State of New Mexico
Energy Minerals and Natural Resources
Department Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505
https://www.emnrd.nm.gov/ocd/ocd-e-permitting/

Form C-147
Revised October 11, 2022

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: Tascosa Energy Partners, L.L.C (For multiple operators attach page with information) OGRID #: 329748
Address: 901 W. Missouri Ave, Midland, Texas
Facility or well name (include API# if associated with a well): Catalina C Containment - associated with 2RF- 157
OCD Permit Number: 2RF-199 (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr B & C Section 30 Township 20S Range 27E County: Eddy
Surface Owner: ☐ Federal ☑ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☑ **Recycling Facility:**
Location of recycling facility (if applicable): Latitude 32.54867 Longitude -104.32794 NAD83
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 32.54881 Longitude -104.32119 NAD83
☐ For multiple or additional recycling containments, attach design and location information of each containment
☑ Lined ☑ Liner type: Thickness 60 mil ☐ LLDPE ☑ HDPE ☐ PVC ☐ Other Secondary 40 mil HDPE
☐ String-Reinforced
Liner Seams: ☑ Welded ☐ Factory ☐ Other _____ Volume: 705399 bbl Dimensions: L 560 x W 360 x D 20
☐ 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 Game Fence

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. - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☑ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	☐ Yes ☑ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map See Geology and Karst Sections of Volume 1	☐ Yes ☑ No
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). - Topographic map; visual inspection (certification) of the proposed site	☐ Yes ☑ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image	☐ Yes ☑ No
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. - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☑ No
Within 500 feet of a wetland. - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☑ No

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): Alyssa McNear (Davanzo), P.E. Title: Operations Manager

Signature: Alyssa McNear Date: 9/7/23

e-mail address: adavanzo@tascosaep.com Telephone: Cell: (720) 244-4417

11.
OCD Representative Signature: Victoria Venegas **Approval Date:** 10/06/2023

Title: Environmental Specialist **OCD Permit Number:** 2RF-199

- [X] OCD Conditions
- [X] Additional OCD Conditions on Attachment

Venegas, Victoria, EMNRD

From: Venegas, Victoria, EMNRD
Sent: Friday, October 6, 2023 1:29 PM
To: Alyssa Davanzo; r@rthicksconsult.com; 'BobbiJo Crain'
Cc: Barr, Leigh, EMNRD; tknight@slo.state.nm.us
Subject: 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370]
Attachments: C-147 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370].pdf

2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370]. Conditions of Approval.

Good afternoon Ms. Davanzo,

NMOCD has reviewed the recycling containment permit application and related documents, submitted by [329748] Tascosa Energy Partners, L.L.C on October 3, 2023, for 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] in Unit Letter C, Section 30, Township-20S, Range-27E, Eddy County, New Mexico. After a thorough review of the application materials, OCD believes [329748] Tascosa Energy Partners, L.L.C has demonstrated that it has incorporated engineering measures into the design to ensure that the containment integrity is not compromised per 19.15.34.11.A.(8). Therefore, the form C-147 and related documents for 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] is approved with the following conditions of approval:

- [329748] Tascosa Energy Partners, L.L.C and the contractors building the Catalina C Containment must retain an on-call BLM-approved karst monitor for the construction activities and notify the OCD in the event the monitor indicates karst and stops all construction activities.
- The purpose of this permit is for oil and gas activities regulated under the NMAC 19.15.34.3 STATUTORY AUTHORITY: 19.15.34 NMAC is adopted pursuant to the Oil and Gas Act, Paragraph (15) of Section 70-2-12(B) NMSA 1978, which authorizes the division to regulate the disposition of water produced or used in connection with the drilling for or producing of oil and gas or both and Paragraph (21) of Section 70-2-12(B) NMSA 1978 which authorizes the regulation of the disposition of nondomestic wastes from the exploration, development, production or storage of crude oil or natural gas.
- [329748] Tascosa Energy Partners, L.L.C shall construct, operate, maintain, close, and reclaim 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] in compliance with 19.15.34 NMAC.
- 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] is approved for five years of operation from the date of permit application. 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] permit expires on October 3, 2028. If [329748] Tascosa Energy Partners, L.L.C, wishes to extend operations past five years, an annual permit extension request must be submitted using an NMOCD form C-147 through OCD Online by September 3, 2028.
- 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] consists of one (1) earthen containment of 554,000.00 BBL of capacity @3' freeboard.
- 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] is bonded pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC. Water reuse and recycling from 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] is limited to wells owned or operated by [329748] Tascosa Energy Partners, L.L.C
- [329748] Tascosa Energy Partners, L.L.C shall notify OCD when construction of 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] commences.
- [329748] Tascosa Energy Partners, L.L.C shall notify OCD when recycling operations commence and cease at 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370].
- A minimum of 3-feet freeboard must be maintained at 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] at all times during operations.
- If less than 20% of the total fluid capacity is utilized every six months, beginning from the first withdrawal, operation of the facility is considered ceased and notification of cessation of operations should be sent

electronically to OCD Online. An extension to extend the cessation of operation, not to exceed six months, may be submitted using a C-147 form through OCD Online.

- [329748] Tascosa Energy Partners, L.L.C shall submit monthly reports of recycling and reuse of produced water drilling fluids, and liquid oil field waste on OCD form C-148 through OCD Online even if there is zero activity.
- [329748] Tascosa Energy Partners, L.L.C shall comply with 19.15.29 NMAC Releases in the event of any release of produced water or other oil field wastes at 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370].

Please note, as provided in past guidance, the OCD recognizes that 19.15.34.11.A(8) NMAC states that a recycling containment shall not be located within an unstable area unless the operator demonstrates that is has incorporated engineering measures into the design to ensure that the containment's integrity is not compromised. Given that the OCD is the abiding authority for produced water recycling facilities for oil and gas activities regulated under 19.15.34 NMAC, OCD reviews all submitted C-147 Form applications and determines if the operator provided sufficient demonstration that engineering measures will be protective of fresh water, public health, and the environment. Therefore, the OCD must approve a C-147 application prior to construction when the recycling containment is located within an unstable area.

Please reference number 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] in all future communications.
Regards,

Victoria Venegas ● Environmental Specialist
Environmental Bureau
EMNRD - Oil Conservation Division
506 W. Texas Ave. Artesia, NM 88210
(575) 909-0269 | Victoria.Venegas@emnrd.nm.gov
https://www.emnrd.nm.gov/ocd/

September 2023

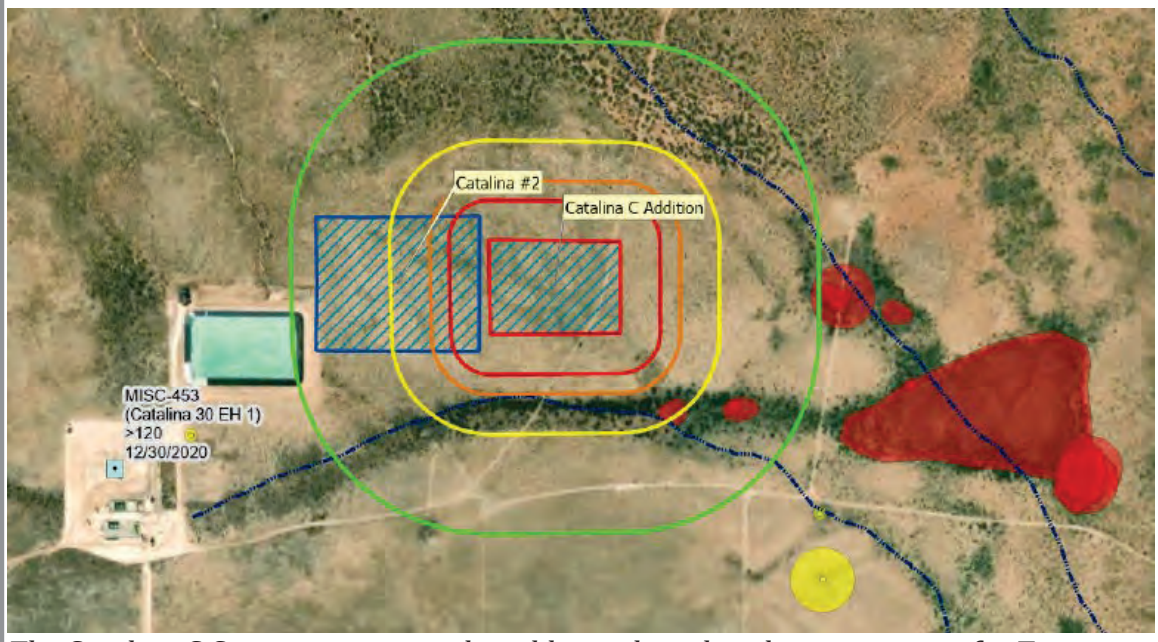
C-147 Registration Package for
Catalina C Recycling Facility & Containment
Section 30, T20S, R27E, Eddy County

Volume 1 Siting Criteria Demonstration

Transmittal Letter

Siting Criteria Demonstration with Plates & Appendices

Southwest Geophysical Consulting Cave & Karst Inventory Report



The Catalina C Containment provides additional produced water storage for Tascosa Energy well stimulation programs. This image shows that a mapped watercourse is slightly more than 300 feet from the edge of the containment, depth to groundwater exceeds 120 feet in the auger boring MISC-453, and suspected and actual karst structures are more than 480 feet from the containment.

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Prepared for:
Tascosa Energy Partners LLC
901 W. Missouri Ave
Midland, Texas

Prepared by:
R.T. Hicks Consultants, Ltd. 901
Rio Grande NW F-142
Albuquerque, New Mexico

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996

September 12, 2023

Ms. Victoria Venegas
NMOCD - District 2
811 S. First St.
Artesia, NM 88210
Via E-Mail

RE: Tascosa Energy LLC, Catalina C Containment In Ground Containments Registration
Section 30 T20S, R27E, Eddy County

Dear Ms. Venegas:

On behalf Tascosa Energy, LLC, R.T. Hicks Consultants is pleased to submit a C-147 *registration* for the above-referenced project. Tascosa will begin construction in less than 10 days and filling of the completed containment will commence about mid-October, 2023. This is the third Tascosa containment associated with the Catalina #1 Recycling Facility. The State Land Office requested a complete cave and karst inventory for this containment and the Southwest Geophysical Consulting (SWG) report, which covers all containments, is appended to Volume 1.

As indicated in the title page of Volume 1, included are:

- This transmittal Letter
- Siting Criteria Demonstration, Plates, Appendices and Site Photos
- Southwest Geophysical Consulting Cave & Karst Inventory Report

Volume 2 includes:

- C-147 Form to register the in-ground containment
- Stamped Design Drawings
- Recently Approved Plans for Design/Construction, O&M, Closure

No variances from the Rule are necessary for the Catalina C in-ground containment as this submission demonstrates compliance with all mandates of the Rule. The recycling facility is registered and is associated with the Catalina #1 containment. The Rule does not require approval by OCD in advance of using the in-ground containment.

This submission refers to the following elements that some OCD reviewers have considered variances:

1. The equivalency demonstration written by Mr. Frobel for the proposed 40-mil HDPE secondary liner has been previously approved by OCD. We maintain that the language of the Rule is clear, and a variance is not required.
2. OCD has approved the proposed Avian Protection Plan (Bird-X Mega Blaster Pro) for other containments. Thus, the plan meets the requirement of the rule that the "otherwise protective of wildlife, including migratory birds" and a variance is not required.

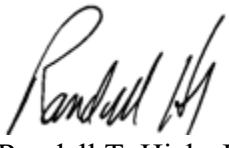
3. Using the proposed game fence in lieu of a 4-strand barbed wire fence is not a variance. Because feral pigs, javelina and deer are present in the area, a game fence is required to comply with Section 19.15.34.12 D.1 of the Rule. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. We maintain that compliance with D.1 is the critical component of the Rule and operators need not be required to submit a variance request to follow Best Management Practices and comply with the Rule. Nevertheless, Tascosa will attach 4 strands of barbed wire to the game fence if required by OCD.

The karst section of Volume 1 should be read carefully for two reasons. First, we examined OCD Rules regarding unstable ground and came to a significantly different interpretation than OCD previously put forth for areas mapped as critical karst. BLM definitions of high karst and critical karst are very similar, and BLM requires the same expert evaluations for both categories. To date, OCD has not stated that high karst and critical karst areas should be treated the same.

Second, Hicks Consultants carefully evaluated the nature of the geologic material beneath the Catalina containments and concluded that the underlying 100-feet of Tansill Formation is predominantly non-soluble, siltstone and claystone. Additionally, the alluvial fan deposits that cover the Tansill at the containment locations combined with our arid environment do not allow transmission of sufficient water downward to cause material solution of the dolomite horizons in the Tansill. We transmitted this information to Southwest Geophysical Consultants (SWG), and they conducted a foot survey of the area around the containment on September 11, 2023. They are generating a summary of the field examination, which we will transmit to OCD when available. As we understand from a phone conversation, SWG did not observe any karst structures around the containments but may recommend that a BLM Carlsbad Field Office karst monitor be “on call” during containment excavation if subsidence or other anomalies are witnessed by construction staff.

If you have any questions or concerns regarding this permit or the attached C-147, please contact me. As always, we appreciate your work ethic and diligence.

Sincerely,
R.T. Hicks Consultants



Randall T. Hicks PG
Principal

Copy: Tascosa Energy Partners
NM State Land Office
Southwest Geophysical Consulting, LLC

SITING CRITERIA DEMONSTRATION

TEXT AND FIGURES

PLATES

Geology

According to the State of New Mexico Geologic Map[1], Permian Age Tansill and Yates Formations (Pty) are exposed at the location of the proposed Catalina C containment with Quaternary Alluvium (Qa) overlying Permian Salado Formation south of the containment location (Plate 2). In the northwest corner of the map, the map shows exposed Permian Seven Rivers Formation. The Permian Salado Formation, which overlies the Tansill, crops out along the east of the map.

The Lake McMillan South 7.5-minute geologic quadrangle map presents a more detailed interpretation of the geology, and the differences are best understood by comparing Plate 2 with the DRAFT of the Lake McMillian South map (below). This draft provides more detail than the final version – but the mapping is the same. As discussed below, the State Map may be slightly more accurate than the 7.5 minute quadrangle in the area of the Catalina containments.

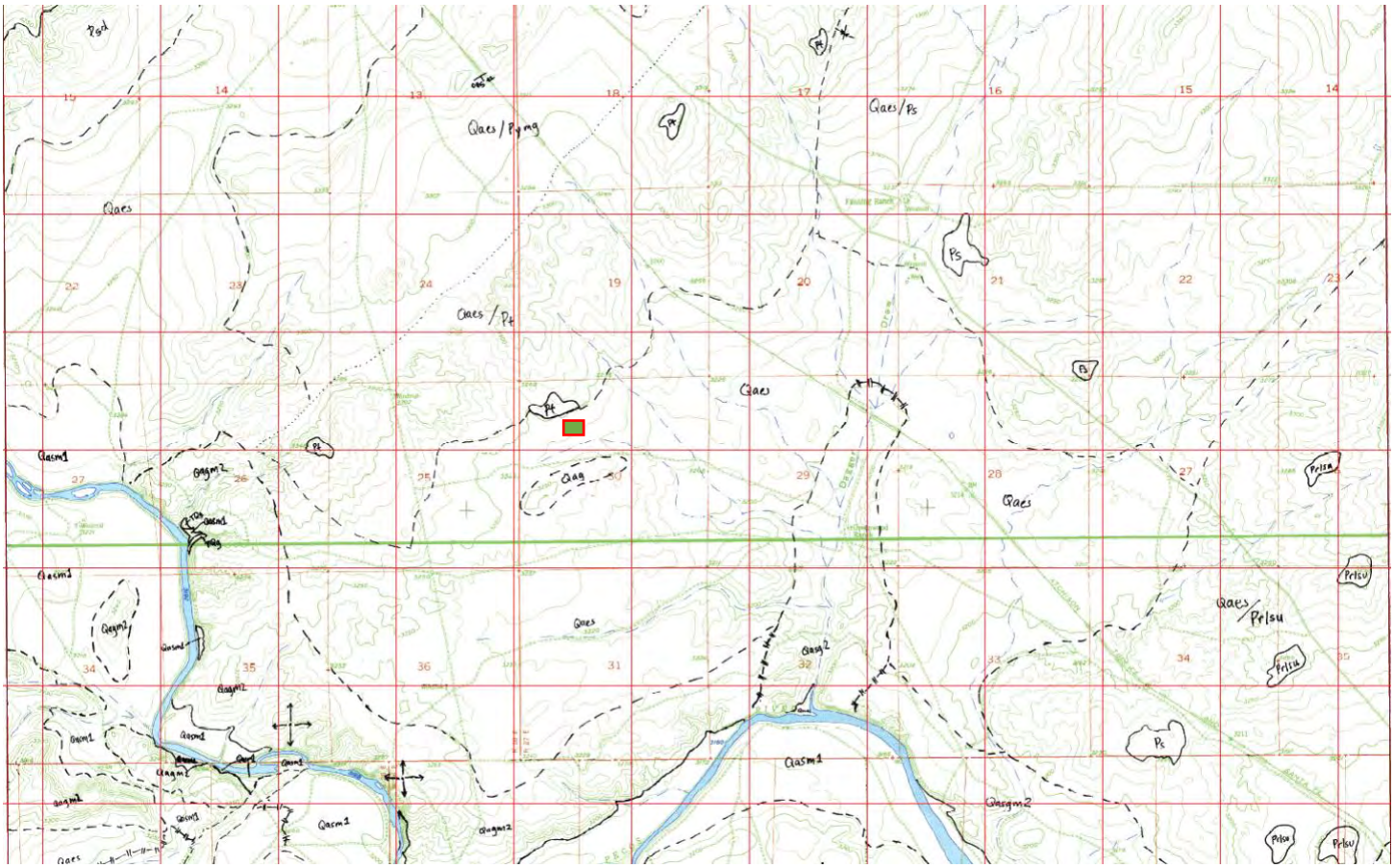


Figure 1 - Portion of Lake McMillan South Geologic Map with the approximate location of the Catalina C Containment (Green rectangle with red border). Source: https://geoinfo.nmt.edu/publications/maps/geologic/ofgm/downloads/97/OFGM-97_LakeMcMillanSouth.pdf

Figure 1 shows the containment is adjacent to and south of outcropping Tansill formation (Pt), which we walked and attest to the fact that the outcrop is a thin-bedded dolomite that is probably more than 4 and less than 10 feet thick. The containments are constructed within Quaternary alluvium and eolian deposits, as the quadrangle map indicates. North of the containment location, the quadrangle map suggests the aeolian and alluvium is a thin veneer over the Tansill

Formation (Qaes/Pt) and, further to the northwest, the veneer overlies the mixed gypsiferous facies of the Yates Formation (Pymg). In the eastern third of Figure 1, the map shows the aeolian and alluvium overlying the Permian Salado Formation (Qaes/Ps) as well as exposed Salado capping several hills. The contact between the Salado and underlying Tansill Formation (beneath the Quaternary veneer) is shown as a dashed line that runs through the northern boundary of the containment area. Thus, the map suggests that the Salado, not the Tansill Formation underlies the Catalina C containment, as well as Catalina #1 and #2 containments.

The description of the Tansill Formation from the [final] Lake McMillan South Quadrangle is presented below verbatim.

> Ptmsg—Tansill Formation —mixed silty gypsiferous facies
> Mixed dolomite, sandy siltstone, and gypsum. White to light gray dolomite, thinly to medium bedded, vesicular, associated with yellow sandy dolomite and dolomitic sandstones in float. Well sorted, sublitharenite, chert grains, orange-red, interbedded with gypsum and white to light gray dolomite. Poorly exposed. Likely equivalent to Ocotillo Member of DeFord and Riggs (1941)

Comparing this description with that on the Geologic Quadrangle Map with the observations of the 120-foot boring log for MISC-453 (Appendix Well Logs and USGS Data) demonstrates to our satisfaction that the Tansill, not the Salado Formation is the bedrock that underlies about 18-feet of Quaternary Alluvium . Knowing that the Tansill Formation is 123.5 feet thick at the type locality (near Living Desert State Park, and about 7.5 miles south of the Catalina Containments) and erosion removed some of the Tansill prior to or contemporaneous with deposition of the Quaternary Alluvium, allows us to conclude that about 100 feet of the Tansill overlie the Salado beneath the Catalina containments. The State geologic map (Plate 2) agrees with our interpretation.

The State geologic map and Hicks Consultants conclude that the Salado underlies a veneer of alluvium east of the mapped watercourse that is about 1500 feet east of Catalina C containment. Plate 5b, which is used in our discussion of Karst, shows the geologic interpretation of the State map with the Yates/Tansill Formations shown without color. Note the orange-red color of the air photo base map in the northeast quadrant of Plate 5b. The authors of the State geologic map interprets the southern extent of the orange-red color as the contact between the Tansill Formation and the overlying Salado, and we agree. We suggest that this contact extends to the southwest, beneath the alluvium (red line) and includes most of the mapped karst features. The mapped karst features north of our interpreted contact could be false karst features or Salado gypsum deposited within a Permian-age channel in the Tansill during the back reef environment that cause deposition of the Salado.

Distance to Groundwater

Plates 1 and 2 and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 100 feet beneath the containment

Plate 1 is topographic map that shows:

1. The Catalina C containment identified by the blue square.
2. Water wells from the OSE database as a blue triangle inside colored circles that indicate well depth (CP and C). OSE wells are often miss-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range.
3. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water.
4. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares (MISC).
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

Plate 2 is a larger scale map than Plate 1 and uses the State of New Mexico geologic map as a base. Plate 2 shows"

A. The Catalina C containment identified by the turquoise square with a measured surface elevation of 3235.
B. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
C. Water wells and one boring measured by professions that we found in publications or measured ourselves (MISC-453).
D. 2015 USGS data from an up-gradient /up-dip Yates Formation well (USGS-9330) with an elevation of 3183
E. 2015 USGS data from a Yates Formation well along strike from the Catalina containments (cross gradient) showing groundwater elevation of 3111

These USGS data and the 120-foot-deep auger boring for the conductor pipe for the oil well adjacent to the containment (see Appendix Well Logs) allow us to confidently conclude:

- The surface elevation of the 120-foot conductor pipe boring for the Catalina 30 EH State 1H is 3244.
- At 120-feet, the auger boring cuttings were dust dry.
- Groundwater elevation beneath the proposed containment is lower than 3124 feet above sea level – probably about 3100 feet ASL.
- The Catalina containments lie at an elevation of about 3240
- Depth to groundwater beneath the containments is about 140 feet.

Finally, the information from the USGS presented in Appendix Well Logs and USGS Data demonstrate that groundwater elevations have not materially changed over decades of measurements.

Distance to Municipal Boundaries and Fresh Water Fields

Plate 3 demonstrates that the location is not within incorporated municipal boundaries or within defined municipal fresh water well fields covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. Plate 3 shows:

- The closest municipality is Carlsbad, NM, approximately 12.5 miles to the south.
- The closest public well is CP-0076 and is located 6.9 miles to the southeast.

- The closest well fields are west of Carlsbad.

Distance to Subsurface Mines

Plate 4 and our general reconnaissance of the area demonstrate the proximity of surface mines to the containment. This location is not within an area overlying a subsurface mine.

- The nearest mapped surface mine is approximately 3.3 miles to the southwest of the Catalina containment.

Distance to High or Critical Karst Areas

The presence of karst features within an area proposed for the storage of treated water for E&P use (e.g., hydraulic stimulation) can be problematic for at least three reasons. First, as suggested in Part 34.11 of OCD Rules, a produced water recycling containment cannot be within an "unstable area". Collapse of a sinkhole would be catastrophic to the integrity of an overlying containment liner system. Thus, understanding where identified or probable karst structures exist is very important when selecting the exact location of a produced water storage facility. Second, significant overtopping or failure of a containment levee could cause overland flow of produced water to enter a conduit (e.g. open fracture or cavern system) between ground surface and an aquifer. Obviously, such an occurrence can severely impact groundwater quality. Last, caves and other karst features can contain unique biological species, geological specimens, or archeological artifacts. Such karst resources should be protected from damage. The evidence presented in this section permits a conclusion with a high degree of scientific certainty that the locations of the Catalina containments are not within an unstable area, as defined by OCD Rules and geologic reasoning.

For the benefit of our clients, a portion of Part 34 that addresses karst is presented below with **emphasis** added:

> *19.15.34.11 SITING REQUIREMENTS FOR RECYCLING CONTAINMENT:*
> *A. An operator shall **not locate a recycling containment**:*
> *(8) **within an unstable area** unless the operator demonstrates that it has incorporated engineering measures into the design to ensure that the containment's integrity is not compromised;*

Unstable area is defined in 19.15.2.7 as

> *U.(6) "Unstable area" means a **location** that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a division-approved facility's structural components. **Examples of unstable areas are** areas of poor foundation conditions, areas susceptible to mass earth movements and **karst terrain areas where karst topography is developed as a result of dissolution of limestone, dolomite, or other soluble rock.** Characteristic physiographic features of karst terrain include sinkholes, sinking streams, caves, large springs, and blind valleys.*

In addition to potential instability of the containment foundation, karst features, such as sinkholes, open fractures or other conduits can provide a direct link between the surface and groundwater. Thus, a release from the containment within an area of high karst could introduce a large volume of saline water to an underlying water table aquifer over a relatively short time.

The key word in the definition of unstable area is "location". We interpret the Rule to mean the footprint of the Catalina C containment and Catalina #1 and #2 containments is the "location".

