20 Portsmouth Ave. Suite 1, No. 225
Stratham, NH 03885
Telephone: (603) 242-1503
www.icelegal.com

August 23, 2025

Planning Board
City of Keene
3 Washington Street
Keene, NH 03431
Via email: mbrunner@keenenh.gov
mfortson@keenenh.gov

Re: Written testimony and additional materials for support of G2 Holdings Earth Excavation application.

Dear Planning Board Members,

Please find the following written testimony to aid in your evaluation and deliberation on the above-referenced application:

1. Luke Hurley Affidavit (Wildlife Impact Opinion)
2. Mark Krumenacher's Affidavit (Property Value Opinion)
3. Dr. Kathy Aimone-Martin Report and Affidavit (Blasting and Noise Opinion)
4. James Weidner Letter (Property Value Opinion)

Additionally, we are providing a support letter from Granite Gorge and current photos showing the buffering and the entrance area.

Thank you for your attention to this matter.

Ariane Ice
Ice Legal, P.A.
20 Portsmouth Ave. Suite 1, No. 225
Stratham, NH 03885
Mobile: (561) 319-5557
ariane.ice@icelegal.com
Attorney for G2 Holdings, LLC

AFFIDAVIT OF LUKE D. HURLEY
(EXPERT IN WILDLIFE ECOLOGY)

1. I, Luke D. Hurley, being duly sworn, depose and say as follows:

I. Qualifications and Background

2. I am over eighteen years of age, competent to testify, and make this affidavit based upon my own personal knowledge, education, and professional experience.

3. A copy of my Curriculum Vitae is attached to this affidavit for reference.

4. I hold a Bachelor of Science Degree in Environmental Biology from the University of Massachusetts and am certified as a Wetland Scientist and Soil Scientist by the State of New Hampshire. I am also a Certified Erosion, Sediment, and Storm Water Inspector (CESSWI), credentialed by EnviroCert International.

5. I have over three decades of experience in wildlife ecology, wetland science, and natural resource permitting.

6. My responsibilities include overseeing and implementing all phases of large-scale commercial, retail, and residential development, including preliminary land evaluations, permitting, and alternatives analysis under local, state, and federal regulations.

7. I regularly coordinate and perform wetland and soil analyses, wetland delineations, vernal pool certification, wildlife habitat evaluations, threatened and endangered species surveys, and prepare permitting documents for federal and state agencies, including:

- New Hampshire Department of Environmental Services (NH DES) Wetlands Bureau NH DES Shoreland Protection Act
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- Maine Department of Environmental Protection (ME DEP) under the Natural Resource Protection Act
- Massachusetts Wetlands Protection Act

8. I am experienced in the wildlife and habitat assessments associated with permitting processes, and I regularly represent clients at public hearings before local conservation commissions and state and federal regulatory agencies.

II. Purpose of Affidavit

9. I have been asked to evaluate the potential ecological and wildlife impacts associated with blasting and earth removal operations proposed in the Gravel and Earth Removal Plan of G2 Holdings, LLC, for Keene Tax Map 215 Lots 7 & 8 and Sullivan Tax Map 5 Lots 46 & 46-1, dated May 9, 2025.

10. I have personally conducted a site visit to the property described in those plans, and my conclusions are based on that visit and my professional expertise.

III. Wildlife and Impact Assessment

11. The property lies within a habitat zone typical of southern New Hampshire which supports a diverse population of wildlife including, but not limited to:

- White-tailed deer (Odocoileus virginianus)
- Moose (Alces alces)
- Red fox, raccoon, skunk, porcupine
- Small mammals such as squirrels, voles, and mice
- Numerous amphibians and reptiles including spring peepers, wood frogs, garter snakes
- Various bird species, both migratory and resident, such as warblers, sparrows, woodpeckers, and hawks

IV. Conclusions Regarding Blasting and Wildlife Impact

12. The planned project includes phased development with a substantial portion of the parcel remaining undisturbed, which will continue to serve as suitable habitat for wildlife during and after construction.

13. Blasting and earth removal activity, though disruptive in the short term, will not result in the permanent displacement of native fauna. Wildlife will temporarily migrate to adjacent undisturbed areas with similar ecological characteristics and will return as reclamation progresses.

14. This pattern of temporary movement and return is consistent with natural behaviors observed during forestry operations, storm events, or other temporary disturbances in New Hampshire.

15. The project area, once disturbed and reclaimed, may actually provide early successional plant growth, which can be beneficial to certain species, especially white-tailed deer, which are known to browse in regenerating habitats.

