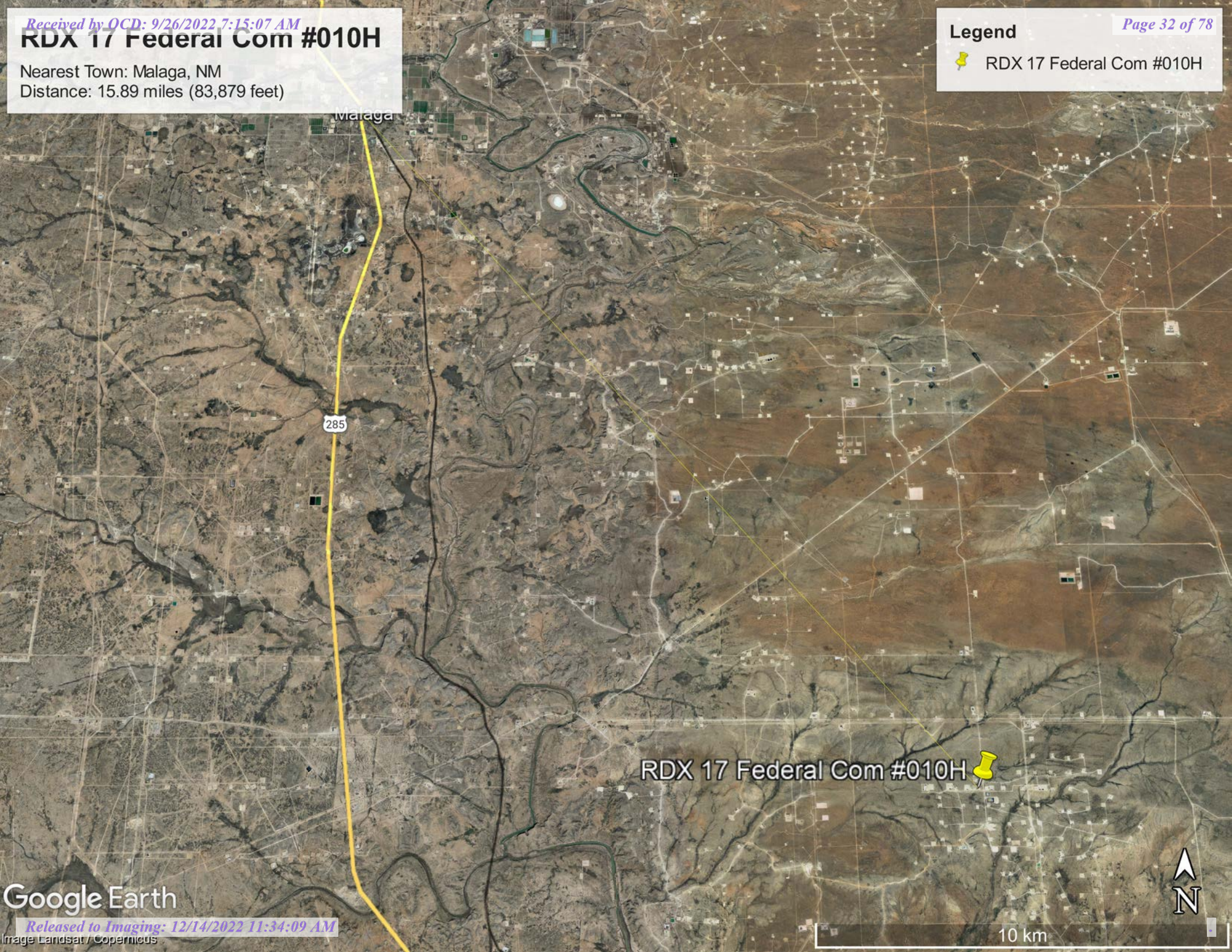


RDX 17 Federal Com #010H

Nearest Town: Malaga, NM
Distance: 15.89 miles (83,879 feet)

