TCEQ DOCKET NO. 2026-0289-EAQ
PROGRAM ID NO. 13002207

IN THE MATTER OF THE APPROVAL OF A RECHARGE ZONE PLAN EXCEPTION REQUEST BY VULCAN CONSTRUCTION MATERIALS, LLC FOR THE VULCAN COMAL QUARRY TURN LANES PROJECT	**§**	**BEFORE THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

PRESERVE OUR HILL COUNTRY ENVIRONMENT AND PRESERVE OUR HILL COUNTRY ENVIRONMENT FOUNDATION'S MOTION TO OVERTURN THE EXECUTIVE DIRECTOR'S DECISION

TO THE HONORABLE CHAIRMAN AND COMMISSIONERS:

The Executive Director erred in her approval of Vulcan Construction Materials, LLC's ("Vulcan") Recharge Zone Plan Exception Request for the Vulcan Comal Quarry (the "Quarry") turn lanes (the "Turn Lane Project") because the proposed project will not provide an equivalent level of water quality protection for the Edwards Aquifer as would the development of a water pollution abatement plan (WPAP) meeting the substantive requirements of Chapter 213 of the TCEQ Rules. Thus, pursuant to 30 Tex. Admin. Code § 50.139, Preserve Our Hill Country Environment and Preserve Our Hill Country Environment Foundation (collectively, "PHCE") file this Motion to Overturn the Executive Director's decision approving Vulcan's Recharge Zone Plan Exception Request, Program ID No. 13002207.

I. Introduction and Background

A. Timeliness of Motion

The TCEQ rules state that a motion to overturn shall be filed within 23 days of the agency mailing notice of the permit, approval, or other action to the applicant. 30 Tex. §Admin. Code § 50.139(b). The agency mailed notice of the approval at issue to Vulcan on February 13, 2026. Accordingly, the deadline to file a motion to overturn is Sunday, March 8, 2025. Pursuant to 30 Tex. Admin. Code § 1.7, because this date falls on a weekend, the period during which to file a motion to overturn runs until the next business day—Monday, March 9, 2026. Thus, this motion is timely filed.

B. Chapter 213 of TCEQ's Rules contain requirements for aquifer and surface water protection that go well beyond mitigation of increased total suspended solids (TSS) increases.

The substantive requirements of TCEQ's Edwards Aquifer Rules extend far beyond merely requiring a reduction in the anticipated increase in TSS runoff. Rather, a proper WPAP will identify any activities or processes which may be a potential source of contamination, and for each major activity to occur at the site, the WPAP must describe the BMPs and measures that will prevent pollution of surface water, groundwater or storm water that originates upgradient from the site and flows across the site, as well as measures to address potential pollution of surface water or groundwater originating on-site or flowing off-site. 30 Tex. Admin. Code § 213.5(b)(4)(B)(i) and (ii). The WPAP must also include construction-phase BMPs for erosion and sediment controls that are designed to retain sediment on site to the extent practicable. 30 Tex. Admin. Code § 213.5 (b)(4)(B)(ix). Consistent with this requirement, BMPs and measures must prevent

pollutants from entering surface streams, sensitive features, or the aquifer. 30 Tex. Admin. Code § 213.5 (b)(4)(B)(iii).

Despite these extensive requirements, TCEQ's Edwards Aquifer Rules, as 30 Tex. Admin. Code § 213.9(a), provides that the executive director may grant an exception to a substantive provision of Chapter 213 "if the requestor can demonstrate equivalent water quality protection for the Edwards Aquifer."

C. Vulcan's 2024 Quarry WPAP Application.

Vulcan Construction Materials LLC (Vulcan) previously submitted an application for a WPAP for its Quarry in February of 2024 (the "2024 Application"). The Quarry will ultimately include 13.81 acres of impervious cover upon a 1,515.16 acre quarry operation. With regard to the requirement of TCEQ's Technical Guidance Manual (TGM) RG-348 that the permanent best management practices (PBMP) of a WPAP remove 80% of the increase in Total Suspended Solids (TSS) from the site, that 2024 application asserted that "additional compensatory treatment is available for turn lane improvement to be submitted under a future separate plan."[1] That 2024 Application asserted that the TSS required to be removed annually from the Quarry was 12,396 pounds, while the 2024 Application asserted that the planned PBMPs would remove 14,866 pounds of TSS.[2] That Application left runoff from certain areas entirely untreated equivalent to a requirement for removal of 54 pounds of TSS annually.[3] Accordingly, Vulcan essentially asserted in 2024 that its WPAP included 2,470 pounds of "overtreatment" for TSS removal.

[1] February 21, 2024 Amended Application at Attachment C thereto.
[2] February 21, 2024 Amended Application, "Pollutant Load and Removal Calculations."
[3] *Id.*

D. Vulcan's 2026 Turn Lane Project WPAP Application.

Vulcan has now submitted an application for approval of the turn lane improvement referenced in the prior 2024 Application. Instead of submitting a WPAP for this turn lane project, and demonstrating that Vulcan has developed BMPs which adequately address the potential contamination resulting from the turn lane project, Vulcan has sought approval of the turn lane project as an "exception" to the substantive requirements of Chapter 213, stating, "The increase in impervious cover will be approximately 1.469 acres (approx. 11.1% of the project area) and equivalent protection is provided by the onsite PBMPs from the approved Comal Quarry."

II. TCEQ has not provided adequate notice and opportunities for public participation with regard to the Turn Lane Project.

The construction and implementation of the Turn Lane Project will result in the potential contamination of groundwater in the area of the project. This groundwater is owned by members of PHCE who own property in the immediate vicinity of the Project. Yet, TCEQ has provided no written notice of the pending application to these persons, and has not even provided published notice of the application to the public.

Considering the sensitivity of the Edwards Aquifer impacted, and the potential impact upon others' property rights, greater notice of the Application should have been provided, and TCEQ should have held a public meeting for the impacted public to be able to present their concerns.

III. Vulcan's Turn Lane Project Exception Inappropriately relies upon a flawed WPAP for the Quarry, and no exception should be granted premised upon that plan while it is under judicial challenge.

Vulcan's current application presumes that the 2024 WPAP was sufficient to effectively accomplish the environmental protection and contaminant mitigation required by the TCEQ Rules. This is simply not true. As noted in PHCE's Motion to Overturn filed with regard to the 2024 Application, the WPAP for the Quarry fails to adequately protect the sensitive geology in the area. Among other reasons, this is because the WPAP fails to fully recognize and address the sensitive features in the area, underestimated the potential pathways to the Edwards Aquifer, failed to account for blasting activities at the Quarry, and would result in harm to threatened and endangered species.[4]

PHCE has appealed TCEQ's approval of the 2024 WPAP application, and that suit is pending in Travis County as *Preserve Our Hill Country Environment, et al. v. Texas Commission on Environmental Quality,* Docket No. D-1-GN-24-007463. By that matter, the courts are considering the propriety of TCEQ's approval of the 2024 Quarry WPAP. It is improper for TCEQ to rely upon that WPAP as a justification for approval of Vulcan's Turn Lane Project exception request.

IV. The Exception Request Relies upon TSS Mitigation, which will not exist at the time of the Turn Lane Project.

In claiming that the increased TSS runoff from the Turn Lane Project will be adequately mitigated, Vulcan relies upon the full scope of TSS mitigation claimed to be accomplished with respect to the entire Quarry. However, the Turn Lane Project will be

[4] *See* Attachment A to this Brief (July 31, 2024 Motion to Overturn regarding approval of 2024 Quarry WPAP application).

undertaken and completed prior to the Quarry activities with which the asserted mitigation will be implemented. Such mitigation of the impacts of separate activities at a later time does not demonstrate that the measures implemented in association with the Turn Lane Project accomplish "equivalent protection" as would the application of the full scope of Chapter 213 to the Turn Lane Project. If the Turn Lane Project was not exempted from the requirements of Chapter 213, then the required mitigation of the pollutant impacts of the project would be accomplished at the time of the project while directly addressing the impacts of the project, achieving a greater level of water quality protection than the exception request results in.

V. The Exception Request does not adequately address the sensitive geology at the site.

A key goal of Chapter 213 is the prevention of contamination of the Edwards Aquifer by the protection of sensitive features where recharge is heightened, by the Turn Lane Project exception request does not adequately ensure protection of such features. The geologic assessment accompanying the exception request only identified three existing storm drain lines located beneath the pavement as "sensitive features."

Yet, the geologic units which outcrop at the site of the Turn Lane Project include the basal nodular, dolomitic and Kirschberg members of the Kainer Formation. These units are characterized by karst development, with sinkholes and caves developed as vertical shafts within the dolomitic unit, and extensive cave formation characterizing the basal nodular member of the Kainer formation. These characteristics of the underlying geology

render the location extremely sensitive to pollution, and that special sensitivity has not been addressed.

VI. The full scope of contaminants produced by the Turn Lane Project have not been addressed.

The construction of the proposed turn lanes will not merely result in additional TSS runoff from the turn lane project area. The construction of the roadway will concentrate stormwater runoff which will carry oil, fuel, heavy metal and sediments directly into recharge features, creeks and ultimately the Edwards Aquifer. The BMPs proposed do not address these various types of contaminants that the turn lanes will produce.

VII. The identified best management practices alone are insufficient.

The BMPs proposed by Vulcan are assumed to be adequate based upon generalized assumptions that were not developed in consideration of Karst settings such as the setting where Vulcan proposes to undertake the Turn Lane Project. There has been no verification that such measures are effective within the karst environment setting present at this location.

VIII. Conclusion

For the reasons listed above, PHCE requests that the TCEQ Commissioners grant this Motion, reverse the Executive Director's decision, and deny Vulcan's requested exception.

Respectfully submitted,

/s/ Eric Allmon
Eric Allmon
State Bar No. 24031819
eallmon@txenvirolaw.com

PERALES, ALLMON & ICE, P.C.
1206 San Antonio Street
Austin, Texas 78701
512-469-6000 (t) | 512-482-9346 (f)

Counsel for PHCE

CERTIFICATE OF SERVICE

By my signature, below, I certify that on March 9, 2026, a true and correct copy of the foregoing document was served via electronic mail.

/s/ Eric Allmon
Eric Allmon

FOR THE APPLICANT:
Barton Chevreaux
Vulcan Construction Materials, LLC
10101 Reunion Place, Ste. 500
San Antonio, Texas 78216
chevreauxb@vmcmail.com

Jean Autrey, P.E., CESSWI
Pape-Dawson Engineers, Inc.
2000 NW Loop 410
San Antonio, Texas 78213
JAutrey@pape-dawson.com

FOR THE EXECUTIVE DIRECTOR:
Monica Reyes, Section Manager
TCEQ Edwards Aquifer Protection Program
P.O. Box 13087, MC-R11
Austin, Texas 78711-3087
Monica.Reyes@tceq.texas.gov

Amy Browning, Acting Deputy Director
TCEQ Environmental Law Division
P.O. Box 13087, MC-173
Austin, Texas 78711-3087
amy.browning@tceq.texas.gov

FOR THE OFFICE OF PUBLIC INTEREST COUNSEL:
David Timberger, Acting Public Interest Counsel
Eli Martinez, Senior Attorney
TCEQ Office of Public Interest Counsel
P.O. Box 13087, MC-103
Austin, Texas 78711-3087
david.timberger@tceq.texas.gov
Eli.martinez@tceq.texas.gov

Attachment A

TCEQ DOCKET NO. 2024-1115-EAQ
PROGRAM ID NO. 13001906

IN THE MATTER OF THE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN BY VULCAN CONSTRUCTION MATERIALS, LLC	§ § § § § § §	**BEFORE THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

PRESERVE OUR HILL COUNTRY ENVIRONMENT AND PRESERVE OUR HILL COUNTRY ENVIRONMENT FOUNDATION'S MOTION TO OVERTURN EXECUTIVE DIRECTOR'S DECISION

TO THE HONORABLE CHAIRMAN AND COMMISSIONERS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY:

The Executive Director's effective approval of Vulcan Construction Materials, LLC's Water Pollution Abatement Plan for the Vulcan Comal Quarry (the "Quarry") constituted a taking of property from members of Preserve Our Hill Country Environment Foundation ("PHCE"), deprived those members of due process as a result of TCEQ's failure to provide notice and a meaningful opportunity to participate in the decision, and violated TCEQ's own rules. Thus, pursuant to 30 Tex. Admin. Code § 50.139, PHCE files this Motion to Overturn the ED's decision approving Vulcan's WPAP.

I. Movant is affected by Vulcan's WPAP in a manner distinct from the general public.

Preserve Our Hill Country Environment is a 501(c)(4) organization whose mission is to preserve, protect, and restore the land, water, air, wildlife, unique features, and quality of life in the Texas Hill Country from the aggressive and insufficiently regulated expansion of the aggregate industry. Preserve Our Hill Country Environment Foundation is a Texas

501(c)(3) nonprofit which conducts research on environmental hazards in the surrounding areas; educates communities on the preservation of natural resources; and advocates for the development of environmental protection legislation and regulations.

Members of PHCE are affected by Vulcan's WPAP in a manner distinct from the general public due to the close proximity of their homes to the proposed Vulcan Quarry and its possible impact on the groundwater underlying their property, as described in detail below. PHCE submitted timely comments on the proposed WPAP.[1]

Milann Guckian is a founder and board member of PHCE and PHCE Foundation. Ms. Guckian resides at Durst Ranch 1, Lot 1, Acres 5.01/30954 FM 3009 New Braunfels, Texas 78132, and her property's fence line is 107.02 feet from Vulcan's eastern fence line.

- Her front porch is 258.01 feet from Vulcan's fence line.
- Her front porch is 358.16 feet from the applicant Mining Area #7.
- Her water well that serves as the exclusive source of water for her property is approximately 4800 – 5000 feet from Vulcan's industrial water well.

[1] PHCE and PHCE Foundation Comments on WPAP (Attachment A).

Figure 1, showing Ms. Guckian's fence line (foreground) 107 feet from Vulcan's fence line.[2]

[2] Picture taken by Milann Guckian (*see* Attachment B, Guckian Comments on WPAP).

Figure 2, showing Ms. Guckian's fence line (foreground) 151 feet from her fence line.[3]

[3] Picture taken by Milann Guckian (*see* Attachment B).

Figure 3, Map showing distance of 107 feet from Vulcan's property line to Ms. Guckian's property line.

Ms. Guckian and her wife purchased this property in April 1996 with a dream and a vision. The dream was to build a home and retire to the Texas Hill Country. Now, her home and her quality of life are threatened by the inappropriate location of Vulcan's quarry.

For this reason, Ms. Guckian has spent approximately the last 7 years grassroots organizing, researching, commenting on Vulcan's TCEQ applications, and pursuing legal action to stop the Vulcan quarry.[4] She has used her experience as a retired lead technician in refinery operations at Valero Energy to conduct significant technical and legal research

[4] *See Preserve Our Hill Country Environment*, https://www.preserveourhillcountry.org/.

on the Vulcan Quarry. Ms. Guckian submitted timely technical comments on the proposed WPAP.[5] She also submitted a timely Motion to Overturn the issuance of Vulcan's WPAP.[6] Ms. Guckian is extremely concerned about the impact of the Vulcan quarry on the groundwater below her property and the underlying aquifers.

Jacques M. Olivier resides at 1509 Cabernet, New Braunfels, Texas, 78132, approximately 2.3 miles from the fence line of the Vulcan property. Mr. Olivier is a board member of PHCE and PHCE Foundation. He is also a retired a professional geologist who has committed extensive time to research the impact of the Vulcan Quarry on his community and its underlying aquifers, publishing several articles on this issue.[7] Mr. Olivier has also given public testimony on legislative bill HB-3883, the TCEQ's Sunset Review (2022-23), and provided information used by the Interim Committee on APOs.[8] He is extremely concerned about the impact of the Vulcan Quarry on the groundwater below his property and the underlying aquifers. Mr. Olivier is also concerned about the impact of the Vulcan Quarry on Texas Water Company's 40 Trinity wells that currently provide water to his property.[9] Kira M. Olson resides at 245 Saur Road, Bulverde, Texas

---

[5] Attachment B.
[6] Milann and Prudence Guckian's Motion to Overturn Executive Director's Decision (July 31, 2024) (Attachment C).
[7] Affidavit of Jacques M. "Jack" Olivier (Attachment D). (Mr. Olivier has published several articles related to the impact of quarries in Comal County, including two Local Guest Columns in the *Herald-Zeitung* (a New Braunfels newspaper): a September 19, 2019 article titled *Quarries pose a risk to local caves, water* and a June 8, 2024 article titled *Vulcan Quarry many not get public meeting*, which are attached as Exhibit 2 and Exhibit 3 to his affidavit, respectively). Mr. Olivier also submitted comments on the WPAP (Attachment E).
[8] *See id.* (legislative testimony attached as Exhibit 4 to his affidavit).
[9] Texas Water Company provides water to the Vintage Oaks Subdivision across State Highway 46 West from Vulcan and submitted comments and a hearing request on the WPAP, stating its concern that "[t]he location of this plant's operations is in close proximity to groundwater wells owned by Texas Water and poses a potential threat to the healthy operation of those wells." Bobby M. Salehi Comments and Hearing Request on behalf of the Texas Water Company (Apr. 22, 2024) (hereinafter, "TWC Comments on Vulcan's WPAP") (Attachment F).

78163, and her property shares a fence line with Vulcan on the southwest side of Vulcan's property. Ms. Olson is a founder and board member of PHCE and PHCE Foundation. Ms. Olson submitted timely comments on the proposed WPAP. She is extremely concerned about the impact of the Vulcan Quarry on the groundwater below her property, on water well located less than 600 feet from the Vulcan fence line, and on the underlying aquifers.

Terry Lee Olson resides at 414 Saur Road, Bulverde, Texas 78163, and his property shares a fence line with Vulcan on the southwest side of Vulcan's property. Mr. Olson is a board member of PHCE and PHCE Foundation. He is extremely concerned about the impact of the Vulcan Quarry on the groundwater below his property, on his water well located approximately 750 feet from the Vulcan fence line, and on the underlying aquifers. Elizabeth May James resides at 30838 FM 3009, New Braunfels, Texas 78132, and her property's fence line is 108 feet from Vulcan's eastern fence line. Mr. Olson is a founder and board member of PHCE and PHCE Foundation. She is extremely concerned about the impact of the Vulcan Quarry on the groundwater below her property, on her water well located approximately 289 feet from the Vulcan fence line, and on the underlying aquifers.

Donald E. Everingham Jr. resides at 601 Pfeiffer Road, Bulverde, Texas 78163, and his property is located approximately 0.9 miles southwest of Vulcan. Mr. Olson is a board member of PHCE and PHCE Foundation. Mr. Everingham is a retired engineer and has spent extensive time studying the Vulcan Quarry.[10] He is extremely concerned about the

[10] *See* Declaration of Don Everingham (Attachment G). Mr. Everingham also submitted comments on the WPAP (Attachment H).

impact of the Vulcan Quarry on the groundwater below his property, on his water well, and on the underlying aquifers.

For these reasons, the members of PHCE are affected by Vulcan's WPAP in a manner distinct from the general public due to the close proximity of their homes to the proposed Vulcan Quarry and its possible impact on the groundwater underlying their property

II. TCEQ's Approval of the WPAP authorizes an activity which will pollute and drain groundwater owned by area landowners without compensation, thereby constituting an unconstitutional taking.

In Texas, landowners have a vested property right in groundwater beneath their land. Tex. Water Code § 36.002(a) ("The legislature recognizes that a landowner owns the groundwater below the surface of the landowner's land as real property."); *see also Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 833 (Tex. 2012). Landowners are further entitled to their "fair share" of groundwater. *Stratta v. Roe*, 961 F.3d 340, 357 (5th Cir. 2020). Landowners therefore "have a constitutionally compensable interest in groundwater," where a taking of groundwater without due process is prohibited under the U.S. and Texas Constitutions. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 838 (Tex. 2012); *Stratta v. Roe* at 357 (5th Cir. 2020).

As further described below, the Commission's decision to approve Vulcan's WPAP constitutes the authorization of an activity which would result in the contamination of groundwater beneath nearby properties by various contaminants, in violation of TCEQ Rule 213.5(b)(4)(B)(i)-(iv). This contamination of area groundwater owned by nearby landowners will reduce—and potentially destroy—the usefulness of that groundwater for

purposes such as domestic and livestock uses. The authorization of such a destruction in the value of groundwater owned by nearby landowners, without compensation, constitutes a taking in violation of the Fifth Amendment Rights of nearby landowners. The Commission's approval of the WPAP also has the impact of authorizing an activity which will result in an increased withdrawal of groundwater. As described in detail below, if Vulcan uses groundwater to operate the quarry, nearby landowners may be deprived of the opportunity to produce their "fair share" of groundwater, which would constitute an unlawful taking.

The Vulcan WPAP does not consider the amount of water needed to maintain operations at permissible dust levels, nor does it identify where that water is going to come from. Vulcan has not secured water from the Texas Water Company, so it can be concluded water required to support quarry development and production operations will be acquired from an existing on-site well or future to-be-drilled and completed wells. The February 20, 2024, and July 3, 2024, versions of the Pape-Dawson Exhibit 1 and Exhibit 3 site development drawings submitted as part of the WPAP, show a Water Well (potable) near the Main Office, a Water Well (Industrial) in Mining Area 2, and a Water Well (Industrial) near the Fuel Island. These wells currently do not exist. It is further noted an existing well "S-1" is next to proposed Primary Pond "B1" and is the well Blue Pine Holdings LLC well drilled in late 2016 - early 2017. State of Texas Well Report #439830 for "S-1" noted: "*Well Tests: Estimate: 150 GPM*". No details of an actual well test was included in the report, so the 150 GPM is not "proven". The well was not completed and is not abandoned.

An estimate based on the amount of material to be quarried shows that the proposed quarry would potentially use approximately 383 acre-ft (125,000,000 gallons) of groundwater per year.[11] This is a massive amount of groundwater use that would have extensive impacts on the surrounding area and landowners in violation of state law and regulations, as described in detail below.

In addition to the impact of the quarry upon the property value of individual landowners, the quarry will have a broad economic impact upon the community. Comal County's tourism and hospitality industry, which is based on water-related activities, generated over $1.3 billion in revenue according to a 2023 economic impact study done by Impact Datasource.[12] The proposed quarry will compromise the availability of water to support such activities.

Also, the quarry could lead to a significant decrease in the property values and the county's tax base. The Quarry is being proposed in an area with high-dollar property and home values. This will potentially significantly adversely impact the value of those nearby properties. For properties located 0 to 5 miles from a quarry fence line, the potential decrease in property value is in excess of 27% based on a study by the W.E. Upjohn

[11] Don Everingham Declaration (Attachment G); Smith, 2024 at 12.
[12] Blaine Young, *$1.3 billion in economic impact last year came from New Braunfels' hospitality industry*, HERALD-ZEITUNG (July 26, 2024) (updated July 28, 2024), https://herald-zeitung.com/news/1-3-billion-in-economic-impact-last-year-came-from-new-braunfels-hospitality-industry/article_f772d4da-4b86-11ef-b07b-1f7b828462f8.html.

Institute.[13] The Quarry provides no offsetting benefit, since Vulcan does not contribute high-paying jobs to the area economy.

For these reasons, the ED's decision was arbitrary and capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements.

III. The ED's approval of Vulcan's WPAP violated the federal constitutional due process rights of area landowners, and the Texas due course of law rights of area landowners, since the decision was made without providing area landowners with notice and meaningful opportunity to be heard.

It is well established in that the fundamental requirement of procedural due process under the United States Constitution is the opportunity to be heard "at a meaningful time and in a meaningful manner." *Armstrong v. Manzo*, 380 U.S. 545, 552 (1965); *Matzen v. McLane*, 659 S.W.3d 381, 392 (Tex. 2021). The protections of the right to due course of law under the Texas Constitution are at least as broad as those afforded under the due process clause of the United States Constitution. *Am. Precision Ammunition, L.L.C. v. City of Mineral Wells,* 90 F.4th 820, 828 (5th Cir. 2024) *citing Mosley v. Tex. Health & Human Services Comm'n,* 593 S.W.3d 250, 264 (Tex. 2019). Furthermore, due process requires that parties are given "an opportunity to present their objections; and the notice must be of such nature that it reasonably conveys the required information, and must afford a reasonable time for those interested to make their appearance." *Mullane v. Cent. Hanover Bank & Tr. Co.*, 339 U.S. 306, 314 (1950). Under the U.S. and Texas Constitutions, individuals are entitled to notice of government action that deprives the person of a

[13] George Erickcek, *An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mines*, W.E. UPJOHN INSTITUTE FOR EMPLOYMENT RESEARCH (Aug. 15, 2006), https://research.upjohn.org/cgi/viewcontent.cgi?article=1225&context=reports.

property right. U.S. Const. Amend. 14; Tex. Const. art. 1, § 19. When a party is deprived of their due process rights through lack of notice, this in turn affects the ability of other parties to meaningfully participate.

In this case, the public was not provided with a meaningful opportunity to comment and be heard concerning Vulcan's WPAP because the public did not receive notice of the WPAP, and meaningful participation was deprived as a result of the lack of any response to public comment. This lack of notice also affected PHCE's ability to benefit from the comments of other aligned parties and meaningfully participate in protesting Vulcan's WPAP.

The WPAP review and approval process does not include any notice to area landowners, who possess impacted groundwater. Furthermore, no public meetings are required to review WPAP applications, despite the fact that other TCEQ water permits such as TPDES and TLAP are routinely given public meetings when sufficient public support is demonstrated or when a request is made by a state or local official.

Even for those who managed to learn about Vulcan's pending WPAP application, the TCEQ failed to provide a meaningful opportunity to participate in the decision-making process. The 30-day comment period is too short for a very technical and lengthy quarry application like the 149-page Vulcan WPAP. As a result, the general public had insufficient time to consult scientific experts to help prepare detailed technical responses. Furthermore, the Executive Director does not respond to public commentors in writing as it does for other permits. This process failed to engage with the public in any meaningful way and enables TCEQ to simply ignore public comments.

Notably, the motion to overturn process does not somehow cure the deficiencies in the process adopted. The ED's decision to approve Vulcan's WPAP is already effective, and Vulcan can already exercise the rights contingent on approval of that WPAP. The denial of a public meeting despite written requests by several political leaders, groups and affected citizens does not provide a meaningful opportunity to participate in the TCEQ's decision on whether to approve Vulcan's WPAP.

For the reasons described above, landowners near the Vulcan quarry were denied procedural due process under the U.S. Constitution, and due course of law rights under the Texas Constitution. Therefore, the approval of the WPAP was arbitrary and capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements.

IV. The ED's approval of Vulcan's WPAP was in error because the WPAP failed to comply with several statutory and regulatory requirements.

A. The Vulcan Quarry WPAP is not consistent with the Edwards Aquifer Protection Plan regulations.

The TCEQ's rules governing Edwards Aquifer Protection Plans are in place to protect existing and potential uses of groundwater and maintain the Texas Surface Water Quality Standards. The goals clearly articulate that existing groundwater quality not be degraded:

1) Consistent with Texas Water Code, §26.401, the goal of this chapter is that the existing quality of groundwater not be degraded, consistent with the protection of public health and welfare, the propagation and protection of terrestrial and aquatic life, the protection of the environment, the operation of existing industries, and the maintenance and enhancement of the long-term economic health of the state.
2) Nothing in this chapter is intended to restrict the powers of the commission or any other governmental entity to prevent, correct, or curtail activities that result or may

> result in pollution of the Edwards Aquifer or hydrologically connected surface waters. In addition to the rules of the commission, an applicant may also be required to comply with local ordinances and regulations providing for the protection of water quality.

30 Tex. Admin. Code § 213.1.

In other words, the TCEQ has the authority to prevent activities that will result in pollution of the Edwards Aquifer or that it deems may result in pollution to the Edwards. Vulcan's Application does not demonstrate that its WPAP will prevent pollution of the Edwards, as described in more detail and supported by several expert opinions below. For these reasons, the WPAP is not compliant with Chapter 213, and therefore the ED's decision was arbitrary and capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements. Movants request the TCEQ Commissioners grant this Motion and reverse the ED's decision.

B. The Vulcan Quarry site is located in an environmentally sensitive area, and the WPAP grossly underestimates the potential pathways to the Edwards Aquifer.

As shown in the Application, the proposed Vulcan quarry operations will occur on an area approximately 1,515 acres in size, with the mining area of approximately 956 acres. Vulcan plans to extract rock from the Kainer (Edwards Group) and Upper Member of the Glen Rose (Trinity Group) Formations. The property contains a 100-year floodplain and is entirely within the Edwards Aquifer Recharge Zone, as shown by Figure 4 below:

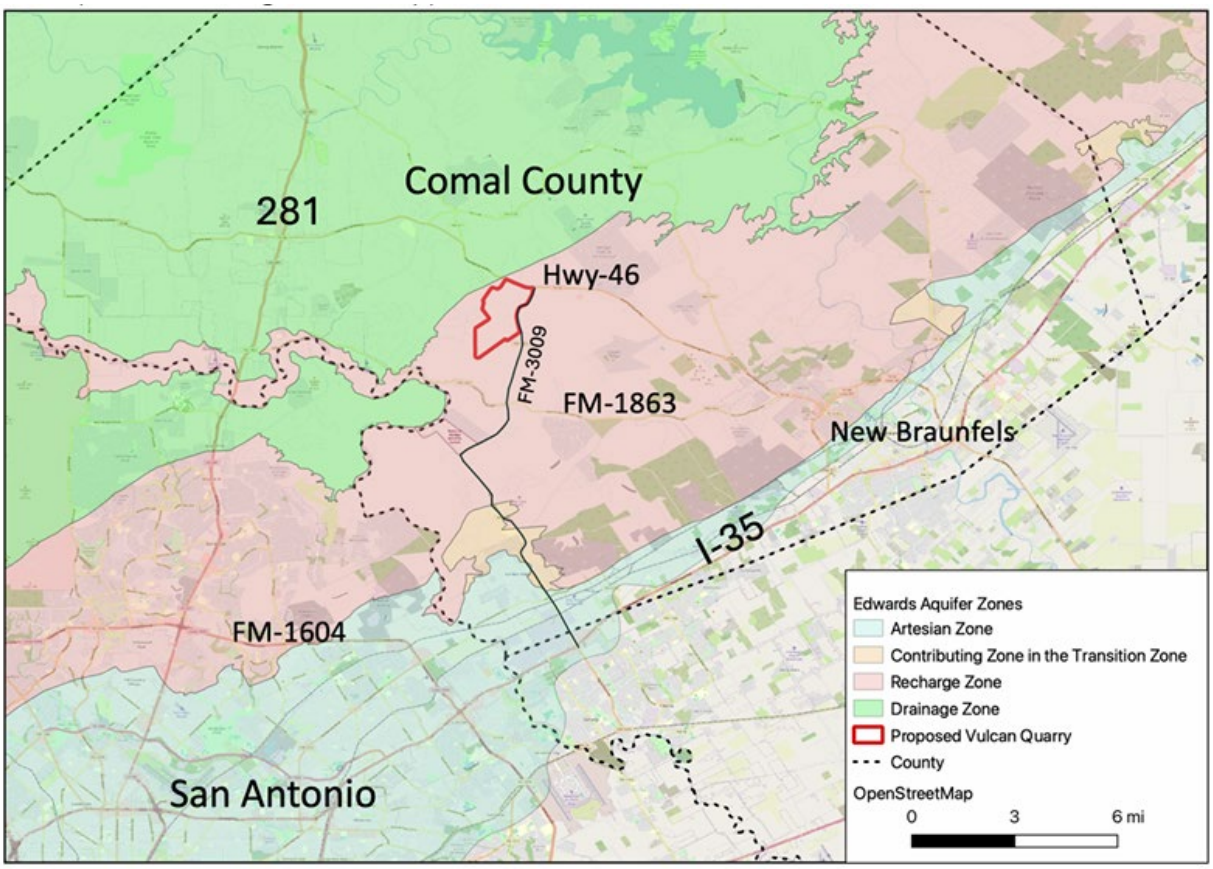


Figure 4, Demonstrating that Vulcan's Property is entirely within the Edwards Aquifer Recharge Zone[14]

Furthermore, only 37 sensitive (recharge) features have been documented on the proposed property, 12 of which are categorized as wells or manmade boring holes. professional geoscientist and hydrologist Dr. Brian A. Smith found that number of documented features appears anomalously low when compared to the fact that a 158-acre tract directly to the north across Highway 46 contained 38 identified sensitive features—

[14] Brian A. Smith, Ph.D., *Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas* (2024) (hereinafter "Smith, 2024") at 1; *see also* Affidavit of Dr. Brian A. Smith (included here as Attachment I).

nearly the same number, but on a property approximately 1/10 the size.[15] This discrepancy calls into question the accuracy of the required geologic assessment.[16] Eventually, much of this water will reach downgradient water-supply wells and springs,[17] as shown in Figure 5 below.

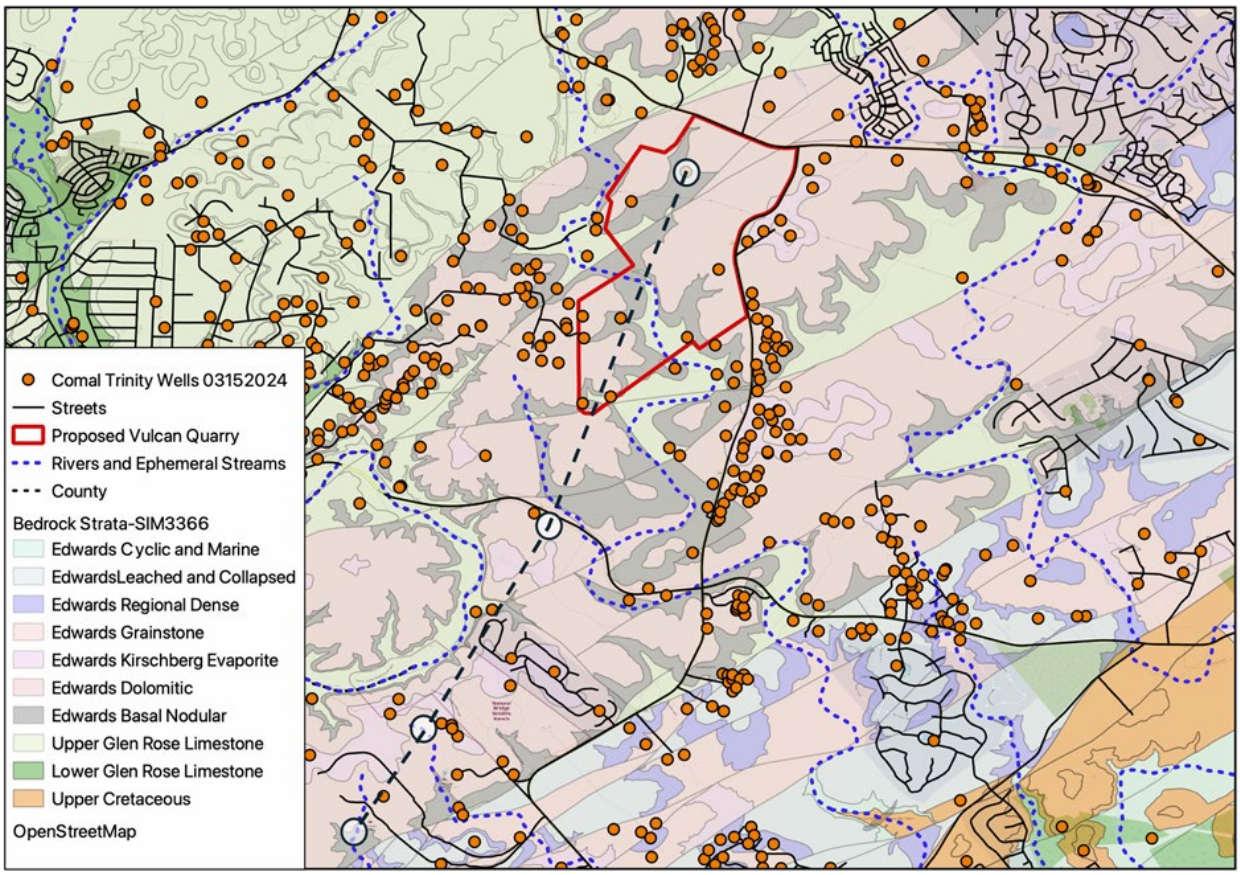


Figure 5, Geologic Map of Central Comal County Showing Water-Supply Wells[18]

In addition, Texas Water Company, which provides water to the nearby Vintage Oaks Subdivision, submitted comments and a hearing request on the WPAP, stating its

[15] Smith, 2024 at 7.
[16] *Id.*
[17] *Id.* at 1.
[18] Smith, 2024 at 2.

concern that "[t]he location of this plant's operations is in close proximity to groundwater wells owned by Texas Water and poses a potential threat to the healthy operation of those wells."[19] Texas Water Company supplies water from taken 40 Trinity wells and from Canyon Reservoir.

Pursuant to 30 Tex. Admin. Code § 213.5(b)(3), the applicant's geologic assessment "must identify all potential pathways for contaminant movement to the Edwards Aquifer." This requirement was not met. Due to the lithologies beneath the proposed quarry site, contaminants will have a very direct and rapid impact on the underlying aquifer.[20] As explained below, there is also concern that contaminated water will make its way to Comal Springs,[21] which is habitat of several, federally protected, endangered aquatic species.

Vulcan failed to identify the numerous potential pathways for contamination that would be created by the massive excavation which it plans to undertake as part of the authorized quarrying activity.

Furthermore, geologist and PHCE Foundation Board Member Jack Olivier found during a review of Vulcan's WPAP that TCEQ's January 2012 Best Management Practices ("BMPs") for Quarry Operations are outdated, including a method of ranking sensitive karst features.[22] TCEQ's BMPs are no longer current with modern scientific work done by

---

[19] Bobby M. Salehi Comments and Hearing Request on behalf of the Texas Water Company (Apr. 22, 2024) (included here as Attachment F).
[20] Smith, 2024 at 10.
[21] *Id.* at 9.
[22] *See* Affidavit of Jack Olivier (citing TCEQ RG-500, https://www.tceq.texas.gov/downloads/compliance/publications/rg/rg-500.pdf) (Attachment D).

the Edwards Aquifer Authority and other scientific agencies.[23] The TCEQ's Geologic Assessment method of ranking the sensitivity of karst features protects only cave openings and some sinkholes, leaving many other feature types unprotected.[24] The Relative Infiltration Rate, a critical factor in rating a feature's ability to transmit surface water to the subsurface, is based solely on professional judgement and not scientific evidence.[25] Furthermore, a 2010 study by the Edwards Aquifer Authority using dye-tracing found that in the Edwards Aquifer Recharge Zone in Bexar County, Texas, surface pollution can quickly enter the aquifer *without any visible karst features being present*.[26] In fact, Mr. Olivier studied a diesel spill in January 2000 at a quarry site in Comal County and found that diesel contaminated the Edwards Aquifer despite no visible karst features in the area, and contamination from the spill was detected in Comal and Hueco Springs located 4.5 and 6.5 miles away. Based on this evidence of Edwards Aquifer contamination in the recharge zone occurring without any visible karst features, Mr. Olivier concluded that the *entire* Edwards Aquifer Recharge Zone is "sensitive."[27]

For all these reasons, the Executive Director's decision to approve Vulcan's WPAP does not comply with Rule 213.5(b)(3), and therefore, the ED's decision was arbitrary and

---

[23] *Id.*
[24] *Id.*
[25] TCEQ RG-500 at 11, https://www.tceq.texas.gov/downloads/compliance/publications/rg/rg-500.pdf.
[26] Affidavit of Jack Olivier (Attachment D) (citing Steve Johnson et al., *Tracing Groundwater Flowpaths in the Edwards Aquifer*
Recharge Zone, Panther Springs Creek Basin, Northern Bexar County, Texas, Edwards Aquifer Authority, Report No. 10-01 (May 2010), https://www.edwardsaquifer.org/doc_publications/tracing-groundwater-flowpaths-in-the-edwards-aquifer-recharge-zone-panther-springs-creek-basin-northern-bexar-county-texas%EF%BF%BD%EF%BF%BD/).
[27] Affidavit of Jack Olivier (Attachment D).

capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements. Movants request the TCEQ Commissioners grant this Motion and reverse the ED's decision. In the event that the Executive Director's decision to approve Vulcan's WPAP is not overturned, a dye-trace study should be conducted to determine flow paths of groundwater from the site and to determine which downgradient wells might be impacted by contaminants coming from the quarry, as recommended by Mr. Olivier.[28]

C. The Application does not demonstrate that the quarry bottom will not reach the aquifer beneath, thereby directly contaminating groundwater.

The revised Application states that the Mining Areas will not be mined below 1047 ft-msl.[29] TCEQ's BMPs require a 25' separation distance between the floor of the quarry and groundwater.[30] This requirement is "based on the maximum propagation of fractures from blasting operation"[31] and is meant to afford some protection from mining impacts to the Edwards Aquifer, particularly in the Recharge Zone.

The WPAP does not provide any explanation or factual reference for a quarry floor base elevation of 1047 ft-msl but simply indicates that because it will take 5 to 10 years for the mining activities to reach that level, its proposal is to monitor the local water levels at the local wells and determine how those water levels correlate to established monitored water levels offsite. As Dr. Smith found, this monitoring plan is not, from a hydrology perspective, an adequate substitute for evaluating water levels *before* obtaining the

---

[28] Smith, 2024 at 12; *see also* Affidavit of Jack Olivier (Attachment D).
[29] General Information Form (TCEQ-0587): Attachment C at 2.
[30] TCEQ RG-500: TCEQ Best Management Practices for Quarry Operations (Jan. 2012) at 2. https://www.tceq.texas.gov/downloads/compliance/publications/rg/rg-500.pdf.
[31] *Id.*

requisite WPAP.[32] This monitoring plan is also inconsistent with TCEQ's BMPs. Thus, the authorized excavation depth, and the monitoring plan used to justify that depth, fail to meet the requirements of 30 Tex. Admin. Code §§ 213.5(b)(4)(B)(i), (ii), and (iii).

In fact, available water level data from several wells within 600 ft of the Vulcan property boundary shows water levels greater than 1022 ft-msl. *See* Figures 6 and 7 below.

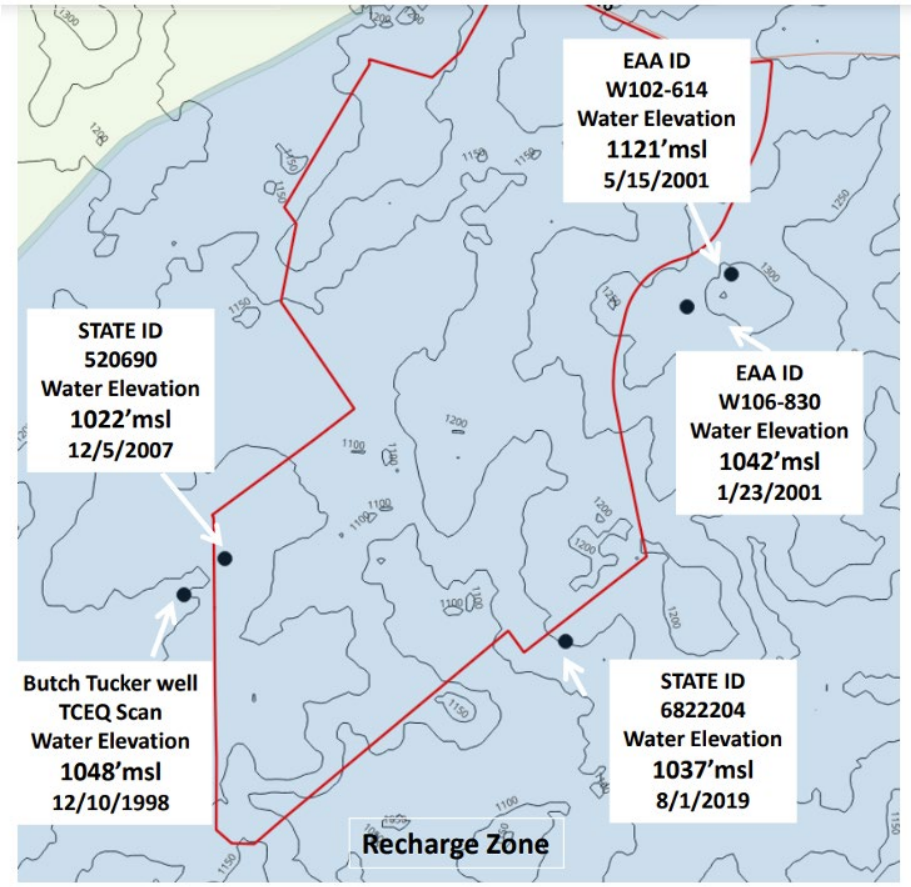


Figure 6, Water Elevation in Wells Near Vulcan[33]

[32] Smith, 2024 at 12.

[33] Base map and data from the Texas Water Development Board Groundwater Database, https://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp; *see* Declaration of Dr. James David Doyle (Attachment J).

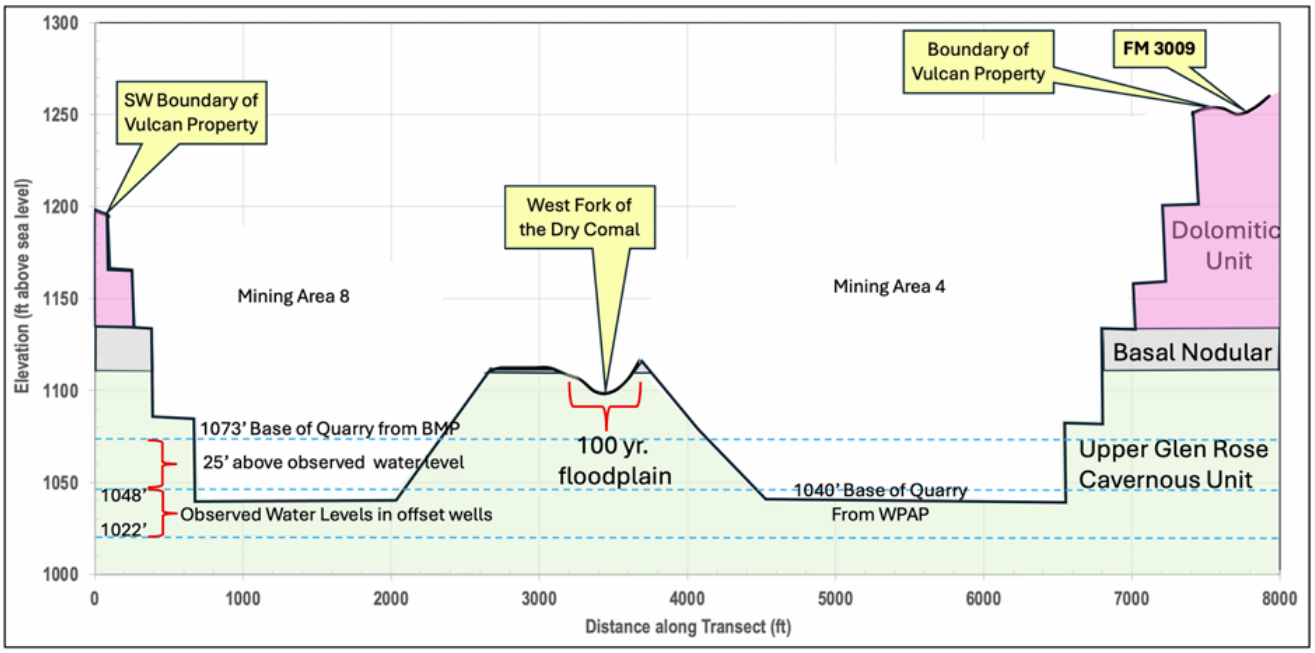


Figure 7, Schematic Cross Section with Estimated Topography after Mining and Water Levels based on Available Data[34]

Dr. Smith, along with geologist Dr. Jim Doyle, found that this data demonstrates that the proposed 1047 ft-msl mining floor may lead to increased infiltration of contaminants to the Edwards Aquifer.[35] The aquifer level at any point in time will be determined by a combination of water recharge and withdrawal. Because the water level in this area has exceeded the 1022 ft-msl level four times in 21 years, there is no reason to think it will not happen again over the expected 65 to 90-year life of the quarry.[36] In the period from 1990 to 2024, the 25 ft standoff approved by the Executive Director would

[34] Smith, 2024 at 11.
[35] Smith, 2024 at 12; Declaration of Dr. James David Doyle (Attachment J).
[36] Declaration of Dr. James David Doyle (referencing data from the Texas Water Development Board Groundwater Database). Dr. Doyle also submitted comments on the WPAP (Attachment K).

have been violated four times.[37] The Vulcan quarry floor likely would have been flooded two times, directly contributing pollutants to the Edwards Aquifer.[38]

Such concerns have been experienced at one of Vulcan's other quarry sites, with the Vulcan Quarry near Loop 1604 having previously breached the Edwards Aquifer.

In addition, the proposed a mining pit located in the recharge zone qualifies as a "manmade feature in basement (MB)" which is considered to be sensitive according to the TCEQ rules for sensitive features.[39] Just as with caves, large sinkholes, and wells, these features are required to be protected in order to prevent pollution of the aquifer. Such protection is not provided in the WPAP, particularly given the nearness of the pit floor to the water table.

Because Vulcan's excavation depth and well monitoring plan does not comply with 30 Tex. Admin. Code §§ 213.5(b)(4)(B)(i)-(iii), and therefore, the ED's decision was arbitrary and capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements. The ED's decision to approve the WPAP should therefore be overturned.

D. The WPAP wholly fails to account for blasting processes as a potential source of contamination, as required.

As an initial matter, Vulcan's "Project Description" states that there is a proposed buffer zone of only 100 feet adjacent to all neighboring properties. (As a preliminary

---

[37] *Id.*
[38] *Id.*
[39] *TCEQ-0585-Instructions: Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones*, (Revised Oct. 1, 2004), https://www.tceq.texas.gov/downloads/permitting/edwards-aquifer/forms/f-0585-geologic-assessment-instructions.pdf.

matter, this buffer zone is insufficient to protect those properties.) Vulcan's "Project Description" also acknowledges that blasting agents will be utilized in the mining process, however, the WPAP does not identify the types of blasting agents or include any plan to control their release.[40] In fact, the description contains very little information about the blasting method and potential contaminants period.

Pursuant to 30 Tex. Admin. Code § 213.5(b)(4)(A)(iv), the WPAP must include a technical report that "must describe any activities or processes which may be a potential source of contamination." The Application includes only a general description of the quarry process:

- Clear
- Strip
- Drill
- Blast
- Load into haul vehicles
- Haul to plant
- Process rock at plant
- Load to trucks for export.[41]

However, in identifying the potential sources of contamination, the Application only identifies temporary sources during construction and potential sources that may affect stormwater discharges from the site after development.[42] But Rule 213.5(b)(4)(A)(iv) does not allow for such a limited consideration.

---

[40] General Information Form (TCEQ-0587): Attach. C at 1-2.
[41] General Information Form (TCEQ-0587): Attach. C at 2.
[42] *See* WPAP Application Form (TCEQ-0584): Attach. A at 1; Temporary Stormwater Section (TCEQ-0602): Attach. B.

Elsewhere, Rule 213.5 makes the distinction between contaminants generated only during construction or contaminants that may flow across the site and then flow offsite, as well as the distinction between contaminants of surface water, groundwater, and stormwater. *See, e.g.*, 30 Tex. Admin Code § 213.5(b)(4)(B) (distinguishing between BMPs to be used during and after construction and BMPs to prevent pollution of surface, groundwater, and stormwater). In other words, the requirement to describe activities and processes which may be a potential source of contamination is broad.

Furthermore, TCEQ requires that "BMPs and measures must prevent pollutants from entering surface streams, sensitive features, or the aquifer." 30 Tex. Admin Code § 213.5(b)(4)(B)(iii). Vulcan's BMPs do not recognize the threat of nitrate (NO_3) pollution to underlying aquifers caused by the type and large quantities of explosives used in aggregate mining. ANFO, a combination of ammonium nitrate and fuel oil, is a common blasting agent. It is highly soluble in water, and up to 30% of the explosive is not consumed by blasting.[43] Aggregate washing is also a common practice, which can dissolve nitrate and aid its passage into the underlying aquifer. Data from the Texas Water Development Board shows that prior to the mid-1950s, nitrate measurements of well-water samples from the Edwards Aquifer were mostly below 4.4 mg/L NO_3, which was consistent with natural background levels for aquifers.[44] (*See* Figure 8 below.) Since the mid-1950s, nitrate

[43] Neil Alberts, *Tackling nitrate contamination of water in mines*, MINING.COM (Aug. 11, 2016, 9:12 AM), https://www.mining.com/web/tackling-nitrate-contamination-of-water-in-mines/.
[44] Data collected from the Texas Water Development Board Groundwater Database, https://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp.

measurements in the Edwards have risen steadily such that more than half from 2020 to 2022 were greater than 8 mg/L NO_3.[45]

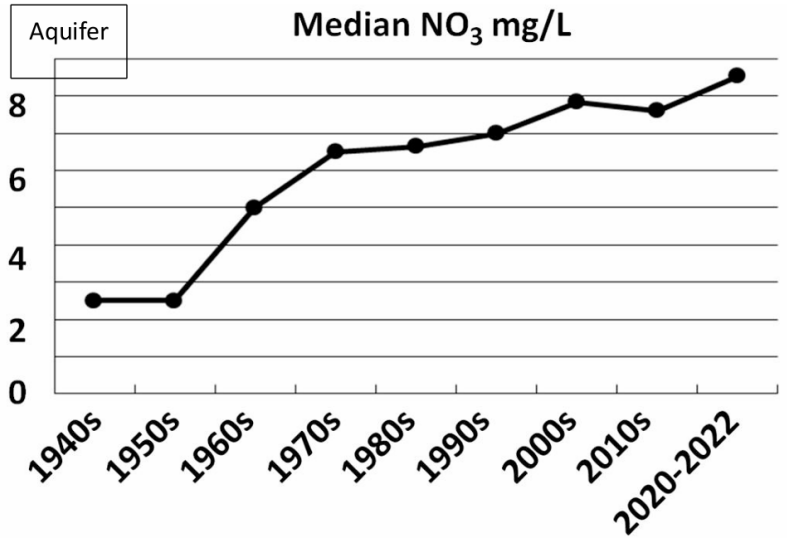


Figure 8, Median Value of Nitrate Measurements in Bexar, Comal, Guadalupe and Hays Counties[46]

Depending on the concentration level, long term exposure to nitrate can be threatening to both humans and aquatic organisms. In particular, prolonged exposure to nitrate levels above the MCL can cause blue-baby syndrome in infants, and pregnant women exposed to high nitrate concentrations may have babies with low birth weights.[47] TCEQ set the ecological screening benchmark for ammonium nitrate in freshwater at 13 mg/L.[48] The EPA set the maximum contamination level ("MCL") for drinking water at 40

---

[45] *Id.*
[46] Chart prepared by Dr. James David Doyle; *see* Declaration of Dr. James David Doyle.
[47] Bryan Swistock, *Nitrates in Drinking Water*, PENNSTATE EXTENSION (updated Aug. 26, 2022), https://extension.psu.edu/nitrates-in-drinking-water; *see also* Declaration of Dr. James David Doyle.
[48] *TCEQ Ecological Screening Benchmarks.xlsx*, (2022), https://www.tceq.texas.gov/remediation/eco (Surface Water Metals, Inorganic tab; nitrate (NO_3) listed in column A, and the Freshwater Chronic Benchmark (mg/L) in column F).

mg/L N as NO_3 (10 mg/L nitrate as N). 40 C.F.R. § 141.62(b)(7). The well data shown in Figure 9 below demonstrates that while nitrate observations above 40 mg/L in the Edwards Aquifer remain relatively rare, levels above 40 mg/L and above the TCEQ ecological screening benchmark tend to be relatively close to quarries. This suggests that well owners whose wells are unfavorably situated near quarries may experience degraded water quality.[49] Texas Water Company also owns wells near Vulcan, including 40 Trinity wells, which supply water to thousands of residents, including those in the nearby Vintage Oaks subdivision.[50] To determine background water-quality conditions, water-supply wells immediately downgradient of the quarry should be sampled and analyzed for nitrates and total petroleum hydrocarbons prior to issuing a permit for the quarry.[51] The Texas Water Company also submitted public comments asking that upon the commencement of any quarry activities a well monitoring program should be required to test for changes in water levels and contaminant levels.[52]

[49] *See* Declaration of Dr. James David Doyle (Attachment J).
[50] Bobby M. Salehi Comments and Hearing Request on behalf of the Texas Water Company (Apr. 22, 2024) (included here as Attachment F).
[51] Smith, 2024 at 12.
[52] Bobby M. Salehi Comments and Hearing Request on behalf of the Texas Water Company (Apr. 22, 2024) (included here as Attachment F).

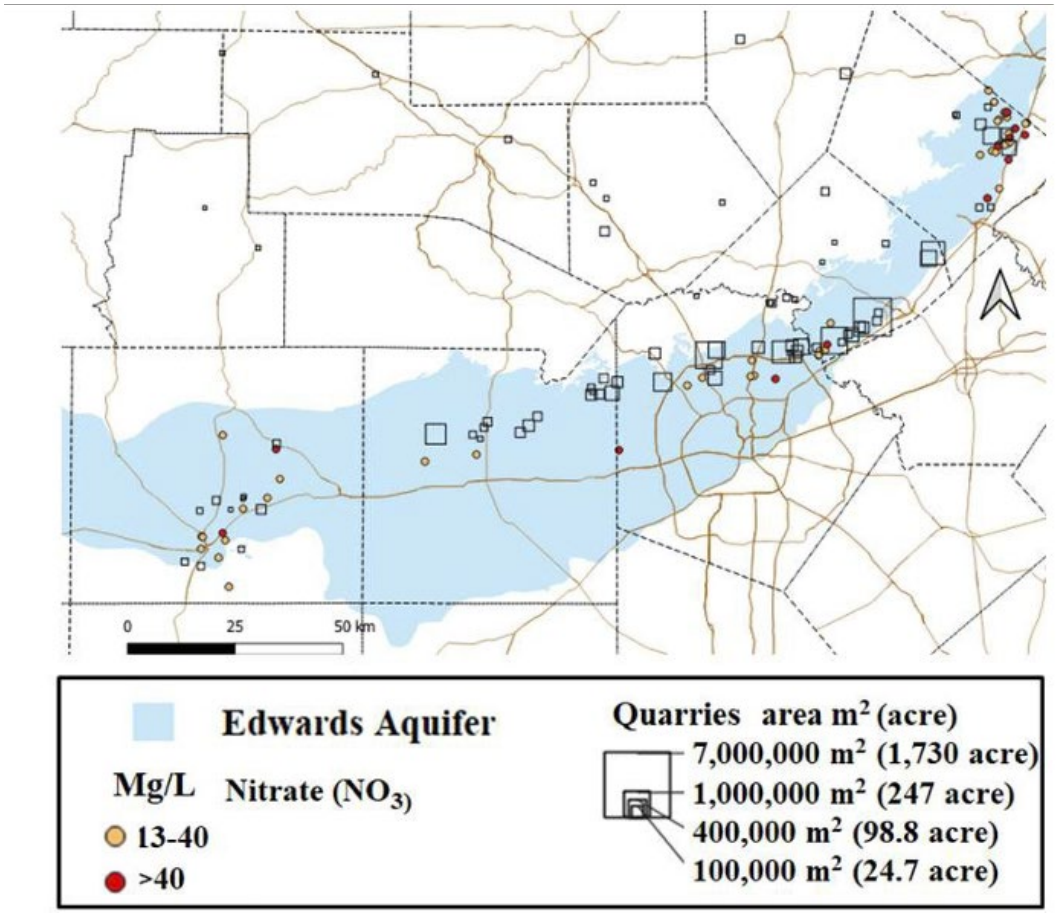


Figure 9, Well Data with Nitrate Measurements above the TCEQ Ecological Screening Benchmark[53]

Vulcan's mining will damage the watershed of the West Fork of Dry Comal Creek.[54] The February 20, 2024, and July 3, 2024, versions of the Pape-Dawson Exhibit 1 and Exhibit 3 site development drawings submitted as part of the WPAP do not identify the location of the West Fork of the Dry Comal Creek which traverses the quarry development from northwest to southeast. The West Fork is normally dry but carries a large amount of

[53] Map prepared by Dr. James David Doyle (base map from TCEQ; data collected from the Texas Water Development Board Groundwater Database, https://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp); *see* Declaration of Dr. James David Doyle.
[54] Affidavit of Jack Olivier.

water during major flood events, which are frequent in the Hill Country area.[55] The West Fork of the Dry Comal Creek is an environmentally significant feature. The drawings identify the 100-Year floodplain which incorporates the West Fork of the Dry Comal Creek. Mining will leave the West Fork elevated between pits.

