

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-147  
Revised April 3, 2017

## Recycling Facility and/or Recycling Containment

Type of Facility: ☒ Recycling Facility ☒ Recycling Containment\*  
Type of action: ☐ Permit ☒ Registration  
☐ Modification ☐ Extension  
☐ Closure ☐ Other (explain) \_\_\_\_\_

\* At the time C-147 is submitted to the division for a Recycling Containment, a copy shall be provided to the surface owner.

Be advised that approval of this request does not relieve the operator of liability should operations result in pollution of surface water, ground water or the environment. Nor does approval relieve the operator of its responsibility to comply with any other applicable governmental authority's rules, regulations or ordinances.

1.  
Operator: Matador Production Company (For multiple operators attach page with information) OGRID #: 228937  
Address: One Lincoln Center, 5400 LBJ Freeway, Suite 1500, Dallas, TX, 75240  
Facility or well name (include API# if associated with a well): Leatherneck Recycling Facility API: Not Applicable  
OCD Permit Number: \_\_\_\_\_ (For new facilities the permit number will be assigned by the district office)  
U/L or Qtr/Qtr \_\_\_\_\_ Section 30 Township 20S Range 29E County: Eddy  
Surface Owner: ☒ Federal ☐ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.  
☒ **Recycling Facility:**  
Location of recycling facility (if applicable): Latitude 32.5432406 Longitude 104.1212737  
Proposed Use: ☒ Drilling\* ☒ Completion\* ☒ Production\* ☒ Plugging \*  
*\*The re-use of produced water may NOT be used until fresh water zones are cased and cemented*  
☐ Other, *requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.*  
☒ Fluid Storage  
☒ Above ground tanks ☒ Recycling containment ☐ Activity permitted under 19.15.17 NMAC explain type \_\_\_\_\_  
☐ Activity permitted under 19.15.36 NMAC explain type: \_\_\_\_\_ ☐ Other explain \_\_\_\_\_  
☐ For multiple or additional recycling containments, attach design and location information of each containment  
☐ **Closure Report (required within 60 days of closure completion):** ☐ Recycling Facility Closure Completion Date: \_\_\_\_\_

3.  
☒ **Recycling Containment:**  
☐ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)  
Center of Recycling Containment (if applicable): Latitude \_\_\_\_\_ Longitude \_\_\_\_\_ NAD83  
☐ For multiple or additional recycling containments, attach design and location information of each containment  
☒ Lined ☒ Liner type: Thickness 60 mil conductive primary ☐ LLDPE ☒ HDPE ☐ PVC ☐ Other 40 mil HDPE secondary  
☐ String-Reinforced  
Liner Seams: ☒ Welded ☐ Factory ☐ Other \_\_\_\_\_ Volume: 331.603 bbl Dimensions: L 510 x W 510 x D 18 (max)  
☐ Recycling Containment Closure Completion Date: \_\_\_\_\_

3.

☒ **Recycling Containment:**

☐ Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)

Center of Recycling Containment (if applicable): Latitude \_\_\_\_\_ Longitude \_\_\_\_\_ NAD83

☐ For multiple or additional recycling containments, attach design and location information of each containment

☒ Lined ☒ Liner type: Thickness two-layers 40 mil ☒ LLDPE ☐ HDPE ☐ PVC ☐ Other \_\_\_\_\_

☒ String-Reinforced

Liner Seams: ☐ Welded ☒ Factory ☐ Other \_\_\_\_\_ Volume: 40,000 bbl Dimensions: 153' diameter. 12' tank walls

☐ Recycling Containment Closure Completion Date: \_\_\_\_\_

4.

**Bonding:**

☒ Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC (These containments are limited to only the wells owned or operated by the owners of the containment.)

☐ Bonding in accordance with 19.15.34.15(A)(1). Amount of bond \$ \_\_\_\_\_ (work on these facilities cannot commence until bonding amounts are approved)

☐ Attach closure cost estimate and documentation on how the closure cost was calculated.

5.

**Fencing:**

☐ Four foot height, four strands of barbed wire evenly spaced between one and four feet

☒ Alternate. Please specify 8 foot tall game fence with locked gates

6.

**Signs:**

☒ 12"x 24", 2" lettering, providing Operator's name, site location, and emergency telephone numbers

☐ Signed in compliance with 19.15.16.8 NMAC

7.

**Variances:**

Justifications and/or demonstrations that the proposed variance will afford reasonable protection against contamination of fresh water, human health, and the environment.

**Check the below box only if a variance is requested:**

☒ Variance(s): Requests must be submitted to the appropriate division district for consideration of approval. If a Variance is requested, include the variance information on a separate page and attach it to the C-147 as part of the application.

**If a Variance is requested, it must be approved prior to implementation.**

8.

**Siting Criteria for Recycling Containment**

**Instructions:** The applicant must provide attachments that demonstrate compliance for each siting criteria below as part of the application. Potential examples of the siting attachment source material are provided below under each criteria.

## **General siting**

### **Ground water is less than 50 feet below the bottom of the Recycling Containment.**

NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells

☐ Yes ☒ No  
☐ NA

Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended.

☐ Yes ☒ No  
☐ NA

- Written confirmation or verification from the municipality; written approval obtained from the municipality

Within the area overlying a subsurface mine.

☐ Yes ☒ No

- Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division

Within an unstable area.

☐ Yes ☒ No

- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map

Within a 100-year floodplain. FEMA map

☐ Yes ☒ No

Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark).

☐ Yes ☒ No

- Topographic map; visual inspection (certification) of the proposed site

Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application.

☐ Yes ☒ No

- Visual inspection (certification) of the proposed site; aerial photo; satellite image

Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application.

☐ Yes ☒ No

- NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site

Within 500 feet of a wetland.

☐ Yes ☒ No

- US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site

9.

### **Recycling Facility and/or Containment Checklist:**

**Instructions:** Each of the following items must be attached to the application. Indicate, by a check mark in the box, that the documents are attached.

- ☒ Design Plan - based upon the appropriate requirements.
- ☒ Operating and Maintenance Plan - based upon the appropriate requirements.
- ☒ Closure Plan - based upon the appropriate requirements.
- ☒ Site Specific Groundwater Data -
- ☒ Siting Criteria Compliance Demonstrations -
- ☒ Certify that notice of the C-147 (only) has been sent to the surface owner(s)

10.

### **Operator Application Certification:**

I hereby certify that the information and attachments submitted with this application are true, accurate and complete to the best of my knowledge and belief.

Name (Print): Cliff Humphreys Title: Area Completions Manager

Signature:  Date: 3/7/19

e-mail address: CHumphreys@matadorresources.com Telephone: 972-371-5288

11.

OCD Representative Signature: \_\_\_\_\_ Approval Date: \_\_\_\_\_

Title: \_\_\_\_\_ OCD Permit Number: \_\_\_\_\_

☐ OCD Conditions \_\_\_\_\_

☐ Additional OCD Conditions on Attachment

## **Variance Request for Audible Bird Deterrent**

Re: Leatherneck Reuse Water Recycling Facility and Containment Pit

Matador Production Company would like to request the OCD's approval for a variance regarding bird deterrents at the location described above. Matador proposes to utilize the Bird-X Mega Blaster Pro, creating intermittent distress calls to create a "danger zone" that frightens native and or migrating birds and wildlife from the water recycling facility and containment pit area. Two units would be installed, each containing 2 built-in high output amplifiers and houses 20 speakers, capable of producing up to 125 decibels and a frequency range from 2,000 – 10,000Hz.

Please note that EOG Resources, Inc. is currently utilizing this same bird deterrent, which was approved by the OCD on several current permits

### **Bird X Specs**

- Coverage: Up to 30 acres from single unit
- Box dimensions: Box 1: 23" x 18" x 16" (23 lbs., unit & speaker), Box 2: 32" x 24" x 5" (17 lbs., solar panel)
- Power Input: 12vDC (3 amps) via solar panel and battery
- Sound Pressure: up to 125 decibels
- Frequency: 2,000–10,000 Hz
- Library of predator calls

## **Siting Criteria- Section 8**



February 15, 2019

#5E26816 BG#11

Mr. Cliff Humphreys  
Matador Resources Company  
5400 LBJ Freeway, Suite 1500  
Dallas, TX 75240

**Subject: C-147 Recycling Containment Permit Siting Criteria Attachment, Proposed  
Leatherneck Recycling Facility, Eddy County, New Mexico**

Dear Mr. Humphreys:

Souder, Miller & Associates (SMA) is pleased to submit the enclosed C-147 Siting Criteria Explanation and supporting documentations for the proposed Leatherneck Recycling Containment Pond to be constructed in central Eddy County, New Mexico. The proposed recycling containment will be composed of a lined pond with an approximate maximum capacity of 43.8 acre feet, and be located in Township 20S, Range 29E, western Section 30 east of Magnum Road approximately 4 miles north of its intersection with Highway 62.

Below are details on the siting criteria in Section 8 of the C-147 permit. Supporting documentation are included in the Appendices indicated in each siting criteria explanation. Information obtained from the supporting documentation was confirmed during a site visit by Lucas Middleton with SMA July 12, 2018.

**8.1 Groundwater is greater than 50 feet below the bottom of the recycling containment**

Groundwater, as indicated by lithology logs from recent drilling activities, has been recorded at 3178 feet above mean sea level (amsl). The proposed facility is located at an elevation of approximately 3,243 feet above mean sea level (amsl). The base of the containment pond is less than 8 feet below surrounding grade at an elevation of approximately 3,234 ft amsl. The depth to groundwater will be greater than 50 feet at this elevation of approximately 3,180, which is over 50 feet from below the bottom of the Recycling Containment. SMA drilled a soil bore was to 65 feet below ground at the lowest elevation in the potential containment area and found groundwater at 63 feet below surface grade (See appendix A.) Supporting information from nearby United States Geological Society (USGS) monitoring wells, and recent lithology logs are included as Appendix A.

**8.2 Facility is located within municipal boundary or within a defined fresh water well field**

The facility is located over 8 miles from the nearest municipality (City of Carlsbad) in an area consisting predominantly of oil and gas development and is not within any defined freshwater field as no municipal water wells are present near the facility location. A vicinity map of the facility on a USGS topographic map is included as Figure 1. A map indicating the location of wells registered with the NMOSE is included as Appendix A.

### **8.3 Facility is located within an area overlying a subsurface mine**

Information from the USGS Topographic map covering the location of the facility as well as a map from the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) indicates that no subsurface mines or quarries are present within the facility boundaries. There are no quarries or subsurface mines within a one (1) mile radius of the facility boundaries. A vicinity map of the facility on a USGS topographic map is included as Figure 1. A map indicating the location of active mines from the EMNRD website is included as Appendix B.

### **8.4 Facility is located within an unstable area**

The facility is in generally flat topography with no nearby mapped faults. The USGS Seismic hazard map places the region as a low-risk area for potential earthquakes or other seismic hazards. As such, SMA believes the facility is not located in an unstable area. A vicinity map of the facility on a USGS topographic map is included as Figure 1, and a geologic map of the area with known faults is included as Figure 3. A seismic hazards map is included as Appendix C.

This site is within the High Karst Occurrence Potential area according to the BLM GIS Base map. SMA field staff geoscientist and Cave and Karst Surface Evaluation contractor David S. Belski found no cave or karst concerns in or around the site, the report is included in Appendix C.

(SMA) was retained by Matador Production Company to prepare a geotechnical report. From the site's subsurface investigation through obtaining soil test borings, the nature of the substrata soils has been determined as suitable for the site as proposed. SMA's official report and drill logs can be made available upon request.

### **8.5 Facility is located within a 100-year floodplain**

The facility is located within FEMA Zone D in an area that is not covered by printed flood maps. Information from the FEMA Floodplain online database indicates that no known 100-year floodplains are present within 10 miles of the facility. A screenshot of the proposed facility area from the online FEMA Floodplain database is included as Appendix D, with site outlined in purple.

### **8.6 Facility is located within 300 feet of a continuously flowing watercourse or 200 feet of any other significant watercourse, lakebed, sinkhole, or playa lake**

The nearest continually flowing watercourse, as indicated on the USGS topographic map, is several miles away; the nearest ephemeral water course is also located several miles away. No lakebeds, sinkholes, or playa lakes are within 200 feet of the facility. FEMA indicates a possible flood stream approximately 0.5 miles to the west of the proposed facility. A vicinity map of the facility on a USGS topographic map is included as Figure 1, an aerial photo of the project area is included as Figure 2, and the FEMA hydrographic Map is included in Appendix D. The absence of watercourses, lakebeds, sinkholes, and playa lakes in the vicinity of the proposed facility was confirmed by a site visit conducted by SMA on July 12, 2018 and David S. Belski Cave of Karst Surface Evaluation on August 24, 2018.

### **8.7 Facility is located within 1,000 feet of an existing residence, school, hospital, institution, or church at time of initial inspection**

The facility is located several miles from the nearest private residence. The closest facilities to the proposed facility are existing oil field tank batteries and well pads located in all directions. A vicinity map of the facility on a USGS topographic map is included as Figure 1, and an aerial photo of the project area is included as Figure 2. The absence of residences, schools, hospitals, churches, or institutions in the vicinity of the proposed facility was confirmed by a site visit conducted by Mr. Lucas Middleton of SMA on July 12, 2018.