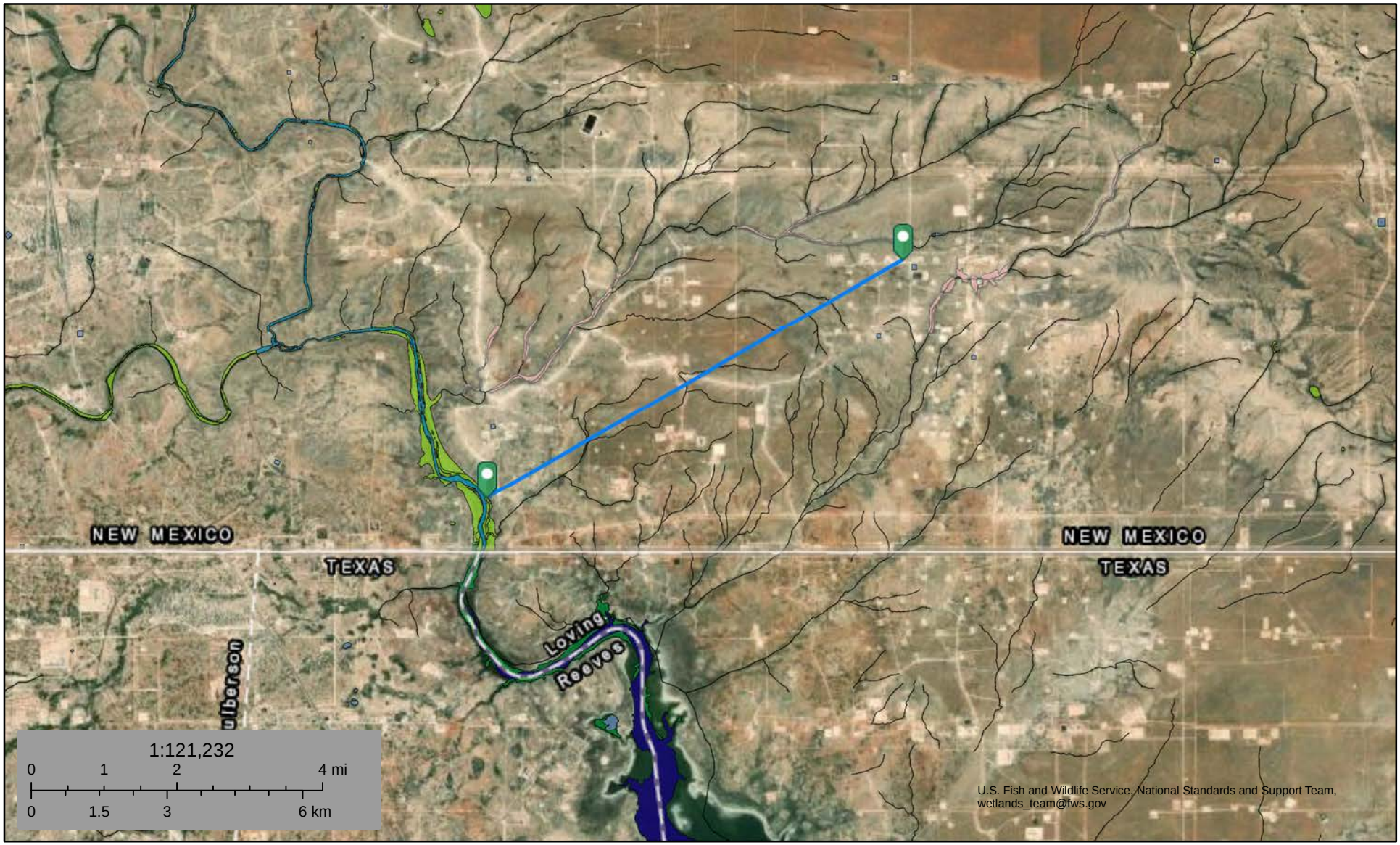
Legend

RDX 17 Federal Com #010H



U.S. Fish and Wildlife Service
National Wetlands Inventory

Nearest Wetland 5.6 Miles Southwest



August 5, 2022

Wetlands

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

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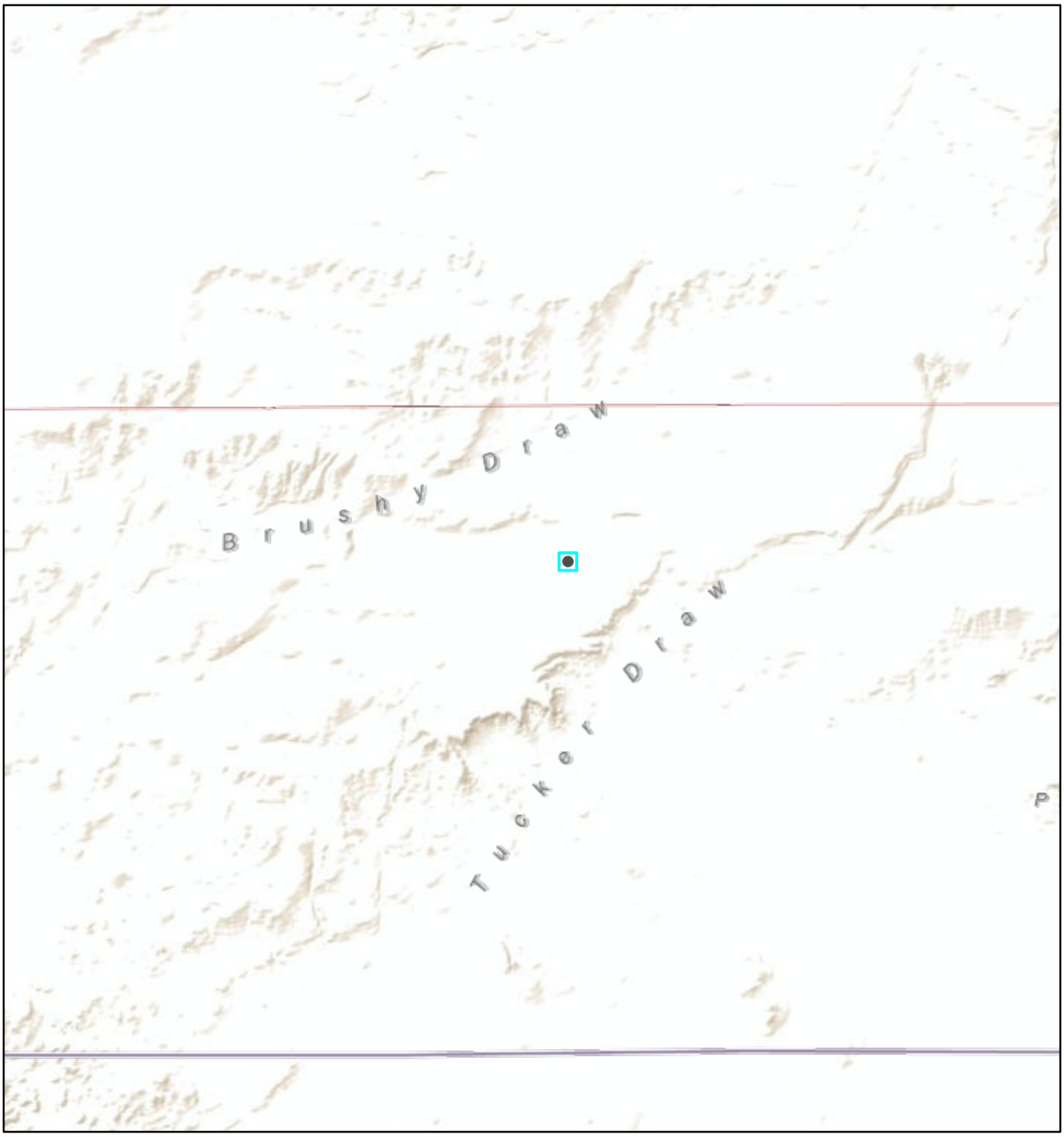
Active Mines in New Mexico