The West Fork of the Dry Comal Creek will become "perched" as Mining Areas 4, 8, 9 and 7 are excavated and while there will be a 25-foot-wide floodplain buffer, geological fractures within the West Fork of the Dry Comal Creek may connect with the mining areas and allow flood water flowing in the West Fork of the Dry Comal Creek to "leak" into one of more of the mine areas and thus become polluted and drain into the underlying aquifer. "Perching" of a dry creek bed within a proposed quarry development over the Edwards Aquifer Recharge Zone may be a "first" for the Edwards Aquifer Authority. During major flood events, surface water can be expected to enter the pits, washing any pollutants—including ANFOs—into the underlying aquifers[56], in violation of TCEQ Rule 213.5(b)(4)(B)(i)-(iv).

Vulcan's Application does not describe in any way the activities and processes that may be a potential source of contamination of the blasting agent, such as ANFO, and neither does the WPAP propose measures to protect the Edwards Aquifer from such contamination. For these reasons, the Application fails to comply with 30 Tex. Admin. Code § 213.5(b)(4)(A)(iv), and the ED's decision to approve the WPAP was arbitrary and

[55] *Id.*
[56] *Id.*

capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements. The ED's decision to approve Vulcan's WPAP should therefore be overturned.

Furthermore, the groundwater flow paths from the Vulcan site need to be determined before the commencement of mining operations. Currently, there is no evidence showing exactly where the nitrate pollution will go, and which water wells will be most at risk of contamination. The best way to do this is by conducting a dye trace study similar to the one done by the Edwards Aquifer Authority in Bexar County, Texas.[57]

Finally, no details are included in the WPAP as to how Vulcan intends to "abandon" and "reclaim" the 1,515-acre quarry development area over the Edwards Aquifer Recharge Zone and its nine (9) mining areas when the site is no longer economically viable to the company. This is likely to result in contamination of groundwater and surface water in violation of TCEQ Rule 213.5(b)(4)(B)(i)-(iv).

V. The blasting method involves the drilling of a borehole and placement of a fluid within that borehole, thereby constituting the installation and operation of an underground injection well, which is prohibited by the TCEQ Rules.

The boreholes which Vulcan proposes to complete and insert ANFO within constitute injection wells which are prohibited over or through the Edwards Aquifer pursuant to the TCEQ rules.

---

[57] Steve Johnson et al., *Tracing Groundwater Flowpaths in the Edwards Aquifer Recharge Zone, Panther Springs Creek Basin, Northern Bexar County, Texas*, Edwards Aquifer Authority, Report No. 10-01 (May 2010), https://www.edwardsaquifer.org/doc_publications/tracing-groundwater-flowpaths-in-the-edwards-aquifer-recharge-zone-panther-springs-creek-basin-northern-bexar-county-texas%EF%BF%BD%EF%BF%BD/).

Under the TCEQ rules, an "injection well" would include a shaft into which a material which moves is injected. Under 30 Tex. Admin. Code § 213.3(39), "well" is defined as "A bored, drilled, or driven shaft, or an artificial opening in the ground made by digging, jetting, or some other method, where the depth of the well is greater than its largest surface dimension. A well is not a surface pit, surface excavation, or natural depression"). TCEQ's regulations governing injection wells define the term "well" in a similar manner. 30 Tex. Admin. Code § 331.2(120). In relevant part, TCEQ's injection well regulations define an "injection well" is "a well into which fluids are being injected." 30 Tex. Admin. Code § 331.2(59). In turn, a "fluid" is a "material or substance which flows or moves whether in a semisolid, liquid, sludge, gas or any other form or state." 30 Tex. Admin. Code § 331.2(47)

The boreholes used for blasting are "wells," since they are bored shafts with a depth greater than their largest surface dimension. The ANFO placed within these wells constitutes a "fluid" since it is a material which flows or moves. In fact, the movement of this ANFO into surrounding formations has been repeatedly documented.

TCEQ's own Edwards Aquifer regulations clearly and unambiguously prohibit such an injection well in the Edwards Aquifer:

> For applications submitted on or after September 1, 2001, injection wells that transect or terminate in the Edwards Aquifer, as defined in § 331.19 of this title (relating to Injection Into or Through the Edwards Aquifer), are prohibited except as provided by § 331.19 of this title.

30 Tex. Admin. Code § 213.8(c).

Vulcan's planned blasting method constitutes the completion of an injection well into the Edwards Aquifer in contravention of the TCEQ Rules. Therefore, the ED's decision to approve the WPAP was arbitrary and capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements. Movants request the TCEQ Commissioners grant this Motion and reverse the ED's decision.

VI. The Quarry and related activity will cause illegal harm to threatened and endangered species.

The Vulcan Quarry activities will harm numerous threatened and endangered species, particularly aquatic species, because they are most sensitive to elevated nitrate levels in water. As previously explained, limestone aggregate quarries use large quantities of ANFO as their primary explosive, which is a combination of ammonium nitrate (fertilizer) and diesel fuel. Ammonium nitrate is highly soluble in water, and up to 30% of the explosive is not consumed by blasting.[58] Depending on the concentration level, long term exposure to nitrate can be threatening to aquatic organisms, which may have lower tolerances for nitrate than humans.[59] As stated previously, TCEQ set the ecological screening benchmark for ammonium nitrate in freshwater at 13 mg/L.[60] As shown in Figure 9 above (demonstrating well data with nitrate measurements above the TCEQ ecological

---

[58] Neil Alberts, *Tackling nitrate contamination of water in mines*, MINING.COM (Aug. 11, 2016, 9:12 AM), https://www.mining.com/web/tackling-nitrate-contamination-of-water-in-mines/.
[59] *See* Declaration of Dr. James David Doyle.
[60] *TCEQ Ecological Screening Benchmarks.xlsx*, (2022), https://www.tceq.texas.gov/remediation/eco (Surface Water Metals, Inorganic tab; nitrate (NO_3) listed in column A, and the Freshwater Chronic Benchmark (mg/L) in column F).

screening benchmark), the majority of recent observations of nitrate have reached a level that may pose a threat to sensitive organisms living within the karstic Edwards.[61]

Dr. Smith's report also found that reduced flows have negative impact on the ecology immediately in the spring area and downstream stretches,[62] including endangered species. Therefore, Vulcan's use of groundwater may contribute to a violation of the Endangered Species Act. Moreover, decreased groundwater availability increases the potential for contamination from various sources,[63] in violation of Edwards Aquifer Protection Plan regulations found in TCEQ Rule 213.1.

Under the Endangered Species Act, no person may "take" an endangered species. 16 U.S.C. § 1538(a)(2). Such a take includes "harm" to a species, which encompasses an act which degrades habitat in a manner which injures wildlife. 40 C.F.R. § 17.3. Vulcan's proposed activities, authorized by approval of the WPAP, could result in such a prohibited take. Because of the ecological sensitivity of this location (in the Recharge Zone) to groundwater contamination, pollution (nitrates) from the Vulcan mining activities is highly likely to enter the Edwards Aquifer and potentially make its way to Comal Springs and Hueco Springs in Comal County via identified flow paths and even further downgradient to San Marcos Springs in Hays County.[64] Notably, TCEQ is not a holder of the incidental take permit issued which under certain conditions authorizes activities that would harm endangered and threatened species. Thus, issuance of the WPAP does not provide coverage

---

[61] *See* Declaration of Dr. James David Doyle.
[62] Smith, 2024 at 11.
[63] *Id.*
[64] *See* Smith, 2024 at 9.

under that permit and provides no justification for the harming of endangered species by the activities authorized.

The Comal Springs and its ecosystem is home to threatened and endangered aquatic species that are dependent upon sufficient water quantity and quality for their continued survival, including the Fountain Darter (*Etheostoma fonticola*), Comal Springs dryopid beetle (*Stygoparnus comalensis*), Comal Springs riffle beetle (*Heterelmis comalensis*), and Peck's cave amphipod (*Stygobromus pecki*). In 2013, the U.S. Fish & Wildlife Service enlarged the critical habitat for the Comal Springs dryopid beetle, Comal Springs riffle beetle, and the Peck's cave amphipod that live in the Comal Springs complex to specifically include subsurface critical habitat. *See* 78 Fed. Reg. 63100.

Vulcan's BMPs do not constitute a defense or an excuse for violations of the Endangered Species Act. Because Vulcan's WPAP does not accurately assess the high potential for contamination that could jeopardize listed species, and therefore does not provide for protections to avoid the take of listed species, the ED's decision was arbitrary and capricious, made through unlawful procedure, and in violation of statutory and regulatory requirements. Therefore, the Executive Director's decision to approve Vulcan's WPAP should be overturned.

VII. Conclusion

For the reasons listed above, Movants request the TCEQ Commissioners grant this Motion, reverse the ED's decision, and deny the WPAP. In the alternative, the ED should provide proper notice of the WPAP—both mailed and published in a local newspaper—

and reopen the comment period to allow the affected public a meaningful opportunity to comment on the WPAP and participate in a public meeting.

Respectfully submitted,

/s/ Eric Allmon
Eric Allmon
State Bar No. 24031819
eallmon@txenvirolaw.com
Lauren Alexander
State Bar No. 24138403
lalexander@txenvirolaw.com
PERALES, ALLMON & ICE, P.C.
1206 San Antonio Street
Austin, Texas 78701
512-469-6000 (t)
512-482-9346 (f)

CERTIFICATE OF SERVICE

By my signature, below, I certify that on July 31, 2024, a true and correct copy of the foregoing document was filed with the TCEQ Office of the Chief Clerk and served upon the parties listed below via electronic mail.

/s/ Eric Allmon
Eric Allmon

FOR VULCAN CONSTRUCTION MATERIALS, LLC:
Richard Spry
Vulcan Construction Materials, LLC
10101 Reunion Pl., Ste. 500
San Antonio, Texas 78216
spryr@vmcmail.com

Caleb Chance, P.E.
Pape-Dawson Engineers, Inc.
2000 NW Loop 410
San Antonio, Texas 78213
cchance@pape-dawson.com

FOR THE EXECUTIVE DIRECTOR:
Lori Wilson, Regional Director
TCEQ Regional Office – Austin
P.O. Box 13087, MC R11
Austin, Texas 78711-3087
lori.wilson@tceq.texas.gov

FOR THE OFFICE OF PUBLIC INTEREST COUNSEL:
Garrett T. Arthur
TCEQ Office of Public Interest Counsel
P.O. Box 13087, MC 103
Austin, Texas 78711-3087
garrett.arthur@tceq.texas.gov

ATTACHMENT A

TO MOTION TO OVERTURN

Preserve Our Hill Country Environment Foundation

April 18, 2024

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program – MC R11
PO Box 13087
Austin, TX 78711-3087
Submit via email to: eapp@tceq.texas.gov

RE: Opposition to the Vulcan Comal Quarry Plant
TCEQ Edwards Aquifer Permit #: 13001906

These comments are submitted on behalf of Preserve our Hill Country Environment's (PHCE) seventy-eight Affected Parties to Vulcan's air quality permit #147392L001 and the over three-thousand advocates that follow us on our Facebook page and subscribe to our email list. PHCE is a 501(c)(3) nonprofit organization that was created to preserve, protect, and restore the land, water, air, wildlife, and the geological formations that make the Texas Hill Country unique.

PHCE and advocates ask that TCEQ grant a public meeting and consider a contested case hearing naming all as affected parties.

The Site:
Vulcan Construction Materials LLC., is proposing the construction of a quarry with associated plant areas, office, shop areas, and driveway on approximately 1,515.16 acres. The nine (9) proposed quarry Mining Areas comprise approximately 956 acres. The site sits entirely over the Edwards Aquifer Recharge Zone (EARZ) and is surrounded by heavily populated residential and ranching communities. Notably, the pristine West Fork Dry Comal Creek runs through, and multiple caves lie beneath the surface of this scenic and consequential segment of the Texas Hill Country. The proposed quarry site is located on the southwest corner of FM 3009 and SH-46, Comal County, Texas.

Air Permit History:
In February 2020, after exhausting all Texas Commission on Environmental Quality (TCEQ) protocols for contesting Vulcan's air quality permit, PHCE sued the TCEQ for issuing the permit without adequately considering the impacts on the environment,

natural resources, and the health of the community, as required by state law. In March 2021, PHCE won an unprecedented victory in District Court: the judge reversed and vacated Vulcan's air quality permit. TCEQ and Vulcan subsequently appealed the trial court decision to the Texas Third Court of Appeals. In September 2022, the Third Court of Appeals reversed the trial court's decision and affirmed the TCEQ Commissioners' order granting Vulcan its air permit. PHCE filed a Petition for Review with the Texas Supreme Court, asking them to reconsider the Third Court's decision. The petition was denied.

Of consequence: March 6, 2024, EPA published it's new, reduced (health-based) annual $PM_{2.5}$ standard from 12.0 micrograms per cubic meter (µg/m3) to 9.0 µg/m3. The background used for Vulcan's permit that PHCE challenged was 8.51 µg/m3, and the modeling for total Annual $PM_{2.5}$ concentrations offsite produced results of 9.1 to 9.26 µg/m3. This was below the standard at the time of the air permit review but now surpasses the new standard.

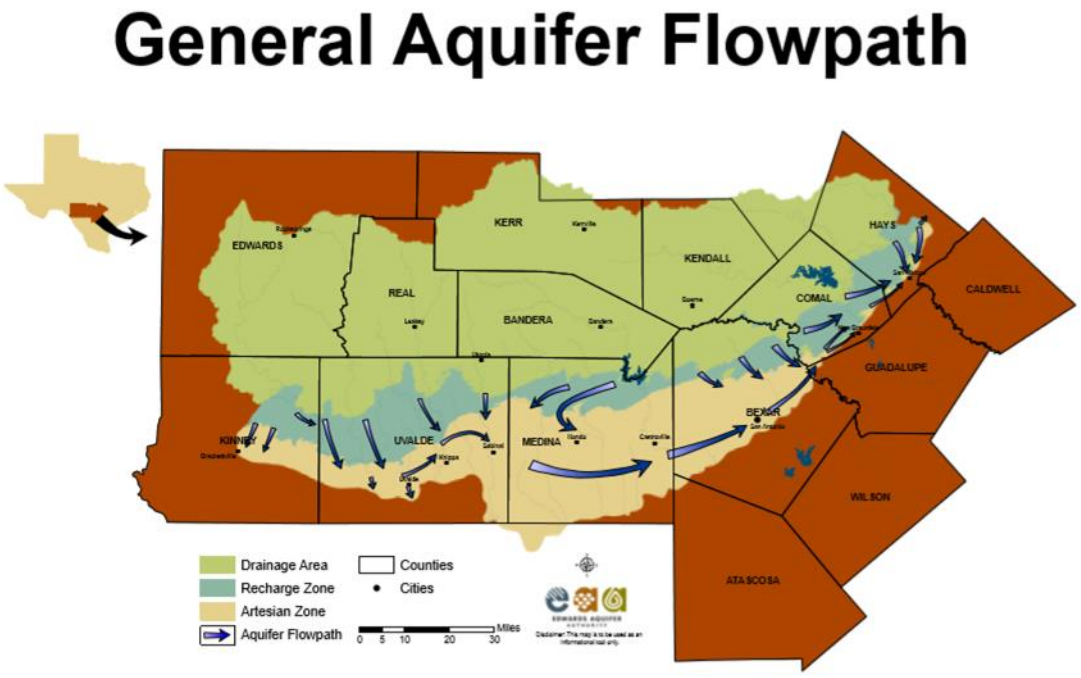
Concerns:
Vulcan's proposed open-pit limestone mining operation would stretch across nearly three miles of the environmentally sensitive Edwards Aquifer Recharge Zone (primary water supply for over two million people, including the cities of San Antonio and New Braunfels). PHCE and its advocates are concerned about air pollution, water supply and quality, truck traffic, destruction of caves, eminent domain for a railroad spur, and decreased property values that could result from the location of this heavy industrial facility in a residential area populated by over 15,000 people.

Not only does this site sit atop the EARZ but the West Fork Dry Comal Creek runs through it, converging downstream with the Dry Comal Creek before merging with the Comal River in New Braunfels. The Comal River is fed by springs from the Edwards Aquifer and is home to several endangered species. The clear, temperate waters of the Comal are widely used for recreational swimming and tubing activities before discharging into the Guadalupe River. Dry Comal Creek and Comal River are essential natural resources in Comal County, supporting economic development and recreation in the city, as well as agricultural operations and wildlife throughout the area. Comal County has numerous waterways — Dry Comal, Cibolo, Rebecca, and Honey creeks; Comal and Guadalupe rivers; Comal and Hueco springs, the

Trinity and Edwards aquifers; and Canyon Lake. If any of these water sources becomes polluted or is irreparably harmed, the others are in danger as well.

The Vulcan plant falls within the boundaries of the Dry Comal Creek/Comal River Watershed Protection Plan (WPP), an EPA sponsored effort to protect the watershed's natural resources. Since the plan's inception, planning and implementation strategies have been conducted to address water quality concerns for the West Fork Dry Comal and Dry Comal Creeks, and the Comal River.

Of note: Groundwater flow from the Vulcan site generally would move southeast then shift to the east then northeast toward Hueco and Comal Springs. Map source Edwards Aquifer Authority.



The Comal Springs are the largest springs in the southwestern United States and are fed by groundwater issuing from the Edwards Aquifer. The Comal ecosystem is home to rare and endangered aquatic species found nowhere else on Earth. These species include the Fountain Darter (*Etheostoma fonticola*), Comal Springs Dryopid Beetle (*Stygoparnus comalensis*), Comal Springs Riffle Beetle (*Heterelmis comalensis*), and Peck's Cave Amphipod (*Stygobromus pecki).*

Additionally, the quarry location is within the 100-year floodplain.

The Edwards Aquifer is a karst aquifer. Karst is characterized by its fractures and faults, caves, sinkholes, and direct recharge from area streams – in this setting lies the West Fork Dry Comal Creek, and its ability to recharge rapidly. Of concern is pollution from the quarry operation, specifically the increased sediment and up to 28% residual ammonium nitrate fuel oil mixture (ANFO) not combusted during blasting. The nitrate left over is readily dissolvable in water and will travel downgradient along groundwater flow paths. Residual contamination from explosives (especially nitrates) is a huge concern for local water quality and for potential negative impacts on endangered species.

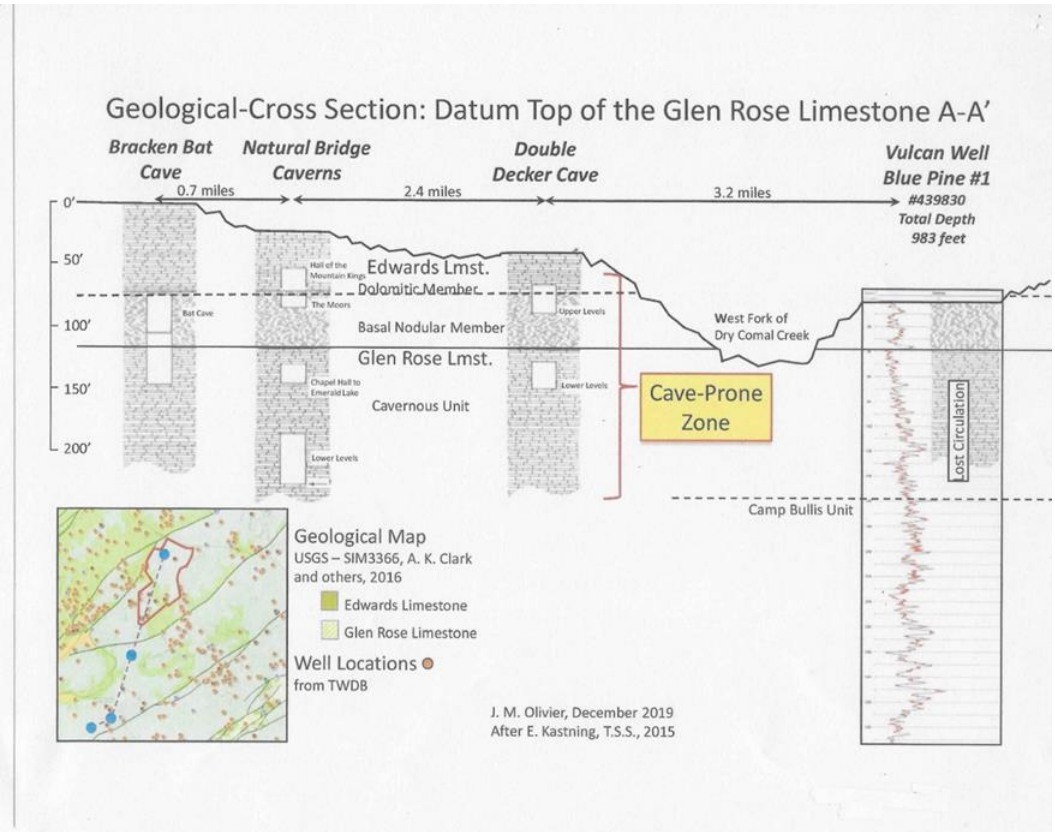
TCEQ requires that quarrying operations limit the downward expansion of the quarry to a level that is 25 ft above the highest expected water level. The WPAP states that the mining areas will not mine below an elevation of 1040 ft msl. A review by hydrogeologist Dr. Brian Wilson shows that there are times when the bottom of the quarry will be flooded by the underlying aquifer. This would be a blatant violation of TCEQ regulations.

Lastly, water usage by the quarry is significant; based on water use per ton of quarried material, approximately 383 acre-ft (125 million gallons) of groundwater per year would be needed. Comal County just passed a year of extreme drought with many area wells going dry. There is not an accurate accounting of these wells, but there should be. Pulling 125 million gallons/year of water out of the aquifers would cause detrimental harm to area residents.

Additional Issues to be Addressed:

Large quarries in the EARZ should be required to provide the TCEQ with all available well logs, drilling reports, and core data. The TCEQ should also take into consideration all available cave information around the proposed site, including data maintained by the Texas Speleological Survey, data submitted to the TCEQ in Geological Assessments, and any information provided by local property owners. The WPAP does not consider the proximity of two highly active cave systems in the area, Natural Bridge Caverns and the Bracken Bat Cave.

Both cave systems run along the same Geological-Cross Section as the Vulcan Well Blue Pine #1. Map Source J. M. Olivier after E. Kastning, T.S.S.



The Best Management Practices (BMPs) for Quarry Operations need to specifically address the risk of encountering large caves, or a series of smaller caves, that are hydrologically connected to the underlying aquifers. Large quarry pits are sensitive *manmade features in bedrock* that deserve special protection because of their size.

The TCEQ's Geologic Assessment and Sensitivity Scoring System should be applied more stringently considering the evidence that groundwater pollution is possible even where no observable karst features are present. Sinkholes are not being sufficiently protected considering that they commonly occur just above caves. The relative water infiltration scoring process is too arbitrary and poorly defined. The Geologic Assessment provided by Pape-Dawson shows that 37 sensitive features were found. This number is anomalously low for the geology in this area. Further evaluation of recharge features is needed to determine areas that will require protective buffers.

The EAA should be consulted during the water-permit review process for quarries to help ensure that the destruction of caves and other sensitive karst features does not

cause serious damage to the Edwards Aquifer, surrounding water wells, and natural springs. Also, according to a recent EAA study, in the area of the proposed quarry, pollution could impact the water quality in the Trinity Aquifer.

In addition, a dye-trace study like the one conducted in 2010 by the EAA in northern Bexar County should be conducted to determine flow paths of groundwater from the site and to determine which downgradient wells might be impacted by contaminants coming from the quarry. This is especially important for Comal County because the Vulcan Site is potentially well-connected hydrologically to Comal Springs.

The operation of a quarry will contribute contamination to the underlying aquifer. To determine background water-quality conditions, water-supply wells immediately downgradient of the quarry should be sampled and analyzed for nitrates and total petroleum hydrocarbons prior to issuing a permit for the quarry.

Elevations of the aquifer should be determined prior to any excavation. The elevation of 1040 ft-msl for the bottom of the quarry, as stated in the WPAP, is likely to be out of compliance with the required buffer of 25 ft. And it is also likely that water levels in the aquifer will be above the elevation of 1040 ft-msl during periods of high-water levels.

Conclusion:

A thorough evaluation of existing data and data collected by Dr. Brian Wilson in the attached "Hydrogeology of the Edwards and Trinity Aquifers…" will show that the aquifer beneath this site is highly sensitive to contamination. Because of the sensitivity of the site and the magnitude of the quarry, PHCE emphatically encourages TCEQ to deny approval of Permit #13001906. PHCE Attorney's Perales, Allmon, & Ice, P.C. will be submitting additional comments on behalf of PHCE, PHCE Foundation, and DBA's Stop 3009 Vulcan Quarry and Friends of Dry Comal Creek.

Respectfully submitted,

Milann Guckian, President
Preserve Our Hill Country Environment
PO Box 310431 New Braunfels, Tx 78131-0431
info@preserveourhillcountry.org

Preserve Our Hill Country Environment Foundation

April 22, 2024

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program – MC R11
PO Box 13087
Austin, TX 78711-3087
Submit via email to: eapp@tceq.texas.gov

RE: Opposition to the Vulcan Comal Quarry Plant
TCEQ Edwards Aquifer Permit #: 13001906

These comments are submitted on behalf of Preserve our Hill Country Environment (PHCE) Foundation, PHCE, and PHCE's seventy-eight Affected Parties to Vulcan's air quality permit #147392L001 and the over three-thousand advocates that follow us on our Friends of Dry Comal Creek Facebook page and subscribe to our Stop 3009 Vulcan Quarry and PHCE email lists. PHCE Foundation is a 501(c)(3) nonprofit organization that was created to preserve, protect, and restore the land, water, air, wildlife, and the geological formations that make the Texas Hill Country unique.

PHCE and advocates ask that TCEQ grant a public meeting and consider a contested case hearing naming all as affected parties.

The Site:
Vulcan Construction Materials LLC., is proposing the construction of a quarry with associated plant areas, office, shop areas, and driveway on approximately 1,515.16 acres. The nine (9) proposed quarry Mining Areas comprise approximately 956 acres. The site sits entirely over the Edwards Aquifer Recharge Zone (EARZ) and is surrounded by heavily populated residential and ranching communities. Notably, the pristine West Fork Dry Comal Creek runs through, and multiple caves lie beneath the surface of this scenic and consequential segment of the Texas Hill Country. The proposed quarry site is located on the southwest corner of FM 3009 and SH-46, Comal County, Texas.

Air Permit History:
In February 2020, after exhausting all Texas Commission on Environmental Quality (TCEQ) protocols for contesting Vulcan's air quality permit, PHCE sued the TCEQ for

issuing the permit without adequately considering the impacts on the environment, natural resources, and the health of the community, as required by state law. In March 2021, PHCE won an unprecedented victory in District Court: the judge reversed and vacated Vulcan's air quality permit. TCEQ and Vulcan subsequently appealed the trial court decision to the Texas Third Court of Appeals. In September 2022, the Third Court of Appeals reversed the trial court's decision and affirmed the TCEQ Commissioners' order granting Vulcan its air permit. PHCE filed a Petition for Review with the Texas Supreme Court, asking them to reconsider the Third Court's decision. The petition was denied.

Of consequence: March 6, 2024, EPA published it's new, reduced (health-based) annual $PM_{2.5}$ standard from 12.0 micrograms per cubic meter (µg/m3) to 9.0 µg/m3. The background used for Vulcan's permit that PHCE challenged was 8.51 µg/m3, and the modeling for total Annual $PM_{2.5}$ concentrations offsite produced results of 9.1 to 9.26 µg/m3. This was below the standard at the time of the air permit review but now surpasses the new standard.

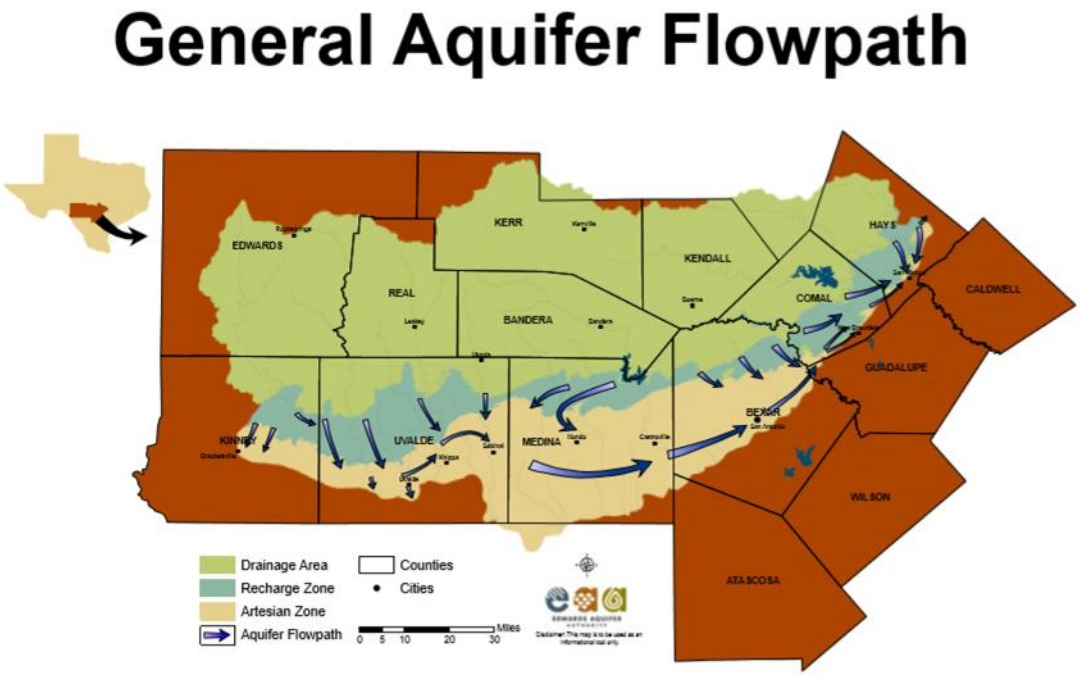
Concerns:
Vulcan's proposed open-pit limestone mining operation would stretch across nearly three miles of the environmentally sensitive Edwards Aquifer Recharge Zone (primary water supply for over two million people, including the cities of San Antonio and New Braunfels). PHCE and its advocates are concerned about air pollution, water supply and quality, truck traffic, destruction of caves, eminent domain for a railroad spur, and decreased property values that could result from the location of this heavy industrial facility in a residential area populated by over 15,000 people.

Not only does this site sit atop the EARZ but the West Fork Dry Comal Creek runs through it, converging downstream with the Dry Comal Creek before merging with the Comal River in New Braunfels. The Comal River is fed by springs from the Edwards Aquifer and is home to several endangered species. The clear, temperate waters of the Comal are widely used for recreational swimming and tubing activities before discharging into the Guadalupe River. Dry Comal Creek and Comal River are essential natural resources in Comal County, supporting economic development and recreation in the city, as well as agricultural operations and wildlife throughout the area. Comal County has numerous waterways — Dry Comal, Cibolo, Rebecca, and Honey creeks; Comal and Guadalupe rivers; Comal and Hueco springs, the

Trinity and Edwards aquifers; and Canyon Lake. If any of these water sources becomes polluted or is irreparably harmed, the others are in danger as well.

The Vulcan plant falls within the boundaries of the Dry Comal Creek/Comal River Watershed Protection Plan (WPP), an EPA sponsored effort to protect the watershed's natural resources. Since the plan's inception, planning and implementation strategies have been conducted to address water quality concerns for the West Fork Dry Comal and Dry Comal Creeks, and the Comal River.

Of note: Groundwater flow from the Vulcan site generally would move southeast then shift to the east then northeast toward Hueco and Comal Springs. Map source Edwards Aquifer Authority.



The Comal Springs are the largest springs in the southwestern United States and are fed by groundwater issuing from the Edwards Aquifer. The Comal ecosystem is home to rare and endangered aquatic species found nowhere else on Earth. These species include the Fountain Darter (*Etheostoma fonticola*), Comal Springs Dryopid Beetle (*Stygoparnus comalensis*), Comal Springs Riffle Beetle (*Heterelmis comalensis*), and Peck's Cave Amphipod (*Stygobromus pecki).*

Additionally, the quarry location is within the 100-year floodplain.

The Edwards Aquifer is a karst aquifer. Karst is characterized by its fractures and faults, caves, sinkholes, and direct recharge from area streams – in this setting lies the West Fork Dry Comal Creek, and its ability to recharge rapidly. Of concern is pollution from the quarry operation, specifically the increased sediment and up to 28% residual ammonium nitrate fuel oil mixture (ANFO) not combusted during blasting. The nitrate left over is readily dissolvable in water and will travel downgradient along groundwater flow paths. Residual contamination from explosives (especially nitrates) is a huge concern for local water quality and for potential negative impacts on endangered species.

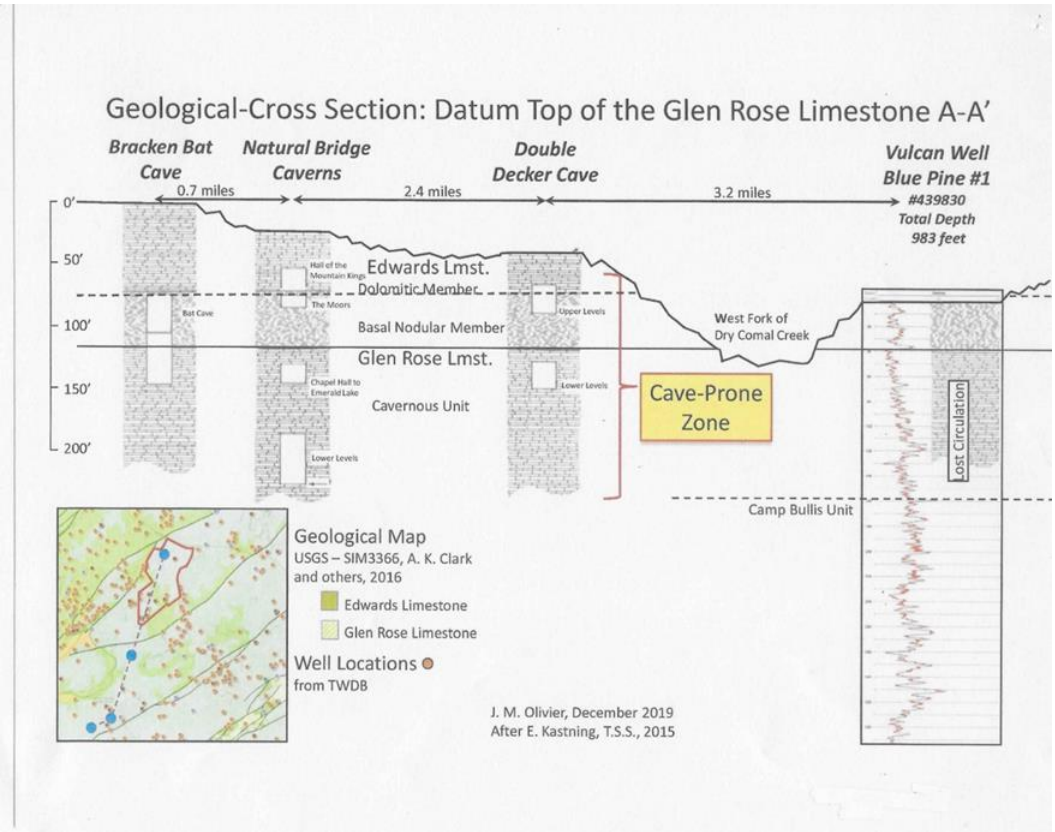
TCEQ requires that quarrying operations limit the downward expansion of the quarry to a level that is 25 ft above the highest expected water level. The WPAP states that the mining areas will not mine below an elevation of 1040 ft msl. A review by hydrogeologist Dr. Brian Smith shows that there are times when the bottom of the quarry will be flooded by the underlying aquifer. This would be a blatant violation of TCEQ regulations.

Lastly, water usage by the quarry is significant; based on water use per ton of quarried material, approximately 383 acre-ft (125 million gallons) of groundwater per year would be needed. Comal County just passed a year of extreme drought with many area wells going dry. There is not an accurate accounting of these wells, but there should be. Pulling 125 million gallons/year of water out of the aquifers would cause detrimental harm to area residents.

Additional Issues to be Addressed:

Large quarries in the EARZ should be required to provide the TCEQ with all available well logs, drilling reports, and core data. The TCEQ should also take into consideration all available cave information around the proposed site, including data maintained by the Texas Speleological Survey, data submitted to the TCEQ in Geological Assessments, and any information provided by local property owners. The WPAP does not consider the proximity of two highly active cave systems in the area, Natural Bridge Caverns and the Bracken Bat Cave.

Both cave systems run along the same Geological-Cross Section as the Vulcan Well Blue Pine #1. Map Source J. M. Olivier after E. Kastning, T.S.S.



The Best Management Practices (BMPs) for Quarry Operations need to specifically address the risk of encountering large caves, or a series of smaller caves, that are hydrologically connected to the underlying aquifers. Large quarry pits are sensitive *manmade features in bedrock* that deserve special protection because of their size.

The TCEQ's Geologic Assessment and Sensitivity Scoring System should be applied more stringently considering the evidence that groundwater pollution is possible even where no observable karst features are present. Sinkholes are not being sufficiently protected considering that they commonly occur just above caves. The relative water infiltration scoring process is too arbitrary and poorly defined. The Geologic Assessment provided by Pape-Dawson shows that 37 sensitive features were found. This number is anomalously low for the geology in this area. Further evaluation of recharge features is needed to determine areas that will require protective buffers.

The EAA should be consulted during the water-permit review process for quarries to help ensure that the destruction of caves and other sensitive karst features does not

cause serious damage to the Edwards Aquifer, surrounding water wells, and natural springs. Also, according to a recent EAA study, in the area of the proposed quarry, pollution could impact the water quality in the Trinity Aquifer.

In addition, a dye-trace study like the one conducted in 2010 by the EAA in northern Bexar County should be conducted to determine flow paths of groundwater from the site and to determine which downgradient wells might be impacted by contaminants coming from the quarry. This is especially important for Comal County because the Vulcan Site is potentially well-connected hydrologically to Comal Springs.

The operation of a quarry will contribute contamination to the underlying aquifer. To determine background water-quality conditions, water-supply wells immediately downgradient of the quarry should be sampled and analyzed for nitrates and total petroleum hydrocarbons prior to issuing a permit for the quarry.

Elevations of the aquifer should be determined prior to any excavation. The elevation of 1040 ft-msl for the bottom of the quarry, as stated in the WPAP, is likely to be out of compliance with the required buffer of 25 ft. And it is also likely that water levels in the aquifer will be above the elevation of 1040 ft-msl during periods of high-water levels.

Conclusion:

A thorough evaluation of existing data and data collected by Dr. Brian Smith in the attached "Hydrogeology of the Edwards and Trinity Aquifers…" will show that the aquifer beneath this site is highly sensitive to contamination. Because of the sensitivity of the site and the magnitude of the quarry, PHCE emphatically encourages TCEQ to deny approval of Permit #13001906. These comments are in addition to any other comments submitted on the organization's behalf, including those submitted by PHCE's attorneys at Perales, Allmon & Ice, P.C.

Respectfully submitted,

Milann Guckian, President
Preserve Our Hill Country Environment
PO Box 310431 New Braunfels, Tx 78131-0431
info@preserveourhillcountry.org

PERALES, ALLMON & ICE, P.C.
ATTORNEYS AT LAW
1206 San Antonio Street
Austin, Texas 78701
(512) 469-6000 • (512) 482-9346 (facsimile)
info@txenvirolaw.com

Of Counsel:
David Frederick
Richard Lowerre
Vic McWherter

April 22, 2024

Ms. Lillian Butler, Section Manager
Edwards Aquifer Protection Program
Texas Commission on Environmental Quality
Region 13 Office – San Antonio
14250 Judson Road
San Antonio, Texas 78233-4480

Via Email: eapp@tceq.texas.gov

Re: Comments regarding the Application of Vulcan Construction Materials LLC for Edwards Aquifer Permit No. 13001906.

Dear Ms. Butler:

We are submitting the following comments on behalf of Preserve Our Hill Country Environment and its sister organization, Preserve Our Hill Country Environment Foundation (together, "PHCE"), regarding the Application of Vulcan Construction Materials LLC ("Vulcan") for Edwards Aquifer Permit No. 13001906 (the "Application"). These comments are in addition to, and do not replace, any other comments submitted on behalf of PHCE.

Preserve Our Hill Country Environment is a 501(c)(4) organization whose mission is to preserve, protect, and restore the land, water, air, wildlife, unique features, and quality of life in the Texas Hill Country from the aggressive and insufficiently regulated expansion of the aggregate industry. Preserve Our Hill Country Environment Foundation is a Texas 501(c)(3) nonprofit which conducts research on environmental hazards in the surrounding areas; educates communities on the preservation of natural resources; and advocates for the development of environmental protection legislation and regulations.

I. The Vulcan Quarry WPAP is not consistent with the Edwards Aquifer Protection Plan regulations.

The TCEQ's rules governing Edwards Aquifer Protection Plans are in place to protect existing and potential uses of groundwater and maintain the Texas Surface Water Quality Standards. The goals clearly articulate that existing groundwater quality not be degraded:

> (1) Consistent with Texas Water Code, §26.401, the goal of this chapter is that the existing quality of groundwater not be degraded, consistent with the protection of public health and welfare, the propagation and protection of

terrestrial and aquatic life, the protection of the environment, the operation of existing industries, and the maintenance and enhancement of the long-term economic health of the state.

(2) Nothing in this chapter is intended to restrict the powers of the commission or any other governmental entity to prevent, correct, or curtail activities that result or may result in pollution of the Edwards Aquifer or hydrologically connected surface waters. In addition to the rules of the commission, an applicant may also be required to comply with local ordinances and regulations providing for the protection of water quality.

30 Tex. Admin. Code § 213.1.

In other words, the TCEQ has the authority to prevent activities that will result in pollution of the Edwards Aquifer or that it deems *may* result in pollution to the Edwards. Vulcan's Application does not demonstrate that its WPAP will prevent pollution of the Edwards, as described in more detail below. In addition, Technical Comments submitted by Douglas A. Wierman with Blue Creek Consulting on the Needmore Quarry Ranch WPAP (included as **Attachment A**), document a connection between quarry operations and residuals from ammonium nitrate/fuel oil explosives (ANFO) found in the Edwards Aquifer. For these reasons, the Application should be rejected as inconsistent with Chapter 213.

II. The Vulcan Quarry site is located in an environmentally-sensitive area, and the WPAP grossly underestimates the potential pathways to the Edwards Aquifer.

As shown in the Application, the proposed Vulcan quarry operations will occur on an area approximately 1,515 acres in size, with the mining area of approximately 956 acres. The property is entirely within the Edwards Aquifer Recharge Zone and also contains a 100-year floodplain. Furthermore, only 37 sensitive (recharge) features have been documented on the proposed property, 12 of which are categorized as wells or manmade boring holes. The number of features appears anomalously low when compared to the fact that a 158-acre tract directly to the north across Highway 46 contained 38 identified sensitive features—nearly the same number, but on a property approximately 1/10 the size. (Smith, 2024).[1] The presence of these features both indicates that stormwater can easily enter the water table of the underlying aquifer; however, the anomalously low number calls into question the accuracy of the required geologic assessment.

Pursuant to 30 Tex. Admin. Code § 213.5(b)(3), the applicant's geologic assessment "must identify all potential pathways for contaminant movement to the Edwards Aquifer." Due to the lithologies beneath the proposed quarry site, contaminants will have a very direct and rapid impact on the underlying aquifer. As explained below, there is also concern that contaminated water will make its way to Comal Springs, which is habitat of several protected, endangered aquatic species. For all these reasons, the Application should be rejected as deficient under Rule 213.5(b)(3).

[1] Brian A. Smith, Ph.D, *Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas* (2024) (submitted with other PHCE comments).

III. The Application does not demonstrate that the quarry bottom will not reach the aquifer beneath, thereby contaminating groundwater.

The Application states that the Mining Areas will not be mined below 1040 ft-msl. Attachment C: General Information Form (TCEQ-0587) at 2. TCEQ typically requires a 25' separation distance between the floor of the quarry and groundwater. This requirement is meant to afford some protection from mining impacts to the Edwards Aquifer, particularly in the Recharge Zone. The WPAP does not provide any explanation or factual reference for a quarry floor base elevation of 1040 ft-msl, but simply indicates that because it will take 5 to 10 years for the mining activities to reach that level, its proposal is to monitor the local water levels at the local wells and determine how those water levels correlate to established monitored water levels offsite. This is not a substitute for evaluating water levels *before* obtaining the requisite WPAP. In fact, available water level data from several wells close to the perimeter of the quarry boundary showed water levels greater than 1015 ft-msl, meaning the proposed 1040 ft-msl mining floor may lead to increased infiltration of contaminants to the Edwards Aquifer. As this is not the purpose of the Edwards Aquifer regulations, the WPAP should be denied.

IV. The WPAP wholly fails to account for blasting processes as a potential source of contamination, as required.

Vulcan's "Project Description" acknowledges that blasting agents will be utilized in the mining process, however, the WPAP does not identify the types of blasting agents or include any plan to control their release. Attachment C: General Information Form (TCEQ-0587) at 1. (As an initial matter, the proposed buffer zone of only 100 feet adjacent to all neighboring properties is insufficient to protect those properties.) In fact, the description contains very little information about the blasting method and potential contaminants period.

Pursuant to 30 Tex. Admin. Code § 213.5(b)(4)(A)(iv), the WPAP must include a technical report that "must describe any activities or processes which may be a potential source of contamination." The Application includes only a general description of the quarry process:

- Clear
- Strip
- Drill
- Blast
- Load into haul vehicles
- Haul to plant
- Process rock at plant
- Load to trucks for export.

Attachment C, General Information Form (TCEQ-0587) at 1. However, in identifying the potential sources of contamination, the Application only identifies temporary sources during construction and potential sources that may affect stormwater discharges from the site after development (*see* Attach. A, WPAP Application Form (TCEQ-0584) at 1; Attach. B, Temporary Stormwater Section (TCEQ-0602)). But Rule 213.5(b)(4)(A)(iv) does not allow for such a limited consideration.

Elsewhere, Rule 213.5 makes the distinction between contaminants generated only during construction or contaminants that may flow across the site and then flow offsite, as well as the distinction between contaminants of surface water, groundwater, and stormwater. *See, e.g.*, Rule 213(b)(4)(B) (distinguishing between BMPs to be used during and after construction and BMPs to prevent pollution of surface, groundwater, and stormwater). In other words, the requirement to describe activities and processes which may be a potential source of contamination is broad. Vulcan's Application does not describe in any way the activities and processes that may be a potential source of contamination of the blasting agent, such as ANFO, and neither does the WPAP propose measures to protect the Edwards from such contamination. For that reason, the WPAP must be denied.

Additionally, the blasting method involves drilling a borehole, which meets the definition of an injection well, which is defined and prohibited by TCEQ's Edwards Aquifer regulations. 30 Tex. Admin. Code § 213.3(39) (defining "well" as "A bored, drilled, or driven shaft, or an artificial opening in the ground made by digging, jetting, or some other method, where the depth of the well is greater than its largest surface dimension. A well is not a surface pit, surface excavation, or natural depression"). TCEQ's own Edwards Aquifer regulations clearly and unambiguously prohibit this injection well in the Edwards Aquifer:

> For applications submitted on or after September 1, 2001, injection wells that transect or terminate in the Edwards Aquifer, as defined in § 331.19 of this title (relating to Injection Into or Through the Edwards Aquifer), are prohibited except as provided by § 331.19 of this title.

30 Tex. Admin. Code § 213.8(c). Vulcan's Application does not demonstrate that its planned blasting method does not constitute drilling into the Edwards Aquifer. For this reason, also, the Application should be denied.

V. The Vulcan Quarry site will jeopardize threatened and endangered species.

The Vulcan Quarry activities will jeopardize numerous threatened and endangered species, particularly aquatic species, because they are most sensitive to elevated nitrate levels in water. As previously explained, limestone aggregate quarries use large quantities of ANFO as their primary explosive, which is a combination of ammonium nitrate (fertilizer) and diesel fuel. Ammonium nitrate is highly soluble in water, with studies showing 28 percent not consumed by the explosion (Smith, 2024; Wierman, 2023). Because of the ecological sensitivity of this location (in the Recharge Zone) to groundwater contamination, pollution (nitrates) from the Vulcan mining activities is highly likely to enter the Edwards Aquifer and make its way to Comal Springs and Hueco Springs in Comal County via identified flowpaths (Johnson et al., 2006), and even further downgradient to San Marcos Springs in Hays County.

The Comal Springs and its ecosystem is home to threatened and endangered aquatic species, including the Fountain Darter (*Etheostoma fonticola*), Comal Springs dryopid beetle (*Stygoparnus comalensis*), Comal Springs riffle beetle (*Heterelmis comalensis*), and Peck's cave amphipod (*Stygobromus pecki*). In 2013, the U.S. Fish & Wildlife Service enlarged the critical habitat for the Comal Springs dryopid beetle, Comal Springs riffle beetle, and the Peck's cave

amphipod that live in the Comal Springs complex to specifically include subsurface critical habitat. *See* 78 Fed. Reg. 63100.

Vulcan's BMPs do not constitute a defense or an excuse for violations of the Endangered Species Act. Because Vulcan's WPAP does not accurately assess the high potential for contamination that could jeopardize listed species, and therefore does not provide for protections to avoid the take of listed species, the WPAP should be denied.

VI. Conclusion

For the reasons described above, PHCE urges the Staff to deny Vulcan's Application for Edwards Aquifer Permit No. 13001906. In the alternative, the Application should be returned and Vulcan required to provide the additional information outlined above.

Please contact us with any questions.

Respectfully submitted,

/s/ Lauren Ice
Eric Allmon
State Bar No. 24031819
eallmon@txenvirolaw.com
Lauren Ice
State Bar No. 24092560
lauren@txenvirolaw.com
PERALES, ALLMON & ICE, P.C.
1206 San Antonio St.
Austin, Texas 78701
512-469-6000 (t) | 512-482-9346 (f)

Counsel for PHCE

ATTACHMENT A

Technical Comments – TCEQ Water Pollution Abatement Plan (WPAP)

Far South Mining LLC - Needmore Quarry Ranch

Blue Creek Consulting LLC has prepared the following technical comments regarding the TCEQ Water Pollution Abatement Plan (WPAP) prepared for Far South Mining LLC - Needmore Quarry Ranch, dated 9/1/2023, prepared by Westward, Boerne (TCEQ reference numbers 11003759 and 11003760).

The proposed quarry is located on the recharge zone of the Edwards Aquifer. Recharge occurs from the surface through fractures and faults, surficial karst features, such as caves, sink holes and direct recharge from streams. Numerous dye studies conducted in the region over the years indicate that San Marcos Springs is a regional discharge point for the Edwards Aquifer, including the proposed site area (Johnson, et al, 2012). Sink Creek has been identified as a local source of recharge to San Marcos Spring (Johnson, et al, 2012). Contaminants entering the aquifer from the quarry site can rapidly migrate through the fractured and karstic aquifer and impact San Marcos Springs.

The WPAP states" It is not expected that any significant amount of groundwater will be encountered in the quarry excavation. In order to maintain appropriate separation from the groundwater the quarry floor will not be lower than 686ft.amsl."

TCEQ typically requires a 25' separation distance between the floor of the quarry and groundwater. This requirement is meant to afford some protection from mining impacts to the Edwards Aquifer, particularly in the recharge zone. The WPAP does not provide any explanation or factual reference for a quarry floor base elevation of 686ft.amsl.

Texas Water Development Board monitored a well very near the proposed quarry excavation for a number of years (SWR# 6808601). Well information can be found at: https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6808601&Type=GWDB)

The reference well is 275' deep from the surface, or elevation 686' amsl, which also is the depth of the proposed quarry floor. Per the TWDB, the well is a shallow Edwards Aquifer well. Previous groundwater levels measured at the well ranged from elevations 746 and 819 feet amsl. These elevations are significantly higher than 686 ft amsl. The applicant needs to provide explanation for the proposed elevation of the floor of quarry, including, the bore depth after drilling a test well at the proposed quarry location to support their proposal that the quarry operations including the deepest depth of boring, blasting, and rock removal will maintain at least a 25' buffer above the highest water level of the Edwards Aquifer in the footprint and impacted area of the quarry operations.

The project proposes mining across a mapped 100-year flood plain. The flood plain is a headwaters tributary to Sink Creek. In numerous places in the WPAP, the applicant states they will obtain permits for mining across 100-year flood plain at a later date. Sink Creek enters the San Marcos River just above Spring Lake and San Marcos Springs (Spring Lake). The tributary is a direct surface water pathway for increased sediment impacts to the creek and downstream receptors as well as a pathway for other contaminants such as residual ANFO. Due to the karstic nature of the aquifer, increased contaminant loads to the creek may also contribute to impacts to the aquifer.

Hays County requires a permit for any construction activities within the 100-year flood plain. Rerouting the tributary around the excavation will be difficult and will likely reduce the carrying capacity of the tributary. Any reduction in size of the flood plain due to mining activities will increase to potential of downstream flooding on downstream properties. A permit from Hays County, including remapping the floodplain, must be obtained prior to reviewing the WPAP.

It has been documented that quarry operations have impacted the Edwards Aquifer with residuals from ammonium nitrate/fuel oil explosives (ANFO). Quarries are known to be sources of nitrate pollution of groundwater. (Alberts, 2016). The proposed quarry on the Needmore Ranch is located on the Edwards recharge zone where the Edwards Limestone is at the surface. If it goes forward as planned it will contribute nitrate contamination to the Edwards Aquifer.

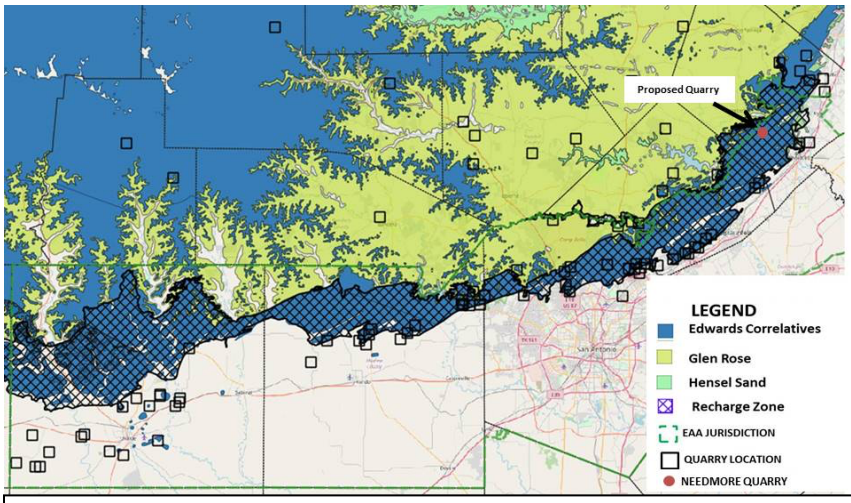


Figure 1. Quarry locations are shown with reference to outcrops of units correlative to the Edwards and Trinity Groups. Surface geology is from the USGS . Recharge zone and Edwards Aquifer Authority jurisdiction outline is from the EAA.

The aggregate industry mostly uses an ammonium nitrate fuel oil mixture (ANFO) as an explosive. ANFO mixtures vary somewhat, but typically are a stoichiometric composition of 94.5% ammonium nitrate (NH_4NO_3) and 5.5% fuel oil (Brochu, 2010). Ammonium nitrate is a salt which disassociates in water to NH_4^+ and NO_3^- and dissolves readily. Loss of ANFO by leaching from boreholes is variable and influenced by a number of factors including specifications of the explosive, nature of the site being mined, design of boreholes and explosive patterns and length of time between loading boreholes and detonation (Brochu, 2010, and Konya and Konya, 2019). ANFO is used in large quantities, typically 0.4-0.5 kg/m^3 (DynoNobel, 2010). Since about 28%-30% of ANFO used is not consumed in the blast (Alberts,

2016) it can also be dissolved after blasting. Once in groundwater, nitrification converts ammonium to nitrate (Musgrove and others, 2016) which is stable.

The Edwards limestone has been quarried extensively in the recharge zone of the San Antonio segment of the Edwards Aquifer, and the proposed Needmore quarry falls in that trend (Figure 1). Studies of nitrate in the Edwards Aquifer have noted that levels are elevated above an expected background level of 4.4 mg/L nitrate as NO_3 (1 mg/L nitrate as N) or less (Dubrovsky and others, 2010) but not offered an explanation, e.g., Bush and others, (2000). More recently, Musgrove and others (2016) ruled out contributions of nitrate from surface water and agriculture as causes of the higher measurements. Instead, they concluded that high nitrate levels in the eastern part of the San Antonio Segment result from urbanization on the recharge zone since 2000. However, they lacked historical data on nitrate concentrations and did not use data from rural counties to the west where they expected concentrations to be low.

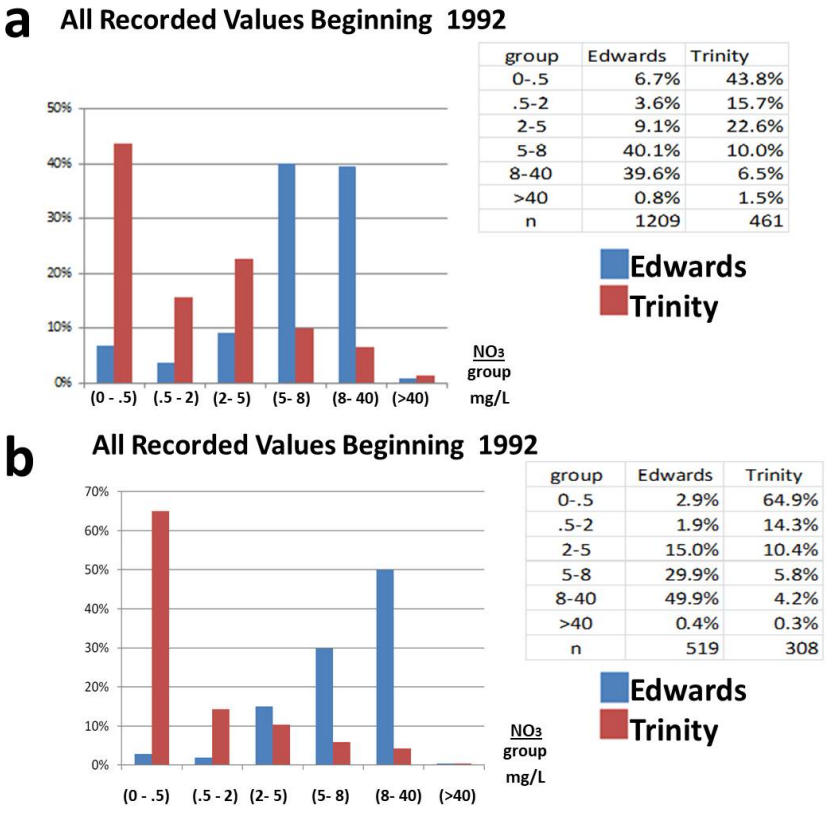
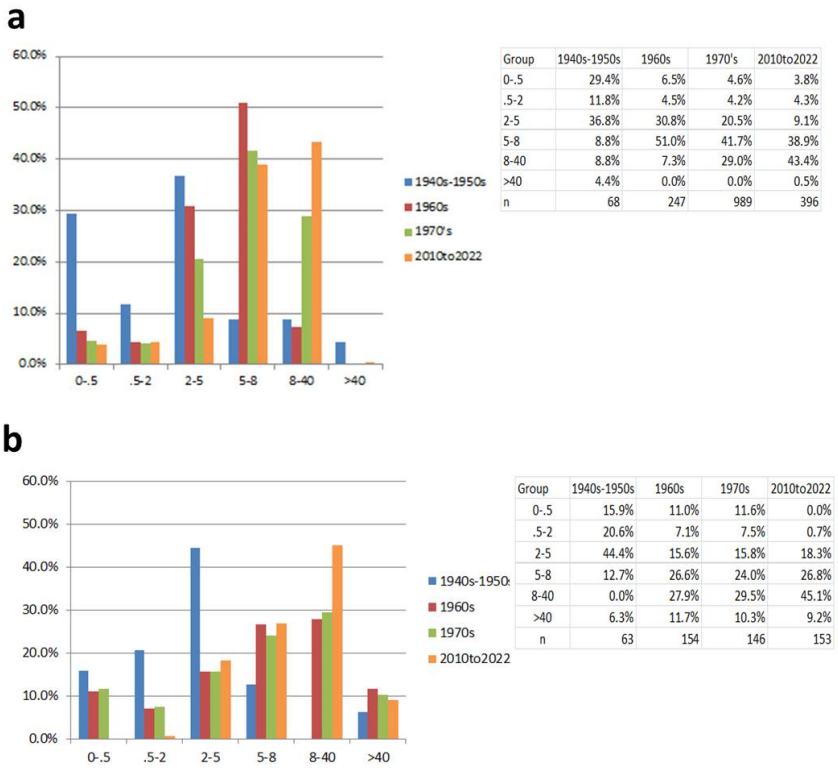


Figure 2. NO_3 measurements from the TWDB for wells in a) the Edwards Aquifer in Bexar, Guadalupe and Hays counties and Trinity Aquifer measurements in Bexar, Kendall, Comal and Hays counties and b) Edwards Aquifer measurements from wells in Medina and Uvalde counties and Trinity Aquifer measurements in Bandera, Kerr, Medina, Real and Uvalde Counties. The lowest three nitrate groups are consistent with background levels of nitrate.