#### **8.8 Facility is located within 500 feet of a spring or fresh water well in existence at time of initial inspection**

The nearest freshwater well registered with the NMOSE or USGS is located over a mile to the west of the proposed facility. No springs are indicated on USGS topographic maps within 1,000 feet of the proposed facility. A vicinity map of the facility on a USGS topographic map is included as Figure 1, and an aerial photo of the project area indicating the location of registered wells is included as Figure 2. Supporting information from nearby NMOSE wells and the USGS monitoring wells is included as Appendix A. The absence of springs or drinking water wells in the vicinity of the proposed facility was confirmed by a site visit conducted by Mr. Lucas Middleton of SMA on July 12, 2018.

#### **8.9 Facility is located within 500 feet of a wetland**

The nearest wetland as mapped by the United States Fish and Wildlife Service is present approximately 4 miles to the southwest of the proposed facility. A map prepared by the US FWS online wetland database is included as Appendix E. The absence of potential wetlands in the vicinity of the proposed facility was confirmed by a site visit conducted by Mr. Lucas Middleton of SMA on July 12, 2018.

If you have any questions, please do not hesitate to call me at 575-689-7040 or to e-mail me at [austin.weyant@soudermiller.com](mailto:austin.weyant@soudermiller.com)

Sincerely,  
**SOUDER, MILLER AND ASSOCIATES**

J. Austin Weyant  
Senior Scientist

Enclosures:            Figure 1: Vicinity Map on USGS Topographic Quad  
                             Figure 2: Site Aerial Photo  
                             Figure 3: Geologic Map of Proposed Facility Area  
                             Figure 4: NMOSE Well Locations Hydrographic Map  
                             Figure 5: Hydrographic Map

Appendix A: Groundwater & Well Information (NMOSE & USGS)  
Appendix B: Active Mine/Quarry Map (NM EMNRD)

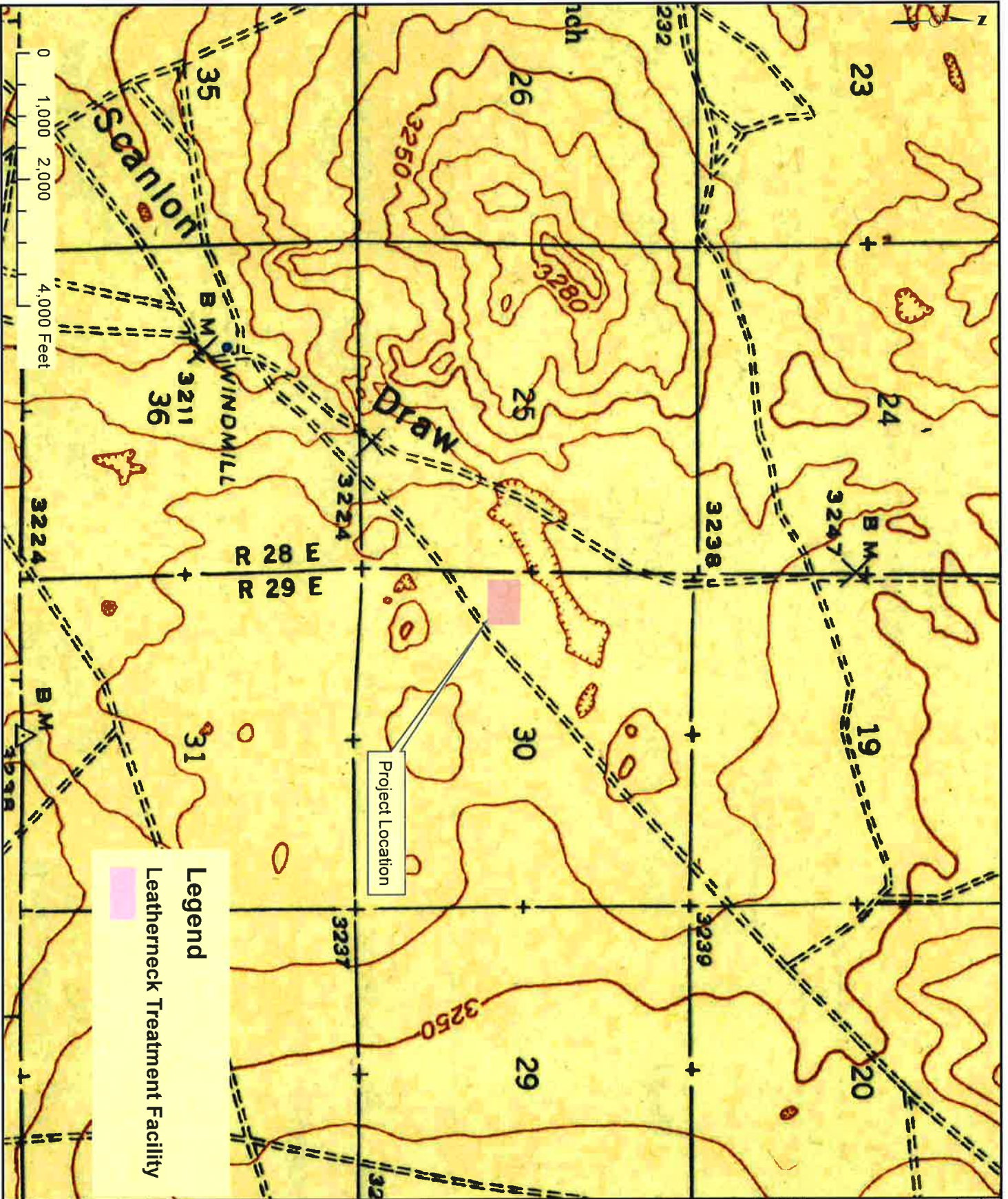


Appendix C: USGS Seismic Hazard Map

Appendix D: FEMA Floodplain Information

Appendix E: Wetlands & Critical Habitat Map (US FWS)

**Figure 1: Vicinity Map on USGS Topographic Quad**



**Legend**

Leatherneck Treatment Facility

Project Location

<p><b>PRELIMINARY</b></p> <p>NOT FOR CONSTRUCTION</p>	<p><b>Site Map</b></p> <p><b>Topographic Map</b></p> <p>Matador - Leatherneck Recycling Facility</p>	 <p><b>SMA</b> Soudner, Miller &amp; Associates Engineering • Environmental • Surveying www.smausa.com Serving the Northern and Rocky Mountains</p>	<p>5454 Venice Avenue NE, Suite D Albuquerque, NM 87113 Phone: (505) 920-0294</p>	Rev #	Date	Description	By	Check

THIS DRAWING IS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION AND NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN CONSENT OF SMA.

Drawn: \_\_\_\_\_

Checked: \_\_\_\_\_

Scale: \_\_\_\_\_

Sheet: \_\_\_\_\_

Project: \_\_\_\_\_

**Figure 2: Site Aerial Photo**



[illegible]

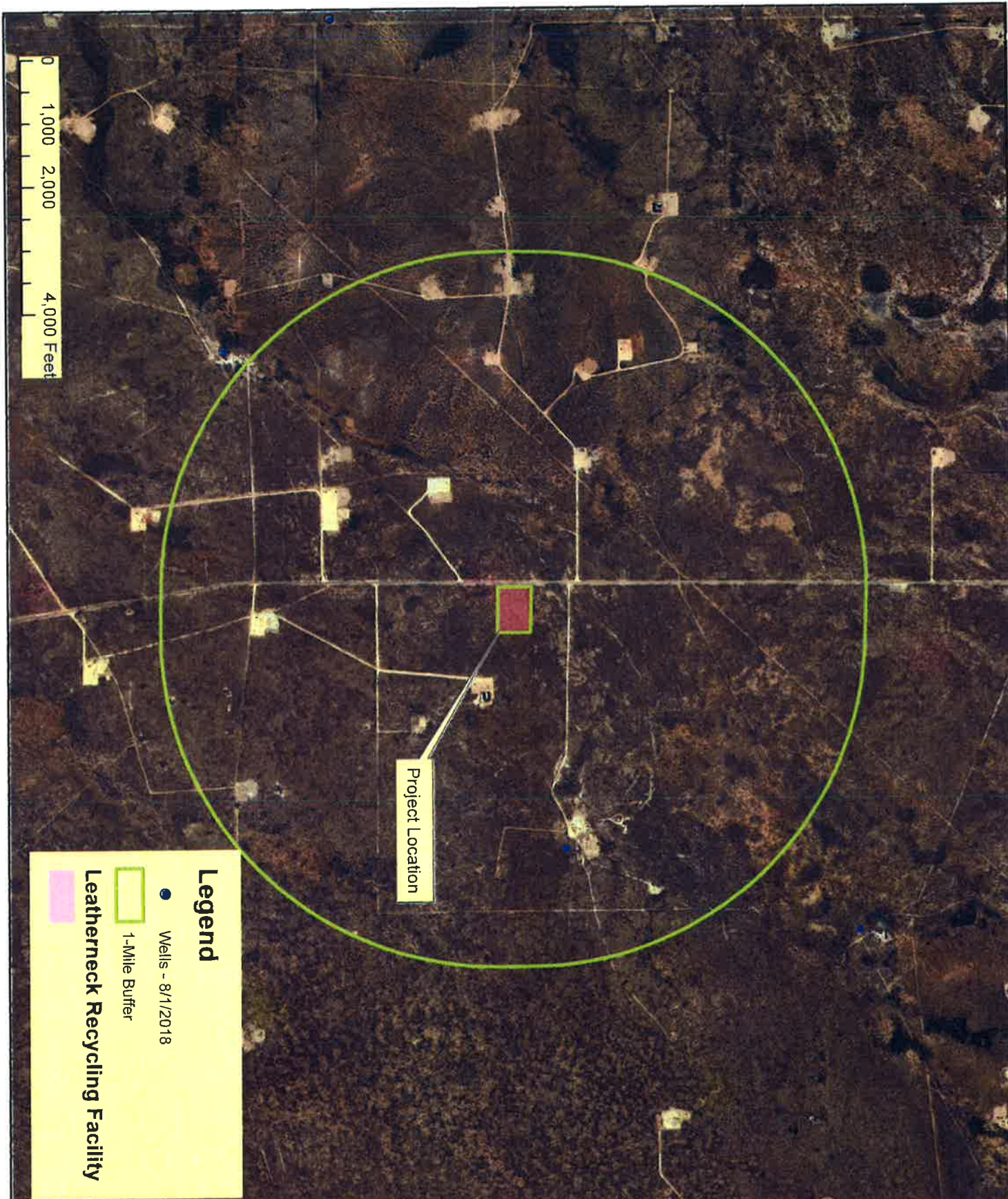
**Figure 3: Geologic Map of Proposed Facility Area**