The region that includes the proposed containment is correctly mapped by the BLM as high karst potential (see Plate5a). The BLM does not insist that the 41 square mile area of high and critical karst shown in Plate 5a is unstable ground. Rather the BLM and the State Land Office require an examination of an area proposed for certain projects to undergo an evaluation by qualified professionals, such as Southwest Geophysical Consulting (SWG).

Agencies interested in identified or likely karst features near the Catalina containments should read *Appendix Cave and Karst Resource Inventory Report Tascosa Catalina #3 Pond* by Southwest Geophysical Consulting (SWG). Below is the summary of the Recommendations section with *emphasis* added:

A. Eleven high-likelihood and three medium-likelihood surface karst features are located within the aerial survey area.
B. Avoid these areas during site and infrastructure planning.
C. The presence of these and other nearby surface karst features indicates that *this area* may be karstified and could contain buried karst features.
D. Caution should be exercised while clearing brush and during any excavation, trenching, or construction operations.
E. Employing a BLM-CFO approved karst monitor during excavation in this area *should be considered*.

We discussed the geology of the project, known karst features in the area, the construction methods for the containment, and the high-likelihood karst features with Garrett Jorgensen of SWG. Because the construction plans call for excavation below grade of 10-feet or less, we believe the Tansill Formation bedrock may not be exposed. Thus, an on-call monitor for construction may be more appropriate. Mr. Jorgensen will visit the project site on September 11, 2023 and provide a short write up on his findings and make a final recommendation regarding the need for a karst monitor. Tascosa will forward this letter to NMOCD when available.

Distance to 100-Year Floodplain

Plate 6 demonstrates that the location is not located in a 100-year floodplain.

- The nearest 100-year floodplain is located approximately 1 mile to the east.

Distance to Surface Water

Plate 7a displays the USGS-mapped watercourses. The principal north/south watercourse to the east of the containments is Dagger Draw, which is the 100-year flooding hazard displayed in Plate 6.

A tributary of Dagger Draw lies about 300 feet south of Catalina C containment. As stated in the registration packages for the Catalina 1 and 2 containments, this mapped drainage does not meet the OCD definition of a watercourse as there is no bed and bank. The Appendix Site Photos

provides evidence to support this statement. The Catalina C containment is about 300 feet distant from the mapped watercourse (see Plate 7b).

Distance to Permanent Residence or Structures

Plate 8 and the site visits demonstrates that the location is not within 1000 feet from an occupied permanent residence, school, hospital, institution, church, or other structure in existence at the time of initial application.

- No occupied permanent residences, schools, hospitals, institutions, churches, or other structures are located within 1000 feet of the site.
- The closest structure to the proposed Catalina #2 Containment is the existing Catalina Containments #1 and #2

Distance to Non-Public Water Supply

Figures 1 and 7 demonstrates that the location is not within 500 horizontal feet of a spring or fresh water well used for domestic or stock watering purposes, in existence at the time of initial application.

- Plate 1 shows the locations of all area water wells, active or plugged. The nearest mapped USGS well is the windmill shown in the northwest quarter of Section 25. We found no evidence of an active well during our site visit.
- We presume the nearest active water supply wells are at Greenwood Ranch in the southeast quarter of Section 29 in Dagger Draw
- Databases identified no springs within Plate 7a.

PLATES

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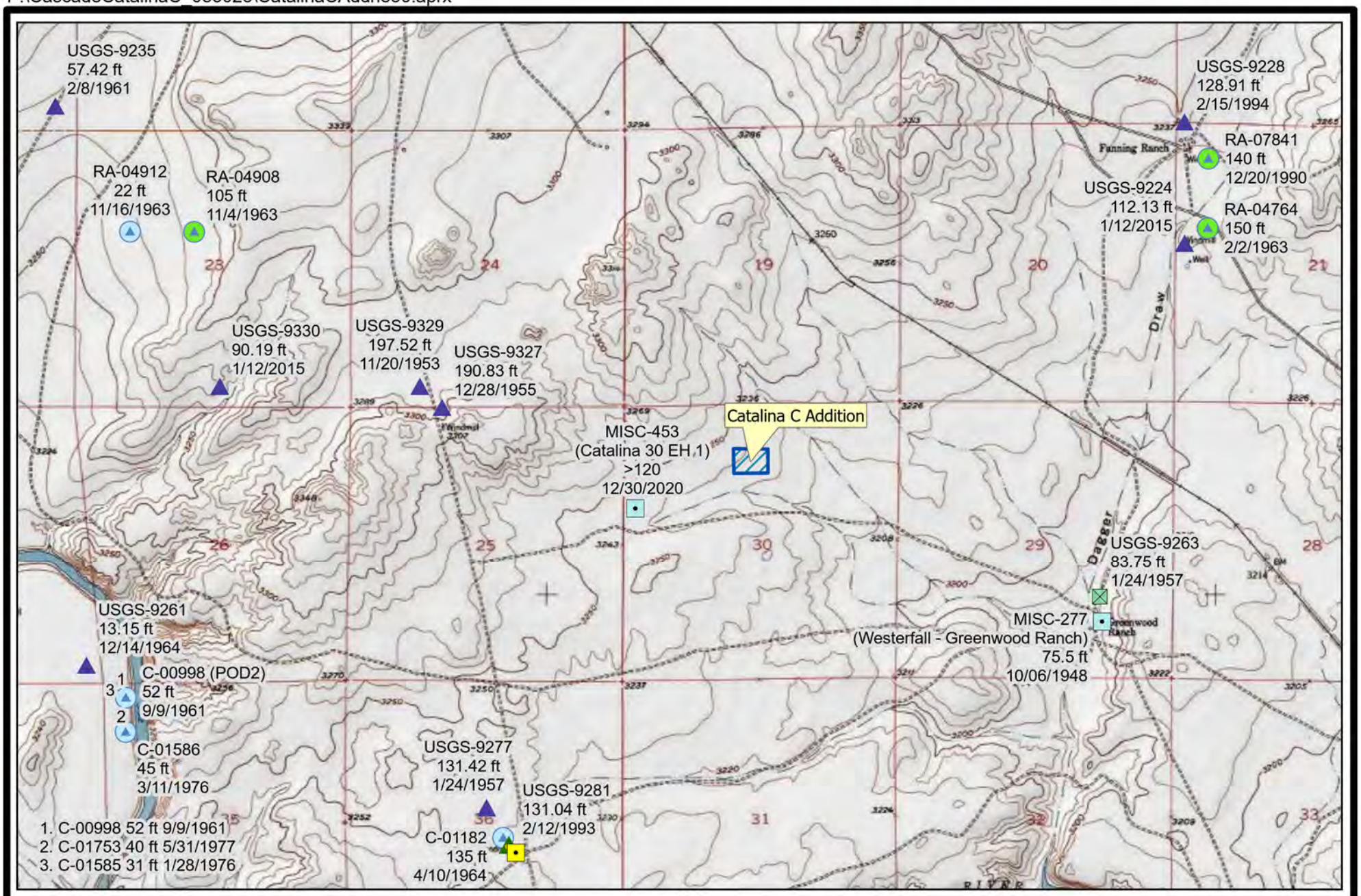

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Wells and Borings with Depth to Water	Plate 1
	Tascosa Energy - Catalina C Containment	August 2023

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R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Plates 1 & 2 Legend	
	Tascosa Energy - Catalina C Containment	September 2023

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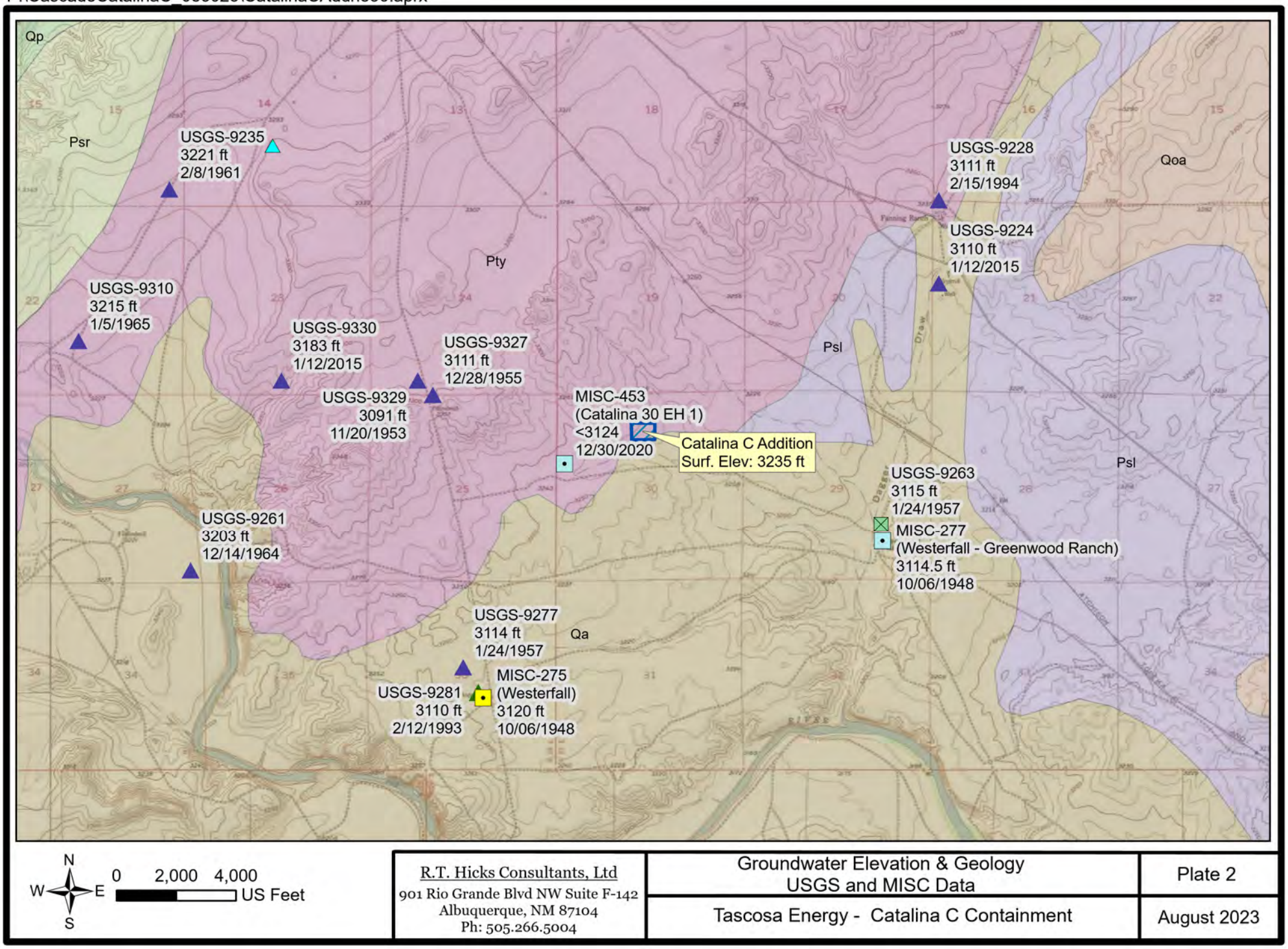

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Groundwater Elevation & Geology USGS and MISC Data	Plate 2
	Tascosa Energy - Catalina C Containment	August 2023

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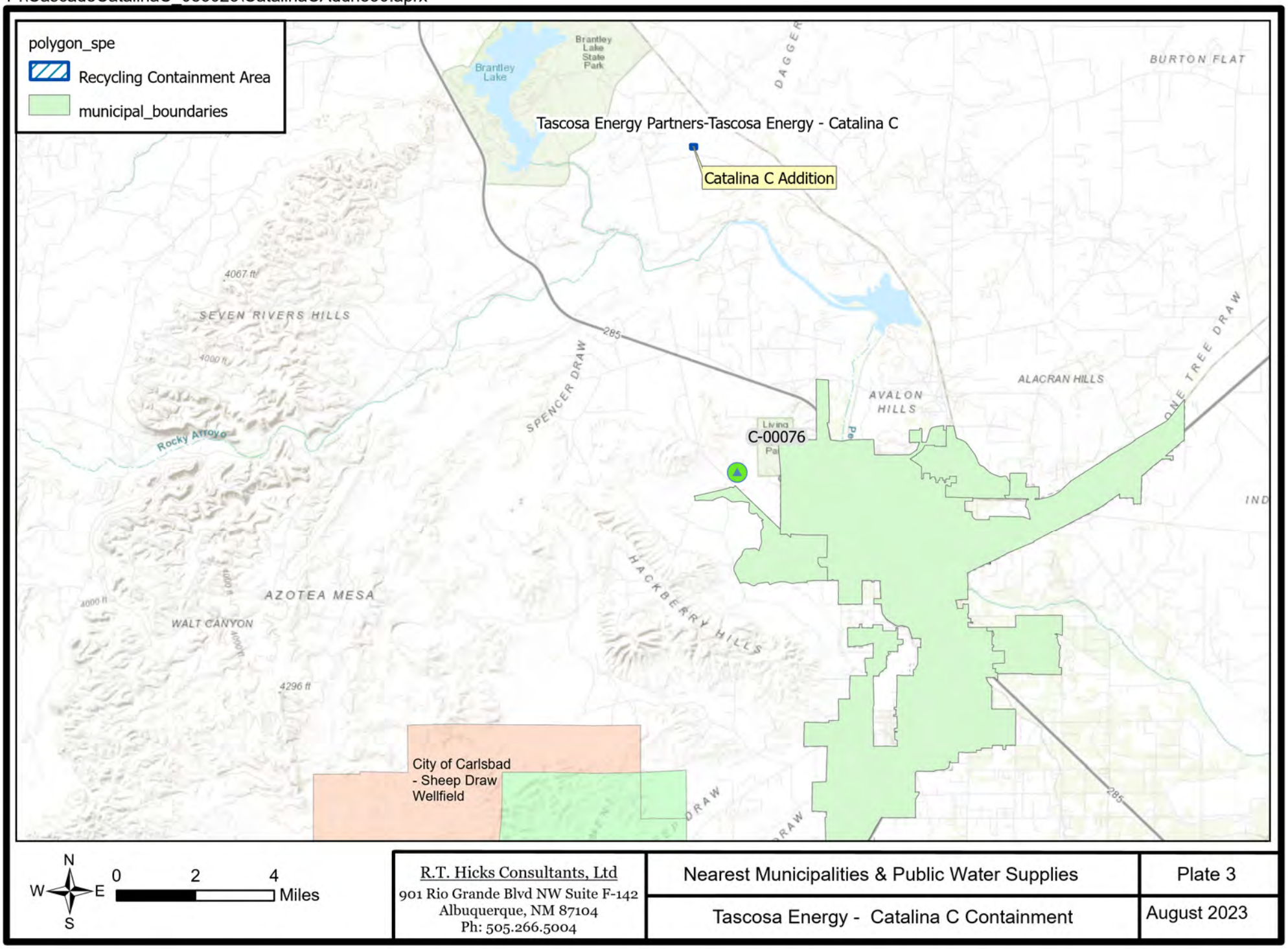

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Municipalities & Public Water Supplies	Plate 3
	Tascosa Energy - Catalina C Containment	August 2023

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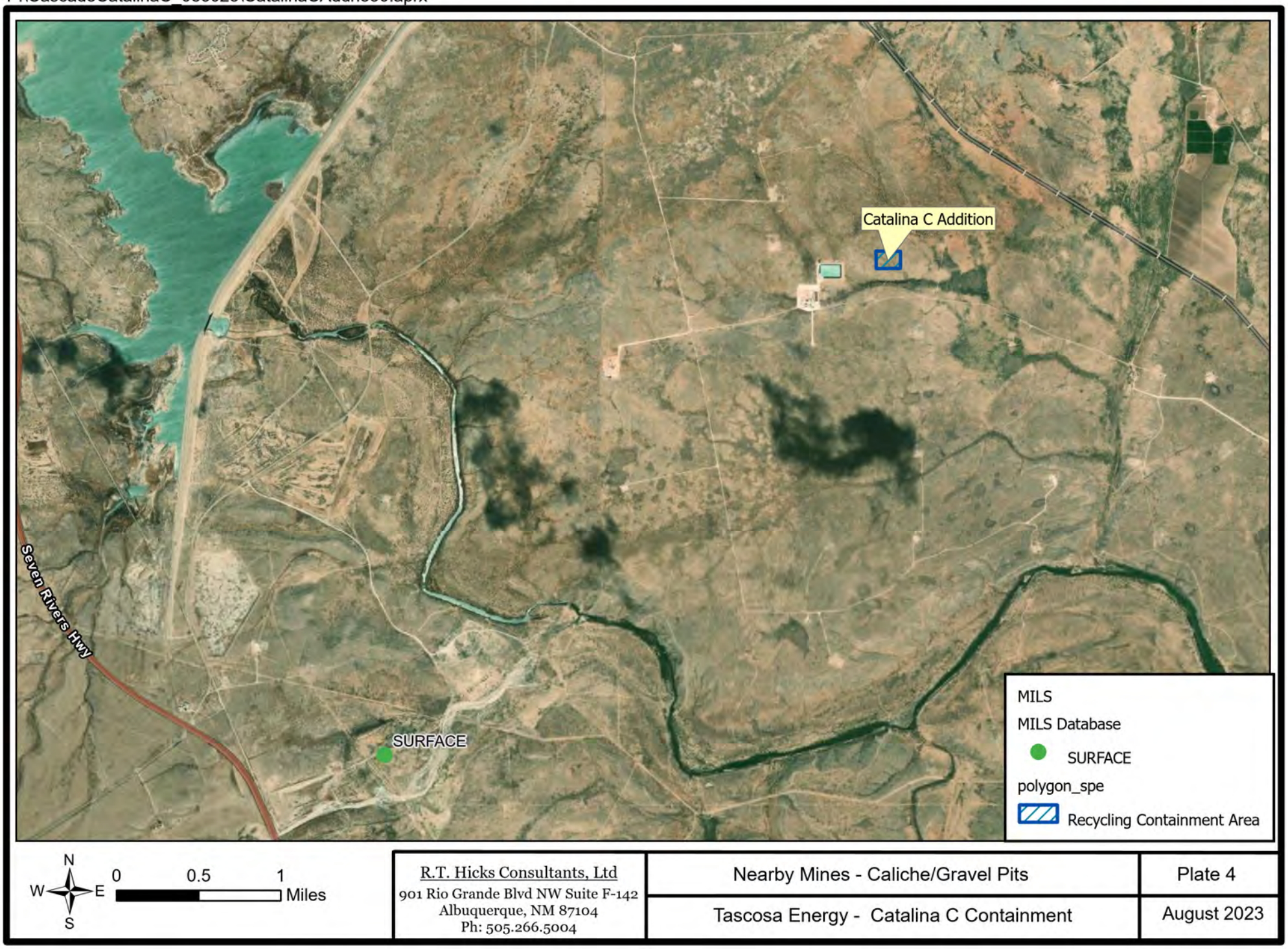

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Mines - Caliche/Gravel Pits — Plate 4
	Tascosa Energy - Catalina C Containment — August 2023

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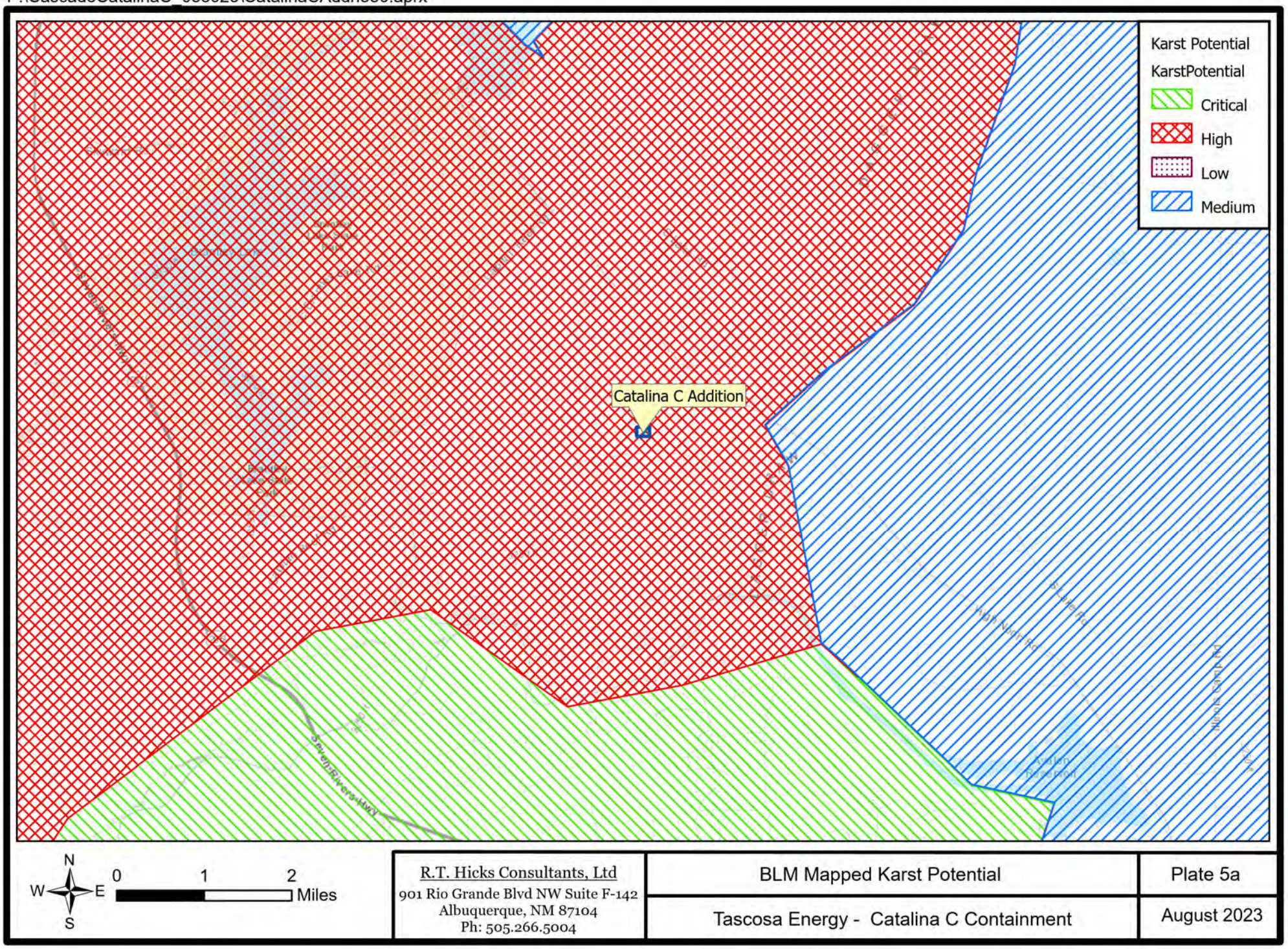

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	BLM Mapped Karst Potential	Plate 5a
	Tascosa Energy - Catalina C Containment	August 2023

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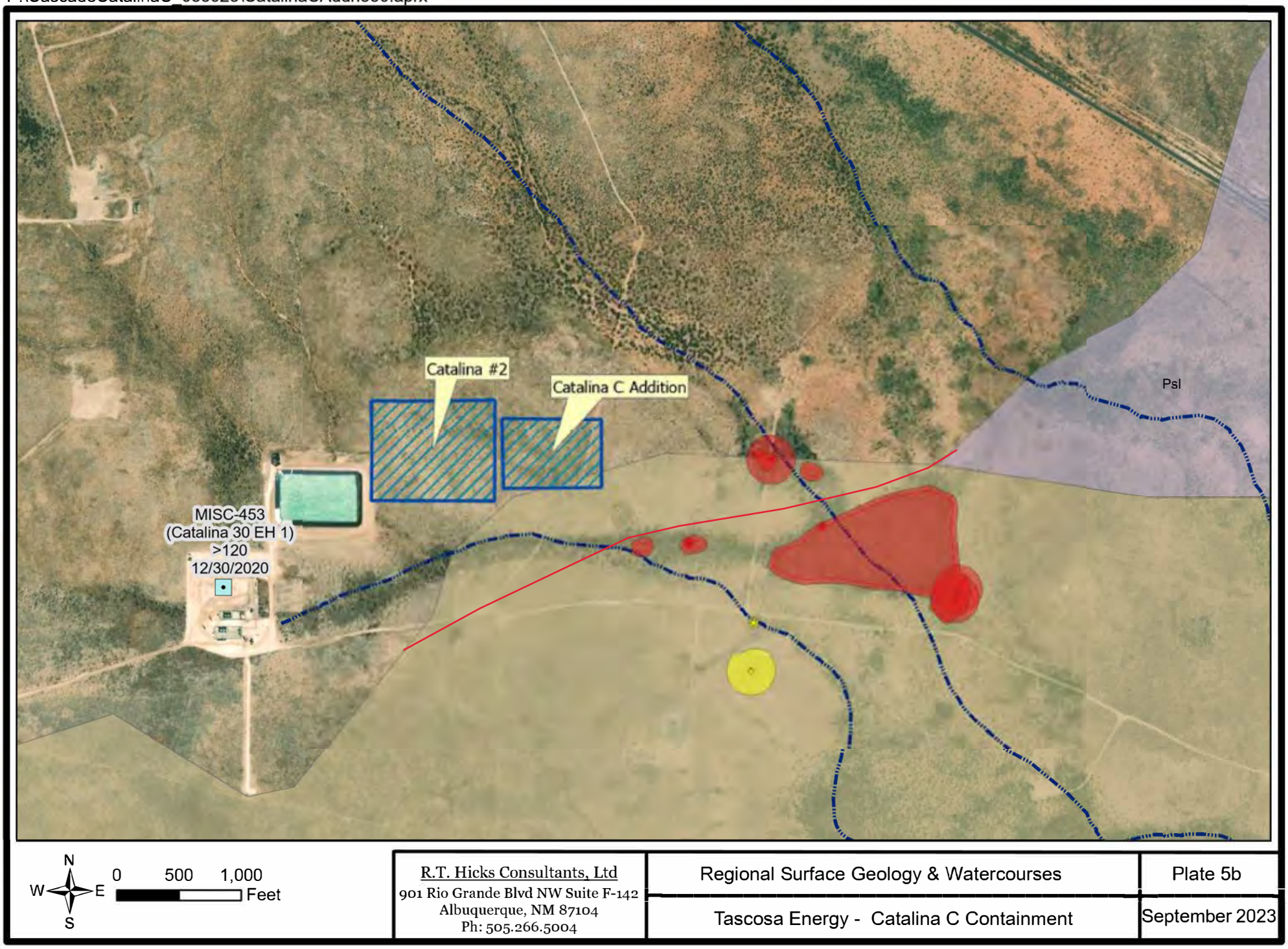