Data from the Texas Water Development Board show urbanization alone cannot explain the geographic distribution of nitrate as shown by elevated concentrations in Medina and Uvalde counties (Figure 2). Besides surface water, the Edwards Aquifer is charged by cross-fault flow from the Trinity Aquifer which is clearly lower in saturation than the Edwards (Figure 2). Also, by the 1960's nitrate levels were elevated compared to background levels observed in the 1940's and 1950's, and levels have continued to increase since (Figure3). So, an additional explanation is required for both geographic distribution and timing of the increase in aquifer nitrate levels.

Quarrying of the Edwards Limestone in the recharge zone has been intense for at least 80 years Forster, 2010) and covers the entire extent from Hays to Uvalde counties (Figure 1). Both distribution and timing of elevated nitrate measurements show quarries are necessary to explain the increase in nitrate in the Edwards Aquifer. In particular, the increase in nitrate concentrations throughout the San Antonio Segment (Figure 3) fits well with the history of ANFO use. ANFO was introduced on large scale to the explosives market in the mid 1950's and dominated the market by the 1960's (Moreira,2012). Levels have continued to rise coincident with increase in aggregate production. Recently measured levels mostly remain below concentrations harmful to humans which is 44 mg/L N as NO^3 (10 mg/L N), but most measurements are above 8 mg/L N as NO^3 (2 mg/L N) which is harmful to some freshwater aquatic organisms (Monson and others, 2016).

The Needmore Quarry is proposed to be $8.09X10^5$ m^2 (200 acres). Applying typical industry usage values of $0.45kg/m^3$ of ANFO would yield an estimate of $3.64X10^5$ kg of ANFO used for every 1 meter of rock removed over that area. In turn, applying 28% unexploded residual would lead after nitrification of ammonium to 1.49X105 kg (165 tons) of nitrate potentially available to leach into the formation from that single meter thickness. That ANFO is used in large volumes is confirmed by a report that the Servtex Plant in Comal County in a single day used 5897 kg (13000) pounds of explosives to break up $1.81X10^7$ kg (20,000 tons) of rock (Chasnof, 2021). That corresponds to ~.5 kg/m^3 of ANFO per cubic meter.



Group	1940s-1950s	1960s	1970's	2010to2022
0-.5	29.4%	6.5%	4.6%	3.8%
.5-2	11.8%	4.5%	4.2%	4.3%
2-5	36.8%	30.8%	20.5%	9.1%
5-8	8.8%	51.0%	41.7%	38.9%
8-40	8.8%	7.3%	29.0%	43.4%
>40	4.4%	0.0%	0.0%	0.5%
n	68	247	989	396

Group	1940s-1950s	1960s	1970s	2010to2022
0-.5	15.9%	11.0%	11.6%	0.0%
.5-2	20.6%	7.1%	7.5%	0.7%
2-5	44.4%	15.6%	15.8%	18.3%
5-8	12.7%	26.6%	24.0%	26.8%
8-40	0.0%	27.9%	29.5%	45.1%
>40	6.3%	11.7%	10.3%	9.2%
n	63	154	146	153

Figure 3. NO3 measurements from the TWDB for wells in a) the Edwards Aquifer in Bexar, Guadalupe and Hays counties and b) Medina and Uvalde counties show that across the San Antonio Segment nitrate in the Edwards was t background levels in the 1940s-1950s and were elevated beginning in the 1960s. Nitrate values since 2010 are shown for comparison and are the highest observed.

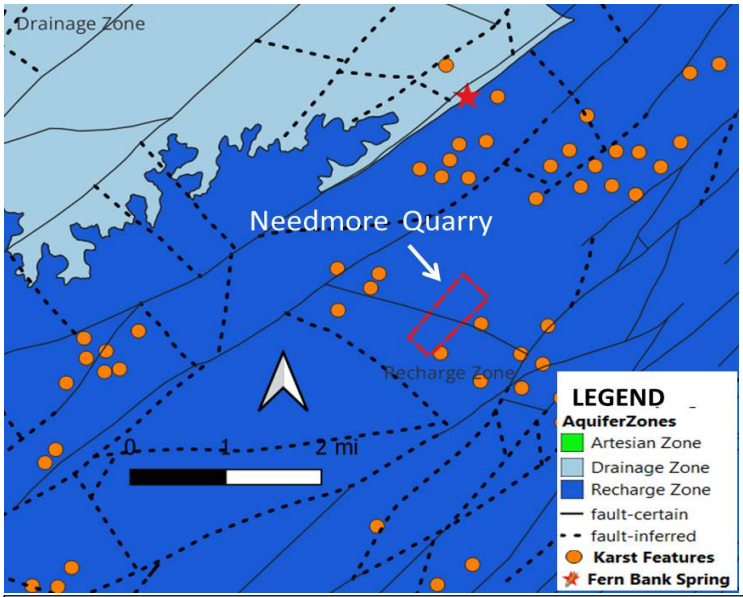


Figure 4. The proposed Needmore quarry is crossed by a fault (Clark and Others,2018) and nearby karst features (Wierman and Hunt, 2010) make it likely that a well developed fracture system will be present.

The geological report in the Needmore WPAP reported no sensitive features, even though the USGS mapped a fault crossing the proposed quarry (Figure 4). Faults will commonly have a zone of deformation including fractures that may be several hundred feet wide (Ferrill and others, 2011). The prevalence of karst features aligning with faults and in close proximity to the proposed quarry make it likely that a natural fracture system will be encountered. During the course of mining induced fractures from blasting will enhance passage of dissolved nitrate to the aquifer. Decreasing the distance between the quarry floor and the aquifer will increase that risk as well (Polemio and others, 2009). In short, with no modifications to the proposed WPAP, the Needmore Quarry will contribute to the problem of rising nitrate concentrations in the Edwards Aquifer.

Another impact from ANFO can be organic compounds, such as residual benzene from fuel oil has also been shown to potentially impact groundwater resources in

the vicinity of mining operations. In Miami –Dade County, it was found that benzene attributable to mining operations caused the seven of fifteen municipal water supply wells to be shut down. (Sierra Club v. Strock, 495 F. Supp. 2d 1188, 1196–97 (S.D. Fla. 2007), vacated sub nom. Sierra Club v. Van Antwerp, 526 F.3d 1353 (11th Cir. 2008).

Fern Bank Spring also known as Little Arkansas Spring, issues from the south bank of the Blanco River, several miles north of the proposed quarry, A dye trace study performed in 2008 (Johnson, et al, 2012) indicated there was a groundwater flow to the spring from the south.

Conclusion

There are two direct pathways for contaminants to reach the Edwards Aquifer and San Marcos Springs, home to several endangered species. Contaminants include ANFO residuals, such as nitrates and benzene, and sediment. Sink Creek and its tributaries provide a direct surface water contaminant pathway to the San Marcos River and San Marcos Springs. Groundwater flow through the fractured and karstic Edwards Aquifer is a pathway to groundwater users in vicinity and to the springs. Given the risk of widespread impacts to surface and groundwater and their users, this application should not be granted.

Respectfully,

Blue Creek Consulting LLC

Douglas A. Wierman, P.G. #4062

References

Alberts, Neil, 2016, Tackling nitrate contamination of water in mines: Mining News Digest, August 11.

Brochu, Sylvie, 2010, Assessment of ANFO on the environment: Defense R&D Canada – Valcartier Technical Investigation 09-01.

Bush, Peter W., Ann F. Ardis, Lynne Fahlquist, Patricia B. Ging,C. Evan Hornig, and Jennifer Lanning-Rush, 2000, Water Quality in South-Central Texas,1996–98: U.S. GEOLOGICAL SURVEY CIRCULAR 1212, 34p.

Chasnof, Bryan, 2021, From Garden Ridge to New Braunfels, 'Quarry Row' Has Residents Demanding Stricter Regulation: San Antonio Express News, October 6, 2021

Clark, Allan K, Diana E. Pedraza, and Robert R. Morris, 2018, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers Within Hays County, Texas: USGS Scientific Investigations Map 3418.

Dubrovsky, Neil M., Karen R. Burow, Gregory M. Clark, Jo Ann M. Gronberg, Pixie A. Hamilton, Kerie J. Hitt, David K. Mueller, Mark D. Munn, Bernard T. Nolan, Larry J. Puckett, Michael G. Rupert, Terry M. Short, Norman E. Spahr, Lori A. Sprague, and William G. Wilber, 2010, The Quality of Our Nation's Water— Nutrients in the Nation's Streams and Groundwater, 1992–2004: U.S. Department of the Interior U.S. Geological Survey Circular 1350, 174 p.

Dyno Nobel, 2010, Blasting and Explosives Quick Reference Guide: Dyno Nobel Asia Pacific Pty Limited, 32p.

Ferrill, David A., Alan P. Morris, Ronald N. McGinnis, Kevin J Smart, and William C. Ward, 2011, Fault zone deformation and displacement partitioning in mechanically layered carbonates: The Hidden Valley fault, central Texas: AAPG Bulletin, v. 95, no. 8 (August 2011), pp. 1383–1397

Forster Charles P., 2010, Recharge and Transition Zone Exception Request Form, Martin Marietta New Braunfels Quarry Operations Modification: https://www.cceo.org/ environmental/documents/ WPAP/ Martin_Marietta_Materials_New_Braunfels_Quarry.pdf

Johnson, S.,et, al., 2012. Tracing Groundwater Flowpaths in the Vicinity of San Marcos Springs, TX. Edwards Aquifer Authority publication.

Konya, Anthony and Calvin Konya, 2019, Blasting mechanics revisited: Characteristics of explosives: Pit and Quarry, March 20.

Monson, Philip, 2022, Aquatic Life Water Quality Standards Draft Technical Support Document for Nitrate: Minnesota Pollution Control Agency, 21p.

Musgrove, M., S.P. Opsahl, B.J.Mahler, C. Herrington, T.L. Sample, and J.R. Banta, 2016, Source, variability, and transformation of nitrate in a regional karst aquifer: Edwards aquifer, central Texas: Science of the Total Environment 568 pp. 457–469.

Polemio, M.; Casarano, D.; and Limoni, P. P., "Karstic aquifer vulnerability assessment methods and results at a test site (Apulia, southern Italy)" (2009). KIP Articles. 3006.
https://digitalcommons.usf.edu/kip_articles/3006

Wierman, Douglas A. and Brian P Hunt, 2010, Occurrence of Karst and Springs: in Douglas A. Wierman, Alex S. Broun, and Brian B. Hunt eds. Hydrogeologic Atlas of the Hill Country Trinity Aquifer

Blanco, Hays, and Travis Counties, Central Texas

ATTACHMENT B
TO MOTION TO OVERTURN

April 21, 2024

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program – MC R11
PO Box 13087
Austin, TX 78711-3087
Submit via email to: eapp@tceq.texas.gov

Re: Opposition to the Vulcan Comal Quarry Plant; TCEQ Edwards Aquifer Permit #: 13001906

To Whom It May Concern,

My name is Milann Guckian and I hereby request a public meeting and contested case hearing as an affected person on WPAP-EAPP permit #13001906. I am also president of Preserve our Hill Country Environment (PHCE) and PHCE Foundation. The applicant is Vulcan Construction Materials LLC, a publicly traded corporation headquartered at 1200 Urban Center Drive Birmingham, Alabama 35242. The applicant's property is listed under the name of Blue Pine Holdings per the Comal County Tax Appraisal District. My property is located at Durst Ranch 1, Lot 1, Acres 5.01/30954 FM 3009 New Braunfels, Tx 78132. I can be reached by phone (361-947-7101) or by email (bgr@gvtc.com).

My wife and I purchased this property in April 1996 with a dream and a vision. The dream was to build a home and retire to the Texas Hill Country. Now, the idea that my home and my quality of life is threatened by the inappropriate location of Vulcan's quarry is unimaginable.

Vulcan is proposing the construction of a quarry with associated plant areas, office, shop areas, and driveway on approximately 1,515.16 acres. The nine (9) proposed quarry Mining Areas comprise approximately 956 acres. The site sits entirely over the Edwards Aquifer Recharge Zone (EARZ) and is surrounded by heavily populated residential and ranching communities. Notably, the pristine West Fork Dry Comal Creek runs through, and multiple caves lie beneath the surface of this scenic and consequential segment of the Texas Hill Country. The proposed quarry site is located on the southwest corner of FM 3009 and SH-46, Comal County, Texas.

My property:

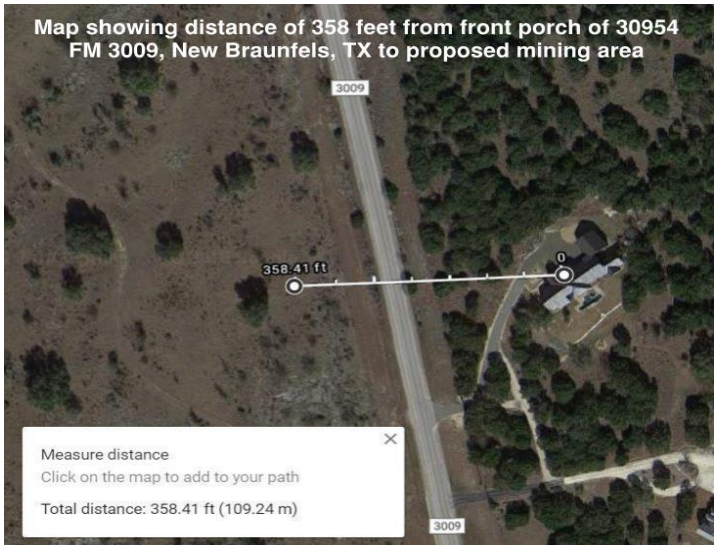
- ✓ My property's fence line is 107.02' from the applicants fence line.
- ✓ My front porch is 258.01' to the applicants fence line.

My fence line (foreground) is 107' from applicant fence line

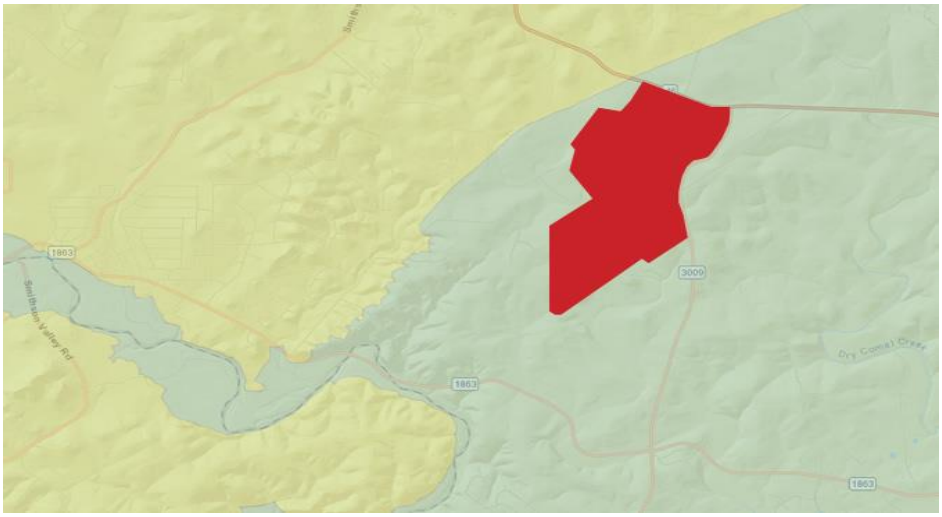
My fence line to our front porch 151'

- ✓ My front porch is 358.16' to the applicant Mining Area #7.
- ✓ Our water well is situated 493' from the applicant Mining Area #7
- ✓ Our water well is approximately 4800' → 5000' to the applicant industrial water well.

Distance mapping:



Vulcan's proposed open-pit limestone mining operation would stretch across nearly three miles of the environmentally sensitive Edwards Aquifer Recharge Zone (primary water supply for over two million people, including the cities of San Antonio and New Braunfels).



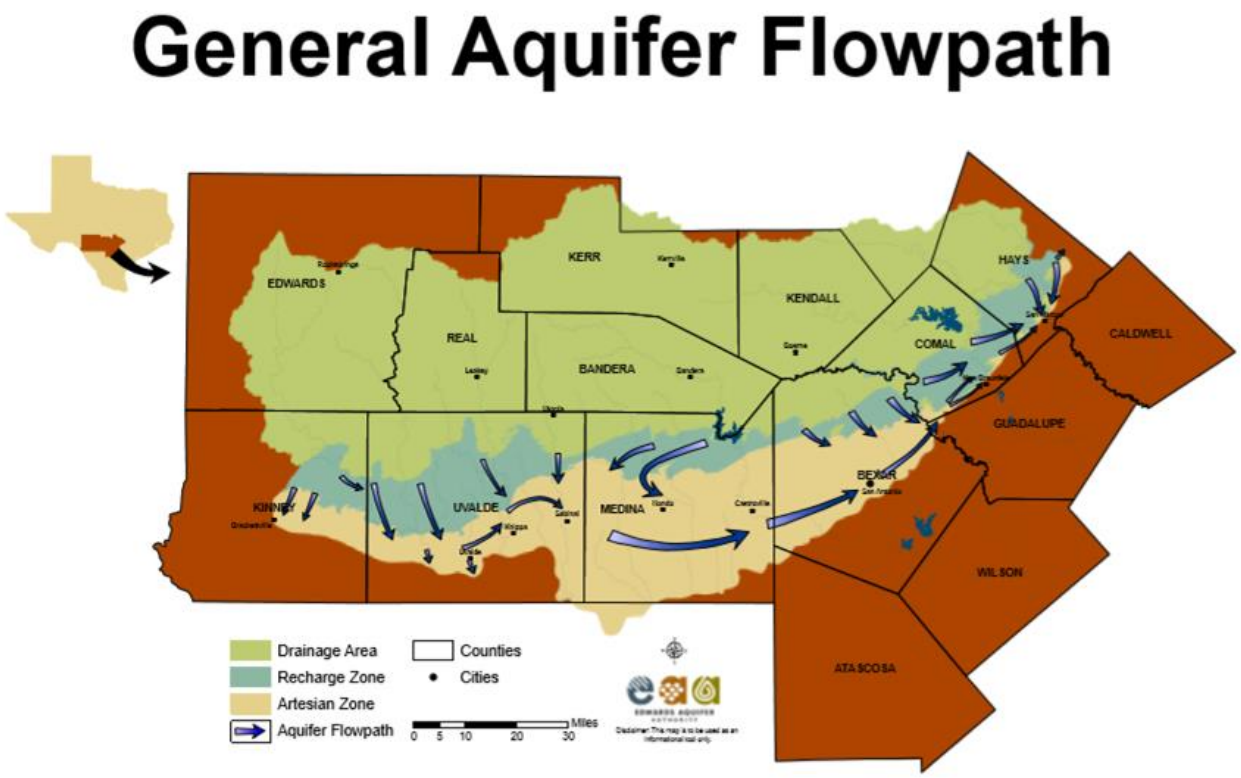
1500-acre Vulcan quarry site (red) situated entirely within the EARZ (darker blue-green color)

Not only does this site sit atop the EARZ but the West Fork Dry Comal Creek runs through it, converging downstream with the Dry Comal Creek before merging with the Comal River in New Braunfels. The Comal River is fed by springs from the Edwards Aquifer and is home to several endangered species. The clear, temperate waters of the Comal are widely used for recreational swimming and tubing activities before discharging into the Guadalupe River. Dry Comal Creek and Comal River are essential natural resources in Comal County, supporting economic development and recreation in the city, as well as agricultural operations and wildlife throughout the area. Comal County has numerous waterways — Dry Comal, Cibolo, Rebecca, and Honey creeks; Comal and Guadalupe rivers; Comal and Hueco springs, the Trinity and Edwards aquifers; and Canyon Lake. If any of these water sources becomes polluted or is irreparably harmed, the others are in danger as well.

- Water Supply & Usage (Quantity)
    - Water usage by Vulcan's Rock Crushing Plant, associated equipment, roads, and stockpiles is significant; based on water use per ton of quarried material, approximately 383 acre-ft (125 million gallons) of groundwater per year would be needed. This will adversely affect not only the Edwards Aquifer Recharge Zone (EARZ), but it will affect our water well too. We are on a private well that cost us $27507.50 to install. We drilled 930' down into Cow Creek (Trinity Aquifer). The Trinity Glen Rose Aquifer is our only water source. The same water table that the applicant (under the holding corporation named Blue Pine Holdings LLC) had the previous owner drill in 2016. My well pumps 8-10 gallons/minute. It is documented that they can pump up to 150 gallons/minute at this site. This is approximately 78 million gallons annually http://www2.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=439830&Type=SDR-Well.
    - Due to the extreme drought that Comal County experienced, water supplies are already strained. Several neighbors have stated that they are having trouble with their wells going dry. They are having to either drill new wells or find other avenues for water delivery to their homes. This is one of our biggest fears, that our well will run dry and we will have to drill for a new well, start a rainwater collection system or pay to have water delivered. The viability and enjoyment of our home will be at risk if we do not have access to clean, unpolluted water. Looking at a 35% increase in cost, the price tag for a new well is now over $37,000 and both other options will be just as costly in the long run.
    - Another concern for our water supply is blasting. Our well is situated 493' from the closest mining site (that includes the 100' buffer zone). When blasts occur, the karst cracks and can travel for several miles leading to the possible collapse of my well and the development of sinkholes. As water and rock are removed due to mining, the support they give to underground features is gone. The blasting can lead to the destruction of caves and the natural infrastructure of the Balcones Escarpment causing disruptions in the natural flow of water which causes a reduction of rainwater to the aquifers and can potentially lead to downstream flooding. Sinkholes can develop. The roofs of underground caverns are weakened or can collapse. The collapse can be sudden or gradual. Although there are natural sinkholes that develop over time, man-made ones predominate in mining areas.
- Water Quality (Pollution)
    - There is also the potential for ground water contamination due to plant operations and the hazardous chemicals inherent in this industry. Quarry operations pose a special risk of groundwater pollution because the predominant explosive used is ANFO, a combination of ammonium nitrate and fuel oil. Ammonium nitrate is used in large quantities, and it is highly soluble in water. Per industry sources, up to 28% of the explosive is not consumed by blasting (Alberts, N., 2016, Mining News Digest, August

issue). Exposure to nitrate can be particularly threatening to aquatic organisms (Isaza, D.F., Cramp, R.L., and Franklin, C.E., 2020, Environmental Pollution, Vol. 26).

- Large quarry pits located over the EARZ act as funnels for pollutants including nitrate into the Edwards Aquifer. At the Vulcan Site, the Edwards Aquifer is interconnected with the Trinity Aquifer, putting it at risk as well. This topic was addressed by hydrogeologists Brian A. Smith, Ph. D., Texas P.G. #4955 (report attached).
- The Vulcan plant falls within the boundaries of the Dry Comal Creek/Comal River Watershed Protection Plan (WPP), an EPA sponsored effort to protect the watershed's natural resources. Since the plan's inception, planning and implementation strategies have been conducted to address water quality concerns for the West Fork Dry Comal and Dry Comal Creeks, and the Comal River.
- The Comal Springs are the largest springs in the southwestern United States and are fed by groundwater issuing from the Edwards Aquifer. The Comal ecosystem is home to rare and endangered aquatic species found nowhere else on Earth. These species include the Fountain Darter (Etheostoma fonticola), Comal Springs Dryopid Beetle (Stygoparnus comalensis), Comal Springs Riffle Beetle (Heterelmis comalensis), and Peck's Cave Amphipod (Stygobromus pecki).



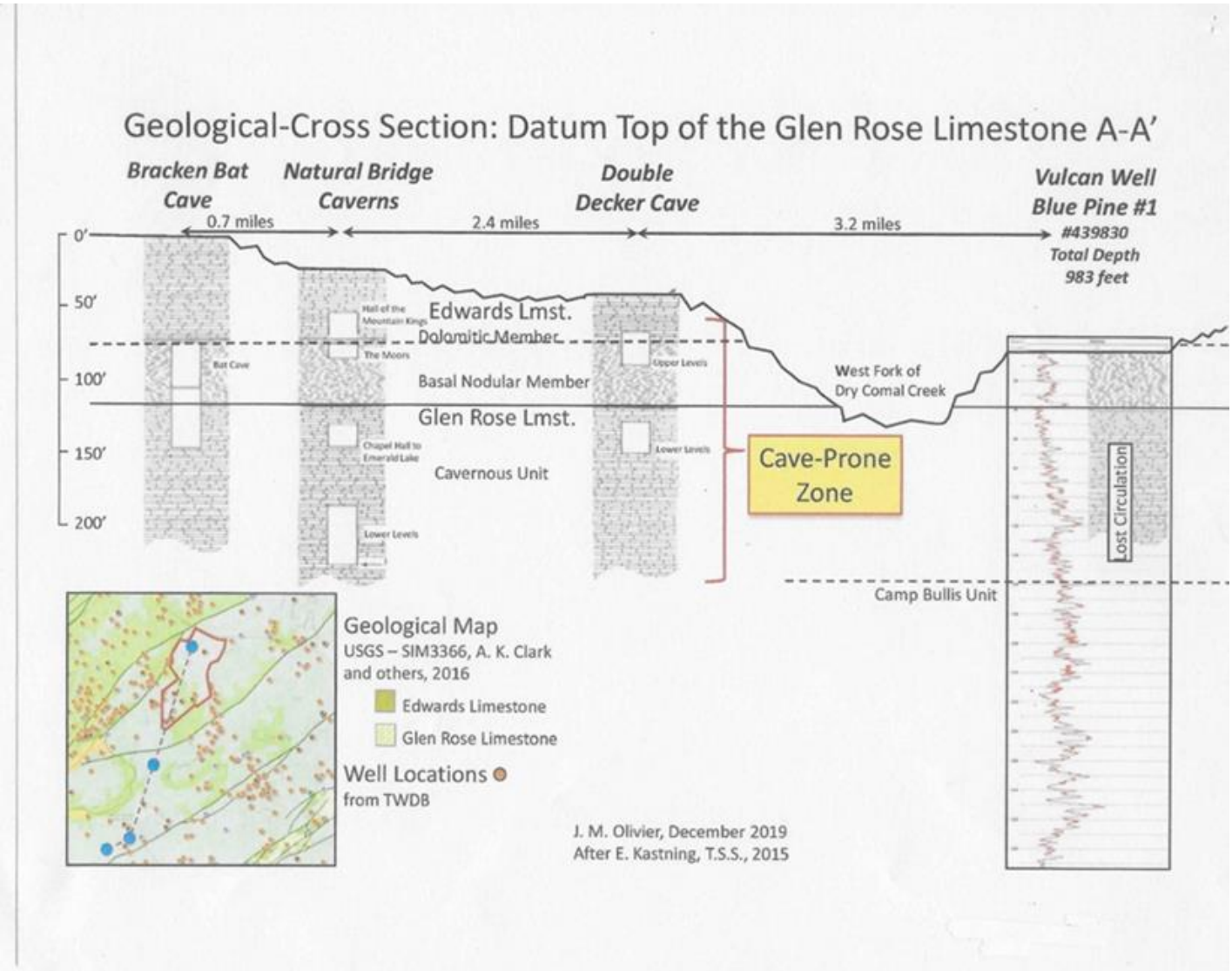
Groundwater flow from the Vulcan site generally would move southeast then shift to the east then northeast toward Hueco and Comal Springs. Map source Edwards Aquifer Authority.

- With the direction of the groundwater flow these issues will not only have the potential to adversely impact Comal and Hueco springs, but they could pollute our water supply as well. We depend on this water for drinking, bathing, home maintenance, and recreation.

- Cave-Prone Zone
  - The limestone formations present in the EARZ have a very high density of caves and sinkholes. Comal County is among the top counties in Texas for having the greatest number of known caves (Texas Speleological Survey website). Two of the best-known caves in Comal County, Natural Bridge Caverns and Bracken Bat Cave, are located approximately 6 miles south of the Vulcan Site. Another large cave, Double Decker, is located just 3 miles south of the Vulcan Site. Exploration work conducted in 2019 at

Natural Bridge Caverns and Double Decker Cave identified significant new chambers and passages (Herald-Zeitung newspaper, August 22, 2019).

- The WPAP does not consider the proximity of two highly active cave systems in the area, Natural Bridge Caverns, and the Bracken Bat Cave.



Both cave systems run along the same Geological-Cross Section as the Vulcan Well Blue Pine #1. Map Source J. M. Olivier after E. Kastning, T.S.S.

- The stratigraphic cross-section A-A' above shows the chambers at Natural Bridge Caverns, Bracken Cave, and Double Decker Cave. On the northern end of the cross-section, a water well drilled on the Vulcan Site lost circulation in a highly permeable interval while being drilled from a depth of 63 – 143 ft. This interval correlates to the Cave-Prone Zone, indicating the potential that significant caves may exist under the Vulcan Site. It also shows the high probability that the entire area is hydrologically connected with both the Edwards and Trinity Aquifers.

- TCEQ Sensitivity Scoring System and Vulcan's Geologic Assessment
  - A *sensitive feature,* as defined by the TCEQ, is "a permeable geologic or manmade feature located on the recharge zone or transition zone where the potential for hydraulic interconnectedness between the surface and the Edwards Aquifer exists, and rapid infiltration to the subsurface may occur." A point system is used to score the sensitivity of features based on a classification of three variables: feature

type (5 - 30 points), orientation with respect to structure, and a field-based assessment of relative water infiltration rate (5 - 35 points or greater). Environmental protection is given only to features with a combined score of 40 or greater.

- Caves are the most common type of karst feature given protection. Although sinkholes are often caused by the partial collapse of caves just below the land surface, they are generally not given protection because their water infiltration rate is often difficult to judge. This poses a significant challenge for assessing the Vulcan Site because a large percentage of the surrounding caves there were only discovered by digging in sinkholes.
- A total of 37 sensitive karst features were identified in the Geologic Assessment for the 1,515-acre Vulcan Site (Pape-Dawson Engineers, 2024). According to the TCEQ rating system, 7 of the karst features, including three caves, require protection. The density of sensitive features appears anomalously low when compared to the surrounding area. Immediately to the north across SH 46, 38 sensitive features were found on 158 acres (Bigbee Tract Subdivision, Geologic Assessment, 2021). Immediately to the south of the Vulcan Site, the Edwards Aquifer Authority (EAA) investigated 1,581 acres for its potential inclusion in a conservation easement program and determined the property has a very high direct recharge potential because of the numerous caves/sinkholes observed (Schindel, 2021, EAA Geological Evaluation of the Froboese Ranches, Comal Co., TX). A regional study using lithology as a predictive tool of cave entrances also indicates that more caves could be expected at the Vulcan Site (Veni, 2005).

- In Summary
  - The Edwards Aquifer Recharge Zone (EARZ) is the primary source of water for over 2.5 million people in South Central Texas, and therefore requires strict protection by the TCEQ and EAA.
  - Quarries introduce pollutants such as ammonium nitrate and diesel fuel (ANFO) used as the explosive.
  - Groundwater in Comal County generally flows from west to east towards the Comal Springs in New Braunfels, home to several endangered aquatic species in the Comal Springs.
  - An extensive system of caves and caverns in the EARZ are important to groundwater transmission.
  - The Edwards and Trinity Aquifers in the EARZ are known to be interconnected across faults in the Balcones Fault Zone.
  - A Cave-Prone Zone extends across the Vulcan Site indicating there is a high probability quarry pits will encounter large caves that are hydrologically connected to the underlying aquifers.

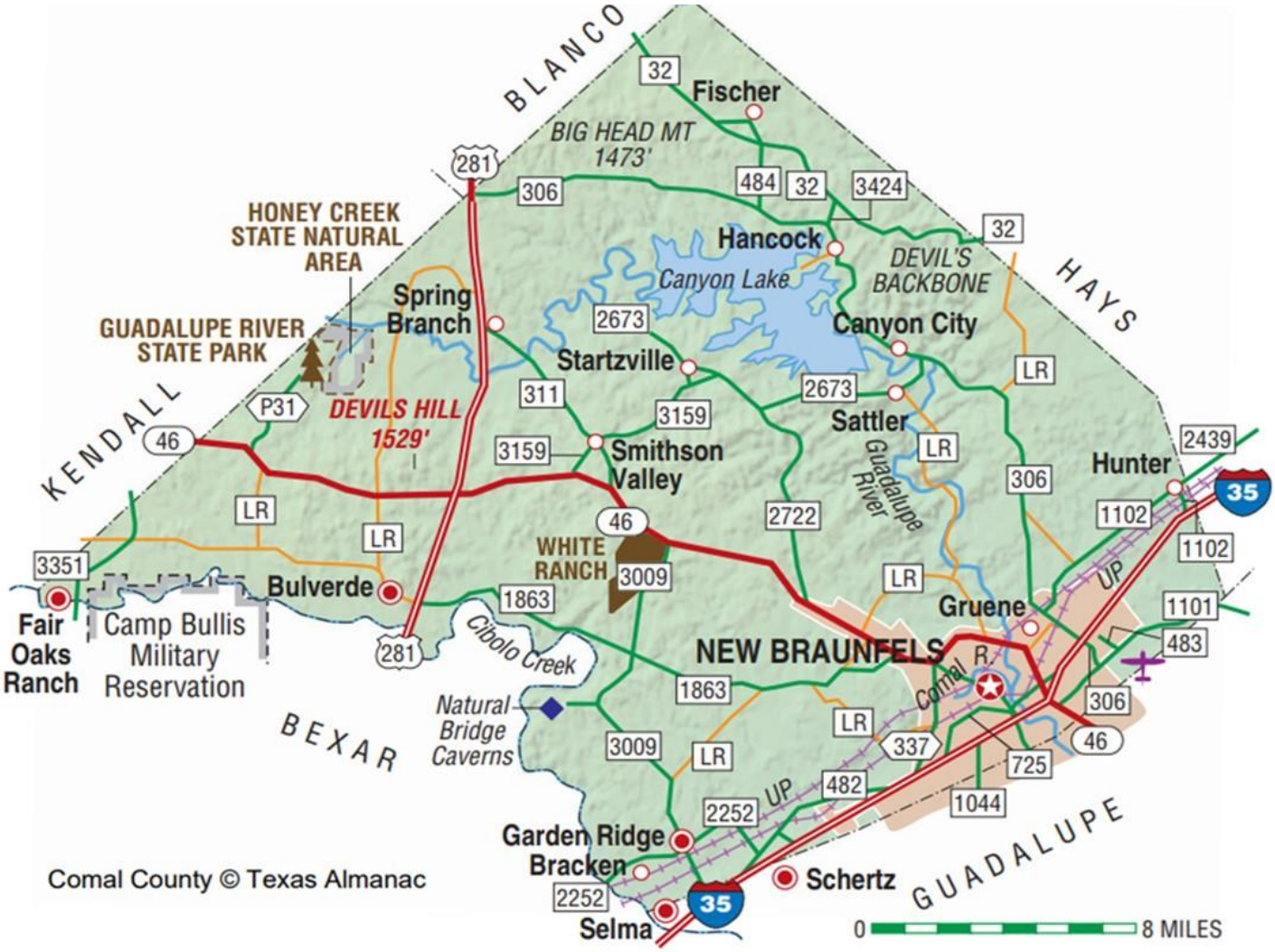
- Conclusion
  - On April 16, 2024, Texas Lieutenant Governor Dan Patrick publicly expressed his serious environmental concerns about a proposed, 600-acre cement production project plant with an associated quarry in Grayson County (kxii.com, Sherman, TX). In a letter sent to the TCEQ, he asked for an immediate pause in the permitting processes for all permanent cement production plants until the legislature can consider what is best for Texas communities. I strongly believe the same thing should be done regarding the proposed Vulcan Comal Quarry. That project has a projected life of over 80 years and will leave permanent pits over a highly sensitive portion of the EARZ, the source of drinking water for over 2.5 million Texans.

Because of the sensitivity of the site and the magnitude of the quarry, I request a public meeting be granted and also, fully expect to be named an Affected Person if a Contested Case Hearing regarding Vulcan Construction Materials LLC WPAP-EAPP permit #13001906 is considered. A thorough evaluation of existing data and data collected by Dr. Brian Smith in the attached "Hydrogeology of the Edwards and Trinity Aquifers…" will show that the aquifer beneath this site is highly sensitive to contamination. I oppose Vulcan's permit application and encourage TCEQ deny approval of Permit #13001906. The amount of time, effort, and money that my family has invested over the last 6 ¾ years in opposing this

quarry has already affected our lives in a negative way. Our home (my sanctuary) and our quality of life will be stripped away if this facility is permitted.

Respectfully submitted,

Milann Guckian
30954 FM 3009
New Braunfels, Tx 78132
361-947-7101
bgr@gvtc.com



ATTACHMENT C
TO MOTION TO OVERTURN

TCEQ DOCKET NO. 2024-1115-EAQ
WPAP PERMIT ID NO. 13001906

In the Matter of the Approval of a Water Pollution Abatement Plan
By Vulcan Construction Materials, LLC
Before the Texas Commission on Environmental Quality

MILANN and PRUDENCE GUCKIAN'S
MOTION TO OVERTURN EXECUTIVE DIRECTOR'S DECISION

TO THE HONORABLE CHAIRMAN COMMISSIONERS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY:

The Executive Director's effective approval of Vulcan Construction Materials, LLC's Water Pollution Abatement Plan for the Vulcan Comal Quarry constituted a real and present threat to our quality of life by the inappropriate location of Vulcan's quarry, deprived us of due process because of TCEQ's failure to allow meaningful opportunity to participate in the decision-making process, and violated TCEQ's own rules. Hence, pursuant to 30 TAC § 50.139 Milann and Prudence Guckian files this Motion to Overturn the ED's decision approving Vulcan's WPAP.

Vulcan is proposing the construction of a quarry with associated plant areas, office, shop areas, and driveway on approximately 1,515.16 acres. The nine (9) proposed quarry Mining Areas comprise approximately 956 acres. The site sits entirely over the Edwards Aquifer Recharge Zone (EARZ) and is surrounded by heavily populated residential and ranching communities. Notably, the pristine West Fork Dry Comal Creek runs through, and multiple caves lie beneath the surface of this scenic and consequential segment of the Texas Hill Country. The proposed quarry site is located on the southwest corner of FM 3009 and SH-46, Comal County, Texas.

TCEQ Executive Directors (ED) decision Threatens Guckian Quality of Life and Natural Resources

- ✓ Our property's fence line is 107.02' from Vulcan quarry's fence line.
- ✓ Our front porch is 258.01' to the Vulcan quarry's fence line.

Our fence line (foreground) is 107' from Vulcan Quarry fence line

Our fence line to our front porch 151'

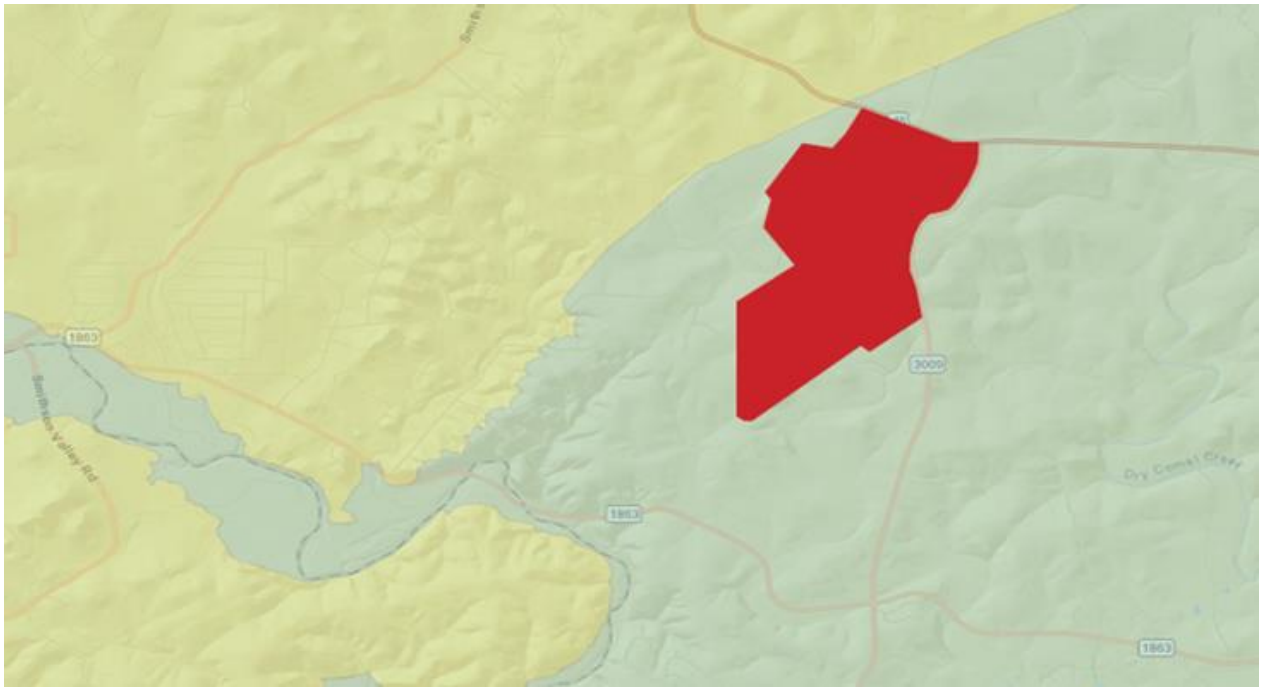
- ✓ Our front porch is 358.16’ to the applicant Mining Area #7.
- ✓ Our water well is situated 493’ from the applicant Mining Area #7
- ✓ Our water well is approximately 4800’ → 5000’ to the applicant industrial water well.

Distance mapping:

Vulcan’s proposed open-pit limestone mining operation would stretch across nearly three miles of the environmentally sensitive Edwards Aquifer Recharge Zone (primary water supply for over 2.5 million people, including the cities of San Antonio and New Braunfels).

Not only does this site sit atop the EARZ but the West Fork Dry Comal Creek runs through it, converging downstream with the Dry Comal Creek before merging with the Comal River in New Braunfels. The Comal River is fed by springs from the Edwards Aquifer and is home to several endangered species. The clear, temperate waters of the Comal are widely used for recreational swimming and tubing activities before discharging into the Guadalupe River. Dry Comal Creek and Comal River are essential natural resources in Comal County, supporting economic development and recreation in the city, as well as agricultural

operations and wildlife throughout the area. Comal County has numerous waterways — Dry Comal, Cibolo, Rebecca, and Honey creeks; Comal and Guadalupe rivers; Comal and Hueco springs, the Trinity and Edwards aquifers; and Canyon Lake. If any of these water sources becomes polluted or is irreparably harmed, the others are in danger as well.



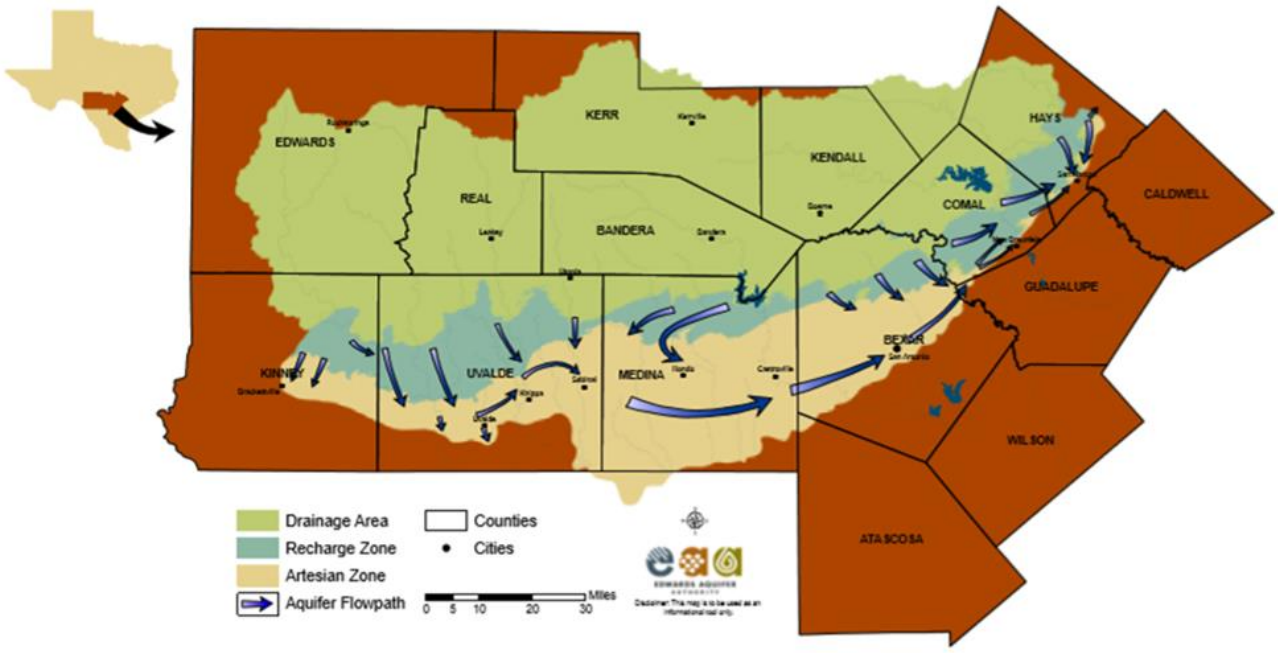
1500-acre Vulcan quarry site (red) situated entirely within the EARZ (darker blue-green color)

- Water Supply & Usage (Quantity)
    - Water usage by Vulcan's Rock Crushing Plant, associated equipment, roads, and stockpiles is significant; based on water use per ton of quarried material, approximately 383 acre-ft (125 million gallons) of groundwater per year would be needed. This will adversely affect not only the Edwards Aquifer Recharge Zone (EARZ), but it will affect our water well too. We are on a private well that cost us $27507.50 to install. We drilled 930' down into Cow Creek (Trinity Aquifer). The Trinity Glen Rose Aquifer is our only water source. The same water table that Vulcan Construction Materials (under the holding corporation named Blue Pine Holdings LLC) had the previous owner drill in 2016. My well pumps 8-10 gallons/minute. It is documented that they can pump up to 150 gallons/minute at this site. This is approximately 78 million gallons annually http://www2.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=439830&Type=SDR-Well.
    - Due to the extreme drought that Comal County experienced, water supplies are already strained. Several neighbors have stated that they are having trouble with their wells going dry. They are having to either drill new wells or find other avenues for water delivery to their homes. This is one of our biggest fears, that our well will run dry and we will have to drill for a new well, start a rainwater collection system or pay to have water delivered. The viability and enjoyment of our home will be at risk if we do not have access to clean, unpolluted water. Looking at a 35% increase in cost, the price tag for a new well is now over $37,000 and both other options will be just as costly in the long run.

- Another concern for our water supply is blasting. Our well is situated 493' from the closest mining site (that includes the 100' buffer zone). When blasts occur, the karst cracks and can travel for several miles leading to the possible collapse of my well and the development of sinkholes. As water and rock are removed due to mining, the support they give to underground features is gone. The blasting can lead to the destruction of caves and the natural infrastructure of the Balcones Escarpment causing disruptions in the natural flow of water which causes a reduction of rainwater to the aquifers and can potentially lead to downstream flooding. Sinkholes can develop. The roofs of underground caverns are weakened or can collapse. The collapse can be sudden or gradual. Although there are natural sinkholes that develop over time, man-made ones predominate in mining areas.

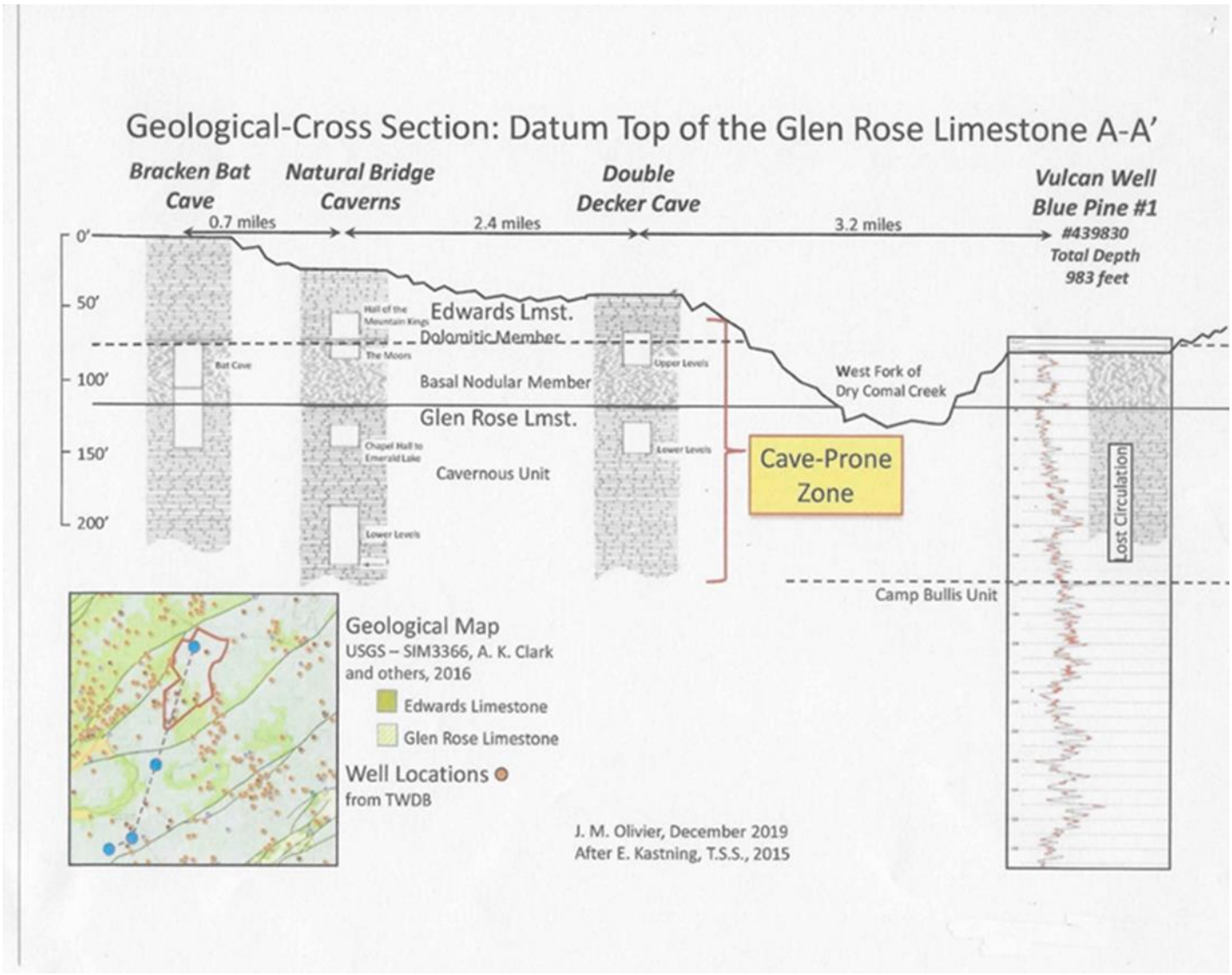
- Water Quality (Pollution)
  - There is also the potential for ground water contamination due to plant operations and the hazardous chemicals inherent in this industry. Quarry operations pose a special risk of groundwater pollution because the predominant explosive used is ANFO, a combination of ammonium nitrate and fuel oil. Ammonium nitrate is used in large quantities, and it is highly soluble in water. Per industry sources, up to 28% of the explosive is not consumed by blasting (Alberts, N., 2016, Mining News Digest, August issue). Exposure to nitrate can be particularly threatening to aquatic organisms (Isaza, D.F., Cramp, R.L., and Franklin, C.E., 2020, Environmental Pollution, Vol. 26).
  - Large quarry pits located over the EARZ act as funnels for pollutants including nitrate into the Edwards Aquifer. At the Vulcan Site, the Edwards Aquifer is interconnected with the Trinity Aquifer, putting it at risk as well. This topic was addressed by hydrogeologists Brian A. Smith, Ph. D., Texas P.G. #4955 (Attachment A).
  - The Vulcan plant falls within the boundaries of the Dry Comal Creek/Comal River Watershed Protection Plan (WPP), an EPA sponsored effort to protect the watershed's natural resources. Since the plan's inception, planning and implementation strategies have been conducted to address water quality concerns for the West Fork Dry Comal and Dry Comal Creeks, and the Comal River.
  - The Comal Springs are the largest springs in the southwestern United States and are fed by groundwater issuing from the Edwards Aquifer. The Comal ecosystem is home to rare and endangered aquatic species found nowhere else on Earth. These species include the Fountain Darter (Etheostoma fonticola), Comal Springs Dryopid Beetle (Stygoparnus comalensis), Comal Springs Riffle Beetle (Heterelmis comalensis), and Peck's Cave Amphipod (Stygobromus pecki).
  - With the direction of the groundwater flow these issues will not only have the potential to adversely impact Comal and Hueco springs, but they could pollute our water supply as well. We depend on this water for drinking, bathing, home maintenance, and recreation.
  - Dr. Smith's report (Attachment A) found that reduced flows have negative impact on the ecology immediately in the spring area and downstream stretches, including endangered species. Therefore, Vulcan's use of groundwater may contribute to a violation of the Endangered Species Act. Moreover, decreased groundwater availability increases the potential for contamination from various sources, in violation of Edwards Aquifer Protection Plan regulations found in TCEQ Rule 213.1.

General Aquifer Flowpath



Groundwater flow from the Vulcan site generally would move southeast then shift to the east then northeast toward Hueco and Comal Springs. Map source Edwards Aquifer Authority.

- Cave-Prone Zone
  - The limestone formations present in the EARZ have a very high density of caves and sinkholes. Comal County is among the top counties in Texas for having the greatest number of known caves (Texas Speleological Survey website). Two of the best-known caves in Comal County, Natural Bridge Caverns and Bracken Bat Cave, are located approximately 6 miles south of the Vulcan Site. Another large cave, Double Decker, is located just 3 miles south of the Vulcan Site. Exploration work conducted in 2019 at Natural Bridge Caverns and Double Decker Cave identified significant new chambers and passages (Herald-Zeitung newspaper, August 22, 2019).
  - The WPAP does not consider the proximity of two highly active cave systems in the area, Natural Bridge Caverns, and the Bracken Bat Cave.
  - The stratigraphic cross-section A-A' below shows the chambers at Natural Bridge Caverns, Bracken Cave, and Double Decker Cave. On the northern end of the cross-section, a water well drilled on the Vulcan Site lost circulation in a highly permeable interval while being drilled from a depth of 63 – 143 ft. This interval correlates to the Cave-Prone Zone, indicating the potential that significant caves may exist under the Vulcan Site. It also shows the high probability that the entire area is hydrologically connected with both the Edwards and Trinity Aquifers.



Both cave systems run along the same Geological-Cross Section as the Vulcan Well Blue Pine #1. Map Source J. M. Olivier after E. Kastning, T.S.S.

- TCEQ Sensitivity Scoring System and Vulcan's Geologic Assessment
  - A *sensitive feature,* as defined by the TCEQ, is "a permeable geologic or manmade feature located on the recharge zone or transition zone where the potential for hydraulic interconnectedness between the surface and the Edwards Aquifer exists, and rapid infiltration to the subsurface may occur." A point system is used to score the sensitivity of features based on a classification of three variables: feature type (5 - 30 points), orientation with respect to structure, and a field-based assessment of relative water infiltration rate (5 - 35 points or greater). Environmental protection is given only to features with a combined score of 40 or greater.
  - Caves are the most common type of karst feature given protection. Although sinkholes are often caused by the partial collapse of caves just below the land surface, they are generally not given protection because their water infiltration rate is often difficult to judge. This poses a significant challenge for assessing the Vulcan Site because a large percentage of the surrounding caves there were only discovered by digging in sinkholes.
  - A total of 37 sensitive karst features were identified in the Geologic Assessment for the 1,515-acre Vulcan Site (Pape-Dawson Engineers, 2024). According to the TCEQ rating

system, 7 of the karst features, including three caves, require protection. The density of sensitive features appears anomalously low when compared to the surrounding area. Immediately to the north across SH 46, 38 sensitive features were found on 158 acres (Bigbee Tract Subdivision, Geologic Assessment, 2021). Immediately to the south of the Vulcan Site, the Edwards Aquifer Authority (EAA) investigated 1,581 acres for its potential inclusion in a conservation easement program and determined the property has a very high direct recharge potential because of the numerous caves/sinkholes observed (Schindel, 2021, EAA Geological Evaluation of the Froboese Ranches, Comal Co., TX). A regional study using lithology as a predictive tool of cave entrances also indicates that more caves could be expected at the Vulcan Site (Veni, 2005).

TCEQ EDs decision deprived us of due process by her failure to allow meaningful opportunity to participate in the decision-making process.

- ✓ No public notice was posted by TCEQ letting us or the community know that the WPAP application had been deemed administratively correct and posted to the TCEQ website. We find out by happenstance.
- ✓ The WPAP application was a 149-page technical document. We had little time to research validity of the application and make public comment.
- ✓ We each submitted a public comment within the 30-day public commenting period but received no notice that you had received said comments and we received no reply to comments from the ED.
- ✓ We asked for a public meeting to ask technical questions, none was provided.
- ✓ We received no notice that the during the 90-day technical review process that there were notices of deficiency on the permit, that those deficiencies were addressed by applicant, and that the application was granted.
- ✓ TCEQ showed a complete lack of transparency in the WPAP permitting process therefore denying our right to present meaningful objection before the ED.

TCEQ EDs decision to approve Vulcan's WPAP even though the WPAP failed to comply with several statutory and regulatory requirements.

- ✓ The Vulcan WPAP is not consistent with the Edwards Aquifer Protection Plan requirements.
    - Per Texas Water Code, §26.401: the goals clearly articulate that existing groundwater quality not be degraded, consistent with the protection of public health and welfare, the propagation and protection of terrestrial and aquatic life, the protection of the environment, the operation of existing industries, and the maintenance and enhancement of the long-term economic health of the state.
    - Nothing in this chapter is intended to restrict the powers of the commission or any other governmental entity to prevent, correct, or curtail activities that result or may result in pollution of the Edwards Aquifer or hydrologically connected surface waters. In addition to the rules of the commission, an applicant may also be required to comply with local ordinances and regulations providing for the protection of water quality.
- ✓ The Vulcan Quarry site is located in an environmentally sensitive area, and the WPAP grossly underestimates the potential pathways to the Edwards Aquifer.

- Vulcan plans to extract rock from the Kainer (Edwards Group) and Upper Member of the Glen Rose (Trinity Group) Formations. The property contains a 100-year floodplain and is entirely within the Edwards Aquifer Recharge Zone (see above – TCEQ Scoring System).
- Due to the lithologies beneath the proposed quarry site, contaminants will have a very direct and rapid impact on the underlying aquifer. There is also concern that contaminated water will make its way to Comal Springs, which is habitat of several protected, endangered aquatic species.
- TCEQ's use of January 2012 Best Management Practices ("BMPs") for Quary Operations are outdated, including a method of ranking sensitive karst features. TCEQ's BMPs are no longer current with modern scientific work done by the Edwards Aquifer Authority and other scientific agencies.

✓ The Application does not demonstrate that the quarry bottom will not reach the aquifer beneath, thereby directly contaminating groundwater.

- The WPAP does not provide any explanation or factual reference for a quarry floor base elevation of 1040 ft-msl but simply indicates that because it will take 5 to 10 years for the mining activities to reach that level, its proposal is to monitor the local water levels at the local wells and determine how those water levels correlate to established monitored water levels offsite. As Dr. Smith found (Attachment A), this monitoring plan is not, from a hydrology perspective, an adequate substitute for evaluating water levels before obtaining the requisite WPAP.
- This monitoring plan is also inconsistent with TCEQ's BMPs.

✓ The WPAP wholly fails to account for blasting processes as a potential source of contamination, as required.

- Vulcan's "Project Description" states that there is a proposed buffer zone of only 100 feet adjacent to all neighboring properties. Our home is 358 feet from Mining Pit #7, this buffer zone is insufficient to protect my home and property.
- Vulcan's "Project Description" also acknowledges that blasting agents will be utilized in the mining process, however, the WPAP does not identify the types of blasting agents or include any plan to control their release. In fact, the description contains very little information about the blasting method and potential contaminants period.
- TCEQ requires that "BMPs and measures must prevent pollutants from entering surface streams, sensitive features, or the aquifer." 30 TAC § 213.5(b)(4)(B)(iii). Vulcan's BMPs do not recognize the threat of nitrate (NO3) pollution to underlying aquifers caused by the type and large quantities of explosives used in aggregate mining. ANFO, a combination of ammonium nitrate and fuel oil, is a common blasting agent. It is highly soluble in water, and up to 30% of the explosive is not consumed by blasting. Aggregate washing is also a common practice, which can dissolve nitrate and aid its passage into the underlying aquifer.

In Summary

- The Edwards Aquifer Recharge Zone (EARZ) is the primary source of water for over 2.5 million people in South Central Texas, and therefore requires strict protection by the TCEQ and EAA.
- Quarries introduce pollutants such as ammonium nitrate and diesel fuel (ANFO) used as explosives.