8/5/2022, 11:04:39 AM

1:72,224

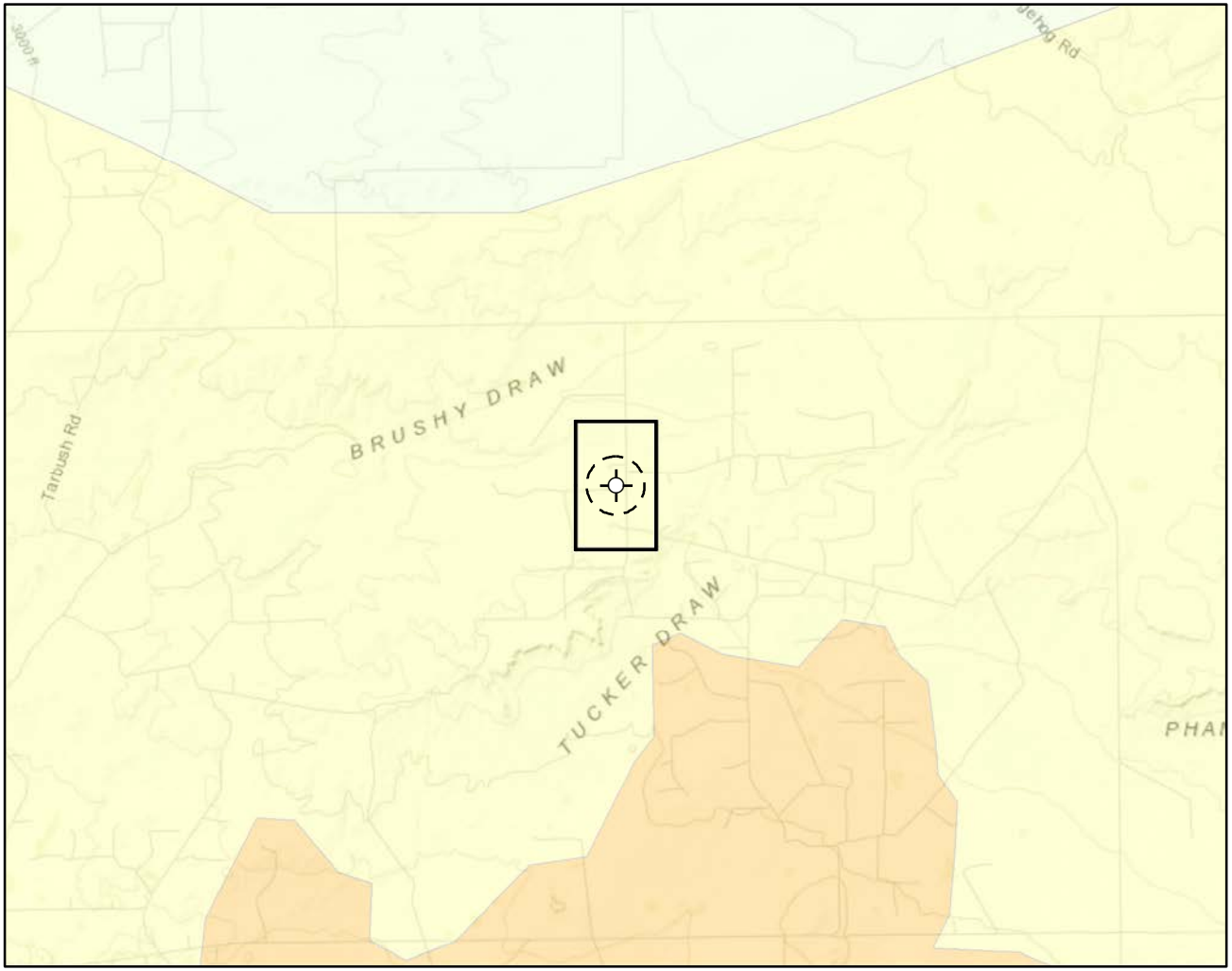
0 0.5 1 2 mi

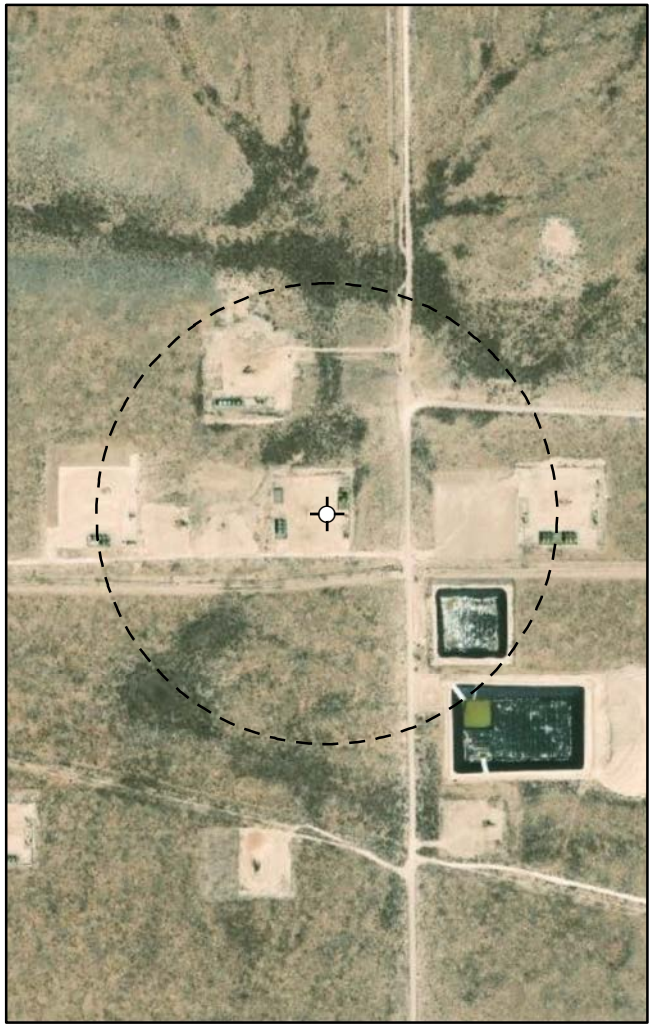
0 0.75 1.5 3 km

Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS

EMNRD MMD GIS Coordinator

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





Karst Potential

- Critical
- High
- Medium
- Low

Site Location

Site Buffer (1,000 ft.)

Overview Map

0 0.25 0.5 1 mi

Detail Map

0 150 300 600 ft.

VERTEX

Map Center:
Lat/Long: 32.049099, -103.896000

NAD 1983 UTM Zone 13N
Date: Aug 04/22

N

Karst Potential
RDX 17 FED COM #010H

FIGURE:
X

devon

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

Note: Inset Map, ESRI 20XX; Overview Map: ESRI World Topographic. Karst potential data sourced from Rosswell Field Office, Bureau of Land Management, 2020 or United States Department of the Interior, Bureau of Land Management. (2018). Karst Potential.

VERSATILITY. EXPERTISE.

Document Path: \\vtx-s-fs01.corp.internal\shared\vps\04 - Geomatics\1-Projects_US PROJECTS\Devon Energy Corporation\2022\22E-02677 - RDX 17 FED COM #010H\Figure X Karst Potential (RDX 17 FED COM #010H).mxd

National Flood Hazard Layer FIRMette

FEMA

103°54'5"W 32°3'12"N

103°53'28"W 32°2'42"N

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

1:6,000

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

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/5/2022 at 1:36 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.

Eddy Area, New Mexico

PD—Pajarito-Dune land complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1w55
Elevation: 3,000 to 5,000 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 60 to 64 degrees F
Frost-free period: 190 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Pajarito and similar soils: 46 percent
Dune land: 45 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pajarito

Setting

Landform: Plains, interdunes, dunes
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 36 inches: fine sandy loam
H3 - 36 to 72 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Description of Dune Land

Setting

Landform: Dune fields
Landform position (two-dimensional): Shoulder, backslope, footslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 60 inches: sandy loam

Interpretive groups

Land capability classification (irrigated): None specified
Ecological site: R042XC003NM - Loamy Sand
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Largo

Percent of map unit: 4 percent
Ecological site: R042XC007NM - Loamy
Hydric soil rating: No

Data Source Information

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 17, Sep 12, 2021

Eddy Area, New Mexico

US—Upton-Simona complex, 1 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: 1w66
Elevation: 2,000 to 5,700 feet
Mean annual precipitation: 6 to 14 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Upton and similar soils: 40 percent
Simona and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Upton

Setting

Landform: Ridges, fans
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 13 inches: gravelly loam
H3 - 13 to 21 inches: cemented
H4 - 21 to 60 inches: very gravelly loam

Properties and qualities

Slope: 1 to 15 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
Drainage class: Well drained
Runoff class: High
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 supply, 0 to 60 inches: Very low (about 1.4 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

Description of Simona

Setting

Landform: Plains, alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 6 inches: gravelly fine sandy loam
H2 - 6 to 20 inches: gravelly fine sandy loam
H3 - 20 to 24 inches: indurated

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 7 to 20 inches to petrocalcic
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: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

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

Minor Components

Rock outcrop

Percent of map unit: 9 percent
Hydric soil rating: No

Dune land

Percent of map unit: 8 percent
Hydric soil rating: No

Pajarito

Percent of map unit: 8 percent
Ecological site: R042XC003NM - Loamy Sand

Hydric soil rating: No

Data Source Information

Soil Survey Area: Eddy Area, New Mexico
Survey Area Data: Version 17, Sep 12, 2021

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site ID: R042XC003NM

Site Name: Loamy Sand

Precipitation or Climate Zone: 8 to 13 inches

Phase:

PHYSIOGRAPHIC FEATURES

Narrative:

This site occurs on upland plains between drainageways. Slopes are nearly level to undulating, usually less than 9 percent. Low stabilized dunes may occur occasionally. Direction of slopes vaaries and is not usually significant. Elevations range from 2,500 to 4,500 feet.

Land Form:

1. Fan
2. Alluvial flat
3.

Aspect:

1. N/A
2.
3.

	Minimum	Maximum
Elevation (feet)	2,500	4,500
Slope (percent)	0	9
Water Table Depth (inches)	N/A	N/A

Flooding:	Minimum	Maximum
Frequency	N/A	N/A
Duration	N/A	N/A

Ponding:	Minimum	Maximum
Depth (inches)	N/A	N/A
Frequency	N/A	N/A
Duration	N/A	N/A

Runoff Class:

Negligible to High depending on slope.

CLIMATIC FEATURES

Narrative:

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

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

The average frost-free season is 207 to 220 days. The last killing frost being late March or early April and the first killing frost being in later October or early November.

Temperature and rainfall both favor warm season perennial plant growth. In years of abundant spring moisture, annual forbs and cool season grasses can make up an important component of this site. Strong winds blow from the southwest from January through June, which accelerates soil drying during a critical period for cool season plant growth.

