From:	Hall, Brittany, EMNRD
To:	"Cole Burton"
Cc:	Bratcher, Michael, EMNRD; Buchanan, Michael, EMNRD; Rodgers, Scott, EMNRD; Enviro, OCD, EMNRD; Ashley Urzedo; Raley, Jim; Romero, Rosa, EMNRD; Minnix, Sharon, EMNRD
Subject:	RE: [EXTERNAL] RE: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392
Date:	Friday, May 22, 2026 7:21:00 AM
Attachments:	image001.png image002.png image003.png

Cole,

The alternative sampling plan for the Tomahawk 13 CTB 1 - nAPP2603556392 is approved. Excavation floor samples must be collected at a frequency of every 400 square feet and every 200 square feet from the sidewalls of the excavation.

Please be advised that any future sampling plans that deviate from established closure criteria, require approval of the use of in-situ remediation techniques or ex-situ but onsite remediation techniques, or contain a variance request for the requirements of 19.15.29 NMAC; the sampling plan must be submitted with a remediation plan.

If a release already has an approved remediation plan or the operator remediating the release within the 90 days after the date of discovery AND is not deviating from established closure criteria, not requiring approval of the use of in-situ remediation techniques or ex-situ but onsite remediation techniques, and/or a variance is not being requested for the requirements of 19.15.29 NMAC; the alternative sampling plan must be submitted via email at this time. Additionally, field environmental specialists may verbally approve an alternative sampling plan while onsite.

The acceptance of this alternative sampling plan by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment; or if the location fails to revegetate properly. In addition, OCD approval does not relieve the responsible party of compliance with any other federal, state, or local laws and/or regulations. If the applicable land managing agency does not agree and requires a more stringent sampling plan, the more stringent requirements must be met regardless of OCD's approval.

A copy of this email correspondence, including all attachments will be uploaded to the incident file.

Thank you,
Brittany Hall ● Environmental Field Compliance Supervisor

Environmental Field Compliance Group
EMNRD - Oil Conservation Division
1000 Rio Brazos Road | Aztec, NM 87410
505.517.5333 | Brittany.Hall@emnrd.nm.gov
http://www.emnrd.nm.gov/ocd/

Effective 12/1/2024: OCD has updated guidance on karst potential occurrence zones. This notice can be found at: https://www.emnrd.nm.gov/ocd/ocd-announcements-and-notifications/ under "2024 OCD ANNOUNCEMENTS AND NOTIFICATIONS".

The Digital C-141 guidance documents can be found at https://www.emnrd.nm.gov/ocd/ocd-announcements-and-notifications/ or https://www.emnrd.nm.gov/ocd/ocd-forms/.

From: Cole Burton <cburton@ensolum.com>
Sent: Friday, May 15, 2026 7:10 AM
To: Hall, Brittany, EMNRD <Brittany.Hall@emnrd.nm.gov>
Cc: Bratcher, Michael, EMNRD <mike.bratcher@emnrd.nm.gov>; Buchanan, Michael, EMNRD <Michael.Buchanan@emnrd.nm.gov>; Rodgers, Scott, EMNRD <Scott.Rodgers@emnrd.nm.gov>; Enviro, OCD, EMNRD <OCD.Enviro@emnrd.nm.gov>; Ashley Urzedo <agiovengo@ensolum.com>; Raley, Jim <jim.raley@dvn.com>; Romero, Rosa, EMNRD <RosaM.Romero@emnrd.nm.gov>; Minnix, Sharon, EMNRD <Sharon.Minnix@emnrd.nm.gov>
Subject: RE: [EXTERNAL] RE: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392

Hello,

I received the aerial karst survey for the site. No karst feature were identified. He also included a short letter about the DTW borehole.

Thanks,

Cole Burton
Project Manager
575-706-5056
Ensolum, LLC

From: Hall, Brittany, EMNRD <Brittany.Hall@emnrd.nm.gov>
Sent: Tuesday, May 12, 2026 7:30 AM
To: Cole Burton <cburton@ensolum.com>
Cc: Bratcher, Michael, EMNRD <mike.bratcher@emnrd.nm.gov>; Buchanan, Michael, EMNRD <Michael.Buchanan@emnrd.nm.gov>; Rodgers, Scott, EMNRD <Scott.Rodgers@emnrd.nm.gov>; Enviro, OCD, EMNRD <OCD.Enviro@emnrd.nm.gov>; Ashley Urzedo <agiovengo@ensolum.com>;

Raley, Jim <jim.raley@dvn.com>; Romero, Rosa, EMNRD <RosaM.Romero@emnrd.nm.gov>; Minnix, Sharon, EMNRD <Sharon.Minnix@emnrd.nm.gov>
Subject: RE: [EXTERNAL] RE: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392

[**EXTERNAL EMAIL**]

Thank you Cole,

Please include the letter from H&R and a statement from the karst professional regarding the borehole in the next C-141 submittal.

Has a date for the aerial/pedestrian survey been scheduled?

Thank you,
Brittany Hall ● Environmental Field Compliance Supervisor
Environmental Field Compliance Group
EMNRD - Oil Conservation Division
1000 Rio Brazos Road | Aztec, NM 87410
505.517.5333 | Brittany.Hall@emnrd.nm.gov
http://www.emnrd.nm.gov/ocd/

Effective 12/1/2024: OCD has updated guidance on karst potential occurrence zones. This notice can be found at: https://www.emnrd.nm.gov/ocd/ocd-announcements-and-notifications/ under “2024 OCD ANNOUNCEMENTS AND NOTIFICATIONS”.

The Digital C-141 guidance documents can be found at https://www.emnrd.nm.gov/ocd/ocd-announcements-and-notifications/ or https://www.emnrd.nm.gov/ocd/ocd-forms/.

From: Cole Burton <cburton@ensolum.com>
Sent: Thursday, May 7, 2026 10:47 AM
To: Hall, Brittany, EMNRD <Brittany.Hall@emnrd.nm.gov>
Cc: Bratcher, Michael, EMNRD <mike.bratcher@emnrd.nm.gov>; Buchanan, Michael, EMNRD <Michael.Buchanan@emnrd.nm.gov>; Rodgers, Scott, EMNRD <Scott.Rodgers@emnrd.nm.gov>; Enviro, OCD, EMNRD <OCD.Enviro@emnrd.nm.gov>; Ashley Urzedo <agiovengo@ensolum.com>; Raley, Jim <jim.raley@dvn.com>; Romero, Rosa, EMNRD <RosaM.Romero@emnrd.nm.gov>; Minnix, Sharon, EMNRD <Sharon.Minnix@emnrd.nm.gov>
Subject: RE: [EXTERNAL] RE: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392

Brittany,

I contacted H&R about your questions, and they sent the attached letter about the

borehole. Hope that helps. I also spoke with Kaleb and made sure he was aware of this for the karst survey, and he mentioned that it is far enough away that it wouldn't have any effect on the area that he surveyed.