- Groundwater in Comal County generally flows from west to east towards the Comal Springs in New Braunfels, home to several endangered aquatic species in the Comal Springs.
- An extensive system of caves and caverns in the EARZ are important to groundwater transmission.
- The Edwards and Trinity Aquifers in the EARZ are known to be interconnected across faults in the Balcones Fault Zone.
- A Cave-Prone Zone extends across the Vulcan Site indicating there is a high probability quarry pits will encounter large caves that are hydrologically connected to the underlying aquifers.
- TCEQ failed to provide due process for public participation in the permitting process.
- TCEQ failed to comply with its own statutory and regulatory requirements.

Conclusion

- On April 16, 2024, Texas Lieutenant Governor Dan Patrick publicly expressed his serious environmental concerns about a proposed, 600-acre cement production project plant with an associated quarry in Grayson County (kxii.com, Sherman, TX). In a letter sent to the TCEQ, he asked for an immediate pause in the permitting processes for all permanent cement production plants until the legislature can consider what is best for Texas communities. We strongly believe the TCEQ Commissioners grant our Motion to Overturn Vulcan Comal Quarry's WPAP Permit #13001906. This project has a projected life of over 80 years and will leave permanent pits over a highly sensitive portion of the EARZ, the source of drinking water for over 2.5 million Texans.
- The amount of time, effort, and money that my family has invested over the last 7 years in opposing this quarry has already affected our lives in a negative way. Our home, our sanctuary, and our quality of life will be stripped away if this facility is permitted.

For the reasons listed above, The Guckian family request the TCEQ Commissioners grant this Motion, reverse the ED's decision, and deny the WPAP.

Respectfully submitted,

Milann and Prudence Guckian
30954 FM 3009
New Braunfels, Tx 78132
830-885-2723 (H)
361-947-7101 (C)

Attachment A

Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas

Brian A. Smith, Ph. D., Texas P.G. #4955

Introduction

Vulcan Construction Materials, LLC, has proposed a major limestone aggregate quarry in central Comal County (Pape-Dawson Engineers, 2024) southwest of the intersection of highways SH-46 and FM 3009 (Texas Commission on Environmental Quality (TCEQ) Edwards Aquifer Permit#: 13001906) (Figure 1). The site encompasses 1,515 acres of which about 956 acres will be quarried. The site is entirely within the Edwards Aquifer Recharge Zone (TCEQ Recharge Zone Map).

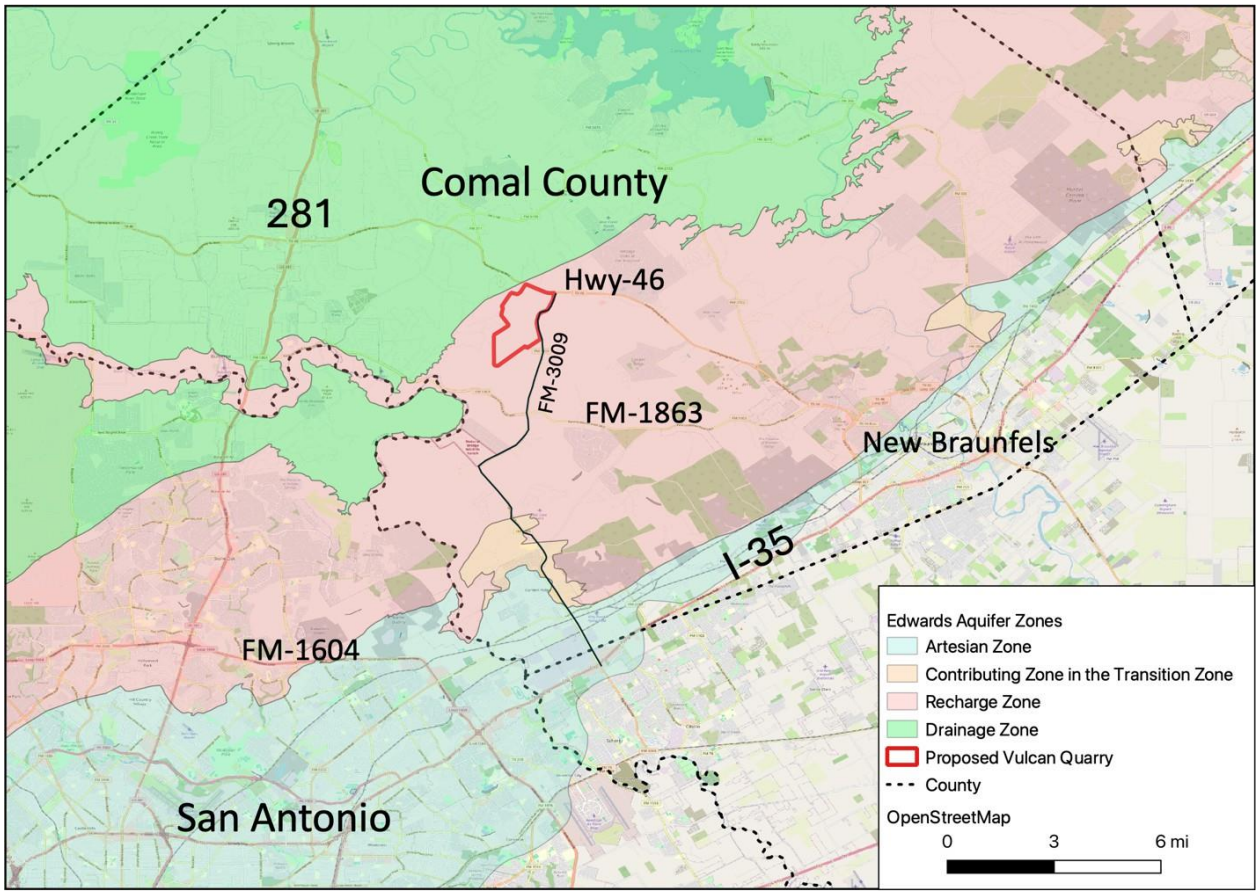


Figure 1. Location map of proposed quarry showing hydrogeologic zones (Source: J. Finneran).

Vulcan plans to extract rock from the Kainer (Edwards Group) and Upper Member of the Glen Rose (Trinity Group) Formations (Figure 2). These formations consist largely of limestone and are karstic in nature. A karst setting is characterized by voids in the rock such as caves, sinkholes, losing streams, and conduits through which water can infiltrate rapidly from the surface and flow through the rock and underlying aquifer. Eventually, much of this water will reach downgradient water-supply wells and springs. Thirty-seven sensitive

karst features have been documented on the proposed property (Pape-Dawson, 2024). Numerous sensitive features on surrounding properties have previously been documented. The presence of these features in high numbers indicates that water at the surface can easily enter these features, pass through a system of voids in the rock, then provide recharge to the water table of the underlying aquifer. Contaminants from the quarrying operation will be carried by this recharging water into the subsurface and the underlying aquifer to reach downgradient receptors such as water-supply wells and biota that live in and downstream of the springs.

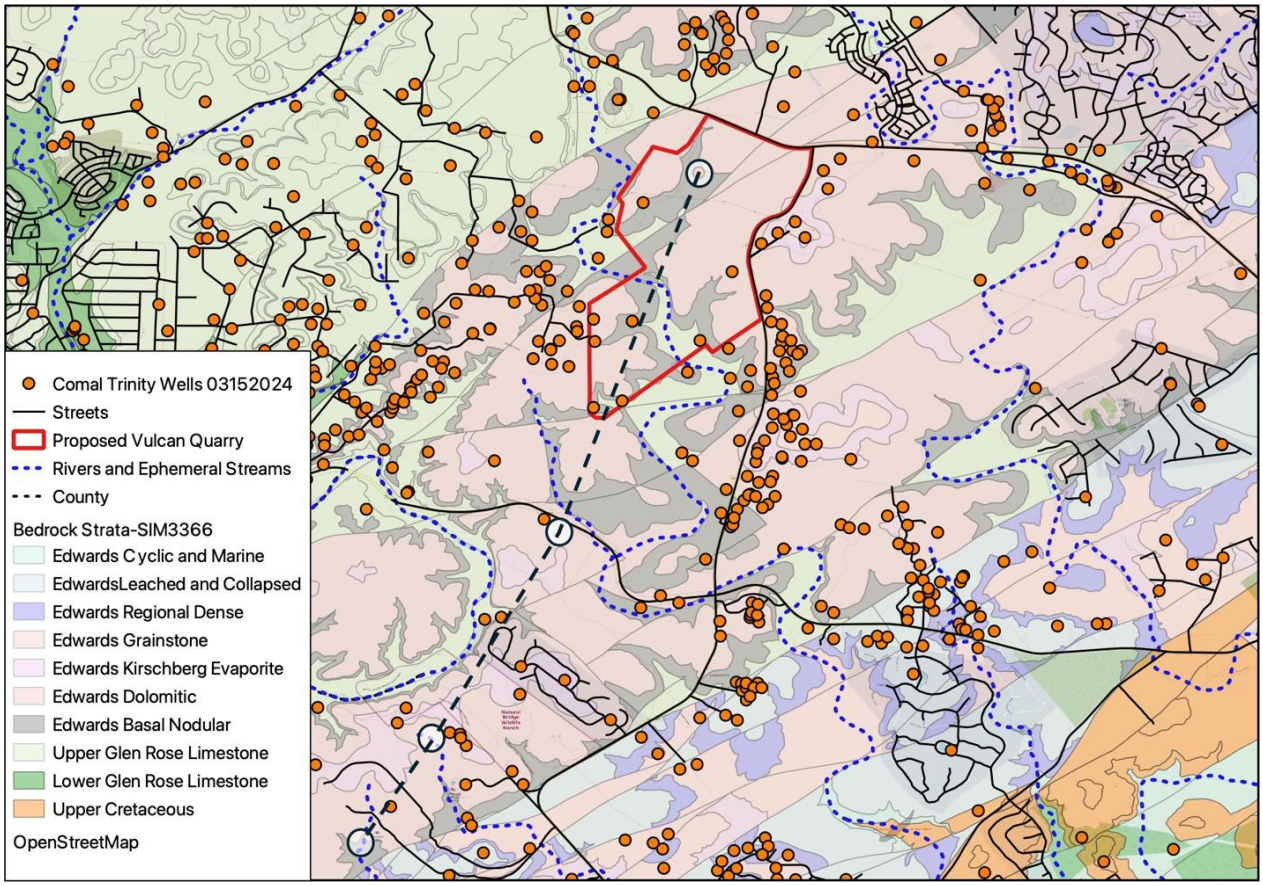


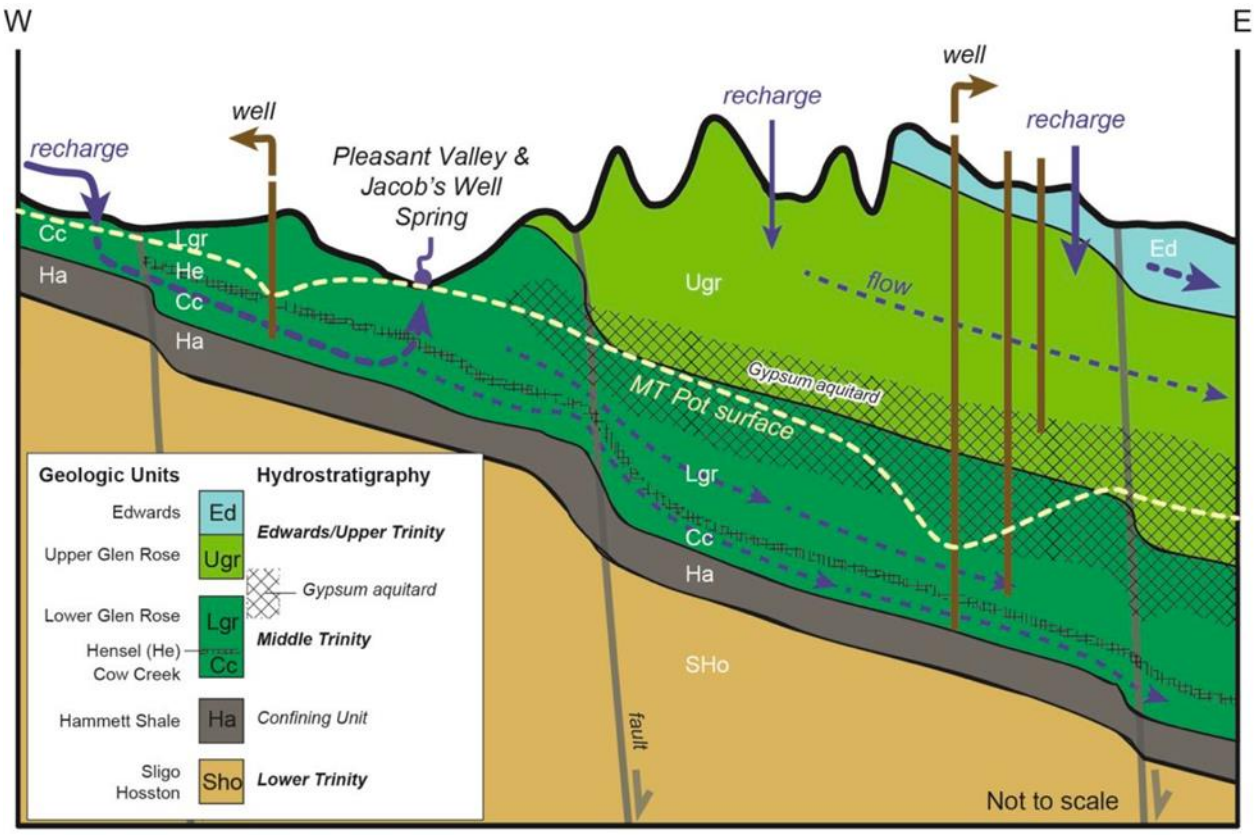
Figure 2. Geologic map of central Comal County showing water-supply wells (Source: J. Finneran).

Hydrogeology

The hydrogeology at the proposed quarry site is similar to the hydrogeology along strike to the northeast and southwest in Hays and Bexar counties, respectively. Significantly more studies have been conducted in these areas and the findings from these studies are applicable to the proposed quarry site. Some of these studies can be found in Clark et al. (2023a and 2023b), Hunt and Smith (2019), Gary et al. (2011), Johnson and Schindel (2006), Green et al. (2019), and Ferrill et al. (2003).

Figure 3 is a schematic cross section from Hays County showing the relationship between the various Edwards and Trinity hydrostratigraphic units (Hunt et al., 2017). Because of the similarity of the geology along strike, this figure provides a good representation of the hydrogeology beneath the proposed quarry site. Figure 4 is a hydrostratigraphic column for Hays and Travis Counties showing how the various geologic units relate to each other hydraulically. This column is similar to one by Clark et al. (2023) (Figure 5) which is representative of Comal and northern Bexar Counties. Even though some of the nomenclature is diderent many of the same hydraulic relationships are the same. One of the key concepts shown in these figures is that the lowermost Kainer/Basal Nodular- Walnut (lower Edwards) is hydraulically connected to the uppermost Upper Glen Rose (Upper Trinity) (Wong et al. 2014; Smith et al., 2018; Smith and Hunt, 2019). These studies have identified the potential for groundwater to move vertically between the Kainer and the uppermost Upper Glen Rose. Studies conducted by the Edwards Aquifer Authority have identified flow of groundwater laterally and across faults from the Upper Glen Rose into the Kainer then into the Person Formation (upper Edwards) (Figure 6) in northern Bexar County (Johnson et al., 2010).

Both hydrostratigraphic columns indicate that there are evaporite units in the lower section of the Upper Glen Rose. This is significant for groundwater flow because these units are generally very low in porosity and therefore limit vertical flow of groundwater. This generally sets a lower level for the overlying aquifer that consists of the Edwards and uppermost Upper Glen Rose. However, there is some potential for vertical flow along faults and fractures. Studies have generally shown that the amount of vertical flow between the Edwards/uppermost Upper Glen Rose and the Cow Creek (Middle Trinity) along these faults is minimal (Wong et al., 2014; Smith and Hunt, 2019). One exception to this is a Middle Trinity well (State Well Number 68-14-701) that demonstrates some hydraulic connectivity to Cibolo Creek (G. Veni, personal communication, April 5, 2024).



Hill Country Middle Trinity

- Karstic (caves, springs)
- Surface-groundwater interaction
- Conduit to diffuse flow
- Relatively fresh and young water

Balcones Fault Zone Middle Trinity

- Deeply confined
- Flow is lateral and from updip
- Discharge is unknown
- Fracture and diffuse flow with some karstification
- Relatively older and variable quality water

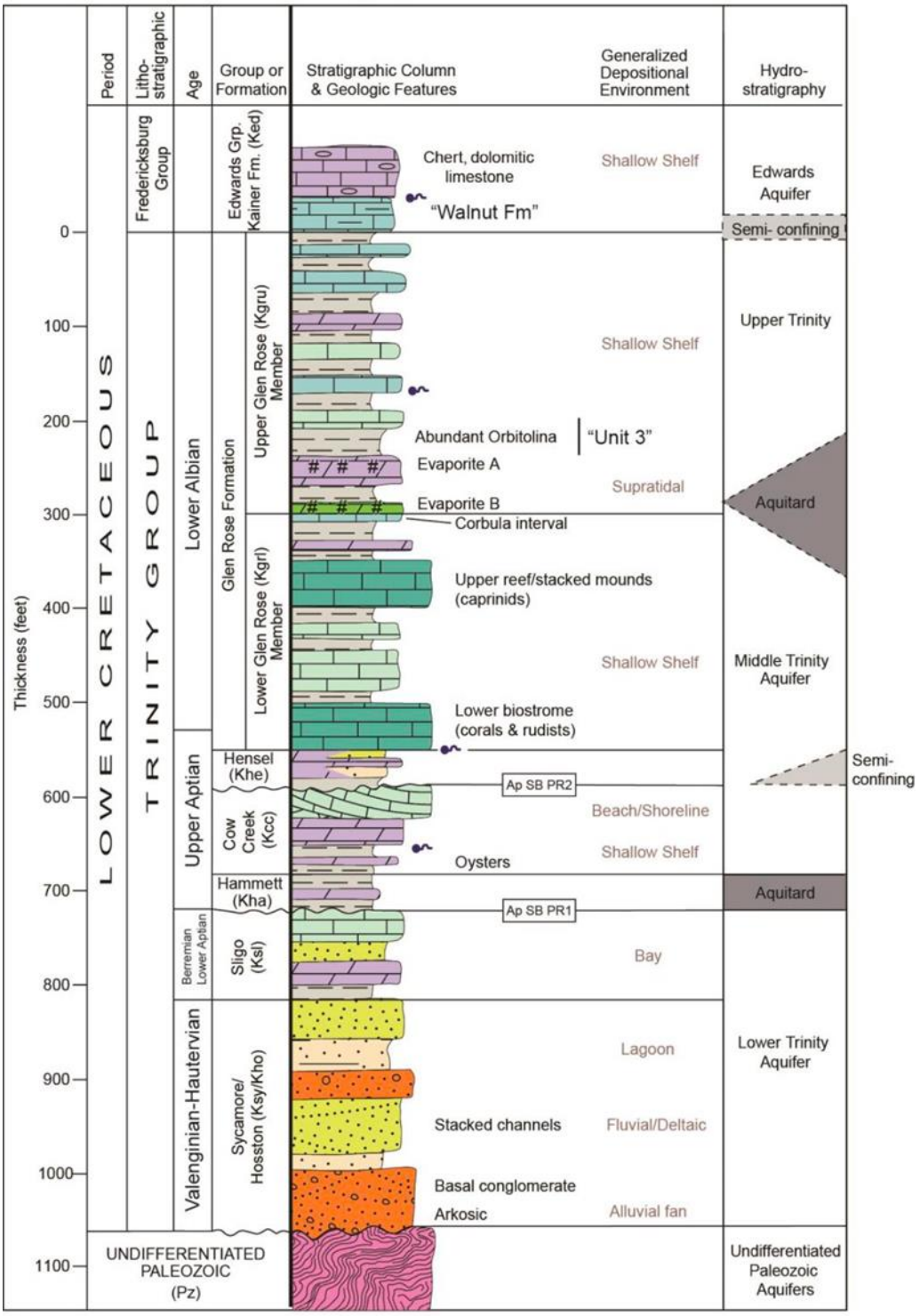


Figure modified from Stricklin et al, (1971) and Wierman et al. (2010); Edwards stratigraphy from Rose (1972); Ages and sequence boundaries from R.W. Scott (2007).

Figure 4. Stratigraphic and hydrostratigraphic column (Hunt et al., 2017).

Group or formation[1]	Member (formal and informal)		Hydrologic unit or informal hydrostratigraphic unit
Taylor Group (Pecan Gap Chalk)	**	Kpg	Upper confining unit (UCU)
Austin Group	**	Ka	
Eagle Ford Group	**	Kef	
Buda Limestone	**	Kb	
Del Rio Clay	**	Kdr	
Georgetown Formation	**	Kg	I
Person Formation	Cyclic and marine, undivided[2]	Kpcm	II
	Leached and collapsed[2]	Kplc	III
	Regional dense member[2]	Kprd	IV
Kainer Formation	Grainstone[2]	Kkg	V
	Kirschberg Evaporite[1]	Kkke	VI
	Dolomitic[2]	Kkd	VII
	Burrowed[2]	Kkb	Seco Pass***
	Basal nodular[2]	Kkbn	VIII
Glen Rose Limestone	Upper Glen Rose Limestone[2]	Kgrc	Cavernous
		Kgrcb	Camp
		Kgrue	Upper evaporite
		Kgruf (Kgrf)	Fossiliferous: Upper
		Kgrlf (Kgrf)	Fossiliferous: Lower
		Kgrle	Lower evaporite
	Lower Glen Rose Limestone[2]	Kgrb	Bulverde
		Kgrlb (Kgrhf)	Herff Falls ***: Litle Blanco
		Kgrts (Kgrhf)	Herff Falls ***: Twin Sisters
		Kgrd (Kgrhf)	Herff Falls ***: Doeppenschmidt
		Kgrr	Rust
		Kgrhc	Honey Creek
Pearsall Formation	Hensell Sand[1]	Kheh	Hensell
	Cow Creek Limestone[1]	Kcccc	Cow Creek
	Hammett Shale[1]	Khah	Hammett

[1]Formal.
[2]Informal.
**No further subdivision.
***Informal hydrostratigraphic unit name that has not been published previously.

Figure 5. Explanation of hydrostratigraphic units (Clark, 2023).

Figure 2. Cross section showing stratigraphy and estimated dye trace paths.

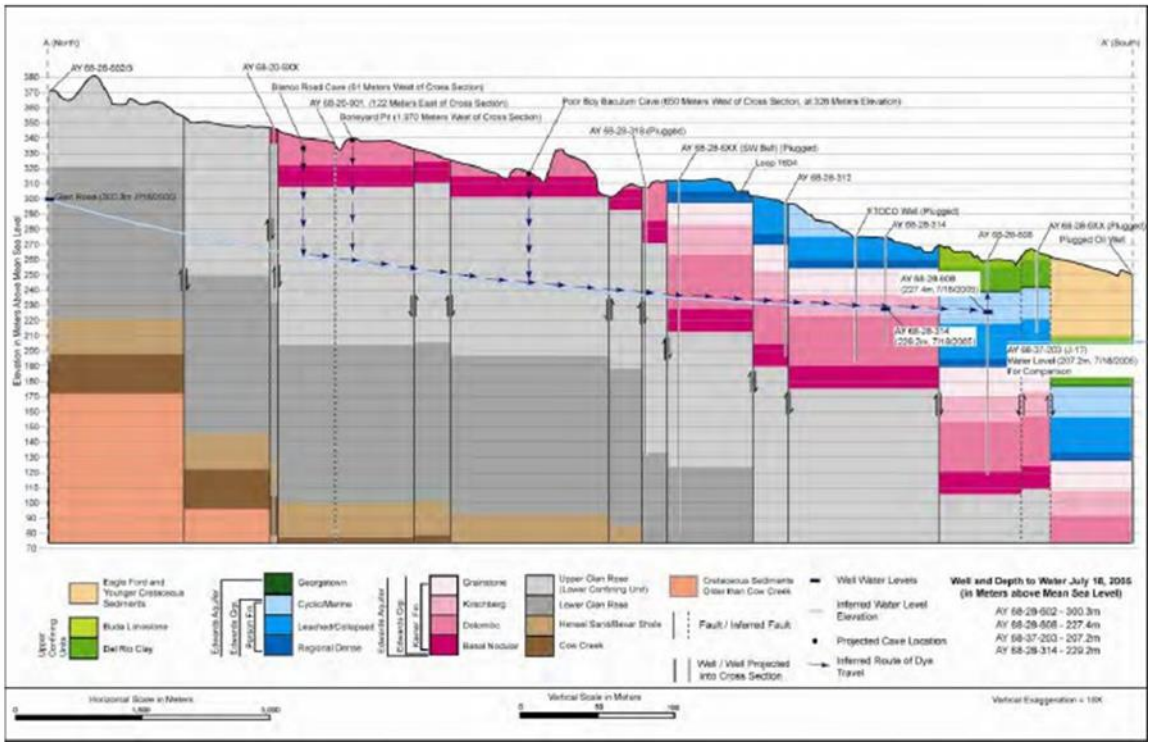


Figure 6. Flow of groundwater laterally and across faults from the Upper Glen Rose (Upper Trinity) into the Kainer (lower Edwards) then into the Person Formation (upper Edwards) in northern Bexar County (Johnson et al., 2010).

Surface Water Recharge

The Vulcan WPAP for the proposed quarry states that 37 sensitive (recharge) features were found during the field investigation for the Geologic Assessment (Pape-Dawson Engineers, 2024). Seven of the features, including three caves, require protection according to the TCEQ (2012) rating system. This number of sensitive features appears anomalously low when compared to the surrounding area.

Recharge features, unless very large, are likely to be covered or filled with soil and vegetation, yet water can easily infiltrate this cover and soil. The 158-acre Bigbee tract immediately north of the proposed quarry site and across Hwy 46, 38 sensitive features were found, and this site has 1/10 the acreage of the proposed quarry site (Frost GeoSciences, 2021). Another site immediately southwest of the proposed quarry site was investigated for inclusion in a conservation easement program based on its significant potential for recharge through numerous recharge features (G. Schindel, personal

communication, April 12, 2024; Schindel, 2021). As mentioned above, the hydrogeology of the proposed quarry site is similar to that along strike to the northeast and southwest.

Water recharging the subsurface will pass through a series of voids that have been formed by dissolution of the limestone, dolomite, and evaporite lithologies. These solution voids are more concentrated along faults and fractures, but interconnected voids can also develop in the absence of faults and fractures. The hydrostratigraphic column in Figure 5 shows that the uppermost hydrostratigraphic unit is called the Cavernous unit because of the large number of caves and smaller voids found in this region (Clark et al., 2023). Plans for the proposed quarrying operation indicate that the Cavernous unit will be significantly mined. A zone of high permeability was encountered in the Vulcan's Blue Pine Holdings #1 well between a depth of 63 and 143 ft. Circulation of drilling fluids and groundwater was lost into the formation over this interval (TWDB Submitted Drilling Reports). This zone of high permeability is correlative to the Cavernous zone and to major caves to the south such as Natural Bridge Caverns (Woodrud et al., 2017). It should be expected that as the quarry advances downward more voids (recharge features) will be encountered. With removal of surface material and the underlying bedrock, it is likely that the area will become more prone to infiltration of surface water and this infiltrating water will be heading directly toward the underlying aquifer. The proposed depth on the mining pits will put them in or near this permeable zone shown by the stratigraphic cross-section below (Figure 7) (J. M. Olivier, personal communication, April 4, 2024).

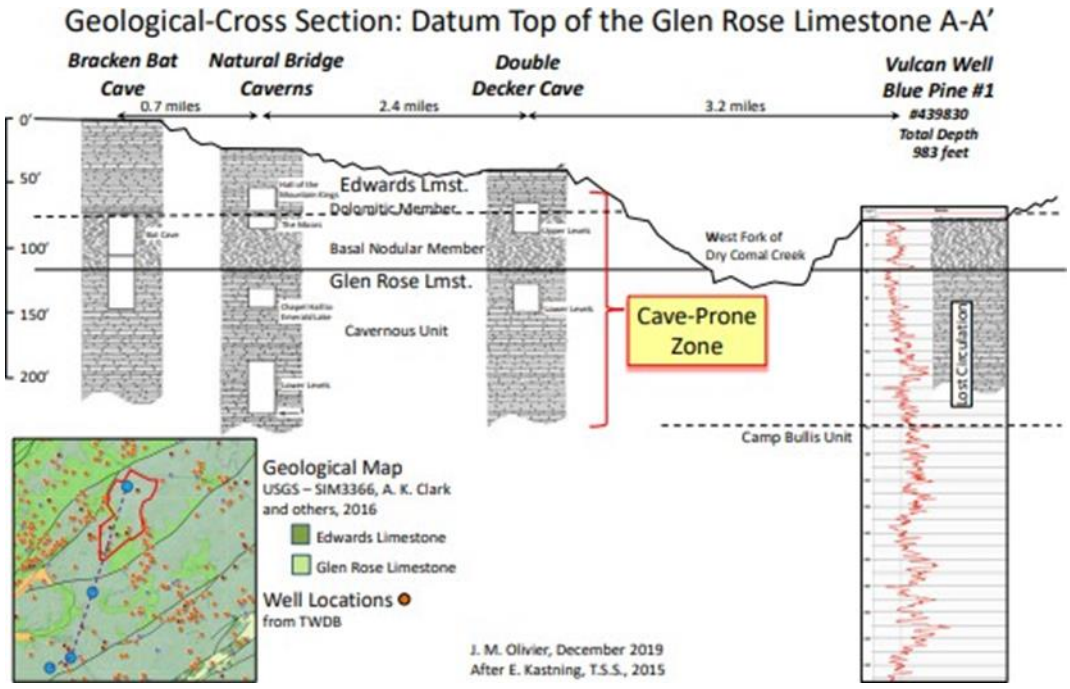


Figure 7. Geologic cross section showing the correlation between the well on the Vulcan site and caves in the same geologic units (Source: J. M. Olivier).

Groundwater Flowpaths

Once this infiltrating water reaches the water table of the aquifer, it will follow the hydraulic gradient. Some of this groundwater will be extracted by water-supply wells, much of it will discharge at the surface from springs, and some will remain in the aquifer following a flowpath into a deeper system many miles from where it first became recharge (Smith and Hunt, 2018).

Figure 8 is a potentiometric surface map of the Edwards Aquifer with water-level data from 2003 (Johnson et al., 2006). Even though no data were collected close to the proposed quarry site, the map suggests that flow from the site would move generally southeast then shift to the east then northeast toward Hueco and Comal Springs. A study following a 2,000-gallon diesel fuel spill in January 2000 at the DynoNobel explosives plant near the CEMEX Balcones Quarry in New Braunfels, Texas, shows flowpaths of the diesel fuel to both Hueco and Comal Springs (G. Schindel, personal communication, April 12, 2024). The proposed Vulcan quarry site is located seven miles NW from the plant. Groundwater flowing from the site would flow generally southeast until it reaches these flowpaths and would ultimately discharge to Hueco and Comal Springs. Some lesser components of the flow would bypass the springs and flow further downgradient towards San Marcos Springs.

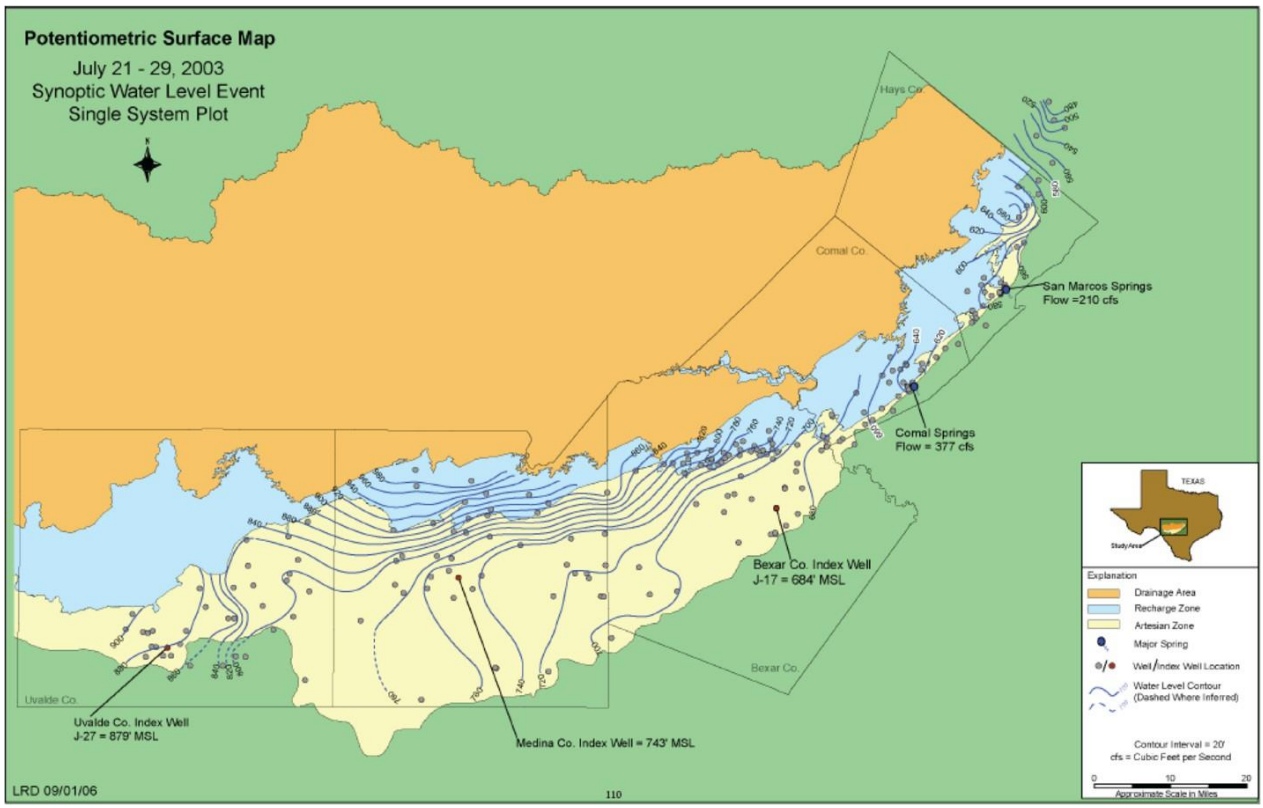


Figure 8. Potentiometric surface map showing approximate Edwards groundwater flow direction in south-central Comal County to be to the southeast (Johnson et al., 2006).

Water Quality

Because of the very porous nature of the lithologies beneath the proposed quarry site, any contamination generated by the quarrying operation would have a very direct and rapid impact on the underlying aquifer. Various studies have shown the potential for contamination of aquifers from the use of ammonium nitrate/fuel oil (ANFO) as an explosive. Contamination with nitrate can occur from poor handling of ANFO prior to an explosion and from incomplete combustion of the ANFO. Studies have shown that the amount of ANFO that does not combust during an explosion could be as high as 28% (BME, 2016 and Brochu, 2010). This leaves a considerable amount of nitrate available to be dissolved by water passing through the area of the blast. Once dissolved in the water, the nitrate is unlikely to break down into less hazardous components and will travel downgradient along the groundwater flowpaths.

Assuming the proposed quarry becomes active, there will be a significant likelihood for groundwater to become contaminated with nitrate and other hazardous substances from the site. Nearby wells could experience nitrate levels above the EPA's maximum concentration limit safe for human consumption of 10 mg/L (N). Wells and springs further downgradient of the quarry would likely see increases in nitrate concentrations but less so than wells immediately downgradient of the quarry. Some of this water with elevated nitrate could make its way to Hueco and Comal Springs. Several protected, aquatic, endangered species live in Comal Springs.

Water Levels

TCEQ requires that quarrying operations limit the downward expansion of a quarry to a level that is 25 ft above the highest expected water level (TCEQ, 2012). This level would either be set for water levels in December 2007, if available, or during a period equivalent to 90% of high rainfall. Because of limited water-level data on and near the site, it is didicult to determine what that level would be in the aquifer beneath diderent parts of the quarry site under varying rainfall conditions. To adequately evaluate water levels in the aquifer, the applicant should be required to do a thorough evaluation of data that are available and to collect data from onsite and nearby wells. A listing of wells and limited water-level data are included in Appendix A of this report (J. Doyle, personal communication, April 10, 2024). Because a water table is rarely a flat surface, a number of wells need to be measured within a short time period. These data then need to be compared to data collected during diderent wet and dry periods to determine appropriate water levels on all sides of the property. Water-level data from Hays (Hunt and Smith, 2019) and Bexar Counties (Johnson and Schindel, 2006), indicate that in the portions of the Edwards Aquifer at some distances from the major springs, hydraulic gradients can be as much as 100 ft per mile. Such a high gradient could be present beneath the quarry site, but it should be anticipated that there could be at least a 50-ft diderence in water levels from one side of the site to the other. This diderence in water levels would significantly impact the depth to which the quarry could be mined.

The WPAP (Pape-Dawson Engineers, 2024) for the site states that the mining areas will not be mined below an elevation of 1040 ft msl. According to the WPAP, this level of the quarry bottom will provide a 25-ft buder above the high water level of the aquifer. A review of available water-level data indicates that at times, the bottom of the quarry will be flooded by the underlying aquifer (Figure 9). Water-level data from five wells close to the perimeter of the quarry boundary were evaluated to estimate expected water levels beneath the quarry and proposed depths of the excavations (Appendix B) (J. Finneran, personal communication, April 16, 2024). The White #4 well (#520690) had a water level of 1022 ft-msl on 12/5/07. At this water level plus the 25-ft buder, the bottom of the quarry would be out of compliance. Another well (Tucker, EAA #Wxxx-137) had a water level of 1048 ft on 12/14/98. At this water level, the bottom of the quarry would be 8 ft below the water level in the aquifer.

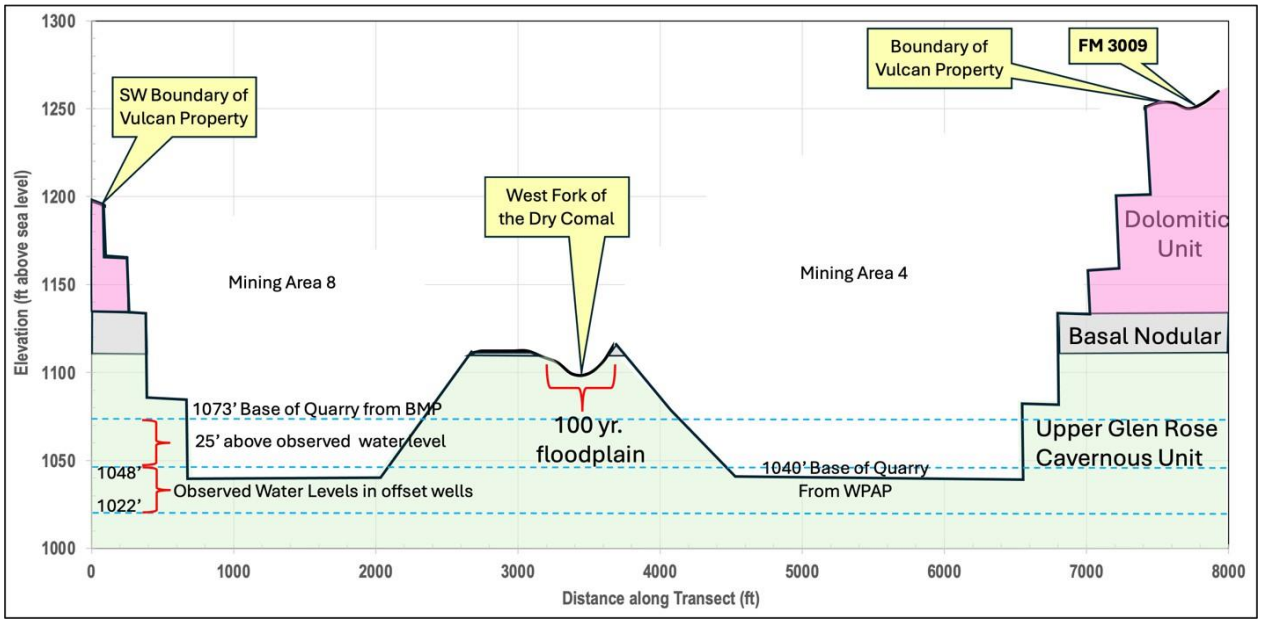


Figure 9. Schematic cross section with estimated topography after mining and water levels based on available data (J. Finneran, personal communication, April 16, 2024).

Groundwater Availability

Recent studies (Watson and Smith, 2023) have shown that intense growth in central Texas, particularly the Hill Country, has brought about significantly increased pumping from the Edwards and Trinity Aquifers. This increased pumping combined with the severe droughts that the region experiences frequently is causing numerous wells to go dry. Many springs either cease flowing during these periods, or the amount of flow is significantly reduced. Reduced spring flow leads to reduced flow in streams on which many people depend on. And these reduced flows also have negative impact on the ecology immediately in the spring area and downstream stretches. And, decreased groundwater availability increases the potential for contamination from various sources.

An analysis of the proposed quarries needs for water based on water use per ton of quarried material shows that approximately 383 acre-ft (125,000,000 gallons) of groundwater per year would be needed (M. Podenberger, personal communication, April 13, 2024). Groundwater availability studies from the Edwards and Trinity Aquifers in Hays County have estimated that pumping 383 acre-ft of groundwater per year could cause sudicient water-level declines in adjacent wells such that during periods of drought those wells could cease to yield water.

Conclusions

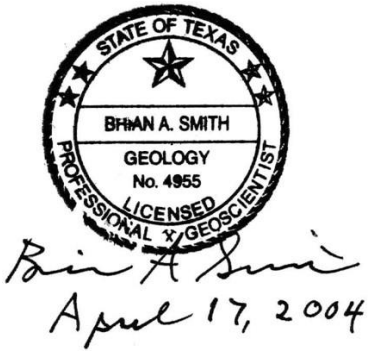
A permit for the quarry should not be considered until the following issues are addressed:

- Elevations of the aquifer should be determined prior to any excavation. The elevation of 1040 ft-msl for the bottom of the quarry, as stated in the WPAP, is likely to be out of compliance with the required buder of 25 ft. And it is also likely that water levels in the aquifer will be above the elevation of 1040 ft-msl during periods of high water levels.

- The Geologic Assessment shows that 37 sensitive features were found. This number is anomalously low for the geology in this area. Further evaluation of recharge features is needed to determine areas that will require protective buders. In addition, a dye-trace study should be conducted to determine flowpaths of groundwater from the site and to determine which downgradient wells might be impacted by contaminants coming from the quarry.

- The operation of a quarry will contribute contamination to the underlying aquifer. To determine background water-quality conditions, water-supply wells immediately downgradient of the quarry should be sampled and analyzed for nitrates and total petroleum hydrocarbons prior to issuing a permit for the quarry.

A thorough evaluation of existing data and data collected by the studies stated above will show that the aquifer beneath this site is highly sensitive to contamination. Because of the sensitivity of the site and the magnitude of the quarry, a permit should not be granted.



References

BME, 2016, Tackling nitrate contamination of water in mines: Mining.com, August 11, 2016, https://www.mining.com/web/tackling-nitrate-contamination-of-water-in-mines/.

Brochu, Sylvie, 2010, Assessment of ANFO on the Environment: Defence R&D Canada-Valcartier, Technical Memorandum, DRDC Valcartier TM 2009-195, https://apps.dtic.mil/sti/tr/pdf/ADA593200.pdf.

Clark, A. K., Golab, J. A., Morris, R. R., Pedraza, D. E., 2023a, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers Within Northern Bexar and Comal Counties, Texas: USGS, Scientific Investigation Map 3150, https://doi.org/10.3133/sim3510.

Clark, A. K., Golab, J. A., Morris, R. R., Pedraza, D. E., 2023b, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers Within Northern Bexar and Comal Counties, Texas: USGS, Pamphlet to Accompany Scientific Investigation Map 3150, https://doi.org/10.3133/sim3510.

Ferrill, D.A., Sims, D.W., Morris, A.P., Waiting, D.J., and Franklin, N.M., 2003, Structural controls on the Edwards aquifer/Trinity aquifer interface in the Camp Bullis quadrangle, Texas: Edwards Aquifer Authority and U.S. Army Corps of Engineers, prepared by CNWRA, Southwest Research Institute, San Antonio, Tex., and Department of Earth and Environmental Science, University of Texas at San Antonio, San Antonio, Tex., December 5, 2003, 126 p., accessed June 5, 2013, at h ttps://www.edwardsaquifer.org/wp- content/uploads/ 2019/ 05/ 2003_Ferrilletal_ StructuralControlsCampBullisQuad rangle.pdf.

Frost GeoSciences, 2021, Bigbee Tract Geologic Assessment, WPAP, April 21, 2021.

Gary, M.O., Veni, G., Shade, B., and Gary, R.H., 2011, Spatial and temporal recharge variability related to ground-water interconnection of the Edwards and Trinity aquifers, Camp Bullis, Bexar and Comal Counties, Texas, *in* Interconnection of the Trinity (Glen Rose) and Edwards aquifers along the Balcones fault zone and related topics— Karst Conservation Initiative meeting, Austin, Tex., February 17, 2011, [Proceedings]: Austin, Tex., Karst Conservation Initiative, 46 p., accessed December 8, 2022, at https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article= 1070&context= kip_ talks.

Hunt, Brian B., Smith, Brian A., Gary, Marcus O., Broun, Alex S., Wierman, Douglas A., Watson, Jeff, and Johns, David, 2017, Surface-water and Groundwater Interactions in the Blanco River and Onion Creek Watersheds: Implications for the Trinity and Edwards Aquifers of Central Texas: South Texas Geological Society, Vol. LVII, No. 5, January 2017, San Antonio.

Hunt, Brian B., Smith, Brian A., Hauwert, Nico M, 2019, The Barton Springs Segment of the Edwards (Balcones Fault Zone) Aquifer, central Texas: in The Edwards Aquifer: The Past,

Present, and Future of a Vital Water Resource: eds. Sharp, Jr., John M., Schindel, Gary M., Green, Ronald T., Geological Society of America Memoir 215, Chapter 7.

Johnson, S. and Schindel, G, 2006, Potentiometric Surface Maps: Edwards Aquifer Authority Report 06-02.

Johnson, S., Schindel, G., and Veni, G., 2010, Tracing Groundwater Flowpaths in the Edwards Aquifer Recharge Zone, Panthers Springs Creek Basin, Northern Bexar County, Texas: Bulletin of the South Texas Geological Society, vol.51, no. 3, Nov. 2010, p.15-45.

Pape-Dawson Engineers, 2024, Water Pollution Abatement Plan for proposed Vulcan Comal Quarry, February 2024.

Schindel, Geary, 2021, Geological Evaluation of the Froboese Ranch Comal County, Texas Prepared by: Edwards Aquifer Authority Geary M. Schindel, P.G. for the City of San Antonio, October 19, 2021).

Smith, B. A., Hunt, B. B., Wierman, D. A., and Gary, M. O., 2018, Groundwater Flow Systems in Multiple Karst Aquifers of Central Texas: 15th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, NCKRI Symposium 6, Shepherdstown, WV, April 2-6, 2018, eds. I. D. Sasowsky, M. J. Blye, and L. Land, pp. 17-29.

Smith, Brian A., Hunt, Brian B., 2019, Multilevel Monitoring of the Edwards and Trinity Aquifers: in The Edwards Aquifer: The Past, Present, and Future of a Vital Water Resource: eds. Sharp, Jr., John M., Schindel, Gary M., Green, Ronald T., Geological Society of America Memoir 215, Chapter 25.

TCEQ Recharge Zone Map https://www.tceq.texas.gov/gis/edwards-viewer.html.

TCEQ, 2012, Best Management Practices for Quarry Operations: Complying with the Edwards Aquifer Rules: Texas Commission on Environmental Quality, Filed Operation Support Division, RG-500, www.tceq.texas.gov/goto/publications.

TWDB Submitted Well Drilling Reports, https://www3.twdb.texas.gov/apps /waterdatainteractive//GetReports.aspx?Num=439830&Type=SDR-Well.

Watson, Jeffery A. and Smith, Brian A., 2023, The BSEACD Trinity Aquifer Sustainability Model: A Tool for Evaluating Sustainable Yield of the Trinity Aquifer in Hays County, Texas: BSEACD Report of Investigations 2023-0717, July 2023.

Wierman, D.A., A.S. Broun, and B.B. Hunt (Eds), 2010, Hydrogeologic Atlas of the Hill Country Trinity Aquifer, Blanco, Hays, and Travis Counties, Central Texas: Prepared by the Hays-Trinity, Barton/Springs Edwards Aquifer, and Blanco Pedernales Groundwater Conservation Districts, July 2010, 17 plates+DVD.

Wong, Corinne I., Kromann, Jenna S., Hunt, Brian B., Smith, Brian A., and Banner, Jay L., 2014, Investigating Groundwater Flow Between Edwards and Trinity Aquifers in Central Texas: Groundwater v.52, No. 4: 624-639.

Woodrud, C. M., Jr, Collins, E. W., Potter, E. C., and Loucks, R. G., 2017, Canyon Dam Spillway Gorge and Natural Bridge Caverns: Geologic Excursions in the Balcones Fault Zone, Central Texas: The University of Texas at Austin, Bureau of Economic Geology, Guidebook No. 29, 56 p.

Appendix A. Well Data

Well_Number	Latitude	Longitude	Location	Date Drilled	Use	TD	Elevation	Hole Size	Casing Size	Comp_Type	Top	Bot	Yield	Aquifer	Surface Geol	Water Level	Water Elev.	Database
17890	29.753195	-98.303472	Elizabeth James 30838 FM3009, New Braunfels, 78132	3/10/03	D	595.00	1161.00	8.75	4.50	P	255.00	595.00	12.00	Upper Trinity	Kkd	260.00	901.00	SDR
42322	29.781111	-98.325833	Doug Harrison Off Hwy 46, New Braunfels, 78130	8/11/03	D	940.00	1182.00	8.00	5.00	OH	400.00	940.00	10.00	Middle Trinity	Kgrcb	420.00	762.00	SDR
47428	29.755278	-98.328611	Torry L. Hurt 31341 Beck Rd., Bulverde, 78163	10/18/04	D	650.00	1141.00	9.50	4.50	P	150.00	650.00	10.00	Upper Trinity	Kgrc	335.00	806.00	SDR
62403	29.750805	-98.327444	Nathan and Kira Olson 245 Saur Road, Bulverde, 78163	6/28/05	D	740.00	1160.00	9.50	5.00	P	540.00	740.00	8.00	U & M Trinity	Kkd	401.00	759.00	SDR
83030	29.762778	-98.323611	Richard Hehs 2520 Shearer Rd, Bulverde, 78163	4/11/06	D	860.00	1112.00	8.75	5.00	P	660.00	860.00	12.00	Middle Trinity	Kkbn	425.00	687.00	SDR
91867	29.759445	-98.324722	Steve Southwell 435 Third Fork, Bulverde, 78163	7/26/06	D	840.00	1113.00	5.50	0.00	OH	540.00	840.00	8.00	Middle Trinity	Kgrc	420.00	693.00	SDR
148952	29.779444	-98.321944	Doug Harrison Highway 46 Diamond H Ranch, New Braunfels	1/20/06	D	920.00	1262.00	8.00	5.00	OH	560.00	920.00	30.00	Middle Trinity	Kkbn	369.00	893.00	SDR
148953	29.779444	-98.322222	Doug Harrison Highway 46 Diamond H Ranch, New Braunfels	1/13/06	D	700.00	1271.00	8.00	5.00	P	665.00	700.00	10.00	Middle Trinity	Kkbn	370.00	901.00	SDR
165144	29.781111	-98.327778	Doug Harrison 700 Harrison Road, New Braunfels, 78132	12/10/08	D	800.00	1205.00	8.00	4.50	P	640.00	780.00	20.00	Middle Trinity	Kgruf	420.00	785.00	SDR
184564	29.783334	-98.308889	Ron Bigbee 10900 Hwy 46 West, New Braunfels, 78132	9/13/06	D	860.00	1266.00	8.00	5.00	P	680.00	860.00	10.00	Middle Trinity	Kkbn	430.00	836.00	SDR
189338	29.745777	-98.328416	Michael Olsen 414 Saur Rd., Bulverde, 78163	7/24/09	D	1000.00	1205.00	9.00	4.50	S	800.00	1000.00	15.00	Middle Trinity	Kkd	520.00	685.00	SDR
197965	29.784167	-98.325278	Doug Harrison 1650 INDEPENDENCE DRIVE, NEW BRAUNFELS, 78132	9/13/09	D	860.00	1204.00	12.25	8.63	P	660.00	860.00	0.00	Middle Trinity	Kgrc	456.00	748.00	SDR
197966	29.784167	-98.325278	Doug Harrison 1650 INDEPENDENCE DRIVE, NEW BRAUNFELS, 78132	9/13/09	D	660.00	1204.00	12.25	8.63	P	660.00	860.00	0.00	Middle Trinity	Kgrc	456.00	748.00	SDR
390602	29.754723	-98.303612	Milann Guckian 30739 FM3009, New Braunfels, 78132	1/27/15	D	980.00	1193.00	8.00	4.50	OH	800.00	980.00	8.00	Middle Trinity	Kkd	472.00	721.00	SDR
402605	29.7825	-98.313889	Lee Page 219 DOEHNE OAKS, NEW BRAUNFELS, 78132	8/6/15	D	410.00	1247.00	6.00	6.00	OH	292.00	410.00	10.00	Upper Trinity	Kgrc	180.00	1067.00	SDR
417876	29.785278	-98.308611	LOT 4 DOEHNE OAKS, NEW BRAUNFELS, 78132	3/8/16	D	460.00	1296.00	6.00	6.00	OH	342.00	460.00	5.00	Upper Trinity	Kkd	330.00	966.00	SDR
420134	29.786389	-98.313889	LOT 3 DOEHNE OAKS, NEW BRAUNFELS, 78132	2/1/16	D	440.00	1299.00	6.00	6.00	OH	321.00	440.00	7.00	Upper Trinity	Kkbn	274.00	1025.00	SDR
439830	29.770222	-98.312083	Blue Pine Holding 10901 TX 46 HWY 3009/ TX 46	1/2/17	IRR	983.00	1143.00	9.88	6.00	OH	632.00	943.00	150.00	Middle Trinity	Kkbn	121.00	1022.00	SDR
454726	29.771971	-98.294277	Carlos Banuelos 9801 Hwy 46 (east of FM3009) W111-780	6/21/17	D	683.00	1225.00	9.00	4.50	P	380.00	660.00	10.00	Upper Trinity	Kkd	255.00	970.00	SDR
475959	29.789889	-98.309222	Kyle Sargisson 1148 Imhoff lane, New Braunfels, 78132	3/20/18	D	455.00	1302.00	9.00	4.50	S	398.00	418.00	5.00	Upper Trinity	Kkd	347.00	955.00	SDR
481756	29.783056	-98.310556	Castele Avalon 10900 W ST HWY 46, New Braunfels, 78132	5/11/18	D	702.00	1237.00	8.00	4.50	P	500.00	702.00	15.00	Middle Trinity	Kgrc	315.00	922.00	SDR
493397	29.764306	-98.323444	Mike McCrary 2580 Shearer Road, Bulverde, 78163	10/1/18	D	920.00	1182.00	8.00	4.50	S	840.00	900.00	3.00	Middle Trinity	Kkbn	515.00	667.00	SDR
502269	29.783861	-98.311139	1108 Imhoff, New Braunfels, 78132	1/31/19	D	860.00	1220.00	9.00	4.50	S	558.00	818.00	10.00	Middle Trinity	Kgrc	197.00	1023.00	SDR
520687	29.740666	-98.325277	Eric W. White 11301 HWY 46 W, New Braunfels, #1 Loc from SDR	10/25/07	IRR	962.00	1135.00	8.75	6.00	OH	40.00	963.00	15.00	U & M Trinity	Kkd	355.00	780.00	SDR
520688	29.748944	-98.325138	Eric W. White 11301 HWY 46 W, New Braunfels, #2 Loc from SDR	11/6/07	IRR	970.00	1170.00	8.75	6.00	OH	40.00	970.00	20.00	U & M Trinity	Kkd	402.00	768.00	SDR
520689	29.7515	-98.320444	Eric W. White 11301 HWY 46 W, New Braunfels, #3 Loc from SDR	11/12/07	IRR	976.00	1124.00	8.75	6.00	OH	40.00	976.00	20.00	U & M Trinity	Kkbn	315.00	809.00	SDR
520690	29.75175	-98.325305	Eric W. White 11301 HWY 46 W, New Braunfels, #4 Loc from SDR	12/5/07	IRR	1054.00	1158.00	8.75	6.00	OH	38.00	1054.00	80.00	U & M Trinity	Kgrc	136.00	1022.00	SDR
520691	29.749027	-98.311917	Eric W. White 11301 HWY 46 W, New Braunfels, #5 Loc from SDR	10/16/07	IRR	931.00	1120.00	8.75	6.00	OH	40.00	931.00	60.00	U & M Trinity	Kkbn	155.00	965.00	SDR
520692	29.741444	-98.321721	Eric W. White 11301 HWY 46 W, New Braunfels, #6 Loc fro SDR	11/19/07	IRR	968.00	1098.00	8.75	6.00	OH	40.00	968.00	25.00	U & M Trinity	Kgrc	297.00	801.00	SDR
533817	29.784586	-98.310181	Ashei Duffy 1114 Imhoff, New Braunfels, 78132	12/26/19	D	360.00	1250.00	9.00	5.00	S	100.00	320.00	30.00	Upper Trinity	Kkbn	90.00	1160.00	SDR
6814902	29.774102	-98.290252	H. Conrad Hwy 46 near Meyer Ranch windmill	1/29/40	IRR	208.00	1174.00					208.00		Upper Trinity	Kkd	139.11	1034.89	GWDB
6822203	29.745294	-98.305563	Chris Hopmann 30323 FM3009 New Braunfels	8/1/19	D	700.00	1123.00	9.88	6.00	OH	500.00	700.00	10.00	Middle Trinity	Kkbn	329.70	793.30	GWDB
6822204	29.748042	-98.308322	Chris Hopmann 30323 FM3009 New Braunfels	8/1/19	D	240.00	1151.00		6.00	OH		240.00		Upper Trinity	Kkbn	113.90	1037.10	GWDB
W102-615	29.764028	-98.299944	Karl Fuchs 31600 FM3009	5/15/01	D	490.00	1301.00	8.00	5.00	P	180.00	490.00	22.00	Upper Trinity	Kkg	180.00	1121.00	EAA
W103-427	29.743222	-98.305944	Windell and Camille Cannon 30045 FM3009	8/11/04	D	400.00	1100.00	8.00	5.00	OH	160.00	400.00	10.00	Upper Trinity	Kkbn	350.00	750.00	EAA
W104-737	29.761278	-98.304194	Stephen and Jane Johnson 31400 FM3009	2/1/06	D	550.00	1241.00	6.50	5.00	S	500.00	560.00	5.00	Upper Trinity	Kkd	400.00	841.00	EAA
W106-830	29.762625	-98.302128	Craig Johnson 31450 FM3009	1/23/01	D	555.00	1272.00	8.00	5.00	OH	220.00	555.00	10.00	Upper Trinity	Kkke	230.00	1042.00	EAA
W109-777	29.744305	-98.308111	Windell Cannon 30045 FM 3009	3/21/00	D	720.00	1090.00	9.88	6.00	P	520.00	720.00	8.00	Middle Trinity	Kgrc	438.00	652.00	EAA
W109-793	29.770499	-98.296389	Larry Lowak 31320 FM3009	6/28/00	D	540.00	1242.00	8.00	5.00	OH	420.00	540.00	10.00	Upper Trinity	Kkd	260.00	982.00	EAA
W110-297	29.753661	-98.304942	Eric White 30715 FM-3009		D	920.00	1190.00						10.00					
W111-669	29.749039	-98.329616	Major W. T. Bump Lot 17 Beck Rd	11/16/84	D	700.00	1214.00	6.00	6.63	OH	130.00	700.00	9.00	Upper Trinity	Kkd	300.00	914.00	EAA
W111-706	29.768194	-98.295833	James Olson 32190 FM3009	12/20/96	D	600.00	1265.00	6.75	4.50	P	400.00	600.00	10.00	Upper Trinity	Kkke	400.00	865.00	EAA
W112-709	29.757739	-98.30788	Windmill well on east side of White Ranch															EAA
W112-710	29.766453	-98.319072	Windmill well on west side of White Ranch															EAA
W202-083	29.753353	-98.327105	R. L. Musgrove 31401 Beck Rd	7/31/86	D	900.00	1160.00	6.00	6.00	OH	325.00	900.00	4.00	U & M Trinity	Kkd	423.00	737.00	EAA
W202-087	29.751428	-98.302958	Alan Hammack 30700 FM3009	3/13/97	D	545.00	1192.00	6.75	4.50	S	270.00	545.00	12.00	Upper Trinity	Kkd	240.00	952.00	EAA
W202-101	29.740164	-98.30708	Glen Mueltlstien 29691 FM3009	2/11/99	D	500.00	1081.00	6.00	5.00	OH	300.00	500.00	100.00	Upper Trinity	Kkbn	260.00	821.00	EAA
W202-104	29.745064	-98.313486	C. Bruce Lee (Heartland Masada Ranch) 30715 FM 3009	2/22/02	D	920.00	1166.00	8.00	4.50	P	720.00	920.00	10.00	Middle Trinity	Kkd	600.00	566.00	EAA
Wxxx-132	29.78293	-98.29999	Tillman Thomas 800 Heritage Oaks	5/29/00	D	543.00	1236.00	6.00	6.00	OH	258.00	543.00	7.00	Upper Trinity	Kgrc	215.00	1021.00	TCEQ
Wxxx-133	29.777538	-98.292613	Bob Satterwhite 10000 Hwy-46 New Braunfels	12/11/93	D	540.00	1192.00	6.75	4.50	OH	340.00	540.00	5.00	Upper Trinity	Kkd	200.00	992.00	TCEQ
Wxxx-134	29.778554	-98.301422	Ken Higby 292 Heritage Oaks Spring Branch TX	5/29/02	D	1062.00	1281.00	10.00	5.00	OH	698.00	1062.00	100.00	Middle Trinity	Kkd	458.00	823.00	TCEQ
Wxxx-137	29.750203	-98.327365	Butch Tucker 333 Saur Rd	12/10/98	D	800.00	1198.00	7.88	4.50	P	540.00	800.00	24.00	Middle Trinity	Kkd	150.00	1048.00	TCEQ
	29.745845	-98.312141	Bruce Lee Permanent Pond				1063.20							Upper Trinity	Kgrc	0.00	1063.20	
WR-1	29.770979	-98.302511	Location from WPAP												Kek			WPAP
WR-2	29.768473	-98.307756	Location from WPAP												Kek			WPAP
WR-3	29.751478	-98.32036	Location from WPAP												Kek			WPAP
WR-4	29.747936	-98.31689	Location from WPAP												Kgr			WPAP
WR-5	29.749045	-98.311958	Location from WPAP												Kgr			WPAP
WR-6	29.741425	-98.321705	Location from WPAP												Kgr			WPAP
S-1	29.770019	-98.312197	Blue Pine Holding Location from WPAP												Kek			WPAP
S-2	29.772232	-98.303037	Cased borehole on White Ranch Location from WPAP												Kek			WPAP
S-3	29.766466	-98.319097	Cased borehole on White Ranch Location from WPAP												Kek			WPAP
S-4	29.75774	-98.307887	Cased borehole on White Ranch Location from WPAP												Kek			WPAP
S-5	29.752889	-98.31672	Cased borehole on White Ranch Location from WPAP												Kgr			WPAP
S-36	29.766218	-98.322403	Uncased borehole on White Ranch Location from WPAP															WPAP
			6822204 EAA monitor well Upper Glen Rose. Donated to CTGCD															
			6822203 EAA monitor well Lower Glen Rose. Donated to CTGCD															
			6814902 Old monitor well. Not active?															
			Log on Green highlighted wells															

Source: J. Doyle

SDR: TWDB Submitted Drillers Reports

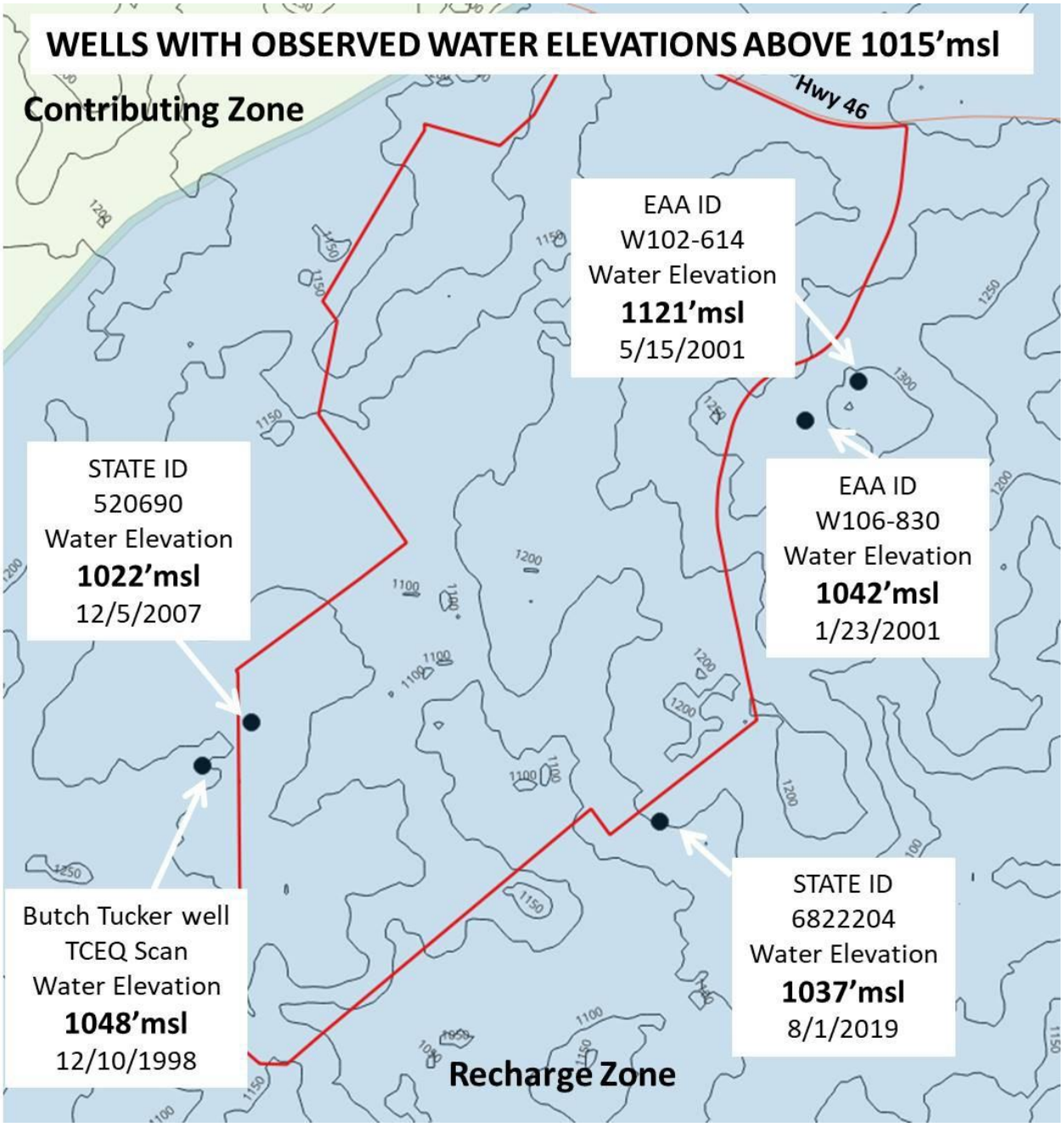
GWDB: TWDB Groundwater Database

EAA: Edwards Aquifer Authority

TCEQ: Texas Commission on Environmental Quality

WPAP: Pape-Dawson, 2024, Water Pollution Abatement Plan

Appendix B. Location Map and Well Records



Source: J. Doyle

ATTACHMENT D

TO MOTION TO OVERTURN

TCEQ DOCKET NO. 2024-115-EAQ
PROGRAM ID NO. 13001906

IN THE MATTER OF THE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN BY VULCAN CONSTRUCTION MATERIALS, LLC	**§** **§** **§** **§** **§** **§** **§**	**BEFORE THE TEXAS** **COMMISSION ON** **ENVIRONMENTAL QUALITY**

AFFIDAVIT OF JACQUES M. OLIVIER

STATE OF TEXAS **§**
§
COUNTY OF COMAL **§**

BEFORE ME, the undersigned notary public, on this day personally appeared Jack Olivier, a person whose identity is known to me. After I administered an oath to him and upon his oath, he stated:

1. My name is Jacques M. Olivier, my date of birth is October 5, 1951, and my address is 1509 Cabernet, New Braunfels, Texas, 78132.