	Minimum	Maximum
Frost-free period (days):	180	221
Freeze-free period (days):	199	240
Mean annual precipitation (inches):	10.0	13.0

Monthly moisture (inches) and temperature (^{0}F) distribution:

	Precip. Min.	Precip. Max.	Temp. Min.	Temp. Max.
January	0.40	0.42	20.6	59.7
February	0.40	0.41	25.2	65.6
March	0.41	0.43	31.4	72.7
April	0.58	0.63	40.4	81.5
May	1.28	1.35	49.6	88.7
June	1.40	1.46	59.1	95.4
July	1.62	1.64	63.3	96.4
August	1.79	1.84	61.6	94.8
September	1.81	2.20	54.1	88.5
October	1.16	1.41	40.7	80.4
November	0.43	0.47	28.4	68.7
December	0.48	0.51	20.9	61.1

Climate Stations:

(1) NM0600, Artesia, NM - Period of record 1961 - 1990
(2) NM0992, Bitter Lakes WL Refuge, NM - Period of record 1961 - 1990
(3) NM1469, Carlsbad, NM - Period of record 1961 - 1990
(4) NM293792, Hagerman, NM - Period of record 1961 - 1990
(5) NM299563, Waste Isolation Plant, NM - Period of record 1961 - 1990
(2) NM4346, Jal, NM - Period of record 1961 - 1990

INFLUENCING WATER FEATURES

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

Wetland description:

System	Subsystem	Class
N/A		

If Riverine Wetland System enter Rosgen Stream Type:
N/A

REPRESENTATIVE SOIL FEATURES

Narrative:
The soils on this site are deep and well drained. The surface texture varies from fine sand to loamy fine sand to a depth of 20 to 30 inches. Underlying layers are fine sandy loam or sandy clay loam. Some layers high in lime or with caliche fragments may occur at depths of 20 to 30 inches. These soils have a moderately rapid to moderate permeability. Available water holding capacity is medium to high. Moisture that falls on this site is readily absorbed and can be stored in the lower part of the root zone. These soils, if unprotected by plant cover and organic residue, become wind blown and low hummocks are formed.

Parent Material Kind: Alluvium

Parent Material Origin: Mixed

Surface Texture:

1. Fine sand
2. Loamy
3. Loamy fine sand

Surface Texture Modifier:

1. N/A
2.
3.

Subsurface Texture Group:	N/A
Surface Fragments <=3" (% Cover):	N/A
Surface Fragments >3" (% Cover):	N/A
Subsurface Fragments <=3" (%Volume):	4 to 12
Subsurface Fragments >=3" (%Volume):	N/A

	Minimum	Maximum
Drainage Class:	Well	Well
Permeability Class:	Moderately slow	Moderate
Depth (inches):	>72	>72
Electrical Conductivity (mmhos/cm):	2.0	4.0
Sodium Absorption Ratio:	N/A	N/A
Soil Reaction (1:1 Water):	6.6	8.4
Soil Reaction (0.1M CaCl2):	N/A	N/A
Available Water Capacity (inches):	5	5
Calcium Carbonate Equivalent (percent):	N/A	N/A

PLANT COMMUNITIES

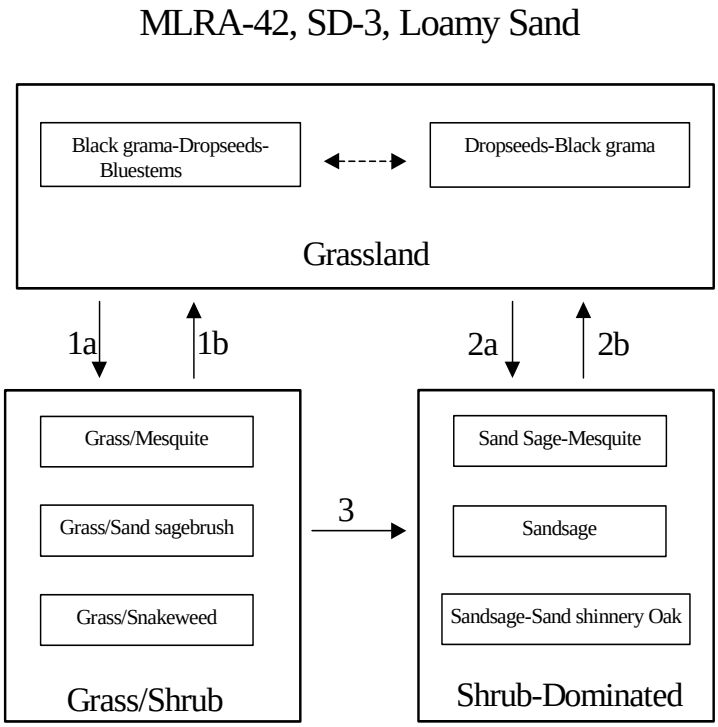
Ecological Dynamics of the Site:

Overview

The Loamy Sand site intergrades with the Deep Sand and Sandy sites (SD-3). These sites can be differentiated by surface soil texture and depth to a textural change. Loamy Sand and Deep Sand sites have coarse textured (sands and loamy sand) surface soils while Sandy sites have moderately coarse textured (sandy loam and fine sandy loam) surfaces. Although Loamy Sand and Deep Sand sites have similar surface textures, the depth to a textural change is different—Loamy Sand sub-surface textures typically increase in clay at approximately 20 to 30 inches, and Deep Sand sites not until around 40 inches.

The historic plant community of Loamy Sand sites is dominated by black grama (Bouteloua eriopoda), dropseeds (Sporobolus flexuosus, S. contractus, S. cryptandrus), and bluestems (Schizachyrium scoparium and Andropogon hallii), with scattered shinnery oak (Quercus havardii) and sand sage (Artemisia filifolia). Perennial and annual forb abundance and distribution are dependent on precipitation. Litter and to a lesser extent, bare ground, are a significant proportion of ground cover while grasses compose the remainder. Decreases in black grama indicate a transition to either a grass/shrub or shrub-dominated state. The grass/shrub state is composed of grasses/honey mesquite (Prosopis glandulosa), grasses/broom snakeweed (Gutierrezia sarothrae), or grasses/sand sage. The shrub-dominated state occurs after a severe loss of grass cover and a prevalence of sand sage with secondary shinnery oak and mesquite. Heavy grazing intensity and/or drought are influential drivers in decreasing black grama and bluestems and subsequently increasing shrub cover, erosion, and bare patches. Historical fire suppression also encourages shrub pervasiveness and a competitive advantage over grass species (McPherson 1995). Brush and grazing management, however, may reverse grass/shrub and shrub-dominated states toward the grassland-dominated historic plant community.

Plant Communities and Transitional Pathways (diagram):



1a. Drought, over grazing, fire suppression.
1b. Brush control, prescribed grazing

2.a Severe loss of grass cover, fire suppression, erosion.
2b. Brush control, seeding, prescribed grazing.

3. Continued loss of grass cover, erosion.

Plant Communities Photo Display & Descriptive Diagnosis

MLRA 42; SD-3; Loamy Sand

Grass/Shrub


•Black grama/Mesquite community, with some dropseeds, threeawns, and scattered sand shinnery oak
•Grass cover low to moderate

Shrub-Dominated


•Sand Sage/Sand shinnery oak community, with some yucca, dropseeds, threeawns, and black grama
•Grass cover low
•Bare patches evident

Shrub-Dominated


•Sand sagebrush community, with some dropseeds, bluestems, and a few scattered mesquite
•Grass cover low
•Bare patches expanding
•Pajarito loamy fine sand, Eddy Co., NM

Plant Community Name: Historic Climax Plant Community

Plant Community Sequence Number: 1 Narrative Label: HCPC

State Containing Historic Plant Community

Grassland: The historic plant community is a uniformly distributed grassland dominated by black grama, dropseeds, and bluestems. Sand sage and shinnery oak are evenly dispersed throughout the grassland due to the coarse soil surface texture. Perennial and annual forbs are common but their abundance and distribution are reflective of precipitation. Bluestems initially, followed by black grama, decrease with drought and heavy grazing intensity. Historical fire frequency is unknown but likely occurred enough to remove small shrubs to the competitive advantage of grass species. Fire suppression, drought conditions, and excessive grazing drive most grass species out of competition with shrub species.