Please let me know if you have any other concerns.

Thanks,

Cole Burton
Project Manager
575-706-5056
Ensolum, LLC

From: Hall, Brittany, EMNRD <Brittany.Hall@emnrd.nm.gov>
Sent: Wednesday, May 6, 2026 9:52 AM
To: Cole Burton <cburton@ensolum.com>
Cc: Bratcher, Michael, EMNRD <mike.bratcher@emnrd.nm.gov>; Buchanan, Michael, EMNRD <Michael.Buchanan@emnrd.nm.gov>; Rodgers, Scott, EMNRD <Scott.Rodgers@emnrd.nm.gov>; Enviro, OCD, EMNRD <OCD.Enviro@emnrd.nm.gov>; Ashley Urzedo <agiovengo@ensolum.com>; Raley, Jim <jim.raley@dvn.com>; Romero, Rosa, EMNRD <RosaM.Romero@emnrd.nm.gov>; Minnix, Sharon, EMNRD <Sharon.Minnix@emnrd.nm.gov>
Subject: RE: [EXTERNAL] RE: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392

[**EXTERNAL EMAIL**]

Cole,

I am unable to approve the alternative sampling plan for **nAPP2603556392** at this time. The karst report for **nAPP2529738476** did not include a desktop or pedestrian/aerial survey; only a geophysical survey was completed. Without all three required survey types, I cannot approve the sampling plan.

In reviewing the site's siting criteria, I also noted that the Well Record and Log submitted to the Office of the State Engineer (OSE) states "Void No Circulation" between 35 and 60 feet below ground surface (bgs). Please provide additional information regarding this void. Specifically:

- Was the void encountered continuously throughout the 25-foot interval noted in

the record?

- How was the total depth of the boring determined—did the rig encounter solid material at 60 feet bgs?
- Has there been any subsidence at the boring location that might indicate the void affected the plugging of the borehole?
- Was the karst professional informed of a potential karst feature at the adjacent site?
- Was the presence of the void considered when the static water level of 56 feet was measured in the completed well?

Mike Bratcher spoke with Kaleb Henry with Advanced Geophysics, who stated that the aerial survey will be completed as soon as possible. OCD is willing to keep the alternative sampling plan in "under review" status until the desktop and pedestrian/aerial surveys are completed and submitted. I understand that excavation is currently underway. Devon may proceed with excavation at this time but must collect 5-point composite samples representative of no more than 200 square feet for the release.

Thank you,
Brittany Hall ● Environmental Field Compliance Supervisor
Environmental Field Compliance Group
EMNRD - Oil Conservation Division
1000 Rio Brazos Road | Aztec, NM 87410
505.517.5333 | Brittany.Hall@emnrd.nm.gov
http://www.emnrd.nm.gov/ocd/

Effective 12/1/2024: OCD has updated guidance on karst potential occurrence zones. This notice can be found at: https://www.emnrd.nm.gov/ocd/ocd-announcements-and-notifications/ under "2024 OCD ANNOUNCEMENTS AND NOTIFICATIONS".

The Digital C-141 guidance documents can be found at https://www.emnrd.nm.gov/ocd/ocd-announcements-and-notifications/ or https://www.emnrd.nm.gov/ocd/ocd-forms/.

From: Cole Burton <cburton@ensolum.com>
Sent: Tuesday, May 5, 2026 1:28 PM
To: Enviro, OCD, EMNRD <OCD.Enviro@emnrd.nm.gov>
Cc: Ashley Urzedo <agiovengo@ensolum.com>; Raley, Jim <Jim.Raley@dvn.com>
Subject: [EXTERNAL] RE: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392

Hello,

I received an approval for the extension but no answer on this sampling plan. The excavation has already started, and I need to know if I will have to collect additional samples in the area of this release or if I can just use the sample grid we created for the first release that is at 400 sq. ft. We started on the north end but in the next few days or week we will need to collect samples in the area of that second release.

Thanks,

Cole Burton
Project Manager
575-706-5056
Ensolum, LLC

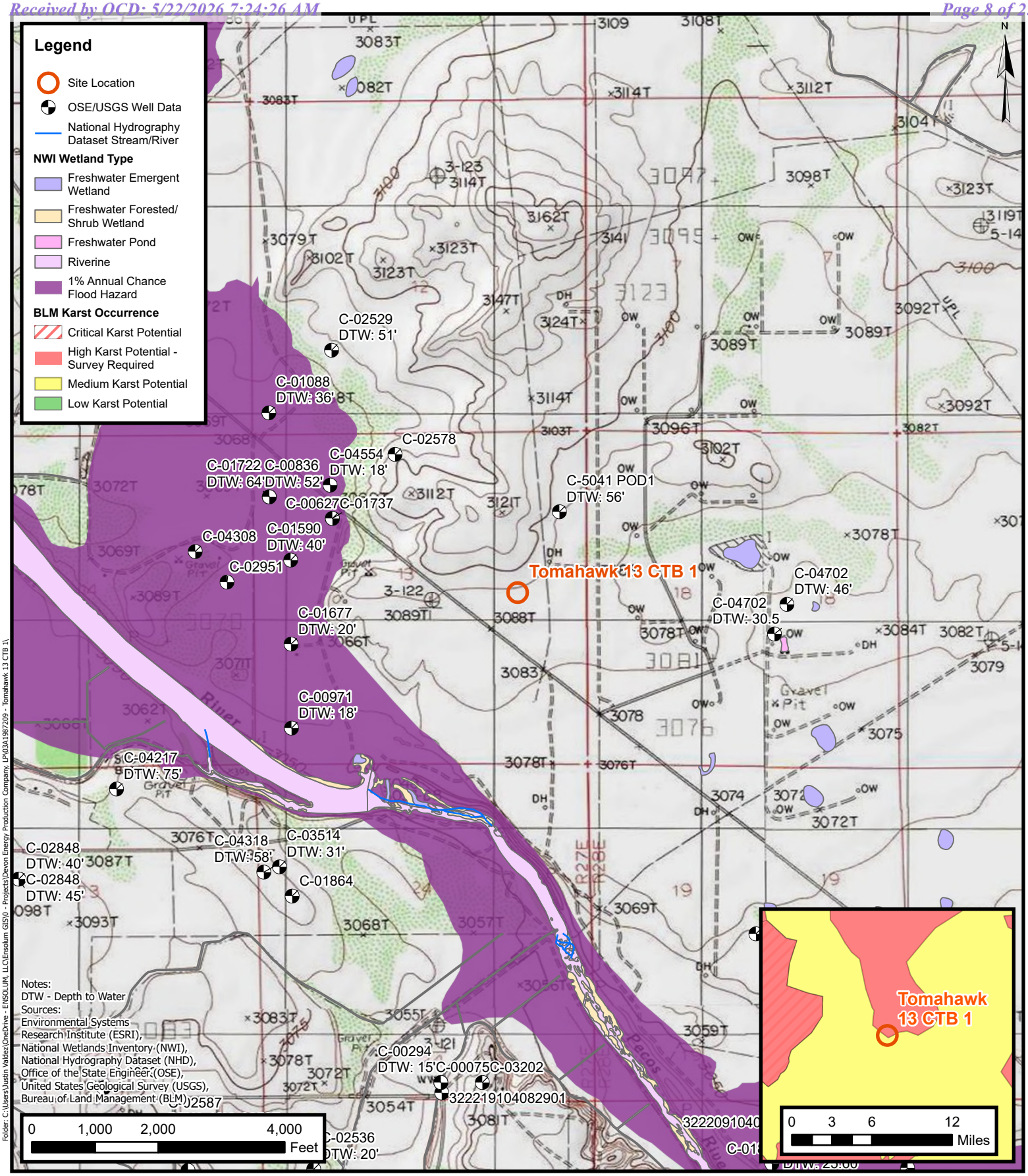
From: Cole Burton
Sent: Tuesday, April 28, 2026 1:58 PM
To: Enviro, OCD, EMNRD <ocd.enviro@emnrd.nm.gov>
Cc: Ashley Urzedo <agiovengo@ensolum.com>; Raley, Jim <Jim.Raley@dvn.com>
Subject: Alternative Sampling Plan - Tomahawk 13 CTB 1 - nAPP2603556392