2. I am over eighteen (18) years of age and of sound mind and am otherwise competent and capable of making this affidavit. The facts testified to in this affidavit are within my personal knowledge and are true and correct.

3. I am a board member of Preserve Our Hill Country Environment, a Texas nonprofit organization.

4. I was previously a professional geologist, and I retired in 2015.

5. I earned a bachelor's degree in Geology from Trinity University in 1973. I went on to earn my master's degree in Geology from the University of Texas at Austin in 1977. My professional resume is attached as **Exhibit 1** to this affidavit.

6. I have published several articles related to the impact of quarries in Comal County, including two Local Guest Columns in the *Herald-Zeitung* (a New Braunfels newspaper): a September 19, 2019 article titled *Quarries pose a risk to local caves, water* and a June 8, 2024 article titled *Vulcan Quarry many not*

get public meeting, which are attached as **Exhibit 2 and Exhibit 3** to this affidavit, respectively.

7. I have also given public testimony on legislative bill HB-3883, the TCEQ's Sunset Review (2022-23), and provided information used by the Interim Committee on APOs, attached as **Exhibit 4** to this affidavit.

8. I have previously submitted several technical Public Comments to the TCEQ-EAPP related to other quarries and wastewater permits.

9. I have reviewed the Water Pollution Abatement Plan (WPAP) submitted by Vulcan Construction Materials, LLC ("Vulcan") on March 21, 2024 for the Vulcan Comal Quarry.

10. Based on my review of the WPAP, I found that Vulcan's mining will damage the watershed of the West Fork of Dry Comal Creek. The West Fork, a tributary of Dry Comal Creek, runs through the Vulcan site. It is normally dry but carries a large amount of water during major flood events, which the Hill Country area is known for. Mining will leave the West Fork elevated between quarry pits. During major flood events, surface water can be expected to enter the pits, washing any pollutants—including blasting agents such as ANFOs—into the underlying aquifers.

11. Furthermore, TCEQ's January 2012 Best Management Practices ("BMPs") for Quarry Operations, that are intended to protect underlying aquifers from pollution, are outdated. This includes the BMPs' current method of ranking sensitive karst features (Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones, TCEQ-0585 (Rev, 10-01-04). TCEQ's BMPs are no longer current with modern scientific work done by the Edwards Aquifer Authority and other scientific agencies. The TCEQ's Geologic Assessment method of ranking the sensitivity of karst features protects only cave openings and some sinkholes, leaving many other feature types unprotected. The Relative Infiltration Rate, a critical factor in rating a feature's ability to transmit surface water to the subsurface, is based solely on professional judgement and not scientific evidence.

12. A 2010 report by the Edwards Aquifer Authority found that that in the Edwards Aquifer Recharge Zone in Bexar County, Texas, surface pollution can quickly enter the aquifer without any visible karst features being present. (Steve Johnson et al., *Tracing Groundwater Flowpaths in the Edwards Aquifer Recharge Zone*, Panther Springs Creek Basin, Northern Bexar County, Texas, Edwards Aquifer Authority, Report No. 10-01 (May 2010)). I studied a diesel spill in January 2000 at a quarry site in Comal County that demonstrated this phenomenon, where diesel contaminated the Edwards Aquifer despite no

visible karst features in the area, and contamination was detected at Comal and Hueco Springs located 4.5 and 6.5 miles away, respectively. Based on this evidence of Edwards Aquifer contamination in the recharge zone occurring without any visible karst features, I concluded that the entire Edwards Aquifer Recharge Zone is "sensitive."

13. In the event that the Executive Director's decision to approve Vulcan's WPAP is not overturned, a dye-trace study should be conducted to determine flow paths of groundwater from the site and to determine which downgradient wells might be impacted by contaminants coming from the Quarry.

14. Furthermore, the Vulcan WPAP does not consider the amount of water needed to maintain operations at permissible dust levels, nor does it identify where that water is going to come from. If Vulcan uses groundwater for its operations, I believe adjacent landowners' wells could cease to yield water.

15. A mining pit is a manmade feature in basement (MB.) Just as is the case with caves (C), large sinkholes (SH), and manmade wells (MB), these features are required to be protected in order to prevent pollution of the aquifer.

16. Based on this analysis, it is my professional opinion that the Executive Director's decision to approve Vulcan's WPAP should be overturned.

Further the Affiant sayeth not.

Jacques M. Olivier, Affiant

SWORN TO AND SUBSCRIBED before me this 30th day of July, 2024.

Notary Public, State of Texas

MARCH 14, 2026
My Commission Expires:

BRIAN E BEDINGFIELD
Notary Public's Printed Name

BRIAN E BEDINGFIELD
Notary ID #125579239
My Commission Expires
March 14, 2026

EXHIBIT 1

to Affidavit of Jacques M. Olivier

JACK M. OLIVIER
16906 Windrow Drive, Spring, Texas, 77379
281-770-6558 (Business)

SUMMARY

30+ years of geological and managerial experience in petroleum exploration and production, both domestic and international. Able to work effectively with people of varied technical backgrounds and nationalities. French and some Spanish spoken.

EXPERIENCE

Independent Geologist **2003 – Present**
Spring, Texas

- Generated multiple exploration prospects in the Texas Eagle Ford Shale Trend.
- Successfully marketed leases in Lavaca Co., TX for PetroEnergy, a Kuwaiti shareholding company.
- Participated in the drilling of 29 wells in the Texas Permian Basin.

Citation Oil & Gas Corp. **2000 - 2002**
Geological Engineering Manager
Houston, Texas

- Responsible for developing mature U.S. oil and gas fields in Permian Basin, S. Texas, Powder River Basin, Williston Basin, and Anadarko Basin.
- Performed detailed field study of Happy field, Garza Co., TX, utilyzing GeoGraphix computer system for log correlation, formation evaluation and mapping.

Petro-Quest Oil & Gas, LP **1999-2000**
Petroleum Geologist – Texas Gulf Coast
San Antonio, Texas

- Generated and evaluated onshore prospects, concentrating mainly on Frio, Vicksburg, Wilcox, and Edwards trends in South Texas. Clients included Southwestern Energy, Houston, TX.

British Gas E&P **1988-1998**
Deputy General Manager - Tunisian British Services 1996-1998
Sfax, Tunisia

- Managed 4 production concessions in a joint venture between British Gas and ETAP, the Tunisian state oil company. Annual oil production exceeded 2 million barrels. Operations included exploration and development drilling and workovers. Oversaw the construction of a 35-km pipeline tying offshore oil production to onshore facilities. Regularly presented operations results and budgets (in French and English) to the Tunisian Committee for Oil and Gas.
- Assisted with the sale and transfer of BG's 49% interest in TBS to Preussag Energie, Germany.

Project Manager- Central & Eastern Europe 1993 – 1996
Reading, England

British Gas E&P (continued)

- Evaluated new venture E&P projects in Central and Eastern Europe. Helped negotiate a new exploration concession in Poland with the Ministry of Environmental Protection, Natural Resources and Forestry.
- Managed multidisciplinary group exploring a BG-operated block in the Bulgarian sector of the Black Sea. Presented exploration results to the Bulgarian Committee of Geology and Mineral Resources. Introduced measures to reduce drilling and evaluation costs.
- Represented BG on British business mission to Ukraine led by Sir Derek Hornsby in 1995. Met with Ukrainian President Kuchma and British MP Ian Lang to discuss the possibility of leasing new acreage in the Black Sea.

Area Exploration Manager-South America & Caribbean 1988 - 1993
Houston, Texas

- Managed a staff of 12 geologists, geophysicists, and engineers responsible for exploration in the South America and Caribbean areas. Traveled extensively to Argentina, Ecuador, and Trinidad. Administered an annual exploration capital budget in excess of $12 million.
- Successfully acquired interests in 8 blocks in Argentina through a combination of competitive bid rounds and farm-ins. Exploration resulted in reserve additions of 10 million barrels of oil.
- Initiated negotiations leading to the licensing of Trinidad Block E and the development of Dolphin Field (1 TCF) in BG-operated Block 6.
- Investigated new ventures in Bolivia, Colombia, and Venezuela.

Tenneco Oil E&P **1979 - 1988**

Division Geological Engineer, International Div. 1987 - 1988
Houston, Texas

- Managed a staff of 9 geologists responsible for developing 13 fields in the U.K., Norway, Gabon, Nigeria, Tunisia, and Trinidad. Annual capital budget exceeded $19 million.
- Quality-controlled formation evaluation of all exploration and development wells drilled.
- Assisted in the sale of the Division to British Gas, UK.

Division Geological Engineer, Gulf Coast Div. 1982 - 1987
Houston, Texas

- Assisted in the merger of Houston Oil & Minerals into the Tenneco organization.
- Built a staff of 12 geologists responsible for drilling 54 development and outpost wells in 20 fields. Drilling success ratio was over 75%.
- Managed a transition group that successfully reorganized departments into multidisciplinary teams following the merger of two Tenneco divisions.

Project Geological Engineer, Southwestern Div. 1980 - 1982
San Antonio, Texas

- Developed the Brunson Ranch Field in Loving Co., Texas. The 16,000’ deep, high pressure, Atoka gas field became the Division's top income generator.
- Drilled and evaluated several 20,000' rank wildcats in the Delaware and Val Verde Basins.

Tenneco Oil E&P (continued)

Senior Geological Engineer, Offshore Division 1979 - 1980
Lafayette, Louisiana

- Evaluated several blocks for federal lease sale in Gulf of Mexico.
- Solved a production anomaly in Vermillion 245 Field that resulted in $1 million savings.

Exxon Company, USA **1975 - 1979**

Exploration & Production Geologist
Midland, Texas & Lafayette, Louisiana

- Generated exploration prospects in W. Texas, and development prospects in S. Louisiana.

EDUCATION

M.A., Geology, University of Texas at Austin, 1977
Austin, Texas GPA: 3.8/4.0

B.A., Geology, Cum Laude, Trinity University, 1973
San Antonio, Texas GPA: 3.7/4.0

MEMBERSHIPS AND AFFILIATIONS

Certified Petroleum Geologist (AAPG #3320)

PERSONAL INFORMATION

Born October 5, 1951.
Married. Excellent health.
Willing to work overseas.

EXHIBIT 2

to Affidavit of Jacques M. Olivier

https://herald-zeitung.com/opinion/quarries-pose-a-risk-to-local-caves-water/article_2d3085b4-da70-11e9-8031-474d5640a35c.html

Quarries pose a risk to local caves, water

Jack Olivier is a guest columnist who lives in New Braunfels.
Sep 19, 2019

Comal County continues to provide new and exciting underground surprises. The proposal to convert 1,500 acres of Hill Country land into an open-pit mine and limestone quarry, and the deluge of recent applications to discharge wastewater into pristine streams and creeks, has ignited interest in Comal County's natural resources and unique environmental features.

In June, local landowners discovered a new chamber in Double Decker Cave on their property. Located between the proposed Vulcan quarry site and Natural Bridge Caverns, Double Decker now measures more than 1,100 feet long, with a depth of over 100 feet.

The exploration of Double Decker Cave is being led by Ben Hutchins, an invertebrate biologist with Texas State University. He is being assisted by teams of volunteer “cavers” from San Antonio and Austin. As a retired geologist and member of Preserve our Hill Country Environment (a non-profit organization working to protect the Texas Hill Country from under-regulated quarries and other aggregate operations), I have had the privilege of organizing this project.

The discovery in Double Decker follows closely on the heels of the new passages being explored in Natural Bridge Caverns. Comal is one of the top counties in Texas when it comes to total number of caves. The Texas Speleological Society recognizes 226 caves in Comal County. Honey Creek Cave, located near Guadalupe State Park, is the longest known cave in the entire state, measuring over 22 miles. Natural Bridge is believed to be over 3.5 miles long.

At 1,100 feet, Double Decker Cave has a long way to go to “catch up” with more well-known caverns, but who knows where it will end? Back in 1964, both Honey Creek Cave and Natural Bridge Caverns were only reported to be 1,000 feet long!

Unfortunately, Texas allows quarries, such as the nearly 3-mile long facility proposed by Vulcan Materials, to destroy caves encountered during the blasting and mining processes. The next Natural Bridge could be at risk of destruction — even before it is fully explored.

Clearly there is still much to learn about the subterranean connections in the area — not only through caves and caverns, but also through the numerous natural faults and fractures located in the environmentally sensitive Edwards Aquifer Recharge Zone.

One purpose of the cave study is to gain a better understanding of the groundwater flow in the recharge zone and the important role played by caves. As the Hill Country undergoes record development, numerous new caves are being discovered.

The abundance of caves and other karst features naturally created by underground water flow demonstrates just how easy it is for pollutants to enter the groundwater system. It is, therefore, extremely important water wells and septic systems be properly maintained. Residential fertilizers, insecticides and weed killers should be used sparingly, if at all, in the recharge zone.

The nitrates used by quarries to blast apart limestone formations, and the chemicals and diesel fuel stored by these industrial facilities pose an unacceptable risk to the drinking water that 1.7 million residents depend on. Additionally, a quarry located over the recharge zone is essentially a permanent, man-made “funnel” that can quickly transport pollutants into the underlying aquifer.

Current rules and regulations by TCEQ and the Edwards Aquifer Authority are insufficient and loosely enforced. If we care about the water we drink and our beautiful caves and caverns, it is imperative that we regular citizens band together and demand more from our public officials and state agencies.

For more information and future updates, please visit stop3009vulcanquarry.com and follow Preserve our Hill Country Environment on Facebook.

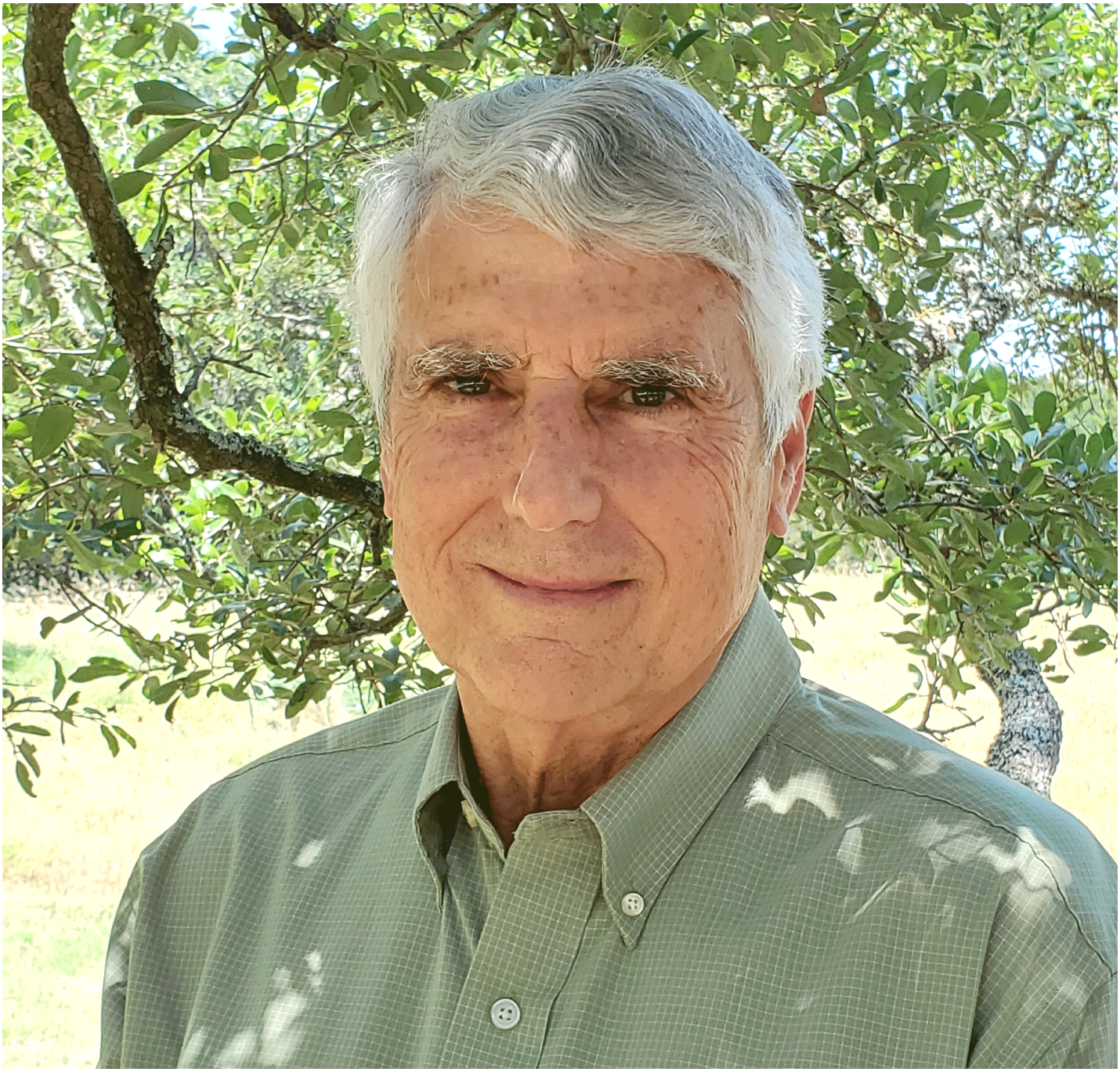
EXHIBIT 3

to Affidavit of Jacques M. Olivier

https://herald-zeitung.com/opinion/olivier-vulcan-quarry-may-not-get-public-meeting/article_fb05c0a8-25bb-11ef-b73a-cf81ad4c230a.html

OLIVIER: Vulcan Quarry may not get public meeting

By Jack Olivier
Jun 8, 2024



Jack Olivier is a resident of New Braunfels.

A large limestone aggregate quarry within the Edwards Aquifer Recharge Zone near Natural Bridge Caverns and the Bracken Bat Cave might soon be approved without a public meeting. While driving in central Comal County, you have probably noticed the road signs indicating that the Edwards Aquifer Recharge Zone is an environmentally sensitive area. This is where the Edwards Limestone is exposed at the surface, allowing large volumes of water to flow into the aquifer.

The Edwards Aquifer is the primary source of drinking water for over 2.5 million people in the cities of San Antonio, New Braunfels, San Marcos, and surrounding communities. In recent years, this area has experienced unprecedented growth in population and increased demand for water resources. Covering ever more farm and ranch land with buildings and roads means there is less land available for aquifer recharge. As a geologist who has studied the extensive network of caves, sinkholes, and natural fractures present in Comal County, I have witnessed how quickly water enters the aquifer, making the recharge zone very sensitive to biological and chemical pollutants, including ammonium nitrate from quarry explosives.

The Texas Commission on Environmental Quality (TCEQ), through its Edwards Aquifer Protection Program (EAPP), is the state agency responsible for regulating development over the recharge zone. The TCEQ oversees development by issuing permits based upon each applicant's Water Pollution Abatement Plan (WPAP). Once the plan is posted on TCEQ's website, the public is given 30 days to submit public comments.

Vulcan Construction Materials, LLC, has a pending WPAP application for a 1,515-acre, limestone-aggregate quarry in central Comal County. Vulcan's proposed quarry site is surrounded by numerous homes with private water wells. The public comment period ended on April 21, 2024. A citizen's group, Preserve our Hill Country Environment (PHCE), employed a

professional hydrogeologist, who identified several technical deficiencies in the WPAP. Over 780 public comments were submitted to the TCEQ-EAPP citing serious concerns and requesting a public meeting.

Public meetings are the only opportunity for the public to directly ask questions to the applicants and TCEQ staff. These meetings are necessary to ensure that private economic interests do not outweigh the goal of maintaining environmental quality. A good example is the public meeting that was held on April 15, 2024 to review a proposed cement production plant and limestone quarry located in Grayson County. Lieutenant Governor Dan Patrick attended that meeting and was convinced the plant was not in the public's best interest. He sent a letter the next day to the TCEQ chairman calling for an immediate pause in the permitting process for all cement production plants until the legislature can weigh in. The letter can be viewed on his website: https://www.ltgov.texas.gov.

Senator Donna Campbell and Representative Carrie Isaac jointly sent a letter on April 23, 2024, to the TCEQ requesting a public meeting for the proposed Vulcan Comal Quarry. The TCEQ executive director quickly replied, claiming a public meeting is not part of its standard procedure for handling WPAPs. Public meetings are commonly granted for other permit types. The public deserves an opportunity to question Vulcan's plan for this massive quarry directly over the recharge zone.

Voice your opinion by contacting Lt. Governor Patrick to ask him to support Senator Campbell and Representative Isaac's request for a public meeting before the TCEQ issues Edwards Aquifer Permit No. 13001906 for the Vulcan Comal Quarry. The TCEQ must not be allowed to ignore the legitimate public concerns this project has generated. The job of protecting the Hill Country's natural resources should not have to depend on citizens banding together to take up legal action.

EXHIBIT 4

to Affidavit of Jacques M. Olivier

Report for the Interim Committee on APOs
Potential Groundwater Contamination
By Quarries located in the Edwards Aquifer Recharge Zone - An Area at Risk of Groundwater Pollution due to Limestone Aggregate Mining

Jack Olivier – M.A., Geology, University of Texas at Austin, 1977

September 30, 2020

Testimony Overview

Thank you Representative Wilson and Mr. Frazier for giving me this opportunity to speak today. And thanks to everyone for listening.

My name is Jack Oliver and I live in Comal County. I am a retired Geologist with experience working with Karst formations that are characterized by the presence of many caves and other solution features like we have in Central Texas. All of my Geologic training was done here: I hold a Masters Degree from the University of Texas at Austin, and a Bachelors degree from Trinity University in San Antonio.

My testimony is focused on the increased potential for contamination of the Edwards Aquifer by the growing number of Aggregate Production Operations (APOs) over the Edwards Aquifer Recharge Zone, which I will refer to simply as the Recharge Zone.

[SLIDE 1] - first slide please.

The Recharge Zone is a state-recognized environmentally sensitive area (as demonstrated by the green TxDot signs posted around it). The area is sensitive because water flowing across the surface, or falling onto it as rain, rapidly enters the Edwards Aquifer through fractures and large pore spaces present in the Edwards Limestone that is exposed at the surface. This happens with very little benefit of natural water filtration. This is very different than sandstone aquifers where groundwater flow is much slower and the sandstone does a much better job of water filtration and purification than limestone.

Limestone aggregate quarries located in the Recharge Zone pose a special environmental risk because over 2 million people rely on the Edwards Aquifer for their drinking water. The Texas Commission on Environmental Quality (known as the TCEQ) is the regulatory authority for all surface development over the Recharge Zone. The Edwards Aquifer Authority (or EAA) is primarily responsible for regulating the amount of Edwards groundwater that is taken out of the aquifer. Recent scientific studies conducted by the EAA have shown that the Recharge Zone is even more sensitive to groundwater pollution than originally believed. Unfortunately, the recent rapid pace of urbanization, and commercialization including APOs, over the Recharge Zone are threatening to cause permanent damage.

[SLIDE 2] next slide please

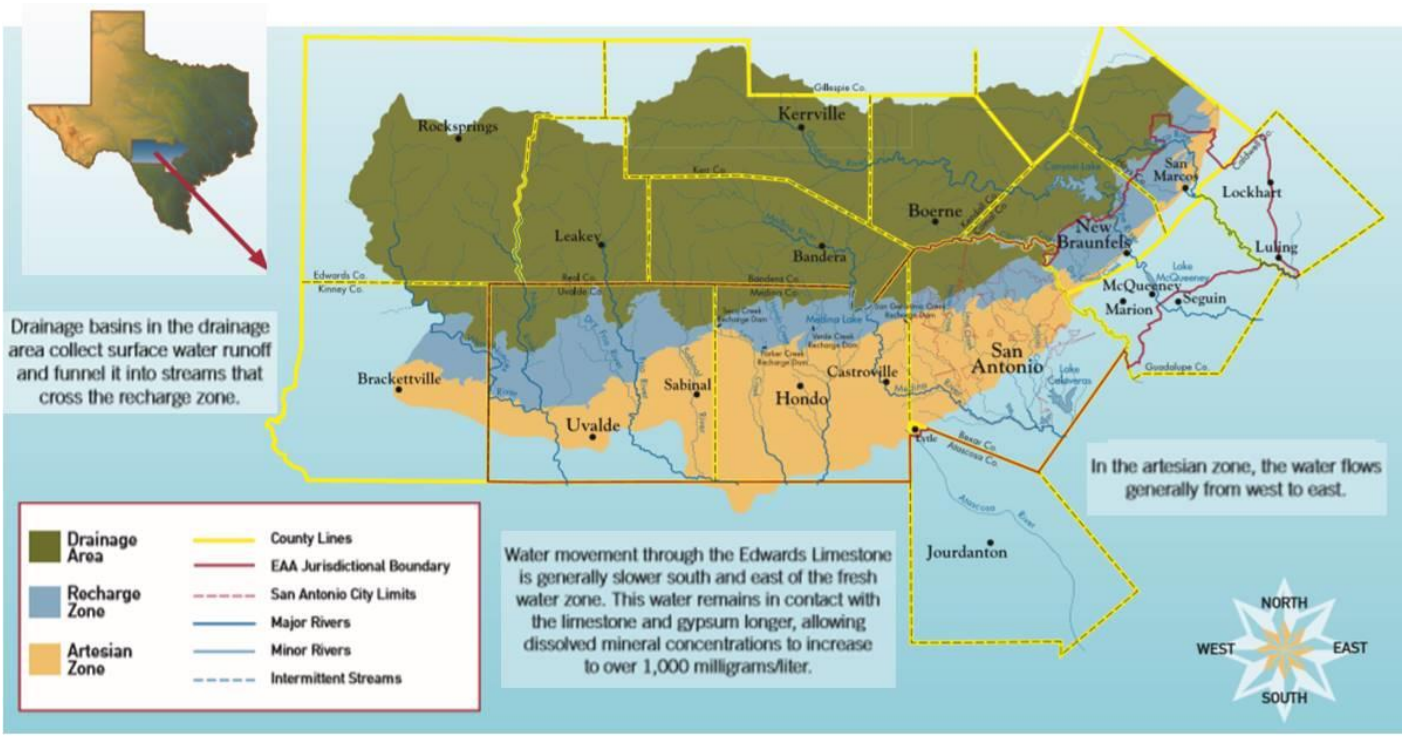


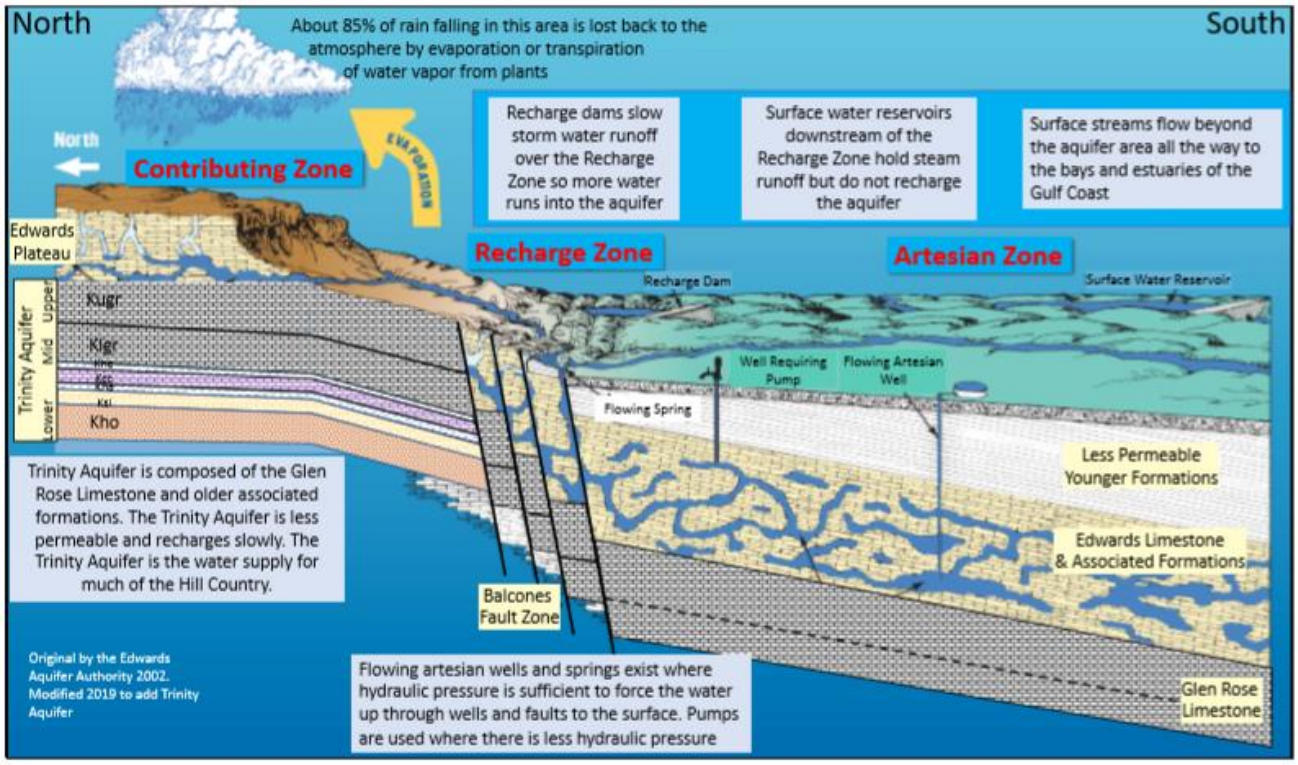
Figure 1. Edwards Aquifer Region.
Modified from https://www.edwardsaquifer.org/wp-content/uploads/2019/04/08eaa018_regionalmap_11x17_fnl.pdf

The Edwards Aquifer Region covers all or parts of 15 counties in Texas, as shown on this slide. Limestone is exposed at the surface in the Drainage Area shown in green, and the Recharge Zone shown in blue. The Artesian Zone, shown in orange, is where the Edwards Limestone is underground.

Although the Recharge Zone is almost 200 miles long, extending from Brackettville in the west, to Kyle in the east, the zone is only 5-10 miles wide in the area extending from San Antonio to San Marcos, where many quarries are located.

[SLIDE 3] next slide

This shows a schematic cross-section from the Drainage Area (here labeled Contributing Zone) in the north, and the Artesian Zone in the south. This region forms one of the best natural rain collection systems in the world. Water wells drilled into the Artesian Zone provide the critical water supply for San Antonio and other cities in the region.



The Edwards Limestone (shown in yellow), and the underlying Glen Rose Limestone (shown in gray) are exposed at the surface in the Contributing Zone. The Recharge Zone is where the Edwards Limestone is faulted down by the Balcones Fault Zone, connecting it to the confined underground Artesian Zone. The blue areas shown within the Edwards Limestone represent cave systems, and smaller voids that are interconnected by fractures. Note that within the Balcones Fault Zone, the Edwards Aquifer and Trinity Aquifers are juxtaposed. The EAA is currently working with the newly-formed Comal Trinity GCD to determine how the aquifers are interacting in this area.

[This natural rain collection system acts much like one you might have at home - roof, plumbing or gutters, and a water tank.]

APOs consider the Edwards Limestone to be an extensive, high quality, and easily accessible resource. International and domestic APOs are purchasing large tracts of land in the region to secure resources for their long-term aggregate mining operations. The number of open-pit mines in Texas is growing rapidly. Production capacity is expected to double.

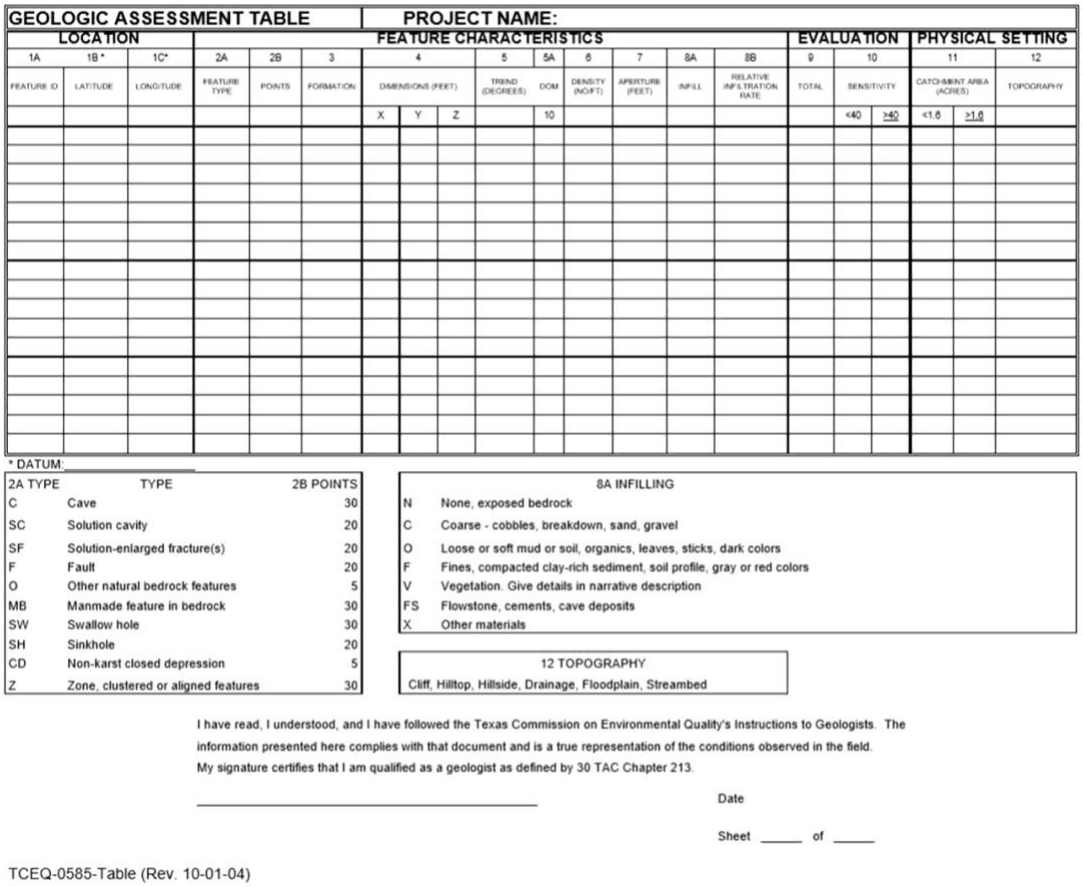
In the Recharge Zone, most of the oldest and largest mines are located along the Balcones Escarpment where the Edwards Limestone juts up along Interstate 35 and Loop 1604 in San Antonio – the area often referred to locally as "Quarry Row." This location on the edge of the Recharge Zone has the advantage of having the aggregate material close to major roads and rail lines needed to transport the crushed rock to market. Many of these existing mines are currently expanding to the north and west, reaching farther into the Recharge Zone.

[Show the escarpment where flowing springs occur. Show the location of the proposed quarry]

APOs already control a large amount of undeveloped land over the Recharge Zone. At the present time there a proposed 1500- acre quarry in central Comal County that has a projected life of over 80 years. In addition to the threat of damaging the Edward Aquifer system from mining, quarries placed in the middle of the Recharge Zone will have to rely totally on trucking to move material over the mostly 2-lane roads there. Or new rail lines will be needed, putting even more of the Recharge Zone at risk.

Therefore, now is the right time for a complete review of the current regulations and enforcement provisions being applied by the TCEQ.

[SLIDE 4 - Sensitive Features] next slide



GEOLOGIC ASSESSMENT TABLE — **PROJECT NAME:**

LOCATION			FEATURE CHARACTERISTICS										EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11		12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	

* DATUM: _____

2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

I have read, I understood, and I have followed the Texas Commission on Environmental Quality's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field.
My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

_____ Date

Sheet _____ of _____

TCEQ-0585-Table (Rev. 10-01-04)

The TCEQ defines a *sensitive feature* as "a permeable geologic or manmade feature located on the recharge zone or transition zone where the potential for hydraulic interconnectedness between the surface and the Edwards Aquifer exists, and rapid infiltration to the subsurface may occur." The TCEQ applies a Geologic Assessment Table (shown here) for rating sensitive features, as put forth by the Edwards Aquifer Protection Program (TCEQ Report-0585, last revised in 2004).

On the lower left side of the table are listed the types of features.

Caves (C) make up the bulk of the most sensitive natural karst features requiring protection – they are given the highest rating for feature type. Also very sensitive are man-made features in bedrock (called MBs) that include water wells drilled into the underlying aquifers.

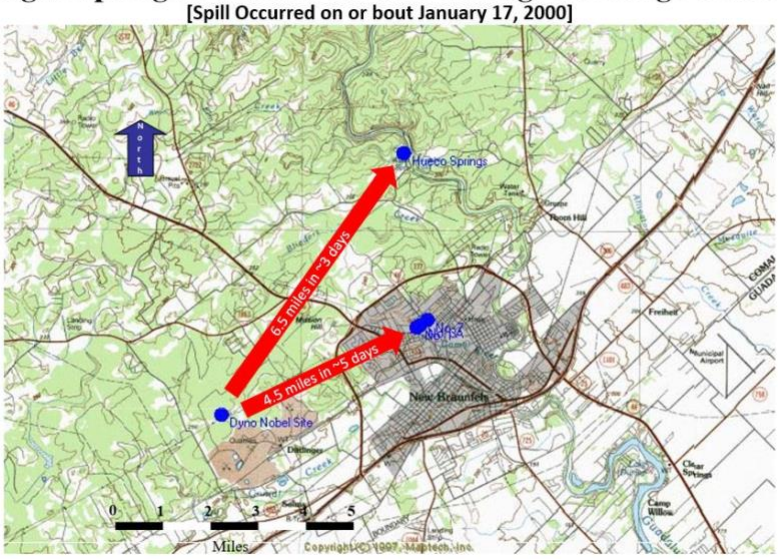
Quarries are very large man-made features; however, they are permitted in the Recharge Zone despite the fact that the open pits can act as funnels for pollutants to enter the aquifer system with no natural filtration. Those pollutants can include diesel fuel and ammonium nitrate being used as the explosive agent in the mining process, or urban runoff containing fertilizers, pesticides, oil products, and septic effluent that can be washed into the open pit during major flood events.

The TCEQ requires the protection of the most sensitive features only when their relative water infiltration rate is judged to be moderate-to-high. However, a dye-trace study conducted by the EAA in northern Bexar County in 2010 found that pollutants can be introduced without any obvious sensitive features being recognized at the surface!

[SLIDE 5 - DIESEL SPILL] next slide

Location of 2,000 gallon diesel fuel spill and Comal Springs - largest spring in western US with average discharge of 280 cfs

[Spill Occurred on or bout January 17, 2000]



This important finding is supported by a 2,000-gallon diesel spill that occurred over the Recharge Zone in Comal County in January 2000 within a contained loading area having no identified sensitive features. It took only a few days for the diesel to be detected at two important springs near New Braunfels - Comal Springs and Hueco Springs - albeit in very low concentrations. The spill shows how easy it is for pollution to enter the aquifer and how quickly the groundwater flow can be.

[talk about the slide]

As a side note, the spill site has been quarried and is now part of a large quarry pit.

[SLIDE 6 -DOUBLE DECKER CAVE] next slide

The TCEQ applies regulatory guidelines (RG-500) published in 2012, entitled Best Management Practices for Quarry Operations, Complying with the Edwards Aquifer Rules.

Rather than show a picture of the BMP report, here is a photo of a large, private cave located just one mile from a proposed quarry in central Comal County.

The BMPs allow for the destruction of caves. On the other hand, they do not call for any reclamation work to be performed upon quarry abandonment, nor do they make any provision for the continued maintenance of any protective berms that might have been installed to prevent the flow of surface waters from entering the quarry pit.

[SLIDE 7 - RECOMMENDATIONS] next slide

It is recommended that State Legislators consider the following proposed actions:

- Require the TCEQ to update all environmental regulations to reflect the new scientific research showing that the entire Recharge Zone is much more sensitive than originally thought, even where no distinct sensitive features have been identified. Dye-trace studies are needed to accurately determine the groundwater flow paths prior to new large quarries being permitted, especially in areas close to major natural springs and water wells.
- Require reclamation of all open pits at the time of quarry abandonment, as is already being done successful and economically in most other states, and in some cases in Texas as we heard yesterday. (well over 40)
- Consider placing a limit on the number and size of limestone quarries and other major commercial projects sited in the middle of the Recharge Zone.
- Adequately fund the TCEQ to ensure that all environmental regulations are properly enforced. Its scientific responsibilities also need to be enhanced because at the present time the TCEQ is serving primarily as a permitting agency.

Conclusion

So in conclusion, APOs located in the Edwards Aquifer Recharge Zone are an important subset that require special attention in order to protect a critical water resource.

The last thing I would like to mention is that my oral testimony is based on a detailed report I completed in April of this year. The report has been submitted as my written testimony to the House Interim Study Committee.

That concludes my presentation. I would be happy to answer any questions.

Detailed Report

[Environmental Sensitivity Study of the Edwards Aquifer Recharge Zone in Comal County, Texas - An Area at Risk of Groundwater Pollution due to Limestone Aggregate Mining, J.M. Olivier, April 2020.]

Supporting Material

APO Key Issues

No.	Key Issue
1.	Air particulate emissions – quantify and address the impact APOs have on air quality for adjacent neighbors, near-by properties, and the community at large
2.	Water use and availability – assess and address consumption, availability, and the mounting effects of APO water use on regional water supplies
3.	Surface and ground water contamination and flooding – address water quality impacts to aquifers, rivers, and wetlands as well as silting and flooding issues
4.	Rapid development of APOs without adequate regulatory oversight – permitting requirements are deficient and Environmental Impact Assessments, mine planning and reclamation are not required. Resolution will require regulation akin to the federal Surface Mining and Control Reclamation Act (SMCRA) that applies to mining almost everywhere else in the US
5.	Truck traffic – address effects of rapidly increasing volume of heavy truckloads on public infrastructure, including limited capacity roads, as well as the associated emissions and dust they create. Address safety and the public cost of maintaining roads not designed for this use
6.	Nuisance issues – address additional impacts to neighbors' quality of life and enjoyment of private property, including blasting (over-pressure and seismic activity), noise, odor, light trespass, and visible blight
7.	Economic impacts – address the negative economic impacts of APOs, including the devaluation of neighboring properties and the misuse of tax exemptions for APO properties

Key Issue # 3 – Surface and Groundwater Contamination

ATTACHMENT E
TO MOTION TO OVERTURN

From: Jacques Olivier <jmolivier@sbcglobal.net>
Sent: Saturday, April 20, 2024 3:39 PM
To: EAPP
Subject: EAPP Application Review: Edwards Aquifer Permit 13001906
Attachments: Public Comments - Vulcan Quarry WPAP_JMOlivier.pdf

Please find attached my Public Comments in opposition to the Vulcan Comal Quarry Water Pollution Abatement Plan: 13001906. The comment deadline is Sunday, April 21, 2024.

I would appreciate a quick return email confirming receipt.

Thanks,

J. M. Olivier
New Braunfels, TX 78132

To: TCEQ Edwards Aquifer Protection Program

Subject: PUBLIC COMMENTS RE: Edwards Aquifer Permit **13001906**

Submitted electronically to eapp@tceq.texas.gov on April 20, 2024

This letter constitutes my Public Comments and Public Meeting Request regarding the Vulcan Construction Materials, LLC Water Pollution Abatement Plan (WPAP) Application in Comal County, Texas (EA Permit No. **13001906**). The subject application is for a new 1,515-acre limestone quarry located between Bulverde and New Braunfels, Texas. It lies totally within the Edwards Aquifer Recharge Zone (Plate 1).

Background

These comments are based on my experience as a geologist who has studied the various karst features present in the Edwards Aquifer Recharge Zone (EARZ), a state-recognized environmentally sensitive area. In 2019, I began studying caves in the area surrounding the proposed Vulcan Comal Quarry (aka Vulcan 3009 Quarry and referred to in this report as the Vulcan Site). Field exploration was conducted to accurately locate and map caves that are the most sensitive karst features present. Information gathered in this report is intended to serve as a resource to the Texas Commission on Environmental Quality (TCEQ) to more thoroughly evaluate this important WPAP application. Cave location coordinates and internal maps of the Study Area are available to the TCEQ upon request.

Geology

The EARZ is defined as the area where the Cretaceous limestone formations of the Edwards Group (commonly called the Edwards Limestone) are exposed at the surface where the rocks have been highly fractured within the Balcones Fault Zone (Plate 2). In Comal County, the Edwards Limestone is composed of the Person and Kainer Formations, from youngest to oldest. In the vicinity of the Vulcan Site, only the Kainer Formation is present. The Kainer directly overlies the older Cretaceous limestone of the Glen Rose Formation of the Trinity Group.

Cave-Prone Zone

The limestone formations present in the EARZ contain a very high density of caves and sinkholes. Comal County is among the top counties in Texas for having the greatest number of known caves (Texas Speleological Survey website). Two of the best-known caves in Comal County, Natural Bridge Caverns and Bracken Bat Cave, are located approximately 6 miles south of the Vulcan Site. Another large cave, Double Decker, is located just 3 miles south of the Vulcan Site. Exploration work conducted in 2019 at Natural Bridge Caverns and Double Decker Cave identified significant new chambers and passages (Herald-Zeitung newspaper, August 22, 2019).

Plate 2 is a USGS geologic map (SIM3366) with cave locations added. It shows that the cave openings in Vulcan Site area occur in the stratigraphic interval extending from the Kainer dolomitic (Kkd) and basal nodular (Kkbn) and into the underlying Upper Glen Rose cavernous (Kgrc) hydrostratigraphic units (Clark et al., 2016). This interval is informally called the “Cave-Prone Zone.”

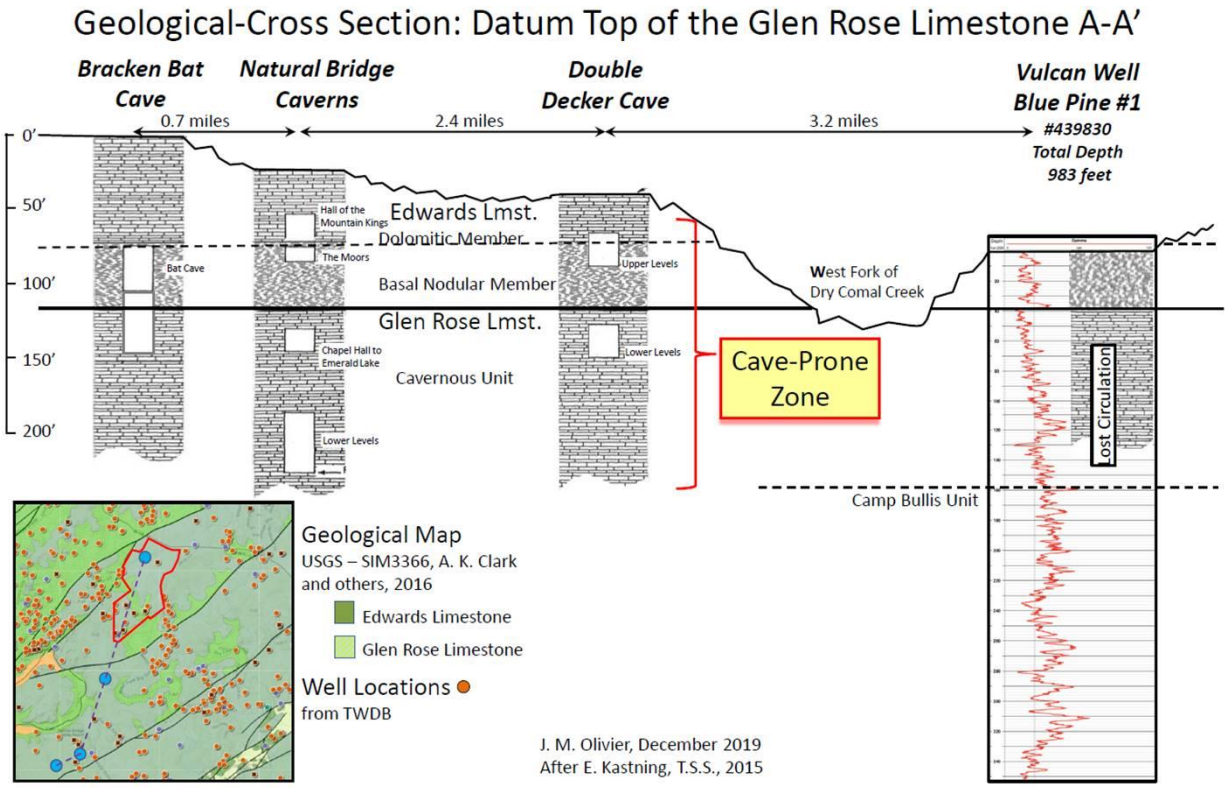


Figure 6. South to north stratigraphic cross section showing the stratigraphic interval that would be affected by the proposed Vulcan Quarry. A detailed location of the cross section is shown on Plate 1

Figure 1. Stratigraphic cross-section (Source: J.M. Olivier after E. Kastning).

Stratigraphic cross-section A-A' (Figure 1 and Plate 1) shows the chambers at Natural Bridge Caverns, Bracken Cave, and Double Decker Cave. On the northern end of the cross-section, a water well drilled on the Vulcan Site lost circulation in a highly permeable interval while being drilled from a depth of 63 – 143 ft. This interval correlates to the Cave-Prone Zone, indicating the potential that significant caves may exist under the Vulcan Site. It also shows the high probability that the entire area is hydrologically connected with both the Edwards and Trinity Aquifers (Gary, et al., 2011).

Caves Near the Vulcan Site

The most complete database of caves in Texas is maintained by the Texas Speleological Survey (TSS), a non-profit corporation made up of cave explorers. In 2016 there were 224 caves listed for Comal County. The TSS does not make exact cave locations available to the general public in order to protect landowners from potential trespassing.

For this study of the Vulcan Site, the TSS provided the location of 16 cave clusters, shown as circles on Plate 2. These clusters contain 48 known caves in the database. The cave names are listed on the legend on Plate 2. Within a 2-mile distance of the quarry site, there are 6 clusters containing 26 caves in the TSS database as of 2019. More caves have since been added to the TSS database as a result of this study.

Over 30 caves and other sensitive features such as sinkholes, springs, and wells were investigated in the Study Area (Table 1 will be made available to the TCEQ upon request). Caves are indicated on Plate 2 by numbered Xs. Ten caves have been mapped internally, three of which were previously unknown to the TSS. Several of these caves were discovered by shallow digging in sinkholes.

The largest concentration of caves occurs in a 1500-acre area extending south from the Vulcan Site boundary to slightly beyond FM 1863. Exploration access was also granted by a private landowner to 500 acres immediately to the west of the Vulcan Site. Access to the north and east was limited to smaller properties generally containing less than 5 acres. It should be noted that areas on the map showing an absence of caves can often be attributed to a lack of exploration access rather than to a lack of actual caves.

Six caves were mapped in detail by teams of volunteer cave explorers led by Dr. Benjamin Hutchins from Texas State University. The largest cave mapped thus far is Double Decker Cave. During exploration, a new chamber was discovered, bringing the cave's total dimensions to 1,680 ft in length and 108 ft in depth.

The closest caves to the Vulcan Site include X9, located only 500 ft from the western fenceline. It consists of a vertical chamber beginning with a very small surface opening (2.5x2.5 ft) and dropping vertically 32 ft. Equally close to Vulcan's fenceline is X4, reported by the former White Ranch foreman to have a 10x10 ft chamber (C. Hopmann, personal communication).

X5 consists of 2 caves located just 875 ft south of Vulcan's fenceline. The 2 caves share a common 10 ft-wide opening, and extend 30 ft in opposite directions along an east-west trending fault. The caves have the potential of extending much further; however, collapsed rubble and nesting vultures prevented additional exploration. Cave X2 is approximately 5,000 ft to the west along the same fault. It is 113 ft long and 62 ft deep, and has not yet been fully explored.

The high occurrence of caves around the Vulcan Site is a clear indication of the area's high sensitivity to groundwater recharge in the EARZ. The size of Double Decker Cave shows the risk that quarrying in the Cave-Prone Zone could encounter a large cave (>1,000 ft in length, or >100 ft in depth). The direct connection of sinkholes to caves in this area shows that the environmental sensitivity of sinkholes might easily be underrated, and therefore go unprotected by the current TCEQ sensitivity-rating system.

Geologic Assessment & Sensitivity Scoring System

A *sensitive feature,* as defined by the TCEQ, is "a permeable geologic or manmade feature located on the recharge zone or transition zone where the potential for hydraulic interconnectedness between the surface and the Edwards Aquifer exists, and rapid infiltration to the subsurface may occur." A point system is used to score the sensitivity of features based on a classification of three variables: feature type (5 - 30 points), orientation with respect to structure, and a field-based assessment of relative water infiltration rate (5 - 35 points or greater). Environmental protection is given only to features with a combined score of 40 or greater.

By feature type, the most sensitive are caves, swallow holes, and zones of clustered or aligned features. These are given a base score of 30. Sinkholes, solution cavities, faults, and solution-enlarged fractures are given a score of 20. Other natural bedrock features and non-karst depressions are given a score of 5.

