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

In the Matter of the Edwards Aquifer Water Pollution Abatement Plan
By Vulcan Construction Materials, LLC
Before the Texas Commission on Environmental Quality (TCEQ)

MILANN and PRUDENCE GUCKIAN'S
RESPONSE to
TCEQ Executive Director (ED), Office of Public Interest Counsel (OPIC), and Vulcan Construction Materials, LLC (Vulcan) REPLY BRIEFS on Motions to Overturn.

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

Pursuant to TCEQ General Counsel's August 13, 2024 notice, Milann and Prudence Guckian file this response to the reply briefs timely submitted by the ED, OPIC, and Vulcan in response to Motions to Overturn (MTO).

Milann and Prudence Guckian uphold the comments, observations and concerns presented in their MTO (Attachment A) submitted to TCEQ on July 31, 2024. Vulcan Comal Quarry constitutes 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.

With understanding "Movants" collectively refers to Preserve our Hill Country Environment, Preserve our Hill Country Environment Foundation, Landowners Robert Carillo, Cheryl Johnson, John Casimir Kucewicz Jr., and Douglas E. Smith, Milann and Prudence Guckian, and Kira Olson. Guckian Movant refers only to Milann and Prudence Guckian.

OPIC in its response determined - "As a preliminary matter, OPIC finds that each of the Movants has raised material and relevant issues of fact under the Commission's jurisdiction and reside in sufficient proximity to the proposed activity to be found a person affected under 30 TAC § 213.1(3). OPIC therefore finds that the Movants have the right to seek Commission review of the ED's approval, in addition to any rights of judicial review"

The ED, OPIC, and Vulcan all opine that the Edwards Aquifer Protection Program was strictly adhered to, and that it was incumbent upon Movants to demonstrate that Vulcan's Water Pollution Abatement Plan (WPAP) #13001906 was inadequate and deficient. We did that to the best of our ability with the resources we had available to us. We did not have access to the property, we could not get an independent geological assessment of the property, a dye trace study, or an environmental impact assessment review. Instead, we relied on research of properties with similar features, proximity to the Vulcan site, and the geological and scientific understanding of Karst Aquifers in Comal County and surrounding areas. In addition, the timeline to study and refute Vulcan's WPAP was limited and the TCEQ non-transparent process hindered communication with the agency.

Public Notice Process and Lack of Transparency:

Guckian Movant understands the Edwards Aquifer Protection Program (EAPP) WPAP public notice process is different from other TCEQ processes. By the ED's own admission "From its inception the EAP Program at the TCEQ was intended to be an expedited process that was never designed to include the opportunity for a public meeting or a contested case hearing." Never mind that over 780 citizens that asked for a public meeting might have concerns that the WPAP is not protective and would like the opportunity to voice those concerns, provide insight, and hold the applicant accountable. ED responded in a letter to Senator Donna Campbell and Representative Carrie Isaac that EAPP did not "include a public meeting", but that same statute doesn't preclude one either.

As we understood it, if we could get our state legislator to ask for a public meeting, and we did (Attachment B – Senator Donna Campbell), then TCEQ would be required to hold one. OPIC confirmed that in their response – "Lastly, unless a local state legislator makes a request, public meetings are held at the discretion of the ED and are not mandatory."

The ED also states:

"**The Commission has endorsed the public participation process for WPAP-applications as adequate because it provides sufficient notice to the public** - *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; they let a handful of affected cities, counties, and groundwater conservation districts know, NOT the general public.*

it allows members of the public to file an MTO if they disagree with the decision - *We received no notice that 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.*

Movants had to take it upon themselves to try to keep up with what TCEQ-EAPP and Vulcan were doing with regard to Vulcan's WPAP via PIR's, emails, attorney intervention, and trolling the TCEQ website.

and adding additional steps would significantly lengthen the review process, would require additional agency resources, and the Legislature has similarly spoken to its adequacy through amendments to the Texas Water Code." – *this process deters public participation and shows a total disregard for citizens quality of life and the environment.*

Site Assessment:

According to ED and Vulcan a site assessment was conducted on April 22 & 24, 2024 by TCEQ staff. They found that through this site visit and other components that the site was as generally described by the Geological Assessment (GA). Where is that documentation? We haven't been able to locate it through PIR's or any of the documents posted on the website. Did the site visit just agree with what was read or did they do an actual assessment?

In OPIC's response they point out that – "Movants raise a suite of technical issues that address areas of serious concern relating to water quality and groundwater levels, dangerous contaminants such as ammonium nitrate/fuel oil and other nitrates, the depth of the quarry bottom and other potential pathways to the Edwards Aquifer, potential impacts on endangered species, and contentions that the proposed activities constitute an injection well. ***Without a response to comments (****again, no transparency on the part of TCEQ, there were no response to comments for movants to refer to)*, **it is difficult to determine from the record the extent to which the specifics of each of these concerns were analyzed by staff, or what the precise basis of their determination may have**

been. However, the application was evaluated by TCEQ staff and experts from Regions 11 and 13 to determine general compliance with the requirements of Chapter 213 of the Commission rules. The permanent best management practices (BMPs) and measures represented in the application were prepared by a **Texas licensed professional engineer** *(Vulcan questioned the validity of PHCE experts and we are to rely on their LPE alone, without an independent GA?)*, and the plan holder is required to comply with all provisions of 30 TAC Chapter 213 and all technical specifications in the approved plan."

Vulcan challenges Dr. Smith and Mr. Olivier's understanding of GA Instructions – "Critically, Movants' concerns expressed by Dr. Smith and Mr. Olivier lack any connection to the GA Instructions, which are the relevant criteria for assessing whether a particular feature meets TCEQ's 30 TEX. ADMIN. CODE § 213.3(29) definition of a "sensitive feature." Movants' irrelevant criticisms do not indicate any deficiencies in Vulcan's approved WPAP application or the TCEQ ED's approval of the WPAP."

The definition of a sensitive feature as defined by the GA Instructions are: "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. *We do understand the rating system, and both Dr. Smith and Mr. Olivier understand the importance of geomorphology and did take it into consideration when using the comparison properties. Vulcan notes a lack of specific documentation on the "38 so-called" sensitive features in the 158-acre tract", see Attachment C, it contains the Bigbee Tract Subdivision GA. Compare it to Vulcan's GA and the "37 so-called sensitive features on 1515.16-acres."*

Vulcan also notes: "A physical field study is essential to conducting a GA or opining about geologic or manmade features on land. Smith's comparison of the specific number of sensitive features on two real property parcels is not relevant to Vulcan's WPAP because Smith's opinion is not based on the GA Instructions, does not take geomorphology into account, and was not based on personal observations at the Site. As such, Smith's opinion is incorrect, unfounded, and should not be given any consideration."

ED states that "for Movants to prevail they must identify the deficiencies within the WPAP, the Application, and any inadequacies of the ED's position as it relates to her decision at issue. This requires Movants to present evidence that directly contradicts the findings, determinations, and verification that make up the ED's approval."

Movants would love to base our research on personal observations at the Site so that the opinions of Dr. Smith and Mr. Olivier will be correct, have foundation, and would be given equal consideration. In order to directly contradict the findings, determinations, and verification that made up the ED's approval it would require personal observation of the site, an independent geological assessment, a dye trace study, and an environmental impact assessment. Without this, our research and the data used is based on expertise from two licensed professional engineers and a retired geologist that has spent a good part of his career studying the Karst Aquifer Systems, knowledge of the area, and experience.

Mining:

Vulcan says that their "approved WPAP is an authorization to conduct certain regulated activities over the Edwards, **but mining or blasting are not specifically WPAP-regulated activities**. TCEQ rules define "regulated activity" as "any construction-related or post-construction activity on the recharge zone of the Edwards Aquifer having the

potential for polluting the Edwards Aquifer and hydrologically connected surface streams." Movants' assumptions in their MTOs that any mining or blasting at the Site will automatically result in pollution of the Edwards Aquifer and hydrologically connected surface streams are speculative and unsubstantiated."