Diagnosis: Grassland dominated by black grama, dropseeds, and bluestems. Shrubs, such as sand sage, shinnery oak, and mesquite are dispersed throughout the grassland. Forbs are present and populations fluctuate with precipitation variability.

Ground Cover (Aveage Percent of Surface Area).	
Grasses & Forbs	28
Bare ground	22
Surface cobble and stone	0
Litter (percent)	50
Litter (average depth in cm.)	1

Plant Community Annual Production (by plant type):

	Annual Production (lbs/ac)		
Plant Type	Low	RV	High
Grass/Grasslike	442	833	1224
Forb	110	208	306
Tree/Shrub/Vine	98	184	270
Lichen			
Moss			
Microbiotic Crusts			
Totals	650	1225	1800

Plant Community Composition and Group Annual Production: Plant species are grouped by annual production **not** by functional groups.

Plant Type - Grass/Grasslike

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
1	SCSC	little bluestem	61 - 123	61 - 123
2	ANHA	sand bluestem	37 - 61	37 - 61
3	BOSA	silver bluestem	37 - 61	37 - 61
3	BOBA3	cane bluestem		
4	BOER4	black grama	123 - 184	123 - 184
4	MUPO2	bush muhly		
5	SEVU2	plains bristlegrass	123 - 184	123 - 184
5	URCI	signal grass		
5	PASE5	sand paspalum		
6	SPCR	sand dropseed	123 - 184	123 - 184
6	SPCO4	spike dropseed		
6	SPFL2	mesa dropseed		
7	DICOA	fall witchgrass	61 - 123	61 - 123
7	CHCU2	hooded windmill		
7	DICA8	Arizona cottontop		
8	SPGI	giant dropseed	37 - 61	37 - 61
8	HENE5	New Mexico feathergrass		
9	2GP	other perennial grasses	37 - 61	37 - 61

Plant Type – Tree/Shrub/Vine

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
10	ARFI2	sand sagebrush	61 – 123	61 – 123
10	QUHA3	shinnery oak		
11	ATCA2	fourwing saltbush	37 - 61	37 - 61
11	DAFO	feather dalea		
12	EPHED	ephedra spp.	37 - 61	37 - 61
12	KRER	range ratany		
13	2SHRUB	other shrubs	37 - 61	37 - 61

Plant Type - Forb

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
14	CRPOP	leather croton	61 - 123	61 - 123
14	SPHAE	globemallow		
14	GAPU	Indian blanket flower		
15	PACAL5	wooly groundsel	12 - 37	12 - 37
16	PLPA2	wooly Indianwheat	61 - 123	61 - 123
16		Deerstongue		
16	DIWI2	spectaclepod		
17	2FORB	other forbs	37 - 61	37 - 61

Plant Type - Lichen

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Moss

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Microbiotic Crusts

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Growth Curves

Growth Curve ID NM2803

Growth Curve Name: HCPC

Growth Curve Description: SD-3 Loamy Sand - Warm season plant community

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	0	3	5	10	10	25	30	12	5	0	0

Additional States

Grass/Shrub State: The grass/shrub state is dominated by communities of grasses/mesquite, grasses/snakeweed, or grasses/sand sage. Decreases in black grama and bluestem species lead to an increase in bare patches and mesquite which further competes with grass species. An increase of dropseeds and threeawns occurs. Grass distribution becomes more patchy with an absence or severe decrease in black grama and bluestems. Mesquite provides nitrogen and soil organic matter to co-dominant grasses (Ansley and Jacoby 1998, Ansley et al. 1998). Mesquite mortality when exposed to fire is low due to aggressive resprouting abilities. Herbicide application combined with subsequent prescribed fire may be more effective in mesquite reduction (Britton and Wright 1971).

Diagnosis: This state is dominated by an increased abundance of communities including grass/mesquite, grass/snakeweed, or grass/sand sage. Dropseeds and threeawns have a patchy distribution.

Transition to Grass/Shrub State (1a): The historic plant community begins to shift toward the grass/shrub state as drivers such as drought, fire suppression, interspecific competition, and excessive grazing contribute to alterations in soil properties and herbaceous cover. Cover loss and surface soil erosion are initial indicators of transition followed by a decrease in black grama with a subsequent increase of dropseeds, threeawns, mesquite, and snakeweed. Snakeweed has been documented to outcompete black grama especially under conditions of fire suppression and drought (McDaniel et al. 1984).
Key indicators of approach to transition:

- Loss of black grama cover
- Surface soil erosion
- Bare patch expansion
- Increased dropseed/threeawn and mesquite, snakeweed, or sand sage abundances

Transition to Historic Plant Community (1b): Brush and grazing management may restore the grassland component and reverse shrub or grass/shrub dominated states back toward the historic plant community.

Shrub-Dominated State: The shrub-dominated state results from a severe loss of grass cover. This state's primary species is sand sage. Shinnery oak and mesquite also occur; however, grass cover is limited to intershrub distribution. Sand sage stabilizes light sandy soils from wind erosion, which enhances protected grass/forb cover (Davis and Bonham 1979). However, shinnery oak also responds to the sandy soils with dense stands due to an aggressive rhizome system. Shinnery oak's extensive root system promotes competitive exclusion of grasses and forbs. Sand sage, shinnery oak, and mesquite can be controlled with herbicide (Herbel et al. 1979, Pettit 1986).

Transition to Shrub-Dominated (2a): Severe loss of grass species with increased erosion and fire suppression will result in a transition to a shrub-dominated state with sand sage, Shin oak, and honey mesquite directly from the grassland-dominated state.

Key indicators of approach to transition:

- Severe loss of grass species cover
- Surface soil erosion
- Bare patch expansion
- Increased sand sage, shinnery oak, and mesquite abundance

Transition to Historic Plant Community (2b): Brush and grazing management may restore the grassland component and reverse shrub or grass/shrub dominated states back toward the historic plant community. In addition, seeding with native grass species will augment the transition to a grassland-dominated state.

Transition to Shrub-Dominated (3): If the grass/shrub site continues to lose grass cover with soil erosion, the site will transition to a shrub-dominated state with sand sage, shinnery oak, and honey mesquite.

Key indicators of approach to transition:

- Continual loss of dropseeds/threeawns cover
- Surface soil erosion
- Bare patch expansion
- Increased sand sage, shinnery oak, and mesquite/dropseed/threeawn and mesquite/snakeweed abundance

ECOLOGICAL SITE INTERPRETATIONS

Animal Community:

This Ecological Site provides habitat which supports a resident animal community that is characterized by pronghorn antelope, desert cottontail, spotted ground squirrel, black-tailed prairie dog, yellow faced pocket gopher, Ord's kangaroo rat, northern grasshopper mouse, southern plains woodrat, badger, roadrunner, meadowlark, burrowing owl, white necked raven, lesser prairie chicken, morning dove, scaled quail, Harris hawk, sie blotched lizard, marbled whiptail, Texas horned lizard, western diamondback rattlesnake, dusty hognose snake and ornate box turtle.

Where mesquite has invaded, most resident birds and scissor-tailed flycatcher, morning dove and Swainson's hawk, nest. Vesper and grasshopper sparrows utilize the site during migration.

Hydrology Functions:

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

Hydrologic Interpretations	
Soil Series	Hydrologic Group
Berino	B
Kinco	A
Maljamar	B
Pajarito	B

Recreational Uses:

This site offers recreation potential for hiking, borseback riding, nature observation, photography and hunting. During years of abundant spring moisture, this site displays a colorful array of wildflowers during May and June.

Wood Products:

This site has no potential for wood products.