The relative water infiltration score is usually the determining factor for which features require special protection (i.e. a combined score of 40 and above). Unfortunately, the determination of water infiltration is much more arbitrary because it is usually based on indirect evidence, such as the accumulation of leaves and sediment present due to water inflow into a karst feature. No direct observation of water infiltration is required (TCEQ Report F-0585, p. 12).

Caves are the most common type of karst feature given protection. Although sinkholes are often caused by the partial collapse of caves just below the land surface, they are generally not given protection because their water infiltration rate is often difficult to judge. This poses a significant challenge for assessing the Vulcan Site because a large percentage of the caves in the surrounding area were only discovered by digging in sinkholes.

Vulcan Geologic Assessment

A total of 37 sensitive karst features were identified in the Geologic Assessment for the 1,515-acre Vulcan Site (Pape-Dawson Engineers, 2024). According to the TCEQ scoring system, 7 of the karst features, including three caves, require protection. The density of sensitive features appears anomalously low when compared to the surrounding area. Immediately to the north across SH 46, 38 sensitive features were found on 158 acres (Frost GeoSciences, Bigbee Tract Geologic Assessment, 2021). Immediately to the south of the Vulcan Site, the Edwards Aquifer Authority investigated 1,581 acres for potential inclusion in a conservation easement program and determined the property has a very high direct-recharge potential because of the numerous caves and sinkholes observed (Schindel, 2021, EAA Geological Evaluation of the Froboese Ranches, Comal Co., TX). A regional study using lithology as a predictive tool of cave entrances also indicates that more caves could be expected at the Vulcan Site (Veni, 2005).

The hydrogeology of the Vulcan Site is similar to that along strike to the northeast and southwest (Smith, P.G.#4955, 2024). The low density of sensitive features including cave entrances reported in the Vulcan Geologic Assessment could be due to the fact that the previous landowner modified the ground surface to prevent cattle from falling in (C. Hopmann, personal communication, 2024). It could also be a function of the somewhat arbitrary system being used to rate sensitive features. Whatever the case may be, there is a high probability that significantly more sensitive features are present very near the surface at the Vulcan Site. A thorough review of the Vulcan Geologic Assessment by the TCEQ is warranted.

Wells Drilled on the Vulcan Site

Wells are categorized by the TCEQ as *manmade features in bedrock*, and are given a high sensitivity rating equal to cave openings. It is therefore important that the location of all wells be correctly identified prior to the development of a site in the EARZ.

Six test wells were drilled in 2007 to a depth of around 1000 ft on the proposed Vulcan Site, formerly known as the White Ranch (Table 2). Because the results were not successful in finding sufficient groundwater to support a planned residential housing development, the wells were plugged and abandoned following the procedures in place at that time. The abandonment procedure consisted of filling the wells with gravel up to the top of the water level in each wellbore, and then capping them with a 10-foot cement plug. Above the cement plug, each wellbore was left open to the surface, where another cement plug was installed. These abandoned wells are potential pathways for pollutants to enter the aquifer that must be protected during quarrying operations according to the TCEQ. If any wells are disturbed by quarry operations, they must be plugged according to current plugging procedures enforced by the Comal Trinity Groundwater Conservation District (CTGCD).

In 2017, a water well was drilled by Blue Pine Holdings, LLC to a total depth of 983 ft. It tested water flow at an estimated rate of 150 gallons per minute from the Middle Trinity Aquifer in the Cow Creek

Limestone. During drilling, the well encountered a highly porous and permeable zone (63–143 ft) in the Glen Rose Formation. This 80-ft interval corresponds to the Cave-Prone Zone seen in the caves to the south (Figure 1). As mentioned previously, this lost circulation zone is a strong indication that quarrying at the Vulcan Site could encounter large caves that are hydrologically connected to Edwards and Trinity Aquifers.

Nitrate Pollution of Groundwater

Quarry operations pose a special risk of groundwater pollution because the predominant explosive used is ANFO, a combination of ammonium nitrate and fuel oil. Ammonium nitrate is used in large quantities and it is highly soluble in water. Per industry sources, up to 28% of the explosive is not consumed by blasting (Alberts, N., 2016, Mining News Digest, August issue). Exposure to nitrate can be particularly threatening to aquatic organisms (Isaza, D.F., Cramp, R.L., and Franklin, C.E., 2020, Environmental Pollution, Vol. 26).

Large quarry pits located over the EARZ act as funnels for pollutants including nitrate into the Edwards Aquifer. At the Vulcan Site, the Edwards Aquifer is interconnected with the Trinity Aquifer as explained previously. This topic was also addressed by hydrogeologist Douglas A. Wierman, P.G. #4062, in his report submitted in 2023 to the TCEQ regarding the WPAP for the Needmore Ranch quarry in Hays County, TX (EA Permits 11003759 and 11003760).

The Edwards Aquifer Authority (EAA) is the agency most responsible for protecting the quantity and quality in the Edwards Aquifer. Prior to the commencement of any quarrying activities at the Vulcan site, a representative number of water samples should be collected and tested to determine background concentrations for various parameters including nitrate levels.

Groundwater Flowpaths & Dye Tracing

In the vicinity of the Vulcan Site, groundwater in the Edwards Aquifer generally flows from west to the east (Figure 2). A portion of it makes its way to the Hueco and Comal Springs in New Braunfels, Texas. Some lesser components of the flow would bypass those springs and flow further downgradient towards San Marcos Springs (Smith, 2024).

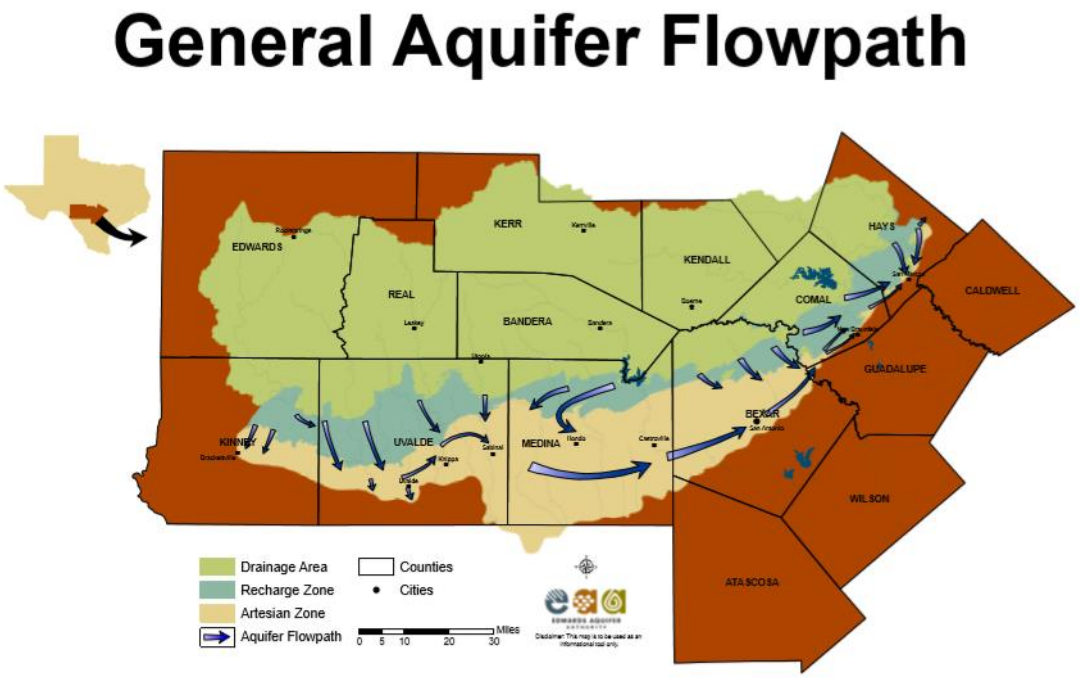


Figure 2. General Aquifer Flowpath in the Edwards Aquifer (Source: EAA website).

The most direct method for determining groundwater flowpaths is known as dye tracing. Nontoxic dyes are injected usually in cave opening and then traced to nearby wells and springs. The closest example of such a study in the EARZ was conducted in 2010 by the EAA at Panther Springs Creek Basin, located in northern Bexar County (Johnson, Schindel, & Veni, 2010). Non-toxic organic dyes were injected into 6 caves, and 32 public and private wells completed in the Edwards or Trinity Aquifers, and then closely monitored. Flow rates as high as 3-miles per day were observed. The tracer tests demonstrated excellent interconnection between the Edwards Aquifer and Upper Trinity Aquifers. Dye traveled across several faults in which permeable members of the Edwards and Glen Rose Formations are juxtaposed. One trace was initiated in a shallow pit dug in an area with no observable karst features, and yet the dye was subsequently detected in 2 wells. This study proves that the EARZ is highly sensitive to groundwater pollution, and that its vulnerability for contamination is not limited to recognizable karst landforms. This calls into question the effectiveness of TCEQ's sensitivity-rating system.

A diesel spill in January 2000 provided valuable groundwater flowpath information (San Antonio ExpressNews, 1/21/2000, Officials hopeful diesel spill in recharge zone contained). The spill occurred at the Dyno Noble explosives plant that was located in the EARZ near the city of New Braunfels (Figure 2). On or about January 17, two-thousand gallons of diesel fuel leaked into the ground from an approved, above-ground-storage tank (Dames & Moore, 2000, Hydrogeology of Dyno Nobel ANFO Manufacturing Facility, Comal Co., TX). Diesel was detected 3 to 4 days later at the Comal Springs and Hueco Springs, a distance of 4.5 miles and 6.5 miles, respectively (G. Schindel, CCCA presentation, 2019). Although the diesel concentrations detected at the springs were minimal, the leak confirmed two important points: 1) the groundwater flow rate in the EARZ is very rapid – well in excess of 1-mile per day, and 2) observable karst landforms are not necessary for groundwater contamination to occur.

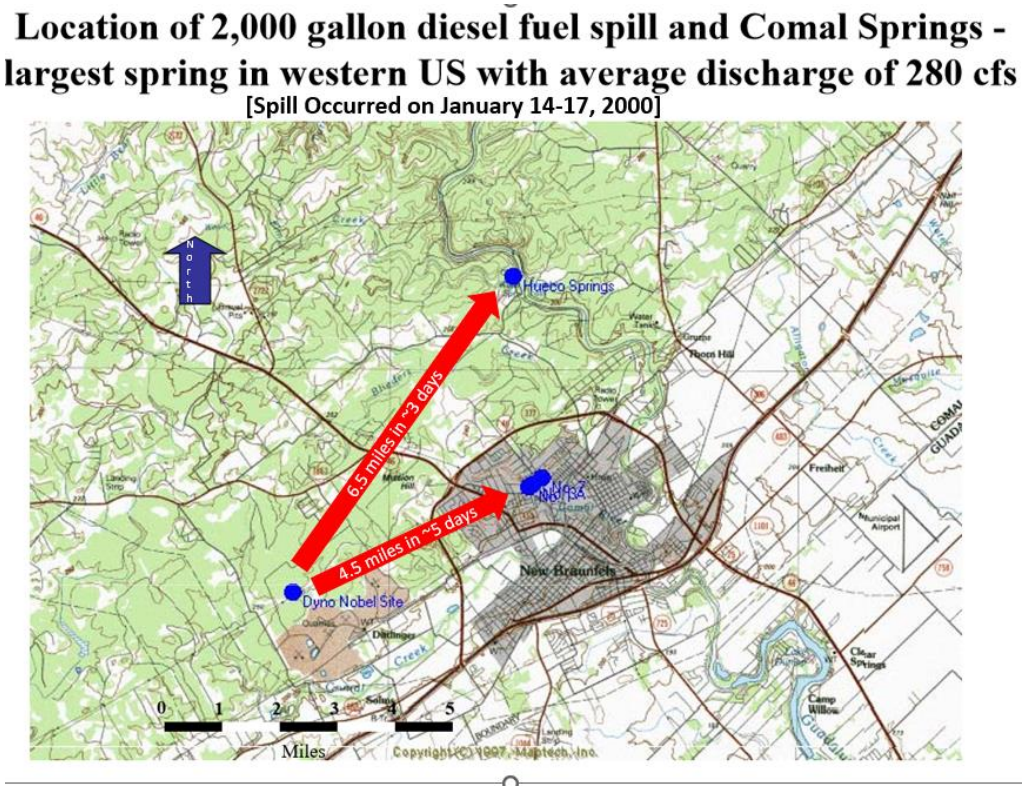


Figure 2. Diesel Spill in New Braunfels, TX (Source: G. Schindel, 2019)

A dye trace study is needed around the Vulcan Site to precisely determine the groundwater flowpaths. There are numerous domestic water wells along FM 3009 and points farther east that potentially would be at risk of contamination with nitrate and other hazardous substances if quarry operations are permitted. Nearby wells could experience nitrate levels above the EPA's maximum concentration limit safe for human consumption of 10 mg/L (N). Some of this water with elevated nitrate could make its way to Hueco and Comal Springs (Smith, 2024). Several protected, aquatic, endangered species live in Comal Springs. New Braunfels is heavily dependent on its water-based tourist industry that requires clean and plentiful groundwater from the Edwards Aquifer.

TCEQ Best Management Practices for Quarry Operations

TCEQ's Best Management Practices (BMPs) for Quarry Operations currently allows for the removal of caves. The Regulatory Guidelines (RG-500) were published in 2010 before agencies like the EAA and the Southwest Research Institute conducted studies showing the Edwards Aquifer recharge zone and contributing zones are much more sensitive than originally thought.

Quarry operators are given too much discretion when determining the need to permanently seal off sensitive features that cannot be totally removed. Sensitive features discovered during quarrying are supposed to be reported to the TCEQ and addressed on a case-by-case basis. A minimum separation of 25 ft is recommended between the floor of the quarry pit and the groundwater level to protect from blasting into the aquifer. In the Balcones Fault Zone, however, natural fractures are already present. Furthermore, the Vulcan WPAP does not make clear which wells will be used in determining the mining depth necessary to protect the aquifer. Quarry berms used to prevent surface drainage and stormwater

from entering the quarry pits are required to be inspected quarterly to ensure continued effectiveness for the active life of the quarry. Unfortunately, there are no provisions in the BMPs for inspection and maintenance of required quarry berms after quarry abandonment, nor is there any requirement for land reclamation.

These are all major oversights in the current BMPs for Quarry Operations, especially for quarries located in the EARZ where the pits qualify as highly sensitive *manmade features in bedrock (MB)*. The BMPs need to be updated to account for modern scientific understanding of aquifer recharge and groundwater flow.

Groundwater Availability

The large amount of water necessary to control dust that would be produced at the Vulcan Site is another major concern. An estimate based on the amount of material to be quarried shows that the proposed Vulcan quarry would use approximately 385 acre-ft (125,000,000 gallons) of groundwater per year (D. Everingham, personal communication, 4/12/2024, assumes one 800 ton per hour portable crusher consumes 40,000 gallons of water/hour). Surrounding domestic water wells completed in the Trinity Aquifer can be expected to suffer depletion.

A special concern is for the future sustainability of water contained in a permanent spring-fed pond (S1, Plate 2) located just 500 ft from Vulcan's southern boundary. It is currently a critical water source for wildlife during the current drought conditions. The pond is at high risk of drying up if quarrying upstream is allow to proceed.

The Comal Trinity Groundwater Conservation District (CTGCD) was formed in 2015 to monitor Trinity groundwater levels. Unlike the Edwards Aquifer Authority (EAA), the CTGCD lacks the authority to regulate water production, so Trinity wells and natural springs are at risk of depletion.

Summary

- The Edwards Aquifer Recharge Zone (EARZ) is the primary source of water for over 2.5 million people in South Central Texas, and therefore requires strict protection by the TCEQ and EAA.
- An extensive system of caves and caverns in the EARZ are important to groundwater transmission which is known to be rapid.
- The Edwards and Trinity Aquifers in the EARZ are known to be interconnected across faults in the Balcones Fault Zone.
- A Cave-Prone Zone extends across the Vulcan Site indicating a high probability that quarry pits will encounter large caves that are hydrologically connected to the underlying aquifers.
- Dye trace studies show that the EARZ is much more sensitive to groundwater pollution than previously understood.
- Quarries introduce pollutants such as ammonium nitrate and diesel fuel (ANFO) used as the primary explosive.
- Groundwater in Comal County generally flows from west to east towards the Comal Springs in New Braunfels, home to several endangered aquatic species in the Comal Springs.
- The Vulcan Site is located in a suburban location surrounded by numerous by domestic water wells; whereas the majority of large limestone quarries in Comal County are located in the commercial zone paralleling Interstate Highway 35.

Recommendations:

- The WPAP application should take into consideration all available cave information within a minimum distance of 2-miles of the proposed quarry site, including data maintained by the Texas Speleological Survey, data submitted to the TCEQ in Geological Assessments, and information provided by local property owners.
- The EAA should be consulted during the water-permit review process to help ensure that the destruction of caves and other sensitive karst features does not cause serious damage to the Edwards Aquifer, surrounding water wells, and natural springs.
- Prior to the issuance of a water permit for the proposed quarry, a dye-tracing study is needed to accurately determine the risk of pollution reaching nearby domestic water wells from the Vulcan Site.
- TCEQ's Geologic Assessment and sensitivity scoring system should be applied more stringently in light of the evidence that groundwater pollution is possible even where no observable karst features are present. Sinkholes are not being sufficiently protected considering that they commonly occur just above cave chambers. The relative water infiltration scoring method is too arbitrary.
- The Best Management Practices (BMPs) for Quarry Operations should specifically address the risk of encountering large caves, or a series of smaller caves, that are hydrologically well connected to the underlying aquifers. Large quarry pits are sensitive *manmade features in bedrock* that deserve to be reclaimed.

Conclusions

The Vulcan WPAP application does not provide sufficient scientific evidence for the TCEQ to adequately determine if the development plan is protective of the Edwards Aquifer both during and after construction. Domestic water wells completed in the Trinity Aquifer near the site are at risk of nitrate pollution and depletion. The Vulcan Site's proximity to the Comal Springs poses a special concern for the long-term health effects on the aquatic endangered species living in spring water sourced by the Edwards Aquifer.

On April 16, 2024, Texas Lieutenant Governor Dan Patrick publicly expressed his serious environmental concerns about a proposed cement production plant in Grayson County (kxii.com, Sherman, TX). This plant has an associated quarry and covers 600 acres. In a letter sent to the TCEQ's Chairman, he asked for an immediate pause in the permitting processes for all permanent cement production plants until the legislature can consider what is best for Texas communities. I strongly believe that a pause in permitting should also apply to the proposed Vulcan Comal Quarry. The Vulcan project has a projected life of over 80 years and will leave permanent pits over a highly-sensitive portion of the EARZ - the source of drinking water for over 2.5 million Texans.

Public Meeting Request

A Public Meeting is requested so that all water-related concerns involved with the proposed quarry can be openly and more-fully discussed with the TCEQ-EAPP's and Vulcan's experts. I believe there is sufficient scientific evidence showing that the Vulcan Site is located in a extremely sensitive portion of the EARZ. The TCEQ's BMPs giving guidance and suggestions are not adequate to protect the special environmental conditions present there.

Respectfully,

Jack Olivier
1509 Cabernet
New Braunfels, Texas 78132

REFERENCES

Alberts, N., 2016, Mining News Digest, August issue). Exposure to nitrate can be particularly threatening to aquatic organisms (Isaza, D.F., Cramp, R.L., and Franklin, C.E., 2020, Environmental Pollution, Vol. 26).

Clark, A. K., Golab, J.A., and Morris, R.R., 2016, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers within Northern Bexar and Comal Counties, Texas: U.S. Geological Survey Scientific Investigation Map 3366, scale 1:24,000, and accompanying Pamphlet, 20 p.

Dames & Moore, 2000, Hydrogeology of Dyno Nobel ANFO Manufacturing Facility, Comal County, Texas.

Frost GeoSciences, 2021, Bigbee Tract Geologic Assessment, WPAP, April 21, 2021.

Gary, M.O., Veni, G., Shade, B., and Gary, R.H., 2011, Spatial and temporal recharge variability related to ground-water interconnection of the Edwards and Trinity aquifers, Camp Bullis, Bexar and Comal Counties, Texas, in Interconnection of the Trinity (Glen Rose) and Edwards aquifers along the Balcones fault zone and related topics— Karst Conservation Initiative meeting, Austin, Tex., February 17, 2011, [Proceedings]: Austin, Tex., Karst Conservation Initiative, 46 p.

Isaza, D.F., Cramp, R.L., and Franklin, C.E., 2020, Environmental Pollution, Vol. 26).

Johnson, S., Schindel, G., and Veni, George, 2010, Tracing Groundwater Flowpaths in the Edwards Aquifer Recharge Zone, Panther Springs Creek Basin, Northern Bexar County, Texas: Edwards Aquifer Authority Report No. 10-01, 112 p.

Kastning, Ernst, 2015, Geomorphology and Hydrogeology of the Edwards Plateau Karst, Central Texas: Texas Speleological Survey (reformatted version of the complete PhD dissertation done at the University of Texas at Austin in 1983), 274 p.

Pape-Dawson Engineers, 2024, Water Pollution Abatement Plan for proposed Vulcan Comal Quarry, February 2024.

Schindel, Geary, 2019, Groundwater Resources in Comal County, Texas, presented at the May meeting of the Comal County Conservation Alliance (CCCA).

Schindel, Geary, 2021, Geological Evaluation of the Froboese Ranch Comal County, Texas Prepared by: Edwards Aquifer Authority Geary M. Schindel, P.G. for the City of San Antonio, October 19, 2021).

Smith, Brian A., 2024, Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas.

TCEQ Publication RG-500, 2010, Best Management Practices for Quarry Operations, 26 p.

TCEQ Report F-0585, 2004, Instructions to geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones, 34 p.

Texas Speleological Survey, 2016, Texas County Karst Totals, TSS website, list updated on 11/22/2016.

Veni, George, 2005, Lithology as a Predictive Tool of Conduit Morphology and Hydrology in Environmental Impact Assessments: Sinkholes and the Engineering and Environmental Impacts of Karst, Geotechnical Special Publication No. 144, American Society of Civil Engineers, pp. 46-56.

Wierman, Douglas A., 2023, Technical Comments – TCEQ Water Pollution Abatement Plan (WPAP) for Needmore Quarry Ranch, Hays, Co. TX, Far South Mining LLC.

TABLES

Table 1 – Will be provided to the TCEQ upon request.

Table 2

Wells on Vulcan Site (former White Ranch)

TWDB Tracking No.	Well Name	Total Depth (ft) Driller/Logger	Date Drilled	Location (Degrees/Minutes/Seconds) Latitude	Longitude	Status
520687	White Ranch #1	980/962	Oct-07	29*, 44', 26.2"	98*, 19', 31.1"	Plugged & Abandoned
520688	White Ranch #2	1000/970	Nov-07	29*, 44', 56.2"	98*, 19', 30.5 '	Plugged & Abandoned
520689	White Ranch #3	1020/976	Nov-07	29*, 45', 5.4"	98*, 19', 13.6"	Plugged & Abandoned
520690	White Ranch #4	1060/1054	Dec-07	29*, 45', 6.3"	98*, 19', 31.1"	Plugged & Abandoned
520691	White Ranch #5	940/931	Oct-07	29*, 44', 56.6"	98*, 18', 42.9"	Plugged & Abandoned
520692	White Ranch #6	980/968	Nov-07	29*, 44', 29.2"	98*, 19', 18.2"	Plugged & Abandoned
439830	Blue Pine #1 aka VULCAN WELL	983/NA	Jan-17	29*, 46', 12.8"	98*, 18', 43.5"	Water Well-Uncompleted

Information Sources:
Texas Water Development Board (TWDB) website
Wells Logs provided upon request from Edwards Aquifer Authority (EAA)

PLATES

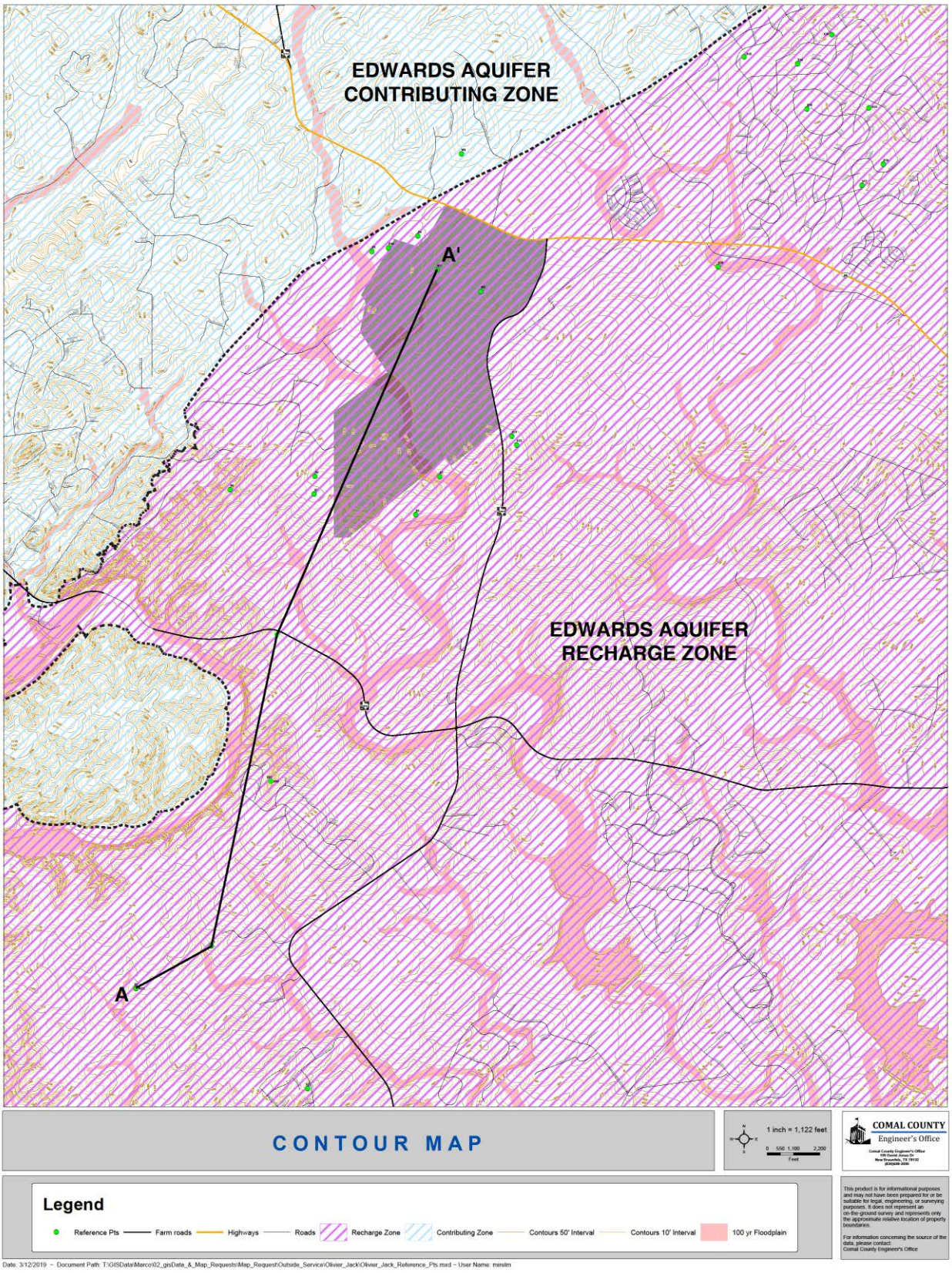


Plate 1. Location of the proposed Vulcan quarry in the Edwards Aquifer Recharge Zone.

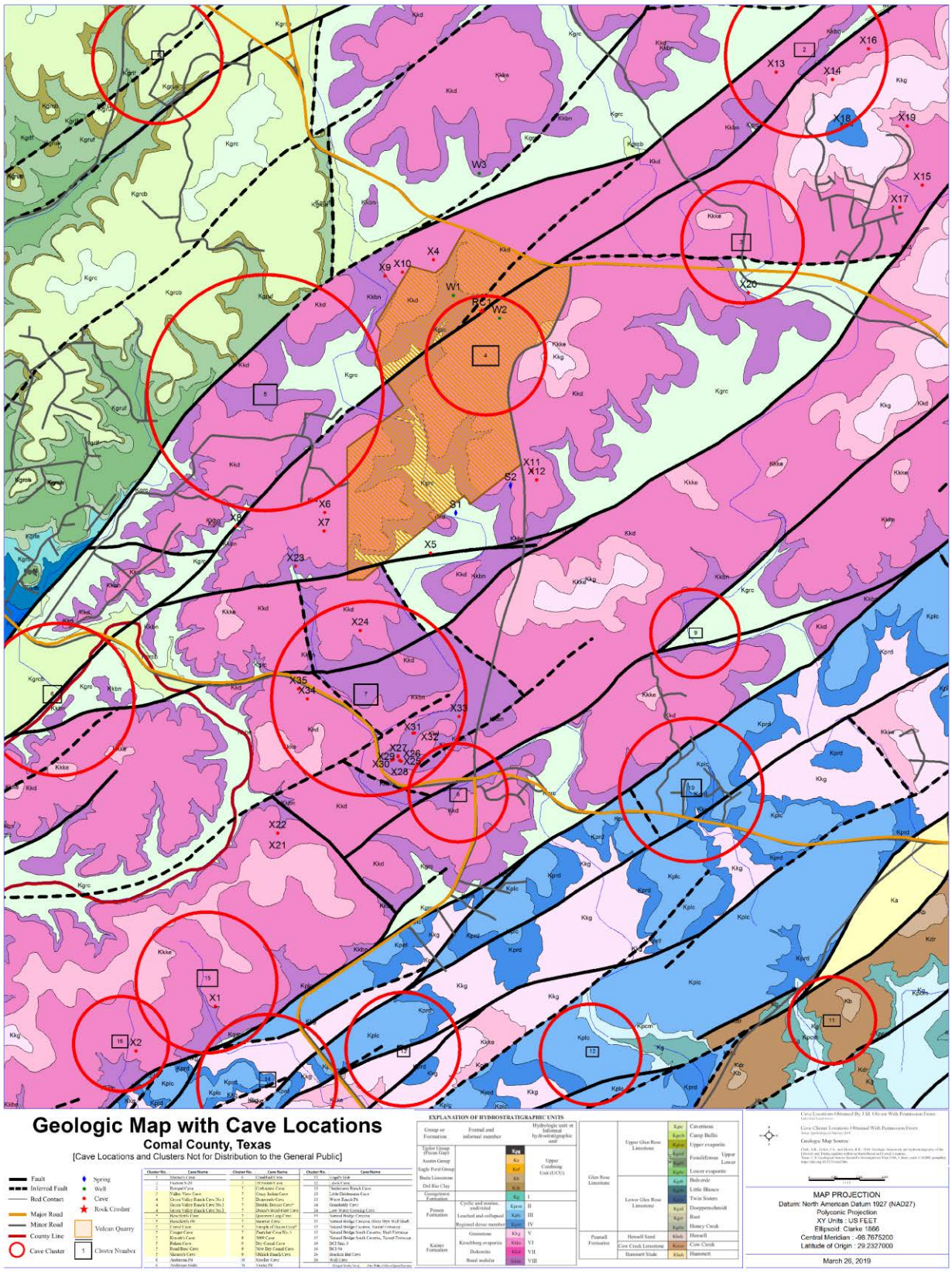


Plate 2. Geologic map of Study Area.

ATTACHMENT F
TO MOTION TO OVERTURN

GRAVES DOUGHERTY HEARON & MOODY

Bobby M. Salehi
512.480.5638
512.480.5838 (fax)
bsalehi@gdhm.com

MAILING ADDRESS:
P.O. Box 98
Austin, TX 78767-9998

April 22, 2024

Filed Electronically

Edwards Aquifer Protection Program
eapp@tceq.texas.gov
Ms. Lillian Butler
TCEQ Region 13, San Antonio Office
14250 Judson Rd
San Antonio TX 78233-4480

RE: *Public Comments on Vulcan Comal Quarry Water Pollution Abatement Plan (the "Plan")*

Dear Ms. Butler:

This public comment on the above-referenced water pollution abatement plan is made on behalf of the Texas Water Company ("Texas Water"). Texas Water requests the Texas Commission on Environmental Quality ("TCEQ") to hold a public meeting and hearing on the Plan by Vulcan.

The Plan seeks to authorize Vulcan to clear, strip, drill, and blast into the sensitive Edwards Aquifer recharge zone in Comal County, Texas. The location of this plant's operations is in close proximity to groundwater wells owned by Texas Water and poses a potential threat to the healthy operation of those wells. As further explained below, Vulcan's proposed operations may have an adverse impact on groundwater resources relied on by Texas Water and other residents as a water supply.

Texas Water is a Texas retail public utility and one of the largest investor-owned water and wastewater utilities in the United States, serving over 84,000 people. Texas Water provides an essential service to citizens throughout Texas, and the disruption of its operations is a severe risk to thousands of citizens in the Texas Hill Country where Vulcan has sited its plant.

As a state-defined major aquifer, the Edwards Aquifer is an important natural resource to our state, and particularly to Texas Water. The recharge zone allows large quantities of water to flow into the aquifer which keeps the aquifer healthy and well stocked. According to the Texas Water Development Board, "Groundwater in the recharge zone is normally under

unconfined, water-table conditions and is most susceptible to contamination."[1] Allowing the blasting of the ground in the Edwards aquifer recharge zone poses a significant risk to groundwater, the aquifer, and ultimately public health. Not surprisingly in this area of significant growth, the recharge zone yields large volumes of groundwater to wells in the area of the proposed Vulcan project. TCEQ has not vetted these significant implications of this Plan.

Given the sensitive hydrogeologic site, and proximity to existing groundwater wells, the TCEQ has not demonstrated that groundwater will be protected.

The quarry is in a unique and highly sensitive geologic segment of the aquifer. The Edwards Aquifer recharge contains faulted and fractured Edwards limestone outcrops that allows for large quantities of water to flow into the Aquifer. Texas Water has multiple registered wells in the nearby area. Outcrops are highly permeable and let in more than just water. It is inevitable that whatever Vulcan blasts into the earth in this segment will make its way into the aquifer recharge zone. The risk to Texas Water's wells is thus exacerbated by the quarry's operation.

In addition, the aquifer and the surface water feeding it serves as a primary water supply for many in the region. The State of Texas and TCEQ acknowledge the significance and importance of the Edwards Aquifer and specifically the recharge zone to water supply for much of South and Central Texas. The sensitive environment in this unique hydrogeologic setting with exposed outcrops, the regional dependence on groundwater for drinking water supply, and the known interaction between surface water and groundwater are extraordinary circumstances that will be affected by Vulcan's Plan. TCEQ may not approve this Plan knowing that groundwater will not be protected. Because the Plan fails to address the sensitivity of the operations to outcrops and nearby wells, arguably, the Plan is incomplete and must be denied.

The TCEQ has not demonstrated that groundwater will be protected.

No analysis has been completed to demonstrate that the quarry operations will not percolate into the water table beneath and will be protective of groundwater. Given the sensitive hydrogeologic connection discussed above, percolation poses significant risks to the aquifers. The TCEQ must establish effluent limits that are protective of groundwater.

Additional monitoring is necessary to protect groundwater.

Additional monitoring of the Vulcan Plan impacts to the Edwards Aquifer Recharge Zone would improve this Plan significantly. The Plan does not require data on the impacts to groundwater quality or impacts to specific wells. Texas Water requests that the Plan require a groundwater quality monitoring station at the operation site, and off-site along the FM 3009

[1] https://www.twdb.texas.gov/groundwater/aquifer/index.asp (last visited Apr. 21, 2024).

and Ramble Ridge intersection to track how the operations interact with groundwater in those areas and include an opportunity to increase pollution abatement controls as needed. Absent this additional monitoring, the Plan provides no means to measure whether the effluent is protective of groundwater quality.

Areas of Concern to Texas Water.

In light of these concerns, Texas Water raises the following relevant issues within TCEQ's jurisdiction:

1. Whether the plan is protective of groundwater;
2. Whether the plan is protective of water quality and the existing uses of the receiving waters in accordance with applicable Texas Surface Water Quality Standards;
3. Whether the plan is substantially complete and contains accurate information as it pertains to impacts to groundwater;
4. Whether additional monitoring is required to protect groundwater quality;
5. Whether drinking water supply will be protected under the plan;
6. Whether the plan contains adequate operator requirements to ensure proper maintenance and operation of the facility; and

Texas Water has a significant interest in ensuring that the impacts from Vulcan's quarry operations do not harm groundwater quality or the area's drinking water supply. This project as currently presented gives no assurances that either will be protected. Thank you for your attention to this matter. Please do not hesitate to call me if you have any questions.

Yours very truly,

/s/Bobby M. Salehi

Bobby M. Salehi

BMS/mah

ATTACHMENT G

TO MOTION TO OVERTURN

TCEQ DOCKET NO. 2024-115-EAQ
PROGRAM ID NO. 13001906

IN THE MATTER OF THE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN BY VULCAN CONSTRUCTION MATERIALS, LLC	**§** **§** **§** **§** **§** **§** **§**	**BEFORE THE TEXAS** **COMMISSION ON** **ENVIRONMENTAL QUALITY**

DECLARATION OF DON EVERINGHAM

1. My name is Don Everingham, my date of birth is November 10, 1947, and my address is 601 Pfeiffer Road Bulverde, Texas 78163.

2. I am over eighteen (18) years of age and of sound mind and am otherwise competent and capable of making this declaration. The facts testified to in this declaration are within my personal knowledge and are true and correct.

3. I am a retired engineer.

4. I have reviewed the Water Pollution Abatement Plan (WPAP) submitted by Vulcan Construction Materials, LLC ("Vulcan") on March 21, 2024 for the Vulcan Comal Quarry.

5. An estimate based on the amount of material to be quarried at Vulcan shows that the proposed quarry would use approximately 383 acre-ft (125,000,000 gallons) of groundwater per year (assuming one 800-ton-per-hour portable crusher consumes 40,000 gallons of water/hour).

6. I prepared a report entitled *Water required to remove Fine & Ultrafine Material from Aggregate production* regarding Vulcan's WPAP. A true and correct copy of this report is attached as **Exhibit 1** to this declaration.

7. Based on this analysis, it is my professional opinion that the Executive Director's decision to approve Vulcan's WPAP should be overturned.

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Comal County, State of Texas, on the 31 day of July, 2024.

Don Everingham

Don Everingham, Declarant

EXHIBIT 1

to Declaration of Don Everingham

Water required to remove Fine & Ultrafine Material from Aggregate production

The water usage for crushers and screening plants has a required amount of water for general operations to remove fine and Ultrafine tailings. Flocculants can be added to the water to increase the removal of the fine unusable material that maybe in mineral and organic forms (50 gallons/ton),is generally considered the starting point for Aggregate Production in Karst/limestone formations. (Karst formations may have large amounts of soil such as clay layers and organic material from surface drainage into the lower formation layers that mining may occur). The amount can vary depending on moisture in the material to be processed after blasting/stockpiled materials, these materials are transported to the crusher and screening plants as broken rock of various dimensions and composition.

Once the operation is up and running the quantity of water used can vary depending on the size and type of crusher,(s), and screening decks used. (Most plants are custom built using predesigned plant components usually rated in tons per hour (TPH). Impact crushers commonly used in Texas Aggregate production can produce up to 20-30 percent more fines than using a cone crusher, thus requiring a high volume of water.

Water based on quantity or volume used,(required for removal of fine and Ultrafine particles) will have a carrying or removal capacity which can be increased by using flocculants and increasing or decreasing gallons per minute, (GPM), to arrive at the optimum flow rate for washing the aggregate product. This slurry water is then sent to a fine tailings pond for settling time to allow the fine materials to settle out (separating from the water and mineral waste. Flocculants will remain, for the most part in the water and recycled usually with makeup water added from clean surface or well water sources, some process water will forever be attached to the fines and ultra fine particles, and this is why fine or material from the holding pond must be stored within vaults/dams onsite and can never be used as building materials.

If the mine uses a clarifier, recycled water maybe recover up to 80% of the total required water needed for operations, this most likely would be on the high side although some newer technologies using press separation claim up to 90%(???). This reuse figure heavily depends on the size of the tailing ponds and the amount of time allowed for separation of fine tailings.
In addition, there is the loss of water absorbed by the aggregate material when it is stockpiled and this depends on the water holding capacity of the processed material,(s). There is also a loss of water from the evaporation from the tailings pond, in Texas this can be as high as 20%, spillage from the clarifier and additional System leaks like plumbing etc. can also require more make up water.

Bottomline, 50 Gallons per ton is a very valid number without detailed process tests and sample data monitoring. This figure does not include water for dust control in or out of the operations area, the additional water requirement also depends on seasonal temperatures, wind speed, open versus cover conveyor systems, chemical additive, and a few other considerations like equipment speed on quarry roads and track out from commercial trucking to name a few items that can be easily overlooked.

ATTACHMENT H
TO MOTION TO OVERTURN

From: dlttexas@gvtc.com
Sent: Wednesday, April 17, 2024 1:03 PM
To: EAPP
Cc: Don Everingham; bgr@gvtc.com
Subject: Vulcan WPAP response and request for Public meeting

Don Everingham retired engineer, resident,
Beck Ranch Central Comal County (Texas 31 years)
I appreciate the opportunity, to address my concerns with the Vulcan Materials submittal of their Water Pollution Abatement Plan (WPAP), for the proposed facility and quarry in central Comal County, Texas. The proposed quarry location is critical to fully understanding what requirements need to be in place, including bonding requirements to ensure that the Edwards and Trinity Aquifers are not contaminated or harmed in any way during the life and operation of the Vulcan Quarry project, (potentially 90 plus years). The potential scale for physical, chemical, and biological contamination affecting not only the local surrounding community, but also includes the Dry Comal Creek, Comal River, and the populations downstream. This could negatively impact hundreds of thousands of people that would need or require new water sources or expensive water treatment plants, if not both. Recent research involving several water agencies, Texas and out of state agencies, Universities, and independent research organizations, have all identified gaps and deviancies in understanding the growing concern over depleted aquifers, and identifying the requirement to conserve all water source as well as controlling all forms of pollution. (***Just announced by EPA***) The EPA set its first-ever drinking water limits for five types of PFAS chemicals, and nearly 50 of Texas public water systems have reported exceeding the new limits for at least one. **Insert**: (The new standards will require water utilities to meet them within five years. The EPA estimates that the new limits, which are *legally enforceable*, will reduce exposure for 100 million people nationwide and help prevent thousands of deaths and illnesses, including from cancer. One study found the chemicals in the blood of nearly 97% of all Americans. Exposure to PFAS has been linked to cancer, causing low birth rate and birth defects, damage to the liver and immune system, and other serious health problems. In 2022, the EPA issued health advisories that said the chemicals were much more hazardous to human health than scientists originally thought.)

The EPA is proposing that 'forever chemicals' be considered *hazardous substances*

The proposed rule will be open for public comment once it is uploaded to the Federal Register, under docket number EPA-HQ-OLEM-2023-0278 **FEBRUARY 2, 2024**

Texas is not Immune from this contamination or other toxic/hazardous chemicals, such as Chromium IV, a very toxic and dangerous chemical found in Elm Creek above the Vulcan quarry in North Bexar County, the source was never confirmed but is likely associated with flyash or bottom ash used in cement manufacturing or concrete mixtures. Forever and Toxic or Hazardous chemicals are not easily removed from drinking water sources with out very expensive filtration facilities.

Because of this potentially huge and complex water/environmental problem, I will lobby for and strongly suggest that performance surety bonds are required for protecting the needs of citizens as well as incorporating Best Practice to be a requirement of this WPAP. This will ensure that Vulcan Materials is prepared to finance and provide for any environmental damages. This is not new to Vulcan as they have provided Bonding in other localities/States for the protection of water sources using Best Practice and meeting

State requirements. The primary reason here is that any **removal of protective cover** over an aquifer, particularly when the aquifer is in Karst material requires extraordinary protective measures.
The satellite pictures below are a strong indicator of such a possibility occurring.

The three satellite pictures of the Vulcan quarry located at North 1604 San Antonio, are a sample of many dating from January 2015 thru October 2016. The quarry is dry in 01/2015 filling by 12/2015 and saturated by 09/2016. The EAA requires a minimum of 25 feet from the quarry floor to the top of the Edwards Aquifer, Since non of the photos indicate flooding or high rain falls events during this period it prompts the question why is the quarry filling with clear water? Not what one would expect from flooding or stream/heavy rain runoff? It also does not answer the question of elevation or other events that can be contributed to aquifer events. (see more in WPAP text)

What these pictures represent is a clear breach that is not unusual for Karst formation and or the comingling of adjoining aquifers, both apply to the Edwards and Trinity Aquifers. This points out why well monitoring is essential research when elevations levels are determined for mining operations, they remove protective cover and indicates how formations have different elevations throughout the aquifer itself. Research in this area is not complete currently, more studies will be required using newer technology as well as increased well monitoring and testing. In addition, the Vulcan quarry not only is situated over or near the Edwards Aquifer but also the recharge and contributing zones which can greatly increase the opportunity for contamination from chemically and biological source. For example, the Dry Comal creek already has elevated levels for E.coli Bacteria that could be easily introduced into an aquifer system in extreme flooding. Aggregate mining would also introduce the possibility of the chemicals and other hazardous materials being introduced as well though sensitive caves and features.

The Texas Commission for Environmental Quality, (TCEQ), has not demonstrated in the recent history that the agency can regulate or enforce anything related to harmful events affecting the public. Recent opportunities under the Sunset Review of the agency, accentually gave the agency a free pass on regulating anything. *Major concern for myself and many others*.
My life experience as an engineer was simple. If there was a breakdown of procedure or a standard, the review period was not lengthened, as it was for the recent Sunset legislation review of TCEQ, it was shortened even down to hours around the clock until the problem was fixed. When sampling for spills that were potentially a contamination issue. Samples were taken live while the event was happening not days later which has also been an issue with TCEQ's performance as well as some current operations along the Edwards escarpment.

In the case for the Vulcan WPAP potentially contaminating aquifers as well as other private and public property, the citizens of Comal County deserve better, I would Challenge TCEQ to make regulation and enforcement the number one priority. Or remove the treat entirely by disallowing any additional quarry development over them Edwards Aquifer.

The WPAP document and plans are fairly well written, including reclamation starting from day one as part of a mining/reclamation plan requiring preservation of soil and using native sod and other plants for stabilization requirements. When I look at Quarry Row with aggregate operations going back to the early 1900's and including new quarries added in the last 8-10 years I see ZERO reclamation, what I read is that it is cheaper for these operations to purchase conservation land in other counties rather than reacclimate their own properties. What I see is topsoil dozed under waste rock and fill materials making it impossible to reclaim. This is nothing short of killing an ecosystem that takes nature thousands of years to create. While this is partly a county issue, it is also a TCEQ regulatory and enforcement issue as a STATE of TEXAS COMMISSION, responsible for protecting Texas Citizens. If this WPAP is to be approved some serious discussions and planning are yet to be achieved including how sensitive features such as sink holes and caves are evaluated, 12 caves were dozed in on the White ranch to protect cattle. Other sensitive caves and features are also listed in the WPAP, but very few considering the large acreage. I have a few acres at the edge of the contributing and recharge zone, and I have more sink holes proportionately than this 1500 acre ranch? I have six stock ponds,(small), but they can contribute 2.3 Acre feet of water to presumably the Edwards Aquafer in a normal year of precipitation,(zero in years like 2011 &2023). One pond after the rain event ends, drains in 20 minutes or less. The others vary up to 5-6 days. I believe there is more features on 1500 acres than on my small acreage proportionately, which means the potential for contamination is far greater than is indicated in the present Vulcan Quarry WPAP. Perhaps another look is required including reclassifying the values placed on caves and sensitive features. It is also known that caves recently documented may extend under the property of concern which may also add features that need to be reevaluated.

One last concern is the aggregate particles size generated from quarry activities such as blasting, handling, and crushing etc. Particles are not just an air borne problem but are also a problem for drainage, in that karst particle are known to plug small features that allow for the infiltration of water into contributing/recharge zones of Karst Aquifers. This can provide opportunity for pollutant to collect and be carried downstream entering the aquifer contributing and recharge zone some distance from the source operation.

Thank You for the opportunity to share my concerns and I look forward to the Public Meeting.
Don Everingham Concerned Citizen April, 15,2024

Sent to TCEQ EAPP@tceq.texas.gov

EA Permit#: 13001906.

ATTACHMENT I
TO MOTION TO OVERTURN

TCEQ DOCKET NO. 2024-115-EAQ
PROGRAM ID NO. 13001906

IN THE MATTER OF THE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN BY VULCAN CONSTRUCTION MATERIALS, LLC	§ § § § § § §	**BEFORE THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

AFFIDAVIT OF DR. BRIAN A. SMITH

STATE OF TEXAS §
§
COUNTY OF TRAVIS §

BEFORE ME, the undersigned notary public, on this day personally appeared Dr. Brian A. Smith, a person whose identity is known to me. After I administered an oath to him and upon his oath, he stated:

1. My name is Dr. Brian A. Smith, my date of birth is August 23, 1955, and my address is 12301 Edwards Hollow Run, Austin, Texas, 78739.

2. I am over eighteen (18) years of age and of sound mind and am otherwise competent and capable of making this affidavit. The facts testified to in this affidavit are within my personal knowledge and are true and correct.

3. I am a professional geoscientist licensed in the State of Texas. I am the Principal Hydrogeologist of Caves and Karst, LLC, a consulting firm based in Austin, Texas. We specialize in providing litigation support and expert witness testimony in matters related to groundwater availability, aquifer storage and recovery, karst aquifers, and groundwater policy. Previously, I was the Principal Hydrogeologist for the Barton Springs/Edwards Aquifer Conservation District from 2001-2023. My professional resume is attached as **Exhibit 1** to this affidavit.

4. I earned a bachelor's degree in Geology from Rice University in 1979. I went on to earn my PhD in Geology from the University of Texas at Austin in 1986.

5. I have reviewed the Water Pollution Abatement Plan (WPAP) submitted by Vulcan Construction Materials, LLC ("Vulcan") on March 21, 2024 for the Vulcan Comal Quarry.

6. I prepared a report entitled *Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas* regarding Vulcan's WPAP. A true and correct copy of this report is attached as **Exhibit 2** to this affidavit. This report was also attached to a comment letter submitted to the TCEQ by Preserve Our Hill Country Environment on April 22, 2024—the deadline to submit comments to the TCEQ on Vulcan's WPAP.

Further the Affiant sayeth not.

Dr. Brian A. Smith, Affiant

SWORN TO AND SUBSCRIBED before me this 29th day of July, 2024.

Notary Public, State of Texas

3/19/25
My Commission Expires:

Aaron Lay
Notary Public's Printed Name

AARON LAY
MY COMMISSION EXPIRES
MARCH 19, 2025
NOTARY ID: 129352136

EXHIBIT 1

to Affidavit of Brian A. Smith

RESUME

BRIAN A. SMITH
Principal Hydrogeologist
Caves and Karst, LLC

Austin, Texas
512-731-7002 mobile
drbasmith@cavesandkarst.org

EDUCATION: Ph.D., Geology, The University of Texas, Austin, 1986
B.A., Geology, Rice University, Houston, Texas, 1979

FIELDS OF SPECIALIZATION

- Litigation support, preparation of expert reports, and giving testimony
- Water-supply studies including karst aquifers and Aquifer Storage and Recovery
- Design and installation of conventional and multiport monitor wells
- Groundwater management
- Evaluation of groundwater flow in karst aquifers
- Groundwater modeling
- Contaminant hydrogeology- Superfund, RCRA, DOE, DOD, etc.

EXPERIENCE SUMMARY

1996 to present: Independent Consulting Hydrogeologist (Caves and Karst, LLC)
February 2001 – July 2023: Principal Hydrogeologist, Aquifer Science Team Leader, Barton Springs/Edwards Aquifer Conservation District, 1124 Regal Row, Austin, TX, 78748
Jun 1998 –Jan 2001: Senior Project Manager with Forensic Environmental Services, Exton, PA
September 1997 - May 1998: Senior Hydrogeologist/Project Manager with Kimball & Assoc.
May 1996 - August 1997: Independent Environmental Consultant
1991 - May 1996: Senior Scientist/Project Manager with Geraghty & Miller in Puerto Rico and Albuquerque, NM
1987 - 1991: Hydrogeologist with Bechtel Environmental in Oak Ridge, TN and Puerto Rico
1986 - 1987: Geologist with Terra Tek Geoscience Services in Salt Lake City, Utah
1980 - 1981: Geologist with U. S. Geological Survey in Washington, D. C.

EXPERIENCE TIMEFRAME

- 30 years of litigation support
- 22 years at Barton Springs/Edwards Aquifer Conservation District
- 33 years of managing projects with annual billings of up to $3,000,000
- 33 years of managing staff with up to 20 people at a time
- 40+ years employed as a professional geologist

POFESSIONAL REGISTRATIONS

- Texas, Professional Geologist #4955
- Tennessee, Registered Professional Geologist, TN0264

KEY TASKS

Independent Consulting Hydrogeologist- 1996 to present

I am working with various clients on hydrogeology projects that involve contaminated groundwater or groundwater management issues. I am currently serving as an expert witness for the U.S. Dept. of Justice regarding a hazardous waste site in Puerto Rico. I am advising a client about the collapse of remediated landfill waste situated in a sinkhole at a Superfund site in Puerto Rico. I am providing reviews of semiannual monitoring reports and revising workplans for a hazardous waste site north of San Antonio. I am also serving as a pro bono advisor to hydrogeology projects in Puerto Rico and Texas.

Barton Springs/Edwards Aquifer Conservation District- February 2001 to July 2023

Supervision of aquifer research and investigations to support policy decisions by the District's Board of Directors.

- Assisted with development of Sustainable Yield policies of the Barton Springs segment of the Edwards and Trinity Aquifers:
    - Performed key numerical (GAM) modeling
    - Helped define the Sustainable Yield and subsequent Desired Future Conditions (DFCs)
- Development of Drought Trigger Methodology (primary aquifer management tool).
- Participated in the development of the Ruby Ranch and Buda ASR systems
- Directed study of saline Edwards Aquifer for ASR and desalination potential

Litigation and legislative support

- Needmore and Electro Purification permits
- Dripping Spring wastewater discharge
- City of Kyle contested case
- Belterra wastewater contested case

Acquired and managed numerous grants, partnerships and programs.

- Conducting numerical modeling of the Edwards and Trinity Aquifers to evaluate sustainable yield of the aquifers.
- Project Manager for a Regional Facility Planning Grant from the Texas Water Development Board to evaluate the potential for desalination and aquifer storage and recovery in the saline Edwards Aquifer.
- Project Manager for a Non-point Source Pollution 319(h) grant from EPA/TCEQ to enhance the quality and quantity of water recharging the Barton Springs segment of the Edwards Aquifer.
- Project Manager for a Non-point Source Pollution 319(h) grant from EPA/TCEQ to study water quality, water levels, and stream-flow loss within the Barton Springs segment of the Edwards Aquifer.
- Directed monitor well program and installation of multiport monitor wells.

Presentation of papers at numerous local, regional, national, and international technical meetings and conferences.

- More than 125 reports, papers, and abstracts.
- Public outreach and presentations to professional and stakeholder groups

- Testified before Texas congressional hearings and county courts.
- Successfully petitioned Texas Commission on Environmental Quality to change portions of the boundaries of the Edwards Aquifer and the recharge zone.

Assignments outside of District

- Served for six years on the City of Austin Environmental Commission
- Served on a water task force for Austin Water Utility

Select Projects

Currently (Dec 2023) serving as an expert for the U.S. Dept. of Justice for a landfill site in Puerto Rico at which waste had been deposited in a karst sinkhole.

Supported clients involved in litigation and remediation of petroleum storage and retail facilities in various states including New Jersey, New York, Kentucky, Alabama, and Texas.

Assisted in the preparation of an expert report for a site in Harris County, Texas where a water-supply well had been impacted by petroleum hydrocarbons from a nearby oil well.

Technical advisor to a client in Southern California involved in mediation at a large Superfund site with over 40 potentially responsible parties. Attended mediation sessions to present client's position and to discuss different allocation schemes with the mediators and other parties.

Task Manager for design and testing of groundwater extraction and reinjection system at a landfill in New Jersey. Conducted groundwater modeling of various groundwater extraction and reinjection scenarios, and design of a remediation system. Designed and tested an injection well at the site.

Project Manager for a feasibility study at a Superfund site in Northern New Jersey. Evaluated groundwater flow regime to determine why existing remediation system was not functioning as planned, and prepared feasibility study that evaluated six remedial alternatives for an aquifer contaminated with industrial solvents and arsenic.

Senior Hydrogeologist and Site Manager on a DOE project (Uranium Mill Tailings Remedial Action Project) to evaluate the impact of abandoned uranium mill tailings on groundwater and planning for remedial activities at a number of sites in the Rocky Mountain states.

Project Manager for a groundwater and soil investigation at a Superfund site in Puerto Rico located in a mature karst terrane on the north coast. Planned and supervised the installation of 23 multiport monitoring wells with over 200 monitoring points, soil-gas surveys, soil sampling, surface geophysical surveys and sampling of water-supply and monitoring wells. Obtained access agreements and well permits from private landowners and government agencies. Assisted groundwater modeling team. Supervised preparation of site risk assessment. Prepared draft and final remedial investigation reports.

Field Supervisor at a Superfund site in St. Thomas, U.S. Virgin Islands which was contaminated with petroleum hydrocarbons and VOCs. Coordinated site access, supervised drilling and installation of monitoring wells, performed pumping tests on water-supply and monitoring wells, conducted site assessments for a variety of industrial facilities.

EXHIBIT 2

to Affidavit of Brian A. Smith

Hydrogeology of the Edwards and Trinity Aquifers in the Vicinity of the Proposed Vulcan Quarry, Comal County, Texas

Brian A. Smith, Ph. D., Texas P.G. #4955

Introduction

Vulcan Construction Materials, LLC, has proposed a major limestone aggregate quarry in central Comal County (Pape-Dawson Engineers, 2024) southwest of the intersection of highways SH-46 and FM 3009 (Texas Commission on Environmental Quality (TCEQ) Edwards Aquifer Permit#: 13001906) (Figure 1). The site encompasses 1,515 acres of which about 956 acres will be quarried. The site is entirely within the Edwards Aquifer Recharge Zone (TCEQ Recharge Zone Map).

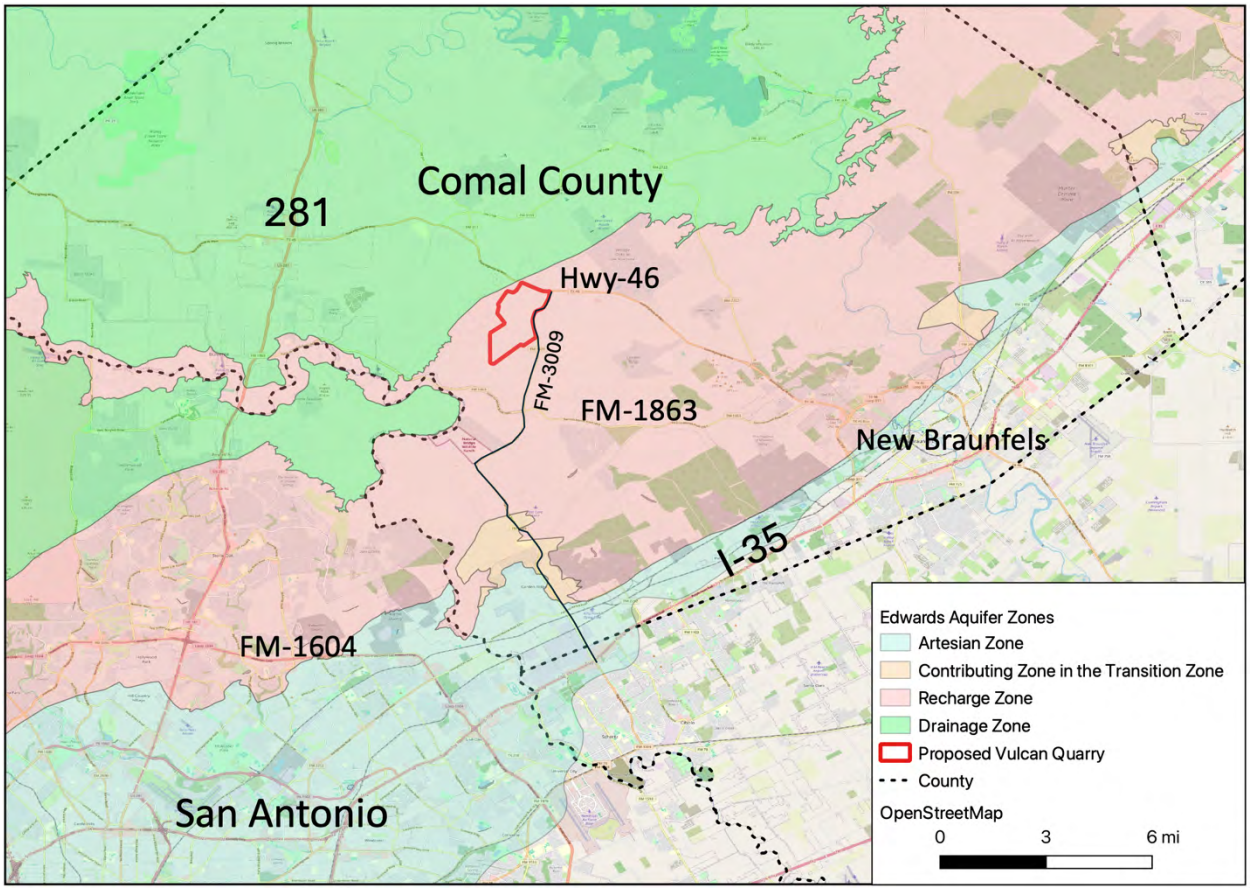


Figure 1. Location map of proposed quarry showing hydrogeologic zones (Source: J. Finneran).