**Figure 4: NMOSE Well Locations Hydrographic Map**





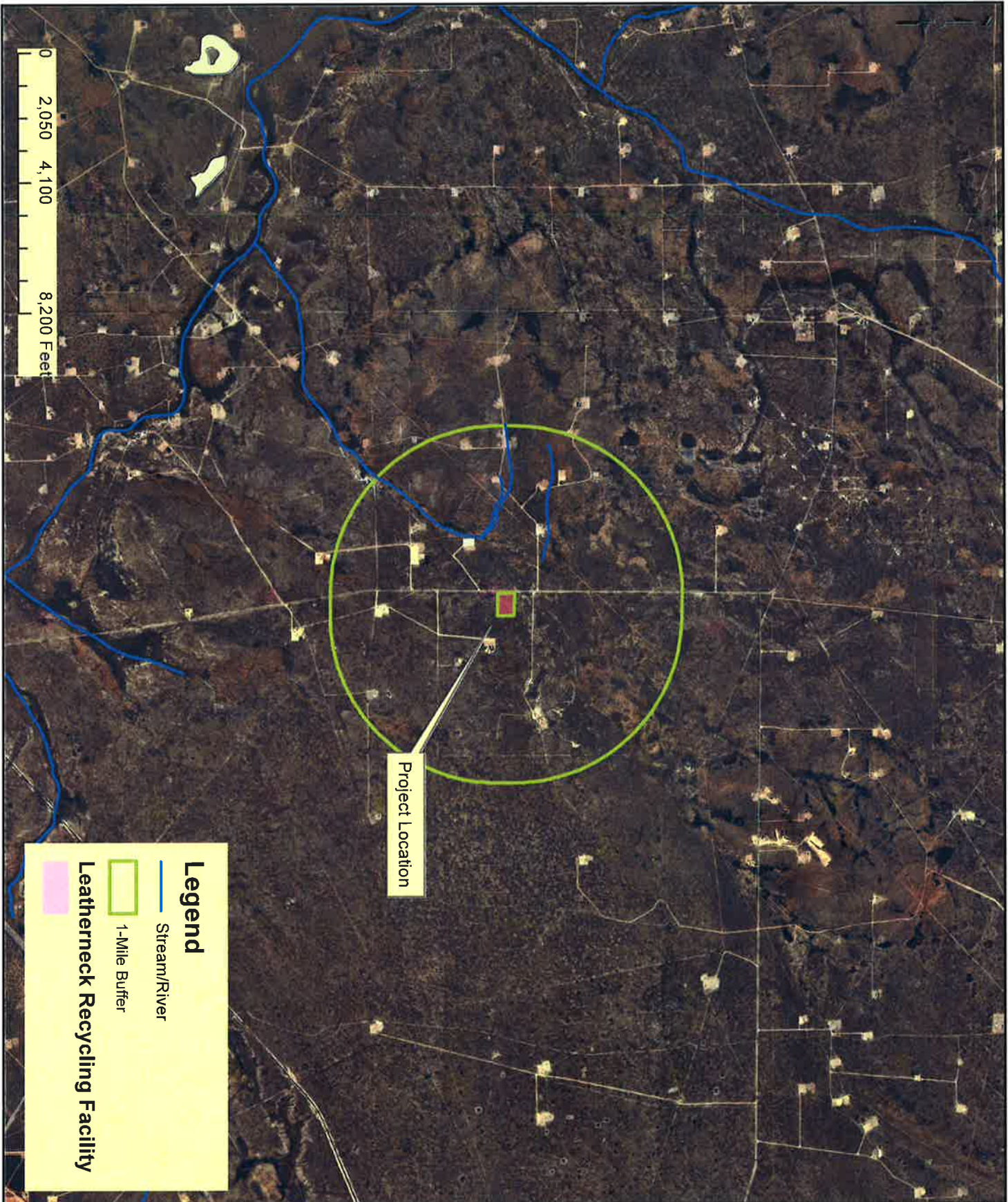
**Legend**

- Wells - 8/1/2018
- 1-Mile Buffer
- Leatherneck Recycling Facility

<b>Site Map</b> <b>NMOSE Well Locations</b> Matador - Leatherneck Recycling Facility		<b>SMA</b> Souder, Miller & Associates Engineering & Environmental • Architecture www.soudermiller.com Serving the Southwest & Rocky Mountains 5454 Venice Avenue NE, Suite D Albuquerque, NM 87113 Phone: (505) 920-0294		<table border="1"> <thead> <tr> <th>Rev#</th> <th>Date</th> <th>Description</th> <th>By</th> <th>Chk</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Rev#	Date	Description	By	Chk																														
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THIS DRAWING IS IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEW MEXICO DEPARTMENT OF REVENUE AND FINANCE (NMDRF) FOR THE CONSTRUCTION OF A RECYCLING FACILITY.		PRELIMINARY NOT FOR CONSTRUCTION																																					
Date: _____ Drawn: _____ Checked: _____	Title: _____ Project No: _____ Sheet: _____	Scale: _____																																					


## **Figure 5: Hydrographic Map**





Rev #	Date	Description	By	Check

<p><b>PRELIMINARY</b></p> <p>NOT FOR CONSTRUCTION</p>	<p><b>Site Map</b></p> <p><b>Hydrographic Map</b></p> <p>Matador - Leatherneck Recycling Facility</p>	 <p><b>SMA</b> Souder, Miller &amp; Associates Engineering • Environmental • Surveying www.soudermiller.com Serving the Southwest &amp; Rocky Mountains</p> <p>5454 Venice Avenue NE, Suite D Albuquerque, NM 87113 Phone (505) 920-0294</p>
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**Appendix A**  
**Groundwater & Well Information (NMOSE & USGS)**  
**On site Drill logs & depth to groundwater**







# New Mexico Office of the State Engineer

## Water Column/Average Depth to Water

(A CLW#### in the (R=POD has been replaced, POD suffix indicates the POD has been replaced & no longer serves a water right file.) 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.	Code	basin	County	64	16	4	Sec	Tws	Rng	X	Y	Distance	Well	Depth	Water
CP 00936 POD1	CP	ED	3	4	2	30	20S	29E	583661	3601238*	1171	70	52	18		

Average Depth to Water: 52 feet  
Minimum Depth: 52 feet  
Maximum Depth: 52 feet

Record Count: 1

UTM NAD83 Radius Search (in meters):

Easting (X): 582517.27

Northing (Y): 3600983

Radius: 1609

\*UTM location was derived from PLSS - see Help

The data is furnished by the NM/OS/ISC and is accepted by the recipient with the expressed understanding that the OS/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

10/30/18 4:17 PM

Page 1 of 1

WATER COLUMN/AVERAGE  
DEPTH TO WATER





# Field Screening

Location Name: <u>Lea Per neck</u>				Date: <u>1-29-19</u>				Borehole <u>9</u> Project Location			
Sample Name:	Collection Time:	EC (ms)	Temp (°C)	PID Reading /pf	Soil Color	Primary Soil Type	Moisture Level	Other Remarks/Notes:			
BH1 - Surface	9:20				<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet				
BH1 - 5					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	<del>with gypsum</del>			
BH1 - 10					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	with gypsum			
BH1 - 15					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	with gypsum			
BH1 - 20					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	with gypsum			
BH1 - 25					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	6 and 25			
BH1 - 30					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	Sand			
BH1 - 35					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	with gypsum			
BH1 - 40					<del>Light</del> Tan Dark Brown Olive Gray Yellow	Gravel Rock Silt Clay	<del>Dry</del> Moist Wet				



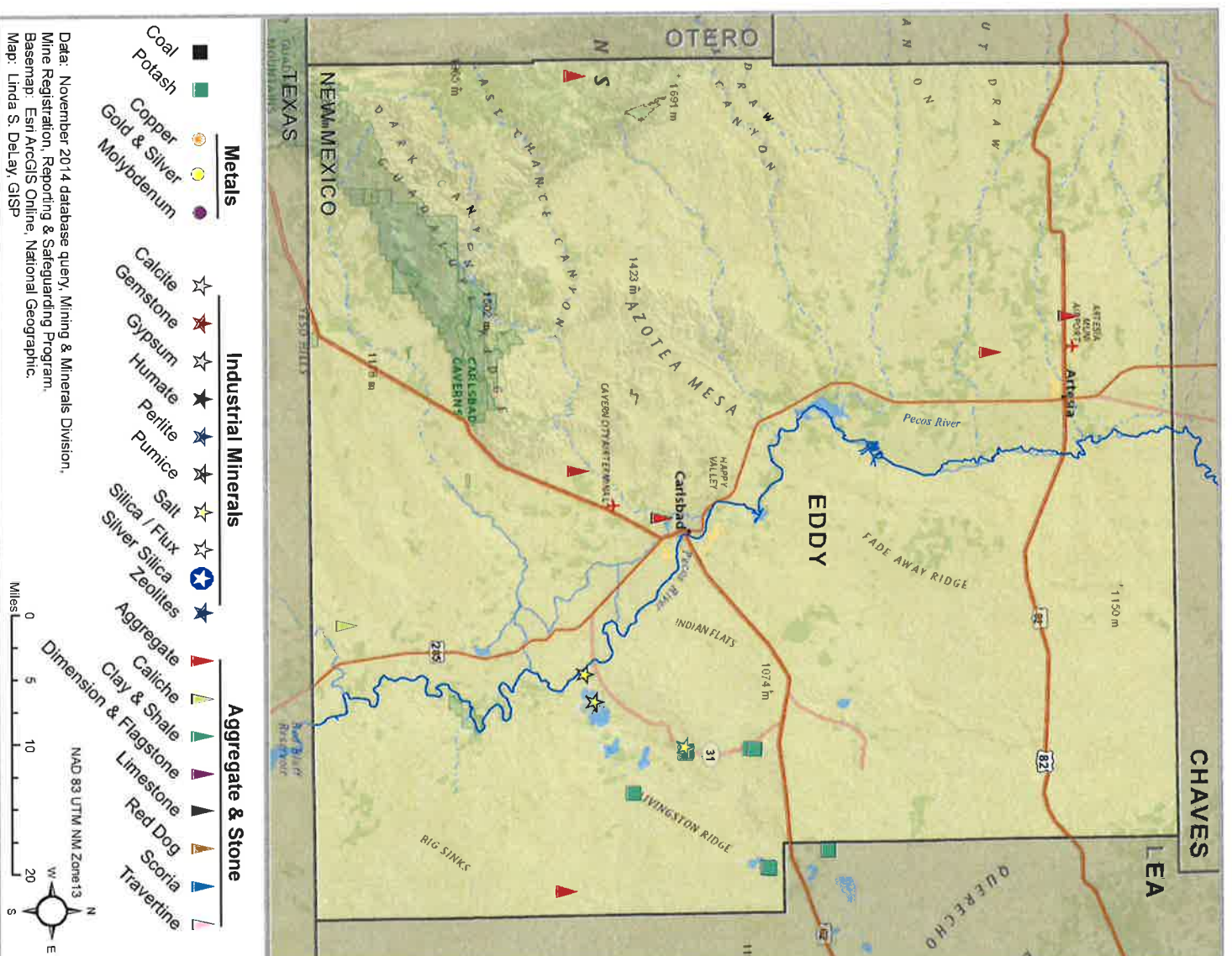
## Field Screening

Location Name: <i>Leather neck</i>				Date: <i>1-29-19</i>				
Sample Name:	Collection Time:	EC (mS)	Temp (°C)	PID Reading /PF	Soil Color	Primary Soil Type	Moisture Level	Other Remarks/Notes:
<i>BH1-45</i>					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	<i>lost on leather</i>
<i>BH1-50</i>					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	<i>lost on leather</i>
<i>BH2-55</i>					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	
<i>BH1-60</i>					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	
<i>BH1-63-TD</i>					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	<i>1st hole not sand 63'</i>
					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	
					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	
					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	
					<del>Light</del> Tan Gray Yellow	<del>Gravel</del> Gravel Rock Silt Clay	<del>Dry</del> Moist Wet	

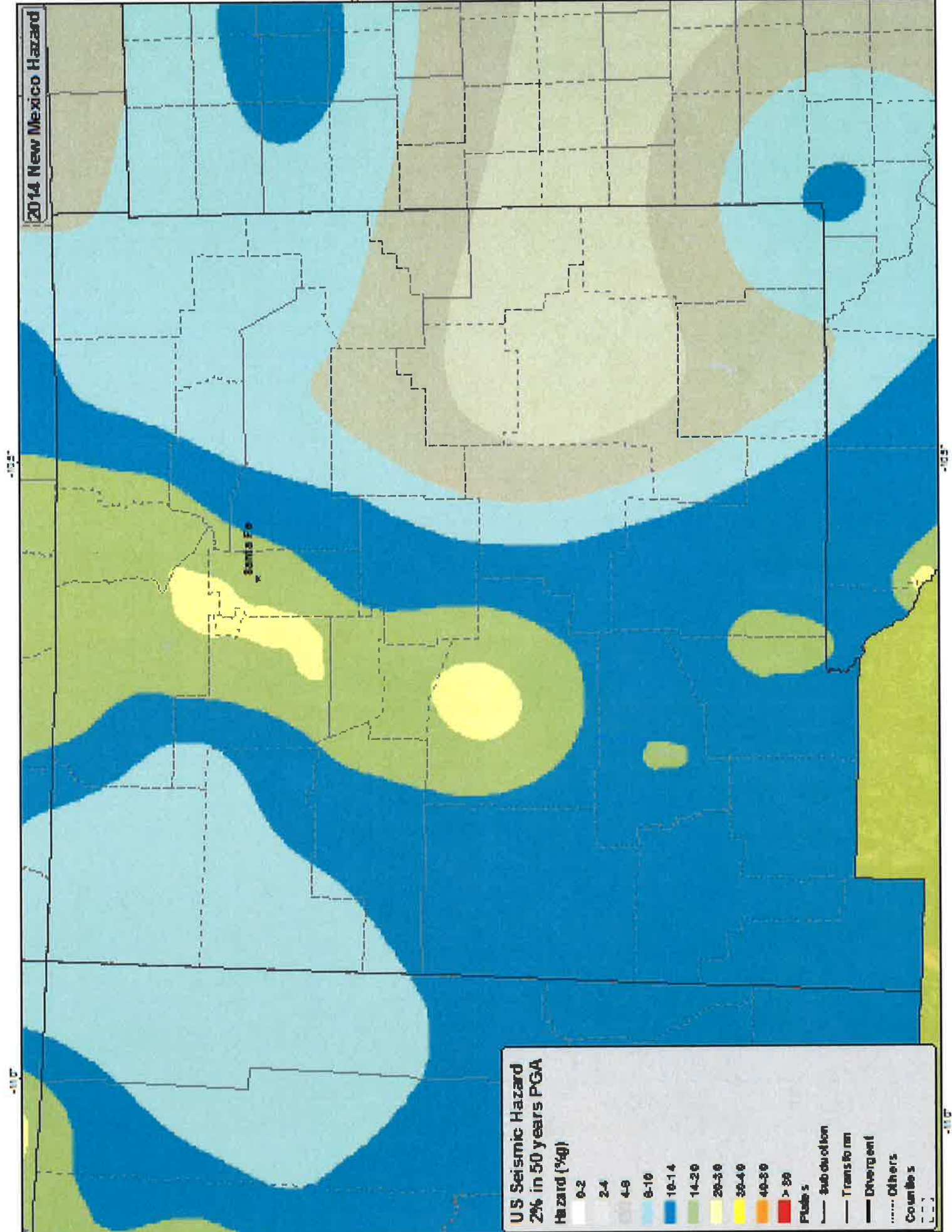


**Appendix B**  
**Active Mine/Quarry Map (NM EMNRD)**

# Active Mines in Eddy County, New Mexico, November 2014



**Appendix C**  
**USGS Seismic Hazard Map and Cave and Karst Surface**  
**Evaluation**



**SOUDER, MILLER & ASSOCIATES  
201 S. HALAGUENO  
CARLSBAD NM 88220**

**LEATHERNECK FRAC POND SITE, MATADOR RESOURCES  
SECTIONS 30, TOWNSHIP 20 SOUTH, RANGE 29 EAST  
EDDY COUNTY, NEW MEXICO  
CAVE AND KARST SURFACE EVALUATION**