Hello,
Devon Energy Production Company, LP (Devon) is requesting an alternative sampling plan at the Tomahawk 13 CTB 1 (Site). On February 4, 2025, a leak on a produced water line resulted in the release of approximately 6 barrels (bbls) of produced water; 4 bbls of produced water were recovered from the release area. Devon reported the release to the New Mexico Oil Conservation Division (NMOCD) on February 4, 2026, and subsequently the release was assigned Incident Number nAPP2603556392. The release impacted an area approximately 2,805 square feet (sq. ft.) in size on Federal Land managed by the Bureau of Land Management (BLM). The closest permitted well with available depth to groundwater data is New Mexico Office of the State Engineer (NMOSE) soil boring C 05041 POD1, located approximately 1,053 feet northeast of the Site; C 05041 POD1 has a reported depth to water greater than 56 feet below ground surface (bgs). Soil boring C 05041 POD1 is a temporary monitoring well used to establish depth to groundwater within the vicinity of the Site. A desktop review for potential site receptors has been completed, and the site is greater than 1,000 ft. to a freshwater well or spring and is not within a 100-year floodplain or overlying a subsurface mine (see Figure 1). The closest significant watercourse is an intermittent dry wash located approximately 3,522 feet southwest of the Site. A karst survey was completed on January 20, 2026, and no anomalies were detected within a 200-foot radius of the release extent. Based on the results of the desktop review, the following Site Closure Criteria will apply: 10 mg/kg benzene, 50 mg/kg BTEX, 1,000 mg/kg TPH – Gasoline Range Organics (GRO) and TPH – Diesel Range Organics (DRO), 2,500 mg/kg Total TPH and 10,000 mg/kg chloride.

This release is confined within the footprint of a previous produced water release associated with

incident number nAPP2529738476. A *Confirmation Sampling Variance* for excavation floor samples collected at a frequency of every 400 square feet from the floor of the excavation and every 200 square feet from the sidewalls of the excavation was approved as part of a *Remediation Work Plan* dated April 21, 2026, for incident number nAPP2529738476. Devon would like to request that the previously approved *Alternative Sampling Plan* be applied to the new release (nAPP2603556392) as it directly overlaps the initial release of produced water, and both releases will be excavated at the same time. Excavation of the subject matter releases will begin as soon as Devon selects a subcontractor. Devon will submit a remediation closure report as required in 19.15.29.12.B.(1) NMAC following excavation and confirmation soil sampling activities. Devon believes this *Alternative Sampling Plan* will provide equal or better protection of public health, and the environment considering that both releases remained on pad, they are located in a low potential karst designation area, and depth to groundwater near the Site is confirmed to be 56 feet bgs. Devon respectfully requests approval for this *Alternative Sampling Plan* associated with Incident Number (nAPP2603556392).
Thanks,

Cole Burton
Project Manager
575-706-5056
Ensolum, LLC



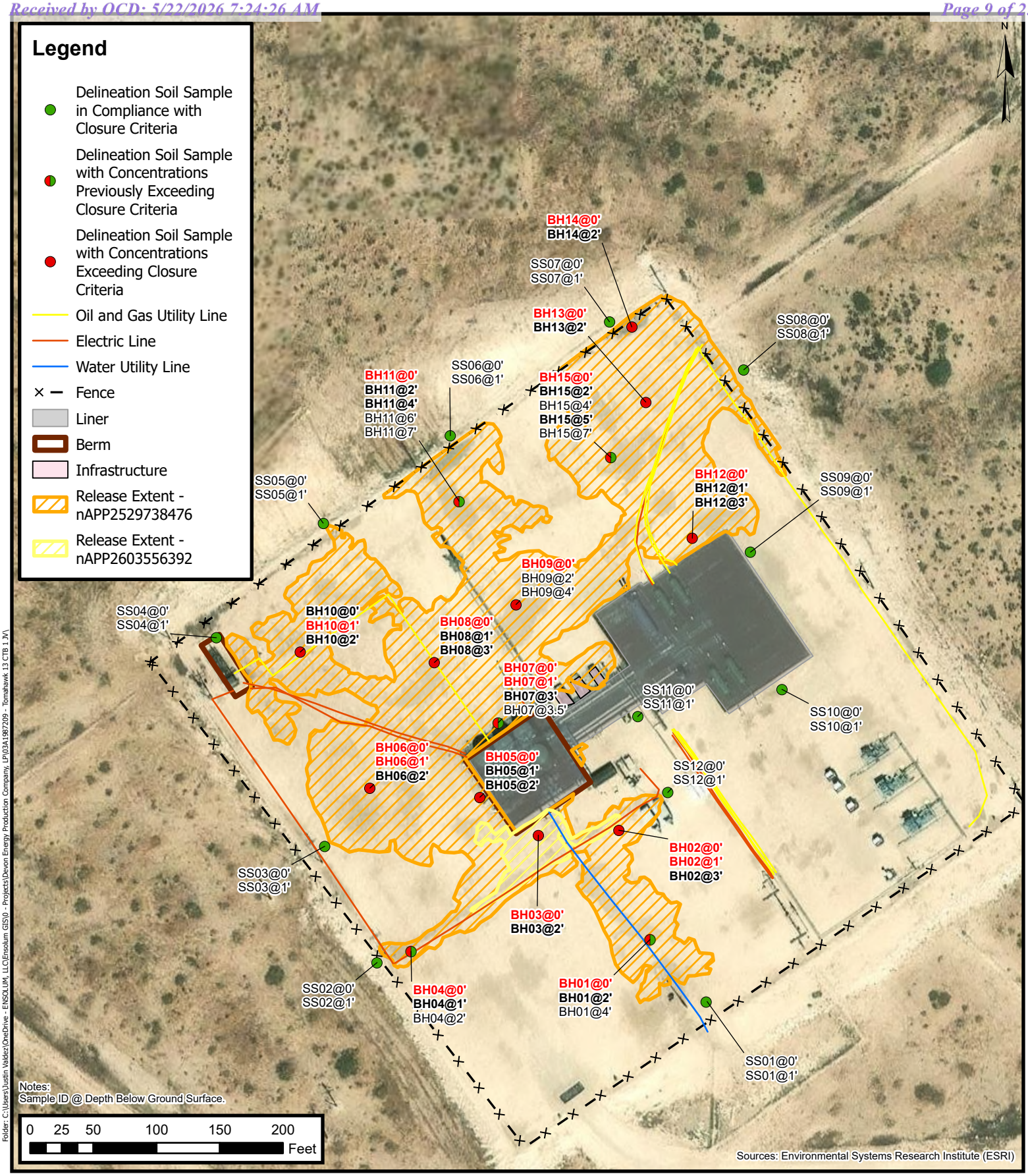
Folder: C:\Users\Justin Valdez\OneDrive - ENSOLUM, LLC\Ensolum GIS\0 - Projects\Devon Energy Production Company, LP\03A1987209 - Tomahawk 13 CTB 1\

ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Site Receptor Map

Devon Energy Production Company, LP
Tomahawk 13 CTB 1
Incident Number: nAPP2529738476 & nAPP2603556392
Unit H, Section 13, T 22S, R 27E
Eddy County, New Mexico

FIGURE 1



Folder: C:\Users\Justin Valdez\OneDrive - ENSOLUM, LLC\Ensolum GIS\0 - Projects\Devon Energy Production Company, LP\03A1987209 - Tomahawk 13 CTB 1.3\

ENSOLUM
Environmental, Engineering and Hydrogeologic Consultants

Delineation Soil Sample Locations

Devon Energy Production Company, LP
Tomahawk 13 CTB 1
Incident Number: nAPP2529738476
Unit H, Section 13, T 22S, R 27E
Eddy County, New Mexico

FIGURE 2

JHawley@H-R-Enterprises.com
PO Box 3641, Hobbs NM 88240
Office: 575-964-8686 Cell: 575-605-3471

Attn: Brittany Hall

Date: 5/7/26

Devon Tomahawk 13 CTB DTW bore

Brittany, Cole Burton contacted me stating you had some questions on the Tomahawk DTW bore, the formation from 35' to 60' was not an open void or cavern, we had to rotate and apply down pressure to get through it, it had to have some small cracks and porous sand to take up our air so we were not getting returns to surface, but it was not just an open void. Also, when we plugged the bore, the theoretical volume of the bore is 88.2 gallons, we pumped 324 gallons to fill the bore and get grout to surface, but the fact that we did get grout to surface indicates that we filled in whatever small cracks and voids that were encountered. We pumped 236 gallons more than it should have taken, 1 gallon=0.261 Square feet, so the voids/cracks equal 62 square feet, so about 2 yards. Hopefully this helps, thanks.

Jim Hawley

President H&R Enterprises, LLC.

575-605-3471

Aerial Cave and Karst Investigation: Tomahawk 13 CTB 1

Report Delivered: 05/14/2026

Prepared for:
Ensolum, LLC
3122 National Parks HWY
Carlsbad, NM 88220

Prepared By:
Advanced Geophysics, LLC
3434 Silver Oaks Dr.
Abilene, Texas 79606

TABLE OF CONTENTS

LIST OF FIGURES

Executive Summary

Introduction

Ensolum, LLC requested an aerial karst survey following a release at the Tomahawk 13 CTB 1 site, located at 32.394008, -104.138017 (**Figure A**). The objective of the surveys was to assess the stability of the site by investigating the subsurface for the presence of potential karst features.

Findings

- The aerial survey revealed:
    - **No surficial karst** features were identified within the 200-meter (656 ft) buffer surrounding the site.

Recommendations

- **Mitigation Planning:**
    - Any subsurface voids encountered during construction, or any phase of the remediation process must be reported to the Bureau of Land Management Karst Division or the New Mexico State Lands Office Resource Division.
    - Mitigation measures should align with guidelines in the **Bureau of Land Management Cave and Karst Management Handbook (H-8380-1)** or the **Natural Resources Conservation Service Conservation Practice Standard for Karst Sinkhole Treatment (Code 527).**

Conclusions

The aerial survey did not identify any closed depressions, or abrupt elevation changes indicative of surficial karst within the 200-meter (656 ft) buffer surrounding the Tomahawk 13 CTB 1 site. In the absence of such features, the site is characterized as stable.