Vulcan plans to extract rock from the Kainer (Edwards Group) and Upper Member of the Glen Rose (Trinity Group) Formations (Figure 2). These formations consist largely of limestone and are karstic in nature. A karst setting is characterized by voids in the rock such as caves, sinkholes, losing streams, and conduits through which water can infiltrate rapidly from the surface and flow through the rock and underlying aquifer. Eventually, much of this water will reach downgradient water-supply wells and springs. Thirty-seven sensitive

karst features have been documented on the proposed property (Pape-Dawson, 2024). Numerous sensitive features on surrounding properties have previously been documented. The presence of these features in high numbers indicates that water at the surface can easily enter these features, pass through a system of voids in the rock, then provide recharge to the water table of the underlying aquifer. Contaminants from the quarrying operation will be carried by this recharging water into the subsurface and the underlying aquifer to reach downgradient receptors such as water-supply wells and biota that live in and downstream of the springs.

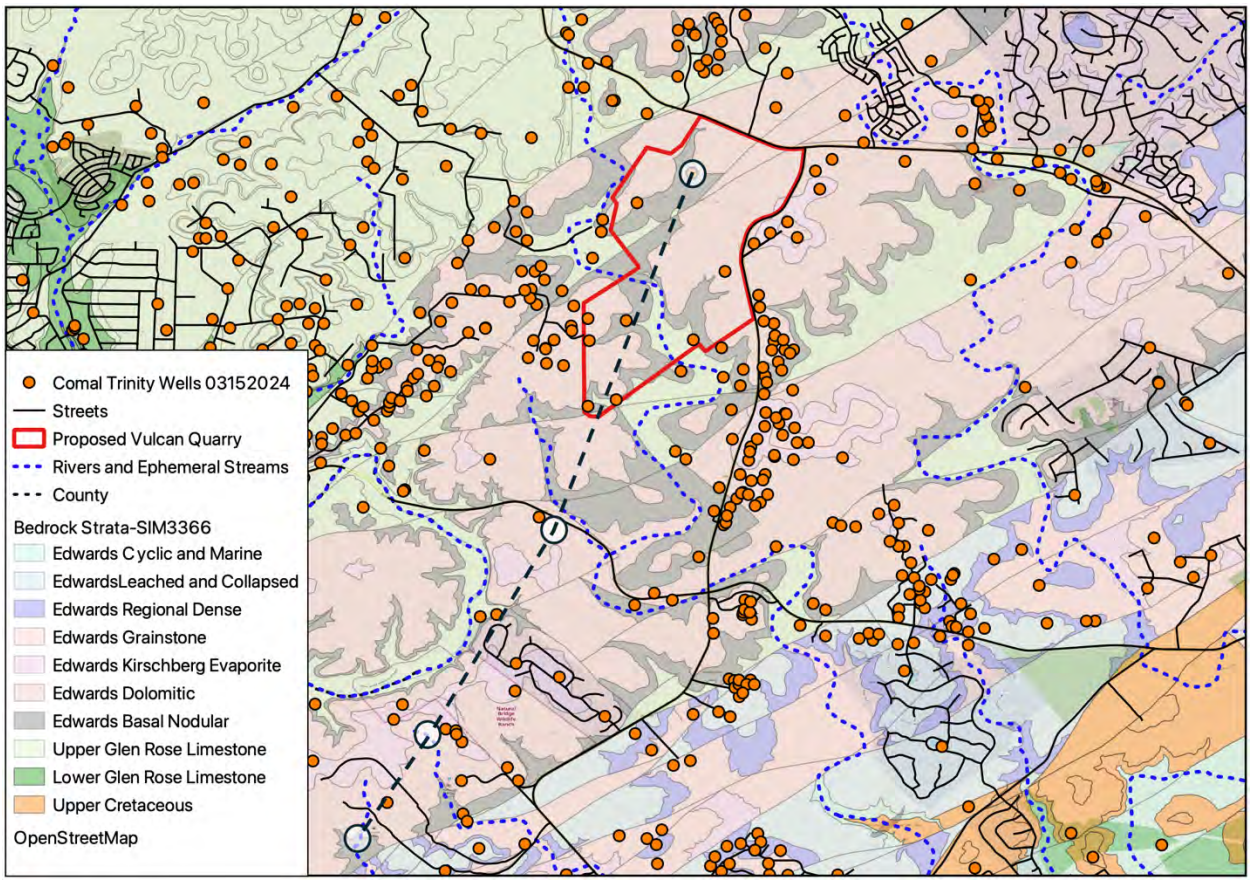


Figure 2. Geologic map of central Comal County showing water-supply wells (Source: J. Finneran).

Hydrogeology

The hydrogeology at the proposed quarry site is similar to the hydrogeology along strike to the northeast and southwest in Hays and Bexar counties, respectively. Significantly more studies have been conducted in these areas and the findings from these studies are applicable to the proposed quarry site. Some of these studies can be found in Clark et al. (2023a and 2023b), Hunt and Smith (2019), Gary et al. (2011), Johnson and Schindel (2006), Green et al. (2019), and Ferrill et al. (2003).

Figure 3 is a schematic cross section from Hays County showing the relationship between the various Edwards and Trinity hydrostratigraphic units (Hunt et al., 2017). Because of the similarity of the geology along strike, this figure provides a good representation of the hydrogeology beneath the proposed quarry site. Figure 4 is a hydrostratigraphic column for Hays and Travis Counties showing how the various geologic units relate to each other hydraulically. This column is similar to one by Clark et al. (2023) (Figure 5) which is representative of Comal and northern Bexar Counties. Even though some of the nomenclature is different many of the same hydraulic relationships are the same. One of the key concepts shown in these figures is that the lowermost Kainer/Basal Nodular-Walnut (lower Edwards) is hydraulically connected to the uppermost Upper Glen Rose (Upper Trinity) (Wong et al. 2014; Smith et al., 2018; Smith and Hunt, 2019). These studies have identified the potential for groundwater to move vertically between the Kainer and the uppermost Upper Glen Rose. Studies conducted by the Edwards Aquifer Authority have identified flow of groundwater laterally and across faults from the Upper Glen Rose into the Kainer then into the Person Formation (upper Edwards) (Figure 6) in northern Bexar County (Johnson et al., 2010).

Both hydrostratigraphic columns indicate that there are evaporite units in the lower section of the Upper Glen Rose. This is significant for groundwater flow because these units are generally very low in porosity and therefore limit vertical flow of groundwater. This generally sets a lower level for the overlying aquifer that consists of the Edwards and uppermost Upper Glen Rose. However, there is some potential for vertical flow along faults and fractures. Studies have generally shown that the amount of vertical flow between the Edwards/uppermost Upper Glen Rose and the Cow Creek (Middle Trinity) along these faults is minimal (Wong et al., 2014; Smith and Hunt, 2019). One exception to this is a Middle Trinity well (State Well Number 68-14-701) that demonstrates some hydraulic connectivity to Cibolo Creek (G. Veni, personal communication, April 5, 2024).

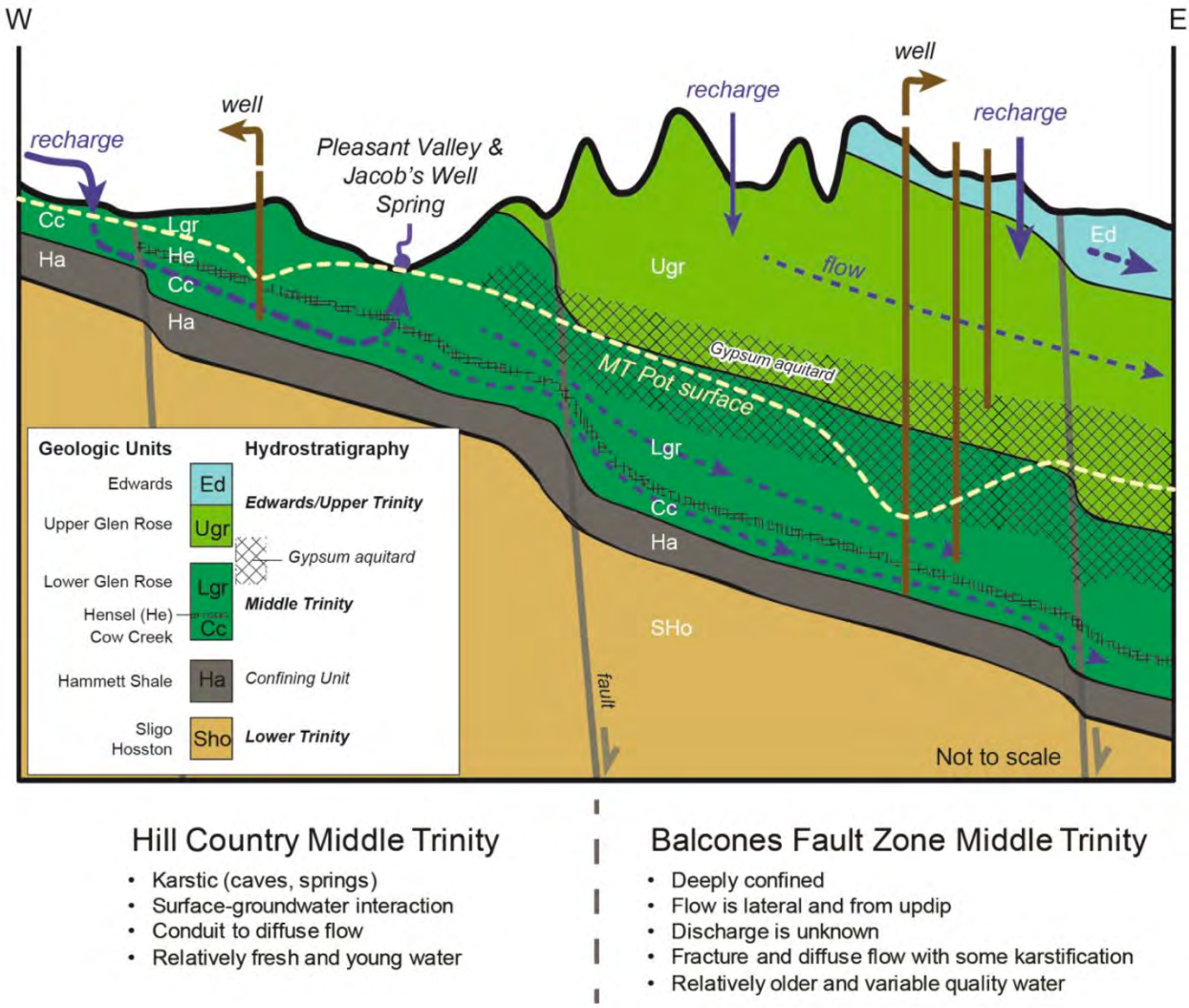


Figure 3. Schematic cross section of the Edwards and Trinity Aquifers. Cross section is based on field and well data from Hays County (Hunt et al., 2017). The portion of the cross section to the right, where the Edwards and Upper Glen Rose are exposed at the surface is representative of the proposed Vulcan quarry site.

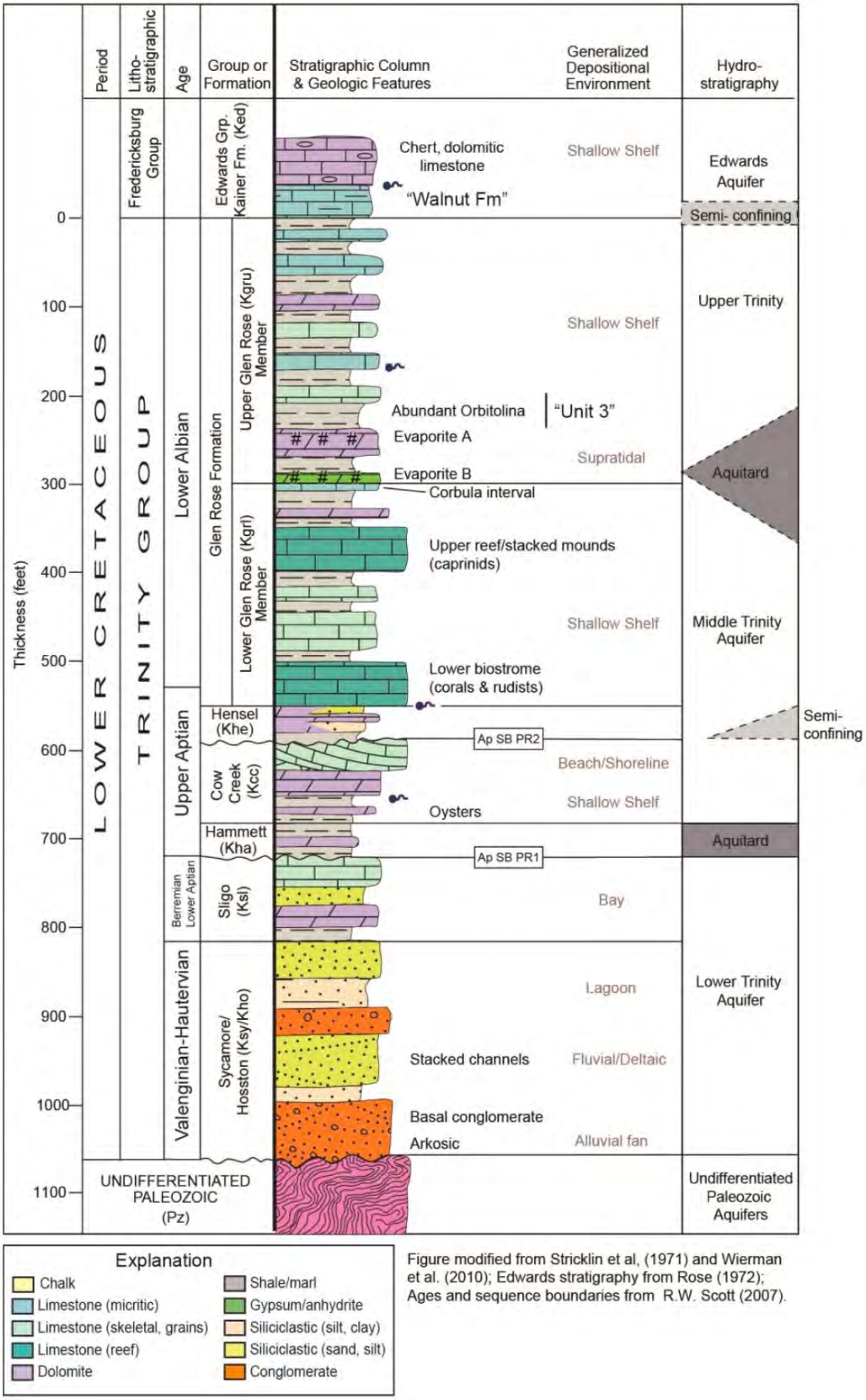


Figure 4. Stratigraphic and hydrostratigraphic column (Hunt et al., 2017).

Group or formation[1]	Member (formal and informal)		Hydrologic unit or informal hydrostratigraphic unit
Taylor Group (Pecan Gap Chalk)	**	Kpg	Upper confining unit (UCU)
Austin Group	**	Ka	
Eagle Ford Group	**	Kef	
Buda Limestone	**	Kb	
Del Rio Clay	**	Kdr	
Georgetown Formation	**	Kg	I
Person Formation	Cyclic and marine, undivided[2]	Kpcm	II
	Leached and collapsed[2]	Kplc	III
	Regional dense member[2]	Kprd	IV
Kainer Formation	Grainstone[2]	Kkg	V
	Kirschberg Evaporite[1]	Kkke	VI
	Dolomitic[2]	Kkd	VII
	Burrowed[2]	Kkb	Seco Pass***
	Basal nodular[2]	Kkbn	VIII
Glen Rose Limestone	Upper Glen Rose Limestone[2]	Kgrc	Cavernous
		Kgrcb	Camp
		Kgrue	Upper evaporite
		Kgruf (Kgrf)	Fossiliferous — Upper
		Kgrlf (Kgrf)	Fossiliferous — Lower
		Kgrle	Lower evaporite
	Lower Glen Rose Limestone[2]	Kgrb	Bulverde
		Kgrlb (Kgrhf)	Herff Falls *** — Litle Blanco
		Kgrts (Kgrhf)	Herff Falls *** — Twin Sisters
		Kgrd (Kgrhf)	Herff Falls *** — Doeppenschmidt
		Kgrr	Rust
		Kgrhc	Honey Creek
Pearsall Formation	Hensell Sand[1]	Kheh	Hensell
	Cow Creek Limestone[1]	Kccc	Cow Creek
	Hammett Shale[1]	Khah	Hammett

[1]Formal.
[2]Informal.
**No further subdivision.
***Informal hydrostratigraphic unit name that has not been published previously.

Figure 5. Explanation of hydrostratigraphic units (Clark, 2023).

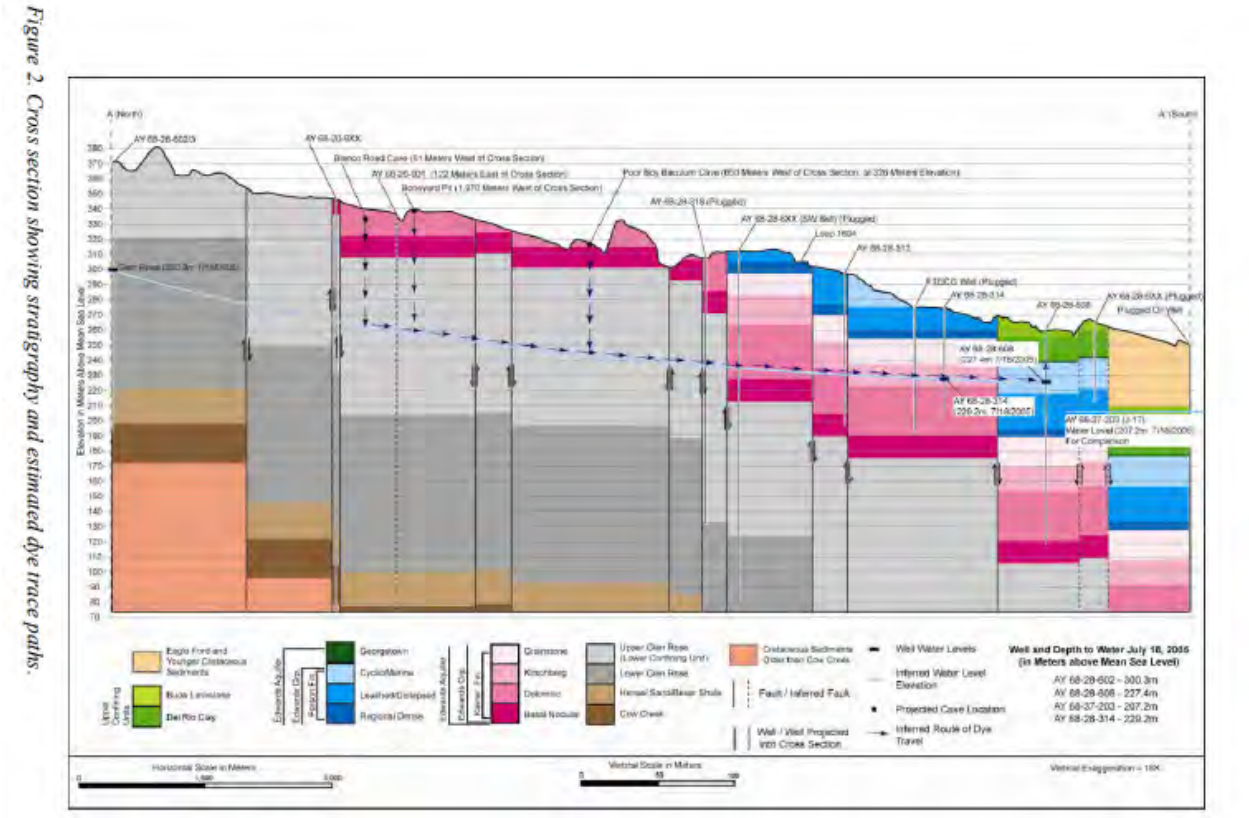


Figure 6. Flow of groundwater laterally and across faults from the Upper Glen Rose (Upper Trinity) into the Kainer (lower Edwards) then into the Person Formation (upper Edwards) in northern Bexar County (Johnson et al., 2010).

Surface Water Recharge

The Vulcan WPAP for the proposed quarry states that 37 sensitive (recharge) features were found during the field investigation for the Geologic Assessment (Pape-Dawson Engineers, 2024). Seven of the features, including three caves, require protection according to the TCEQ (2012) rating system. This number of sensitive features appears anomalously low when compared to the surrounding area.

Recharge features, unless very large, are likely to be covered or filled with soil and vegetation, yet water can easily infiltrate this cover and soil. The 158-acre Bigbee tract immediately north of the proposed quarry site and across Hwy 46, 38 sensitive features were found, and this site has 1/10 the acreage of the proposed quarry site (Frost GeoSciences, 2021). Another site immediately southwest of the proposed quarry site was investigated for inclusion in a conservation easement program based on its significant potential for recharge through numerous recharge features (G. Schindel, personal

communication, April 12, 2024; Schindel, 2021). As mentioned above, the hydrogeology of the proposed quarry site is similar to that along strike to the northeast and southwest.

Water recharging the subsurface will pass through a series of voids that have been formed by dissolution of the limestone, dolomite, and evaporite lithologies. These solution voids are more concentrated along faults and fractures, but interconnected voids can also develop in the absence of faults and fractures. The hydrostratigraphic column in Figure 5 shows that the uppermost hydrostratigraphic unit is called the Cavernous unit because of the large number of caves and smaller voids found in this region (Clark et al., 2023). Plans for the proposed quarrying operation indicate that the Cavernous unit will be significantly mined. A zone of high permeability was encountered in the Vulcan's Blue Pine Holdings #1 well between a depth of 63 and 143 ft. Circulation of drilling fluids and groundwater was lost into the formation over this interval (TWDB Submitted Drilling Reports). This zone of high permeability is correlative to the Cavernous zone and to major caves to the south such as Natural Bridge Caverns (Woodruff et al., 2017). It should be expected that as the quarry advances downward more voids (recharge features) will be encountered. With removal of surface material and the underlying bedrock, it is likely that the area will become more prone to infiltration of surface water and this infiltrating water will be heading directly toward the underlying aquifer. The proposed depth on the mining pits will put them in or near this permeable zone shown by the stratigraphic cross-section below (Figure 7) (J. M. Olivier, personal communication, April 4, 2024).

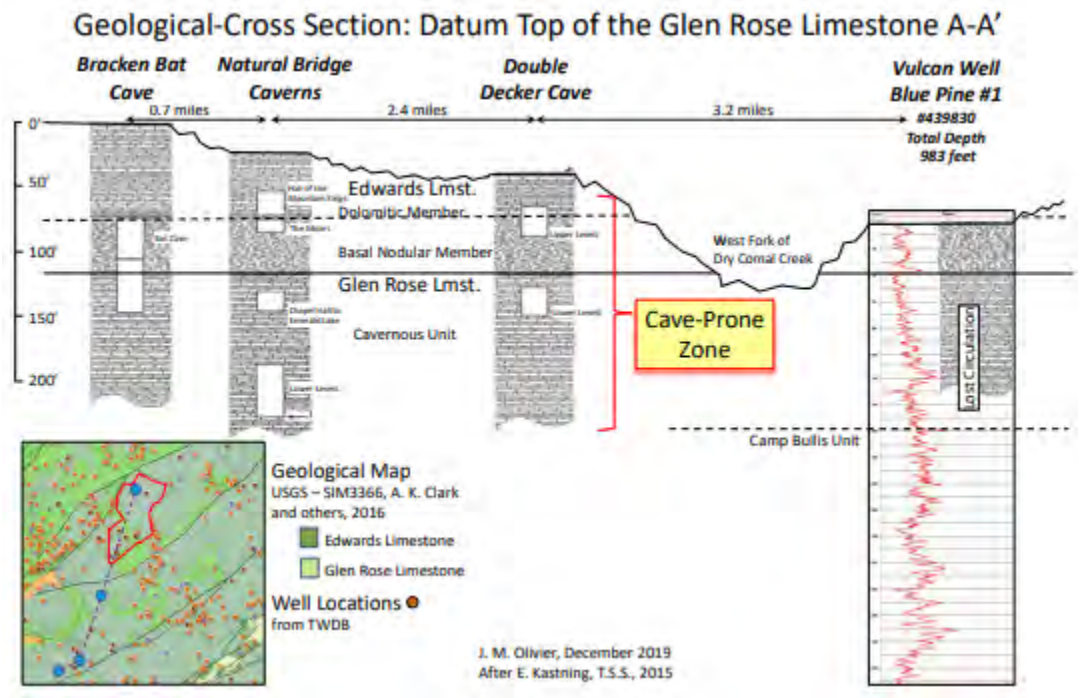


Figure 7. Geologic cross section showing the correlation between the well on the Vulcan site and caves in the same geologic units (Source: J. M. Olivier).

Groundwater Flowpaths

Once this infiltrating water reaches the water table of the aquifer, it will follow the hydraulic gradient. Some of this groundwater will be extracted by water-supply wells, much of it will discharge at the surface from springs, and some will remain in the aquifer following a flowpath into a deeper system many miles from where it first became recharge (Smith and Hunt, 2018).

Figure 8 is a potentiometric surface map of the Edwards Aquifer with water-level data from 2003 (Johnson et al., 2006). Even though no data were collected close to the proposed quarry site, the map suggests that flow from the site would move generally southeast then shift to the east then northeast toward Hueco and Comal Springs. A study following a 2,000-gallon diesel fuel spill in January 2000 at the DynoNobel explosives plant near the CEMEX Balcones Quarry in New Braunfels, Texas, shows flowpaths of the diesel fuel to both Hueco and Comal Springs (G. Schindel, personal communication, April 12, 2024). The proposed Vulcan quarry site is located seven miles NW from the plant. Groundwater flowing from the site would flow generally southeast until it reaches these flowpaths and would ultimately discharge to Hueco and Comal Springs. Some lesser components of the flow would bypass the springs and flow further downgradient towards San Marcos Springs.

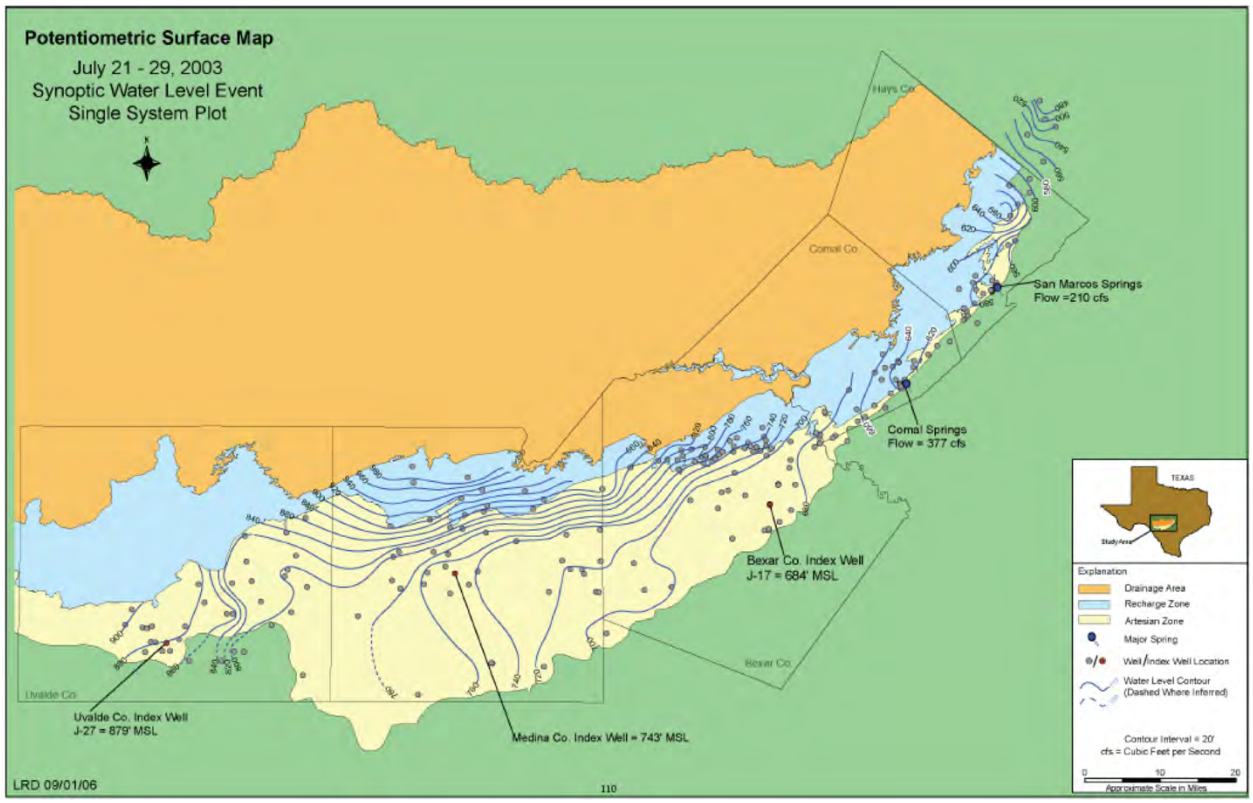


Figure 8. Potentiometric surface map showing approximate Edwards groundwater flow direction in south-central Comal County to be to the southeast (Johnson et al., 2006).

Water Quality

Because of the very porous nature of the lithologies beneath the proposed quarry site, any contamination generated by the quarrying operation would have a very direct and rapid impact on the underlying aquifer. Various studies have shown the potential for contamination of aquifers from the use of ammonium nitrate/fuel oil (ANFO) as an explosive. Contamination with nitrate can occur from poor handling of ANFO prior to an explosion and from incomplete combustion of the ANFO. Studies have shown that the amount of ANFO that does not combust during an explosion could be as high as 28% (BME, 2016 and Brochu, 2010). This leaves a considerable amount of nitrate available to be dissolved by water passing through the area of the blast. Once dissolved in the water, the nitrate is unlikely to break down into less hazardous components and will travel downgradient along the groundwater flowpaths.

Assuming the proposed quarry becomes active, there will be a significant likelihood for groundwater to become contaminated with nitrate and other hazardous substances from the site. Nearby wells could experience nitrate levels above the EPA's maximum concentration limit safe for human consumption of 10 mg/L (N). Wells and springs further downgradient of the quarry would likely see increases in nitrate concentrations but less so than wells immediately downgradient of the quarry. Some of this water with elevated nitrate could make its way to Hueco and Comal Springs. Several protected, aquatic, endangered species live in Comal Springs.

Water Levels

TCEQ requires that quarrying operations limit the downward expansion of a quarry to a level that is 25 ft above the highest expected water level (TCEQ, 2012). This level would either be set for water levels in December 2007, if available, or during a period equivalent to 90% of high rainfall. Because of limited water-level data on and near the site, it is difficult to determine what that level would be in the aquifer beneath different parts of the quarry site under varying rainfall conditions. To adequately evaluate water levels in the aquifer, the applicant should be required to do a thorough evaluation of data that are available and to collect data from onsite and nearby wells. A listing of wells and limited water-level data are included in Appendix A of this report (J. Doyle, personal communication, April 10, 2024). Because a water table is rarely a flat surface, a number of wells need to be measured within a short time period. These data then need to be compared to data collected during different wet and dry periods to determine appropriate water levels on all sides of the property. Water-level data from Hays (Hunt and Smith, 2019) and Bexar Counties (Johnson and Schindel, 2006), indicate that in the portions of the Edwards Aquifer at some distances from the major springs, hydraulic gradients can be as much as 100 ft per mile. Such a high gradient could be present beneath the quarry site, but it should be anticipated that there could be at least a 50-ft difference in water levels from one side of the site to the other. This difference in water levels would significantly impact the depth to which the quarry could be mined.

The WPAP (Pape-Dawson Engineers, 2024) for the site states that the mining areas will not be mined below an elevation of 1040 ft msl. According to the WPAP, this level of the quarry bottom will provide a 25-ft buffer above the high water level of the aquifer. A review of available water-level data indicates that at times, the bottom of the quarry will be flooded by the underlying aquifer (Figure 9). Water-level data from five wells close to the perimeter of the quarry boundary were evaluated to estimate expected water levels beneath the quarry and proposed depths of the excavations (Appendix B) (J. Finneran, personal communication, April 16, 2024). The White #4 well (#520690) had a water level of 1022 ft-msl on 12/5/07. At this water level plus the 25-ft buffer, the bottom of the quarry would be out of compliance. Another well (Tucker, EAA #Wxxx-137) had a water level of 1048 ft on 12/14/98. At this water level, the bottom of the quarry would be 8 ft below the water level in the aquifer.

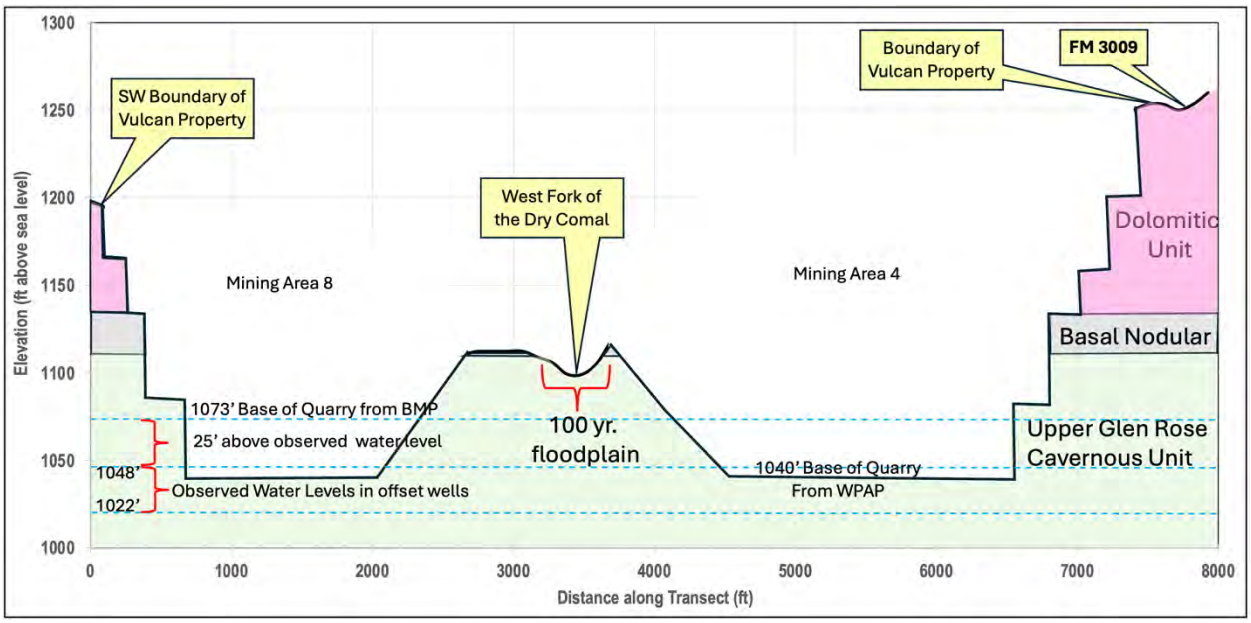


Figure 9. Schematic cross section with estimated topography after mining and water levels based on available data (J. Finneran, personal communication, April 16, 2024).

Groundwater Availability

Recent studies (Watson and Smith, 2023) have shown that intense growth in central Texas, particularly the Hill Country, has brought about significantly increased pumping from the Edwards and Trinity Aquifers. This increased pumping combined with the severe droughts that the region experiences frequently is causing numerous wells to go dry. Many springs either cease flowing during these periods, or the amount of flow is significantly reduced. Reduced spring flow leads to reduced flow in streams on which many people depend on. And these reduced flows also have negative impact on the ecology immediately in the spring area and downstream stretches. And, decreased groundwater availability increases the potential for contamination from various sources.

An analysis of the proposed quarries needs for water based on water use per ton of quarried material shows that approximately 383 acre-ft (125,000,000 gallons) of groundwater per year would be needed (M. Poffenberger, personal communication, April 13, 2024). Groundwater availability studies from the Edwards and Trinity Aquifers in Hays County have estimated that pumping 383 acre-ft of groundwater per year could cause sufficient water-level declines in adjacent wells such that during periods of drought those wells could cease to yield water.

Conclusions

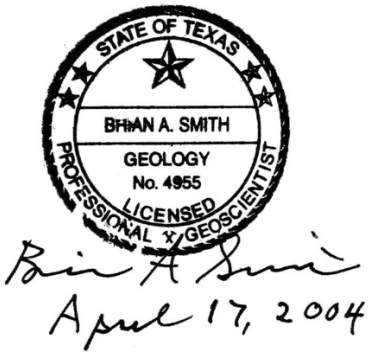
A permit for the quarry should not be considered until the following issues are addressed:

- Elevations of the aquifer should be determined prior to any excavation. The elevation of 1040 ft-msl for the bottom of the quarry, as stated in the WPAP, is likely to be out of compliance with the required buffer of 25 ft. And it is also likely that water levels in the aquifer will be above the elevation of 1040 ft-msl during periods of high water levels.

- The Geologic Assessment shows that 37 sensitive features were found. This number is anomalously low for the geology in this area. Further evaluation of recharge features is needed to determine areas that will require protective buffers. In addition, a dye-trace study should be conducted to determine flowpaths of groundwater from the site and to determine which downgradient wells might be impacted by contaminants coming from the quarry.

- The operation of a quarry will contribute contamination to the underlying aquifer. To determine background water-quality conditions, water-supply wells immediately downgradient of the quarry should be sampled and analyzed for nitrates and total petroleum hydrocarbons prior to issuing a permit for the quarry.

A thorough evaluation of existing data and data collected by the studies stated above will show that the aquifer beneath this site is highly sensitive to contamination. Because of the sensitivity of the site and the magnitude of the quarry, a permit should not be granted.



References

BME, 2016, Tackling nitrate contamination of water in mines: Mining.com, August 11, 2016, https://www.mining.com/web/tackling-nitrate-contamination-of-water-in-mines/.

Brochu, Sylvie, 2010, Assessment of ANFO on the Environment: Defence R&D Canada-Valcartier, Technical Memorandum, DRDC Valcartier TM 2009-195, https://apps.dtic.mil/sti/tr/pdf/ADA593200.pdf.

Clark, A. K., Golab, J. A., Morris, R. R., Pedraza, D. E., 2023a, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers Within Northern Bexar and Comal Counties, Texas: USGS, Scientific Investigation Map 3150, https://doi.org/10.3133/sim3510.

Clark, A. K., Golab, J. A., Morris, R. R., Pedraza, D. E., 2023b, Geologic Framework and Hydrostratigraphy of the Edwards and Trinity Aquifers Within Northern Bexar and Comal Counties, Texas: USGS, Pamphlet to Accompany Scientific Investigation Map 3150, https://doi.org/10.3133/sim3510.

Ferrill, D.A., Sims, D.W., Morris, A.P., Waiting, D.J., and Franklin, N.M., 2003, Structural controls on the Edwards aquifer/Trinity aquifer interface in the Camp Bullis quadrangle, Texas: Edwards Aquifer Authority and U.S. Army Corps of Engineers, prepared by CNWRA, Southwest Research Institute, San Antonio, Tex., and Department of Earth and Environmental Science, University of Texas at San Antonio, San Antonio, Tex., December 5, 2003, 126 p., accessed June 5, 2013, at h ttps://www.edwardsaquifer.org/wp- content/uploads/ 2019/ 05/ 2003_Ferrilletal_ StructuralControlsCampBullisQuad rangle.pdf.

Frost GeoSciences, 2021, Bigbee Tract Geologic Assessment, WPAP, April 21, 2021.

Gary, M.O., Veni, G., Shade, B., and Gary, R.H., 2011, Spatial and temporal recharge variability related to ground-water interconnection of the Edwards and Trinity aquifers, Camp Bullis, Bexar and Comal Counties, Texas, *in* Interconnection of the Trinity (Glen Rose) and Edwards aquifers along the Balcones fault zone and related topics— Karst Conservation Initiative meeting, Austin, Tex., February 17, 2011, [Proceedings]: Austin, Tex., Karst Conservation Initiative, 46 p., accessed December 8, 2022, at https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article= 1070&context= kip_ talks.

Hunt, Brian B., Smith, Brian A., Gary, Marcus O., Broun, Alex S., Wierman, Douglas A., Watson, Jeff, and Johns, David, 2017, Surface-water and Groundwater Interactions in the Blanco River and Onion Creek Watersheds: Implications for the Trinity and Edwards Aquifers of Central Texas: South Texas Geological Society, Vol. LVII, No. 5, January 2017, San Antonio.

Hunt, Brian B., Smith, Brian A., Hauwert, Nico M, 2019, The Barton Springs Segment of the Edwards (Balcones Fault Zone) Aquifer, central Texas: in The Edwards Aquifer: The Past,

Present, and Future of a Vital Water Resource: eds. Sharp, Jr., John M., Schindel, Gary M., Green, Ronald T., Geological Society of America Memoir 215, Chapter 7.

Johnson, S. and Schindel, G, 2006, Potentiometric Surface Maps: Edwards Aquifer Authority Report 06-02.

Johnson, S., Schindel, G., and Veni, G., 2010, Tracing Groundwater Flowpaths in the Edwards Aquifer Recharge Zone, Panthers Springs Creek Basin, Northern Bexar County, Texas: Bulletin of the South Texas Geological Society, vol.51, no. 3, Nov. 2010, p.15-45.

Pape-Dawson Engineers, 2024, Water Pollution Abatement Plan for proposed Vulcan Comal Quarry, February 2024.

Schindel, Geary, 2021, Geological Evaluation of the Froboese Ranch Comal County, Texas Prepared by: Edwards Aquifer Authority Geary M. Schindel, P.G. for the City of San Antonio, October 19, 2021).

Smith, B. A., Hunt, B. B., Wierman, D. A., and Gary, M. O., 2018, Groundwater Flow Systems in Multiple Karst Aquifers of Central Texas: 15th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, NCKRI Symposium 6, Shepherdstown, WV, April 2-6, 2018, eds. I. D. Sasowsky, M. J. Blye, and L. Land, pp. 17-29.

Smith, Brian A., Hunt, Brian B., 2019, Multilevel Monitoring of the Edwards and Trinity Aquifers: in The Edwards Aquifer: The Past, Present, and Future of a Vital Water Resource: eds. Sharp, Jr., John M., Schindel, Gary M., Green, Ronald T., Geological Society of America Memoir 215, Chapter 25.

TCEQ Recharge Zone Map https://www.tceq.texas.gov/gis/edwards-viewer.html.

TCEQ, 2012, Best Management Practices for Quarry Operations: Complying with the Edwards Aquifer Rules: Texas Commission on Environmental Quality, Filed Operation Support Division, RG-500, www.tceq.texas.gov/goto/publications.

TWDB Submitted Well Drilling Reports, https://www3.twdb.texas.gov/apps /waterdatainteractive//GetReports.aspx?Num=439830&Type=SDR-Well.

Watson, Jeffery A. and Smith, Brian A., 2023, The BSEACD Trinity Aquifer Sustainability Model: A Tool for Evaluating Sustainable Yield of the Trinity Aquifer in Hays County, Texas: BSEACD Report of Investigations 2023-0717, July 2023.

Wierman, D.A., A.S. Broun, and B.B. Hunt (Eds), 2010, Hydrogeologic Atlas of the Hill Country Trinity Aquifer, Blanco, Hays, and Travis Counties, Central Texas: Prepared by the Hays-Trinity, Barton/Springs Edwards Aquifer, and Blanco Pedernales Groundwater Conservation Districts, July 2010, 17 plates+DVD.

Wong, Corinne I., Kromann, Jenna S., Hunt, Brian B., Smith, Brian A., and Banner, Jay L., 2014, Investigating Groundwater Flow Between Edwards and Trinity Aquifers in Central Texas: Groundwater v.52, No. 4: 624-639.

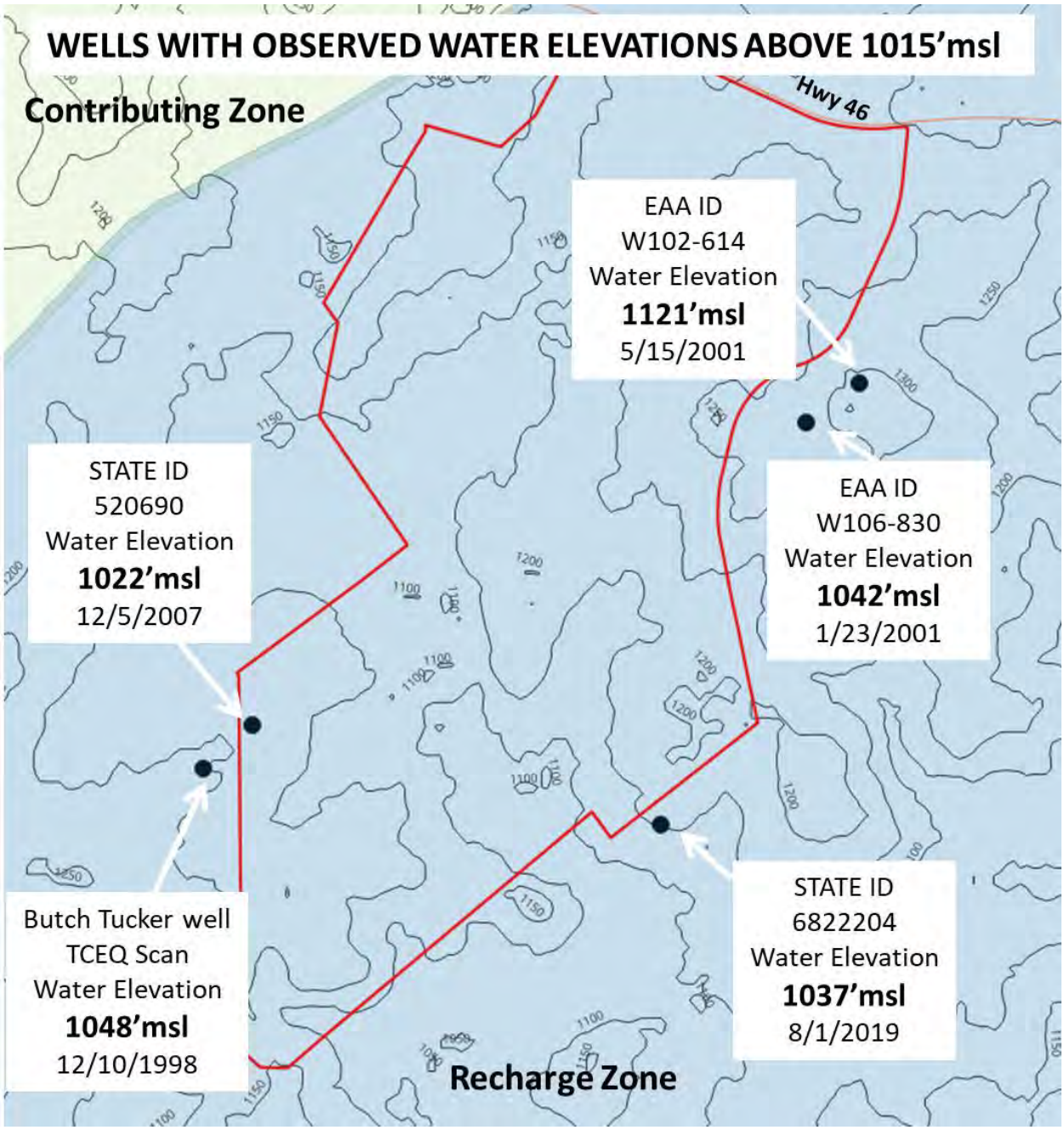
Woodruff, C. M., Jr, Collins, E. W., Potter, E. C., and Loucks, R. G., 2017, Canyon Dam Spillway Gorge and Natural Bridge Caverns: Geologic Excursions in the Balcones Fault Zone, Central Texas: The University of Texas at Austin, Bureau of Economic Geology, Guidebook No. 29, 56 p.

Appendix A. Well Data

Well_Number	Latitude	Longitude	Location	Date Drilled	Use	TD	Elevation	Hole Size	Casing Size	Comp_Type	Top	Bot	Yield	Aquifer	Surface Geol	Water Level	Water Elev.	Database
17890	29.753195	-98.303472	Elizabeth James 30838 FM3009, New Braunfels, 78132	3/10/03	D	595.00	1161.00	8.75	4.50	P	255.00	595.00	12.00	Upper Trinity	Kkd	260.00	901.00	SDR
42322	29.781111	-98.325833	Doug Harrison Off Hwy 46, New Braunfels, 78130	8/11/03	D	940.00	1182.00	8.00	5.00	OH	400.00	940.00	10.00	Middle Trinity	Kgrcb	420.00	762.00	SDR
47428	29.755278	-98.328611	Torry L. Hurt 31341 Beck Rd., Bulverde, 78163	10/18/04	D	650.00	1141.00	9.50	4.50	P	150.00	650.00	10.00	Upper Trinity	Kgrc	335.00	806.00	SDR
62403	29.750805	-98.327444	Nathan and Kira Olson 245 Saur Road, Bulverde, 78163	6/28/05	D	740.00	1160.00	9.50	5.00	P	540.00	740.00	8.00	U & M Trinity	Kkd	401.00	759.00	SDR
83030	29.762778	-98.323611	Richard Hehs 2520 Shearer Rd, Bulverde, 78163	4/11/06	D	860.00	1112.00	8.75	5.00	P	660.00	860.00	12.00	Middle Trinity	Kkbn	425.00	687.00	SDR
91867	29.759445	-98.324722	Steve Southwell 435 Third Fork, Bulverde, 78163	7/26/06	D	840.00	1113.00	5.50	0.00	OH	540.00	840.00	8.00	Middle Trinity	Kgrc	420.00	693.00	SDR
148952	29.779444	-98.321944	Doug Harrison Highway 46 Diamond H Ranch, New Braunfels	1/20/06	D	920.00	1262.00	8.00	5.00	OH	560.00	920.00	30.00	Middle Trinity	Kkbn	369.00	893.00	SDR
148953	29.779444	-98.322222	Doug Harrison Highway 46 Diamond H Ranch, New Braunfels	1/13/06	D	700.00	1271.00	8.00	5.00	P	665.00	700.00	10.00	Middle Trinity	Kkbn	370.00	901.00	SDR
165144	29.781111	-98.327778	Doug Harrison 700 Harrison Road, New Braunfels, 78132	12/10/08	D	800.00	1205.00	8.00	4.50	P	640.00	780.00	20.00	Middle Trinity	Kgruf	420.00	785.00	SDR
184564	29.783334	-98.308889	Ron Bigbee 10900 Hwy 46 West, New Braunfels, 78132	9/13/06	D	860.00	1266.00	8.00	5.00	P	680.00	860.00	10.00	Middle Trinity	Kkbn	430.00	836.00	SDR
189338	29.745777	-98.328416	Michael Olsen 414 Saur Rd., Bulverde, 78163	7/24/09	D	1000.00	1205.00	9.00	4.50	S	800.00	1000.00	15.00	Middle Trinity	Kkd	520.00	685.00	SDR
197965	29.784167	-98.325278	Doug Harrison 1650 INDEPENDENCE DRIVE, NEW BRAUNFELS, 78132	9/13/09	D	860.00	1204.00	12.25	8.63	P	660.00	860.00	0.00	Middle Trinity	Kgrc	456.00	748.00	SDR
197966	29.784167	-98.325278	Doug Harrison 1650 INDEPENDENCE DRIVE, NEW BRAUNFELS, 78132	9/13/09	D	660.00	1204.00	12.25	8.63	P	660.00	860.00	0.00	Middle Trinity	Kgrc	456.00	748.00	SDR
390602	29.754723	-98.303612	Milann Guckian 30739 FM3009, New Braunfels, 78132	1/27/15	D	980.00	1193.00	8.00	4.50	OH	800.00	980.00	8.00	Middle Trinity	Kkd	472.00	721.00	SDR
402605	29.7825	-98.313889	Lee Page 219 DOEHNE OAKS, NEW BRAUNFELS, 78132	8/6/15	D	410.00	1247.00	6.00	6.00	OH	292.00	410.00	10.00	Upper Trinity	Kgrc	180.00	1067.00	SDR
417876	29.785278	-98.308611	LOT 4 DOEHNE OAKS, NEW BRAUNFELS, 78132	3/8/16	D	460.00	1296.00	6.00	6.00	OH	342.00	460.00	5.00	Upper Trinity	Kkd	330.00	966.00	SDR
420134	29.786389	-98.313889	LOT 3 DOEHNE OAKS, NEW BRAUNFELS, 78132	2/1/16	D	440.00	1299.00	6.00	6.00	OH	321.00	440.00	7.00	Upper Trinity	Kkbn	274.00	1025.00	SDR
439830	29.770222	-98.312083	Blue Pine Holding 10901 TX 46 HWY 3009/ TX 46	1/2/17	IRR	983.00	1143.00	9.88	6.00	OH	632.00	943.00	150.00	Middle Trinity	Kkbn	121.00	1022.00	SDR
454726	29.771971	-98.294277	Carlos Banuelos 9801 Hwy 46 (east of FM3009) W111-780	6/21/17	D	683.00	1225.00	9.00	4.50	P	380.00	660.00	10.00	Upper Trinity	Kkd	255.00	970.00	SDR
475959	29.789889	-98.309222	Kyle Sargisson 1148 Imhoff lane, New Braunfels, 78132	3/20/18	D	455.00	1302.00	9.00	4.50	S	398.00	418.00	5.00	Upper Trinity	Kkd	347.00	955.00	SDR
481756	29.783056	-98.310556	Castele Avalon 10900 W ST HWY 46, New Braunfels, 78132	5/11/18	D	702.00	1237.00	8.00	4.50	P	500.00	702.00	15.00	Middle Trinity	Kgrc	315.00	922.00	SDR
493397	29.764306	-98.323444	Mike McCrary 2580 Shearer Road, Bulverde, 78163	10/1/18	D	920.00	1182.00	8.00	4.50	S	840.00	900.00	3.00	Middle Trinity	Kkbn	515.00	667.00	SDR
502269	29.783861	-98.311139	1108 Imhoff, New Braunfels, 78132	1/31/19	D	860.00	1220.00	9.00	4.50	S	558.00	818.00	10.00	Middle Trinity	Kgrc	197.00	1023.00	SDR
520687	29.740666	-98.325277	Eric W. White 11301 HWY 46 W, New Braunfels, #1 Loc from SDR	10/25/07	IRR	962.00	1135.00	8.75	6.00	OH	40.00	963.00	15.00	U & M Trinity	Kkd	355.00	780.00	SDR
520688	29.748944	-98.325138	Eric W. White 11301 HWY 46 W, New Braunfels, #2 Loc from SDR	11/6/07	IRR	970.00	1170.00	8.75	6.00	OH	40.00	970.00	20.00	U & M Trinity	Kkd	402.00	768.00	SDR
520689	29.7515	-98.320444	Eric W. White 11301 HWY 46 W, New Braunfels, #3 Loc from SDR	11/12/07	IRR	976.00	1124.00	8.75	6.00	OH	40.00	976.00	20.00	U & M Trinity	Kkbn	315.00	809.00	SDR
520690	29.75175	-98.325305	Eric W. White 11301 HWY 46 W, New Braunfels, #4 Loc from SDR	12/5/07	IRR	1054.00	1158.00	8.75	6.00	OH	38.00	1054.00	80.00	U & M Trinity	Kgrc	136.00	1022.00	SDR
520691	29.749027	-98.311917	Eric W. White 11301 HWY 46 W, New Braunfels, #5 Loc from SDR	10/16/07	IRR	931.00	1120.00	8.75	6.00	OH	40.00	931.00	60.00	U & M Trinity	Kkbn	155.00	965.00	SDR
520692	29.741444	-98.321721	Eric W. White 11301 HWY 46 W, New Braunfels, #6 Loc fro SDR	11/19/07	IRR	968.00	1098.00	8.75	6.00	OH	40.00	968.00	25.00	U & M Trinity	Kgrc	297.00	801.00	SDR
533817	29.784586	-98.310181	Ashei Duffy 1114 Imhoff, New Braunfels, 78132	12/26/19	D	360.00	1250.00	9.00	5.00	S	100.00	320.00	30.00	Upper Trinity	Kkbn	90.00	1160.00	SDR
6814902	29.774102	-98.290252	H. Conrad Hwy 46 near Meyer Ranch windmill	1/29/40	IRR	208.00	1174.00					208.00		Upper Trinity	Kkd	139.11	1034.89	GWDB
6822203	29.745294	-98.305563	Chris Hopmann 30323 FM3009 New Braunfels	8/1/19	D	700.00	1123.00	9.88	6.00	OH	500.00	700.00	10.00	Middle Trinity	Kkbn	329.70	793.30	GWDB
6822204	29.748042	-98.308322	Chris Hopmann 30323 FM3009 New Braunfels	8/1/19	D	240.00	1151.00		6.00	OH		240.00		Upper Trinity	Kkbn	113.90	1037.10	GWDB
W102-615	29.764028	-98.299944	Karl Fuchs 31600 FM3009	5/15/01	D	490.00	1301.00	8.00	5.00	P	180.00	490.00	22.00	Upper Trinity	Kkg	180.00	1121.00	EAA
W103-427	29.743222	-98.305944	Windell and Camille Cannon 30045 FM3009	8/11/04	D	400.00	1100.00	8.00	5.00	OH	160.00	400.00	10.00	Upper Trinity	Kkbn	350.00	750.00	EAA
W104-737	29.761278	-98.304194	Stephen and Jane Johnson 31400 FM3009	2/1/06	D	550.00	1241.00	6.50	5.00	S	500.00	560.00	5.00	Upper Trinity	Kkd	400.00	841.00	EAA
W106-830	29.762625	-98.302128	Craig Johnson 31450 FM3009	1/23/01	D	555.00	1272.00	8.00	5.00	OH	220.00	555.00	10.00	Upper Trinity	Kkke	230.00	1042.00	EAA
W109-777	29.744305	-98.308111	Windell Cannon 30045 FM 3009	3/21/00	D	720.00	1090.00	9.88	6.00	P	520.00	720.00	8.00	Middle Trinity	Kgrc	438.00	652.00	EAA
W109-793	29.770499	-98.296389	Larry Lowak 31320 FM3009	6/28/00	D	540.00	1242.00	8.00	5.00	OH	420.00	540.00	10.00	Upper Trinity	Kkd	260.00	982.00	EAA
W110-297	29.753661	-98.304942	Eric White 30715 FM-3009		D	920.00	1190.00						10.00					
W111-669	29.749039	-98.329616	Major W. T. Bump Lot 17 Beck Rd	11/16/84	D	700.00	1214.00	6.00	6.63	OH	130.00	700.00	9.00	Upper Trinity	Kkd	300.00	914.00	EAA
W111-706	29.768194	-98.295833	James Olson 32190 FM3009	12/20/96	D	600.00	1265.00	6.75	4.50	P	400.00	600.00	10.00	Upper Trinity	Kkke	400.00	865.00	EAA
W112-709	29.757739	-98.30788	Windmill well on east side of White Ranch															EAA
W112-710	29.766453	-98.319072	Windmill well on west side of White Ranch															EAA
W202-083	29.753353	-98.327105	R. L. Musgrove 31401 Beck Rd	7/31/86	D	900.00	1160.00	6.00	6.00	OH	325.00	900.00	4.00	U & M Trinity	Kkd	423.00	737.00	EAA
W202-087	29.751428	-98.302958	Alan Hammack 30700 FM3009	3/13/97	D	545.00	1192.00	6.75	4.50	S	270.00	545.00	12.00	Upper Trinity	Kkd	240.00	952.00	EAA
W202-101	29.740164	-98.30708	Glen Mueltistien 29691 FM3009	2/11/99	D	500.00	1081.00	6.00	5.00	OH	300.00	500.00	100.00	Upper Trinity	Kkbn	260.00	821.00	EAA
W202-104	29.745064	-98.313486	C. Bruce Lee (Heartland Masada Ranch) 30715 FM 3009	2/22/02	D	920.00	1166.00	8.00	4.50	P	720.00	920.00	10.00	Middle Trinity	Kkd	600.00	566.00	EAA
Wxxx-132	29.78293	-98.29999	Tillman Thomas 800 Heritage Oaks	5/29/00	D	543.00	1236.00	6.00	6.00	OH	258.00	543.00	7.00	Upper Trinity	Kgrc	215.00	1021.00	TCEQ
Wxxx-133	29.777538	-98.292613	Bob Satterwhite 10000 Hwy-46 New Braunfels	12/11/93	D	540.00	1192.00	6.75	4.50	OH	340.00	540.00	5.00	Upper Trinity	Kkd	200.00	992.00	TCEQ
Wxxx-134	29.778554	-98.301422	Ken Higby 292 Heritage Oaks Spring Branch TX	5/29/02	D	1062.00	1281.00	10.00	5.00	OH	698.00	1062.00	100.00	Middle Trinity	Kkd	458.00	823.00	TCEQ
Wxxx-137	29.750203	-98.327365	Butch Tucker 333 Saur Rd	12/10/98	D	800.00	1198.00	7.88	4.50	P	540.00	800.00	24.00	Middle Trinity	Kkd	150.00	1048.00	TCEQ
	29.745845	-98.312141	Bruce Lee Permanent Pond				1063.20							Upper Trinity	Kgrc	0.00	1063.20	
WR-1	29.770979	-98.302511	Location from WPAP												Kek			WPAP
WR-2	29.768473	-98.307756	Location from WPAP												Kek			WPAP
WR-3	29.751478	-98.32036	Location from WPAP												Kek			WPAP
WR-4	29.747936	-98.31689	Location from WPAP												Kgr			WPAP
WR-5	29.749045	-98.311958	Location from WPAP												Kgr			WPAP
WR-6	29.741425	-98.321705	Location from WPAP												Kgr			WPAP
S-1	29.770019	-98.312197	Blue Pine Holding Location from WPAP												Kek			WPAP
S-2	29.772232	-98.303037	Cased borehole on White Ranch Location from WPAP												Kek			WPAP
S-3	29.766466	-98.319097	Cased borehole on White Ranch Location from WPAP												Kek			WPAP
S-4	29.75774	-98.307887	Cased borehole on White Ranch Location from WPAP												Kek			WPAP
S-5	29.752889	-98.31672	Cased borehole on White Ranch Location from WPAP												Kgr			WPAP
S-36	29.766218	-98.322403	Uncased borehole on White Ranch Location from WPAP															WPAP
			6822204 EAA monitor well Upper Glen Rose. Donated to CTGCD															
			6822203 EAA monitor well Lower Glen Rose. Donated to CTGCD															
			6814902 Old monitor well. Not active?															
			Log on Green highlighted wells															

Source: J. Doyle
SDR: TWDB Submitted Drillers Reports
GWDB: TWDB Groundwater Database
EAA: Edwards Aquifer Authority
TCEQ: Texas Commission on Environmental Quality
WPAP: Pape-Dawson, 2024, Water Pollution Abatement Plan

Appendix B. Location Map and Well Records



Source: J. Doyle

EAA well W102-615
Latitude 29.764028 Longitude -98.299944

Attention Owner: Confidentiality Privilege Notice on reverse side of owner's copy.