**24 AUGUST 2018**

**Work was started and completed on 24 August, 2018.**

**The LEATHERNECK FRAC POND SITE, MATADOR RESOURCES, was identified and the area walked on a 50 meter grid checking for cave and karst surface occurrences. A 200 meter corridor was also walked around the entire proposed facility.**

**The locations of the corner stakes were found using Garmin GPSMAP 64 hand-held GPS units with 13S, NAD 83 as the datum.**

<b>STAKE LOCATION</b>	<b>EUTM</b>	<b>NUTM</b>	
<b>CENTER OF PAD</b>	<b>582509</b>	<b>3600993</b>	<b>NOT STAKED</b>
<b>NW CORNER STAKE</b>	<b>582398</b>	<b>3601072</b>	
<b>SW CORNER STAKE</b>	<b>582397</b>	<b>3600914</b>	
<b>NE CORNER STAKE</b>	<b>582618</b>	<b>3601072</b>	
<b>SE CORNER STAKE</b>	<b>582616</b>	<b>3600912</b>	
<b>BURIED PIPE LINE</b>	<b>582725</b>	<b>3600904</b>	<b>BEARING 237°/057°</b>

**A buried pipe line cuts the SW corner of the 200 meter corridor. It does not enter into the proposed frac pond perimeter.**

**Ground consists of red/brown sandy soil. Some caliche/limestone gravel is present.**

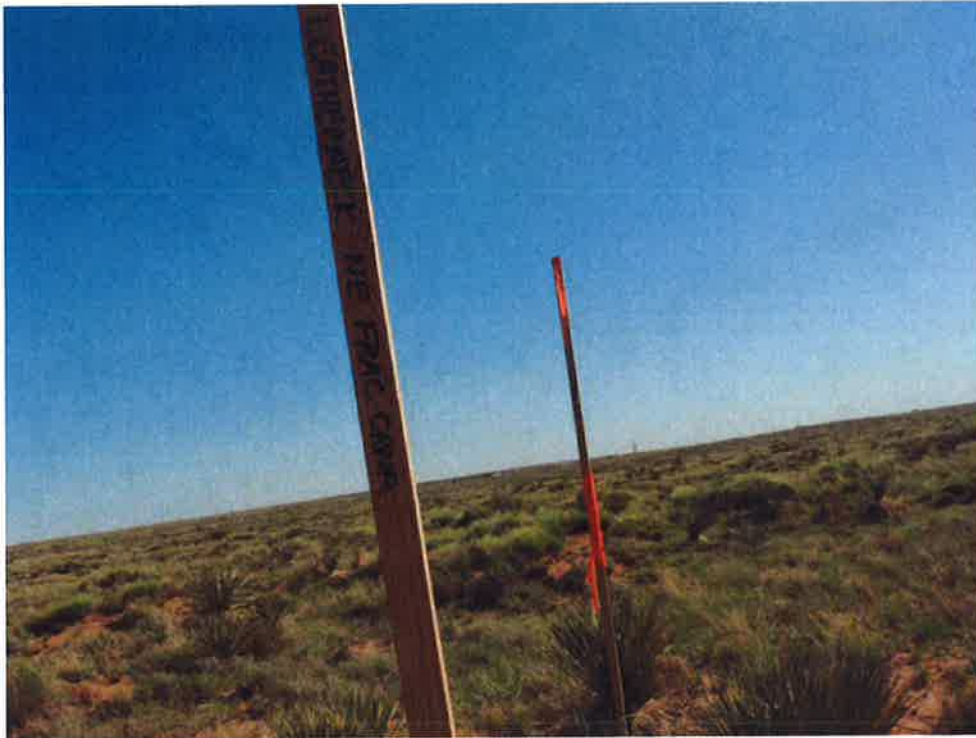
**No cave or karst concerns were identified.**

**Photographs were taken and are included in this report.**

**David S. Belski**

**Cave and Karst Surface Evaluation**





**NE FRAC POND CORNER STAKE, 582618E, 3601072N**



**NW FRAC POND CORNER STAKE, 582509E, 3601072N**



**SW FRAC POND CORNER STAKE, 582397E, 3600914N**

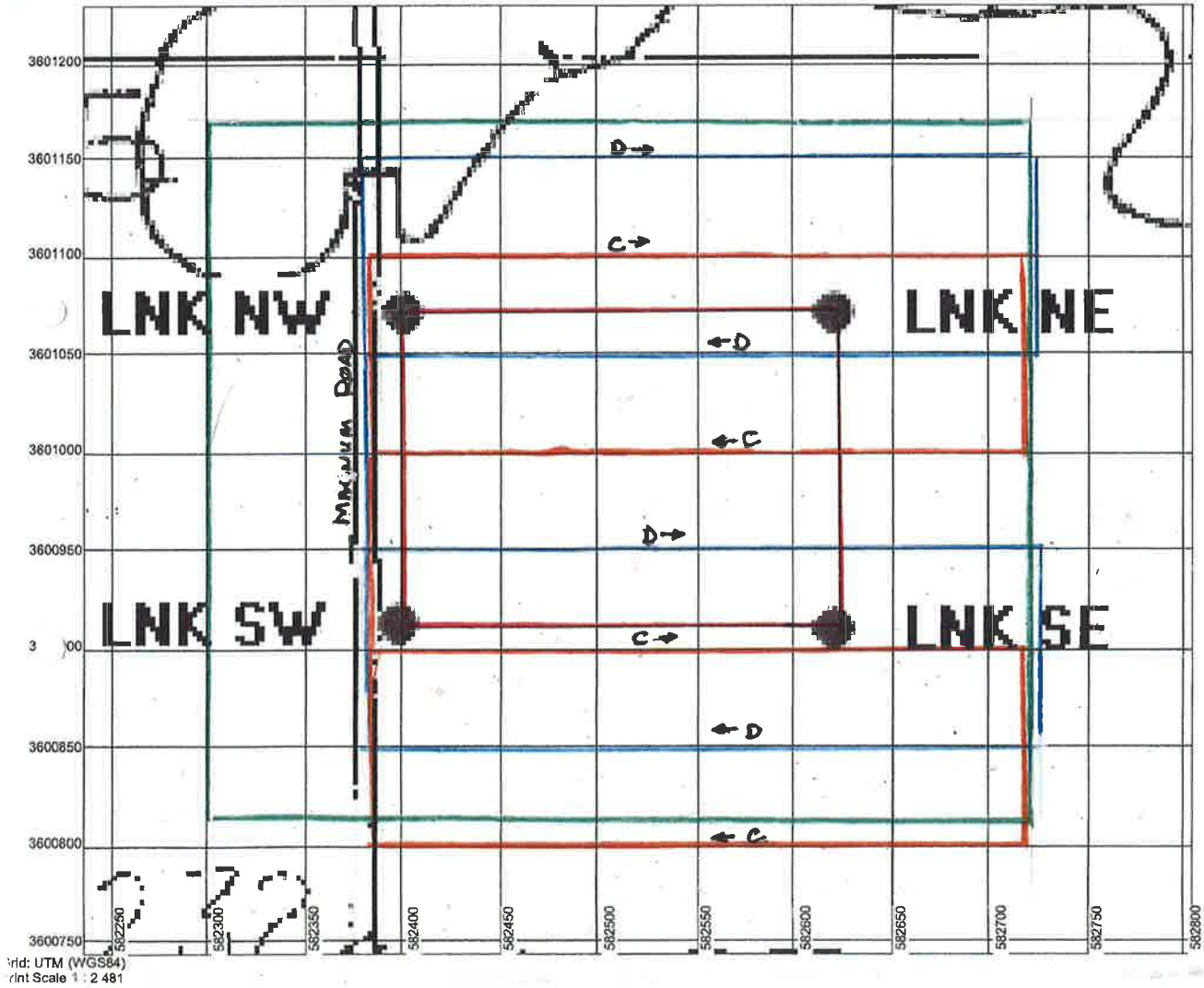


**SE FRAC POND CORNER STAKE, 582616E, 3600912N**





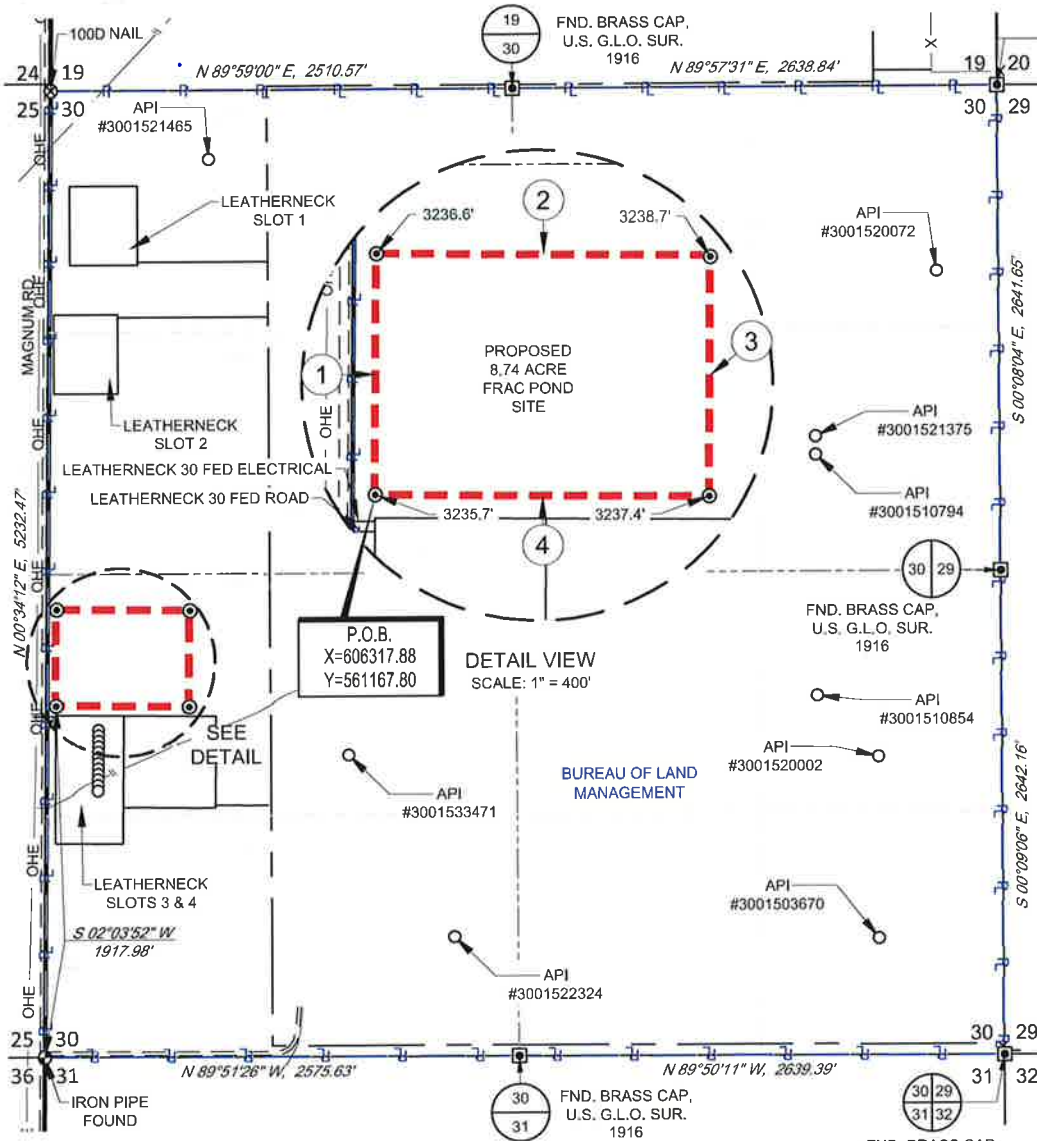
**BURIED PIPE LINE @ 582725E, 3600904N, BEARING 237°/057°**



SCALE: 1" = 1000'

0' 500' 1000'

SECTION 30, TOWNSHIP 20-S, RANGE 29-E, N.M.P.M.,  
EDDY COUNTY, NEW MEXICO



**LEATHERNECK  
FRAC POND SITE**

Metes and Bounds Description of a proposed 8.74 acre frac pond site located within Section 30, Township 20 South, Range 29 East, N.M.P.M., in Eddy County, New Mexico.