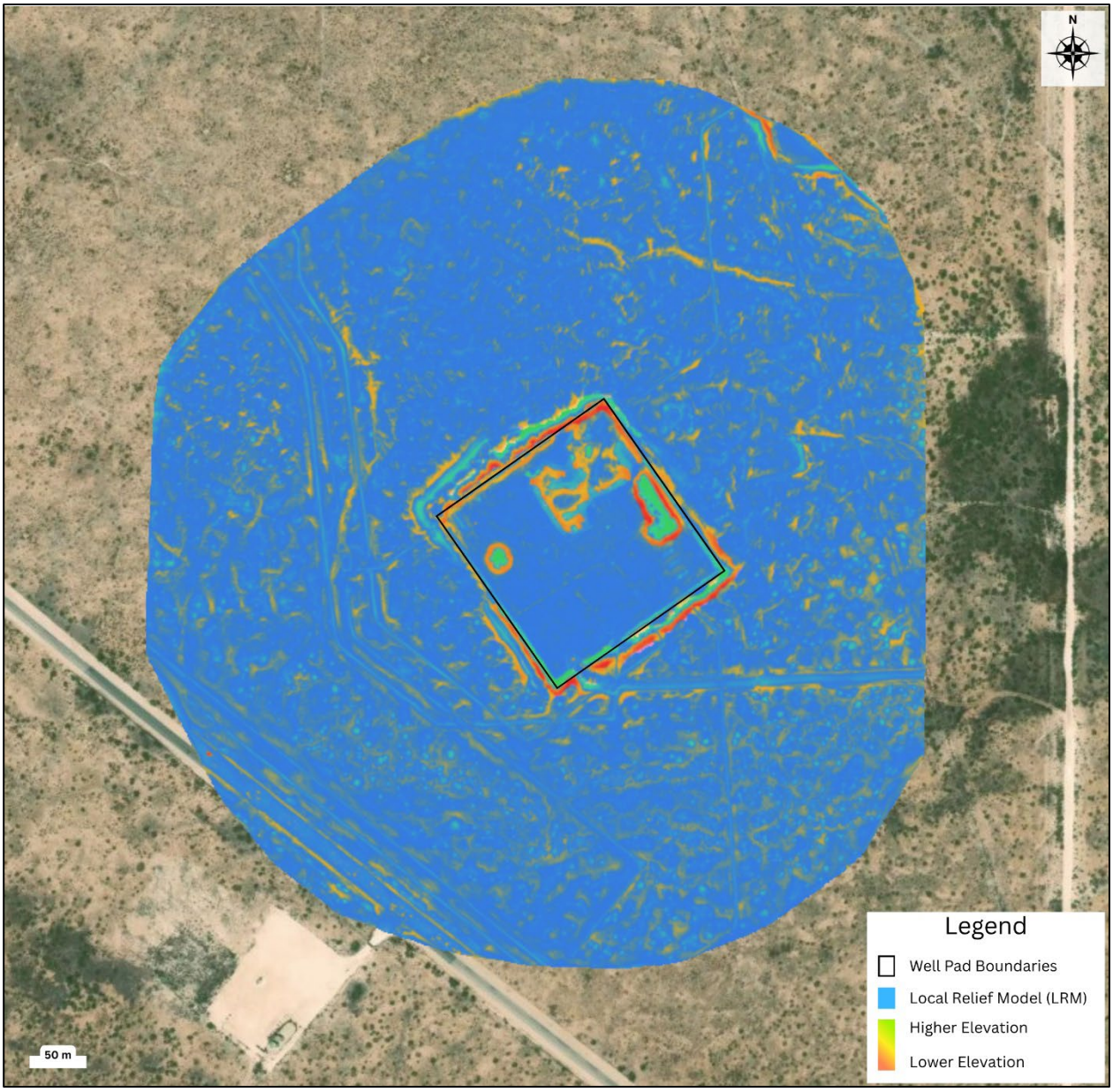


Figure A. Aerial view of the Tomahawk 13 CTB 1 site with an integrated Local Relief Model (LRM) overlay illustrating the surrounding microtopographic relief associated with shrub-anchored nebkhas, shrub canopy signatures, and anthropogenic features including berms and access roads.

1.0 INTRODUCTION

The following report has been prepared for Ensolum, LLC, on the behalf of Devon Energy, to determine the presence or absence of surficial karst features surrounding a release that occurred at the Tomahawk 13 CTB 1 site, located at 32.394008, -104.138017, within Eddy County, New Mexico. To delineate the potential surface features, an aerial drone survey was conducted and processed by SWCA Environmental Consultants, and the resulting data was subsequently reviewed and interpreted by Kaleb Henry of Advanced Geophysics LLC.

The aerial karst survey was requested by Ensolum, LLC on January 16, 2026. Upon the request, the client provided coordinates (listed above) for the well pad, as well as a Google Earth shape file (**output_release.kmz)** to ensure the survey was conducted across the release.

1.1 Summary of Results

The LRM derived from the aerial survey conducted at the Tomahawk 13 CTB 1 site delineates persistent micro-relief expressed as shrub-anchored nebkhas, shrub canopy signatures, and manmade berms and access roads. Additionally, the elevated and depressed topographic expressions identified within the well pad boundaries reflect the ongoing excavation and remediation activities rather than surficial karst features or dissolution-related geomorphic processes. Critically, no closed depressions or abrupt elevation changes indicative of surficial karst features were identified within the 200-meter (656 ft) survey buffer. Given the vertical resolution and spatial accuracy of the dataset, any depressional features not resolved by the survey would be of a scale below detection thresholds and, consequently, are unlikely to correspond to active collapse structures at this site.

1.2 Site Location

The site is located approximately 8.94 kilometers (5.56 miles) southeast of Carlsbad, New Mexico, and approximately 7.79 kilometers (4.84 miles) east of US Highway 62, within the SENE quarters of Section 13, Township 22 South, Range 27 East, in Eddy County, New Mexico. The release occurred on the Bureau of Land Management land.

1.3 Bureau of Land Management Characterization

The Bureau of Land Management (BLM) Karst Division has identified four divisions of karst potential: low, medium, high, and critical. These regions are characterized based on the known occurrence of karst features, underlying geologic formations, and potential impacts to freshwater aquifers. The survey was conducted within an area characterized as **HIGH** karst occurrence zone (**Figure 1**)[1].