Texas Department of License and Regulation
Water Well Driller/Pump Installer Program
P.O. Box 12157 Austin, Texas 78711 (512)463-7880 FAX (512)463-8616
Toll free (800)803-9202
Email address: water.well@license.state.tx.us

This form must be completed and filed with the department and owner within 60 days upon completion of the well.

WELL REPORT

A. WELL IDENTIFICATION AND LOCATION DATA

1) OWNER

Name	Address	City	State	Zip
KARL FUCHS	127 PENNSYLVANIA	NEW BRAUNFELS	TX.	78130

2) WELL LOCATION

County	Physical Address	City	State	Zip
COMAL	31600 FM 3009	NEW BRAUNFELS	TX	78130

Lat. | Long. | Grid # 68-14-8

3) Type of Work: ☑ New Well ☐ Deepening ☐ Reconditioning

4) Proposed Use (check) ☐ Monitor ☐ Environmental Soil Boring ☑ Domestic ☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5) NT

6) Drilling Date
Started 4/30/01
Completed 5/15/01

Diameter of Hole

Dia.(in)	From (ft)	To (ft)
8"	0	490

7) Drilling Method (check) ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☑ Cable Tool ☐ Jetted ☐ Other

8) Borehole Completion ☑ Open Hole ☐ Straight Wall ☐ Under-reamed ☐ Gravel Packed ☐ Other
If Gravel Packed give the interval from ft. to ft.

From	To	Description
0	10	CALICHE
10	130	WHITE LIMESTONE
130	150	ORANGE "
150	180	WHITE "
180	275	YELLOW " (WATER)
275	490	BLUE

EMP / DESC CO
JUL 11 2001
COMMENT AG

(Use reverse side of Well Owner's copy, if necessary)

Casing & Liner

Dia. (in.)	New Or Used	Steel, Plastic, etc. Perf, Slotted, etc Screen Mfit., if commercial	Setting (ft) From	To	Gage Casing Screen
5"	N	PVC SCH 40	280	0	
		PERFURATED	280	180	

9) Cementing Data
Cementing from 175 ft. to 160 ft. # of sacks used 2
20 ft. to 0 ft. # of sacks used 4
Method Used MIXER
Cementing By S. L. VOGES
Distance to septic system field or other concentrated contamination NA ft.
Method of verification of above distance

10) Surface Completion
☐ Specified Surface Slab Installed
☑ Specified Surface Sleeve Installed
☐ Pitless Adapter Used
☐ Approved Alternative Procedure Used

11) Water Level
Static level 180 ft. below Date 5/15/01
Artesian Flow gpm. Date

12) Packers

Type	Depth
2 SCREEN	175 + 170

13) Plugged ☐ Well plugged within 48 hours
Casing left in well: Cement/Bentonite placed in well:

From (ft)	To (ft)	From (ft)	To (ft)	Sacks used

14) Type Pump
☐ Turbine ☐ Jet ☑ Submersible ☐ Cylinder
☐ Other
Depth to pump bowls, cylinder, jet etc., 460 ft.

15) Water Test
Type test ☐ Pump ☑ Bailer ☐ Jetted ☐ Estimated
Yield: 20 gpm with 0 ft. drawdown after 2 hrs.

16) Water Quality
Did you knowingly penetrate any strata which contain undesirable constituents.
☐ YES ☑ NO If yes, did you submit a REPORT OF UNDESIRABLE WATER
Type of water GOOD Depth of Strata EAWARDS
Was a chemical analysis made ☐ Yes ☑ No

Company or individual's Name (type or print)	S. L. VOGES CONST.		
Address 128 VOGES	City NEW BRAUNFELS	State TX	Zip 78132
Signature CHARLES KUTSCHER (Licensed Driller/Pump Installer)	Date 7/8/01	Signature Staton L. Voges (Apprentice)	Date 5/22/01

TDLR FORM 1001WWD White - TDLR Yellow - Owner Pink - Driller/Pump Installer

Charles R. Kutscher WPRL 1861 STATON L. VOGES WWDAPP 799

Butch Tucker 333 Saur Rd
Latitude 29.750203 Longitude -98.327365

Send original copy by certified return receipt requ... mail to: TNRCC, MC 177, P.O. Box 13087, Austin, TX 78711-3087 1200

ATTENTION OWNER: *Confidentiality Privilege Notice on on reverse side of Well Owner's copy (pink)*

State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
MC 177
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) **OWNER** Butch Tucker (Name) **ADDRESS** 12415 La Albada SanAntonio 78233 (Street or RFD) (City) (State) (Zip)

2) **ADDRESS OF WELL:** County Comal Beck Rd/Saver (Street, RFD or other) (City) (State) (Zip) **GRID #** 68148

3) **TYPE OF WORK (Check):** [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) **PROPOSED USE (Check):** [ ] Monitor [ ] Environmental Soil Boring [X] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC? [ ] Yes [ ] No

5)

6) **WELL LOG:**
Date Drilling: Started 11/30 19 98 Completed 12/10 19 98

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
7 7/8	Surface	800

7) **DRILLING METHOD (Check):** [ ] Driven [X] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [ ] Other

From (ft.)	To (ft.)	Description and color of formation material
0	3	Black dirt
3	18	Lt grey limestone
18	100	Cream limestone
100		Void, lost return

(Use reverse side of Well Owner's copy, if necessary)

8) **Borehole Completion (Check):** [X] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If Gravel Packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
4.5	N	Sdr17 250psiPVC (260' perf)	0	800	Sdr17
5	N	200psiPVC stubout	0	2	Sdr21

9) **CEMENTING DATA** [Rule 338.44(1)]
Cemented from 0 ft. to 80 ft. No. of sacks used 6
0 ft. to 10 ft. No. of sacks used 4
Method used poured in top
Cemented by Mike
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance ____

13) **TYPE PUMP:**
[ ] Turbine [ ] Jet [X] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., 661 ft.

10) **SURFACE COMPLETION**
[X] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[ ] Approved Alternative Procedure Used [Rule 338.71]

14) **WELL TESTS:**
Type test: [ ] Pump [ ] Bailer [ ] Jetted [X] Estimated
Yield: 24 gpm with 20 ft. drawdown after 1 hrs.

11) **WATER LEVEL:**
Static level 150 ft. below land surface Date 12/14/98
Artesian flow ____ gpm. Date ____

15) **WATER QUALITY:**
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [X] No

12) **PACKERS:**

Type	Depth
6 mil cones	plastic 80'

FILE ID SEQ # EMP # JAN 06 1999 COMMENT TEMP

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME BoMax Industries Inc (Type or print) **WELL DRILLER'S LICENSE NO.** 5911

ADDRESS 7901 Cedarvales Drive Spicewood Tx 78669 (City) (State) (Zip)

(Signed) Michael E. Stempelmann (Licensed Well Driller) **(Signed)** ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 05-21-96) *White - TNRCC Yellow - DRILLER Pink - WELL OWNER*

Texas Water Development Board

Texas Water Development Board (TWDB)
Groundwater Database (GWDB)
Well Information Report for State Well Number
68-22-204

groundwater

GWDB Reports and Downloads | **Well Basic Details** | Scanned Documents

State Well Number	6822204
County	Comal
River Basin	Guadalupe
Groundwater Management Area	9
Regional Water Planning Area	L - South Central Texas
Groundwater Conservation District	Comal Trinity GCD
Latitude (decimal degrees)	29.7480417
Latitude (degrees minutes seconds)	29° 44' 52.95" N
Longitude (decimal degrees)	-98.3083222
Longitude (degrees minutes seconds)	098° 18' 29.96" W
Coordinate Source	Global Positioning System - GPS
Aquifer Code	
Aquifer	Trinity
Aquifer Pick Method	
Land Surface Elevation (feet above sea level)	1151
Land Surface Elevation Method	Global Positioning System-GPS
Well Depth (feet below land surface)	240
Well Depth Source	Person Other than Owner
Drilling Start Date	
Drilling End Date	
Drilling Method	
Borehole Completion	

Well Type	
Well Use	
Water Level Observation	GCD Current Site Visit
Water Quality Available	No
Pump	
Pump Depth (feet below land surface)	
Power Type	
Annular Seal Method	
Surface Completion	
Owner	Chris Hopmann
Driller	
Other Data Available	
Well Report Tracking Number	
Plugging Report Tracking Number	
U.S. Geological Survey Site Number	
Texas Commission on Environmental Quality Source Id	
Groundwater Conservation District Well Number	
Owner Well Number	
Other Well Number	Hopman Shallow
Previous State Well Number	
Reporting Agency	Groundwater Conservation District
Created Date	11/6/2020
Last Update Date	11/6/2020

Remarks	Reported and monitored by Edwards Aquifer Authority.

Casing - No Data

Well Tests - No Data

Lithology - No Data

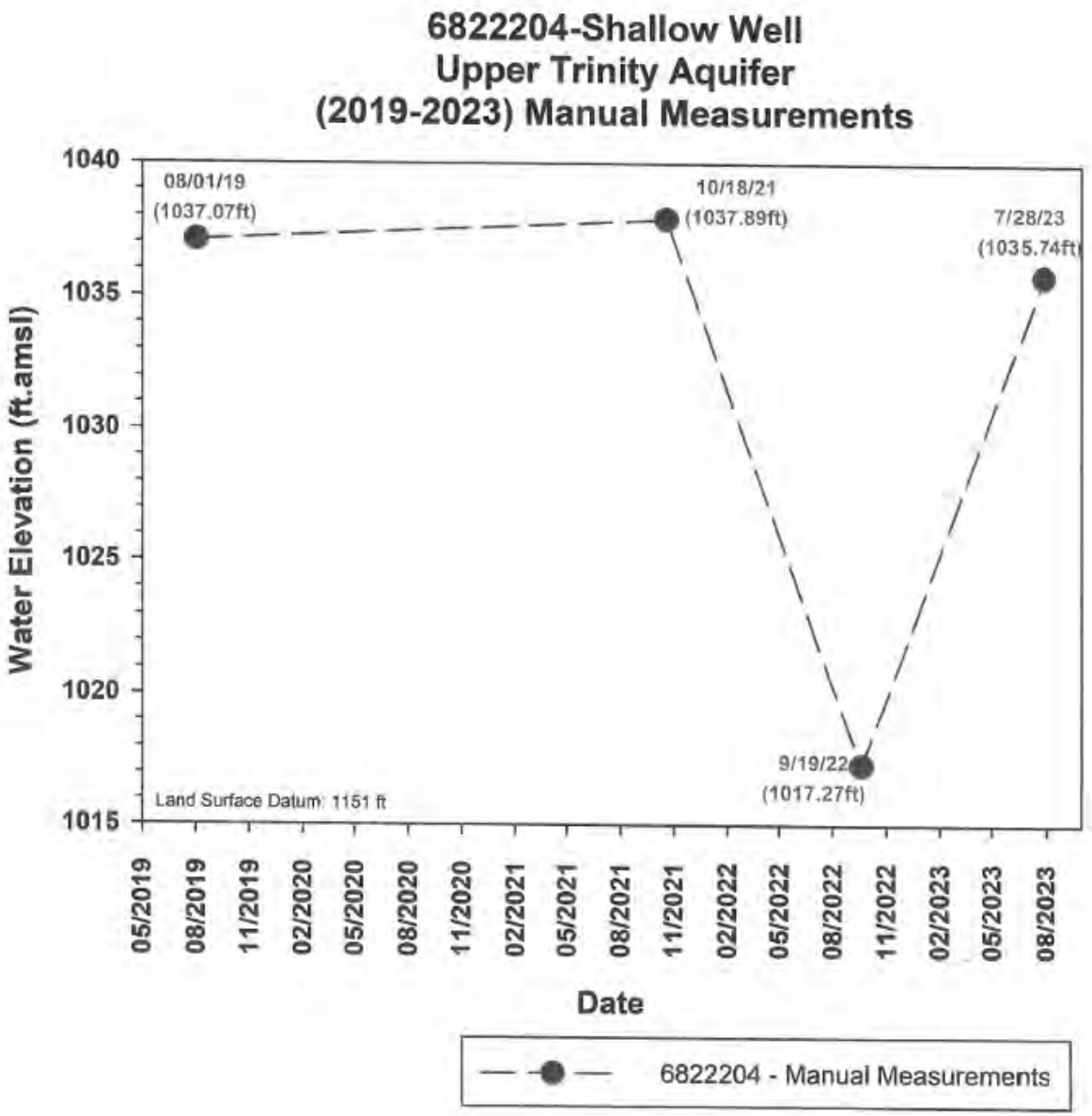
Annular Seal Range - No Data

Borehole - No Data

Plugged Back - No Data

Filter Pack - No Data

Packers - No Data


6822204-Shallow Well
Upper Trinity Aquifer
(2019-2023) Manual Measurements
Water Elevation (ft.amsl)
1040
1035
1030
1025
1020
1015
08/01/19
(1037.07ft)
10/18/21
(1037.89ft)
7/28/23
(1035.74ft)
9/19/22
(1017.27ft)
Land Surface Datum: 1151 ft
05/2019
08/2019
11/2019
02/2020
05/2020
08/2020
11/2020
02/2021
05/2021
08/2021
11/2021
02/2022
05/2022
08/2022
11/2022
02/2023
05/2023
08/2023
Date
6822204 - Manual Measurements

STATE OF TEXAS WELL REPORT for Tracking #520690

Owner:	**Eric W White**	Owner Well #:	**4**
Address:	**11301 HWY 46 W New Braunfels, TX 78132**	Grid #:	**68-14-8**
Well Location:	**11301 HWY 46 W New Braunfels, TX 78132**	Latitude:	**29° 45' 06.3" N**
		Longitude:	**098° 19' 31.1" W**
Well County:	**Comal**	Elevation:	**1158 ft. above sea level**
Number of Wells Drilled:	**6**		
Type of Work:	**New Well**	Proposed Use:	**Irrigation**

Drilling Start Date: **12/3/2007** Drilling End Date: **12/5/2007**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8.75**	**0**	**1054**

Drilling Method: **Air Rotary**

Borehole Completion: **Pilot HOle**

	Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
Annular Seal Data:	**0**	**38**	**Benseal 4 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **No Data** **Surface Completion NOT by Driller**

Water Level: **136 ft.** below land surface on **2007-12-05**

Packers: **Rubber at 38 ft.**

Type of Pump: **No Data**

Well Tests: **Jetted** **Yield: 80 GPM with ? ft. drawdown after 2 hours**

EAA well W106-830
Latitude 29.762625 Longitude -98.302128

Attention Owner: Confidentiality Privilege Notice on reverse side of owner's copy.

TX Department of License and Regula
Water Well Driller/Pump Installer Program
P.O. Box 12157 Austin, Texas 78711 (512)463-7880 FAX (512)463-8616
Toll free (800)803-9202
Email address: water.well@license.state.tx.us

This form must be completed and filed with the department and owner within 60 days upon completion of the well.

WELL REPORT

A. WELL IDENTIFICATION AND LOCATION DATA

1) OWNER

Name	Address	City	State	Zip
CRAIG JOHNSON	4710 CRESTED GROVE	SAN ANTONIO	TX	78217

2) WELL LOCATION

County	Physical Address	City	State	Zip
COMAL	31450 FM 3009	NEW BRAUNFELS	Tx.	78130

Lat. | Long. | Grid # 68-14-8

3) Type of Work ☑ New Well ☐ Deepening ☐ Reconditioning

4) Proposed Use (check) ☐ Monitor ☐ Environmental Soil Boring ☑ Domestic ☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5) NT

6) Drilling Date
Started 12/28/00
Completed 1/23/01

Diameter of Hole

Dia.(in)	From (ft)	To (ft)
8"	0	

7) Drilling Method (check) ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☑ Cable Tool ☐ Jetted ☐ Other

0-25	ORANGE, FRACTURE ROCK
25-135	LIMESTONE, WHITE
135-240	YELLOW
240-555	BLUE (WATER)

(Use reverse side of Well Owner's copy, If necessary)

8) Borehole Completion ☑ Open Hole ☐ Straight Wall ☐ Under-reamed ☐ Gravel Packed ☐ Other
If Gravel Packed give the interval from ft. to ft.

Dia. (in.)	New Or Used	Steel, Plastic, etc. Perf., Slotted, etc Screen Mfr., if commercial	Setting (ft) From	Setting (ft) To	Gage Casing Screen
5"	N	PVC SCH#40	0		

9) Cementing Data
Cementing from 220 ft. to 0 ft. # of sacks used 21
ft. to ft. # of sacks used
Method Used MIXER, ELECTRIC & PUMP
Cementing By S.L. VOGES
Distance to septic system field or other concentrated contamination ft.
Method of verification of above distance

10) Surface Completion
☐ Specified Surface Slab Installed
☑ Specified Surface Sleeve Installed
☐ Pitless Adapter Used
☐ Approved Alternative Procedure Used

11) Water Level
Static level 230 ft. below Date 1/23/01
Artesian Flow gpm. Date

12) Packers

Type	Depth
2 SCREEN	220 + 215

13) Plugged ☐ Well plugged within 48 hours
Casing left in well: Cement/Bentonite placed in well:

From (ft)	To (ft)	From (ft)	To (ft)	Sacks used

14) Type Pump
☐ Turbine ☐ Jet N/A ☑ Submersible ☐ Cylinder
☐ Other
Depth to pump bowls, cylinder, jet etc., ft.

15) Water Test
Type test ☐ Pump ☑ Bailer ☐ Jetted ☐ Estimated
Yield: 10 gpm with 325 ft. drawdown after 1/2 hrs.

16) Water Quality
Did you knowingly penetrate any strata which contain undesirable constituents.
☐ YES ☑ NO If yes, did you submit a REPORT OF UNDESIRABLE WATER
Type of water 6000 Depth of Strata GLEN ROSE
Was a chemical analysis made ☐ Yes ☑ No

Company or individual's Name (type or print)	S. L. VOGES CONST.		
Address 138 VOGES	City NEW BRAUNFELS	State TX	Zip 78132
Signature Licensed Driller/Pump Installer: Charles R. Kutscher	Date 2-20-01	Signature Apprentice: Staton L. Voges	Date 1/10/01

TDLR FORM a001WWD White - TDLR Yellow - Owner Pink - Driller/Pump Installer

CHARLES R. KUTSCHER
WPKL 1861

FEB 26 2001

STATON L. VOGES
WWDAPP 799

ATTACHMENT J
TO MOTION TO OVERTURN

TCEQ DOCKET NO. 2024-115-EAQ
PROGRAM ID NO. 13001906

IN THE MATTER OF THE APPROVAL OF A WATER POLLUTION ABATEMENT PLAN BY VULCAN CONSTRUCTION MATERIALS, LLC	§ § § § § § §	**BEFORE THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

DECLARATION OF DR. JAMES DAVID DOYLE

1. My name is Dr. James David Doyle, my date of birth is March 25, 1951, and my address is 200 Cedar Park, Canyon Lake, Texas, 78132.

2. I am over eighteen (18) years of age and of sound mind and am otherwise competent and capable of making this declaration. The facts testified to in this declaration are within my personal knowledge and are true and correct.

3. I am a retired geologist. My professional resume is attached as **Exhibit 1** to this declaration.

4. I have reviewed the Water Pollution Abatement Plan (WPAP) submitted by Vulcan Construction Materials, LLC ("Vulcan") on March 21, 2024 for the Vulcan Comal Quarry.

5. During my review of Vulcan's WPAP, I analyzed the separation distance between the floor of the quarry and groundwater. The amended Application states that the Mining Areas will not be mined below 1047 feet-msl. I found that water level data from the Texas Water Development Board from several wells within 600 feet of the Vulcan property boundary shows water levels greater than 1022 ft-msl. I prepared a map showing the location of those wells which is labeled as **Figure 1**, below:

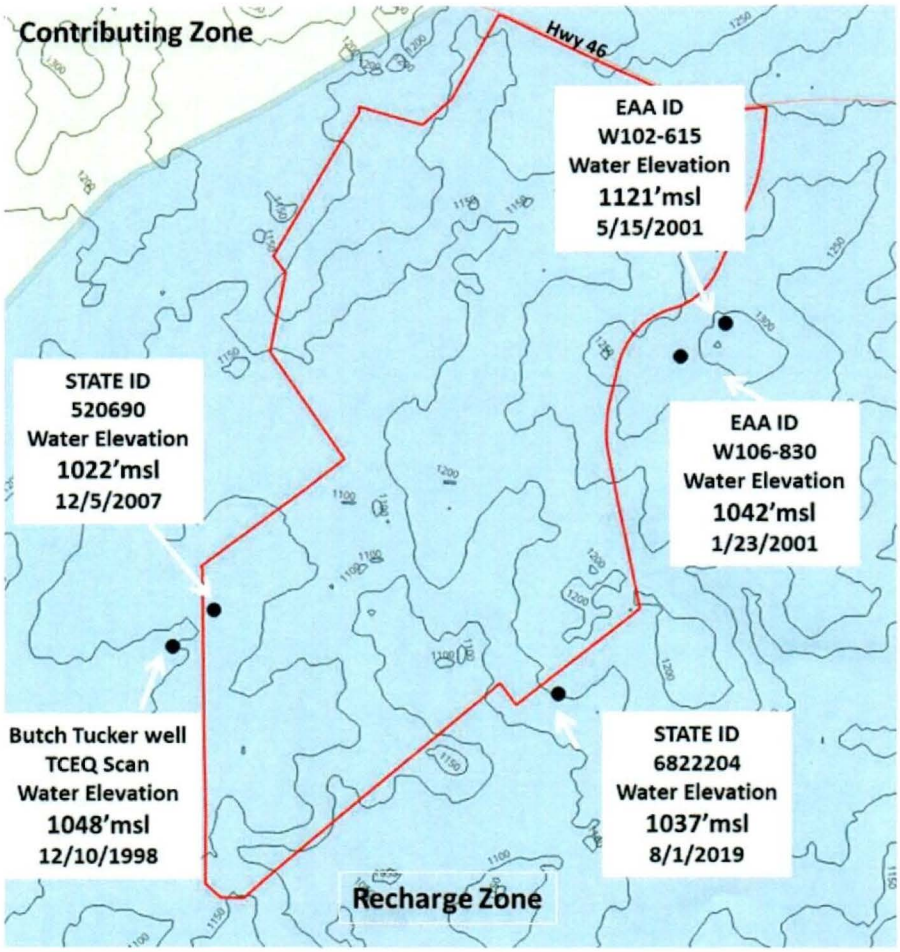


Figure 1

1. The map demonstrates that the proposed 1047 ft-msl mining floor may lead to increased infiltration of contaminants to the Edwards Aquifer. Because the water level has exceeded the 1022 ft-msl level four times in 21 years, there is no reason to think it will not happen again over the expected 65 to 90-year life of the quarry. If the quarry permit had been granted as written in 1990 instead of 2024, the 25 ft standoff approved by the TCEQ-EAPP would have been violated four times in the period from 1990 to 2020. Also, the Vulcan quarry floor would have been flooded twice, directly contributing pollutants to the Edwards Aquifer.

2. I also reviewed the possible impact of nitrate (NO_3) pollution from the Vulcan quarry to underlying aquifers caused by the type and large quantities of explosives used in aggregate mining. ANFO, a combination of ammonium nitrate and fuel oil, is a common blasting agent. It is highly soluble in water, and up to 30% of the explosive is not consumed by blasting.

3. Natural and blasting-induced fractures in the quarry provide an avenue for unexploded ANFO to reach the aquifer. Aggregate washing is also a common

practice, which can dissolve ANFO and aid the passage of nitrate into the underlying aquifer.

9. The boreholes used for blasting are wells since they are bored shafts with a depth greater than their largest surface dimension. ANFO is highly soluble and depending on moisture conditions may be readily leached from a borehole. Any such loss would pass readily into the fracture system of the surrounding rock and thus to the aquifer.

10. Data from the Texas Water Development Board shows that prior to the mid-1950s, nitrate measurements of well-water samples from the Edwards Aquifer were mostly below 4.4 mg/L NO3, which was consistent with natural background levels for aquifers. Since the mid-1950s, nitrate measurements in the Edwards Aquifer in Bexar, Comal, Guadalupe and Hays counties have risen steadily such that more than half from 2020 to 2022 were greater than 8 mg/L NO3. Nitrate levels in the aquifer began to rise coincident with the large scale introduction of ANFO to the mining industry (Moreira, G., 2012, *History of Explosives and Initiation Devices*, SAND & STONE The Official Publication of the CMPA). The rise in nitrate concentration in the Edwards Aquifer is demonstrated by the chart that I prepared which is labeled as **Figure 2**, below:

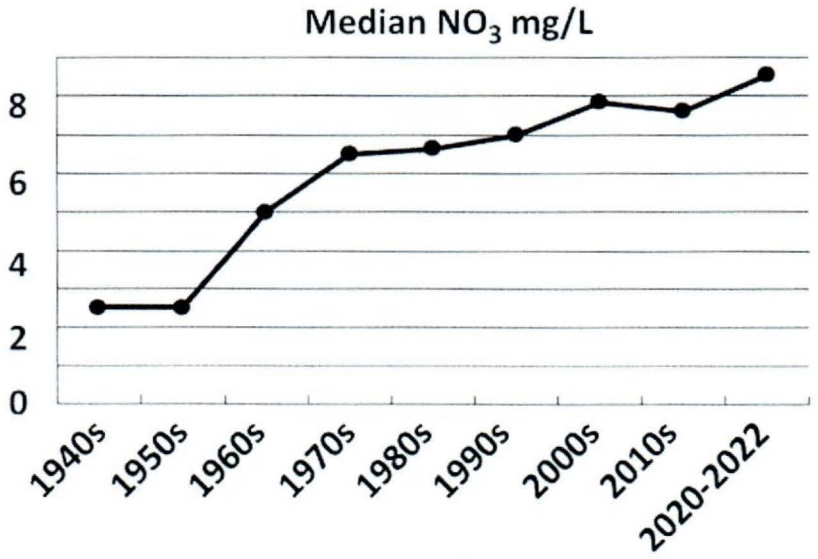


Figure 2

11. TCEQ set the ecological screening benchmark for ammonium nitrate in freshwater at 13 mg/L. In 40 C.F.R. § 141.62(b)(7), the EPA set the maximum

4. contamination level ("MCL") for drinking water at 40 mg/L N as NO_3 (10 mg/L nitrate as N). Texas Water Development Board well data demonstrate that while nitrate observations above 40 mg/L in the Edwards Aquifer remain relatively rare, levels above 40 mg/L and above the TCEQ ecological screening benchmark tend to be relatively close to quarries. This data is shown in the figure I prepared, which is labeled as **Figure 3** below, using an aquifer map from TCEQ, quarry locations from satellite imagery and Texas Water Development Board data:

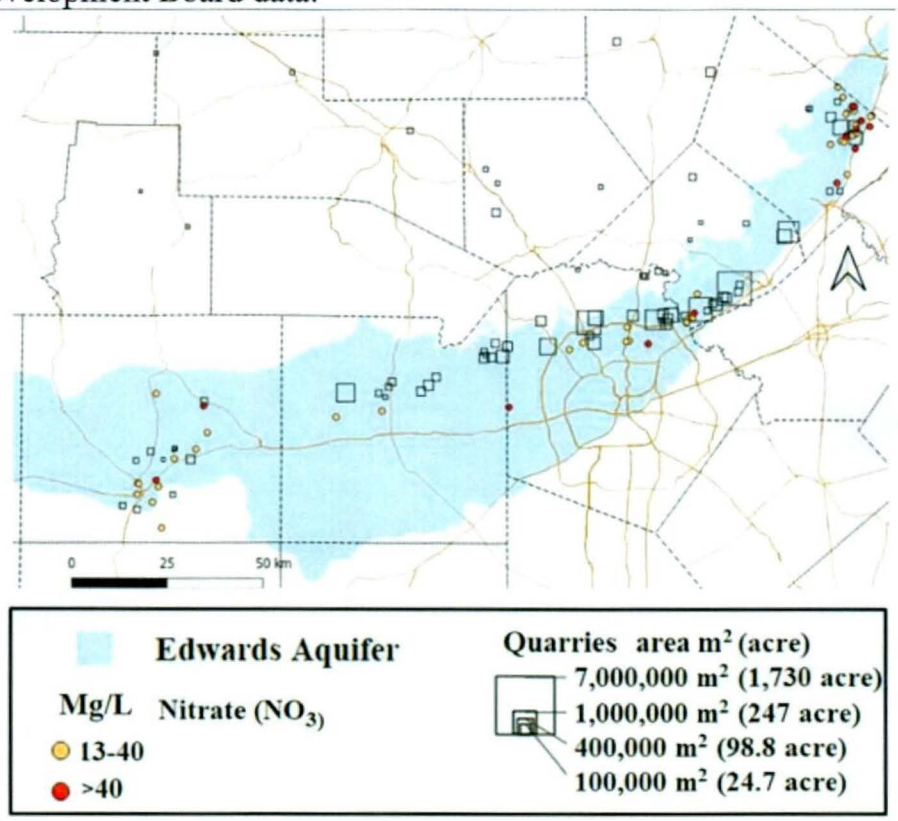


Figure 3

5. The data shown above in **Figure 3** suggest that well owners whose wells are unfavorably situated near quarries may experience degraded water quality.

6. Depending on the concentration level, long term exposure to nitrate can be threatening to humans. In particular, prolonged exposure to nitrate levels above EPA's maximum contamination level can cause blue-baby syndrome in infants, and pregnant women exposed to high nitrate concentrations may have babies with low birth weights. (Bryan Swistock, *Nitrates in Drinking Water*, PENNSTATE EXTENSION (updated Aug. 26, 2022)).

7. Depending on the concentration level, long term exposure to nitrate can be threatening to aquatic organisms, which may have lower tolerances for nitrate

than humans. The majority of recent observations of nitrate have reached a level above 8 mg/L NO_3 that may pose a threat (Monson, P., 2022, *Aquatic Life Water Quality Standards Draft Technical Support Document for Nitrate,* Minnesota Pollution Control Agency) to sensitive organisms living within the karstic Edwards Aquifer.

15. Based on this analysis, it is my professional opinion that the Executive Director's decision to approve Vulcan's WPAP should be overturned.

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Comal County, State of Texas, on the 31st day of July, 2024.

Dr. James David Doyle, Declarant

EXHIBIT 1

to Declaration of Dr. James David Doyle

James Doyle
Retired Geologist

Professional Summary

Geologist possessing extensive experience in geological evaluation for simulation studies, risk analysis and defining drilling targets. Has worked on a variety of integrated projects in which I have developed 3D reservoir models. Petrel is the primary modeling tool used for the past seven years. Very experienced in geological interpretation and mapping, both at reservoir and regional scales.

U.S. geographic areas of experience include the Gulf of Mexico, Gulf Coast (south Texas Wilcox and Vicksburg), Alaska, Anadarko Basin, Delaware Basin, Denver Basin, Powder River Basin, and Permian Basin. International areas include Venezuela, China, Libya, and Abu Dhabi, Offshore Israel.

Professional Experience

November, 2011– May, 2015
Noble Energy Inc, Houston, TX
Geologist Advisor
Geoscience Development: worked as an internal consultant in Noble's technology group on issues related to appraisal and development. Developed reservoir models for evaluating major discoveries in the deep water Gulf of Mexico and offshore Israel.

February 2002 – November, 2011
ENI Petroleum, Houston, TX
Senior Development Geologist
Deep water Gulf of Mexico Reservoir Group: Working in a team of geologists, reservoir engineers and geophysicists. As part of the team, I have been assigned evaluation of some of the highest profile projects considered for sanction in the Houston office. An important part of this job has been building geocellular models for risk evaluation. I've also built reservoir models for producing fields, supervised work done by consulting groups, monitored field activities and prepared materials required by BOEMRE.

April 1999 – February 2002
Consulting Geologist

- Offshore Gulf of Mexico Reservoir Studies: Worked on behalf of PetroVentures International for Apache Corp. on field studies in the West Delta and South Marsh Island areas (Louisiana) and Matagorda Island (Texas).
- Venezuelan Reservoir Study: Represented VoluMetrix Corp. in applying FastTracker to a reservoir modeling study in a field producing from the Oficina Formation in Venezuela.

October 1985 – March 1999
BP Exploration, Houston, TX
1998 – 1999
Staff Geologist, Appraisal and Development

- Mississippi Canyon: Interpreted 3D seismic to evaluate exploration potential for blocks in which BP held an interest and to appraise the Mississippi Canyon 211 discovery. Worked in a multidisciplinary team to integrate well, seismic and engineering data to mitigate subsurface risks associated with the planned development.

1995 - 1998
Staff Geologist, BP Technology Organization

- Faja heavy oil: Conducted a reserves evaluation of a 4000 km^2 part of the Cerro Negro district of the Venezuelan heavy oil belt to identify the best remaining reservoir areas for a possible joint heavy oil venture with Lagoven. Identified a focus area and performed a detailed stratigraphic study and geological assessment of it in support of the engineering effort. The team established the feasibility of the project at the existing oil price.

- Infill drilling project in Prudhoe Bay Field: Worked with an engineer to develop a methodology for rapid modeling of reservoir geology and fluids to identify and quantitatively rank infill drilling targets. Results of the project were incorporated into reservoir characterization software developed by VoluMetrix Corp.

1992 - 1995
Research Specialist, on assignment to Statoil, Trondheim, Norway

- Effects of Heterogeneities Project in the BP/Statoil R&D Alliance: Conducted core studies and reservoir modeling as part of an integrated team of geoscientists and engineers. The team successfully developed a methodology for assessing which geological heterogeneities matter for reservoir performance for particular types of reservoirs and implemented the method for shallow marine and low net to gross fluvial reservoirs. This approach was subsequently applied by BP and Statoil in other reservoir settings.

1985 - 1992
Senior Geologist, Sohio/BP technology organization, Dallas & Houston, TX

- Gypsy Sandstone Project: Identified a test site for assessing the value of data and relative merit of different methods of reservoir characterization. Conducted outcrop data collection and subsurface mapping which I integrated into quantitative reservoir models. The site was donated to Oklahoma University for continued industry and academic use.
- Technical service projects in Sohio's technology center: Worked on projects designed to integrate petrographic and digital well log data for making completion decisions on tight gas sandstones.

April 1985 - October 1985
Consulting Geologist

- Interim between resigning at SSI and reporting for work at Sohio: Divided time between consulting contracts with Sohio and SSI and completion of dissertation research.

January 1980 - April 1985
Scientific Software Intercomp, Denver, CO
Geological Consultant

- Reservoir description projects in SSI's consulting division: Analyzed the stratigraphy and performed detailed mapping of various fields in both clastics and carbonates; worked with reservoir engineers and log analysts to produce models for reservoir simulation. Projects included Wolfcamp Field (Permian Basin), El Bunduq Field (Abu Dhabi and Qatar), El Gialo Field (Libya) and Daqing Field (China).
- Regional exploration projects in SSI's consulting division: Conducted regional stratigraphic studies in mature plays where stratigraphic traps constitute primary targets. Project areas included the Delaware Basin, Las Animas Arch, and Powder River Basin. Delivered for each project a set of prospect leads and a report to participating companies.

January 1974 - December 1979
Cities Service Company, Houston, TX
Staff Geologist, Southern Region

- Exploration geologist: generated prospects, conducted well site geology, and evaluated submittals in the Wilcox, Vicksburg, and Frio trends of south Texas.

January 1975 - September 1976

- Educational leave of absence

January - December 1974
Geologist I, Southern Region

Education

- Ph.D. in Geology Colorado School of Mines (completed as part time student) 1987
  - Dissertation: Depositional Environments of the Pennsylvanian and Lower Permian of the Hartville Uplift and Adjacent Areas in Eastern Wyoming, Western Nebraska, and Southwest South Dakota
- M. A. in Geology University of Texas at Austin 1976
  - Thesis: Depositional Patterns of Miocene Facies, Middle Texas Coastal Plain
- B. S. in Geology with highest honors University of Texas at Austin 1973

Publications

1. Doyle, J. D., 1979, Depositional Patterns of Miocene Facies, Middle Texas Coastal Plain: Bureau of Economic Geology, U. of Texas, Report of Investigations 99, 28p.
2. Doyle, J. D., and D. M. Lorenz, 1984, Application of Principal Axis Ordination (Q-Mode Analysis) in Classification of Depositional Environments of Morrow (Upper Carboniferous) Strata in Southeast Colorado: in J. J. Royer (ed), Computers in Earth Sciences for Natural Resources Characterization, Coll., Int., 9-13 April, 1984, Nancy, France, p. 153-178.
3. Doyle, J. D., M. S. Sweet, and K. K. Thomas, 1991, Three Dimensional Fluvial Architecture of the Gypsy Sandstone (Pennsylvanian), Central Oklahoma: AAPG Bull. V75/3, p. 564.
4. O'Meara, D. J., B.Haynes, J. D. Doyle, M.L. Sweet, and V. Langlais, 1991, Modeling Reservoir Heterogeneity in a Fluvial Sandstone: the Gypsy Sandstone of Oklahoma. abs. SPE 22742.
5. Doyle, J. D., D. J. O'Meara Jr., and E. J. Witterholt, 1992, The "Gypsy" Field Research Program in Integrated Reservoir Characterization. SPE 24710.
6. Langlais, V., J. D. Doyle, M. L. Sweet, and G. W. Geehan, 1992, An Additional Geological Input to the Sequential Indicator Simulation (S.I.S): the Vertical Organization of Lithofacies: in R. Eschard and B. Doligez eds., Proceedings of the VIIth IFP Research Conference on Exploration and Production. Scarborough April 12-17, 1992, p. 111-123.
7. Sweet, M. L., and J. D. Doyle, 1992, Reservoir Heterogeneity in the Fluvial Gypsy Sandstone of Oklahoma: in R. Eschard and B. Doligez eds., Proceedings of the VIIth IFP Research Conference on Exploration and Production. Scarborough April 12-17, 1992, abs., p. 188.
8. Langlais, Valerie and James Doyle, 1992, Comparison of Several Methods of Lithofacies Simulation on the Fluvial Gypsy Sandstone of Oklahoma. in Soares, ed., Proceedings of the 4th International Geostatistics Congress, Troia.
9. Jones, Alistair, James Doyle, Torgrim Jacobsen, and Dagrun Kjønsvik, 1993, Which Subseismic Heterogeneities Influence Waterflood Performance? A Case Study of a Low Net-to-Gross Fluvial
10. Reservoir. Proceedings of the 7th European IOR Symposium in Moscow, Russia, Oct.27-29
11. 1993, p. 35-46.
12. Above reprinted in New Developments in Improved Oil Recovery, Pierre Forbes and H. Han de Haan eds., Geological Society of London,1995, p. 5-18.
13. Doyle, J., T. Jacobsen, A. Jones, D. Kjønsvik, W. England, C. Townsend, A Case Study of the Effects of Geological Heterogeneities in a Low Net-To-Gross Fluvial Reservoir: Official Program 1994 AAPG Annual Convention, Denver, CO., June 13-15, p. 139.
14. Kjønsvik, D., J. Doyle, T. Jacobsen, A. Jones, 1994, The Effects of Sedimentary Heterogeneities on Production From a Shallow Marine Reservoir - What Really Matters? Proceedings of the European Petroleum Conference, London, Oct 25-27, SPE 28445, pp. 27-40.
15. Doyle, J. D., and M. L. Sweet, 1995, Three-Dimensional Distribution of Lithofacies, Bounding Surfaces, Porosity and Permeability in a Fluvial Sandstone - The Gypsy Sandstone of Northern Oklahoma: AAPG Bulletin, v.79, no. 1, pp. 70-96.
16. Ruvo, L., J. Doyle, M. Cozzi, S. Riva, P. Scaglioni, and G. Serafini, 2008, Multi-scale Data Integration in Characterizing and Modeling a Deep Water Turbidite Reservoir: SPE 115305, SPE Annual Technical Conference and Exhibition held in Denver, CO., 21-24 September.
17. Yared, K. M. Pelorosso, I. Altintutar, D. Buster, E. Manuel, J. Doyle and C. Russell, 2010, Novel Approach to Quantifying Deepwater Laminated Sequences Using Integrated Evaluation of LWD Real-Time Shear, Porosity, Azimuthal Density and High-Resolution Propagation Resistivity: SPE 134515, SPE Deepwater Drilling and Completions Conference held in Galveston, Texas, USA, 5–6 October.
18. Doyle, J. D., 2024, Quarries as a Source of Nitrate Pollution in Karst Aquifers: Case Study, the Edwards Aquifer, Texas: Environmental and Engineering Geoscience, in press.

ATTACHMENT K
TO MOTION TO OVERTURN

From: Joyce or Jim Doyle <doyles@swbell.net>
Sent: Tuesday, April 16, 2024 8:50 AM
To: EAPP
Subject: Re: Opposition to Vulcan Comal Quarry TCEQ Edwards Aquifer Permit #: 13001906
Attachments: Comments on Vulcan WPAP Doyle.pdf

Dear Sirs:

I am writing to request that TCEQ Edwards Aquifer Permit #: 13001906 be rejected as written because I believe the current plan to pose a risk to water quality in the aquifer. If TCEQ concludes that the application should be approved without modification, then I request a public hearing before that step is taken. My detailed comments on the application are attached.

James Doyle
200 Cedar Park
New Braunfels, TX 78132

REQUEST FOR A PUBLIC HEARING ON THE VULCAN COMAL QUARRY WPAP

I am writing to request a public hearing for the Vulcan Comal Quarry Water Pollution Abatement Plan (WPAP). As written, this plan should be rejected because of the hazard it poses to the aquifer. At a minimum it should not reach final approval without an opportunity for public discussion.

The reason this quarry should not be approved is because it will deliver pollutants, especially nitrate, to the aquifer. In general, quarries are known elsewhere to be a source of nitrate pollution[1] because they primarily use a mixture of ammonium nitrate and fuel oil (ANFO). ANFO dissolves readily when exposed to moisture[2], and industry sources indicate it is used in large quantities. In a local example, the ServTex Quarry reportedly used 13,000 pounds of explosive in one day to mine 20,000 tons of rock[3]. Per industry sources, up to 30% may not be consumed in the explosions, and thus is a potential source of pollution[1]. The influence of ANFO is illustrated by the contrast in nitrate concentrations in the Edwards and Trinity aquifers. As shown in Figure 1, nitrate levels in the Trinity Aquifer are generally less than 5 mg/L Nitrate as NO_3 whereas levels in the Edwards Aquifer are elevated. Values since 1990 were chosen because population has rapidly increased since then in Bexar, Comal and Hays counties compared to the more rural counties to the west. Urbanization undoubtedly contributes nitrate to the aquifer, but the Edwards nitrate level is similar across the area. Observations in the highest two classes on Figure 1 mostly are close to quarries as are four extreme values > 500 mg/L. A look at the median (half the observations above, half below) value of nitrate measurements in the Edwards Aquifer over time shows an increase between 1950s and 1960s from mostly background levels (Figure 2). The increase corresponds in time with the large-scale introduction in the mid-1950s of ANFO as an explosive and its uptake by the aggregate industry[4].

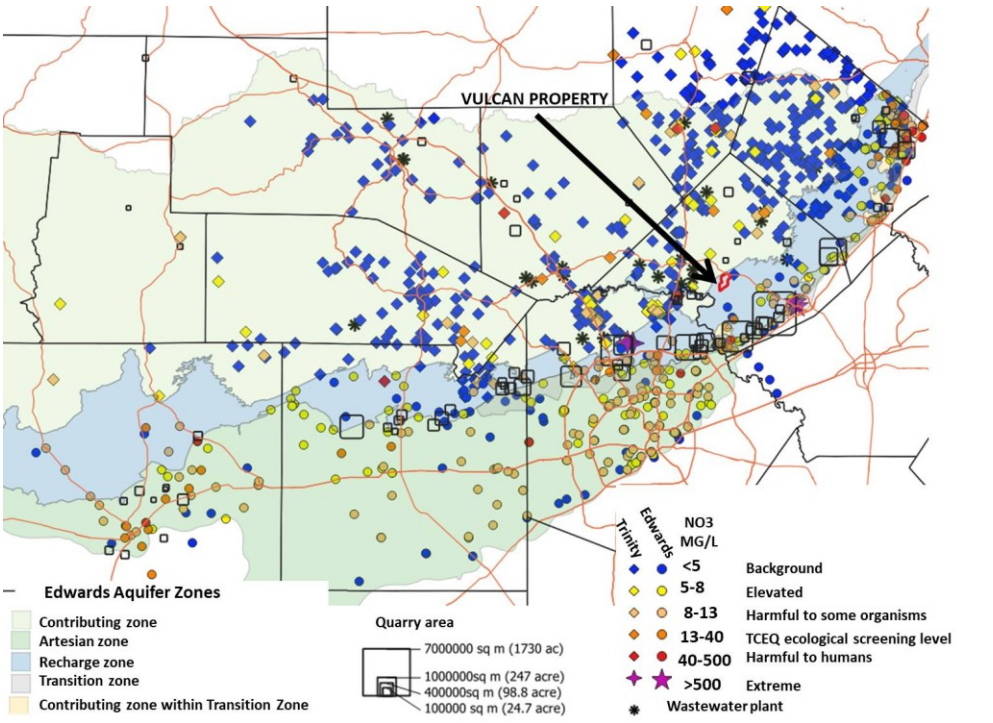
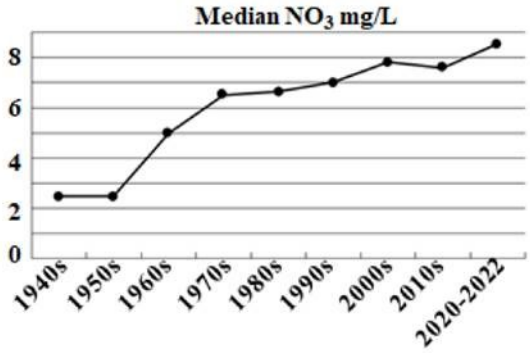


Figure 1. Maximum value of nitrate since 1990 for wells in the Trinity and Edwards aquifers. Nitrate concentrations are from the TWDB Groundwater Database.

Aggregate washing is a common practice using fresh water produced from wells drilled into the underlying aquifer. The water and fines from the process are directed to settling ponds, and the water is reused. Since explosive residuals are high,



Decade	N	# wells
1940s	38	21
1950s	30	24
1960s	247	144
1970s	994	300
1980s	487	91
1990s	417	250
2000s	454	178
2010s	306	88
2020-2022	116	41

Figure 2. For the Edwards Aquifer changes by decade in the median nitrate value measured in Bexar, Comal, Guadalupe and Hays counties show an increase coincident with the large-scale use of ANFO in mining. Nitrate concentrations are from the TWDB Groundwater database.

the water will contain dissolved nitrate. The stated intention in the Vulcan WPAP is to wash the aggregate and direct the water and fines to a system of lined settling ponds. Once the fines fill 50% of a pond depth, they will be removed and placed in an inactive part of the quarry. As the quantity of fines increases, the fines will compact and dewater, thus delivering dissolved nitrate directly to the natural and induced fractures on the quarry floor. Also water from the settling ponds is reused in mining operations which offers the potential for distributing the dissolved nitrate over the natural fracture system elsewhere on the property.

The site chosen for the Vulcan Comal Quarry is especially unsuitable for a quarry. Despite the claim in the WPAP that there is low potential for fluid migration into the aquifer, the abundance of caves in the vicinity show the area to be sensitive (Figure 3). Also, it should be noted that there is a subjective aspect to identifying sensitive features. The contrast in the density of features recorded at the Vulcan site and those recorded in a site assessment for a much smaller area directly on the other side of highway 46 suggests sensitive features on the Vulcan site may be undercounted.

If operations are conducted as indicated in the WPAP, the site will be particularly prone to aquifer contamination. Most of the quarries in the region are concentrated along the southern edge of the Edwards Recharge Zone. The Vulcan site is on the northern edge of the recharge zone where the shallow aquifer is the Upper Trinity Aquifer. It's well documented that the Edwards and upper Trinity aquifers communicate across faults in the recharge zone.

Specifically for the Edwards Aquifer recharge zone, the TCEQ has established best management practices (BMPs) designed to prevent aquifer contamination. One BMP is to estimate the highest elevation an aquifer is likely to reach for the life of the quarry. This can be based on a wet year (defined as a year in the upper 10% of historical annual precipitation). The estimate is done using a water level from a well on the property or a close offset, finding the elevation in a monitoring well on the same date, calculating the difference in the monitoring well with a wet year and adding that to site elevation. Quarries should go no lower than 25' above the resulting wet year estimate. The 25' buffer is based on an estimated depth of induced fractures below a quarry floor.

Vulcan has indicated they do not intend to observe this BMP. The quarry site has an abundance of wells that could be used to establish a maximum expected level for the aquifer. Instead of using the well data,

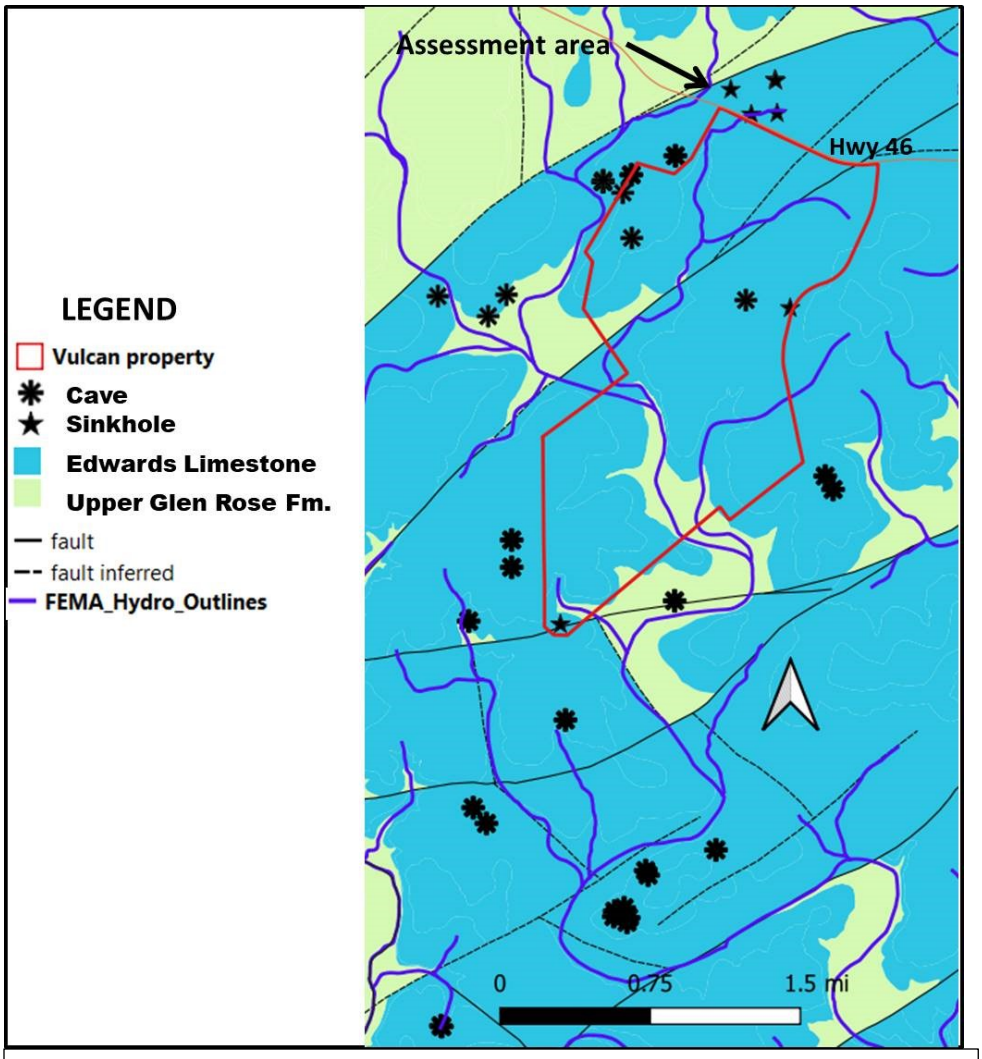


Figure 3. Abundant caves indicate the sensitivity of the area, and along with the density of karst feature mapped directly across highway 46 contrasts with the density of features mapped in the Vulcan site assessment.

Vulcan has indicated a desired depth of 1040' msl to which they will excavate. They justify ignoring the BMP stating (without basis) that they know how the water elevation will change over the next 5-10 years and making the absurd claim that monitoring wells during excavation will tell them the highest level that the aquifer can reach. Since the WPAP calls for mining 956 acres in 10 to 15 acre annual increments, their monitoring program would have to be predictive of aquifer level changes resulting from varying precipitation for the next 64-96 years. For the 1040'msl quarry base to be compliance with the TCEQ BMP, the highest elevation expected for the aquifer would have to be no higher than 1015'msl. In fact, five wells already drilled on or within several hundred feet of the property document different times over a 21 year span when a 1040' msl quarry base would have violated the TCEQ BMP (Figure 4). Three of those wells the recorded aquifer elevations above 1040' msl. Well monitoring would have value if its purpose is to monitor contaminant concentrations. Water level monitoring might allow mining activity to stop when level approaches 1015'msl, but if the 1040'msl level has already been reached in parts of the quarry, those areas will flood. The only thing that can be stated factually is that if Vulcan had been allowed to start this project in 1990 we would have already seen the quarry floor in excavated areas flood three times. Each time would bring the aquifer directly into contact with nitrate and other contaminants accumulated there. It is unlikely that the five wells drilled at random dates have actually identified the maximum possible elevation, and there is no reason to think the aquifer will not

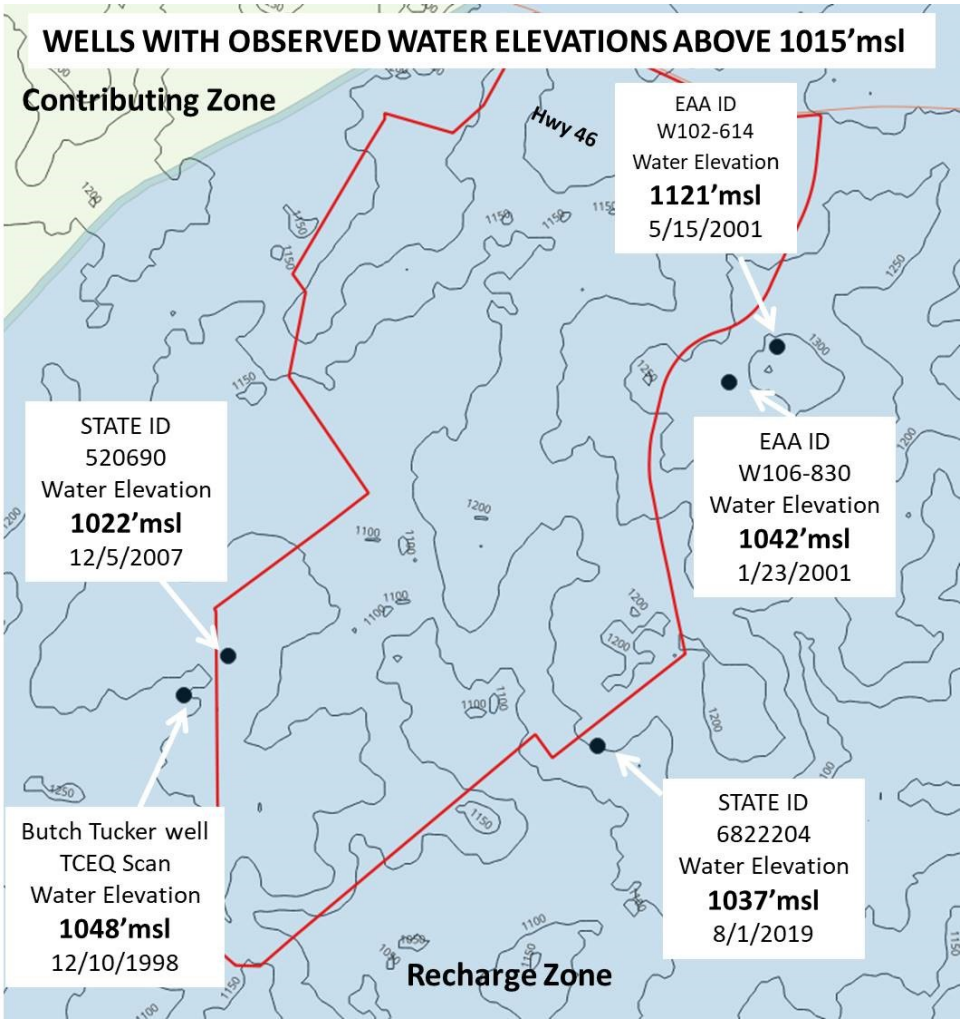


Figure 4. One observed water elevation on the Vulcan property and four within a few hundred feet of the property demonstrate that the water levels in the area repeatedly reach elevations that would put Vulcan's desired elevation for the base of the quarry in violation of the TCEQ BMP.

reach the observed levels again. In TCEQ RG-500, the stated purpose of the BMP for the minimum quarry floor elevation is to establish the maximum level the aquifer might reach which "requires a preliminary estimate of the high-water level at the site", and to limit the quarry floor to 25' above that. While the BMP allows the use of a single well to establish the maximum expected aquifer level, the intent clearly is not to choose a minimum elevation from candidate wells. To really avoid causing harm to the aquifer, the minimum elevation limit for the quarry should be set no lower than a level that would have satisfied the TCEQ BMP for all of the observed dates or else offer a clear explanation of why wells so close to the property are not indicative of past aquifer levels on the property.

For all of the reasons indicated above TCEQ should allow a public meeting. That would give the Vulcan technical people a chance to explain why the proposal is technically sound. If TCEQ is planning to approve this application as written, the meeting would give TCEQ staff an opportunity to explain why their BMPs for the Edwards Aquifer should be ignored in this instance. Considering that the decision on the application will affect Comal County residents for well more than the next half century, this request is more than reasonable.

References

1. Alberts, Neil, 2016, Tackling nitrate contamination of water in mines: Mining News Digest, August 11. 2.
2. Brochu, Sylvie, 2010, Assessment of ANFO on the environment: Defense R&D Canada – Valcartier Technical Investigation 09-01, 38p.
3. Chasnof, Bryan, 2021, From Garden Ridge to New Braunfels, 'Quarry Row' Has Residents Demanding Stricter Regulation: San Antonio Express News, October 6, 2022.
4. Moreira, Gavin, 2012, History of Explosives and Initiation Devices: SAND & STONE The Official Publication of the CMPA.