This contradicts the ED's assertion that "Vulcan applied for a WPAP to authorize clearing, **excavating**, and any other activities that may alter or disturb the topographic, geologic, or existing recharge characteristics of a site, or that may pose a potential for contaminating the Edwards and hydrologically connected surface streams."

We surmise that blasting and mining (excavating) does alter the topographic, geologic and existing recharge characteristics of this site.

Water Quality/Quantity:

In the ED response she notes: "For protection of the existing and potential uses of groundwater and to ensure the Texas Surface Water Quality Standards are maintained, the EAP Program regulates activities with the potential to pollute the Edwards and its hydrologically connected surface streams. The protection to the Edwards from a WPAP is the protection against sediment disturbed during regulated activities. Increased sedimentation in karst features and streams can decrease permeability of the water-bearing limestone and inhibit natural groundwater flow, possibly affecting the recharge of the Edwards. A WPAP also protects against pollution of the Edwards from contaminants in the sediment."

Facts:

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.

Due to the extreme drought that Comal County is experiencing, water supplies are already strained.

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.

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.

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.

Dr. Smith's report 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.

Endangered Species:

Vulcan asserts: "Endangered Species Concerns Are Outside the Scope of the EAPP and Vulcan's WPAP. TCEQ lacks jurisdiction to enforce the federal Endangered Species Act. Vulcan's approved WPAP and TCEQ's EAPP rules in Chapter 213 do not address or require applicants to include measures to prevent takings of endangered species. Even though no regulated activity has taken place at the Vulcan Comal Quarry, Movants assert that the TCEQ ED's approval of Vulcan's WPAP will result in activities at the Site ***in the future*** that could result in a prohibited taking of a listed endangered species." *The life of this quarry is 80-100 years per Vulcan's website, so the future is critical.*

The very purpose of TCEQ-EAPP is to protect the Edwards Aquifer. Part of protecting the aquifer is protecting the water itself. Edwards Aquifer Authority (EAA) was created with the 1993 passage of House Bill Number 1477 and was eventually signed into law, effective September 1, 1995. It maintains that springflow must be maintained to assure that Comal and San Marcos springs will not drop below jeopardy levels protecting endangered species in these springs.

The Edwards Aquifer Habitat Conservation Plan (EAHCP) defines how we protect federally listed species that live in the Edwards Aquifer and the Comal and San Marcos springs. The program's Incidental Take Permit was granted to the Edwards Aquifer Authority, City of San Marcos, City of New Braunfels, Texas State University, and the City of San Antonio acting by and through the San Antonio Water System (collectively known as the EAHCP Permittees) to protect federally listed species from specific activities, Covered Activities, like groundwater pumping.

Facts:

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.

The ED says the EAP program and its oversight has no authority to and does not regulate groundwater rights. They are correct, that falls to the local groundwater conservation district, but what TCEQ-EAPP does have authority over is the protection of the aquifer itself and that includes the groundwater quality and quantity that is inherent to its very survival. The Edwards Aquifer is natural infrastructure, it is designated one of the most prolific artesian aquifers in the world and it is TCEQ's job to protect and preserve this resource.

Conclusion and Prayer:

The ED, OPIC, and Vulcan seek to deny Guckian Movant Motion to Overturn. For the reasons and logic outlined above, I respectfully request that the Commission grant this Motion to Overturn the Executive Director's Decision and deny WPAP #13001906.

Respectfully submitted,

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Filed with the Chief Clerk's Office on September 6, 2024.

ATTACHMENT A

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'

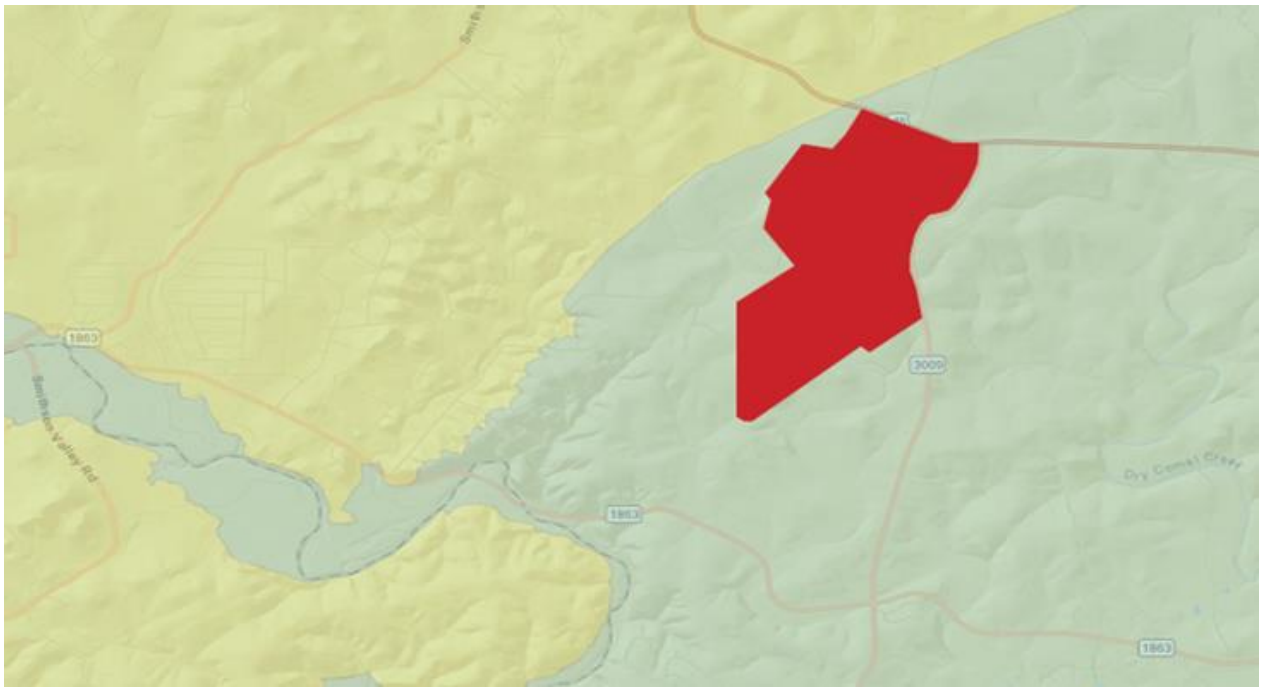
- ✓ Our front porch is 358.16’ to the applicant Mining Area #7.
- ✓ Our water well is situated 493’ from the applicant Mining Area #7
- ✓ Our water well is approximately 4800’ → 5000’ to the applicant industrial water well.