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Regional Surface Geology & Watercourses	Plate 5b
	Tascosa Energy - Catalina C Containment	September 2023

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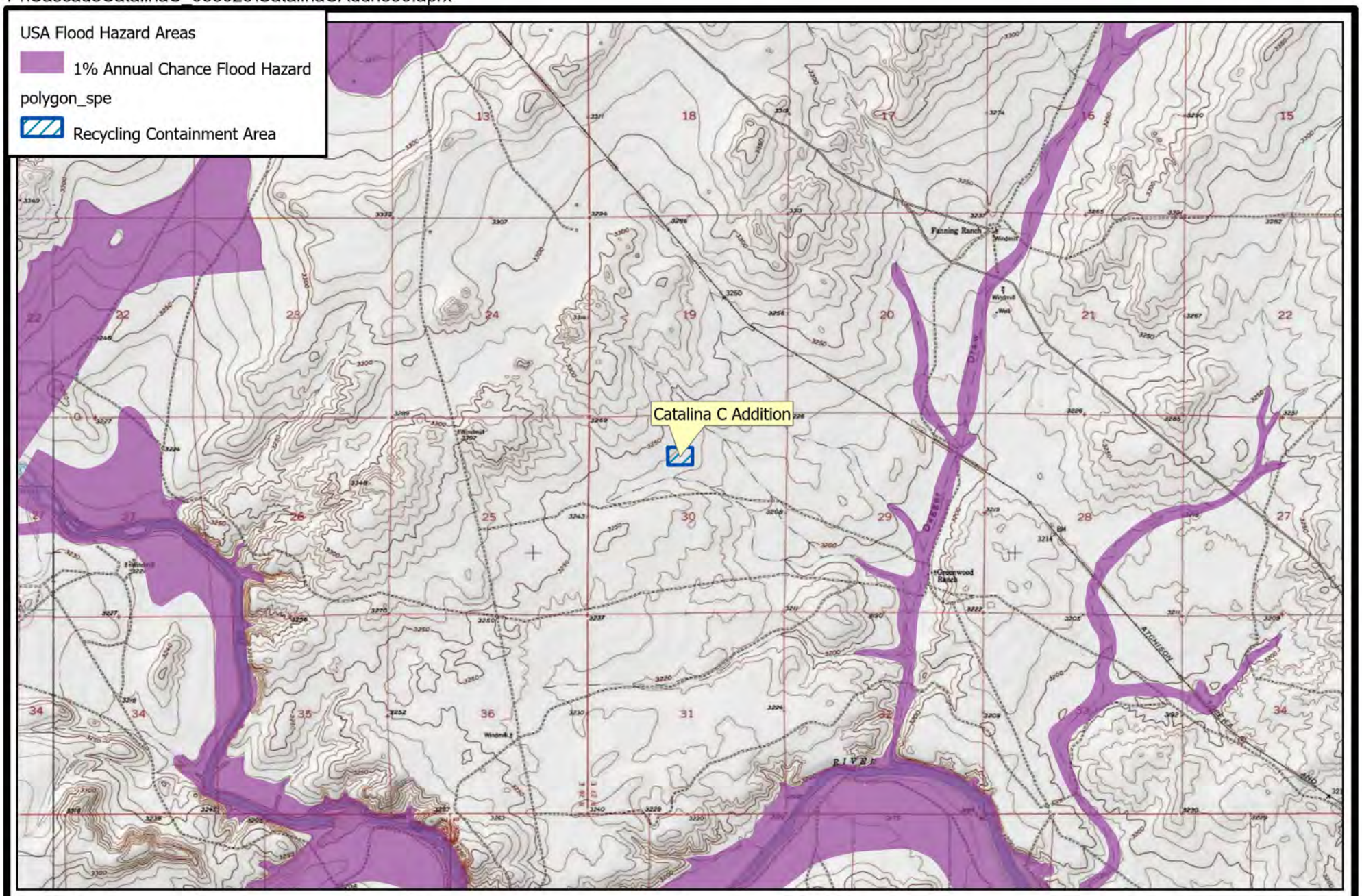

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	FEMA Mapped Flood Zones	Plate 6
	Tascosa Energy - Catalina C Containment	August 2023

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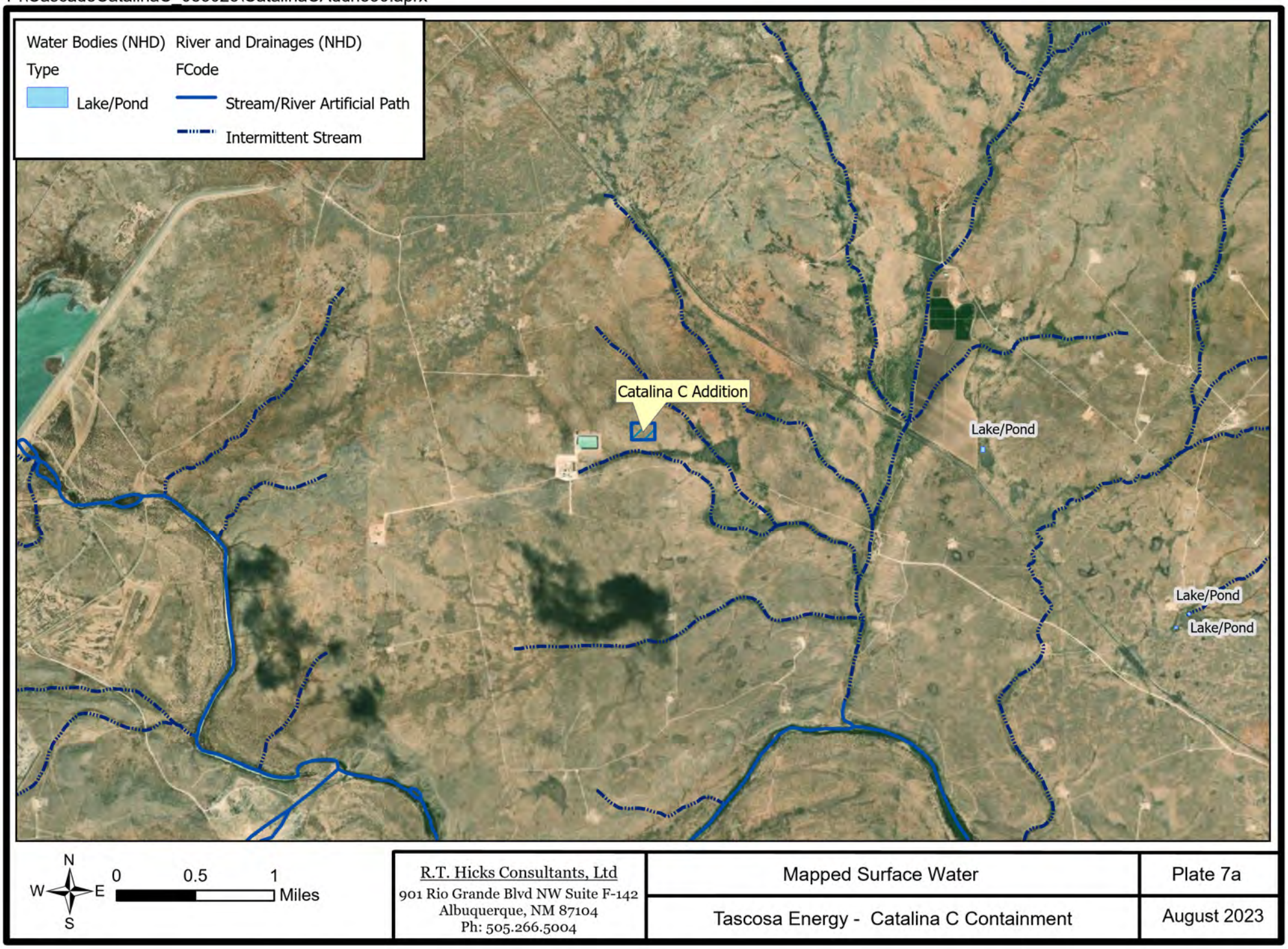

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mapped Surface Water	Plate 7a
	Tascosa Energy - Catalina C Containment	August 2023

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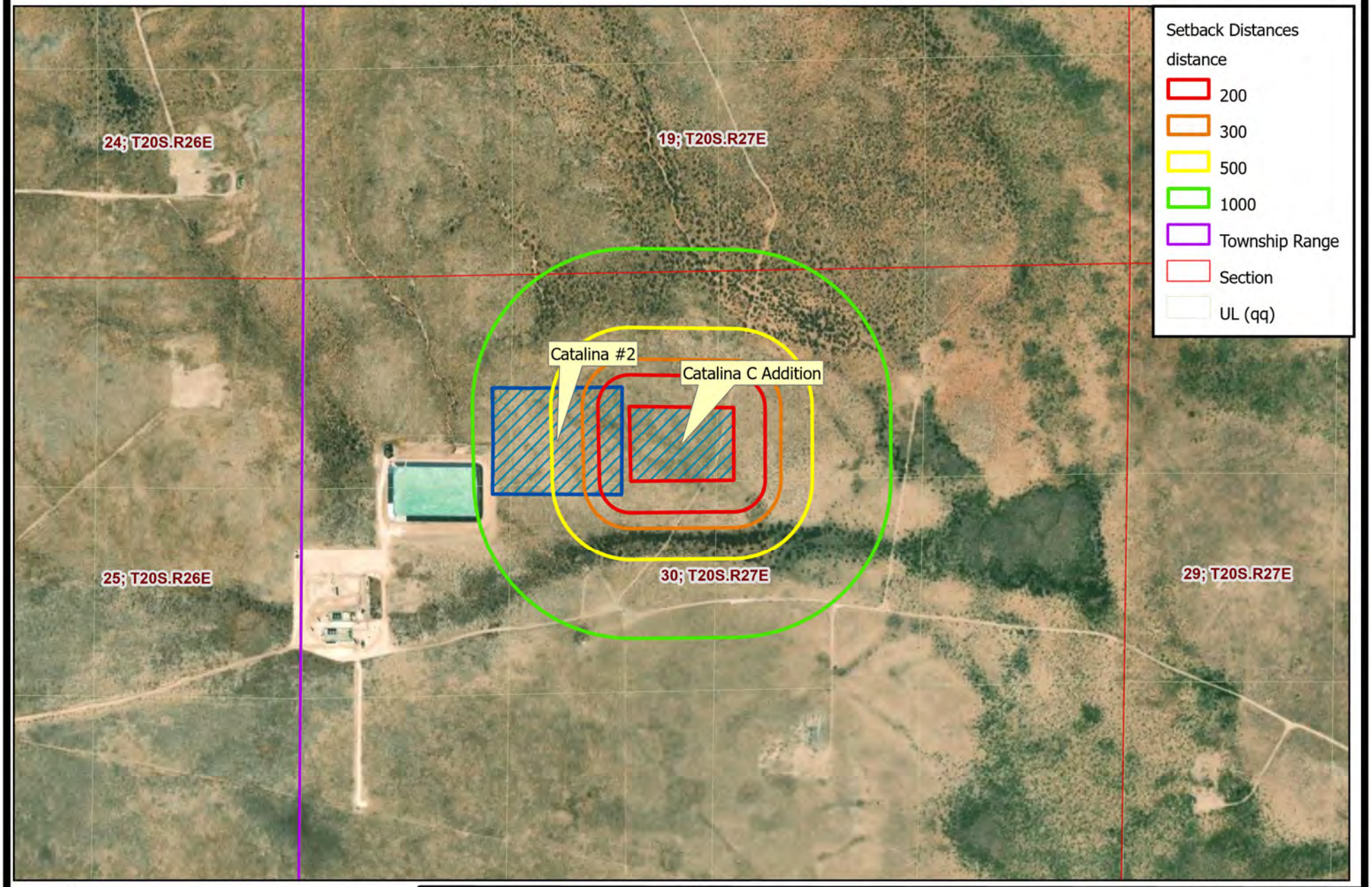

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Structures	Plate 8
	Tascosa Energy - Catalina C Containment	September 2023

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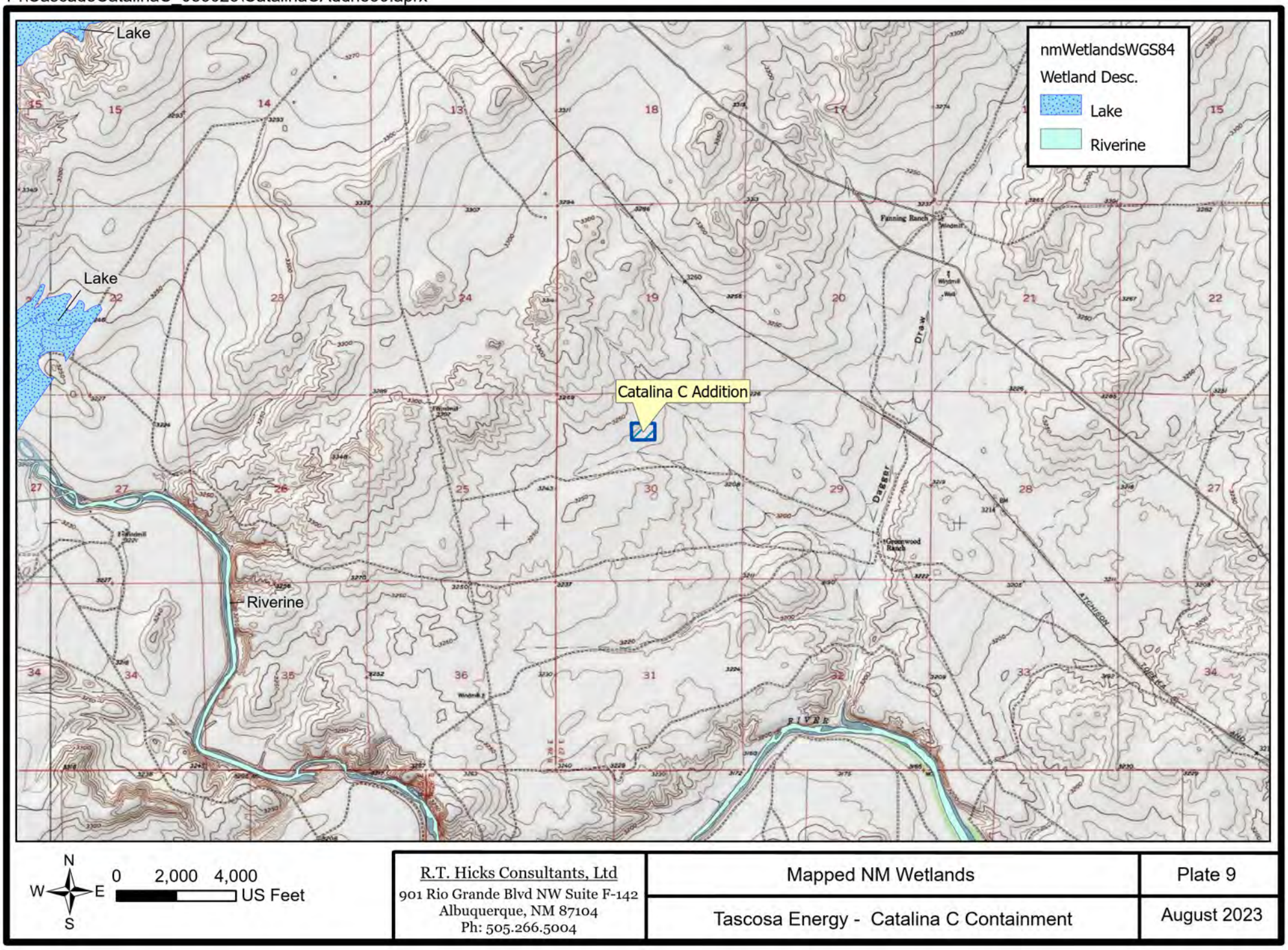


R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mapped NM Wetlands	Plate 9
	Tascosa Energy - Catalina C Containment	August 2023

WELL LOGS AND USGS DATA

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

Memorandum

From: Kristin Pope
Date: December 30, 2020
RE: Tascosa Energy – Catalina 30 EH St. #001H, Conductor Hole Evaluation

The subject well site has a surface elevation of 3,244 feet and is located approximately 3 miles east from Brantley Lake. East of the Pecos River, groundwater is present in Permian units, such as the Seven Rivers, Yates, and Tansill formations.

On December 17, 2020 I witnessed the drilling of the conductor hole at the Catalina 30 EH St. #001H, located approximately 10 miles northwest of Carlsbad, New Mexico. Byrd Oilfield Services of Midland, Texas performed the work using a track-mounted auger drilling rig as shown in the adjacent photograph of the auger spinning the cuttings after the final trip out of the hole. A cellar 10-feet deep was previously installed and when I arrived and drilling of the conductor hole began at 11:40 a.m. MST. Beginning at 10 feet below the well pad surface, cuttings were continuously monitored for moisture and lithology with each trip out of the hole. No water or drilling fluids were used to drill this conductor hole.

Over the next 2.75 hours the boring was advanced to a total depth of 120 feet with no issue. I inspected the cuttings from each trip for moisture to indicate a groundwater formation and all samples were dry. If any appreciable moisture would have been indicated, the operation would have been suspended to allow the water to accumulate and then measured.

During the drilling operations, representative samples of each lithologic type were collected for further inspection, if necessary, and photographs were taken of each. Observed lithologies appear consistent with published descriptions of Quaternary alluvium near the surface and Permian Tansill formation throughout the remainder of the boring. The following descriptions of the cuttings were recorded:

10-18 feet	Alluvium: brown, fine sand; caliche
18-63 feet	Tan, loose siltstone with 10-30% interbedded green-gray dolomite. Dolomite beds are massive (1 mm-5 cm vesicles observed at 40 ft, most filled with siltstone)
63-68 feet	Red, massive clay; minor tan silt, loose
68-74 feet	Red, massive clay; clast and veins of white and clear gypsum/selenite

74-94 feet	Massive purple-red clay interbedded with white and pink gypsum; <5% green “sugar” dolomite clasts
94-110 feet	Loose, medium red silt interbedded; 30% green/gray/yellow vesicular (1-2 mm) dolomite
110-113 feet	Red-brown silt with thin layers of red-brown siltstone and gypsum (1-2 mm thick)
113-120 feet	Dark red silt interbedded with 40% dolomite, green-gray, massive

50-ft sample

110-ft sample

115-ft sample

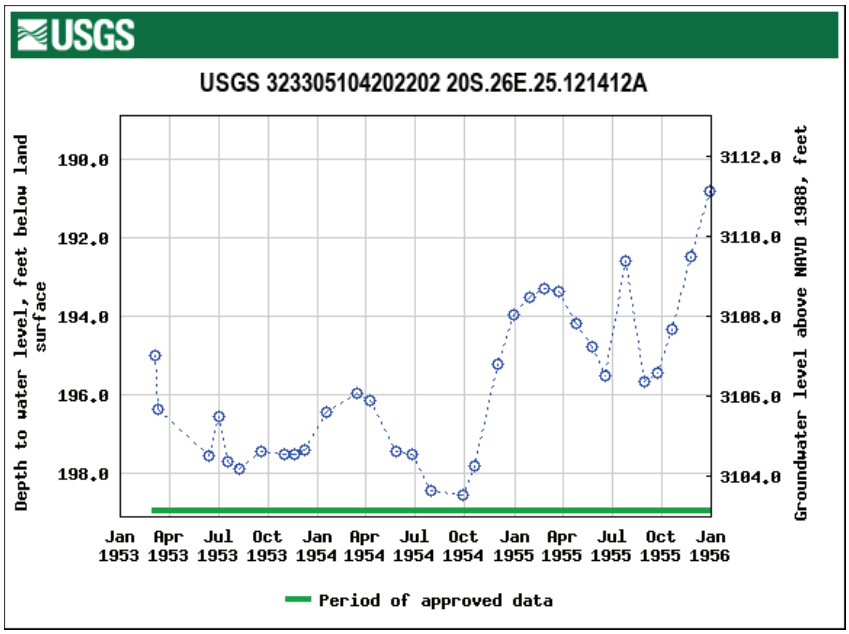
Based on these observations, I am certain that no groundwater is present below the surface of this well site to 120 feet below ground surface (3,124 feet above sea level).

Kristin Pope

USGS 323305104202202 20S.26E.25.121412A AKA USGS-9327

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°33'05",
Longitude 104°20'22" NAD27
Land-surface elevation 3,302 feet above NAVD88
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Rustler Formation (312RSLR) local aquifer.

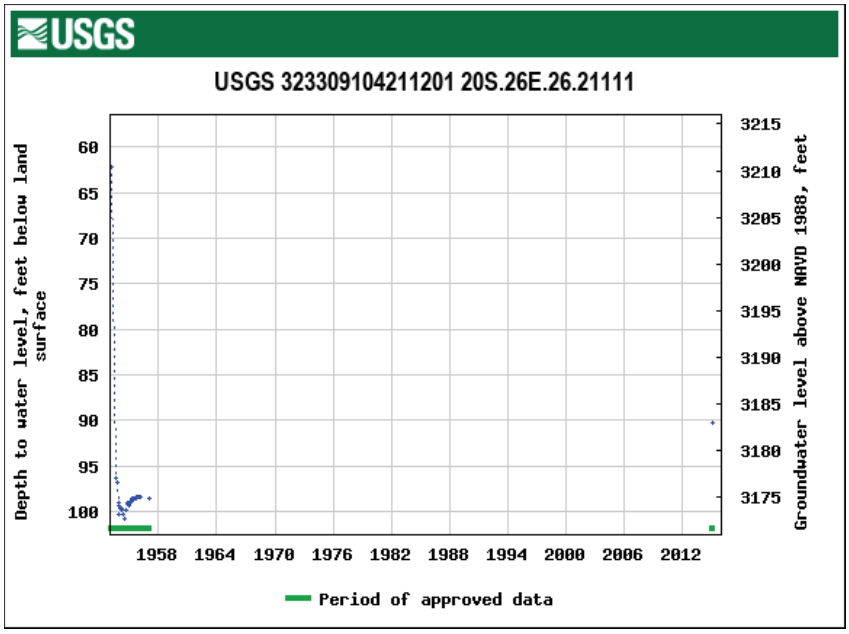
This well is probably completed in the Yates Formation as the Rustler was removed by Tertiary erosion.



USGS 323309104211201 20S.26E.26.21111 AKA USGS-9330

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°33'09",
Longitude 104°21'12" NAD27
Land-surface elevation 3,273 feet above NAVD88
The depth of the well is 200 feet below land surface.
This well is completed in the Roswell Basin aquifer system (S400RSWLBS) national aquifer.
This well is completed in the Rustler Formation (312RSLR) local aquifer.

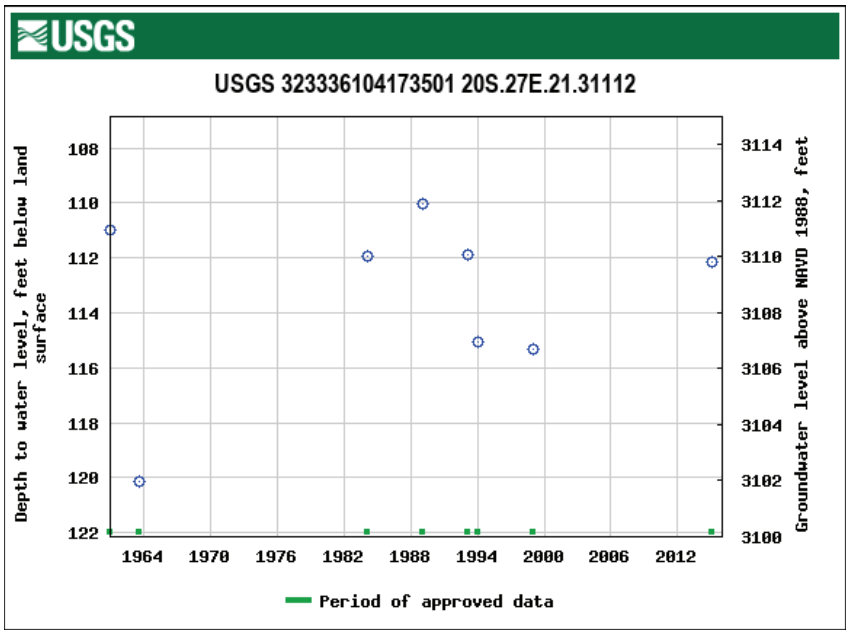
This well is probably completed in the Yates Formation as the Rustler was removed by Tertiary erosion.



USGS 323336104173501 20S.27E.21.31112 AKA USGS-9224

Eddy County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°33'36",
Longitude 104°17'35" NAD27
Land-surface elevation 3,222 feet above NAVD88
The depth of the well is 190 feet below land surface.
This well is completed in the Other aquifers (N9999OTHER) national aquifer.
This well is completed in the Rustler Formation (312RSLR) local aquifer.