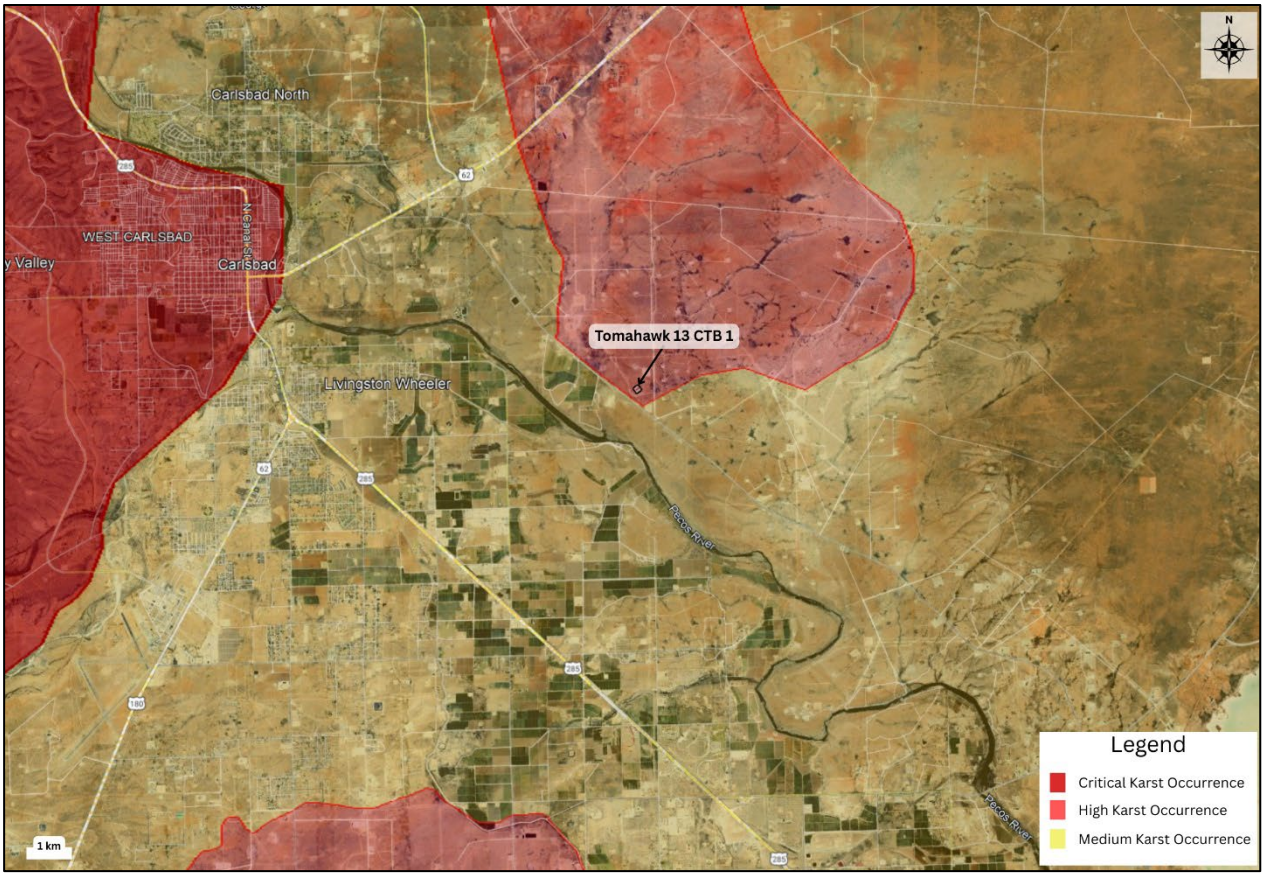


Figure 1. Aerial overview of the site location, illustrating the surrounding karst occurrence zones. Map provided by Google Earth in datum WSG-84. Karst occurrence map provided by Bureau of Land Management – Carlsbad Office.

2.0 LOCAL GEOLOGY AND ENVIRONMENT

2.1 Geologic Setting

The site is located within a region known for its extensive karst development, due to the underlying geologic formations (**Figure 2**). The Rustler Formation was deposited during the mid-to-late Ochoan, as the Delaware Basin transitioned from a hypersaline sea to a terrestrial environment[2][3]. This transition led to a complex array of depositional environments, resulting in the formation of five distinct members within the Rustler Formation: Los Medaños, Culebra Dolomite, Tamarisk, Magenta Dolomite, and Forty-niner, listed in ascending order. The Tamarisk and Forty-niner Members, in particular, exhibit the most diverse salt pan to mudflat facies within the Rustler Formation, comprising mudstone, halite, and gypsum[9]. These evaporite facies are highly prone to dissolution by downward-migrating meteoric waters, which can create various karst features such as conduits, sinkholes, and cavernous porosity. Once initiated, these features can expand rapidly due to

the high solubility of halite and gypsum/anhydrite. Halite, with a solubility rate of 360 g/L at 77°F, is approximately two orders of magnitude more soluble than gypsum[8]. Gypsum, in turn, has a solubility rate of approximately 2.531 g/L at 68°F, which is around four orders of magnitude higher than that of limestone (calcium carbonate)[4].

The high solubility of these evaporite facies facilitates the rapid development of complex cave systems, which can form within days, weeks, or years, depending on the surrounding hydrogeologic conditions[6]. These cave systems serve as preferential flow paths for shallow groundwater recharge, creating a dynamic and continuously evolving karst-aquifer system[5].

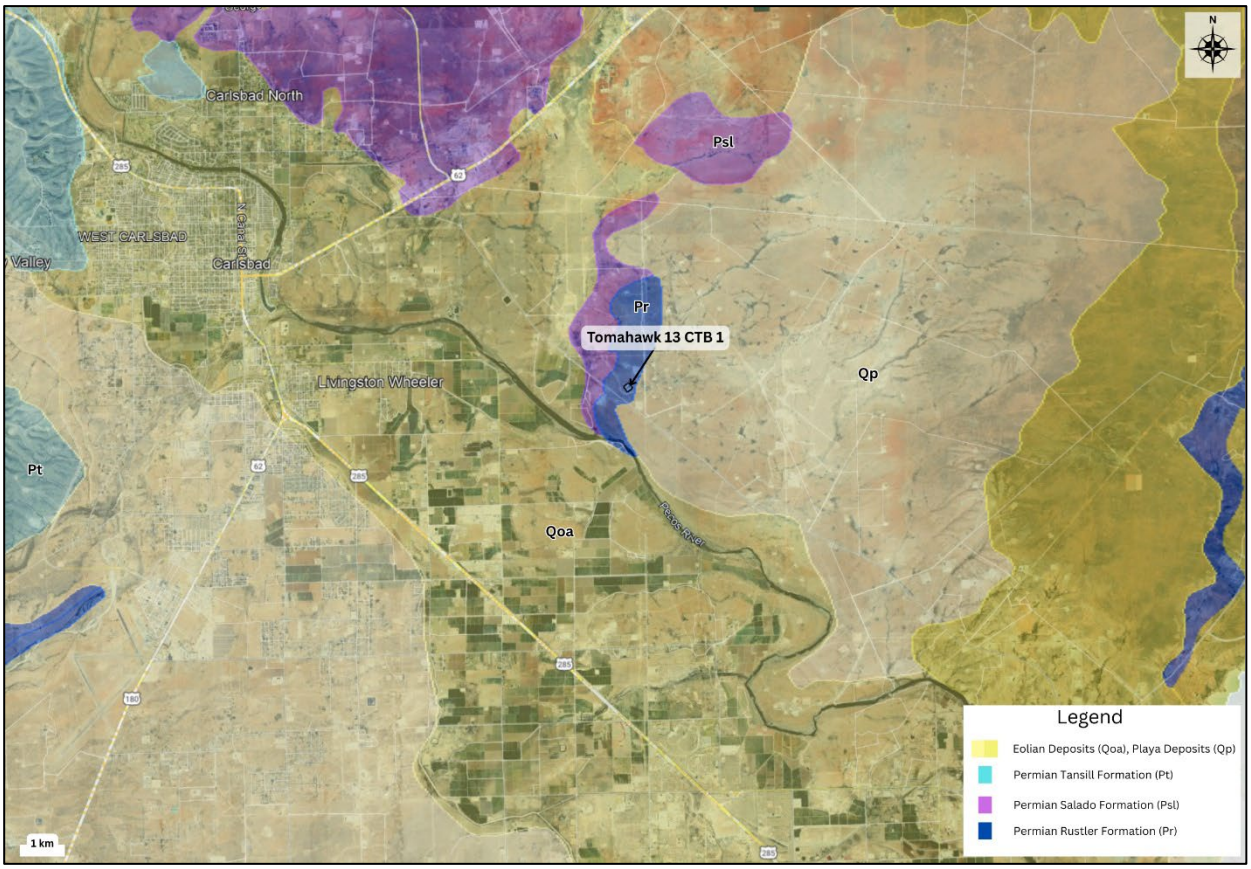


Figure 2. Geologic formations surrounding the site location. Permian Tansill Formation (Pt), Permian Salado Formation (Psl), Permian Rustler Formation (Pr), Quaternary eolian, and playa deposits (Qoa, Qp). Background image provided by Google Earth in datum WSG-84. Geologic unit overlay provided by the United State Geologic Society (USGS) and the Bureau of Economic Geology, UT-Austin.

