

Alamo, Austin, and Lone Star chapters of the Sierra Club **Bexar Audubon Society** Austin, Bexar and Travis Green Parties Bexar Grotto **Boerne Together Bulverde Neighborhood Alliance** Bulverde Neighbors for Clean Water **Cibolo Center for Conservation** Citizens for the Protection of Cibolo Creek **Comal County Conservation Alliance Environment Texas** First Universalist Unitarian Church of SA Friends of Canyon Lake Friends of Dry Comal Creek Friends of Government Canyon Fuerza Unida Green Society of UTSA **Guadalupe River Road Alliance Guardians of Lick Creek** Headwaters at Incarnate Word Helotes Heritage Association **Hill Country Alliance** Kendall County Well Owners Association Kinney County Ground Zero Leon Springs Business Association Native Plant Society of Texas - SA Northwest Interstate Coalition of Neighborhoods Pedernales River Alliance - Gillespie Co. **Preserve Castroville** Preserve Lake Dunlop Association Preserve Our Hill Country Environment **RiverAid San Antonio** San Antonio Audubon Society San Antonio Conservation Society San Geronimo Valley Alliance San Marcos Greenbelt Alliance San Marcos River Foundation Save Barton Creek Association Save Our Springs Alliance Scenic Loop/Boerne Stage Alliance Securing a Future Environment **SEED Coalition** Signal Hill Area Alliance Sisters of the Divine Providence Solar San Antonio **Texas Cave Management Association** Trinity Edwards Spring Protection Assoc. Water Aid - Texas State University Wildlife Rescue & Rehabilitation Wimberley Valley Watershed Association PO Box 15618

San Antonio, Texas 78212 (210) 320-6294 November 16, 2023

Edwards Aquifer Protection Plan Review Texas Commission on Environmental Quality 12100 Park 35 Circle Austin, TX 78753

RE: Opposition to the Needmore Ranch Quarry's Edwards Aquifer Protection Plan Application (No. 11003759 & 1100376) Submitted via email to: <u>eapp@tceq.texas.gov</u>

These comments are submitted on behalf of the fifty-seven member organizations of the Greater Edwards Aquifer Alliance, a 501(c)(3) nonprofit organization that promotes effective broad-based advocacy for the protection and preservation of the Edwards Aquifer, its springs, watersheds, and the Texas Hill Country that sustains it. GEAA has multiple member organizations that would be adversely affected by the proposed development.

1.0 Background

The applicant, Far South Mining, LLC is proposing to operate a quarry (Needmore Ranch Quarry) for limestone aggregate and minor quantities of cut bulk limestone within an approximately 200-acre section of the Needmore Ranch located on Fulton Ranch Road near Wimberley, Hays County, Texas. The land is currently undeveloped and used for agricultural and hunting purposes. The applicant has submitted an Edwards Aquifer Protection Plan (EAPP) that includes a Water Pollution Abatement Plan (WPAP) and Aboveground Storage Tank (AST) Facility Plan for review by TCEQ and concerned parties such as GEAA. The proposed development site is located within the Edwards Aquifer Recharge Zone.

2.0 Comments on the EAPP

Under the federal Clean Water Act, TCEQ is charged with maintaining the quality of our state's waters and protecting their existing uses. The Needmore Ranch Quarry as currently proposed will likely degrade Sink Creek, a tributary that has a direct flow path to Spring Lake, and local groundwater quality GEAA; therefore, strongly opposes the Far South Mining, LLC's EAPP for the reasons presented in these comments.

2.1 Environmentally-Sensitive Location of the Facility

GEAA understands the location of this quarry is within the 100-year floodplain, and is located on the Edwards Aquifer Recharge Zone (EARZ). The floodplain in this proposed project is a headwaters tributary to Sink Creek. In numerous places in the WPAP, the applicant states they will obtain permits for mining across a 100-year flood plain at a later date. Sink Creek enters the San Marcos River just above Spring Lake and San Marcos Springs. 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 ammonium nitrate fuel oil mixtures (ANFOs). Due to the karstic nature of the aquifer, increased contaminant loads to the creek may also contribute to impacts to the aquifer.