This well is probably completed in the Yates Formation as the Rustler was removed by Tertiary erosion.



SITE PHOTOGRAHS

Figure SP-1 View west from southwest corner of staked containment showing nature of vegetation and local topography.

Figure SP-2 View east from southwest corner stake shown above.

Figure SP-3 View east from center of mapped watercourse about 220 feet due south of proposed Catalina containment area.

Figure SP-4 View west from same area as SP-3 showing nature of center of channel mapped as a watercourse. Equipment is parked on former production pad located south of the proposed containment area.

Figure SP-5 View north (uphill) of Cattle trail within small swale that, on Google Earth images, could be mistaken as a watercourse.

SP-6 View north from mapped outcrop of Qagp2 sand and gravel. Rig in background is drilling the Catalina 30 EH State 1H oil well, which is the location of the conductor pipe boring.

Figure SP-7 Close up showing nature of alluvial deposit with sub-rounded dolomite cobbles, within a matrix of smaller rounded clasts and some angular clasts.

2022 Site Photographs – Catalina Containment #2 Area

Plate 22SP-1 – View north from southeast corner of Catalina Recycling Containment #1. 32 32 49.34, -104 19 30.21

Figure 22SP-2 View south from northeast corner of Catalina Containment #1

2022 Site Photographs – Catalina Containment #2 Area

22SP-3 View west showing nature of slope and vegetation east of Catalina Containment #1, which is defined in this image as the area between the red arrows. The USGS-mapped intermittent stream is south (left) in this image.

22SP-4 View south toward the USGS mapped intermittent stream from same location as SP3. 32 32 51.72, -104 19 19.03

2022 Site Photographs – Catalina Containment #2 Area

22SP-5 – View upstream near the Catalina Containment #1 from the center of the USGS-mapped intermittent stream. This image is typical of the drainage that show no evidence of a bed or bank. 32 32 46.96, -104 19 27.38

22SP6- View west showing nature of slope and vegetation about 1400 feet east of the Catalina Containment #1, which is defined by the red arrows. Location is 32 32 56.04, -104 19 13.04

2022 Site Photographs – Catalina Containment #2 Area

22SP-7 View to northwest (uphill) showing one of many similar small channels that compose the alluvial fan in this area. This channel is unusual because it trends NW to SE and may be an old, abandoned channel that is now more of a cattle track. None of these small channels exist south of the break in slope that is obvious in the Google Earth image. The location of this image is 32 33 4.30, -104 19 21.01

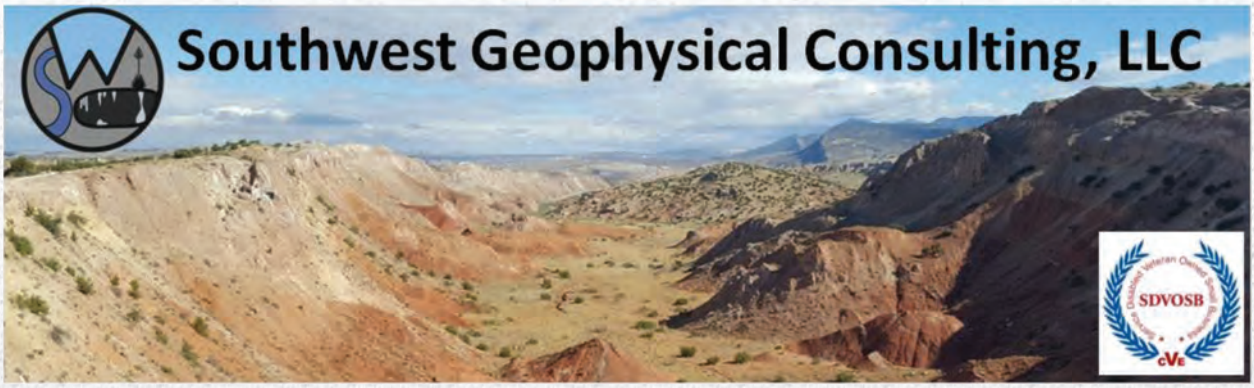
22SP-8 View uphill to the northwest showing nature of channel in the active alluvial fan. Scrub brush about 4-6 feet tall are common within the alluvial fan. 32 33 4.93, -104 19 25.84

2022 Site Photographs – Catalina Containment #2 Area

22SP-9 – View to south-southwest showing the Catalina Containment #1 on the right of the image (red arrow) and the slope and nature of vegetation from location 32 33 4.58, -104 19 27.05. Image 22SP-8 is about 100 feet over the left shoulder of the photographer, within the active alluvial fan. Note the scrub bush vegetation continues where the slope flattens.

22SP-10 View south-southeast from the lowermost portion of the bedrock hill that exists north Containment #1 (in right of image). The scrub brush vegetation shown in 22SP-9 is on the upper left of the image. 32 33 5.06, -104 19 30.57

APPENDIX CAVE AND KARST RESOURCE INVENTORY REPORT TASCOSA CATALINA #3 POND



Cave and Karst Resource Inventory Report
Tascosa Catalina #3 Pond
Eddy County, New Mexico

Prepared for:

Permits West, Inc.
37 Verano Loop
Santa Fe, NM 87508

☑ Positive
- ☐ Relocation/Realignment Recommended
- ☐ Construction Monitor Recommended
- ☑ Relocation/Realignment Not Required

☐ Negative

August 7, 2023

PW-165-20230626

Published by:
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MMXXIII

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1.0 INTRODUCTION

An aerial karst survey was commissioned by Permits West, Inc. (hereinafter referred to as "the client"), on June 26, 2023, for the purpose of determining the presence of karst-related surface features within the Tascosa Catalina #3 Pond project site (hereinafter termed “TPOND”).

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

1.1 Goals of this Study

To provide the client with the location and description of any surface karst-related features within the client-supplied survey boundary (**TEP_Cat_Rec_arch_survey_bounds_063023.shp**) provided via e-mail on June 26, 2023.

1.2 Summary of Findings

Eleven high-likelihood and three medium-likelihood surface karst features are located within the aerial survey area (**Figure 4**). **Avoid these areas during site and infrastructure planning.**

The presence of these and nearby surface karst features indicates that this area is karstified and may contain buried karst features. Caution should be exercised while clearing brush and during any excavation, trenching, or construction operations. Employing a Bureau of Land Management approved karst monitor on site during these activities should be considered. Please see the section entitled ***2.4 Description of Karst Features*** and **Table 1** for information on the features located during this survey.

1.3 Affected Environment

The proposed TPOND project is located in evaporite karst terrain, a landform that is characterized by underground drainage through solutionally enlarged conduits. Evaporite karst terrain may contain sinkholes, sinking streams, caves, and springs. Sinkholes leading to underground drainages and voids are common. These karst features, as well as occasional fissures and discontinuities in the bedrock, provide the primary sources for rapid recharge of the groundwater aquifers of the region.

Karst features are delicate resources that are often of geological, hydrological, biological, and archeological importance, and should be protected. The three primary concerns in these types of terrain are environmental issues, worker safety, and infrastructure integrity.

The Bureau of Land Management (BLM) categorizes all areas within the Carlsbad Field Office (CFO) zone of responsibility as having either low, medium, or high cave potential based on geology, occurrence of known caves, density of karst features, and potential impacts to freshwater aquifers[1]. These designations are also recognized by the New Mexico State Land Office (NMSLO). This project occurs within a **HIGH** karst occurrence zone[2] (HKOZ) (**Figure 1**).

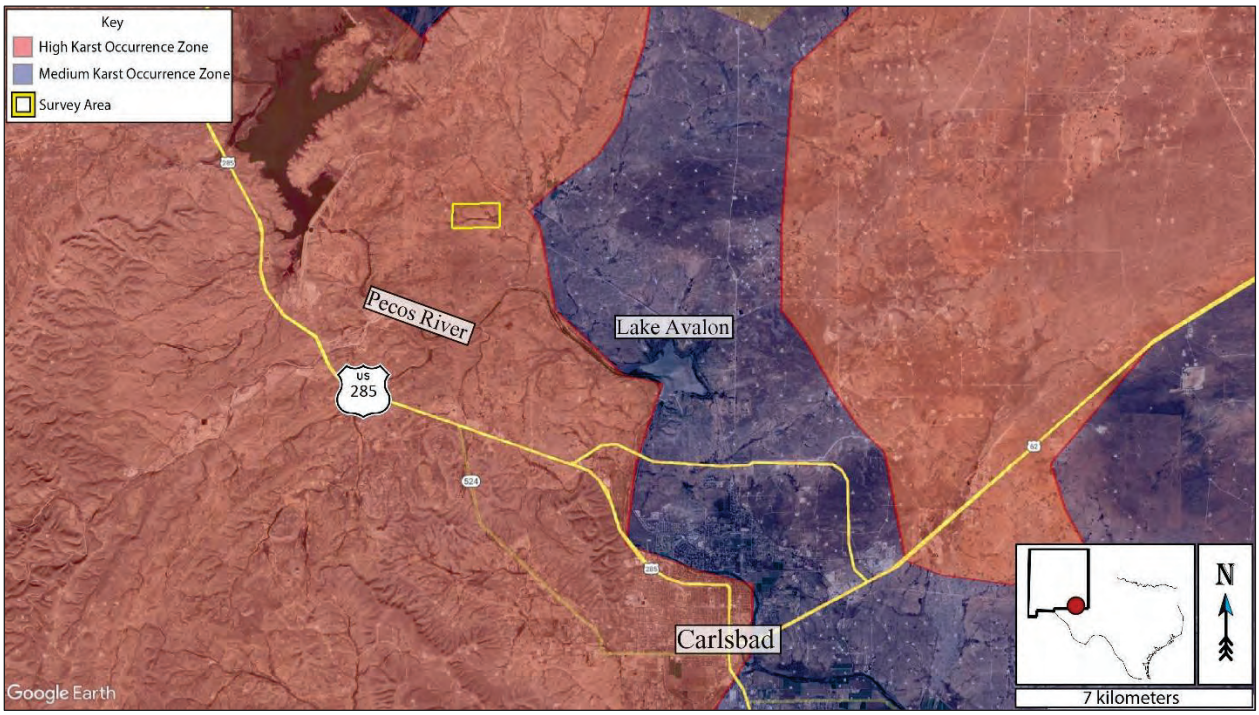


Figure 1: Karst occurrence overview. Background image: Google Earth. Image date: December 29, 2019. Datum: WGS-84.

A high karst occurrence zone is defined as an area in known soluble rock types that contains a high frequency of significant caves and karst features such as sinkholes, bedrock fractures that provide rapid recharge of karst aquifers, and springs that provide riparian habitat[1].

1.4 Limitations of Report

This report should be read in full. No responsibility is accepted for the use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

This report has been prepared for the use of Permits West, Inc., in accordance with generally accepted consulting practices. Every effort has been made to ensure the information in this report is accurate as of the time of its writing. This report has not been prepared for use by parties other than the client, their contracting party, and their respective consulting advisors. It may not contain sufficient information for the purposes of other parties or for other uses.

This report was prepared upon completion of the associated fieldwork using a standard template prepared by Southwest Geophysical Consulting and is based on information collected prior to fieldwork, conditions encountered on site, and data collected during the fieldwork and reviewed at the time of preparation. Southwest Geophysical Consulting disclaims responsibility for any changes that might have occurred at the site after this time. The interpreted results, locations, and depths noted in this report (if applicable) should be taken as an interpretation only and no decision should be based solely on this information. Physical verification of aerial imagery analysis results in the field should be conducted prior to moving any planned infrastructure.

To the best of our knowledge, information contained in this report is accurate at the date of issue; however, conditions on the site can change in a limited time and, therefore, the information in this report shall not be used beyond three years past the date of the imagery collection flight (see section ***2.3 Description of Survey***).

2.0 LOCATION AND DESCRIPTION OF STUDY AREA

2.1 Description of Site

The TPOND project site is located in Eddy County, New Mexico, 16.4 kilometers (10.2 miles) northwest of Carlsbad, New Mexico, north of the Pecos River and west of North Lake Road (**Figure 1** and **Figure 2**). The survey area is located within section 30 of NM T20S R27E [3]. The region is semi-arid with an average annual precipitation of approximately 13 inches, of which about two-thirds falls as rain during summer thunderstorms from June to October. Summers are hot and sunny while winters are generally mild, with an average maximum temperature of 96°F in July and an average minimum temperature of 28°F in January[4]. This area is within the Chihuahuan Desert Thornscrub as defined by the Southwestern Regional ReGAP Vegetation map[5] and the vegetation consists mostly of areas of grass, sparse creosote, and sparse yucca, with very good visibility in most locations. See section ***2.2 Local Geology*** for the geology of the area. The project site is located within an HKOZ[2] (**Figure 1**) and NMSLO managed lands[6] (**Figure 2**).

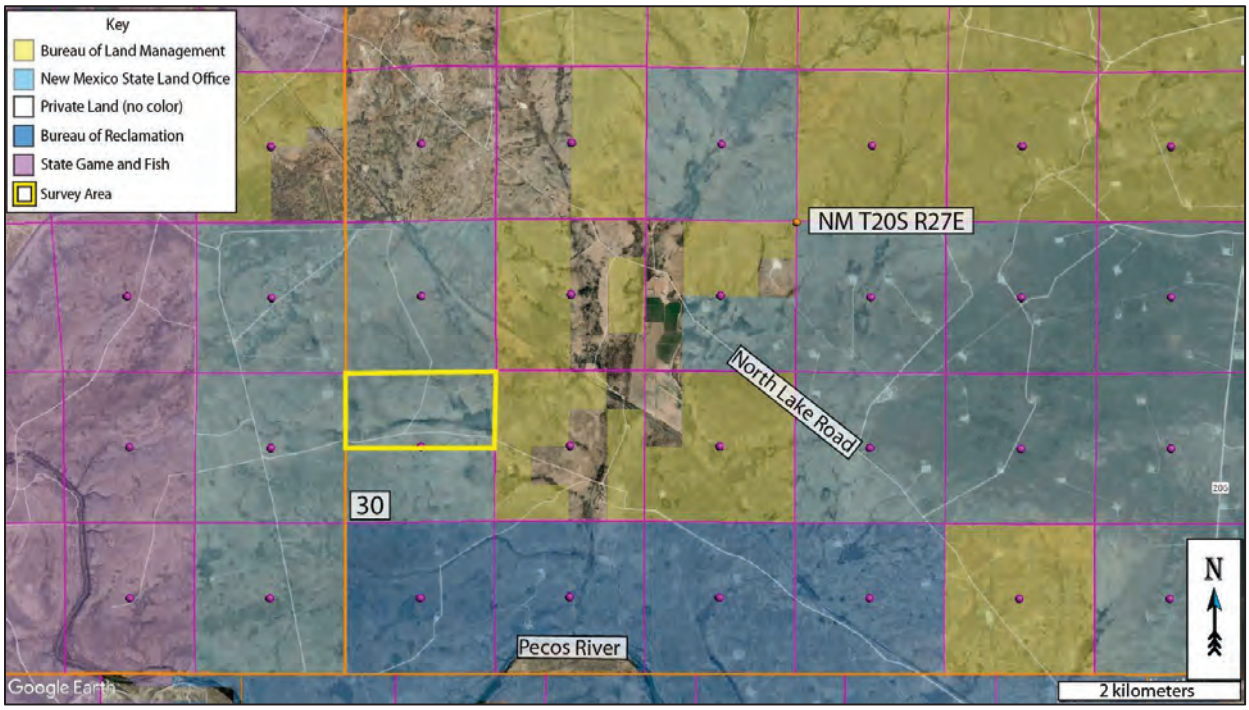


Figure 2: Land ownership[6] and PLSS[3] overview. Background image credit: Google Earth. Image date: December 29, 2019. Datum: WGS-84.

2.2 Local Geology

The area surveyed for the TPOND project is located at an elevation of 989 meters (3,245 feet), ± 10 meters (32.8 feet), and is underlain by the Permian Artesia Group. The area is mantled by thin gypsiferous soils and Quaternary aeolian and alluvial sands (Qal)[7] between 0 and 6 meters in depth (**Figure 3**).

The Artesia Group consists of the Greyburg and Queen Formations (Pqg), the Seven Rivers Formation (Psr), the Yates Formation (Py), and the Tansill Formation (Pt)[8]. At this location, the Yates and Tansill Formations immediately underly the Quaternary units. The Tansill Formation is mostly carbonate with minor siltstone and anhydrite. The carbonate is susceptible to karst formation. The Yates Formation is dominated by a quartz-rich, frosted-sandstone facies with minor carbonate, anhydrite, and siltstone. The zones of carbonate and anhydrite are susceptible to karst formation[9]. The Seven Rivers Formation underlies the Yates and Tansill Formations and is a back-reef facies containing interbeds of dolomite and gypsum with occasional sandstone lenses. Both the dolomite and gypsum are subject to karst formation.

This area is heavily karstified and has numerous sinkholes, swallets, caves, and other karst features within the survey area. Extreme caution is recommended during any surface activities including surface inspection, brush clearing, and trenching. The survey area is covered by the easily accessible Geologic Map of New Mexico (2003) at 1:500,000 scale[7].

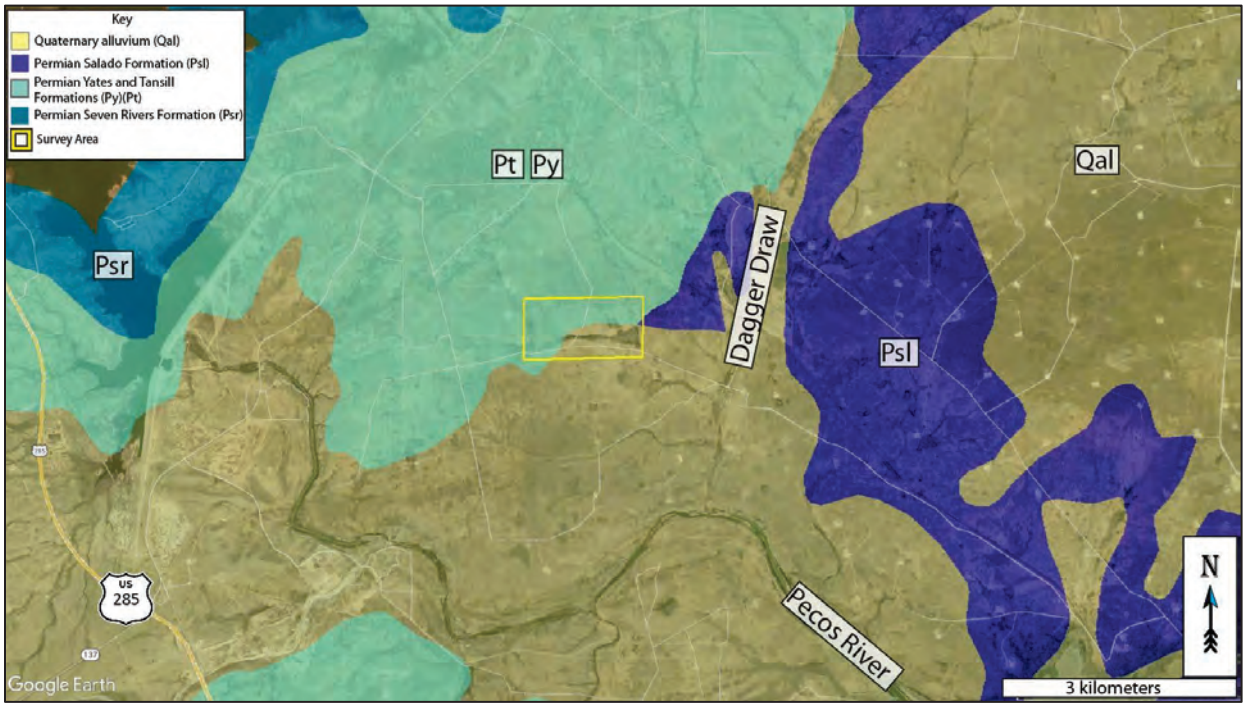


Figure 3: Geology overview. Map credit: The Digital Geologic Map of New Mexico in ARC/INFO Format[10], and Google Earth. Image date: December 29, 2019. Datum: WGS-84.

2.3 Description of Survey

Southwest Geophysical Consulting, in partnership with SWCA Environmental Consultants, provides aerial karst surveys using drones that are flown by qualified, FAA licensed drone pilots and that meet the stringent Bureau of Land Management – Carlsbad Field Office requirements for both pedestrian and aerial karst surveys.

Aerial karst surveys are conducted at low elevation following a preplanned raster pattern flightpath designed for the purpose of generating at least 75% imagery overlap. The collected high-resolution, georeferenced imagery is stitched together to develop orthomosaic imagery which is further developed into a digital elevation model (DEM); the DEM is then processed into a local relief model (LRM, **Figure 4**). This LRM is color coded to enhance differences in elevation of as little as five centimeters. The orthoimagery, DEM, and LRM are uploaded to a server where they are analyzed by a highly qualified karst geologist. Finally, the data is reviewed by a senior karst geologist for quality assurance and downloaded into a table for inclusion in a written report[11].

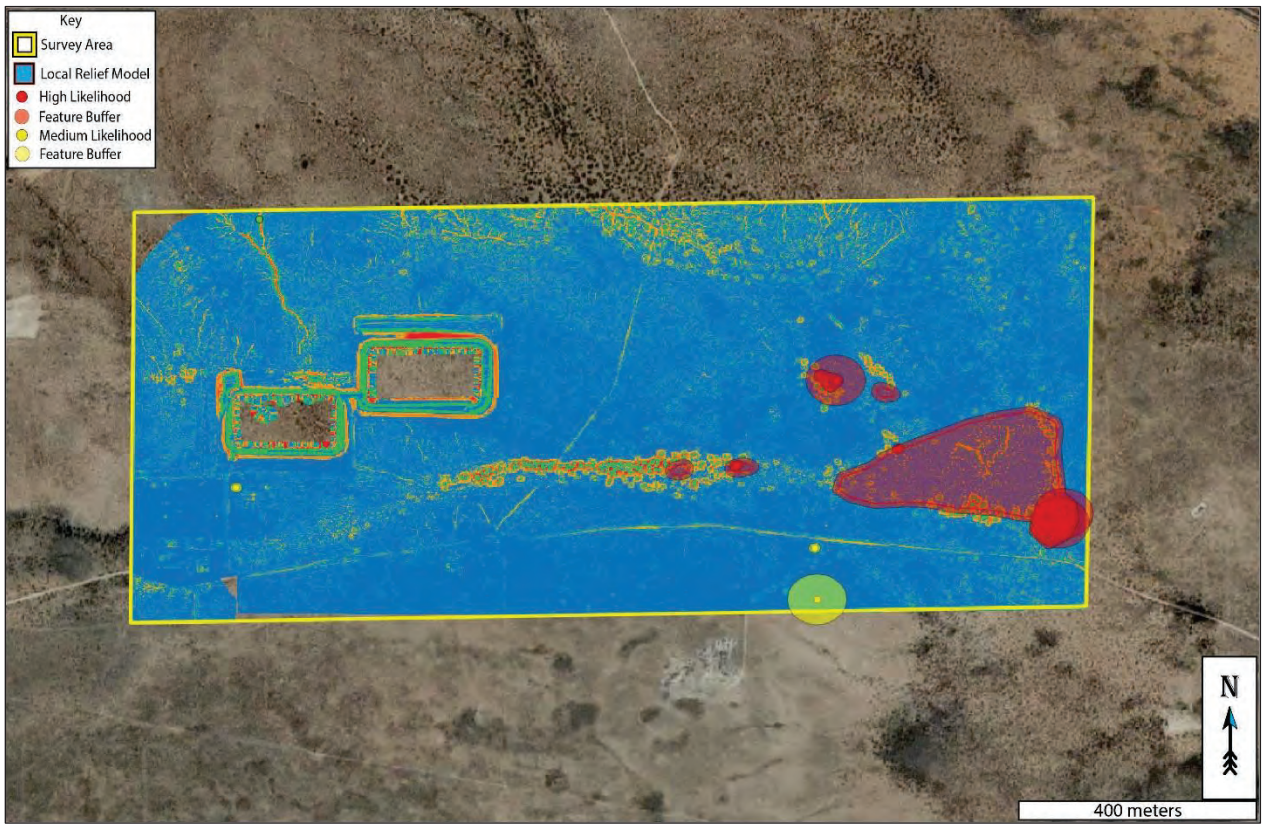


Figure 4: Survey overview. Background image credit: Google Earth. Image date: December 29, 2019. Datum: WGS-84.

Resolution of the orthoimagery is clear enough that features as small as 10 centimeters can be positively identified in most circumstances. Occasionally there are ambiguous features identified during an aerial survey that will need to be checked in the field if they impact the facility's location. Specifically, it is difficult to tell the difference between solution tubes, abandoned uncased well bores, and some burrows in drone imagery[12]. These features are marked with yellow dots in **Figure 4**. If a feature is subsequently verified in the field prior to publication of the report, the dot will be changed to red triangle if confirmed as a karst feature or deleted if not.

The imagery for this study was collected via aerial survey by Pat Lagodney of SWCA on July 8, 2023. Surface karst features may have developed after this date and will not be noted in this report. Imagery analysis was completed by David Decker of Southwest Geophysical Consulting on July 26, 2023.

2.4 Description of Karst Features

Eleven high-likelihood surface karst features are located within the aerial survey area (**Figure 4**, **Table 1**). High-likelihood surface karst features are features that are positively identified in either satellite or aerial imagery as karst features but have not been field checked.