16. The ecological impact is expected to be minimal and temporary, and no long-term harm to local wildlife populations is anticipated.

V. Summary

17. Based on my site visit and professional assessment:

- General wildlife species in the area will adapt and relocate temporarily.
- A large portion of the parcel will remain viable habitat throughout the project duration.
- Wildlife will not be permanently displaced and is likely to return post-disturbance.
- Habitat diversity and ecological function will be maintained.

I affirm that the foregoing is true and accurate to the best of my knowledge and belief.

Signed under penalty of perjury this 27th day of June, 2025.

Luke D. Hurley
CWS, CSS, CESWII

STATE OF NEW HAMPSHIRE
COUNTY OF MERRIMACK

On this 10 day of July, 2025, before me, the undersigned Notary Public, personally appeared Luke D. Hurley, who, being by me duly sworn, made oath that the foregoing affidavit is true to the best of his knowledge and belief.

Michele M. Bell
Notary Public
My Commission Expires: 12/18/2029

(Seal)

MICHELE M. BELL NOTARY PUBLIC NEW HAMPSHIRE MY COMMISSION EXPIRES 12/18/2029

LUKE D. HURLEY

CWS, CSS, CESWII

Wetland Scientist, Soil Scientist, Ecologist

EXPERIENCE

4/2024-Present Owner/Principal, Hurley Environmental and Land Planning, LLC, Epsom, NH
1/2023-4/2024 Senior Ecologist, Wetland and Soil Scientist, *BSC Group, Manchester NH*
2002–2022 Vice President, Senior Ecologist, Wetland Scientist, Soil Scientist, *Gove Environmental Services, Inc*.
2000–2002 Environmental/Wetland Scientist, *Acton Survey & Engineering, Acton, MA*
1999–2000 Staff Naturalist, *Massachusetts Audubon Society, Lincoln, MA*
1998–1999 Environmental Inorganic Chemist, *Severn Trent Laboratories, Billerica, MA*

EDUCATION

B.S. in Environmental Biology, University of Massachusetts, 1996. Concentration in Ornithology, Field Ecology & Biology, Entomology, Invertebrate Zoology, Botany, Wetland Ecology and Limnology.

CERTIFICATIONS

Certified Wetland Scientist, State of New Hampshire (*Cert. No 232*)
Certified Soil Scientist, State of New Hampshire (*Cert no. 095*)
Certified Erosion, Sediment, and Storm Water Inspector

PROFESSIONAL SOCIETIES

Association of Massachusetts Wetland Scientists (AMWS)
International Erosion Control Association (IECA)
Massachusetts Association of Conservation Commissions (MACC)
New Hampshire Association of Natural Resource Scientists (NHANRS)

PROFESSIONAL EXPERIENCE SYNOPSIS

Luke Hurley has worked in the field of wetland science and ecology since 1999. He is responsible for overseeing and implementing all phases of large-scale commercial retail and residential development including preliminary land evaluations, permitting and alternatives analysis under all aspects of local, state and federal regulations. Mr. Hurley is also responsible for coordinating and performing field wetland and soil analyses, delineating wetlands, wetland functions and values and project impact assessments, vernal pool certification, wetland mitigation and restoration design and monitoring, wildlife habitat evaluation, threatened and endangered species surveys, inventories and permitting documents. He specializes in permitting under the NH DES Wetlands Bureau and NH DES Shoreland Protection Act, as well as the US Army Corps of Engineers and US Environmental Protection Agency, ME DEP Natural Resource Protection, and Massachusetts Wetlands Protection Act, through Notice's of Intent, as well as additional wetland related permitting through Notice of Resource area Delineations (NRAD) and Abbreviated NRAD (ANRAD), Determination of Applicability and represents clients at hearings with local conservation commissions and other state and federal agencies. Mr. Hurley has a Bachelor of Science Degree in Environmental Biology from the University of Massachusetts. He is certified as a Wetland Scientist and Soil Scientist by the State of New Hampshire and CESSWI, by Envirocert International. Mr. Hurley has also been an on-call Wetland Scientist for The State of New Hampshire DOT for three successive contract terms.

PROFESSIONAL SPECIALIZATION

<u>New Hampshire Department of Environmental Services Wetlands Bureau</u>

- Dredge and Fill Applications
- Shoreland Protection Act

New Hampshire Fish and Game Qualified Biologist
Under NH Fish and Game FIS 1004, conducted hundreds or rare species and habitat reports for coordination with NHF&G as part of the new requirement for all projects permitted through the NH Department of Environmental Services, to have coordination reports documenting the existing site conditions, as well as documentation of potential rare species present and potentially present on the site and proposing mitigation measures to minimize any possible impacts to species and their habitat.