BEGINNING at a 1/2" iron rod with cap stamped "Topographic" set for the Southwest corner of this site, from whence an iron pipe found for the Southwest corner of said Section 30, bears: S 02°03'52" W, a distance of 1917.98 feet;

Thence N 00°34'14" E, a distance of 525.00 feet to a 1/2" iron rod with cap stamped "Topographic" set for the Northwest corner of this site;

Thence S 89°25'46" E, a distance of 725.00 feet to a 1/2" iron rod with cap stamped "Topographic" set for the Northeast corner of this site;

Thence S 00°34'14" W, a distance of 525.00 feet to a 1/2" iron rod with cap stamped "Topographic" set for the Southeast corner of this site;

Thence N 89°25'46" W, a distance of 725.00 feet to the Point of Beginning.

**LEGEND**

- RANGE LINE
- SECTION LINE
- QUARTER SECTION LINE
- SIXTEENTH SECTION LINE
- PROPOSED SITE
- TRACT BORDER
- ROAD WAY
- FENCE LINE
- EXISTING PIPELINE
- OVERHEAD ELECTRIC
- IRON ROD SET
- MONUMENT
- IRON PIPE FOUND
- NAIL FOUND

**LINE TABLE**

LINE	BEARING	DISTANCE
1	N 00°34'14" E	525.00'
2	S 89°25'46" E	725.00'
3	S 00°34'14" W	525.00'
4	N 89°25'46" W	725.00'



**TOPOGRAPHIC**  
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Michael Blake Brown, P.S. No. 18329  
JULY 23, 2018

**LEATHERNECK  
FRAC POND SITE**

**REVISION:**

INT DATE

DATE: 07/23/18

FILE:BO\_LEATHERNECK\_FRAC\_POND\_SITE

DRAWN BY: EAH

SHEET: 1 OF 3

**NOTES:**

1. ORIGINAL DOCUMENT SIZE: 8.5" x 11"
2. ALL BEARINGS, DISTANCES, AND COORDINATE VALUES CONTAINED HEREIN ARE GRID BASED UPON THE NEW MEXICO COORDINATE SYSTEM OF 1983, EAST ZONE, U.S. SURVEY FEET.
3. CERTIFICATION IS MADE ONLY TO THE LOCATION OF THIS EASEMENT, IN RELATION TO THE EVIDENCE FOUND DURING A FIELD SURVEY, MADE ON THE GROUND, UNDER MY SUPERVISION, AND USING DOCUMENTATION PROVIDED BY MATADOR PRODUCTION COMPANY, ONLY UTILITIES/EASEMENTS THAT WERE VISIBLE ON THE DATE OF THIS SURVEY, WITHIN/ADJOINING THIS EASEMENT, HAVE BEEN LOCATED AS SHOWN HEREON OF WHICH I HAVE KNOWLEDGE. THIS CERTIFICATION IS LIMITED TO THOSE PERSONS OR ENTITIES SHOWN ON THE FACE OF THIS PLAT AND IS NON-TRANSFERABLE, AND MADE FOR THIS TRANSACTION ONLY.
4. P.O.B. = POINT OF BEGINNING
5. ADJOINER INFORMATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.

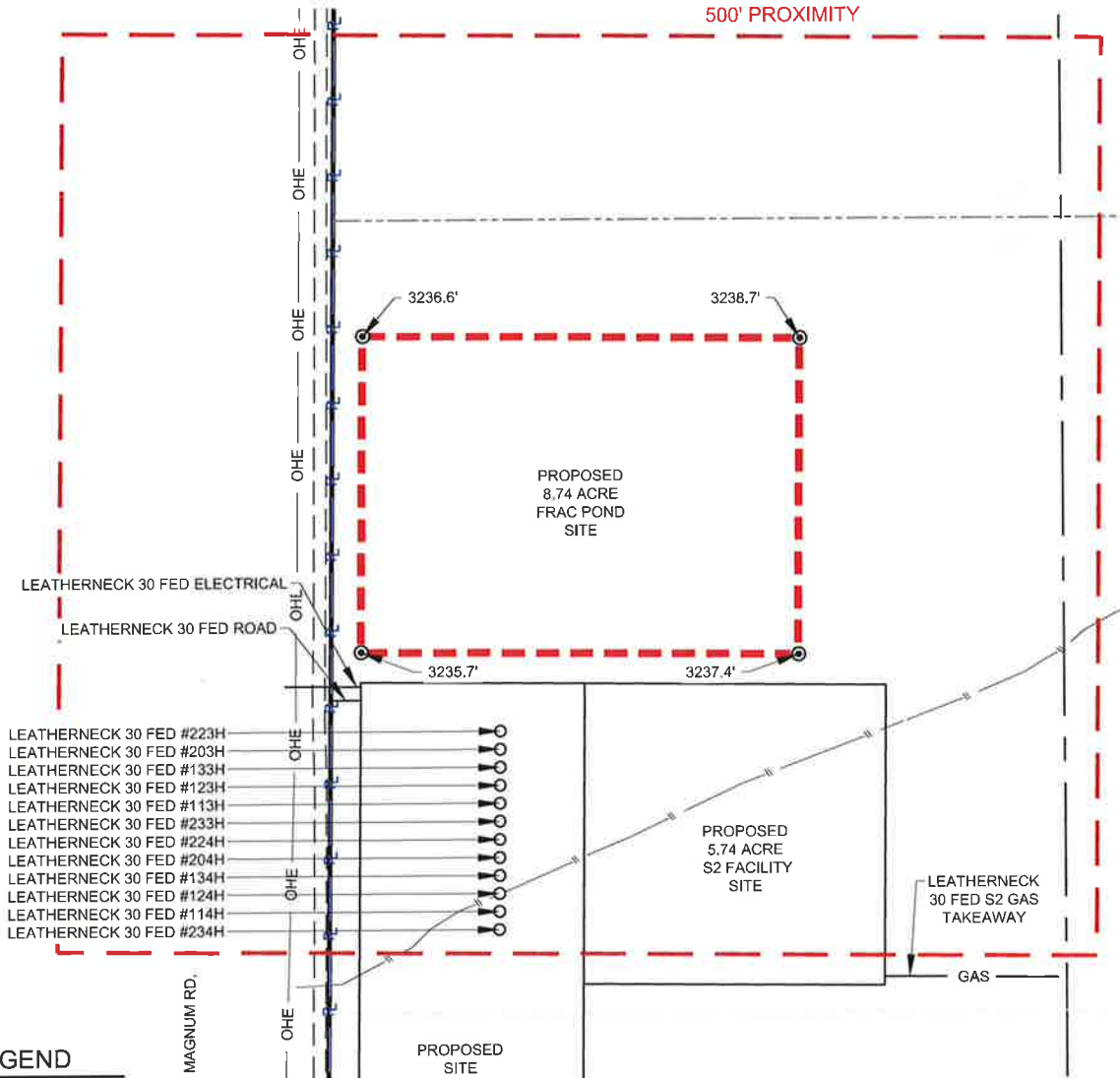


SCALE: 1" = 300'

0' 150' 300'

SECTION 30, TOWNSHIP 20-S, RANGE 29-E, N.M.P.M.  
EDDY COUNTY, NEW MEXICO

500' PROXIMITY



LEGEND

- PROPOSED SITE
- 500' PROXIMITY
- TRACT BORDER
- PROPOSED ROAD
- RANGE LINE
- FENCE LINE
- EXISTING PIPELINE
- OHE OVERHEAD ELECTRIC
- ROAD WAY
- ⊙ IRON ROD SET



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Michael Blake Brown, P.S. No. 18329  
JULY 23, 2018

LEATHERNECK FRAC POND SITE	REVISION:	
	INT	DATE
DATE: 07/23/18		
FILE:BO_LEATHERNECK_FRAC_POND_SITE		
DRAWN BY: EAH		
SHEET: 2 OF 3		

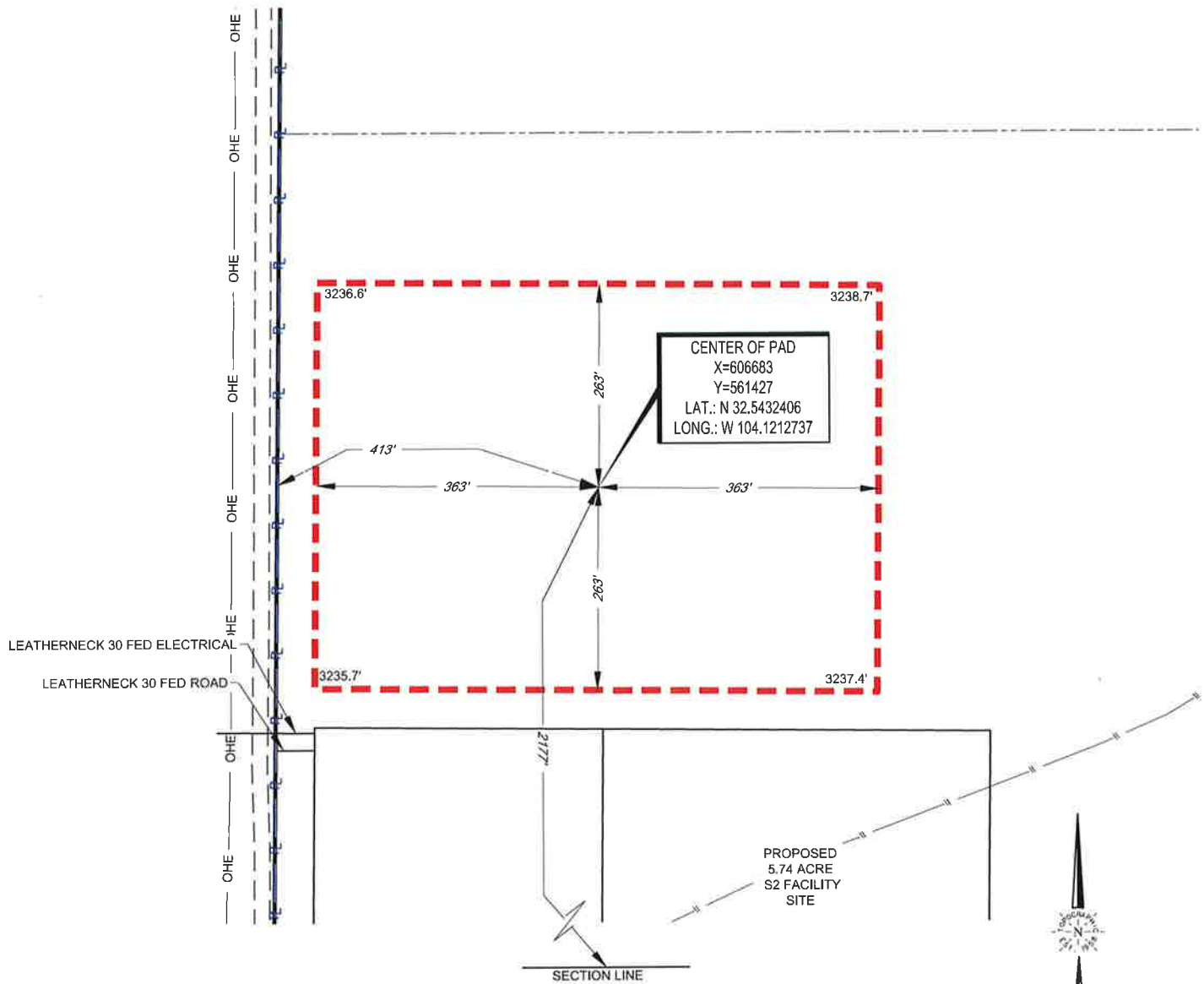
NOTES:

1. ORIGINAL DOCUMENT SIZE: 8.5" X 11"
2. ALL BEARINGS, DISTANCES, AND COORDINATE VALUES CONTAINED HEREIN ARE GRID BASED UPON THE NEW MEXICO COORDINATE SYSTEM OF 1983, EAST ZONE, U.S. SURVEY FEET.
3. CERTIFICATION IS MADE ONLY TO THE LOCATION OF THIS EASEMENT, IN RELATION TO THE EVIDENCE FOUND DURING A FIELD SURVEY, MADE ON THE GROUND, UNDER MY SUPERVISION, AND USING DOCUMENTATION PROVIDED BY MATADOR PRODUCTION COMPANY. ONLY UTILITIES/EASEMENTS THAT WERE VISIBLE ON THE DATE OF THIS SURVEY, WITHIN/ADJOINING THIS EASEMENT, HAVE BEEN LOCATED AS SHOWN HEREON OF WHICH I HAVE KNOWLEDGE. THIS CERTIFICATION IS LIMITED TO THOSE PERSONS OR ENTITIES SHOWN ON THE FACE OF THIS PLAT AND IS NON-TRANSFERABLE, AND MADE FOR THIS TRANSACTION ONLY.
4. ADJOINER INFORMATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.