Three medium-likelihood surface features are located within the aerial survey area (**Figure 4**, **Table 1**). Medium-likelihood surface karst features are ambiguous in aerial imagery and should be site-checked for verification if they impact the facility's location. The features identified in this report as medium likelihood are probably burrows or shadows, or erosional in nature; however, there is insufficient evidence to make this determination and therefore these features cannot be ruled out.

Avoid these features during site and infrastructure planning (**Figure 4**, see section **3.0 RECOMMENDATIONS** for further information).

Caution should be exercised while operating in or around any karst-related features due to the possibility of near-surface voids. Please be aware that the area may contain buried karst features. Caution is advised while clearing brush and during trenching and excavation activities. Employing a BLM-CFO approved karst monitor on site during these activities should be considered.

Table 1 contains details of the features identified during the aerial karst survey and subsequent imagery analysis. Each feature is identified with a feature identification number (Feature ID), type of feature, estimated size (in meters), recommended buffer (in meters), the likelihood of this feature being a surface karst feature (modifiers H/M for high or medium likelihood, V for field verified), and its location in WGS-84/UTM-13.

Table 1: Karst Feature Data Table

Feature ID	Type	Size (m)	Buffer (m)	Modifier	Easting	Northing
PKF 220417-D02	Highly karstified area	218.0	10	H	564403.382	3601290.297
PKF 220417-D02a	Cover-collapse sinkhole	11.5	50	H	564558.862	3601200.673
PKF 220417-D02b	Collapse feature	6.4	50	H	564552.401	3601181.818
PKF 230524-G01	Suffosion sinkhole	0.7	10	M	563175.238	3601242.889
PKF 230726-D01	Collapse feature	0.5	50	M	564147.856	3601028.259
PKF 230726-D02	Suffosion sinkhole	0.3	10	M	564143.396	3601129.657
PKF 230726-D03	Suffosion sinkhole	2.0	10	H	564009.276	3601290.886
PKF 230726-D04	Suffosion sinkhole	1.0	10	H	564013.045	3601292.198
PKF 230726-D05	Highly karstified area	23.1	10	H	564020.339	3601288.846
PKF 230726-D06	Highly karstified area	22.3	10	H	563916.539	3601282.528
PKF 230726-D07	Suffosion sinkhole	1.5	10	H	564282.155	3601326.995
PKF 230726-D08	Highly karstified area	19.8	10	H	564167.180	3601459.170
PKF 230726-D09	Highly karstified area	20.3	10	H	564259.168	3601437.434
PKF 230726-D10	Cover-collapse sinkhole	1.1	50	H	564176.455	3601461.144

NOTE: Location data provided in WGS-84/UTM 13S. PKF – possible karst feature.

3.0 RECOMMENDATIONS

3.1 Summary

- Eleven high-likelihood and three medium-likelihood surface karst features are located within the aerial survey area (**Figure 4**, **Table 1**).
- **Avoid these areas during site and infrastructure planning.**
- The presence of these and other nearby surface karst features indicates that this area may be karstified and could contain buried karst features.
- Caution should be exercised while clearing brush and during any excavation, trenching, or construction operations.
- Employing a BLM-CFO approved karst monitor during excavation in this area should be considered.

3.2 Best Practices

Because of the ambiguous nature of the medium-likelihood surface karst features found in the survey area, caution should be used while working in or near the feature buffer zone. **Please be advised that any change to the currently proposed infrastructure may require a field verification by a BLM-CFO or NMSLO approved karst vendor to confirm the nature of these features.**

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

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

Vigilance during construction is paramount. If voids are encountered during excavation, contact the Bureau of Land Management Karst Division at (575) 234-5972, the New Mexico State Land Office Surface Resources Division at (505) 827-5768, or a BLM-CFO approved karst vendor and request an on-site investigation from a karst expert if one is not already on site. A karst consultant can generally be available in Eddy County within five hours.

Approved karst monitors should have karst feature identification training, at least two years of supervised experience identifying karst features, wilderness first aid training, SRT training, confined space training, gas monitor training, and a minimum of SPAR cave rescue training through NCRC. They should have with them the proper gear and be prepared both physically and mentally to enter a collapse feature within minutes to perform a rescue if needed. Monitoring services with qualified karst monitors, as well as cave surveys and geophysical surveys, are available from Southwest Geophysical Consulting.

Under no circumstances should an untrained, inexperienced person enter a cave, pit, sinkhole, or collapse feature. All field employees of Southwest Geophysical Consulting have extensive caving experience and the ability to determine whether entry into a karst feature is safe or presents a hazard. In the event it is necessary to enter a karst feature, Southwest Geophysical Consulting can provide these services on request.

Cave and karst resource inventory reports for the BLM-CFO should be submitted to:

blm_nm_karst@blm.gov

Cave and karst resource inventory reports for the NMSLO should be submitted to the respective project manager.

4.0 REFERENCES

1 Goodbar, J. R. Vol. BLM Management Handbook H-8380-1 (ed Carlsbad Field Office) 59 (Bureau of Land Management, Denver, CO, 2015).

2 Rybacki, K. (Bureau of Land Management - Carlsbad Field Office, 2020).

3 Earthpoint. *Earthpoint Tools for Google Earth*, <https://www.earthpoint.us/Townships.aspx> (2022).

4 W.R.C.C. *National Climate Data Center 1981-2010 Normal Climate Summary for Carlsbad, New Mexico (291469)*, 2010.

5 Whitehead, W. & Flynn, C. *Plant Utilization in Southeastern New Mexico: Botany, Ethnobotany, and Archaeology*. (Bureau of Land Management, Carlsbad Field Office, 2017).

6 NMSLO. Digital overlay (KML) of the surface land ownership in New Mexico (New Mexico State Land Office, Santa Fe, NM, 2016).

7 Scholle, P. A. Geologic Map of New Mexico, 2003.

8 Silver, B. A. & Todd, R. G. Permian Cyclic Strata, Northern Midland and Delaware Basins, West Texas and Southeastern New Mexico. *The American Association of Petroleum Geologists Bulletin* **53**, 2223 - 2251 (1969).

9 Johnson, K. S. Evaporite Karst in the United States. *Carbonates and Evaporites* **12**, 2-14 (1997).

10 Green, G. N. & Jones, G. E. *The Digital Geologic Map of New Mexico in ARC/INFO Format*, <https://mrdata.usgs.gov/geology/state/state.php?state=NM> (1997).

11 Whitehead, W., Bandy, M. & Decker, D. Protocol for Using UAV Photography for Rapid Assessment of Karst Features in Southeast New Mexico. *Proceedings of the 2022 Cave and Karst Management Symposium* (2022).

12 Decker, D. D. & Jorgensen, G. L. (ed LLC Southwest Geophysical Consulting) (Private Correspondence, 2020).

5.0 GLOSSARY OF TERMS AND ABBREVIATIONS

BLM-CFO	Bureau of Land Management - Carlsbad Field Office
caprock-collapse sinkhole	Collapse of roof-spanning rock into a cave or void.
cave	Natural opening at the surface large enough for a person to enter.
cover-collapse sinkhole	Collapse of roof-spanning soil or clay ground cover into a subsurface void.
GPS	Global Positioning System
grike	A solutionally enlarged, vertical, or sub-vertical joint or fracture.
(H)	High confidence modifier for a PKF. This is typically reserved for a feature that is definitely karst but has not been confirmed in the field.
HKOZ	High Karst Occurrence Zone
InSAR	Interferometric Synthetic Aperture Radar. A method by which radar signals from satellites are processed to determine the amount and rate of subsidence of an area as well as whether the area is actively subsiding.
(L)	Low confidence modifier for a PKF. This is typically a feature that cannot be ruled out as karst but is most likely NOT karst related. This modifier may also be used for pseudokarst features.
LED	Locally enclosed depression. A natural depression on the surface that collects rainwater. Some contain swallets and/or caves, others do not.
LKOZ	Low Karst Occurrence Zone
(M)	Medium confidence modifier for PKF. This is an ambiguous feature that can't be positively identified as karst without a field visit (e.g., burrows, abandoned unlined wells, solution tubes, pseudokarst).
MKOZ	Medium Karst Occurrence Zone
NCRC	National Cave Rescue Commission
NKF	Non-karst feature. Used for features originally identified as PKF that have been subsequently identified in the field as non-karst related. This term may also be used for pseudokarst features.
NMSLO	New Mexico State Land Office
Pat	Permian Artesia Group
Pcs	Permian Castile Formation
Pdl	Permian Dewey Lake Formation
PKF	Possible karst feature. This term is reserved for features identified in satellite or aerial imagery that have NOT been visited in the field. Further modifiers include (H) for high confidence, (M) for medium confidence, and (L) for low confidence. These confidence levels are based on field experience.

PLSS	Public Land Survey System
Pqg	Permian Queen/Greyburg Formation
Pr	Permian Rustler Formation
pseudokarst	Karst-like features (sinkholes, conduits, voids etc.) that are not formed by dissolution. These types of features include soil piping, lava tubes, and some cover-collapse and suffosion sinkholes.
Psl	Permian Salado Formation
Psr	Permian Seven Rivers Formation
Pt	Permian Tansill Formation
Py	Permian Yates Formation
Qal	Quaternary alluvium
Qp	Quaternary piedmont deposits
Qpl	Quaternary playa lake deposits
RKF	Recognized karst feature. This term is reserved for karst features that have been physically verified in the field.
SKF	Surface Karst Feature
SPAR	Small Party Assisted Rescue
suffosion sinkhole	Raveling of soil into a pre-existing void or fracture.
swallet	A natural opening in the surface, too small for a person, that drains water to an aquifer. Some are "open," meaning a void can be seen below; some are "closed, "meaning they are full of sediment.
SWG	Southwest Geophysical Consulting, LLC
UTM	Universal Transverse Mercator (projected coordinates)
(V)	Field verified modifier for a PKF. This indicates that the feature has been visited by a qualified karst professional in the field and fully identified
WGS	World Geodetic System (geographic coordinates)

6.0 ATTESTATION

David D. Decker, PhD, PG, CPG
Chief Executive Officer, Principal Geologist
Southwest Geophysical Consulting, LLC
5117 Fairfax Dr. NW
Albuquerque, NM 87114
dave@swgeophys.com
(505) 585-2550

CERTIFICATE OF AUTHOR

I, David D. Decker, a Licensed Professional Geologist and a Certified Professional Geologist, do certify that:

- I am currently employed as a consulting geologist in the specialty of caves and karst with an office address of 5117 Fairfax Dr. NW, Albuquerque, NM, USA, 87114.
- I graduated with a Master of Science in Applied Physics with a specialization in Sensor Systems from the Naval Post Graduate School in Monterey, California, in 2003, and a Doctor of Philosophy in Earth and Planetary Sciences from the University of New Mexico, Albuquerque, New Mexico, in 2018.
- I am a Licensed Professional Geologist in the State of Texas, USA (PG-15242) and have been since 2021. I am a Certified Professional Geologist through the American Institute of Professional Geologists (CPG-12123) and have been since 2021.
- I have been employed as a geologist continuously since 2016. I was previously employed as a Fire Controlman, Naval Flight Officer, and Aerospace Engineering Duty Officer in the U.S. Navy and operated, maintained, and installed various sensor systems including magnetic, electromagnetic, radar, communications, and acoustic systems in various capacities from 1986 through 2010.
- I have been involved in various aspects of cave and karst studies continuously since 1985, including exploration, mapping, and scientific studies.
- I have read the definition of “qualified karst professional” set out in the ASTM Standard (currently in review). I meet the definition of “qualified professional” for the purposes of ASTM E-1527.
- I am responsible for the content, compilation, and editing of all sections of this report numbered PW-165-20230626, entitled “Cave and Karst Resource Inventory Report, Tascosa Catalina #3 Pond, Eddy County, New Mexico.” I or a duly authorized and qualified representative of Southwest Geophysical Consulting, LLC, have personally visited this site on the date or dates mentioned in section ***2.3 Description of Survey***.

- I have no prior involvement nor monetary interest in the described property or project, save for my fee for conducting this investigation and providing the report.

Dated in Albuquerque, New Mexico, August 7, 2023.

David D. Decker
PhD, CPG-12123

September 2023

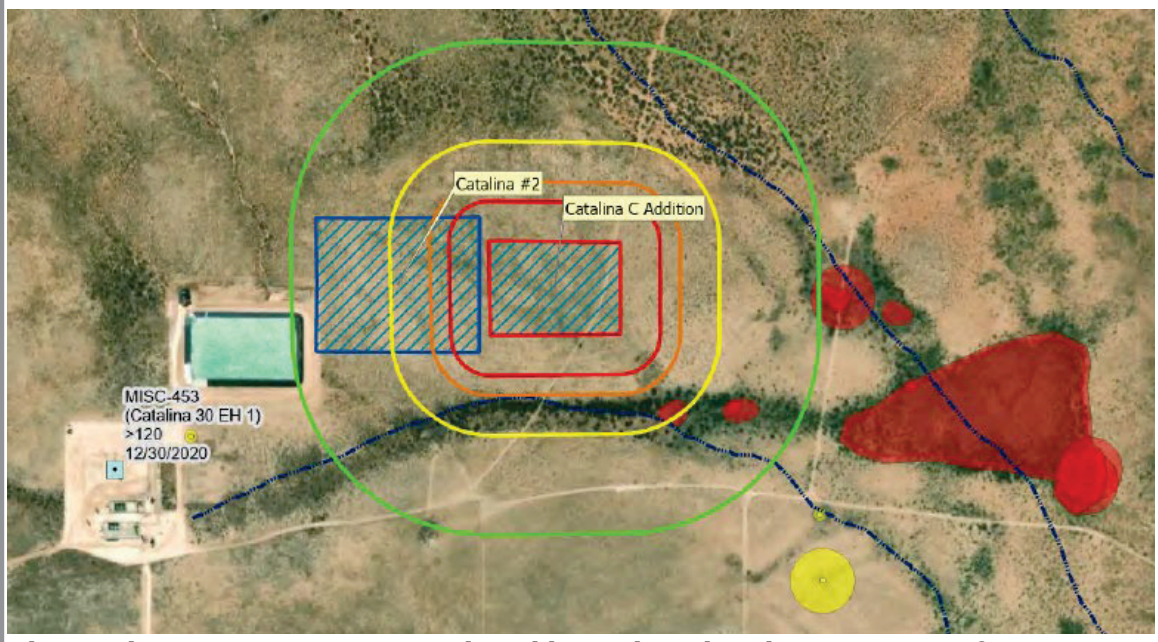
C-147 Registration Package for
Catalina C Recycling Facility & Containment
Section 30, T20S, R27E, Eddy County

Volume 2 In-Ground Containment

C-147 Form

Stamped Design Drawings, Liner Equivalency Demonstration & Avian Deterrent System

Plans for Design/Construction, O&M, and Closure



The Catalina C Containment provides additional produced water storage for Tascosa Energy well stimulation programs. This image shows that a mapped watercourse is slightly more than 300 feet from the edge of the containment, depth to groundwater exceeds 120 feet in the auger boring MISC-453, and suspected and actual karst structures are more than 480 feet from the containment.

.

Prepared for:
Tascosa Energy Partners LLC
901 W. Missouri Ave
Midland, Texas

Prepared by:
R.T. Hicks Consultants, Ltd. 901
Rio Grande NW F-142
Albuquerque, New Mexico

C-147

Form C-147
Revised October 11, 2022

State of New Mexico
Energy Minerals and Natural Resources
Department Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505
https://www.emnrd.nm.gov/ocd/ocd-e-permitting/

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: Tascosa Energy Partners, L.L.C (For multiple operators attach page with information) OGRID #: 329748
Address: 901 W. Missouri Ave, Midland, Texas
Facility or well name (include API# if associated with a well): Catalina C Containment - associated with 2RF- 157
OCD Permit Number: _____ (For new facilities the permit number will be assigned by the district office)
U/L or Qtr/Qtr B & C Section 30 Township 20S Range 27E County: Eddy
Surface Owner: ☐ Federal ☑ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☑ **Recycling Facility:**
Location of recycling facility (if applicable): Latitude 32.54867 Longitude -104.32794 NAD83
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 32.54881 Longitude -104.32119 NAD83
☐ For multiple or additional recycling containments, attach design and location information of each containment
☑ Lined ☑ Liner type: Thickness 60 mil ☐ LLDPE ☑ HDPE ☐ PVC ☐ Other Secondary 40 mil HDPE
☐ String-Reinforced
Liner Seams: ☑ Welded ☐ Factory ☐ Other _____ Volume: 705399 bbl Dimensions: L 560 x W 360 x D 20
☐ 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 Game Fence

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. - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☑ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	☐ Yes ☑ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map See Geology and Karst Sections of Volume 1	☐ Yes ☑ No
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). - Topographic map; visual inspection (certification) of the proposed site	☐ Yes ☑ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image	☐ Yes ☑ No
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. - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☑ No
Within 500 feet of a wetland. - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☑ No

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): Alyssa McNear (Davanzo), P.E. Title: Operations Manager

Signature: Alyssa McNear Date: 9/7/23

e-mail address: adavanzo@tascosaep.com Telephone: Cell: (720) 244-4417

11.
OCD Representative Signature: _____ **Approval Date:** _____

Title: _____ **OCD Permit Number:** _____

☐ OCD Conditions _____
☐ Additional OCD Conditions on Attachment

STAMPED DESIGN DRAWINGS

AVIAN DETERRENT SYSTEM

LINER EQUIVALENTCY DEMONSTRATION

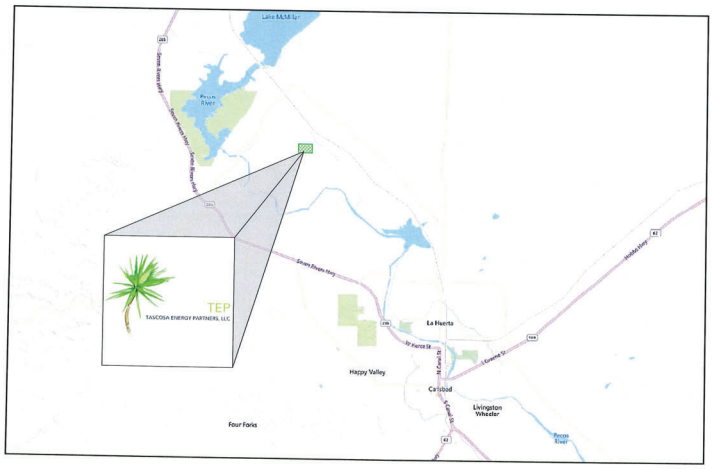
CATALINA C RECYCLE
TASCOSA ENERGY PARTNERS
SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST

32° 32' 55.7376", -104° 19' 16.2690"
32.548816°, -104.321186°

TEP
TASCOSA ENERGY PARTNERS, LLC

Index to Drawings
11X17

Sheet No.	Description
1.	COVER SHEET
2.	PROJECT LOCATION
3.	EXISTING SITE FEATURES
4.	SITE PLAN
5.	PIT CAPACITY
6.	RUB SHEET & FENCE PLAN
7.	CROSS SECTIONS
8.	SUMP DETAILS
9.	LINER DETAILS
10.	FENCE DETAILS



Contacts

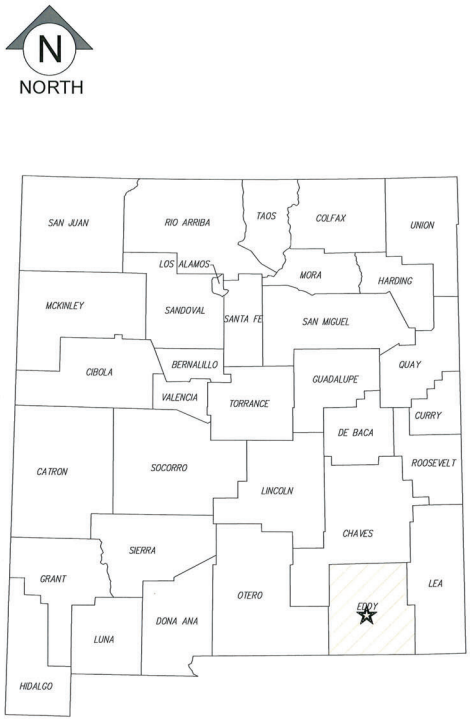
ALYSSA DAVANZO - TASCOSA ENERGY PARTNERS, LLC- (432)-695-6970
BOBBIJO CRAIN - CASCADE SERVICES - (210)-632-8670
ENVIROTECH ENGINEERING & CONSULTING - MITCHELL RATKE, EIT (580)-234-8780 (DESIGN ENGINEER)
ENVIROTECH ENGINEERING & CONSULTING - TYLER WILLIAMS, EIT (580)-234-8780 (SUPERVISING ENGINEER)

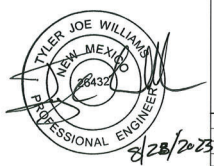
nm811 Professional Resources for Damage Prevention

TYLER JOE WILLIAMS
NEW MEXICO
26432
PROFESSIONAL ENGINEER
8/28/2023

ENVIROTECH
ENGINEERING

2500 N. Eleventh Street Enid, OK 73701 • 580.234.8780 • envirotechconsulting.com
License #26432 - Expiration Data: 12-31-2024





ENVIROTECH ENGINEERING

PE #23432 - Expiration Date: 12-31-2024

COPYRIGHT

NO.	DATE	DESCRIPTION

PROJECT LOCATION

CATALINA C RECYCLE

TASCOSA ENERGY PARTNERS, LLC

SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
EDDY COUNTY, NEW MEXICO

DATE:	AUGUST 2023
SCALE:	NOT TO SCALE
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	2 OF 10

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NO.	DATE	DESCRIPTION

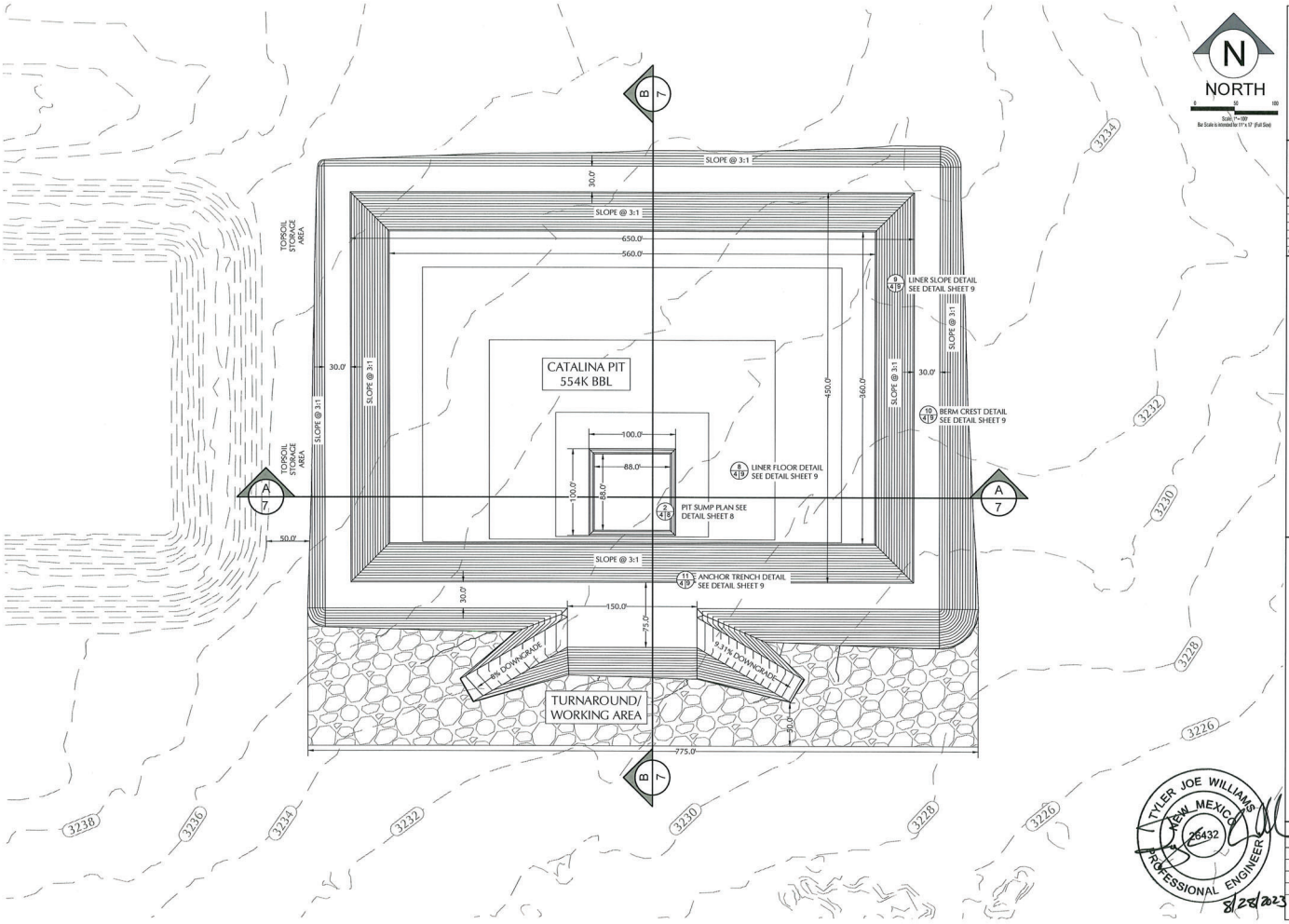
EXISTING SITE FEATURES

CATALINA C RECYCLE

TASCOSA ENERGY PARTNERS, LLC

SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST, EDDY COUNTY, NEW MEXICO

DATE:	AUGUST 2023
SCALE:	1" = 300'
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	3 OF 10