US Fish and Wildlife
Conducted numerous surveys for federally listed plant and animal species in conjunction with US Army Corp of Engineers permitting guidelines.

Massachusetts Wetlands Protection Act (MWPA) & Massachusetts Environmental Policy Act (MEPA) Permitting including:

- NOI (Notice of Intent)
- ANOI (Abbreviated Notice of Intent)
- NRAD (Notice of Resource Area Delineation)
- ANRAD (Abbreviated Notice of Resource Area Delineation)
- RDA (Request of the Determination of Applicability)
- Water Quality Certification
- Ecological Impact Assessments
- Critical Habitat Evaluation in Terrestrial
  Aquatic Ecosystems; Wildlife Ecology

Massachusetts Endangered Species Act (MESA) Regulations and Massachusetts Natural Heritage & Endangered Species Program including:

- Priority/Estimated Habitat Certification
- Vernal Pool Assessment and Certification
- Rare, Threatened & Endangered Species Inventories
- Natural Communities & Habitat Classification
- Qualified Biologist for Rare, Threatened and Endangered Species Collection

ME DEP Natural Resource Protection

- Ch 305 Permit by Rule
- Ch 310 Wetlands
- Ch 315 Assessing and Mitigating Impacts to Scenic and Aesthetic Uses
- Ch 335 Significant Wildlife Habitat Rules

STATE OF WISCONSIN)
)
COUNTY OF WAUKESHA)

AFFIDAVIT OF MARK J. KRUMENACHER, P.G.

I, Mark J. Krumenacher, P.G., being duly sworn, do hereby state as follows:

Background

I am a Senior Principal Geologist with GZA GeoEnvironmental, Inc. ("GZA") and have more than 40 years of experience in nonmetallic mining and over 20 years specifically focused on the relationship between mining and real estate values. I have conducted or reviewed property value research across the United States, provided expert testimony at public hearings and before legislative bodies, and spoken at numerous professional conferences.

1. Purpose of Affidavit

At the request of G2 Holdings, LLC, I evaluated whether the proposed earth excavation project in the City of Keene and the Town of Sullivan, New Hampshire, would negatively impact surrounding property values.

2. Summary of Findings

Extensive, peer-reviewed, and professionally conducted studies consistently demonstrate there is no reliable evidence that nonmetallic mining operations cause widespread or consistent declines in nearby property values. While individual cases may vary, particularly properties immediately adjacent to mine entrances, many nearby properties experience no change or even value increases due to buffers, open space, and wooded areas. This is especially true after reclamation.

3. Scientific Studies Show Little or No Adverse Effects of Excavation Sites on Local Home Values

I reviewed over a dozen studies conducted between 1981 and 2011. Key findings include:

- **1981 U.S. Bureau of Mines Study**: Found no consistent relationship between quarries and property values in four states.
- **1987 Georgia State University Study**: Found properly operated quarries had no adverse effect on adjacent home values; some areas near quarries appreciated faster.
- **1995–2002 Appraisal and Academic Studies** (WA, CO, OH, IL): Found no adverse property value effects when reasonable buffers were in place. In several instances, appreciation was higher near mines.
- **2011 Winona County, MN**: Reviewed 54 existing mining operations and found no measurable negative impact on surrounding property values.

4. Invalid or Misleading Reports

Claims of decreased property values are often based on flawed or non-peer-reviewed documents, such as the so-called "Erickcek Study," which inappropriately applied landfill data to mining scenarios and used an unpublished, unverified theoretical model. This report has been widely discredited by professional appraisers and its conclusions lack empirical support.

5. Perception vs. Reality

While fear of harm may exist, such perceptions are not based on data. In some cases, opposition and repetition of false claims can harm property values more than the proposed mining operation. Real-world evidence and experience show that nonmetallic mining does not predictably harm property values.

6. Conclusion

Based on decades of research, expert review, and a comprehensive analysis of existing studies, there is no credible evidence that the proposed quarry expansion by G2 Holdings will result in decreased property values. The community and decision-makers should be guided by objective, scientific information, not unsubstantiated fears or misrepresented studies.

I swear (or affirm) that the statements made in this affidavit are true and correct to the best of my knowledge and belief.

Dated: 07/21, 2025

Signed: _____

Mark J. Krumenacher, P.G.
Senior Principal, GZA GeoEnvironmental, Inc.