In addition, recharge occurs from the surface through fractures and faults, surficial karst features, such as caves, sink holes, and direct recharge from streams. According to several 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. Further, Sink Creek has been identified as a local source of recharge to San Marcos Spring¹. Contaminants entering the aquifer from the quarry site can rapidly migrate through the fractured and karstic aquifer and impact San Marcos Springs.

2.2 Water Quality & Endangered Species Concerns

Residual contamination from the explosives used in rock quarries (especially Nitrates) is a huge concern for the local water quality and endangered species. Evidence exists that quarry operations have impacted the Edwards Aquifer in the past due to residuals from ANFOs. The aggregate industry primarily uses ANFOs as an explosive for day-to-day operation, linking quarries to be a known source of nitrate pollution of groundwater. 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. In addition to nitrate concerns, ANFOs can be organic compounds, such as residual benzene from fuel oil, which has been shown to impact groundwater resources in the vicinity of mining operations.

In addition to water quality concerns, the impacts on the local endangered species in Spring Lake and the San Marcos River need to be stated. Species of concern found in the Spring Lake and the San Marcos River area include, but are not limited to the Comal Springs Dryopid Beetle, Peck's Cave Amphipod, Texas Blind Salamander, Comal Springs Riffle Beetle, Fountain Darter, San Marcos Salamander, and Texas Wild Rice. It is also worth noting that the Blanco Blind Salamander and the Comal Springs Riffle Beetle have been found near the site are also worth stating concern.

¹ Johnson, S.,et, al., 2012. Tracing Groundwater Flowpaths in the Vicinity of San Marcos Springs, TX. Edwards Aquifer Authority publication.

3.0 Conclusion

With the above comments stated, GEAA encourages TCEQ to deny approval of this plan as currently submitted. GEAA would support the creation of a draft Best Management Practices (BMPs) for aggregate production operations (APOs) impacting the Edwards Aquifer as this is long overdue.

TCEQ should also consider incorporating Edwards-specific rules for quarries and rock crushers in the Recharge and Contributing Zones. Where these facilities are located in Edwards Limestone, the underlying aquifer is particularly vulnerable to contamination, whether or not the quarry actually excavates to below the aquifer water level. Without more stringent TCEQ regulations, quarries and rock crushers threaten to degrade the Aquifer and damage the health and water supply of adjacent communities. In addition, TCEQ should provide additional venues for public participation in considering APOs on the EARZ by providing for public meetings, public hearings, and contested case hearings for water pollution abatement. This could be achieved by changing the WPAP to a Water Pollution Abatement Permit. Since APOs are only required to go through the permit application process for air quality, the public is deprived of the opportunity to pursue concerns regarding vital groundwater resources.

Lastly, GEAA supports the statements made by the Trinity Edwards Springs Protection Association (TESPA, see attached document for their comments), the San Marcos River Foundation (SMRF), and Preserve Our Hill Country Environment (PHCE)

Thank you for the opportunity to submit these comments.

Respectfully,

An IN ASSAGE

Annalisa Peace Executive Director Greater Edwards Aquifer Alliance

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: <u>https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=6808601&T</u> ype=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.

2

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.





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 NH4⁺ and NO3⁻ 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/m³ (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 NO₃ (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. NO₃ 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.

(8-40) (>40)

mg/L

the increase in aquifer nitrate levels.

(.5 - 2) (2- 5) (5- 8)

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

(0 - .5)

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 NO³ (10 mg/L N), but most measurements are above 8 mg/L N as NO³ (2 mg/L N) which is harmful to some freshwater aquatic organisms (Monson and others, 2016).

The Needmore Quarry is proposed to be 8.09×10^5 m² (200 acres). Applying typical industry usage values of 0.45kg/m³ of ANFO would yield an estimate of 3.64×10^5 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 1.49×105 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 1.81×10^7 kg (20,000 tons) of rock (Chasnof, 2021). That corresponds to ~.5 kg/m³ of ANFO per cubic meter.



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.





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 guarry 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

Unman

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