SECTION 30, TOWNSHIP 20-S, RANGE 29-E, N.M.P.M.  
EDDY COUNTY, NEW MEXICO

DETAIL VIEW  
SCALE: 1" = 200'



### LEGEND

- RANGE LINE
- SECTION LINE
- - - PROPOSED SITE
- TRACT BORDER
- EXISTING PIPELINE
- OHE — OVERHEAD ELECTRIC
- == ROAD WAY

CENTER OF PAD IS 2177' FSL & 413' FWL

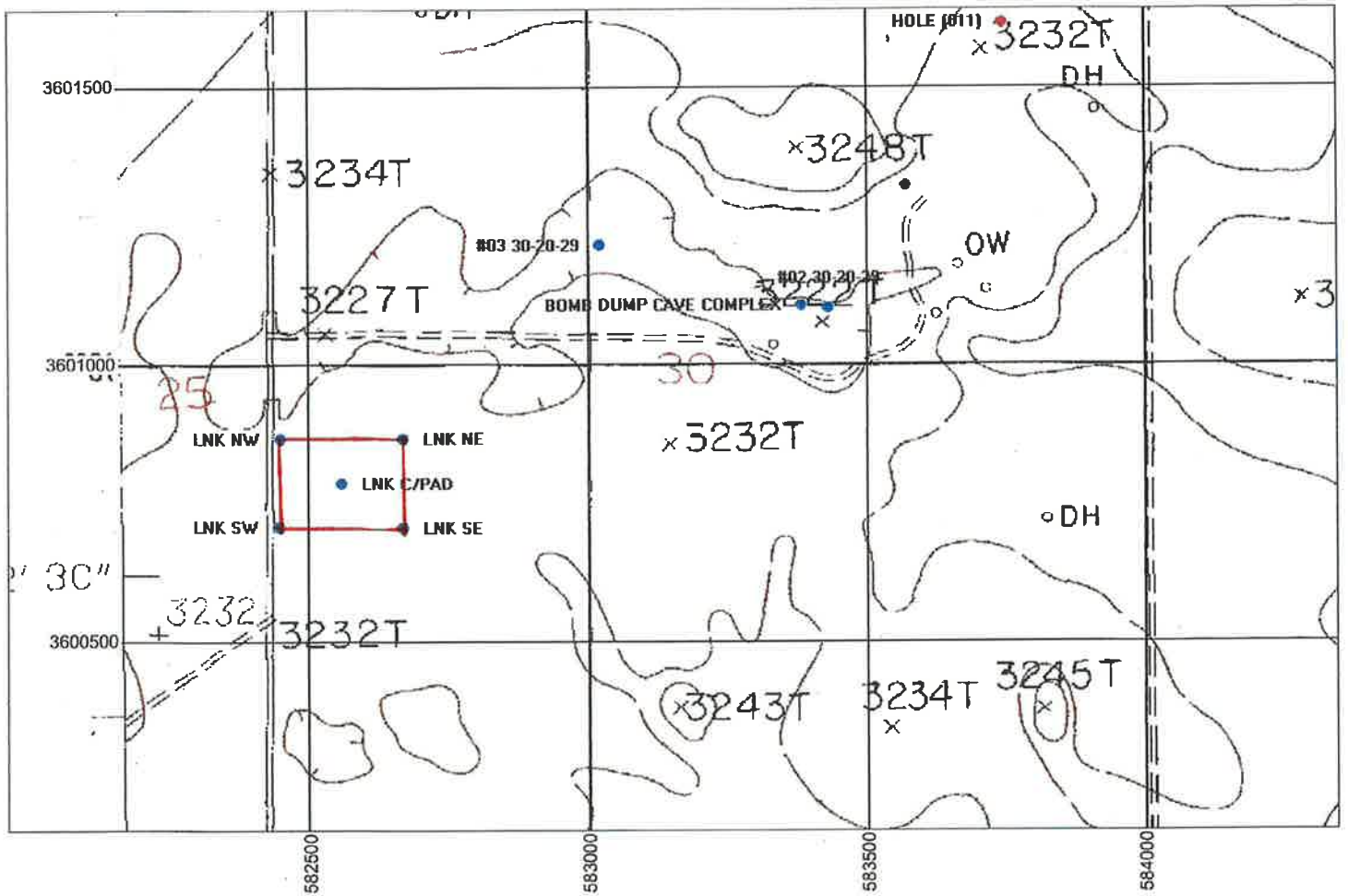
SCALE: 1" = 200'  
0' 100' 200'



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ALL BEARINGS, DISTANCES, AND COORDINATE VALUES CONTAINED HEREON ARE GRID BASED UPON THE NEW MEXICO COORDINATE SYSTEM OF 1983, EAST ZONE, U.S. SURVEY FEET

THIS PROPOSED PAD SITE LOCATION SHOWN HEREON HAS BEEN SURVEYED ON THE GROUND UNDER MY SUPERVISION AND PREPARED ACCORDING TO THE EVIDENCE FOUND AT THE TIME OF SURVEY, AND DATA PROVIDED BY MATADOR PRODUCTION COMPANY. THIS CERTIFICATION IS MADE AND LIMITED TO THOSE PERSONS OR ENTITIES SHOWN ON THE FACE OF THIS PLAT AND IS NON-TRANSFERABLE. THIS SURVEY IS CERTIFIED FOR THIS TRANSACTION ONLY.



**Appendix D**  
**FEMA Floodplain Information**

## LEGEND

[illegible]

Another limitation in this study is that the data were collected for a specific flood event, and the results may not be generalizable to other flood events. The data were collected for a specific flood event, and the results may not be generalizable to other flood events.

Food offerings on the map are referenced to the North American Vegetal Diet of risk. These food offerings must be compared to standard diet and nutrient information for the same vegetal diet. For information regarding diet and nutrient information for the National Geographic Vegetal Diet of 1978 and the North American Vegetal Diet of 1987, visit the National Geographic Survey website at <http://www.national-geographic.com>.

HSR&C 3 89202  
1215 East Wall Highway  
Smyth Spring, Maryland 20613-3262  
(202) 715-3242

Corporate leaders discuss the issues and benefit of the time and quality of life of patients. Related strategies can be successful in the operations you have selected after the time has passed, but you should consider appropriate measures to ensure that your employees have a strong commitment to the company.

**Check for FTSMA Mail Service Center** at 1-800-755-2641 for information on product availability. Products may be discontinued without notice. Products previously marked "Check for FTSMA Mail Service Center" may be marked "Check for FTSMA Mail Service Center" again. Products marked "Check for FTSMA Mail Service Center" may be received by Feb. 1, 2005, 2006-2007 and by website at [www.ftsma.com/ftsma2005](http://www.ftsma.com/ftsma2005).



---

[illegible][illegible]

**CONC E** ☐ **OTHER AREAS**

Percent committed to be outside the 0.1% annual chance floodplain  
Areas in which flood heights are unattainable, (N/A possible)

**CONC D** ☐

CRIS 10001 and 10011 are vertically oriented with a thickness of 10000 mm. The vertical axis is defined by the vertical axis of the CRIS 10001 and 10011.

Cross section line  
 Thymine line  
 Geographic coordinates referential to the North American Datum of 1983 (NAD 83), WGS84 Mercator  
 49000000 FT  
 49000000 FT  
 49000000 FT

EFFECTIVE DATE OF COUNTERVAILING FLOOD INSURANCE RATE MAP  
2008 & 2010

EFFECTIVE DATE OF REMARCHING TO THIS PANEL

To determine if flood insurance is available in this community, consult your insurance agent or call the National Flood Insurance Program at 1-800-455-6603.

PANEL 0850D	<b>FIRM</b> FLOOD INSURANCE RATE MAP
-------------	---

**PANEL 850 OF 2000**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

MAP NUMBER

NATIONAL  
FEDERAL Emergency Management Agency



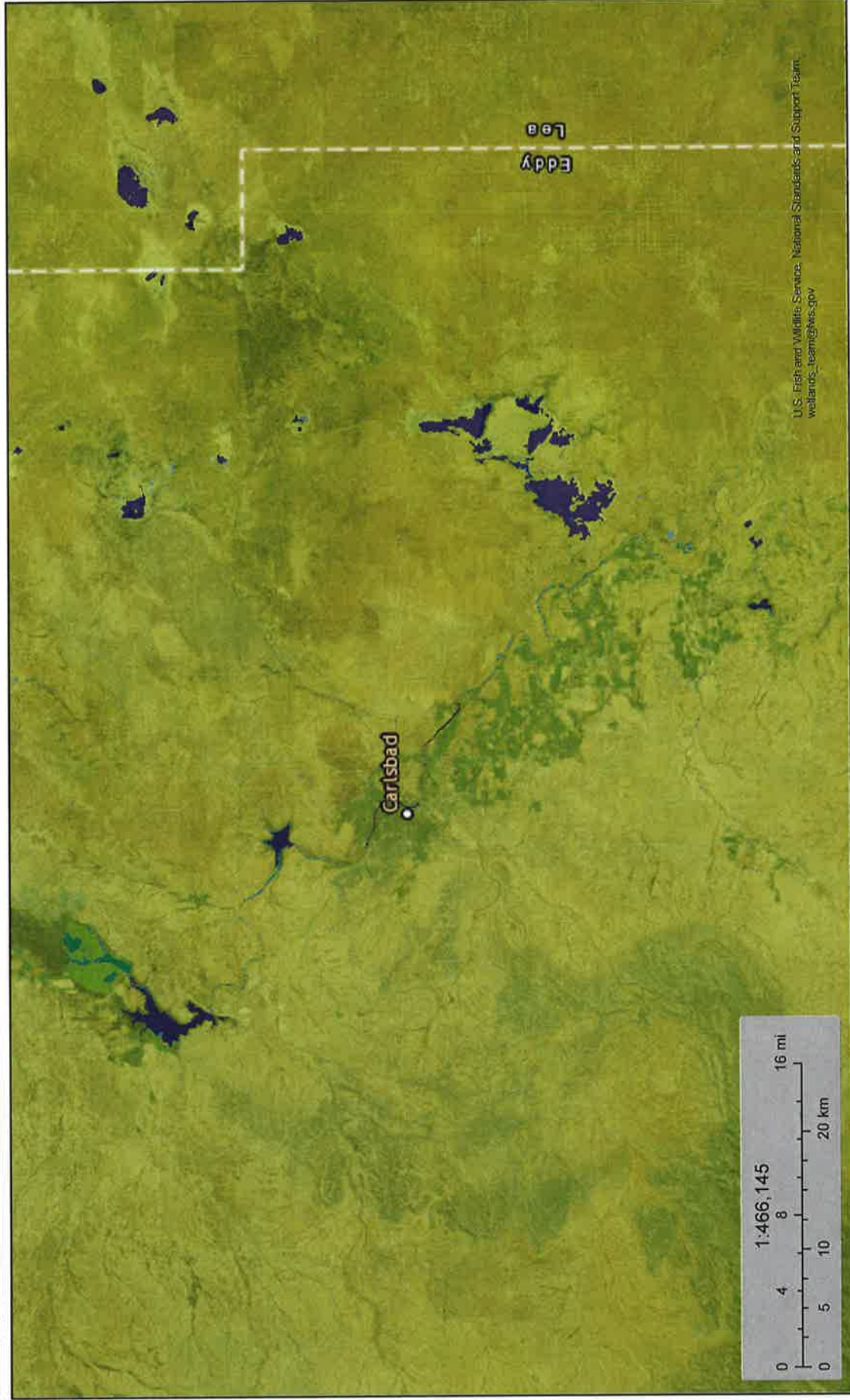
**Appendix E**  
**Wetlands & Critical Habitat Map (US FWS)**



U.S. Fish and Wildlife Service

## National Wetlands Inventory

## Wetlands Eddy County New Mexico



August 21, 2018

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

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.





August 21, 2018

Wetlands

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

**Design Plan, Operating and Maintenance Plan, &  
Closure Plan**



## Design and Construction Plan:

### Project Overview

The following specifications will be met during the construction of the recycling containment:

- The recycling containment will be constructed to ensure the confinement of produced water, to prevent releases and to prevent overtopping due to wave action or rainfall.
- The foundation will be properly constructed and interior slopes will consist of a firm unyielding base that will be smooth and free of rocks, debris or and sharp edges that may penetrate the liner.
- 8 ounce geotextile will be laid on the base of the containment to add another layer of protection for the liner from any sharp edges and to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.
- A levee will be constructed with an inside and outside grade of three horizontal feet to one vertical foot (3H:1V). The top of the levee shall be wide enough to install an anchor trench and provide adequate room for inspection and maintenance. The anchor trench will be at least 18 inches deep.
- The recycling containment will be constructed with a 60 mil HDPE *conductive* primary liner and a 40 mil HDPE secondary liner with a leak detection system appropriate to the site's conditions. Liner compatibility shall meet or exceed the EPA SW-846 method 9090A or subsequent relevant publications.
- The edges of both liners will be anchored with a 24 inch deep (needs to be at least 18 inches deep) compacted earth filled trench.
- Liner seems will be minimized and shall be oriented up and down (not across) the slope of the levee. Factory welded seams will be used anywhere possible and no horizontal seams will be within five feet of the slope's toe.
- All field seams will be tested and logged to ensure the seams are thermally sealed. Prior to field seaming, the operator shall overlap liners four to six inches. The number of field seams and corners and irregularly shaped areas will be minimized. Qualified personnel will conduct field welding and testing.
- The conductive primary liner will be spark tested to ensure no cuts are present.
- The liner will be protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines will not penetrate the liner.