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)

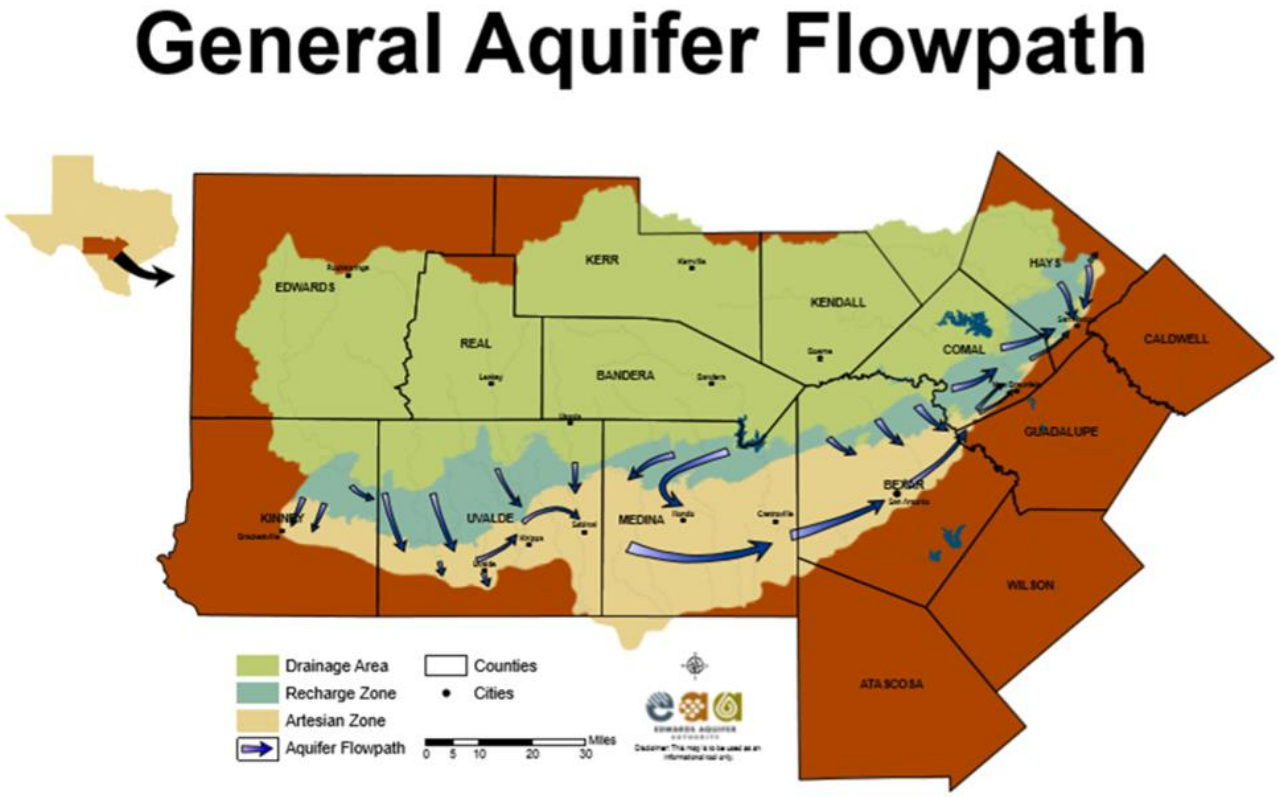
- Water Supply & Usage (Quantity)
    - Water usage by Vulcan's Rock Crushing Plant, associated equipment, roads, and stockpiles is significant; based on water use per ton of quarried material, approximately 383 acre-ft (125 million gallons) of groundwater per year would be needed. This will adversely 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.

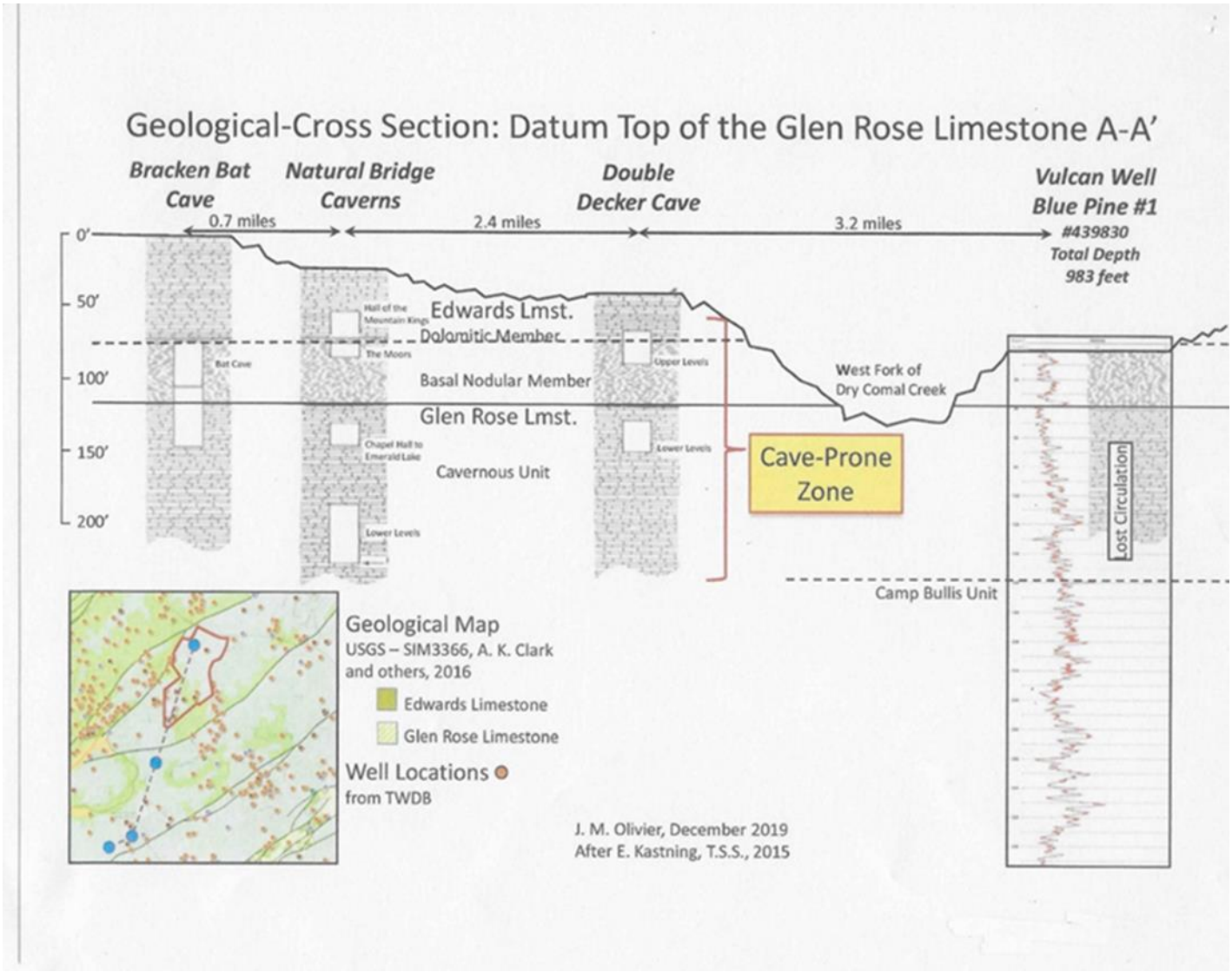
- Dr. Smith's report (Attachment A) found that reduced flows have negative impact on the ecology immediately in the spring area and downstream stretches, including endangered species. Therefore, Vulcan's use of groundwater may contribute to a violation of the Endangered Species Act. Moreover, decreased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



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
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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).