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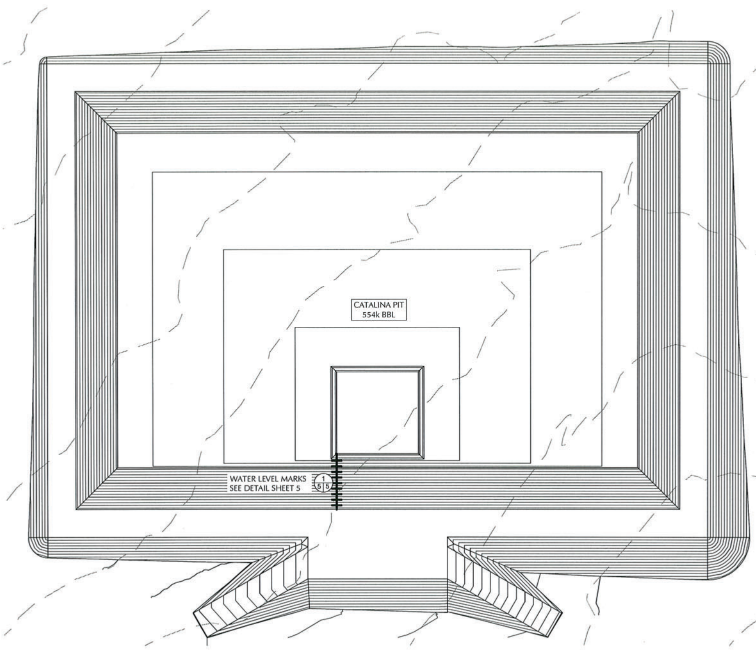
NO.	DATE	DESCRIPTION

SITE PLAN

CATALINA C RECYCLE
TASCOSA ENERGY PARTNERS, LLC
SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
EDDY COUNTY, NEW MEXICO

DATE:	AUGUST 2023
SCALE:	1" = 100'
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	4 OF 10

TYLER JOE WILLIAMS
NEW MEXICO
26432
PROFESSIONAL ENGINEER
8/28/2023



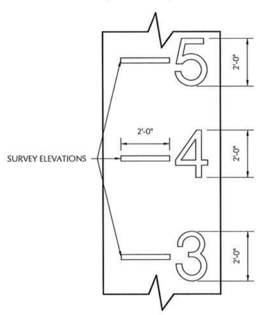
NORTH

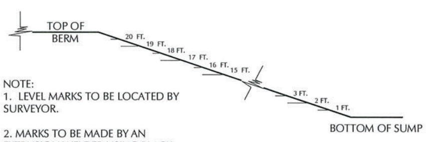
Scale: 1" = 100'
Bar Scale is intended for 11" x 17" (Full Size)

Owner	Tascosa Energy Partners		
Site Name	Catalina C Facility		
	Top FB	Bottom	Max Liq. Level
Lagoon Features			
Side slope Ratio	3		3
Maximum Depth (ft)	20.0		17.0
Lagoon Top Width (ft)	650	560	632
Lagoon Top Length (ft)	450	360	432
Maximum Total Vol (ft^3)	3,960,267		3,112,256
Maximum Total Vol (bbls)	705,399		554,352

- Freeboard
- Maximum Capacity
- Storage Volume
- Floor
- Sump

Elevation ft	Lagoon Liq Depth ft	Remaining Storage ft	Remaining Stor Vol ft3	Remaining Storage gal	Remaining Storage bbls	Percent of Total Vol %	Vol in lagoon ft^3	Vol in Lagoon gal	Vol in Lagoon bbls	Vol in Lagoon ac-ft	Percent Total Vol %
3244.50	20.0	0.0	-	-	-	0%	3,960,267	29,626,754	705,399	90.92	100%
3243.5	19.0	1.0	449,752	2,163,307	51,507	7%	3,671,093	27,463,448	653,892	84.28	93%
3242.5	18.0	2.0	889,352	4,277,783	101,852	14%	3,388,447	25,348,971	603,547	77.79	86%
3241.5	**17.0**	**3.0**	**1,318,912**	**6,343,968**	**151,047**	**21%**	**3,112,256**	**23,282,787**	**554,352**	**71.45**	**79%**
3240.5	16.0	4.0	1,738,545	8,362,400	199,105	28%	2,842,448	21,264,354	506,294	65.25	72%
3239.5	15.0	5.0	2,148,362	10,333,621	246,039	35%	2,578,951	19,293,134	459,360	59.20	65%
3238.5	14.0	6.0	2,548,475	12,258,164	291,861	41%	2,321,694	17,368,590	413,538	53.30	59%
3237.5	13.0	7.0	2,938,996	14,136,572	336,585	48%	2,070,603	15,490,183	368,814	47.53	52%
3236.5	12.0	8.0	3,320,038	15,969,381	380,223	54%	1,825,608	13,657,373	325,176	41.91	46%
3235.5	11.0	9.0	3,691,711	17,757,131	422,789	60%	1,586,636	11,869,623	282,610	36.42	40%
3234.5	10.0	10.0	4,054,129	19,500,361	464,294	66%	1,353,615	10,126,394	241,105	31.07	34%
3233.5	9.0	11.0	4,407,403	21,199,608	504,753	72%	1,126,473	8,427,147	200,646	25.86	28%
3232.5	8.0	12.0	4,751,644	22,855,409	544,176	77%	905,139	6,771,345	161,223	20.78	23%
3231.5	7.0	13.0	5,086,966	24,468,306	582,579	83%	689,540	5,158,448	122,820	15.83	17%
3230.5	6.0	14.0	5,413,480	26,038,838	619,972	88%	479,604	3,587,916	85,427	11.01	12%
3229.5	5.0	15.0	5,731,297	27,567,540	656,370	93%	275,259	2,059,214	49,029	6.32	7%
3228.5	4.0	16.0	5,971,035	28,720,679	683,826	97%	121,117	906,075	21,573	2.78	3%
3227.5	3.0	17.0	6,090,789	29,296,695	697,540	99%	44,120	330,059	7,859	1.01	1%
3226.5	2.0	18.0	6,131,889	29,494,388	702,247	100%	17,694	132,367	3,152	0.41	0%
3225.5	1.0	19.0	6,146,526	29,564,791	703,924	100%	8,283	61,963	1,475	0.19	0%
3224.5	0.0	20.0	6,159,408	29,626,754	705,399	100%	-	-	-	-	0%





NOTE:
1. LEVEL MARKS TO BE LOCATED BY SURVEYOR.
2. MARKS TO BE MADE BY AN EXTRUSION WELDER USING BLACK FILAMENT (OR WHITE FILAMENT ON BLACK LINER).
3. MARKS SHOULD BEGIN AT THE TOP OF BERM AND CONTINUE TO THE BOTTOM OF THE SUMP. (TOP OF BERM SHOULD READ 20-FT, BOTTOM OF SUMP +1-FT SHOULD READ 1-FT)
4. REFERENCE PIT CAPACITY TABLES FOR ACCURATE ELEVATIONS

WATER LEVEL MARKS (1 / 5)
Not to Scale

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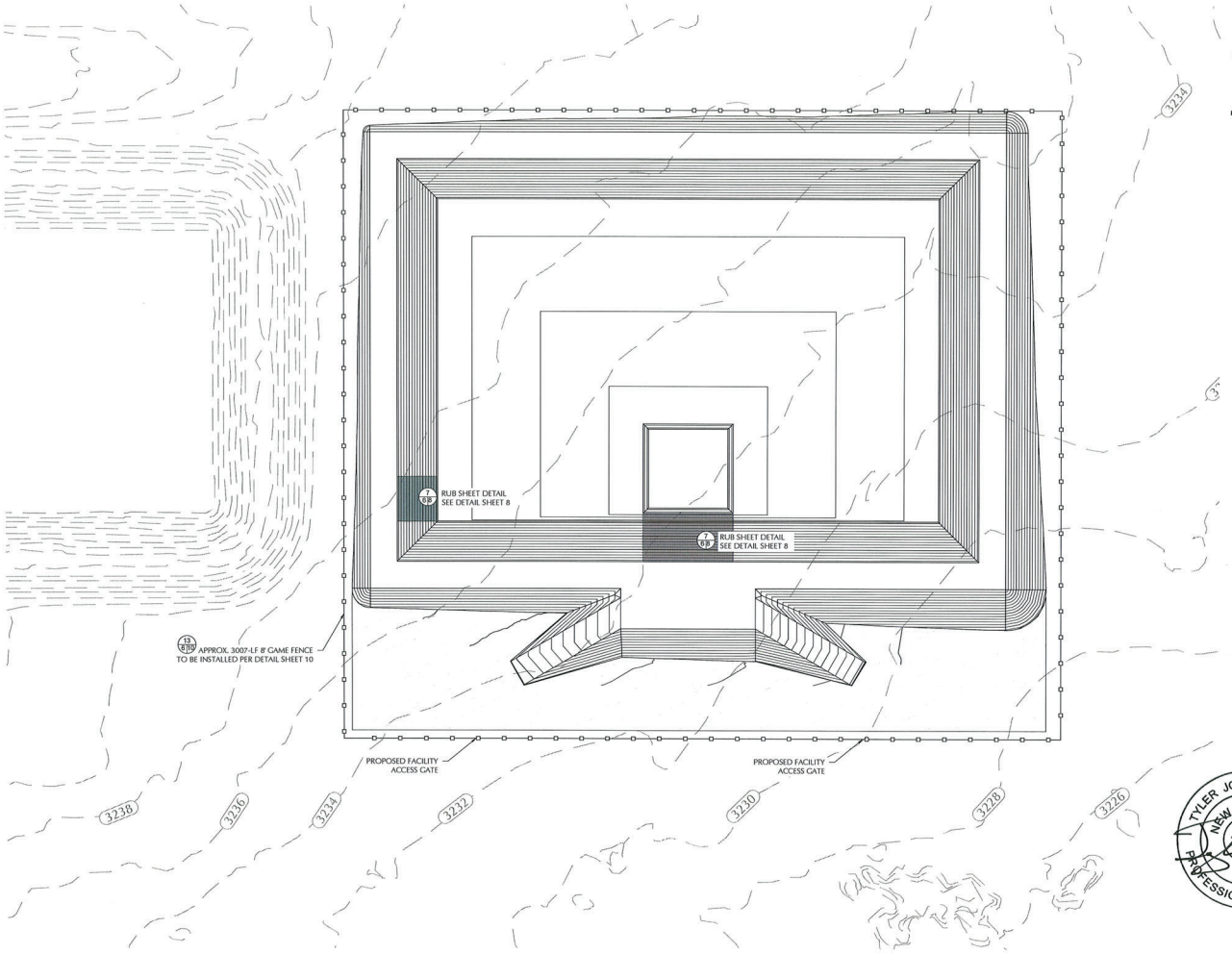
NO.	DATE	DESCRIPTION

TEP
TASCOSA ENERGY PARTNERS, LLC

PIT CAPACITY
CATALINA C RECYCLE
TASCOSA ENERGY PARTNERS, LLC
SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
EDDY COUNTY, NEW MEXICO

DATE:	AUGUST 2023
SCALE:	1" = 100'
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	5 OF 10



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RUB SHEET & FENCE PLAN

CATALINA C RECYCLE

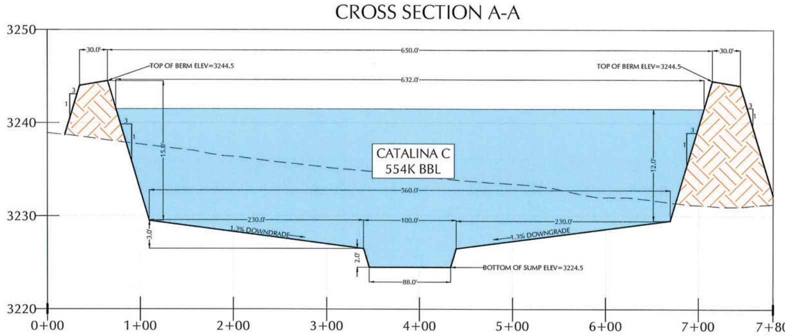
TASCOSA ENERGY PARTNERS, LLC

SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
EDDY COUNTY, NEW MEXICO

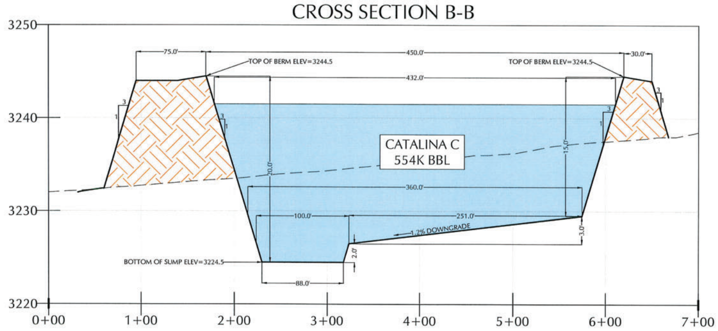
TYLER JOE WILLIAMS
NEW MEXICO
26432
PROFESSIONAL ENGINEER
8/28/2023

DATE:	AUGUST 2023
SCALE:	1" = 100'
DESIGNED BY:	M. RATKE
DRAWN BY:	J. HIGHFILL
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	022316-00
SHEET NO.	6 OF 10

CROSS SECTION A-A



CROSS SECTION B-B



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NO.	DATE	DESCRIPTION

CROSS SECTIONS
CATALINA C RECYCLE
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SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
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TYLER JOE WILLIAMS
NEW MEXICO
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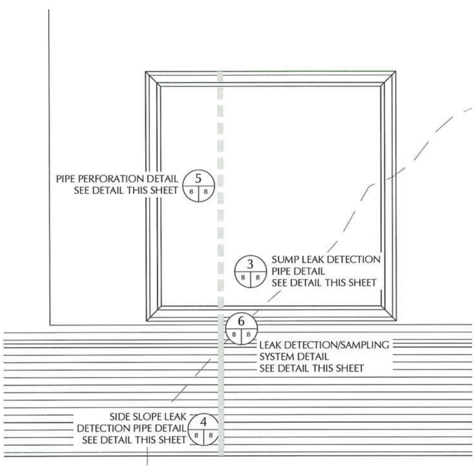
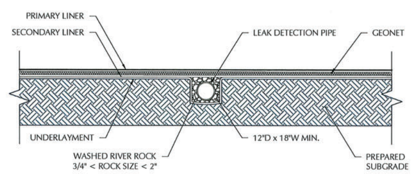
PROFESSIONAL ENGINEER
8/28/2023

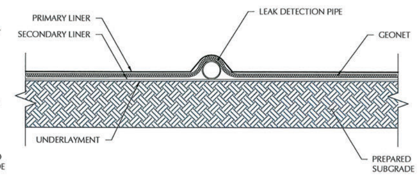
DATE:	AUGUST 2023
SCALE:	Vertical 1" = 10' Horizontal 1" = 100'
DESIGNED BY:	M. RATKE
DRAWN BY:	M. RATKE
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	7 OF 10



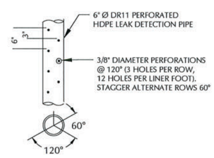
PIT SUMP PLAN DETAIL (2)
NOT TO SCALE



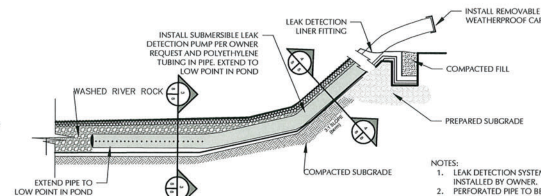
SUMP LEAK DETECTION PIPE DETAIL (3)
NOT TO SCALE



SIDE SLOPE LEAK DETECTION PIPE DETAIL (4)
NOT TO SCALE

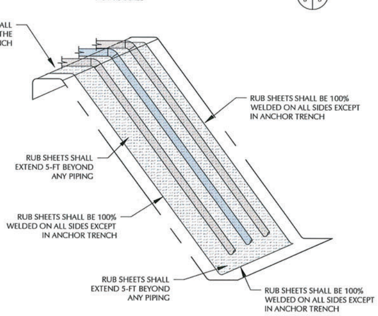


PERFORATED PIPE DETAIL (5)
NOT TO SCALE



LEAK DETECTION/SAMPLING SYSTEM DETAIL (6)
NOT TO SCALE

NOTES:
1. LEAK DETECTION SYSTEM TO BE INSTALLED BY OWNER.
2. PERFORATED PIPE TO BE ALONG THE BOTTOM OF THE POND. SOLID PIPE ON THE SIDE SLOPE.
3. CONSTRUCT COMPACTED SUBGRADE TO 95% STANDARD PROCTOR AS PER ASTM D-698.
4. EXTEND 60 MIL. RUB SHEET 1.0-FT PAST TOP OF SHOULDER OF SUMP.
5. WASH RIVER ROCK SHALL BE 3/4" MIN. & 2" MAX.



NOTES:
1. RUB SHEETS SHALL BE WHITE 60 MIL HDPE TEXTURED LINER ON TOP OF BLACK PRIMARY LINER
2. RUB SHEETS SHALL BE EXTRUSION WELDED 100%, VACUUM TESTED 100% AND INCLUDED IN LENGTH OF SEAMS FOR DESTRUCTIVE SAMPLE FREQUENCY.
3. RUB SHEETS SHALL EXTEND UP THE SLOPE AND BE BURIED IN THE ANCHOR TRENCH WITH PRIMARY AND SECONDARY LINERS.
4. ALL RUB SHEET LOCATION AND DIMENSIONS SHALL BE VERIFIED AGAINST THE PIPING CONTRACTORS PLANS.

RUB SHEET DETAIL (7)
Not to Scale

PROPOSED PIT REFERENCE TABLE

DETAIL	DESCRIPTION
PRIMARY LINER	60-MIL HDPE SMOOTH LINER
LEAK DETECTION	200-MIL GEONET
SECONDARY LINER	40-MIL HDPE SMOOTH LINER
UNDERLAYMENT	8 OZ GEOTEXTILE
SUMP	3224.5-ft ELEVTION
BERM (ROAD CREST)	DESIGN ELEV. 3244.5-ft - RD CREST 30-ft
LEAK DETECTION PIPING	6-in SDR11.X PERFORATED HDPE PIPE LEAK DETECTION PIPE

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SUMP DETAILS
CATALINA C RECYCLE
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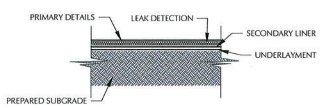
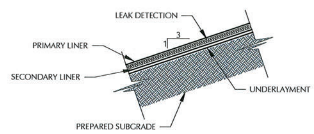
SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
EDDY COUNTY, NEW MEXICO

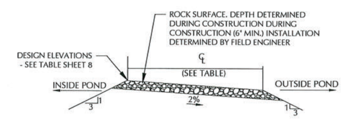
DATE:	AUGUST 2023
SCALE:	NOT TO SCALE
DESIGNED BY:	M. RATKE
DRAWN BY:	J. HIGHFILL
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	8 OF 10



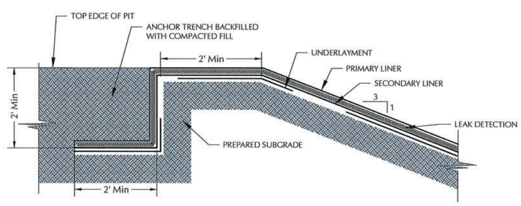
LINER SYSTEM FLOOR DETAIL (8, 4 | 9)
NOT TO SCALE



LINER SYSTEM SIDE SLOPE DETAIL (9, 4 | 9)
NOT TO SCALE



TYPICAL BERM CREST DETAIL (10, 4 | 9)
NOT TO SCALE



ANCHOR TRENCH DETAIL (11, 4 | 9)
NOT TO SCALE

GENERAL NOTES:

1. PREPARED SUBGRADE MEANS COMPACTED SMOOTH SUBGRADE FREE OF ROCK, ROOTS, WOOD DEBRIS, CONCRETE RUBBLE AND ANY SHARP OBJECTS THAT MIGHT PUNCTURE THE HDPE LINER.
2. ALL INTERIOR SLOPES AND TOP OF BERMS TO BE SMOOTH DRUM ROLLED.
3. ALL EMBANKMENT SLOPES SHALL HAVE A RATIO OF 3:1, COMPACTED EARTH EMBANKMENTS TO BE CONSTRUCTED WITH 8 INCH (MAXIMUM LOOSE LIFTS), COMPACTED TO 95% STANDARD PROCTOR DENSITY (ASTM D698), AND MOISTURE CONDITIONS TO +/- 2% OPTIMUM MOISTURE (ASTM D698)
4. PERFORM GEOTECHNICAL ANALYSIS ON EXISTING SOIL TO CONFIRM SOIL IS SUITABLE FOR USE IN THE LEVEE.
5. ALL BOTTOM OF PITS SHALL SLOPE TO THE SUMP AT A MINIMUM OF 1% UNLESS OTHERWISE SPECIFIED.

NOTE:

1. SEE REFRENCE TABLES SHEET 8 FOR LINER SPECIFICATIONS

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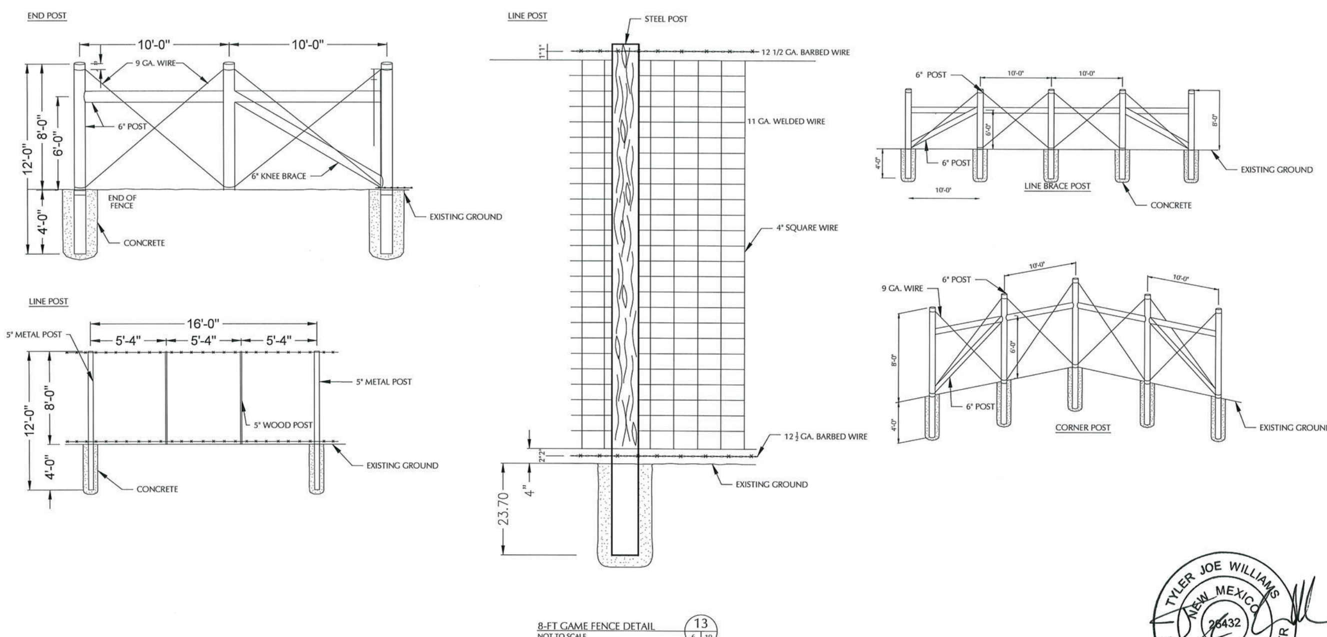
LINER DETAILS
CATALINA C RECYCLE
TASCOSA ENERGY PARTNERS, LLC
SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST, EDDY COUNTY, NEW MEXICO

DATE:	AUGUST 2023
SCALE:	NOT TO SCALE
DESIGNED BY:	M. RATKE
DRAWN BY:	J. HIGHFILL
CHECKED BY:	D. SCHRANTZ
PROJECT NO.	023216-00
SHEET NO.	9 OF 10



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NO.	DATE	DESCRIPTION

FENCE DETAILS
CATALINA C RECYCLE
TASCOSA ENERGY PARTNERS, LLC
SECTION 30, TOWNSHIP 20 SOUTH, RANGE 27 EAST,
EDDY COUNTY, NEW MEXICO

TYLER JOE WILLIAMS
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PROJECT NO.	023216-00
SHEET NO.	10 OF 10

EFFECTIVE WIDE-AREA BIRD CONTROL!

Mega Blaster PRO sonic bird repeller covers 30 acres!

- NEMA Rated Case
- Crystal-Clear Digital Sounds

Mega Blaster PRO uses intermittent distress calls to create a "danger zone" that frightens infesting birds away for good.

PREDATOR cries help scare all the birds.

- *Laughing Gull*
- *Ring-Billed Gull*
- *Herring Gull*
- *California Gull*
- *Black-Headed Gull*
- *Glaucous-Winged Gull*
- *Double Crested Cormorant*
- *Marsh Hawk*

Perfect for Landfills, Airfields, Fish Farms, Farm Fields or any multi-acre facility.

Our most powerful system features two high-output amplifiers that drive our specially-designed 20 speaker tower. The intense sound output covers up to 30 acres (12 hectares).

It features solid-state electronics mounted inside a NEMA-type control box, suitable for most any application.

The generating unit mounts easily to a post or pole using the included hardware. The unit comes pre-recorded in four different configurations for the most common bird infestations.

Choose any or all of the 8 sounds, including predators to give the birds even more of a sense of danger. Customize by choosing volume and silent time between sounds.