Other Products:

This site is suitable for grazing by all kinds and classes of livestock at any time of year. In cases where this site has been invaded by brush species it is especially suited for goats. Mismanagement of this site will cause a decrease in species such as the bluestems, blsck grama, bush muhly, plains bristlegrass, New Mexico feathergrass, Arizona cottontop and fourwing saltbush. A corresponding increase in the dropseeds, windmill grass, fall witchgrass, silver bluestem, sand sagebrush, shinery oak and ephedra will occur. This will also cause an increase in bare ground which will increase soil erodibility. This site will respond well to a system of management that rotates the season of use.

Other Information:
Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index	Ac/AUM
100 - 76	2.3 – 3.5
75 – 51	3.0 – 4.5
50 – 26	4.6 – 9.0
25 – 0	9.1 +

Plant Preference by Animal Kind:

	Code	Species Preference	Code
Stems	S	None Selected	N/S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	NC
Underground Parts	UP	Emergency	E
		Toxic	T

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
little bluestem	Schizachyrium scoparium	EP	D	D	D	D	P	P	P	P	P	D	D	D
sand bluestem	Andropogon hallii	EP	D	D	D	D	P	P	P	P	P	D	D	D
black grama	Bouteloua eripoda	EP	P	P	P	D	D	D	D	D	D	D	P	P
bush muhly	Mulenbergia porteri	EP	P	P	P	P	P	P	P	P	P	P	P	P
sand dropseed	Sporobolus cryptandrus	EP	U	U	U	D	D	D	D	D	D	U	U	U
sand sagebrush	Artemisia filifolia	EP	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
shinnery oak	Quercus havardii	EP	E	E	T	T	T	U	U	U	U	U	U	E
fourwind saltbush	Atriplex canescens	EP	P	P	P	D	D	D	D	D	D	P	P	P
globemallow	Sphaeralcea	EP	N/S	N/S	N/S	N/S	P	D	D	D	P	P	P	

Supporting Information

Associated Sites:

Site Name	Site ID	Site Narrative
Deep Sand	R042XC005NM	
Sandy	R042XC004NM	

Similiar Sites:

Site Name	Site ID	Site Narrative

State Correlation:
This site has been correlated with the following states: Texas

Data Source	Number of Records	Sample Period	State	County

Type Locality:

Relationship to Other Established Classifications:

Other References:

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

Characteristic soils are:	Maljamar fine sand	Pyote loamy fine sand
Berino fine sand	Parjarito loamy fine sand	Wickett loamy fine sand
Berino Loamy fine sand	Palomas fine sand	Wink loamy fine sand
Kinco loamy fine sand	Pyote fine sand	Wink loamy sand

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Site Description Approval:

Author	Date	Approval	Date
Don Sylvester	07/12/1979	Don Sylvester	07/12/1979

Site Description Revision:

Author	Date	Approval	Date
David Trujillo	04/30/03	George Chavez	04/30/03

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Range

Site ID: R042XC025NM

Site Name: Shallow

Precipitation or Climate Zone: 10 to 13 inches

Phase:

PHYSIOGRAPHIC FEATURES

Narrative:
This site occurs on upland plains, fans and mesas, or between toe slopes of desert hills and drainage ways. Slopes range fro 0 to 15 percent. Direction of slope varies and is usually not significant. Elevations range from 2,842 to 4,500 feet.

Land Form:
1. plain
2. fan
3. mesa

Aspect:
1. Not signifant
2.
3.

	Minimum	Maximum
Elevation (feet)	2,842	4,500
Slope (percent)	0	15
Water Table Depth (inches)	N/A	N/A

Flooding:	Minimum	Maximum
Frequency	N/A	N/A
Duration		

Ponding:	Minimum	Maximum
Depth (inches)	N/A	N/A
Frequency		
Duration		

Runoff Class:
Negligible to High

CLIMATIC FEATURES

Narrative:

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

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

The average frost-free season is 207 to 220 days. The last killing frost is late March or early April, and the first killing frost is in late October or early November.

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

	Minimum	Maximum
Frost-free period (days):	180	221
Freeze-free period (days):	199	240
Mean annual precipitation (inches):	10.0	13.0

Monthly moisture (inches) and temperature (^{0}F) distribution:

	Precip. Min.	Precip. Max.	Temp. Min.	Temp. Max.
January	0.40	0.42	20.6	59.7
February	0.40	0.41	25.2	65.6
March	0.41	0.43	31.4	72.7
April	0.58	0.63	40.4	81.5
May	1.28	1.35	49.6	88.7
June	1.40	1.46	59.1	95.4
July	1.62	1.64	63.3	96.4
August	1.79	1.84	61.6	94.8
September	1.81	2.20	54.1	88.5
October	1.16	1.41	40.7	80.4
November	0.43	0.47	28.4	68.7
December	0.48	0.51	20.9	61.1

Climate Stations:

(1) NM0600, Artesia, NM - Period of record 1961 - 1990
(2) NM0992, Bitter Lakes WL Refuge, NM - Period of record 1961 - 1990
(3) NM1469, Carlsbad, NM - Period of record 1961 - 1990
(4) NM293792, Hagerman, NM - Period of record 1961 - 1990
(5) NM299563, Waste Isolation Plant, NM - Period of record 1961 - 1990
(2) NM4346, Jal, NM - Period of record 1961 - 1990

INFLUENCING WATER FEATURES

Narrative:

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

Wetland description:

System	Subsystem	Class
N/A		

If Riverine Wetland System enter Rosgen Stream Type:

N/A

REPRESENTATIVE SOIL FEATURES

Narrative:

The soils of this site are shallow to very shallow. Surface layers are stony silty clay, gravelly loam and gravelly fine sandy loam. There is an indurated caliche layer of limestone bedrock that occurs within 20 inches and averages less than 10 inches. Permeability is moderate and moderately rapid and water holding capacity is low. All water is stored above the caliche layer in the shallow soil profile.
Characteristic soils are:
Delnorte very gravelly loam
Lozier gravelly loam 0 to 5 percent slopes
Potter gravelly loam
Tencee gravelly fine sandy loam
Upton gravelly loam
Vieja stony silty clay
Kimbrough gravelly loam

Parent Material Kind:	Alluvium
Parent Material Origin:	Mixed

Surface Texture:

1. gravelly loam
2. gravelly fine sandy loam
3. stony silt clay

Surface Texture Modifier:

1. gravel
2.
3.

Subsurface Texture Group:	N/A
Surface Fragments <=3" (% Cover):	15 - 40
Surface Fragments >3" (% Cover):	N/A
Subsurface Fragments <=3" (%Volume):	13 - 42
Subsurface Fragments >=3" (%Volume):	0 - 1