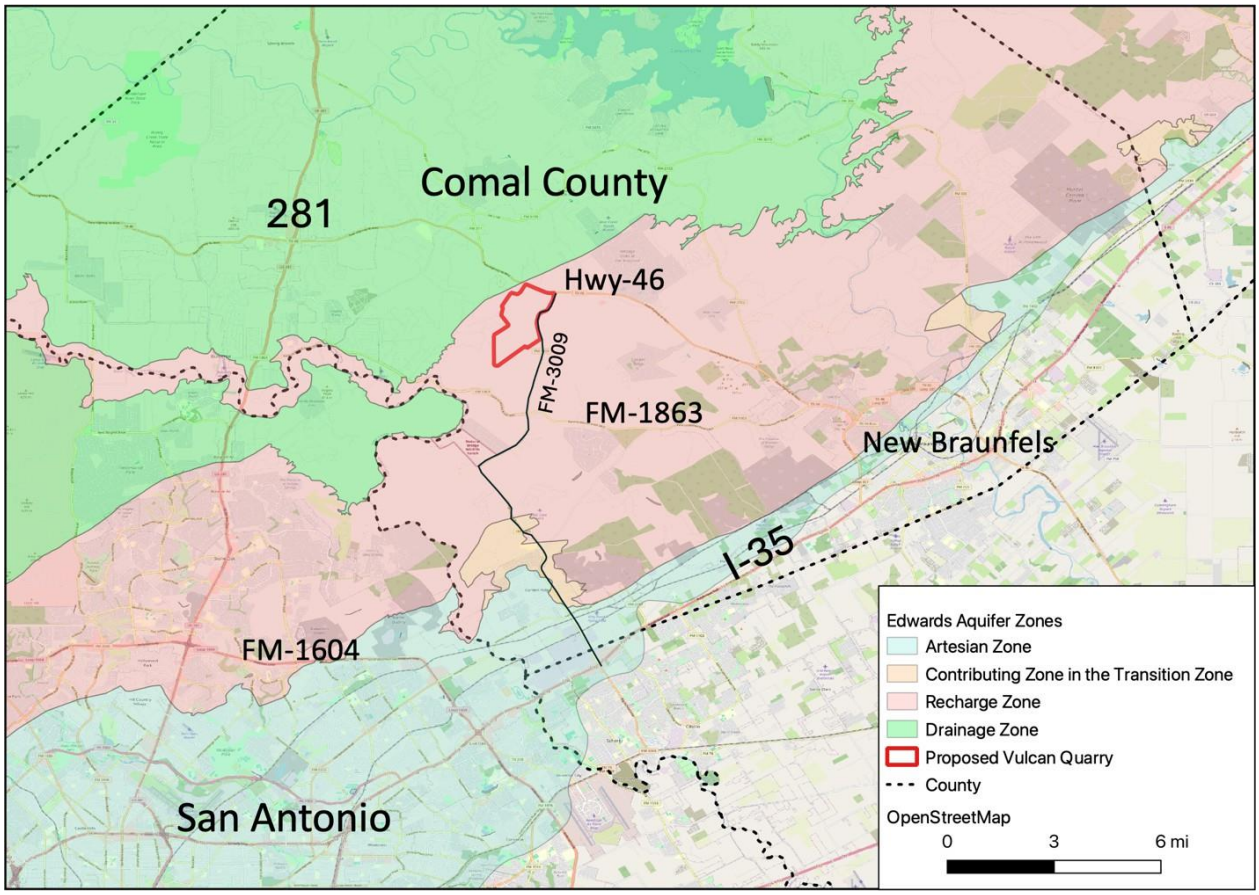


Figure 1. Location map of proposed quarry showing hydrogeologic zones (Source: J. Finneran).

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.