CONFIGURATIONS AVAILABLE:

- Agricultural
  # MEGA-AG
- Crow / Raven
  # MEGA-CROW
- Woodpecker
  # MEGA-WP
- Marine / Gull
  # MEGA-MAR

Mega Blaster PRO

Complete system includes the generating unit with two built-in high-output amplifiers, 20-speaker tower with audio cables, 40 watt solar panel, battery clips and all mounting hardware.

BIRD-X

The Bird Control 'X'-Perts

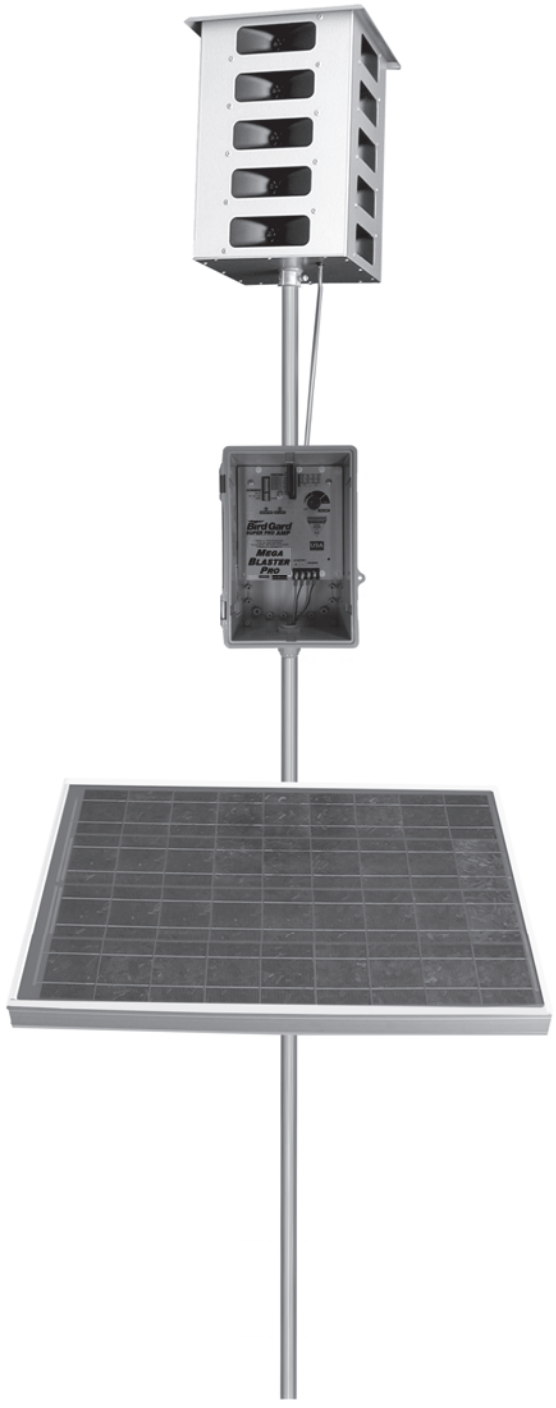
NOTE: This unit is capable of sound output up to 125 decibels. **HEARING PROTECTION IS RECOMMENDED.**

HEARING PROTECTION RECOMMENDED

MEGA BLASTER PRO

BIRD-X

User's Manual



Overview

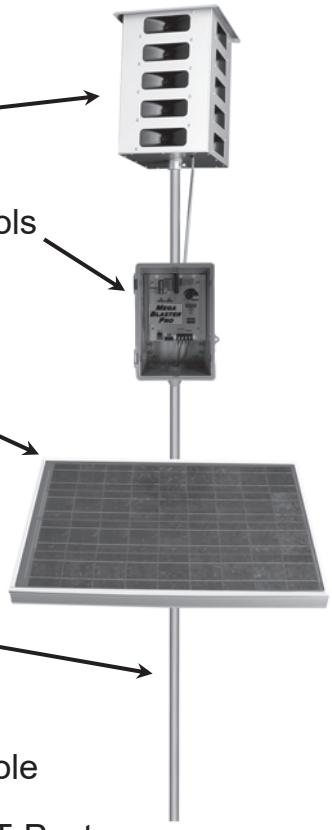
The Bird-X Mega Blaster Pro utilizes the innate power of the natural survival instincts of birds to effectively repel them. Digital recordings of distressed and alarmed birds, along with the sounds made by their natural predators are broadcast through high fidelity weather-resistant speakers over the top of areas. This action triggers a primal fear and flee response. Pest birds soon relocate to where they can feed without feeling threatened.

Your Bird-X Mega Blaster Pro system consists of:

20-Speaker Tower broadcasts the bird sounds

Control Unit produces the bird sounds and contains all operational controls

Solar Panel recharges the 12-volt deep cycle battery



Items needed but <u>not</u> included:

(1) **Mounting Pole** or **Mast** tall enough to raise the 20-Speaker Tower at least 5 feet above the top of the areas, trees or other obstructions

(1) **12-volt Deep Cycle Battery** (RV/Marine) Group 27 or larger wet cell

(1) **T-Post** or similar (Optional) may be needed to support the mounting pole

(1) **Bailing Wire or zip-tie** (Optional) to secure the Mounting Pole to the T-Post

CAUTION: THE MEGA BLASTER PRO IS CAPABLE OF PRODUCING SOUNDS UP TO 125 DECIBELS. PROPER HEARING PROTECTION MUST BE WORN ANYTIME THE UNIT IS TURNED ON.

Bird Control Management Guidelines

An active bird control management program is a key to successfully repelling pest birds. Bird feeding patterns may take several days or weeks to break. Follow all suggestions for maximum effectiveness. Read all instructions prior to installation.

For best results:

- **It is extremely important to fully protect your entire area from birds.** Any areas not fully protected will allow birds to begin feeding at the fringes of the sound coverage. They will soon become bolder and learn the sounds are nothing to fear. This will cause the effectiveness to diminish. Complete Bird-X product coverage forces birds to leave the area entirely.
- Install the Mega Blaster Pro unit at least two weeks before birds are attracted to your area. It is much easier to keep birds away before they have found a food source than it is to repel them once they have developed a feeding pattern.
- Most birds begin feeding from the perimeter of an area. Place Mega Blaster Pro units so the sound protection covers past the edges of the area.
- Birds will often use tall trees for roosting and observation. If birds are in bordering trees it is necessary to position the units so the sound protection covers the trees as well.
- Mount the 20-Speaker Tower at least five feet above trees, areas and structures for maximum coverage. The higher the better. Sound will disperse or reflect off structures or foliage. Mount control unit out of direct sun, if possible.
- When first installed, run Mega Blaster Pro units at FULL volume and on SHORT time off periods. This ensures maximum “bird stress” and creates a hostile environment.
- Watch for changes in bird activity and adjust the location of your Mega Blaster Pro unit if needed.
- **Check the battery and unit settings often to insure continuous bird control. Be certain that the system is not turned down or has a dead battery. Field hands or harvesters may turn down the volume.**
- Changing settings and switches often helps to prevent bird habituation. Periodically change the switch settings of the eight sounds (turning them ON or OFF). NEVER turn OFF the distress calls of the target birds you are trying to repel and always keep at least one predator bird sound turned ON.
- If different bird species enter the protected area and begin causing damage contact us immediately for an updated Sound Recording Card designed to repel the new invading birds.
- Remember that the Mega Blaster Pro system is a management tool, and should be used as part of your overall bird control strategy, sometimes in conjunction with other bird control techniques and devices.

Be aware that under extreme drought or other adverse conditions, birds will disregard all deterrents and risks in order to survive

R.K. FROBEL & ASSOCIATES
Consulting Engineers

Technical Memorandum: 40-mil HDPE as Alternative Secondary Liner System for In Ground Recycling Containment Facilities

NMAC 19.15.34.12 A

I have investigated the suitability of application for 40 mil HDPE geomembrane as an equivalent secondary liner to 30 mil scrim reinforced LLDPE (LLDPEr) in the application for In Ground Recycling Containment facilities. *In summary, it is my professional opinion that the specified 40 mil HDPE geomembrane will provide a secondary liner system that is equal to or better than 30 mil scrim reinforced LLDPEr and will provide the requisite protection of fresh water, public health and the environment for many years when engineering design provides requisite site/soil/slope preparation and when used in concert with requisite primary liners and drainage layers.*

It is understood that the lining system under discussion is composed of a 60 mil HDPE Primary liner, geonet drainage layer and a 40 mil HDPE Secondary liner. *In consideration of the secondary lining system application, size of impoundment and depth, design details as well as the chemical nature of typical processed water, it is my professional opinion that the 40 mil HDPE geomembrane will provide the requisite barrier against processed water loss and will function effectively as a secondary liner.*

The following are discussion points that hopefully will exhibit the equivalency of a 40 mil HDPE secondary liner to that of a 30 mil LLDPEr.

The nature and formulation of the 40 mil HDPE resin is the same as the Primary 60 mil HDPE. The major difference is that the 40 mil HDPE is lower in thickness (more flexible and less puncture resistant). However, in covered conditions, HDPE will resist aging and degradation and remain intact for many decades. In fact, a secondary liner of 40 mil HDPE will outlast an exposed 60 mil HDPE liner. According to the Geosynthetic Research Institute (GRI) study on lifetime prediction (GRI Paper No. 6), the half life of HDPE (GRI GM 13) exposed is > 36 years and the half-life of HDPE covered or buried is greater than 100 years. It is understood that in order to ensure compliance of materials, the primary 60 mil HDPE to be used must meet or exceed GRI GM 13 Standards. Likewise, the secondary liner that is not exposed to the same environmental and chemical conditions must meet or exceed GRI GM 13 for non-reinforced HDPE. Adhering to the minimum requirements of the GRI Specifications, 40 mil HDPE when used as a secondary liner will be equally as protective as the primary 60 mil HDPE liner (reference: www.geosynthetic-institute.org/grispecs) and equally as protective as a 30 mil scrim reinforced LLDPEr liner.

Durability of Geomembranes is directly affected by exposure conditions. Buried or covered geomembranes are not affected by the same degradation mechanisms (UV, Ozone, Chemical, Stress, Temperature, etc) as are fully exposed geomembranes. In this regard, the secondary liner material and thickness can be much less robust than the fully exposed primary liner which in this case is 60 mil HDPE. This is also the case for

landfill lining systems where the secondary geomembrane in a bottom landfill cell may be 40 mil HDPE.

Thermal Fusion Seaming Requirements. Thermal seaming and QC seam test requirements for geomembranes are product specific and usually prescribed by the sheet manufacturer. Dual wedge thermal fusion welding is commonly used on HDPE and QC testing by air channel (ASTM D 5820) is fully acceptable and recognized as an industry standard. In this regard, there should be no exception requirement for seaming and QC testing as both the Primary and Secondary geomembranes are HDPE. This is fully covered in comprehensive specifications for both the Primary and Secondary geomembranes (Reference: www.ASTM.org/Standards).

Potential for Leakage through the Primary and Secondary Liners. Leakage through geomembrane liners is directly a function of the height of liquid head above any hole or imperfection. The geonet drainage media provides immediate drainage to a low point or sump and thus no hydrostatic head or driving gradient is available to push leakage water through a hole in the secondary liner. In this regard, secondary geomembrane materials can be (and usually are) much less in thickness and also polymer type. Hydraulic Conductivity through the 40 mil HDPE liner material is extremely low due to the polymer type, structure and crystallinity and exceeds requirements of EPA SW-846 Method 9090A.

Chemical Attack. Chemical attack to polymeric geomembranes is directly a function of type of chemical, temperature and exposure time. Again, the HDPE Primary provides the chemically resistant liner and is QC tested to reduce potential defects or holes. If there is a small hole, the geonet drain takes any leakage water immediately to the sump for extraction. Thus, exposure time is very limited on a secondary liner in addition to low temperature, little volume and virtually no head pressure. In this regard, a chemically resistant geomembrane material such as 40 mil HDPE can be specified for the secondary and is a fully acceptable alternate to 30 mil scrim reinforced LLDPEr.

Mechanical Properties Characteristics. Geomembranes of different polymer and/or structure (i.e., reinforced vs non-reinforced) cannot be readily compared using such characteristics as tensile stress/strain, tear, puncture and polymer requirements. For a 40 mil HDPE liner material to function as a Secondary liner it should meet or exceed the manufacturers minimum requirements for Density, Tensile Properties, Tear, Puncture as well as other properties such as UV resistance. The sheet material must also meet or exceed GRI GM 13 minimum requirements. *In this regard, a 40 mil HDPE will be equivalent to a 30 mil LLDPEr as a secondary liner for the conditions listed below:*

- *The subgrade or compacted earth foundation will be smooth, free of debris or loose rocks, dry, unyielding and will support the lining system.*
- *The side slopes for the containment shall be equal to or less than 3H:1V.*
- *The physical properties and condition of the subgrade or liner foundation*

(i.e., density, slope, moisture) will be inspected and certified by a Professional Engineer that it meets or exceeds specification requirements.

- *Immediately prior to installation, the installation contractor shall inspect and sign off on the subgrade conditions that they meet or exceed the HDPE manufacturer and installers requirements.*
- *A protective geotextile will be placed on the finished and accepted subgrade between subgrade and the 40 mil HDPE Secondary liner.*
- *A 200 mil geonet will be placed over the 40 mil HDPE Secondary Liner.*
- *A 60 mil HDPE Primary liner will be placed over the 200 mil geonet drainage layer.*

If you have any questions on the above technical memorandum or require further information, give me a call at 720-289-0300 or email geosynthetics@msn.com

Sincerely Yours,

R K Frobel

Ronald K. Frobel, MSCE, PE

References:

NMAC 19.15.34.12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2017
www.geosynthetic-institute.org

ASTM Geosynthetics Standards 2017
www.ASTM.org/Standards

DESIGN/CONSTRUCTION PLAN

Design and Construction Plan In Ground Containments

This plan addresses construction of the earthen containments.

Magrym Engineers is providing the design of the containment and their plans are presented in this submission.

Dike Protection and Structural Integrity

The design and operation provide for the confinement of produced water, prevention of releases and prevention of overtopping due to wave action or rainfall. Additionally, the design prevents run-on of surface water as the containment is surrounded by an above-grade levee (a berm) and/or diversion ditch (between the levee and the soil stockpile) to prevent run-on of surface water.

19.15.34.12 A Design and Construction Specifications
(1). The operator shall design and construct a recycling containment to ensure the confinement of produced water, to prevent releases and to prevent overtopping due to wave action or rainfall.
(8). The operator of a recycling containment shall design the containment to prevent run-on of surface water. The containment shall be surrounded by a berm, ditch or other diversion to prevent run-on of surface water

Stockpile Topsoil

Where topsoil is present, prior to constructing containment, the operator will strip and stockpile the topsoil for use as the final cover or fill at the time of closure.

19.15.34.12 B. Prior to constructing containment, the operator shall strip and stockpile the topsoil for use as the final cover or fill at the time of closure

Signage

The operator will place an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The sign is posted in a manner and location such that a person can easily read the legend. The sign will provide the following information:

- the operator's name,
- the location of the site by quarter-quarter or unit letter, section, township and range, and
- emergency telephone numbers

19.15.34.12 C. Signs.
The operator shall post an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The operator shall post the sign in a manner and location such that a person can easily read the legend. The sign shall provide the following information: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers

Fencing

The operator will provide for a fence to enclose the recycling containment in a manner that deters unauthorized wildlife and human access. As specified in the design drawings, the operator will employ a chain-link or game fence. If required by the District Office, the operator will add four-strands of barbed wire to comply with the text of the Rule. Because feral pigs, javelina and deer are present in the area, a chain link or game fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. However, 19.15.34.12 D.2 requires "a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level". Therefore, a barbed wire specification will be added to the game fence to avoid a variance if required by the OCD District Office.

19.15.34.12 D. Fencing
(1) The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
(2) Recycling containments shall be fenced with a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level.

As stated in the O&M plan, the operator will ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

Netting and Protection of Wildlife

The perimeter game/chain-link fence will be effective in excluding stock and most terrestrial wildlife. If requested by the surface owner, the game fence can include a fine mesh from the base to 1 foot above the ground to exclude the small reptiles (e.g. dune sagebrush lizard).

The recycling containment will be protective of wildlife, including migratory birds through the implementation of an Avian Protection Plan, routine inspections and the perimeter fence.

The avian protection plan includes the use of a Bird-X Mega Blaster Pro[1] as a primary hazing program for avian species. The device will be equipped with sounds suitable for the Permian Basin environment. In addition to this sonic device, staff will routinely inspect the containment for the presence of avian species and, if detected, will use a blank cartridge or shell in a handgun, starter pistol or shotgun as additional hazing. Decoys of birds of prey may be placed on the game fence and other roosts around the open water to provide additional hazing.

The O&M plan calls for the operator to inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

19.15.34.12 E Netting.
The operator shall ensure that a recycling containment is screened, netted or otherwise protective of wildlife, including migratory birds. The operator shall on a monthly basis inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

Earthwork

The containment will have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.

This volume provides the stamped drawings for the containment with the following design/construction specifications:

a) levee has inside grade no steeper than two horizontal feet to one vertical foot (2H: 1V).

19.15.34.12 A
(2) A recycling containment shall have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity…

b) levee outside grade is no steeper than three horizontal feet to one vertical foot (3H: 1V)
c) top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
d) The containment floor design calls for a slope toward the sump in the corner(s).

19.15.34.12 A
(2) …The operator shall construct the containment in a levee with an inside grade no steeper than two horizontal feet to one vertical foot (2H:1V). The levee shall have an outside grade no steeper than 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.

Liner and Drainage Geotextile Installation

The containment has a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions.

19.15.34.12 A
(3) Each recycling containment shall incorporate, at a minimum, a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions.

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is specified in the design drawings and is 40-mil HDPE or thicker and is equivalent to 30-mil LLDPEr (in accordance with a previously approved variance) Liner compatibility meets or exceeds a subsequent relevant publication to EPA SW-846 method 9090A.

19.15.34.12 A
(4) All primary (upper) liners in a recycling containment shall be geomembrane liners composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. All primary liners shall be 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced or equivalent with a hydraulic conductivity no greater than 1 x 10-9 cm/sec. Liner compatibility shall meet or exceed the EPA SW-846 method 9090A or subsequent relevant publications.

The recycling containment design has a leak detection system between the upper and lower geomembrane liners of 200-mil geonet to facilitate drainage. The leak detection system consists of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection. The containment floor design calls for a slope toward the sump in the corner(s) of the containment, as shown in the design drawings. This slope combined with the highly transmissive geonet drainage layer provide for rapid leak detection.

19.15.34.12 A
(7) The operator of a recycling containment shall place a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet or two feet of compacted soil with a saturated hydraulic conductivity of 1 x 10-5 cm/sec or greater to facilitate drainage. The leak detection system shall consist of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection.

The liners and drainage material will be installed consistent with the Manufacturer's specifications. In addition to any specifications of the Manufacturer, protocols for liner installation include measures to:

i. minimizing liner seams and orient them up and down, not across, a slope of the levee.
ii. use factory-welded seams where possible.
iii. use field seams in geosynthetic material that are thermally seamed and prior to field seaming, overlap liners four to six inches.
iv. minimize the number of field seams and comers and irregularly shaped areas.
v. provide for no horizontal seams within five feet of the

19.15.34.12 A
(5) The operator of a recycling containment shall minimize liner seams and orient them up and down, not across, a slope of the levee. Factory welded seams shall be used where possible. The operator shall ensure field seams in geosynthetic material are thermally seamed. Prior to field seaming, the operator shall overlap liners four to six inches…

slope's toe.

vi. use qualified personnel to perform field welding and testing.

vii. avoid excessive stress-strain on the liner

viii. The edges of all liners are anchored in the bottom of a compacted earth-filled trench that is at least 18 inches deep

19.15.34.12 A
(5) ...The operator shall minimize the number of field seams and corners and irregularly shaped areas. There shall be no horizontal seams within five feet of the slope's toe. Qualified personnel shall perform field welding and testing.

At points of discharge into the lined earthen containment the pipe configuration effectively protects the liner from excessive hydrostatic force or mechanical damage during filling.

19.15.34.12 A
(3) The edges of all liners shall be anchored in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep.

The design shows that at any point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines do not penetrate the liner.

19.15.34.12 A
(6) At a point of discharge into or suction from the recycling containment, the operator shall insure that the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines shall not penetrate the liner.

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, lines are permanently placed in the containment with floats attached to prevent damage to the liner system. The containment may be equipped with permanent HDPE stinger (supported by a sacrificial liner or geotextile) for withdrawal of fluid if the owner deems necessary during operations.

Leak Detection and Fluid Removal System Installation

The leak detection system, contains the following design elements

a. The 200-mil HyperNet Geonet drainage material between the primary and secondary liner that is sufficiently permeable to allow the transport of fluids to the observation ports (Appendix A).
b. The containment floor is sloped towards the monitoring riser pipe to facilitate the earliest possible leak detection of the containment bottom. A pump may be placed in the observation port to provide for fluid removal.
c. Piping will withstand chemical attack from any seepage, structural loading from stresses and disturbances from overlying water, cover materials, equipment operation or expansion or contraction (see Appendix A).

Operations and Maintenance Plan

Closure Plan

Operation and Maintenance Plan
In Ground Containments

Overview

The operator will operate and maintain the lined earthen containment to contain liquids and solids (blow sand and minimal precipitates from the produced water) and maintain the integrity of the liner system in a manner that prevents contamination of fresh water and protects public health and the environment as described below. The purpose of the lined earthen containment is to facilitate recycling, reuse and reclamation of produced water derived from oil and gas wells. During periods when water for E&P operations is not needed, produced water will discharge to injection wells or to a pipeline for transfer to another recycling facility. The containment will not be used for the disposal of produced water or other oilfield waste.

19.15.34.10 D
Recycling containments may not be used for the disposal of produced water or other oilfield wastes.

The operation of the containment is summarized below.

A. Produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
B. Unless specified in the transmittal letter, after treatment, the produced water discharges into the containment.
C. When required, produced water is removed from the containment for E&P operations. At this time, produced water will be used for drilling beneath the freshwater zones (beneath surface casing), for well stimulation (e.g. hydraulic fracturing) and other E&P uses as approved by OCD.
D. Whenever the maximum fluid capacity of the containment is reached, treatment and discharge to the containment ceases (see Freeboard and Overtopping Plan, below).
E. The operator will keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148 (see attached example).
F. The operator will maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.

19.15.34.9 E
The operator of a recycling facility shall keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.

19.15.34.9 F
The operator of a recycling facility shall maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.

G. The containment shall 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 report cessation of operations to the appropriate division district office. The appropriate division district office may grant an extension to this determination of cessation of operations not to exceed six months.

19.15.34.13 C
A recycling containment shall 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 must report cessation of operations to the appropriate division district office. The appropriate division district office may grant an extension to this determination of cessation of operations not to exceed six months.

The operation of the lined earthen containment will follow the mandates listed below:

1. The operator will not discharge into or store any hazardous waste (as defined by 40 CFR 261 and NMAC 19.15.2.7.H.3) in the containments.
2. If the containment's primary liner is compromised above the fluid's surface, the operator will repair the damage or initiate replacement of the primary liner within 48 hours of discovery or seek an extension of time from the division district office.
3. If the primary liner is compromised below the fluid's surface, the operator will remove all fluid above the damage or leak within 48 hours of discovery, notify the division district office and repair the damage or replace the primary liner.
4. If any penetration of the containment liner is confirmed by sampling of fluid in the leak detection system (see Monitoring, Inspection, and Reporting Plan; below), the operator will:
    a. Begin and maintain fluid removal from the leak detection/pump-back system,
    b. Notify the district office within 48 hours (phone or email) of the discovery,
    c. Identify the location of the leak, and
    d. Repair the damage or, if necessary, replace the containment liner.
5. The operator will install, or maintain on site, an oil absorbent boom or other device to contain an unanticipated release and the operator will remove any visible layer of oil from the surface of the recycling containment.
6. The operator will report releases of fluid in a manner consistent with NMAC 19.15.29
7. The containment will be operated to prevent the collection of surface water run-on.

19.15.34.13 B
(4) If the containment's primary liner is compromised above the fluid's surface, the operator shall repair the damage or initiate replacement of the primary liner within 48 hours of discovery or seek an extension of time from the division district office.
(5) If the primary liner is 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 or replace the primary liner.

19.15.34.13 B
(7) The operator shall install, or maintain on site, an oil absorbent boom or other device to contain an unanticipated release.
(1) The operator shall remove any visible layer of oil from the surface of the recycling containment.
19.15.34.8 A

(6) All releases from the recycling and re-use of produced water shall be handled in accordance with 19.15.29 NMAC.

8. The operator will maintain the containment free of miscellaneous solid waste or debris.
9. The operator will maintain at least three feet of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-foot of freeboard.
10. As described in the design/construction plan, the injection or withdrawal of fluids from the containment is accomplished through hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.
11. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
12. The operator will maintain the fences in good repair.

19.15.34.13
(6) The containment shall be operated to prevent the collection of surface water run-on.

19.15.34.13 B
(2) The operator shall maintain at least three feet of freeboard at each containment.

19.15.34.13 B
(3) The injection or withdrawal of fluids from the containment shall be accomplished through a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.

19.15.34.12 D
(1) The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

19.15.34.13 A
The operator shall inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

Monitoring, Inspection, and Reporting Plan

The operator will inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

Weekly inspections consist of:

- reading and recording the fluid height of staff gauges,
- recording any evidence that the pond surface shows visible oil,
- visually inspecting the containment's exposed liners
- checking the leak detection system for any evidence of a loss of integrity of the primary liner.
- inspect diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
- inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.