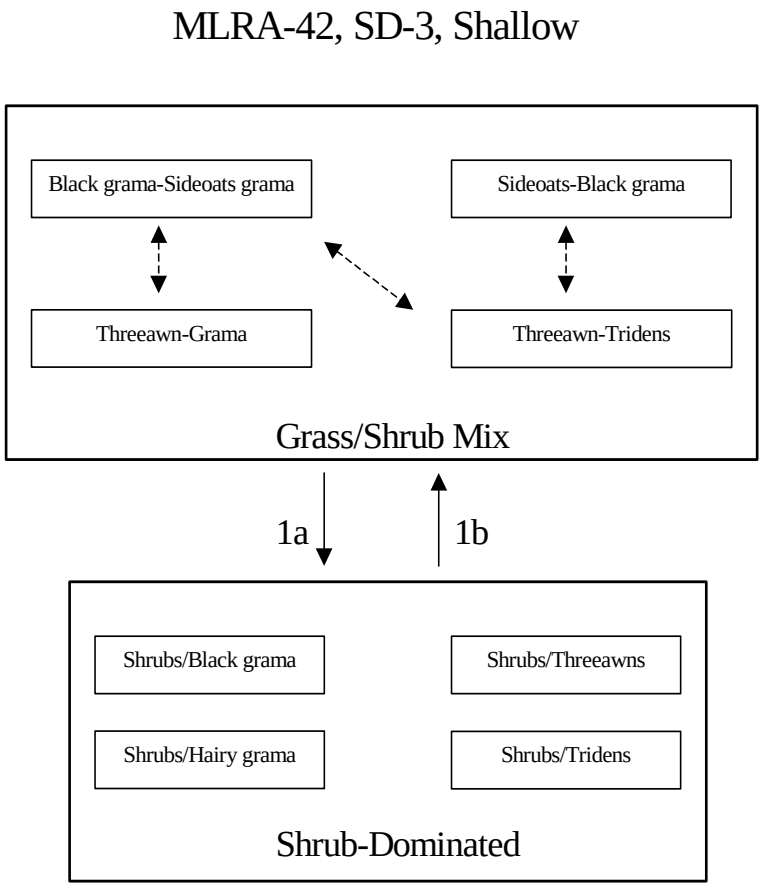
	Minimum	Maximum
Drainage Class:	Well	Well
Permeability Class:	very slow	moderately slow
Depth (inches):	4	24
Electrical Conductivity (mmhos/cm):	0	2
Sodium Absorption Ratio:	N/A	N/A
Soil Reaction (1:1 Water):	7.4	8.4
Soil Reaction (0.1M CaCl2):	N/A	N/A
Available Water Capacity (inches):	1	1
Calcium Carbonate Equivalent (percent):		

Ecological Dynamics of the Site:

Overview

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

Plant Communities and Transitional Pathways (diagram)



1a. Extended drought, overgrazing, no fire

1b. Brush control, Prescribed grazing

Plant Communities Photo Display & Descriptive Diagnosis

MLRA 42; SD-3; Shallow

Grass/Shrub mix

•Threeawns-black grama community
•Grass recovery following treatment with tebuthiuron
•Transition back to Grass/Shrub mix

Shrub-Dominated

•Creosotebush-catclaw mimosa, with some broom snakeweed and a few scattered mesquite
•Grass cover (hairy tridens-black grama) patchy, large connected bare areas present
•Upton gravelly loam, Eddy Co., NM

Plant Community Name: Historic Climax Plant Community

Plant Community Sequence Number: 1 Narrative Label: HCPC

Plant Community Narrative:

State Containing Historic Climax Plant Community

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

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

Ground Cover (Aveage Percent of Surface Area).

Grasses & Forbs	10 – 15
Bare ground	40 - 60
Surface cobble and stone	15 - 25
Litter (percent)	5 - 8
Litter (average depth in cm.)	2 - 3

Percent canopy cover (trees, shrubs, and half-shrubs	
Trees	0
Shrubs and half -shrubs	5 - 10

Plant Community Annual Production (by plant type):

	Annual Production (lbs/ac)		
Plant Type	Low	RV	High
Grass/Grasslike	168	352	536
Forb	20	42	64
Tree/Shrub/Vine	63	131	200
Lichen			
Moss			
Microbiotic Crusts			
Totals	250	525	800

Plant Community Composition and Group Annual Production: Plant species are grouped by annual production **not** by functional groups.

Plant Type - Grass/Grasslike

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
1	BOER4	black grama	105 – 158	105 - 158
2	BOCU	sideoats grama	79 - 105	79 - 105
3	BOGR2	blue grama	79 - 105	79 - 105
3	BOHI2	hairy grama		
4	MUPO2	bush muhly	26 - 53	26 - 53
5	BOBA3	cane bluestem	16 – 26	16 - 26
6	SPCR	sand dropseed	26 – 53	26 - 53
7	ERPI5	hairy tridens	16 – 26	16 – 26
8	MUAR	ear muhly	5 – 16	5 - 16
9	HENE5	New Mexico feathergrass	5 - 16	5 - 16
10	DAPU7	fluffgrass	5 – 16	5 – 16
11	2GP	other grasses	16 – 26	16 – 26

Plant Type – Tree/Shrub/Vine

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
18	RHMI3	littleleaf sumac	5 – 16	5 – 16
19	LATR2	cresostebush	5 – 16	5 – 16
20	KRER	range ratany	5 – 16	5 – 16
21	MIERX	common javalinabush	5 – 16	5 – 16
22	FLCE	American tarbush	5 – 16	5 – 16
23	KOSP	spiny allthorn	5 – 16	5 – 16
24	PRGL2	mesquite	11 – 26	11 – 26
25	MIACB	catclaw mimosa	5 – 16	5 - 16
26	OPUNT	cactus	5 - 16	5 - 16
27	PAIN2	mariola	11 – 26	11 - 26
28	GUSA2	broom snakeweed	5 – 16	5 – 16
29	2SHRUB	other shrubs	16 – 26	16 - 26

Plant Type - Forb

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production
12	TEACE	stemless actinea	11 – 26	11 – 26
13	PACAL5	wooly groundsel	5 - 16	5 - 16
14	SPHAE	globemallow	5 - 16	5 - 16
15	LESQU	bladderpod	5 - 16	5 - 16
16	CASSI	Senna	5 - 16	5 - 16
17	2FORB	other forbs	11 – 26	11 - 26

Plant Type - Lichen

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Moss

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Plant Type - Microbiotic Crusts

Group Number	Scientific Plant Symbol	Common Name	Species Annual Production	Group Annual Production

Other grasses that could appear on this site would include: vine-mesquite, silver bluestem, burrograss, spike dropseed, threeawns, tobosa, muhlys, Arizona cottontop and plains bristlegrass

Other woody plants include: condalia, tesajo cactus, Apacheplume, wolfberry, cactus, ephedra spp., yucca, witerfat and fourwing saltbush.

Other forbs include: desert zinnia, wolly paperflower, prickleaf dogweed, verbena, deerstongue, croton and wright's buckwheat.

Plant Growth Curves

Growth Curve ID NM2825

Growth Curve Name: HCPC

Growth Curve Description: SD-3 Shallow HCPC Warm Season Plant Community

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	0	3	5	10	10	25	30	12	5	0	0

Additional States:

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

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

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

Key indicators of approach to transition:

- Decrease or change in composition or distribution of grass cover.
- Increase in size and frequency of bare patches.
- Increase in amount of shrub seedlings.

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

ECOLOGICAL SITE INTERPRETATIONS

Animal Community:

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

Where associated with limestone hills, mule deer utilize this site. Where large woody shrubs occur, most resident birds and scissor-tailed flycatcher, morning dove, lark sparrow and Swainson's hawk nest.

Hydrology Functions:

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

Hydrologic Interpretations	
Soil Series	Hydrologic Group
Delnorte	C
Lozier	D
Potter	C
Tencee	D
Upton	C
Kimbrough	D
Vieja	D

Recreational Uses:

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

Wood Products:

This site has no potential for wood production.