2.2 Environmental Setting

The site is located within the Chihuahuan Desert Thornscrub ecoregion, which is characterized by sparse vegetation. Vegetation in the immediate vicinity of the survey area consists primarily of grasses with occasional creosote bushes. The site is mantled by soils of the Tonuco series, which are composed predominantly of loamy fine sands and extend to depths of approximately 48.3 cm (19 inches)[7]. These soils are classified as excessively well-drained, despite exhibiting relatively low transmissivity rates[7].

The environment surrounding the survey has been characterized as an evaporitic karst terrain, due to the underlying geologic formations. The Rustler Formation has many documented sinkholes, conduits, and caves, which are highly susceptible to enlargement by dissolution as surface water migrates downward through the formation. These conduits can facilitate the rapid recharge of the groundwater aquifers.

3.0 METHODOLOGY

3.1 Description of Aerial Survey

An aerial karst survey was conducted at the Tomahawk 13 CTB 1 site, by a Federal Aviation Administration (FAA)–licensed drone pilot affiliated with SWCA Environmental Consultants. Survey parameters were developed by Kaleb Henry of Advanced Geophysics to ensure compliance with the stringent requirements established by the Bureau of Land Management Karst Division, which are recognized by the New Mexico Oil Conservation Division (NMOCD) and the New Mexico State Land Office (NMSLO).

The aerial survey utilized a preplanned flight path flown at low elevations, with aerial transects spaced to achieve an estimated 70–80% imagery overlap. This overlap minimizes errors during the image-stitching process and enhances the accuracy and resolution of the final imagery products. Following data collection, the images were stitched to produce an orthomosaic image, which was then processed to generate a highly accurate Digital Elevation Model (DEM). A Local Relief Model (LRM) was subsequently derived from the DEM to highlight sharp changes in elevation (approximately 5 cm). The LRM, along with the DEM and orthomosaic imagery, was carefully examined and analyzed by an experienced cave and karst specialist.

The aerial imagery used in the survey has a resolution of approximately 5 cm (1.9 in), enabling a trained geologist to identify small-scale karst features with a high degree of detail. However, it is important to recognize the potential presence of artificial artifacts within the

LRM, as shadowing and dense vegetation can result in the misrepresentation of topographic highs or lows.

4.0 SURVEY RESULTS

4.1 Aerial Karst Survey

The LRM derived from the aerial survey conducted at the Tomahawk 13 CTB 1 site delineates persistent micro-relief expressed as shrub-anchored nebkhas, shrub canopy signatures, and manmade berms and access roads (**Figure 3**). Additionally, the elevated and depressed topographic expressions identified within the well pad boundaries reflect the ongoing excavation and remediation activities rather than surficial karst features or dissolution-related geomorphic processes. Critically, no closed depressions or abrupt elevation changes indicative of surficial karst features were identified within the 200-meter (656 ft) survey buffer. Given the vertical resolution and spatial accuracy of the dataset, any depressional features not resolved by the survey would be of a scale below detection thresholds and, consequently, are unlikely to correspond to active collapse structures at this site.

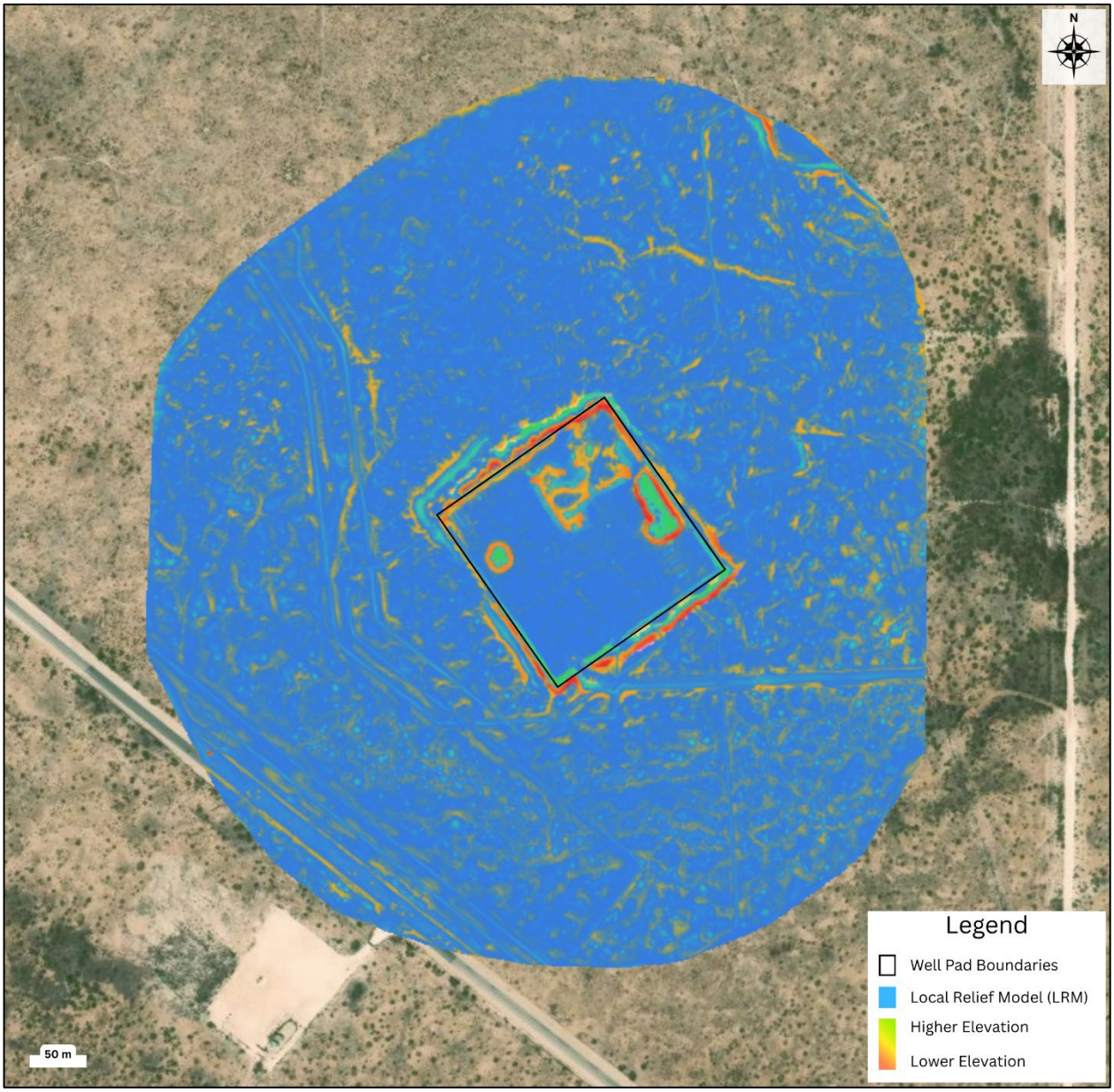


Figure 3. Aerial view of the Tomahawk 13 CTB 1 site with an integrated Local Relief Model (LRM) overlay illustrating the surrounding microtopographic relief associated with shrub-anchored nebkhas, shrub canopy signatures, and anthropogenic features including berms and access roads.