As stated above, if a liner's integrity is compromised, or if any penetration of the liner occurs, then the operator will take appropriate action within 48 hours, based on if above or below water surface, as noted above.

Monthly, the operator will:

A. Inspect the containment for dead migratory birds and other wildlife. Within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.
B. Report to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.
C. Record sources and disposition of all recycled water.

19.15.34.12 E
The operator shall on a monthly basis inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

19.15.34.9 E
The operator of a recycling facility shall keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.

19.15.34.9 F
The operator of a recycling facility shall maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.

The operator will maintain a log of all inspections and make the log available for the appropriate Division district office's review upon request. An example of the log is attached to this section of the permit application.

Freeboard and Overtopping Prevention Plan

The method of operation of the containment allows for maintaining freeboard with very few potential problems. When the capacity of the containment is reached (3-feet of freeboard), the discharge of produced water ceases and the produced water generated by nearby oil and gas wells is managed by an injection well(s).

If rising water levels suggest that 3-feet of freeboard will not be maintained, the operator will implement one or more of the following options:

I. Cease discharging produced water to the containment.
II.Accelerate re-use of the produced water for purposes approved by the Division.

III. Transfer produced water from the containment to injection wells.

The reading of the staff gauge typically occurs daily when treatment operations are ongoing and weekly when discharge to the containment is not occurring.

Protocol for Leak Detection Monitoring, Fluid Removal and Reporting

As shown in Appendix A, the leak detection system includes a monitoring system. Any fluid released from the primary liner will flow to the collection sump, where fluid level monitoring is possible at the monitoring riser pipe associated with the leak detection system.

Staff may employ a portable electronic water level meter to determine if fluid exists in the monitoring riser pipe. Obtaining accurate readings of water levels in a sloped pipe beneath a containment can be a challenge. An electrician's wire snake may be required to push the probe to the bottom of the port and the probe may be fixed in a 2-inch pipe "dry housing" to avoid false readings due to water condensation on the pipe. There are many techniques to determine the existence of water in the sumps – including low flow pumps and a simple small bailer affixed to an electrician's snake. The operator will use the method that works best for this containment.

If seepage from the containment into the leak detection system is suspected by a positive fluid level measurement, the operator will:

1. Re-measure fluid levels in the monitoring riser pipe on a daily basis for one week to determine the rate of seepage.
2. Collect a water sample from the monitoring riser pipe to confirm the seepage is produced water from the containment via electrical conductivity and chloride measurements.
3. Notify NMOCD of a confirmed positive detection in the system within 48 hours of sampling (initial notification).
4. Install a pump into the monitoring riser pipe sump to continually (manually on a daily basis or via automatic timers) remove fluids from the leak detection system into the containment until the liner is repaired or replaced.
5. Dispatch a liner professional to inspect the portion of the containment suspected of leakage during a "low water" monitoring event.
6. Provide NMOCD a second report describing the inspection and/or repair within 20 days of the initial notification.

If the point of release is obvious from a low water inspection, the liner professional will repair the loss of integrity. If the point of release cannot be determined by the inspection, the liner professional will develop a more robust plan to identify the point(s) of release. The inspection plan and schedule will be submitted to OCD with the second report. The operator will implement the plan upon OCD approval.

Closure Plan
In Ground Containments

Overview

After operations cease, the operator will remove all fluids within 60 days and close the containment within six months from the date the operator ceases operations from the containment for use.

19.15.34.14 A
Once the operator has ceased operations, the operator shall remove all fluids within 60 days and close the containment within six months from the date the operator ceases operations from the containment for use.

The operator shall substantially restore the impacted surface area to

a. the condition that existed prior to the construction of the recycling containment or
b. to a condition imposed by federal, state trust land or tribal agencies on lands managed by those agencies as these provisions govern the obligations of any operator subject to those provisions,

19.15.34.14 E
The operator shall substantially restore the impacted surface area to the condition that existed prior to the construction of the recycling containment.

19.15.34.14 G
The re-vegetation and reclamation obligations imposed by federal, state trust land or tribal agencies on lands managed by those agencies shall supersede these provisions and govern the obligations of any operator subject to those provisions, provided that the other requirements provide equal or better protection of fresh water, human health and the environment.

The surface owner will impose a closure design that conforms to their needs for the site. The operator understands that a variance will be submitted to OCD to allow for any alternative closure protocol.

Excavation and Removal Closure Plan – Protocols and Procedures

The containment is expected to hold a small volume of solids, the majority of which will be windblown sand and dust with some mineral precipitates from the water

1. The operator will remove all liquids from the containment and either:
    a. Dispose of the liquids in a division-approved facility, or
    b. Recycle, reuse or reclaim the water for reuse in drilling and stimulation.
2. The operator will close the recycling containment by first removing all fluids, contents and synthetic liners and transferring these materials to a division approved facility.
3. After the removal of the containment contents and liners, soils beneath the containment will be tested by collection of a five-point (minimum) composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I of 19.15.34.14.
4. After review of the laboratory results:
    a. If any contaminant concentration is higher than the parameters listed in Table I, additional delineation may be required, and the operator must receive approval before proceeding with closure.

19.15.34.14 B
The operator shall close a recycling containment by first removing all fluids, contents and synthetic liners and transferring these materials to a division approved facility.

19.15.34.14 C
The operator shall test the soils beneath the containment for contamination with a five-point composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I below.

19.15.34.14 C
(1) If any contaminant concentration is higher than the parameters listed in Table I, the division may require additional delineation upon review of the results and the operator must receive approval before proceeding with closure.

b. If all contaminant concentrations are less than or equal to the parameters listed in Table I, then the operator will proceed to
    i. backfill with non-waste containing, uncontaminated, earthen material - Or
    ii. undertake an alternative closure process pursuant to a variance request after approval by OCD.

19.15.34.14 C
(2) If all contaminant concentrations are less than or equal to the parameters listed in Table I, then the operator can proceed to backfill with non-waste containing, uncontaminated, earthen material.

Reclamation and Re-vegetation

a. The operator will reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area.
b. Topsoils and subsoils shall be replaced to their original relative positions and contoured so as to achieve erosion control, long-term stability and preservation of surface water flow patterns.
c. The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment.

19.15.34.14 E
Once the operator has closed the recycling containment, the operator shall reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area. Topsoils and subsoils shall be replaced to their original relative positions and contoured so as to achieve erosion control, long-term stability and preservation of surface water flow patterns. The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment.

Closure Documentation

Within 60 days of closure completion, the operator shall submit a closure report on form C-147, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The closure report shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in division rules or directives.

19.15.34.14 D
Within 60 days of closure completion, the operator shall submit a closure report on form C-147, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The closure report shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in division rules or directives.

The operator shall notify the division when reclamation and re-vegetation are complete. Specifically the notice will document that all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.

19.15.34.14 H
The operator shall notify the division when reclamation and re-vegetation are complete.

19.15.34.14 F
Reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.

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Statement Explaining Why the Applicant Seeks a Variance

On September 26, 2023, NMOCD transmitted the following to Tascosa Energy:

> *NMOCD has reviewed the recycling containment permit application and related documents, submitted by [329748] Tascosa Energy Partners, L.L.C on 9/14/2023, Application ID: 265265 for the proposed Catalina C Containment in Unit Letter C, Section 30, Township 20S, Range 27E, Eddy County, New Mexico. The application is denied for the following reasons:*
>
> - *As stated in the application Volume 1 Siting Criteria Demonstration, Page 9: "The region that includes the proposed containment is correctly mapped by the BLM as high karst".*
> - *Per 19.15.34.11.A. (8): "An operator shall not locate a recycling containment within an unstable area unless the operator demonstrates that it has incorporated engineering measures into the design to ensure that the containment's integrity is not compromised."*
> - *If [329748] Tascosa Energy Partners, L.L.C wishes to build a recycling containment within a high karst area, the operator must request a variance to the rule. Variances must receive division approval prior to implementation per 19.15.34.16.F, so this recycling containment proposal requires a permit, not a registration. Please correct form C-147.*

Tascosa Energy wishes to explain why a variance is not required while emphasizing the fact that it has incorporated engineering measures into the design to ensure the containment's integrity is not compromised. Thus, if OCD insists on a variance, please accept this submission as a request for a variance.

Demonstration that a Variance Is Not Required by Rule 34 to Provide Equal or Better Protection of Fresh Water, Public Health, and the Environment

The evidence presented the Tascosa Energy Catalina B Containment C-147 permits a conclusion with a high degree of scientific certainty that none of the three Catalina Containments is not within an unstable area, as defined by OCD Rules.

For the benefit of Tascosa and OCD, the portion of Part 34 referenced by OCD that addresses karst is presented below with **emphasis** added:

> Unstable area is defined in 19.15.2.7 as
> U.(6) "Unstable area" means a **location** that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a division-approved facility's structural components. **Examples of unstable areas are** areas of poor foundation conditions, areas susceptible to mass earth movements and **karst terrain areas where karst topography is developed as a result of dissolution**

> **of limestone, dolomite, or other soluble rock.** Characteristic physiographic features of karst terrain include sinkholes, sinking streams, caves, large springs, and blind valleys.

The key word in the definition of unstable area is "location". We interpret the Rule to mean the containment footprint plus a reasonable buffer zone is the "location". Our interpretation is based upon common sense and the similarity of the text of Rule 29 and Rule 17 (Pit Rule). The term unstable area in Rule 17 differs very little from Rule 34 as shown below.

19.15.17.10 SITING REQUIREMENTS A (5) An operator shall not locate a permanent pit or multi-well fluid management pit: (h) within an unstable area, unless the operator demonstrates that it has incorporated engineering measures into the design to ensure that the pit's integrity is not compromised; or	19.15.34.11 SITING REQUIREMENTS FOR RECYCLING CONTAINMENTS: A. An operator shall not locate a recycling containment: (8) within an unstable area unless the operator demonstrates that it has incorporated engineering measures into the design to ensure that the containment's integrity is not compromised; or

We compared the text of Rule 17 to the text shown of Rule 34 because a multi-well fluid management pit is a containment by another name. Hicks Consultants gained OCD approval for several Rule 17 permits for MWFM pits prior to promulgation of Rule 34. We then submitted C-147s for these approved "pits" to convert them to Rule 34 containments.

Mr. Hicks was one of three principal NMOGA authors of Rule 17 and was a consulting expert for the Rule 17 hearings. Mr. Hicks participated in some elements of the NMOGA Rule 34 regulatory process and sat through the rulemaking hearing. With certainty, Mr. Hicks affirms that the Oil Conservation Commission did not intend to eliminate large tracts of land from the use of temporary, permanent or MWFM pits due to a Federal designation of high or critical karst. Rather, the Commission was convinced that appropriate engineering measures could be employed to maintain the integrity of these structures. Mr. Hicks believes the Commission intended the same for Rule 34. Both Rules places the burden of proof upon the operator to demonstrate that the design/construction incorporates engineering measures to ensure the containment's integrity. BLM mapped area as "high karst or critical karst potential" does not remove responsibility from the OCD examine and accept or reject the proposed engineering measures as compliant with the Rule.

BLM does not suggest that 100% of high and critical karst areas are unstable ground. Rather BLM and State Land Office require project locations to undergo an evaluation by qualified professionals (approved karst contractors), such as Southwest Geophysical Consulting (SWG). The responsibility to demonstrate that the project protects public health, fresh water, natural resources (e.g. caves) and the environment is that of the operator. The pertinent agencies (OCD, BLM or SLO) must review the submission and approve or deny.

In preparation of the Appendix for the Catalina C registration (C-147), SWG followed procedures required by BLM to inventory karst features. Hicks Consultants evaluated the "location" as stable or unstable based upon the karst inventory report, the lithology of the alluvial fan and underlying bedrock upon which all three containment footprints exist, the successful operation of Catalina Containments #1 and #2, conversations with SWG about the report and a site visit by a BLM-CFO approved karst consultant, Mr. Garrett Jorgenson Olague of SWG. Hicks Consultants checked the box on the C-147 Form that the containment was not within an unstable area. .

In reviewing the submission and the OCD denial, we believe a better approach is clearly identifying the specific data and interpretations used to define the footprints of the Catalina containments as "stable" locations within an area mapped by the BLM karst experts as high karst potential.

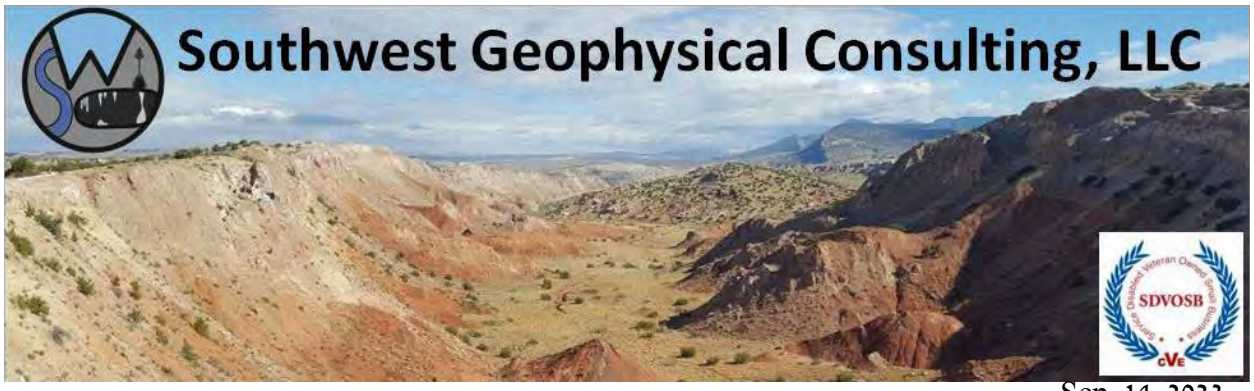
1. SWG used BLM-approved protocols to examine an area that included the locations of the three Catalina containments. The data and recommendations of their report is summarized below
    a. Eleven high-likelihood and three medium-likelihood surface karst features are located within the aerial survey area.
    b. Avoid these areas during site and infrastructure planning.
    c. The presence of these and other nearby surface karst features indicates that this area may be karstified and could contain buried karst features.
    d. Caution should be exercised while clearing brush and during any excavation, trenching, or construction operations.
    e. Employing a BLM-CFO approved karst monitor during excavation in this area should be considered.
2. SWG (Mr. Garrett Jorgensen Olague) inspected the site on foot and examined the identified karst structures within the area of the inventory. Mr. Jorgenson also had access to the boring log in the Appendix of the C-147. In the attached letter from SWG that was not submitted to OCD by Hicks Consultants in a timely manner, he concluded "the probability of karst underneath the Tascosa Catalina C Containment Pond is low, but still there." He also recommended an on-call karst monitor for the project.
3. In a subsequent e-mail, Dr. Decker suggested more nuanced wording ""low to moderate possibility of subsurface karst away from areas of surface hydrologic flow." Dr. Decker also suggested, as Mr. Jorgensen states, low to moderate potential is not zero probability.
4. The Catalina C containment is 400 feet from the buffer zone associated with the closest identified karst feature (see the second photograph of the attached letter and Plate 5b), 960 feet from the buffer zone of the karst feature east of the containment, and about 1300 feet from the buffer zone of the suspected karstified area in the watercourse to the southeast of the containment. The buffer around each karst feature is created by SWG and is based upon the data from the inventory and experience in the area – but was generated prior to the site visit of Mr. Jorgensen. Nevertheless, the design footprint of the Catalina C containment avoided the areas of karst and potential instability as well as large (mapped) and small (unmapped) watercourses with beds and banks.

5. Hicks Consultants logged a boring west of to the Catalina #1 containment, examined the bedrock exposures around the Catalina containments, walked most of the alluvial fan upon which the containment footprints lie, and considered the fact that two adjacent containments were successfully constructed and used. We did not examine the southeastern corner of the SWG survey area where karst is most obvious. While we do not possess the karst expertise of the SWG staff, we offer our observations relating to karst/subsidence:
    a. Identified karst features exist only in drainages within the survey area.
    b. The location of the containments is on an alluvial fan where 10-20 feet of alluvium overlie Tansill bedrock as described in the boring log.
    c. We agree with the SWG 9/14/23 letter, the identified karst features could be due to infiltration of stormwater that dissolved underlying soluble rock (epigene) or exposed older hypogene karst features.
    d. Infiltration of stormwater (and the potential of dissolving underlying bedrock) is restricted to the active drainages that exist east and west of the alluvial fan.
    e. Recharge of stormwater from the two small drainages that are uphill from the Catalina containments occurs only near the head of the fan as no obvious gullies or watercourses/channels exist on the main body of the alluvial fan.
    f. Based upon these data and our observations, we fully support the opinion of Mr. Jorgensen that the potential for karst features beneath the Catalina C containment is low and the more nuanced opinion of Dr. Decker.
    g. We conclude that the low karst potential exists at the location of all Catalina containments.

The following engineering measures are also active at the Catalina C containment site:

A. The contractors building the Catalina C containment are aware of the potential for karst and are exercising caution (see attached instruction).
B. Cascade Services has retained an on-call BLM-approved karst monitor for the construction. Mr. Jorgensen will visit the site tomorrow as excavation of the containment may afford a closer look at the subsurface.
C. The design plans for all containments avoided karst features and watercourses.
D. The engineering plans require a sound, compacted foundation for the liner system.
E. The presence of a leak detection/pump back system between the primary and secondary liner with the requisite weekly monitoring will quickly identify any seepage that could, under low probability circumstances, cause infiltration of fluid and dissolution of underlying bedrock.
F. Maintaining 3-feet of freeboard minimizes the chance of overtopping with an attendant release that could, under unusual circumstances, enter the watercourse and cause dissolution of underlying soluble bedrock.

The most meaningful engineering measure is retaining SWG to examine the area, identify surface karst features, and provide recommendations for consideration prior to moving forward with building an additional containment at this particular location.



Sep. 14, 2023

Randall Hicks, PG
R. T. Hicks Consultants, LTD
901 Rio Grande Blvd NW, Suite F-142
Albuquerque, NM 87104

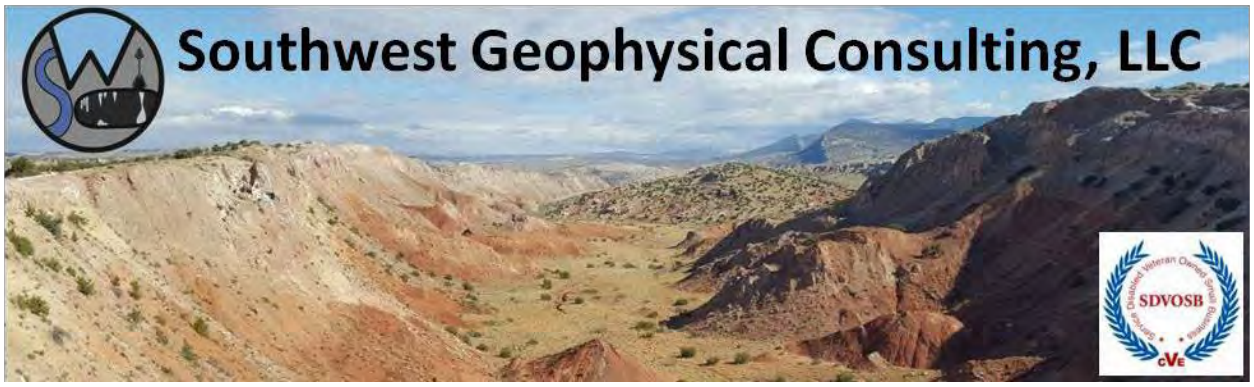
Dear Mr. Hicks,

This letter serves to inform you of the results of a site visit to the Tascosa Catalina C Containment Pond performed by Southwest Geophysical Consulting, LLC on September 11, 2023; and provide recommendations regarding whether a karst monitor should be on-site during excavation and construction operations.

The Tascosa Catalina C Containment Pond project site is located in Eddy County, New Mexico, 16.4 kilometers northwest of Carlsbad in an area underlain by the Permian Tansil Formation. This area is prone to karst development both by epigene (hypergene) karst processes: which is the typical karst paradigm involving dissolution from fluids with a direct genetic and functional relationship with the surface; and by hypogene karst processes: which involves dissolution by upwelling fluids from depth independent of recharge from the overlying or immediately adjacent surface. Within the greater Carlsbad area, the largest known caves such as Carlsbad Caverns and Lechuguilla Cave were formed by hypogene karst processes. Unlike epigene karst, many hypogene karst systems are not connected to the surface and remain undiscovered unless encountered during drilling or excavation. Because of this, caution should always be exercised while clearing brush, excavating, or drilling; including in areas where no karst is seen at the surface.

The site of the Tascosa Catalina C Containment Pond was investigated, and no indications of karst were seen at the surface. The nearby excavations to the west also showed no evidence of karst. However, the underlying Tansill bedrock was not visible at either site. Therefore, karst may be present buried within the subsurface within the Tansil. The drainage south and east of the site was then investigated and several small karst features were found. The surface expression of these features consists of collapses within the soil where about 0.5 cubic meters of material has disappeared into the subsurface. The location of these features within the drainage may be due to either water subsiding within the drainage and dissolving the underlying soluble rock, or due to hypogene karst structures that formed before the drainage was present. In this second case, the formation of the drainage may have been influenced by structures that the hypogene karst followed.

Based on these findings, it is determined that the probability of karst underneath the Tascosa Catalina C Containment Pond is low, but still there. A karst monitor on-site is not necessary. However, it is recommended to have a karst specialist on-call in the event that a karst feature is uncovered during excavation or construction operations.



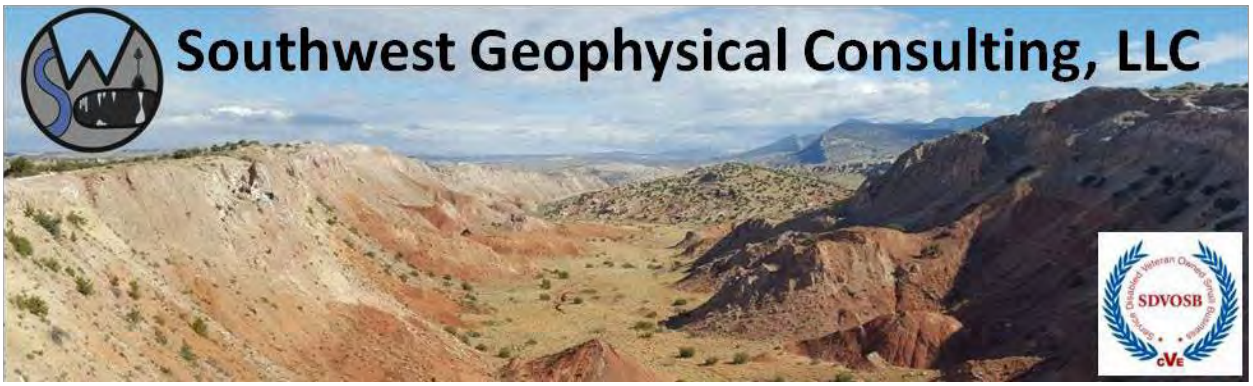
If there are any questions regarding this response, please contact me via phone at (505) 697-8106 or e-mail at swgeogarrett@gmail.coim

Sincerely,

Garrett Jorgensen Olague
Senior Geologist
Southwest Geophysical Consulting, LLC

Figure 1*: *The Tascosa Catalina C Containment Pond project site.

Tascosa Catalina C Containment Pond Site Visit



Karst features (highlighted in red) within the drainage to the southwest of the The Tascosa Catalina C Containment Pond.

Tascosa Catalina C Containment Pond Site Visit

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Tascosa Catalina C Containment Excavation Protocols for Ground Motion / Subsidence / Collapse

All site workers must be vigilant for ground motion during construction.

BLM has correctly mapped many square miles around the Catalina produced water containments as "high karst potential." Certain locations within this area show evidence of soil collapse and cave/cavern formation. The attached Plate 5b shows areas of collapse caused by karst near the construction site in red, southeast of the Catalina B construction site. Collapse structures lie within, mapped drainages near the Catalina containments.

Hicks Consultants believes that ground subsidence/collapse in the area of construction is highly unlikely, but possible. **Heavy equipment working over an unknown large cavern can cause collapse and result in injury or death**. The chance of this occurrence is small, and vigilance of ground motion or instability can prevent injury.

If any workers suspect or experience ground motion/subsidence when performing work, CALL CASCADE SERVICES AT 210 632 8670 AND CEASE WORK IN THE AREA OF MOTION/SUBSIDENCE IMMEDIATELY. Cascade will dispatch a qualified expert to monitor the conditions and provide advice on how to proceed.

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
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 272076

CONDITIONS

Operator: Tascosa Energy Partners, L.L.C 901 W. Missouri Ave Midland, TX 79701	OGRID: 329748
	Action Number: 272076
	Action Type: [C-147] Water Recycle Long (C-147L)

CONDITIONS

Created By	Condition	Condition Date
vvenegas	• [329748] Tascosa Energy Partners, L.L.C and the contractors building the Catalina C Containment must retain an on-call BLM-approved karst monitor for the construction activities and notify the OCD in the event the monitor indicates karst and stops all construction activities. 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] permit expires on October 3, 2028. If [329748] Tascosa Energy Partners, L.L.C, wishes to extend operations past five years, an annual permit extension request must be submitted using an NMOCD form C-147 through OCD Online by September 3, 2028. • [329748] Tascosa Energy Partners, L.L.C shall construct, operate, maintain, close, and reclaim 2RF-199 - CATALINA C CONTAINMENT FACILITY ID [fVV2327939370] in compliance with 19.15.34 NMAC.	10/6/2023