Other Products:

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

Other Information:

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index	Ac/AUM
100 - 76	3.7 – 4.5
75 – 51	4.3 – 5.5
50 – 26	5.3 – 10.0
25 – 0	10.1 +

Plant Preference by Animal Kind:

	Code	Species Preference	Code
Stems	S	None Selected	N/S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	NC
Underground Parts	UP	Emergency	E
		Toxic	T

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
black grama	Bouteloua eriopoda	EP	P	P	P	D	D	D	D	D	D	D	P	P
sideoats grama	Bouteloua curtipendula	EP	P	P	P	P	P	P	P	P	P	P	P	P
blue grama	Bouteloua gracilis	EP	D	D	D	D	P	P	P	P	P	D	D	D
hairy grama	Bouteloua hirsuta	EP	D	D	D	D	P	P	P	P	P	D	D	D
bush muhly	Muhlenbergia porterti	EP	P	P	P	P	P	P	P	P	P	P	P	P
cane bluestem	Bothriochloa barbinodis	EP	U	U	U	U	U	U	P	P	D	U	U	U
sand dropseed	Sporobolus cryptandrus	EP	U	U	U	D	D	D	D	D	D	U	U	U
globemallow	Sphaeralcea	EP	N/S	N/S	N/S	D	D	D	D	D	P	P	P	N/S
bladderpod	Lesquerella	EP	N/S	N/S	D	D	D	D	N/S	N/S	N/S	N/S	N/S	N/S
Senna	Cassia L.	EP	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
cresostebush	Larrea tridentata	L	U	U	U	U	U	U	U	U	U	U	U	U
common javalinabush	Microrhamnus eridoides	EP	U	U	U	U	U	U	U	U	U	U	U	U
American tarbush	Flourensia cernua	EP	U	U	U	U	U	U	U	U	U	U	U	U
mesquite	Prosopis glandulosa	EP	U	U	U	U	U	U	U	U	U	U	U	U
catclaw mimosa	Mimosa aculeaticarpa		U	U	U	U	U	U	U	U	U	U	U	U
cactus	opuntia sp.	EP	E	E	E	E	E	E	E	E	E	E	E	E
mariola	Parthenium incanum	EP	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
broom snakeweed	Gutierrezia sarothrae	L/F	U	U	U	U	U	T	T	U	U	U	U	U

Supporting Information

Associated Sites:

Site Name	Site ID	Site Narrative

Similiar Sites:

Site Name	Site ID	Site Narrative

State Correlation:
This site has been correlated with the following states: Texas

Data Source	Number of Records	Sample Period	State	County

Type Locality:

Relationship to Other Established Classifications:

Other References:
Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico (SD-3). This site has been mapped and correlated with soils in the following soil surveys. Eddy County, Lea County, and Chaves County.
Characteristic soils are:

Delnorte very gravelly loam	Lozier gravelly loam 0-5% slope	Potter gravelly loam
Tencee gravelly fine sandy loam	Upton gravelly loam	Vieja stony silty clay
Kimgrough gravelly loam		

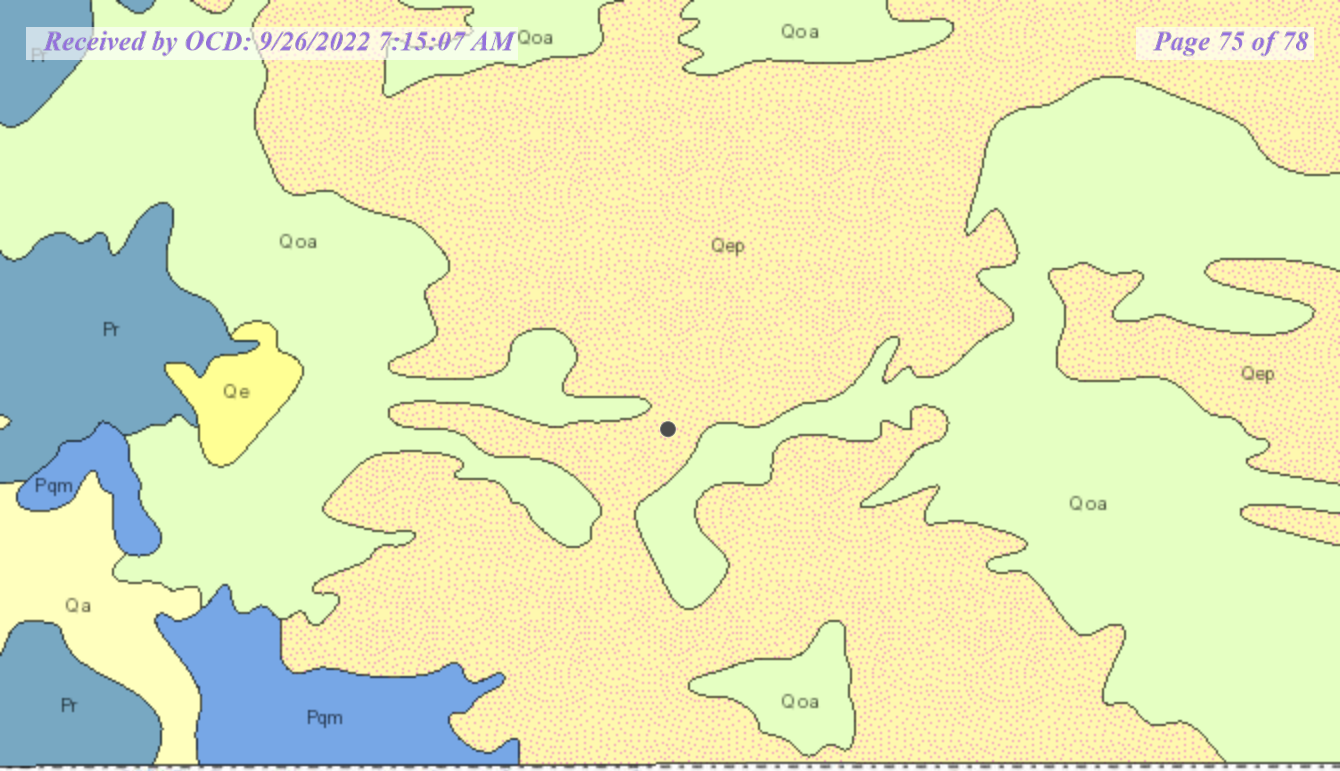
1. Humphrey, R.R. 1974. Fire in the deserts and desert grassland of North America. In: Kozlowski, T. T.; Ahlgren, C. E., eds. Fire and ecosystems. New York: Academic Press: 365-400.
2. Hennessy, J.T., R.P. Gibbens, J.M. Tromble, and M. Cardenas. 1983. Water properties of caliche. J. Range Manage. 36: 723-726.
3. U.S. Department of Agriculture, Natural Resources Conservation Service. 2001. Soil Quality Information Sheets. Rangeland Soil Quality—Infiltration, Organic Matter, Rangeland Sheets 5,6. [Online]. Available: http://www.statlab.iastate.edu/survey/SQI/range.html

Site Description Approval:

Author	Date	Approval	Date
Don Sylvester	07/12/1979	Don Sylvester	07/12/1979

Site Description Revision:

Author	Date	Approval	Date
David Trujillo	03/26/03	George Chavez	03/26/03



ATTACHMENT 4

Monica Peppin

From: Dhugal Hanton <vertexresourcegroupusa@gmail.com>
Sent: September 12, 2022 3:16 PM
To: Enviro, OCD, EMNRD; CFO_Spill, BLM_NM
Cc: Raley, Jim; Monica Peppin
Subject: Multiple Liner Inspections 48-HR Notification

All,

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

nAPP2222130109 DOR: 8/8/2022 Site Name: RDX 17 Federal #035H

nAPP2222750606 DOR: 8/15/2022 Site Name: RDX 17 Federal #040H

nAPP2218938856 DOR: 7/7/2022 Site Name: RDX 17 Federal #010H

This work will be completed on behalf of WPX Energy Permian, LLC

On Friday, September 16, 2022 at approximately 8:00 a.m., Jacob Reta will be on site to conduct liner inspections. He can be reached at 505-506-0040. 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
Project Manager

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

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F

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Phone:(575) 748-1283 Fax:(575) 748-9720
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 145991

CONDITIONS

Operator:	OGRID:
WPX Energy Permian, LLC Devon Energy - Regulatory Oklahoma City, OK 73102	246289
	Action Number: 145991
	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 #NAPP2218938856 RDX 17 FEDERAL COM #010H, thank you. This closure is approved.	12/14/2022