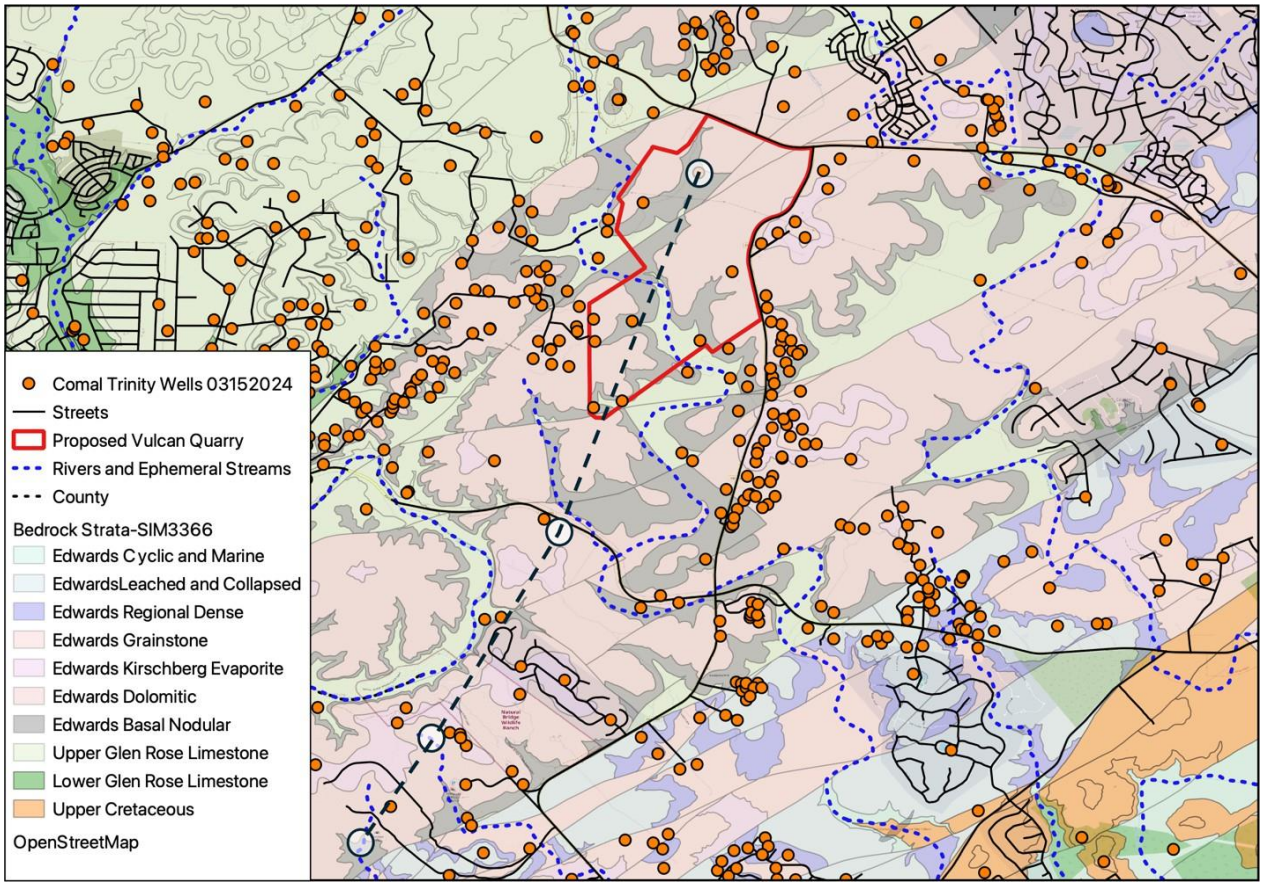


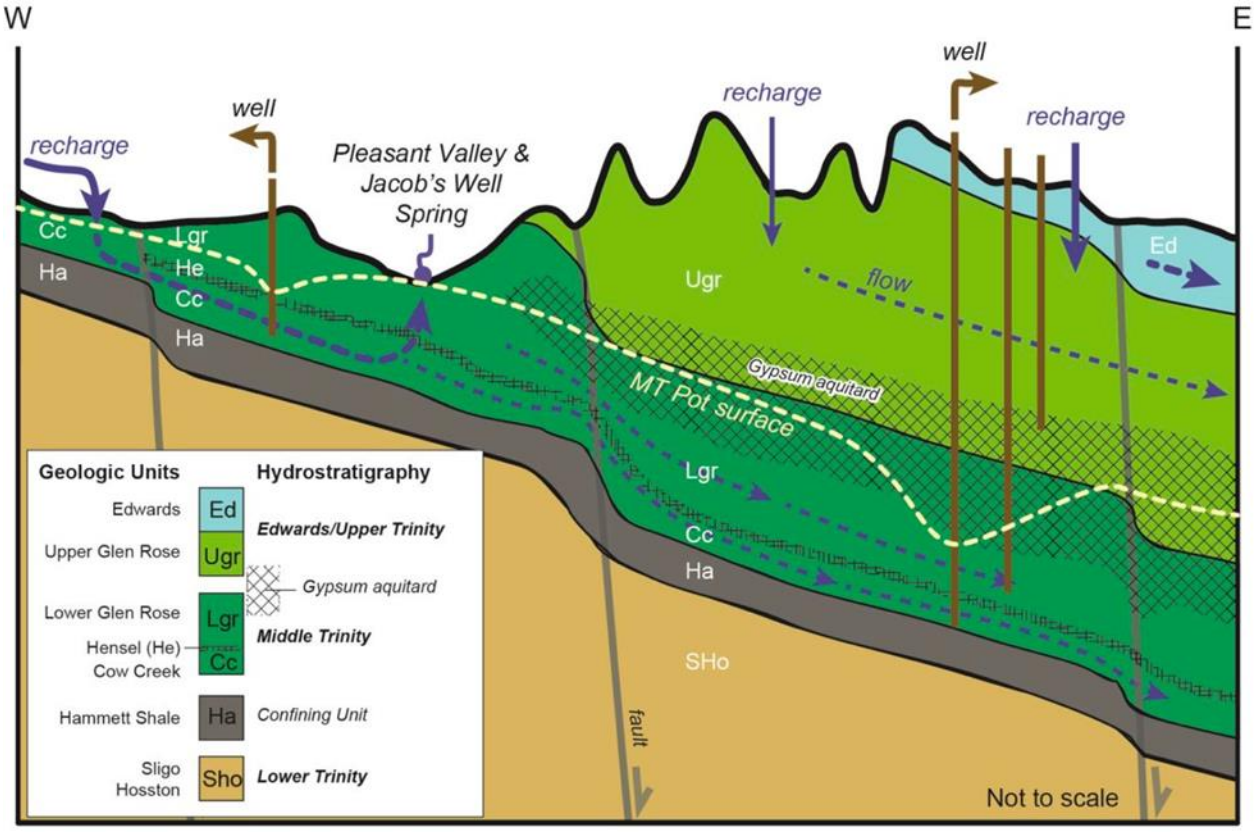
Figure 2. Geologic map of central Comal County showing water-supply wells (Source: J. Finneran).

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

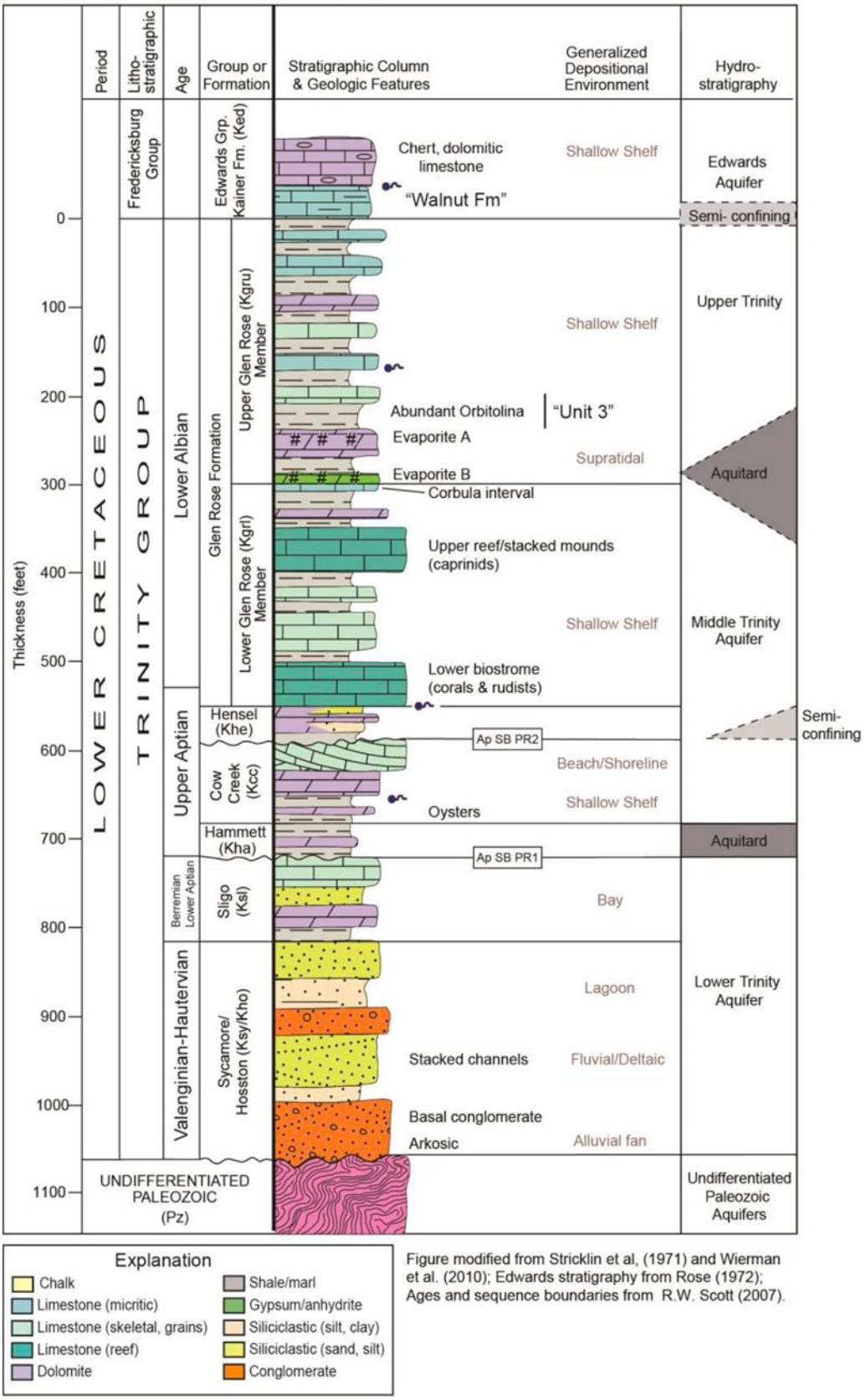


Figure 4. Stratigraphic and hydrostratigraphic column (Hunt et al., 2017).

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.

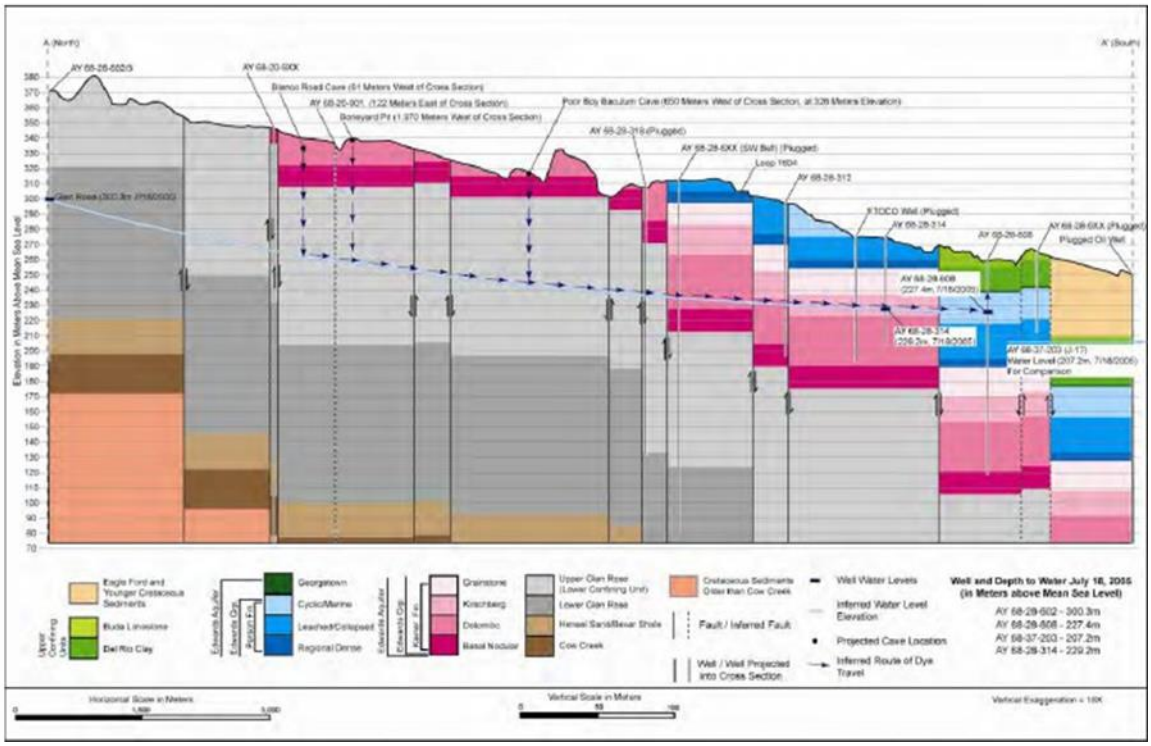


Figure 6. Flow of groundwater laterally and across faults from the Upper Glen Rose (Upper Trinity) into the Kainer (lower Edwards) then into the Person Formation (upper Edwards) in northern Bexar County (Johnson et al., 2010).