5.0 SUMMARY AND RECOMMENDATIONS

The aerial survey did not identify any closed depressions, or abrupt elevation changes indicative of surficial karst within the 200-meter (656 ft) buffer surrounding the Tomahawk 13 CTB 1 site. However, any surficial karst features that may have formed after the date of the surveys are not reflected in this report.

The underlying geologic formation at the surveyed location is highly susceptible to dissolution, which facilitates the rapid development and expansion of subsurface voids and conduits, within a timescale ranging from days to a few months. The progression of these processes can be significantly accelerated in the absence of appropriate mitigation measures. Infrastructure systems that contain or transport fluids pose a heightened risk in such settings. In the event of a structural failure or unnoticed leakage, the unintended introduction of fluids into the subsurface can intensify dissolution processes, potentially triggering rapid subsidence or collapse.

Any karst features encountered during construction, drilling or remediation processes should be immediately reported to either the New Mexico State Land Office Resources Division, or the Bureau of Land Management Karst Division, in order to request a Cave and Karst Specialist. Any implemented procedures to mitigate a cave or karst feature should follow the **Bureau of Land Management Cave and Karst Management Handbook, H-8380-1**, or the **Natural Resources Conservation Service Conservation Practice Standard for Karst Sinkhole Treatment, Code 527**.

6.0 DISCLAIMER AND LIMITATIONS OF USE

This report has been prepared exclusively for the use of Ensolum, LLC, and their client Devon Energy. It is not intended for use or reliance by any third party without the prior written consent of Advanced Geophysics, LLC. Any unauthorized use or reliance upon this report by third parties is strictly prohibited and shall be at the sole risk of the user.

The findings, analyses, and interpretations contained herein are based upon the professional judgment of qualified geoscientists at Advanced Geophysics, LLC, utilizing data acquired through recognized industry-standard aerial drone survey methods. These interpretations are inherently non-definitive and are subject to verification through appropriate field investigations.

The geological and environmental conditions described reflect the state of the site during the time of the geophysical survey, conducted on May 11, 2026. Advanced Geophysics, LLC assumes no responsibility for any changes to site conditions that may have occurred subsequent to this time period. It is acknowledged that subsurface conditions, particularly within karst or evaporitic terrains, are inherently dynamic and subject to natural processes such as dissolution, which may result in rapid and unanticipated changes.

This report is further subject to limitations associated with the resolution capabilities of the aerial drone survey methodologies employed. Certain surficial features, including but not limited to minor closed depressions or solutional fissures, may exist below the detection threshold of the instruments used and, as such, may not have been identified herein. The absence of anomalies identified during the aerial survey should not be interpreted as definitive evidence of the absence of surficial karst features, subsurface voids, or associated geohazards within the surveyed area.

To the best of our knowledge and belief, the information presented in this report is accurate as of the date of issuance. No warranty, express or implied, is made as to the completeness or accuracy of the data, interpretations, or conclusions contained herein.

7.0 REFERENCES

1. Bureau of Land Management, (2025), Karst Potential Map. CFO Base map.

2. Adams, J. E. (1972). Semi-cyclicity in the Castile anhydrite. In J. G. Elam & S. Chuber (Eds.), *cyclic Sedimentation in the Permian Basin* (pp. 196–202). West Texas Geological Society.

3. Kendall, A. C., & Harwood, G. M. (1989). Shallow-water gypsum in the Castile Formation: Significance and implications. In P. M. Harris & G. A. Grover (Eds.), *Subsurface and Outcrop Examination of the Capitan Shelf Margin, Northern Delaware Basin* (pp. 451–457). SEPM Core Workshop No. 13, San Antonio, TX.

4. Klimchouk, A. (1996). Dissolution and conversion of gypsum and anhydrite. *International Journal of Speleology*, 25(3–4), 263–274.

5. Stafford, K. W. (2013). Evaporite karst and hydrogeology of the Castile Formation: Culberson County, Texas, and Eddy County, New Mexico. *Faculty Publications*, 3.

6. Stafford, K. W., Ulmer-Scholle, D., & Rosales-Largarde, L. (2008). Hypogene calcitization: Evaporite diagenesis in the western Delaware Basin. *Faculty Publications*, 7.

7. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Official Soil Series Descriptions*. Available online. Accessed [05/13/2026].

8. Offermann, H. L. (1982). On the solubility of sodium chloride in water. *Journal of Crystal Growth*, 60(2), 389–392.

9. Powers, D. W., Holt, R. M., Beauheim, R. L., & Richardson, R. G. (2006). Caves and karst of southeastern New Mexico. In L. Land, V. W. Lueth, W. Raatz, P. Boston, & D. L. Love (Eds.), *New Mexico Geological Society 57th Annual Fall Field Conference Guidebook* (pp. 267–276).

ADVANCED GEOPHYSICS

Abilene, Texas
469.337.4110
Kaleb@advgeophysics.com
www.advgeophysics.com

To Whom It May Concern,

I was recently informed by Cole Burton of Ensolum, LLC of a potential karst-related feature encountered during the drilling of a water well located approximately 267 meters northeast of the Tomahawk 13 CTB 1 site. According to the drilling contractor, drilling returns reportedly ceased at depth; however, no loss of circulation or significant pressure drop was reported during drilling operations. Based on the available description, the encountered interval may represent a zone of enhanced dissolution, secondary porosity, or fracturing rather than an open subsurface void or cavernous feature.

While the reported conditions are noteworthy and should be considered with respect to the property on which the feature was identified, the release area associated with the Tomahawk 13 CTB 1 site is located a sufficient distance from the reported feature such that migration of released material into the suspected dissolution zone is considered unlikely under the currently understood site conditions.

Sincerely,
Kaleb Henry

CEO, Principal Geophysicist
ADVANCED GEOPHYSICS, LLC

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
https://www.emnrd.nm.gov/ocd/contact-us

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

CONDITIONS

Operator: DEVON ENERGY PRODUCTION COMPANY, LP 333 West Sheridan Ave. Oklahoma City, OK 73102	OGRID: 6137
	Action Number: 587601
	Action Type: [IM-SD] Incident File Support Doc (ENV) (IM-BNF)

CONDITIONS

Created By	Condition	Condition Date
bhall	Upload of approved sampling plan.	5/22/2026