- The recycling containment will be constructed with a leak detection system between the primary and secondary liner. The leak detection system will consist of 200-mil geonet and will be sloped to facilitate the earliest possible leak detection.
- The containment will be designed to prevent run-on of surface water. Diversion ditches will be used where necessary.
- Above-ground storage tank will be double-lined using (2) 40-mil LLDPE string reinforced liners. This tank will be installed according to notes in the engineering drawing and according to manufacturer specifications.
- Above-ground storage tank will be placed on 200-geonet, 8 oz. geotextile and will exist within a secondary containment

### **Stockpiling of Topsoil**

Topsoil will be stockpiled beside the recycling containment and will be used as final layer at the time of the enclosure of the containment.

### **Signs**

Matador Resources Company will provide easily read sign(s) no less than 12 inch by 24 inch with lettering not less than two inches in height in a conspicuous place around the perimeter of the fence that will include:

- The operator's name
- The location of the site by quarter-quarter, section, township and range
- Emergency telephone numbers

### **Fencing**

An 8-foot tall game fence will be provided around the perimeter of the containment to deter an unauthorized human or wildlife access. Gates will be used for authorized personnel only and will be kept locked at all times. The operator maintains that this will provide equal or better protection to wildlife than the minimum four-foot, four stranded barbed wire fence required by NMOCD.

### **Netting and Wildlife Plan**

The fence indicated above will be effective in excluding any terrestrial wildlife. In lieu of a physical net over the recycling containment and over tanks at the recycling facility, the operator proposes instead utilizing a previously approved audible avian deterrent system. This system has proved effective in deterring migratory birds on other recycling facilities operated by Matador in both New Mexico and Texas. The audible system is manufactured by **Bird-X**. Manufacturer's specifications are attached to the registration.

### **Operating and Maintenance Plan:**

The recycling facility and containment will be operated as such to protect public health and the environment and maintained in a manner that prevents contamination of fresh water. The recycling facility and lined containment will be used to facilitate recycling and reclamation of produced water from surrounding oil and gas wells for the purpose of reuse in drilling, completion, producing or plugging operations in oil and gas wells. This facility or containment will not be used for the purpose of disposal of produced water or oilfield waste of any kind. The operation plan consists of the following:

- Weekly inspections of the recycling facility and recycling containment including leak detection testing while the containment is holding fluid. A log of these inspections will be filed and held by the operator for review by the division upon request.
- Produced water from nearby producing oil and gas wells will enter the facility to be treated via gathering lines or trucks. Produced water will be treated for removal of hydrocarbons at the facility before entering the recycling containment.
- The operator shall remove any visible layer of oil from the surface of the recycling containment should such appear.
- The operator will maintain a minimum of three feet of freeboard in the recycling containment.
- Records will be kept by the operator and delivered on a monthly basis to the state in the form of a C-148 notification documenting the total volume of produced water received for recycling, and the total volume of water leaving the facility for use in oil and gas operations.
- In the case of discovery that the containment's primary liner has been compromised above the fluid's surface, the operator shall repair the damage within 48 hours of discovery or else seek an extension of time from the division district office.
- In the case of discovery that the containment's primary liner has been compromised below the fluid's surface, the operator shall remove all fluid above the damage or leak within 48 hours of discovery, notify the division district office, and repair the damage to the liner.
- Above ground storage tank will be inspected weekly along with the recycling containment, including leak detection testing within the secondary containment. If a leak is discovered in the above-ground storage tank, operator will follow the same protocol as if a leak was discovered in the recycling containments liner.
- The containment berm shall be operated and regularly inspected to prevent the collection of surface water run-on.
- The recycling containment will be deemed to have ceased operations if less than 20% of the total fluid capacity is used every six months following the first withdrawal of produced water for use. The operator will either report cessation of operations to the appropriate division district office or request an extension for cessation of operations.

## **Closure Plan**

- Once operator has declared cessation of operations, all fluid shall be removed from the site within 60 days. The containment will be closed within six months from the date of cessation.
- All fluids, contents and synthetic liners will be transferred to a division approved facility.
- The soil under the containment will be tested for contamination with a five-point composite sample, including any and all stained or wet soils. The sample will be analyzed for constituents in accordance with Table 1 of NMOCD 19.15.34.14.
- The operator will submit a closure report on form C-147, including required attachments to document all closure activities.
- After closure, the operator will reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area.
- Surface reclamation obligations imposed by the BLM or NM State Trust Land on lands managed by those agencies will supersede these requirements, provided that these other requirements provide equal or greater protection of fresh water, human health, and the environment.

## **Financial Assurance Requirements**

The operator has an existing financial assurance in place with NMOCD as required by 19.15.8 NMAC. Use of recycling facility and containment will be used solely for well owned or operated by Matador Production Company.

## **Variance Request**

- Bird Deterrents- In lieu of a physical net over the recycling containment and over tanks at the recycling facility, the operator proposes instead utilizing a previously approved audible avian deterrent system. This system has proved effective in deterring migratory birds on other recycling facilities operated by Matador in both New Mexico and Texas. The audible system is manufactured by **Bird-X**. Manufacturers specifications are attached to the registration.



## **Equipment and Materials Manufacturers Specifications**



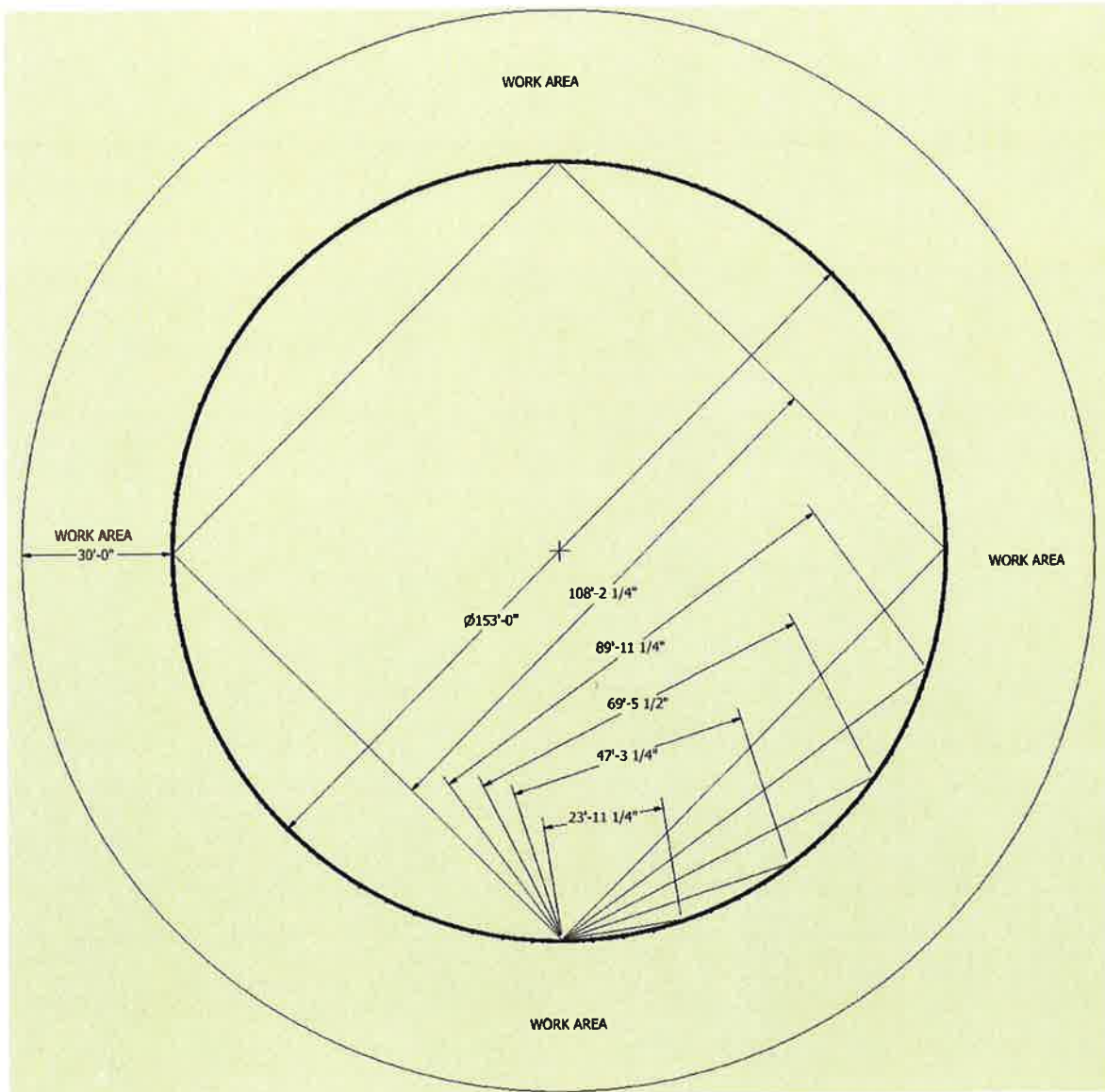
## 40,000BBL Water Corral Installation Sheet

### Corral Site Requirements:

- 213ft Diameter site per 40,000bbl Water Corral
- Over all site must be level to +/- .5in
- Corral ring must be level to +/- .25in
- Soil report must meet ASTM D-698A, 90% or greater

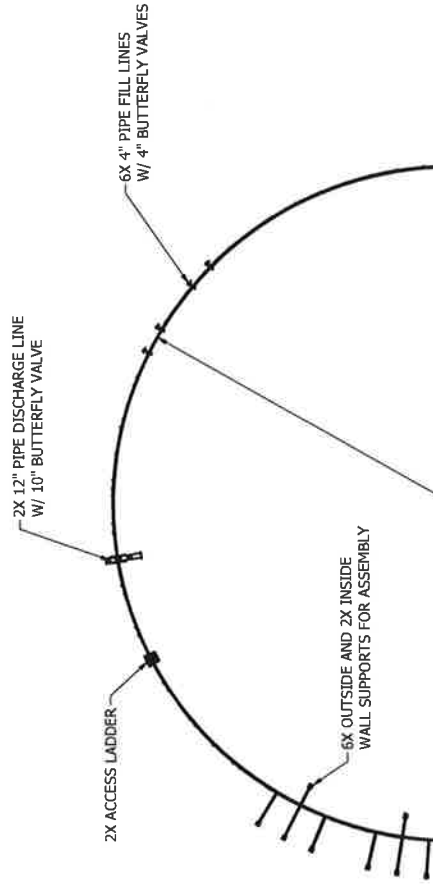
### Corral Setup:

- Mark your 153ft diameter circle from center pin
- Mark your 0°(Start point), 90°, 180°, and 270°
- Check your cord lengths periodically (inside corner to inside corner), adjust next panel if needed
- Ensure last panel can fit (pulling together is easier than pushing apart)
- 12" x 12" Sand radius ring is required for inside corral

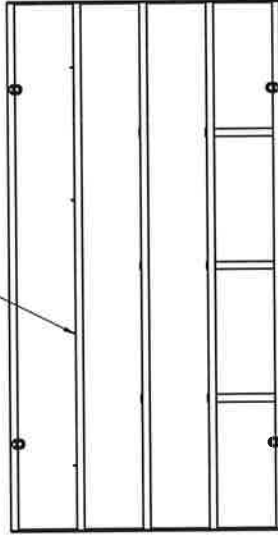


NOTES:

1. REQUIRES A 30FT WORK AREA AROUND CORRAL



D-RING TIE-DOWNS



PANEL SECTION  
SCALE 1 / 50

PROTECTIVE RUBBER STRIP  
COVERING END SEAMS



<p>THIS DRAWING IS PROPERTY OF JWF INDUSTRIES IT MAY NOT BE COPIED OR DISTRIBUTED IN WHOLE OR PART WITHOUT PRIOR PERMISSION OF JWF INDUSTRIES.</p>		<p>INTERNAL DIMENSIONS AND TOLERANCES ARE AS SHOWN UNLESS OTHERWISE SPECIFIED. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES AND DECIMALS THEREOF.</p>		<p>DATE: 6/4/2012 CHECKED BY: [Signature] DATE: [Blank] APPROVED: [Signature] DATE: [Blank]</p>		<p>DRAWN BY: [Signature] DATE: 6/4/2012</p>		<p>ETC Environmental Tank &amp; Container 2500 S. 100th Ave. Suite 200 Tulsa, OK 74133-0001 www.etcinc.com</p>	
<p>TITLE: 40,000 BBL MOBILE WATER CORRAL, BOLT-UP DESIGN</p>		<p>SIZE: 11" x 17"</p>		<p>SCALE: N/A</p>		<p>PROJECT NO.: MWC-A-002</p>		<p>REV: 1 OF 1</p>	
<p>THICKNESS: NA</p>		<p>WEIGHT: NA</p>		<p>LOCATION: [Blank]</p>		<p>DATE: [Blank]</p>		<p>PROJECT: [Blank]</p>	

Date : 3/06/2014  
Document ID : 14006G  
Revision : 0  
Project : Evaluation of existing design  
Tank #(s) : 40,000 bbl Corral  
Diameter : 153'- 1/2"  
Shell height : 12' - 4 "  
Roof type : Open Top  
Client : ETC  
Location : Pittsburgh, Pa  
PO# :





## Standard Properties

### 1. Gross Tank Geometry

$$D := 153 \cdot \text{ft} + 0.5 \cdot \text{in}$$

Tank diameter

$$H_s := 12 \cdot \text{ft} + 4 \cdot \text{in}$$

Shell height

### 2. Product Variables

$$DLL := 12 \cdot \text{ft} + 4 \cdot \text{in}$$

Design liquid level

$$V_{\text{nom}} := \frac{\pi}{4} \cdot D^2 \cdot H_s$$

$$V_{\text{nom}} = 40408 \cdot \text{bbl}$$

Nominal volume

$$PSG := 1.2$$

Maximum product specific gravity [assumed for heavy brine]

### 3. Design Parameters

$$T_{\text{max}} := 200 \cdot \text{F}$$

Maximum design temperature

$$T_{\text{min}} := 5 \cdot \text{F}$$

Minimum design temperature

$$P_{\text{int}} := 0 \cdot \text{psi}$$

Design internal pressure

$$P_{\text{ext}} := 0 \cdot \text{psi}$$

Design external pressure (vacuum)

## 4. Environmental Variables

### A. Temperature Variables

$DMT := 5 \cdot F$

Design metal temperature

### B. Wind Variables

$V_{wind} := 90 \cdot \text{mph}$

Design wind speed [3-second gust]

$I_{wind} := 1.0$

Wind importance factor

Exposure category (Default = C)

$K_{zt} := 1.0$

Topographic factor (1.0 minimum)

Check windbuckling in corroded condition?