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).

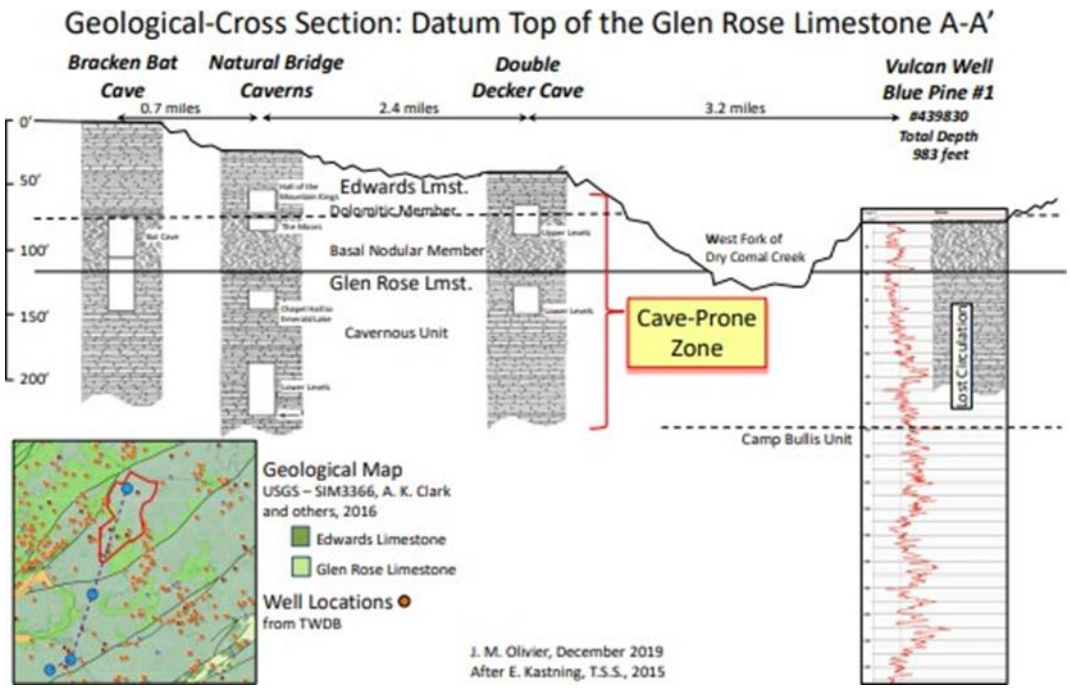


Figure 7. Geologic cross section showing the correlation between the well on the Vulcan site and caves in the same geologic units (Source: J. M. Olivier).

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.

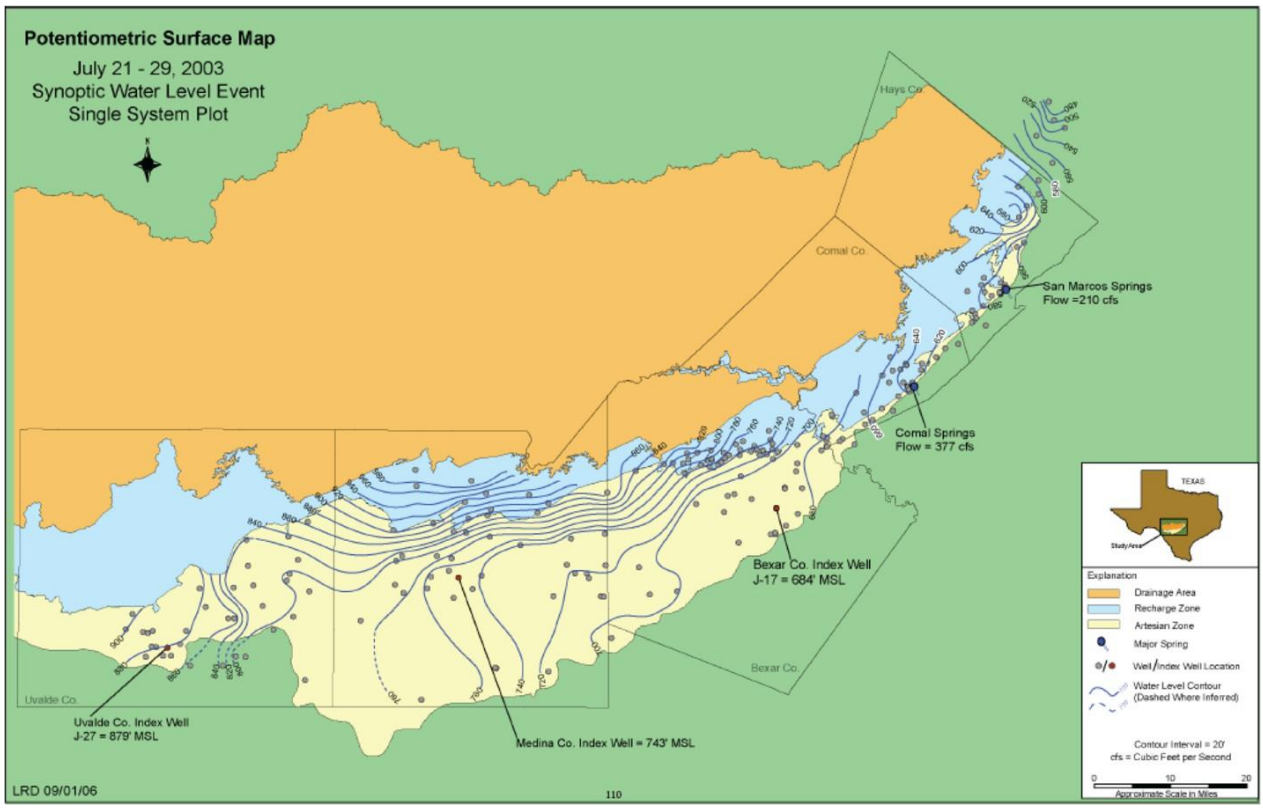


Figure 8. Potentiometric surface map showing approximate Edwards groundwater flow direction in south-central Comal County to be to the southeast (Johnson et al., 2006).

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.

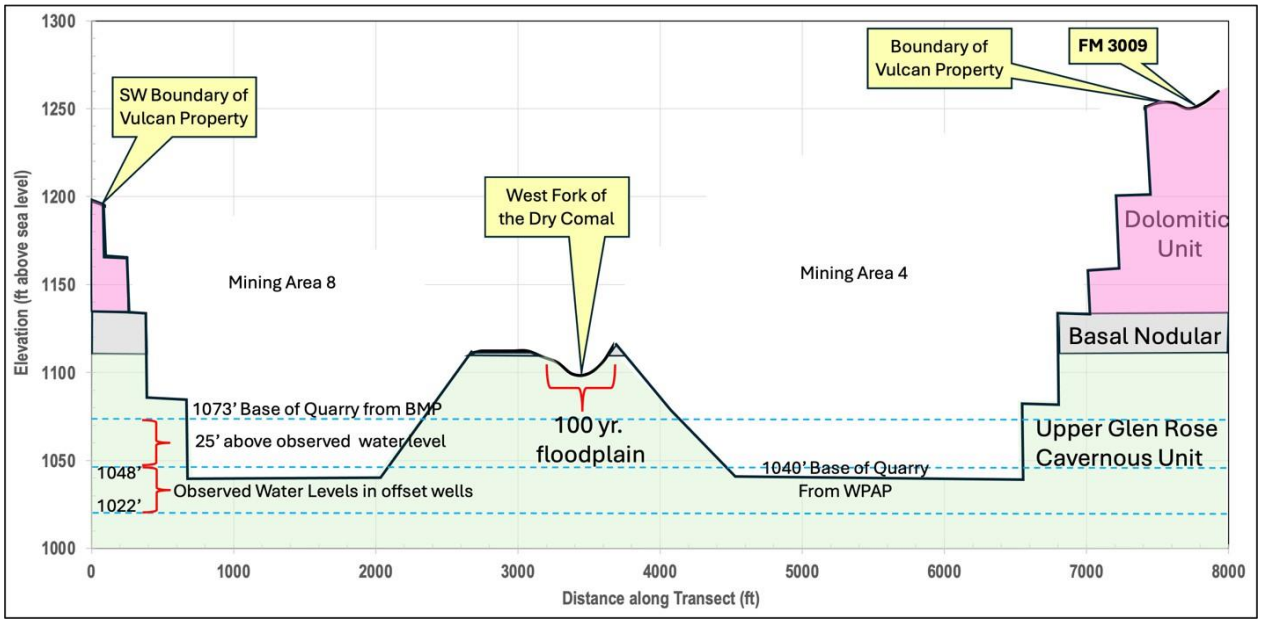


Figure 9. Schematic cross section with estimated topography after mining and water levels based on available data (J. Finneran, personal communication, April 16, 2024).

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

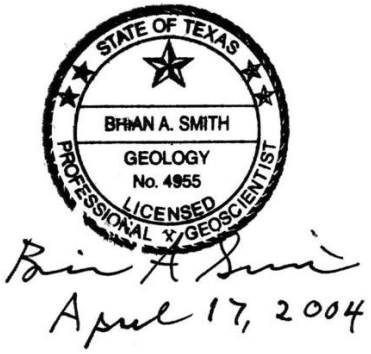
A permit for the quarry should not be considered until the following issues are addressed:

- 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.



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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

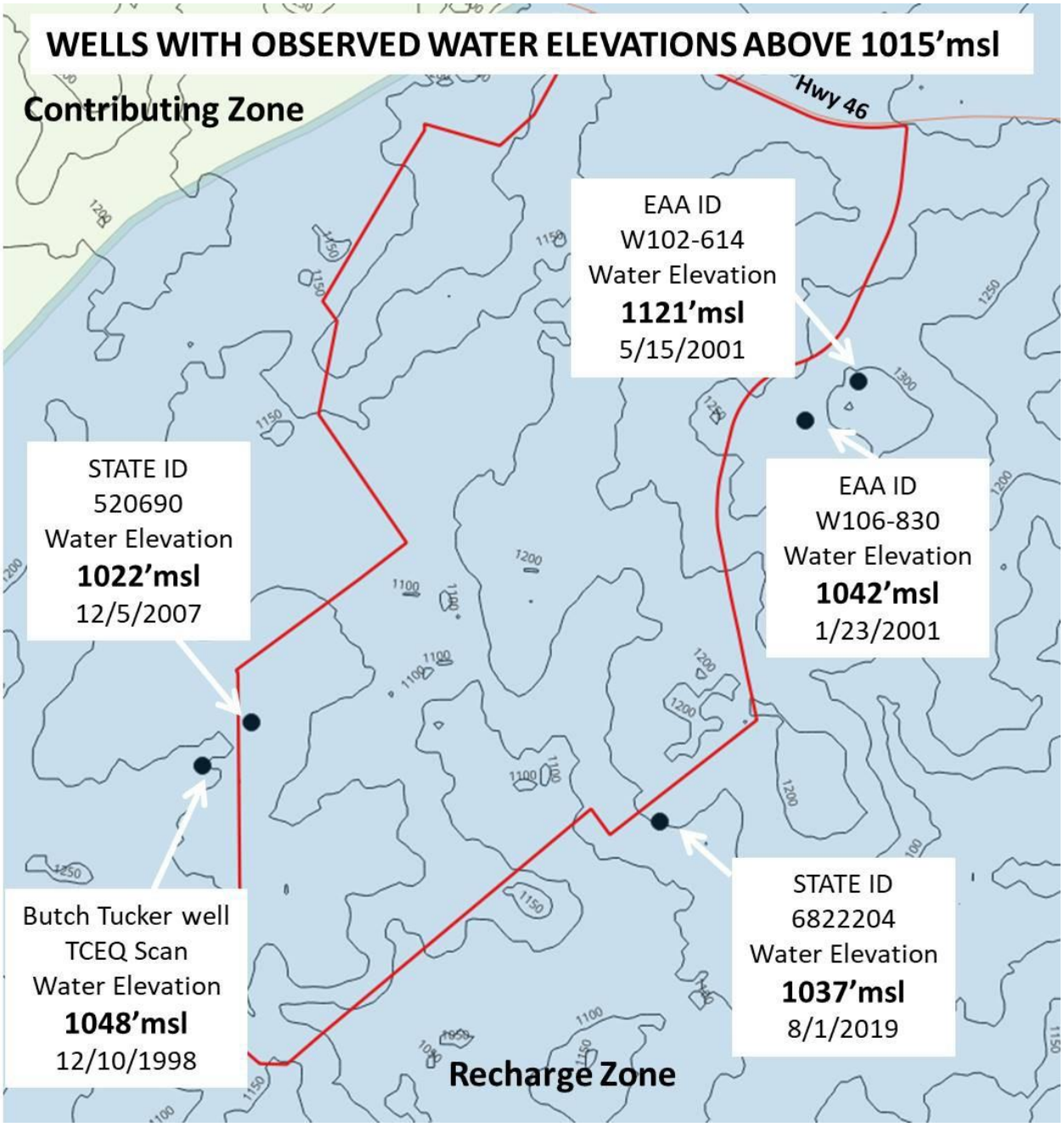
GWDB: TWDB Groundwater Database

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 B

Donna Campbell, M.D.
Texas State Senator
District 25

April 16, 2024

Laurie Gharis, Chief Clerk, MC-105
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Dear Chief Clerk Gharis,

I am writing on behalf of the constituents living near the proposed Vulcan Quarry on FM3009 in the New Braunfels and Bulverde area of Comal County, Texas. I would like to request a public meeting regarding PROPOSED PERMIT FOR AIR QUALITY NO. 13001906. The constituents have a myriad of questions and concerns they do not feel have been addressed.

Our responsibility to protect the Texas air, water, and natural resources, such as the Edwards Aquifer, while balancing economic development is an integral reason in having a public meeting with all parties involved.

With that in mind, I respectfully request TCEQ hold a public meeting at the earliest possible convenience to discuss the permit filed by the Vulcan Quarry.

I respectfully request that my office continue to be informed on activity regarding proposed permit No. 13001906.