Can windgirders for tanks with a diameter greater than 200 feet be designed using  $D = 200 \text{ ft}$ ?



## 5. Shell Design

### A. Shell Parameters

$$JE_s := 1.00$$

Shell joint efficiency

- ☒ Yes  
☐ No

Does the client allow shell design using the variable-design-point method for tanks less than 200 feet in diameter?

$$h_s := \left( \frac{6}{6} \right) \cdot \text{ft} + \left( \frac{0}{4} \right) \cdot \text{in}$$

Height of each shell course.

$$t_s := \left( \frac{0.25}{0.25} \right) \cdot \text{in}$$

Actual thickness of each shell course

$$CA_s := \left( \frac{0}{0} \right) \cdot \text{in}$$

Corrosion allowance on the shell

Shell Material 1

Shell Material 2

Shell Material 3

A36

None

None

SR1

SR2

SR3

SR4

SR5

SR6

SR7

SR8

- |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 | <input checked="" type="radio"/> Matl 1 |
| <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            | <input type="radio"/> Matl 2            |
| <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            | <input type="radio"/> Matl 3            |

#### ☒ Shell Material Properties

Shell material

Group number

Design stress

Hydrotest stress

Appendix M factor

$$SM = \left( \frac{"A36"}{"A36"} \right)$$

$$GRP = \left( \frac{1}{1} \right)$$

$$SD = \left( \frac{23200}{23200} \right) \text{psi}$$

$$ST = \left( \frac{24900}{24900} \right) \text{psi}$$

$$RF = \left( \frac{1.000}{1.000} \right)$$

### B. Shell Thickness Check (API 650)

#### ☒ Shell Thickness

$$t_{smin} = \left( \frac{0.3125}{0.3125} \right) \cdot \text{in}$$

Minimum required steel plate thickness required by API 650

$$\frac{t_{smin}}{t_s} = \left( \frac{125.00}{125.00} \right) \cdot \%$$

## 5. Shell Design

### C. Shell Wind Buckling Check

#### ☒ Shell Buckling

$$\frac{H_{tr} - h_{twg}}{H_1} = 69.06\%$$

Wind buckling check.  
If value exceed 100%, intermediate windgirders are required.

### D. Splice Bolt Check

$n_{bolt} := 15$	Bolts per splice connection
$d_b := 1.25 \cdot \text{in}$	Diameter of bolts
$P_{des} := 150 \cdot \text{kip}$	Design strength in tension for A490 bolt
$\Phi_{pry} := 2.0$	Increase in bolt force due to prying action [conservative estimate]
$P_{head} := \gamma_w \cdot \text{PSG} \cdot \text{DLL} = 923.82 \cdot \text{psf}$	Head pressure at base of shell
$P_{ave} := \frac{1}{2} \cdot P_{head} = 461.91 \cdot \text{psf}$	Average pressure on shell
$P_{fb} := \frac{1}{2} \cdot P_{ave} \cdot \text{DLL} \cdot D = 435.93 \cdot \text{kip}$	Force in each splice plate from circumferential hydrostatic forces
$P_b := \frac{P_{fb}}{n_{bolt}} = 29.06 \cdot \text{kip}$	Average pure tensile force in bolt

### E. Panel Information

$n_{pl} := 20$	Panels per ring
$w_{tb} := 4 \cdot \text{in}$	Square tubing width
$t_{tb} := 0.25 \cdot \text{in}$	Tubing thickness
$n_{tb} := 5$	Number of tubes per panel
$F_{ytb} := 46 \cdot \text{ksi}$	Yield strength of tubing [A500 Grade B]
$F_{Ultb} := 58 \cdot \text{ksi}$	Ultimate strength of tubing [A500 Grade B]

12.

#### F. Safety Factor - Bolts

$$SF_{ba} := \frac{P_{des}}{\Phi_{pry} P_b} = 2.6$$

Safety factor for bolt in pure tension compared to allowable tensile strength for the bolts

#### G. Safety Factor - Panels

$$SF_{pa} := \frac{F_{A_{comp}}}{\sigma_{hoop}} = 3.2$$

Safety factor for hoop stress in panel compared to composite allowable stress of plate and tubing

$$SF_{py} := \frac{F_{Y_{comp}}}{\sigma_{hoop}} = 5.0$$

Safety factor for hoop stress in panel compared to composite yield stress of plate and tubing

$$SF_{pu} := \frac{F_{U_{comp}}}{\sigma_{hoop}} = 7.4$$

Safety factor for hoop stress in panel compared to composite ultimate stress of plate and tubing



PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	1096676
<b>SPECIFICATIONS</b>				
Thickness (Nominal $\pm 10\%$ ) (11)	ASTM D-5199	Every roll	mils	60,0
Resin Density	ASTM D-1505	Certified	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	Certified	g/10 min	0,0
Sheet Density (8)	ASTM D-792	1/Batch	g/cc	$\geq 0.940$
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D-3895	Per formulation	min	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 5 rolls		
Strength at Yield			ppi	126
Elongation at Yield			%	12
Strength at Break			ppi	228
Elongation at Break			%	700
Tear Resistance (min. avg.)	ASTM D-1004	Every 10 rolls	lbf	38
Puncture Resistance (min. avg.)	ASTM D-4833	Every 10 rolls	lbf	108
Dimensional Stability	ASTM D-1204	Certified	%	$\pm 2$
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation		
HP OIT (min. avg.)	ASTM D-5885		%	80
UV Res. - % retained after 1600 hr	ASTM D-7238	Per formulation		
HP-OIT (min. avg.)	ASTM D-5885		%	50
Volume Resistivity (max.)	ASTM D-4496	Every 10 rolls	Ohm•m	10
<b>SUPPLY SPECIFICATIONS</b> (Roll dimensions may vary $\pm 1\%$ )				
Roll Dimension - Width			ft	24.6
Roll Dimension - Length			ft	459
Area (Surface/Roll)			sf	11 291
Application (10)		-	-	Conductive

PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	1000986
<b>SPECIFICATIONS</b>				
Thickness (Nominal $\pm 10\%$ ) (11)	ASTM D-5199	Every roll	mils	40,0
Resin Density	ASTM D-1505	Certified	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	Certified	g/10 min	0,0
Sheet Density (8)	ASTM D-792	1/Batch	g/cc	$\geq 0.940$
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D-3895	Per formulation	min	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 5 rolls		
Strength at Yield			ppi	85.7
Elongation at Yield			%	12
Strength at Break			ppi	154.2
Elongation at Break			%	700
Tear Resistance (min. avg.)	ASTM D-1004	Every 10 rolls	lbf	24
Puncture Resistance (min. avg.)	ASTM D-4833	Every 10 rolls	lbf	72
Dimensional Stability	ASTM D-1204	Certified	%	$\pm 2$
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation		
HP OIT (min. avg.)	ASTM D-5885		%	80
UV Res. - % retained after 1600 hr (10)	GRI-GM-11	Per formulation		
HP-OIT (min. avg.) (11)	ASTM D-5885		%	50
<b>SUPPLY SPECIFICATIONS</b> (Roll dimensions may vary $\pm 1\%$ )				
Roll Dimension - Width	-		ft	0,9
Roll Dimension - Length	-		ft	780
Area (Surface/Roll)	-		sf	17 394

**NOTES**

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
8. Correlation table is available for ASTM D792 vs ASTM D1505. Both methods give the same results.
9. Correlation table is available for ASTM D1603 vs ASTM D4218. Both methods give the same results.
10. Condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. Condensation at 60°C.
11. The minimum average thickness is  $\pm 10\%$  of the nominal value.

\* All values are nominal test results, except when specified as minimum or maximum.

\* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

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**SKAPS TRANSNET™ (TN)  
HDPE GEONET 220**

**SKAPS TRANSNET™ Geonet consists of SKAPS GeoNet made from HDPE resin.**

Property	Test Method	Unit	Required Value	Qualifier
<b>Geonet</b>				
Thickness	ASTM D 5199	mil.	220±20	Range
Carbon Black	ASTM D 4218	%	2 to 3	Range
Tensile Strength	ASTM D 7179	lb/in	45	Minimum
Melt Flow	ASTM D 1238 <sup>3</sup>	g/10 min.	1	Maximum
Density	ASTM D 1505	g/cm <sup>3</sup>	0.94	Minimum
Transmissivity <sup>1</sup>	ASTM D 4716	m <sup>2</sup> /sec.	2x10 <sup>-3</sup>	MARV <sup>2</sup>

**Notes:**

1. Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10000 psf between stainless steel plates after 15 minutes. Values may vary between individual labs.
2. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
3. Condition 190/2.16

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PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	1020228
<b>SPECIFICATIONS</b>				
Thickness (Nominal $\pm 10\%$ ) (11)	ASTM D-5199	Every roll	mils	40,0
Thickness (min. avg.)	ASTM D-5199	Every roll	mils	36.0
Resin Density	ASTM D-1505	Certified	g/cc	< 0.926
Melt Index - 190/2.16 (max.)	ASTM D-1238	Certified	g/10 min	0,0
Sheet Density (8)	ASTM D-792	1/Batch	g/cc	$\leq 0.939$
Carbon Black Content (9)	ASTM D-4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D-5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D-3895	Per formulation	min	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 5 rolls		
Strength at Break			ppi	152
Elongation at Break			%	800
2% Modulus (max.)	ASTM D-5323	Per formulation	ppi	2 400
Tear Resistance (min. avg.)	ASTM D-1004	Every 10 rolls	lbf	20
Puncture Resistance (min. avg.)	ASTM D-4833	Every 10 rolls	lbf	56
Dimensional Stability	ASTM D-1204	Certified	%	$\pm 2$
Multi-Axial Tensile (min.)	ASTM D-5617	Per formulation	%	30
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation		
STD OIT (min. avg.)	ASTM D-3895		%	35
HP OIT (min. avg.)	ASTM D-5885		%	60
UV Res. - % retained after 1600 hr	ASTM D-7238	Per formulation		
HP-OIT (min. avg.)	ASTM D-5885		%	35
<b>SUPPLY SPECIFICATIONS</b> (Roll dimensions may vary $\pm 1\%$ )				
Roll Dimension - Width			ft	0,9
Roll Dimension - Length			ft	780
Area (Surface/Roll)			sf	17 394



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## Geotextile Product Description Sheet

### Mustang-10 Nonwoven Geotextile

Mustang-10 is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. Mustang-10 resists ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. Mustang-10 conforms to the physical property values listed below:

PROPERTY	TEST METHOD	UNIT	M.A.R.V. (Minimum Average Roll Value)
Grab Tensile	ASTM D 4632	lbs	225
Grab Elongation	ASTM D 4632	%	50
Trapezoid Tear Strength	ASTM D 4533	lbs	90
CBR Puncture Resistance	ASTM D 6241	lbs	600
Permittivity*	ASTM D 4491	sec <sup>-1</sup>	1.26
Water Flow*	ASTM D 4491	gpm/ft <sup>2</sup>	100
AOS*	ASTM D 4751	US Sieve (mm)	80 (.180)
UV Resistance	ASTM D 4355	%/hrs	70/500

\* At the time of manufacturing. Handling, storage, and shipping may change these properties.

PACKAGING	
Roll Dimensions (W x L) – ft	15 x 1200
Square Yards Per Roll	2000
Estimated Roll Weight - lbs	1065

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**Made in U.S.A.**