Sincerely,

Donna Campbell

Senator Donna Campbell, M.D.
Senate District 25

Capitol Office:
Room 3E.18
P.O. Box 12068
Austin, Texas 78711
(512) 463-0125
Fax: (512) 463-7794

ATTACHMENT C

Frost GeoSciences

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Bigbee Tract **PROJECT NUMBER:** FGS-E21115

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	
S-1	29° 46' 48.38"	-98° 18' 24.97"	SC	20	Kkd	0.75	3	2	-	-	-	-	CF	15	35	35		YES		HILLSIDE
S-2	29° 46' 47.88"	-98° 18' 26.69"	SC	20	Kkd	1	3	2	-	-	-	-	CF	12	32	32		YES		HILLSIDE
S-3	29° 46' 49.51"	-98° 18' 28.84"	SC	20	Kkd	1.5	1	1.5	-	-	-	-	CF	13	33	33		YES		HILLSIDE
S-4	29° 46' 46.99"	-98° 18' 31.69"	SC	20	Kkd	1	1	1.5	-	-	-	-	CF	10	30	30		YES		HILLSIDE
S-5	29° 46' 46.72"	-98° 18' 30.98"	CD	5	Kkd	2	2	0.75	-	-	-	-	CF	10	15	15		YES		HILLSIDE
S-6	29° 46' 46.16"	-98° 18' 22.98"	SH	20	Kkd	4	5	2	-	-	-	-	CF	12	32	32		YES		HILLSIDE
S-7	29° 46' 46.39"	-98° 18' 22.68"	SC	20	Kkd	1	0.75	1	-	-	-	-	CF	12	32	32		YES		HILLSIDE
S-8	29° 46' 45.84"	-98° 18' 22.76"	SH	20	Kkd	4	5	2	-	-	-	-	CF	12	32	32		YES		HILLSIDE
S-9	29° 46' 45.63"	-98° 18' 33.26"	O^{FR}	5	Kkd	12	20	-	-	-	1/ft	0.1 to 0.25	CF	10	15	15		YES		HILLSIDE
S-10	29° 46' 43.60"	-98° 18' 36.22"	SH	20	Kkd	5	4	2	-	-	-	-	CF	15	35	35		YES		HILLSIDE
S-11	29° 46' 43.09"	-98° 18' 19.72"	CD	5	Kkd	4	4	2	-	-	-	-	CF	10	15	15		YES		HILLSIDE
S-12	29° 46' 41.02"	-98° 18' 32.29"	SC	20	Kkd	1	3	2	-	-	-	-	CF	12	32	32		YES		HILLSIDE
S-13	29° 46' 41.49"	-98° 18' 35.75"	O^{FR}	5	Kkd	15	20	-	-	-	1 to 2/ft	0.1 to 0.5	CF	15	20	20		YES		HILLSIDE

Datum: NAD 83

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, Floodplain, Streambed

STATE OF TEXAS Christopher Wickman Geology 10403 LICENSED PROFESSIONAL GEOSCIENTIST

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 213.

Chris Wickman, P.G.

Date: April 21, 2021

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

Sheet 1 of 3

Frost GeoSciences

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Bigbee Tract | **PROJECT NUMBER:** FGS-E21115

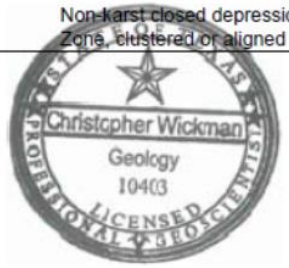
LOCATION			FEATURE CHARACTERISTICS											EVALUATION			PHYSICAL SETTING		
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10		11	12
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)	TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6 >1.6	
S-14	29° 46' 37.10"	-98° 18' 30.12"	SH	20	Kkd	4	3	2	-	-	-	-	OCF	15	35	35		YES	HILLSIDE
S-15	29° 46' 37.37"	-98° 18' 18.57"	O[FR]	5	Kkd	15	20	-	-	-	3 to 6/ft	0.1 to 0.25	CF	17	22	22		YES	STREAMBED
S-16	29° 46' 51.06"	-98° 18' 21.08"	CD	5	Kkd	3	4	1.5	-	-	-	-	CF	10	15	15		YES	HILLSIDE
S-17	29° 46' 49.12"	-98° 18' 22.40"	SH	20	Kkd	2	3.5	7	-	-	-	-	CF	25	45	45		YES	STREAMBED
S-18	29° 46' 49.57"	-98° 18' 28.32"	CD	5	Kkd	1.5	3	1	-	-	-	-	CF	10	15	15		YES	HILLSIDE
S-19	29° 46' 46.84"	-98° 18' 35.00"	SC	20	Kkd	1	3	2	-	-	-	-	CF	15	35	35		YES	HILLSIDE
S-20	29° 47' 0.81"	-98° 18' 33.98"	MB	30	kgrc	0.5	0.5	400+	-	-	-	-	CF	8	38	38		YES	HILLSIDE
S-21	29° 47' 0.77"	-98° 18' 32.30"	MB	30	kgrc	0.5	0.5	400+	-	-	-	-	CF	8	38	38		YES	HILLSIDE
S-22	29° 47' 0.72"	-98° 18' 29.62"	MB	30	kgrc	0.5	0.5	400+	-	-	-	-	CF	8	38	38		YES	HILLSIDE
S-23	29° 46' 59.92"	-98° 18' 37.82"	MB	30	kgrc	0.5	0.5	400+	-	-	-	-	CF	8	38	38		YES	HILLSIDE
S-24	29° 46' 58.17"	-98° 18' 39.62"	MB	30	kgrc	0.5	0.5	?	-	-	-	-	CF	8	38	38		YES	HILLSIDE
S-25	29° 46' 40.56"	-98° 18' 19.22"	MB	30	kgrc	0.5	0.5	4	-	-	-	-	X	5	35	35		YES	HILLSIDE
S-26	29° 46' 43.26"	-98° 18' 26.35"	MB	30	kgrc	0.5	0.5	2.5	-	-	-	-	X	5	35	35		YES	HILLSIDE

Datum: NAD 83

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, Floodplain, Streambed



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Chris Wickman, P.G.

Date: April 21, 2021

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

Frost GeoSciences

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Bigbee Tract | **PROJECT NUMBER:** FGS-E21115

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	
S-27	29° 46' 39.21"	-98° 18' 35.17"	MB	30	Kkd	0.5	0.5	2.5	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-28	29° 46' 48.03"	-98° 18' 31.83"	MB	30	Kkd	0.5	0.5	2.5	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-29	29° 46' 53.65"	-98° 18' 39.02"	MB	30	Kgrc	0.5	0.5	15	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-30	29° 46' 52.67"	-98° 18' 31.61"	MB	30	Kgrc	0.5	0.5	15	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-31	29° 46' 59.27"	-98° 18' 31.23"	MB	30	Kgrc	0.5	0.5	2.5	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-32	29° 46' 56.76"	-98° 18' 23.17"	MB	30	Kgrc	0.5	0.5	15	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-33	29° 47' 2.04"	-98° 18' 21.94"	MB	30	Kgrc	0.5	0.5	3.5	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-34	29° 46' 55.74"	-98° 18' 15.54"	MB	30	Kgrc	0.5	0.5	4	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-35	29° 46' 52.07"	-98° 18' 22.49"	MB	30	Kgrc	0.5	0.5	4	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-36	29° 46' 48.25"	-98° 18' 17.45"	MB	30	Kkd	0.5	0.5	2	-	-	-	-	X	5	35	35		YES		HILLSIDE
S-37	29° 46' 56.16"	-98° 18' 27.04"	F	20	Kgrc	-	-	-	-	-	-	-	CF	10	30	30		YES		HILLSIDE
S-38	29° 46' 50.95"	-98° 18' 24.66"	F	20	Kkd/Kgrc	-	-	-	-	-	-	-	CF	15	35	35		YES		HILLSIDE

Datum: NAD 83

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STATE OF TEXAS — Christopher Wickman — Geology — 10403 — LICENSED PROFESSIONAL GEOSCIENTIST

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Sheet 3 of 3