Notary Acknowledgment

State of Wisconsin)
County of Waukesha)

On this 21 day of July, 2025, before me, the undersigned notary public, personally appeared **Mark J. Krumenacher**, who is known to me (or satisfactorily proven) to be the person whose name is subscribed to the within affidavit, and who, being duly sworn, made oath that the statements contained in the affidavit are true to the best of his knowledge and belief.

Whitney Fleischfresser

Whitney Fleischfresser

Notary Public
[Seal]

WHITNEY FLEISCHFRESSER NOTARY PUBLIC STATE OF WISCONSIN

My Commission Expires: 07/24/2027

Waukesha County

AIMONE-MARTIN ASSOCIATES, LLC
18 NATURE LANE • Lemitar NM 87823 • 505.980.9949

BLASTING AND MONITORING CONSULTANTS
NEW MEXICO • ARIZONA

Project:	Keene Quarry Earth Excavation Permit application
Submitted to:	Ariane Ice, Esq., Ice Legal, P.A. Cody Gordon, G2 Holdings, LLC
Description of Work:	Assessment of Proposed Quarry Blasting Impacts on Adjacent Community
Summitted by:	Dr. Catherine Aimone-Martin, Blasting and Monitoring Consultant
Date:	July 22, 2025

Background

G2 Holdings, LLC seeks to expand a quarry northeast of Keene, New Hampshire ("Quarry") at 57 Route 9 between Roxbury and Sullivan Counties. The City of Keene Land Development Code Amended February 2025 sets forth requirements in Article 25 pertaining to Earth Excavation as it applies to quarry excavations that requires rock drilling and blasting. I have been requested to address rock removal by blasting and certain aspects of post-blast rock processing as these activities might affect off-site properties and persons residing in proximity to the planned Quarry.

In preparation for this report, I have herein included reviews of the following materials and information as they pertain to quarry rock blasting:

1. Earth Excavation Application Materials available on the City of Keene Planning Board website[1],
2. discussions with Mr. Cody Gordon regarding plans for rock blasting,
3. a map of the Keene Quarry permit boundary provided by Granite Engineering overlain in Google Earth to evaluate the locations and types of surrounding properties,
4. information and documents in support of rock blast planning, documentation, and assessments in addition to instrumentation to record off-site ground vibrations and air overpressures during blasting for Mr. Cory Gordon (G2 Holdings, LLC) at the Gilsum Quarry provided from Mr. Louis Rumore, owner of Capital Rock Drilling & Blasting, a Blasting Contractor ("Contractor"),
5. post-blast records obtained from Capital Rock Drilling & Blasting during blasting at the Gilsum Quarry under the direction of Mr. Gordon used as an "analog" model to assess off-site impacts of blasting, including the Gilsum Quarry boundary map overlain in Google Earth and locations of surrounding properties showing where vibration monitoring took place,
6. Keene Land Development Code Section 25.3.21 Explosive Management and Section 25.3.22 Blasting Notifications, and Section 18.2.3 Noise & Vibrations,
7. the New Hampshire Admin. Code Saf, Subtitle Saf-C, Chapter Saf-C 1600 regulating the use, storage, transportation, handling, sale, and purchase of explosive materials within the state administered by the Department of Safety, Commissioner, and specifically Saf-C 1625.04 Vibration Limits[2],
8. New Hampshire Department of Safety and its Division of State Police Licenses in the Permits and Licensing Unit issues licenses and permits for the use, storge, marketing and sale of explosives.[3] The Administrative Rules for these permit and licenses are contained in Saf-C 1600.

[1] https://keenenh.gov/community-development/boards-and-committees/planning-board/
[2] https://gc.nh.gov/rules/state_agencies/saf-c1600.html
[3] https://www.nhsp.dos.nh.gov/our-services/justice-information-bureau/permits-and-licensing

This report addresses, in general, rock blasting planned for the Keene Quarry expansion with discussions of State and Federal regulations and Contractor requirements for the use of explosives for blasting, industry standards related to post-blast reporting and the use of blasting-type seismographs, predictions of ground vibrations associated with planned blasting at the Quarry using the Gilman Quarry as an "analog" model and other related issues pertaining to off-site impacts of rock blasting.

Preliminary Site Characteristics

A map of the Keene Quarry superimposed on Google Earth is given in Figure 1. The map shows the distribution of inhabited structures labeled as structures 1 through 6 that can be identified at this time and assumed to be closest to possible future blasting at the Quarry. Structure 3 and other structures on this property east of the Quarry are part of the Monadnock Habitat for Humanity that are allegedly slated for demolition in the near future. Therefore, the closest structure to future blasting identifiable at this time is structure 1 shown to be 1656 ft from the Quarry boundary to the northwest along S Rd.

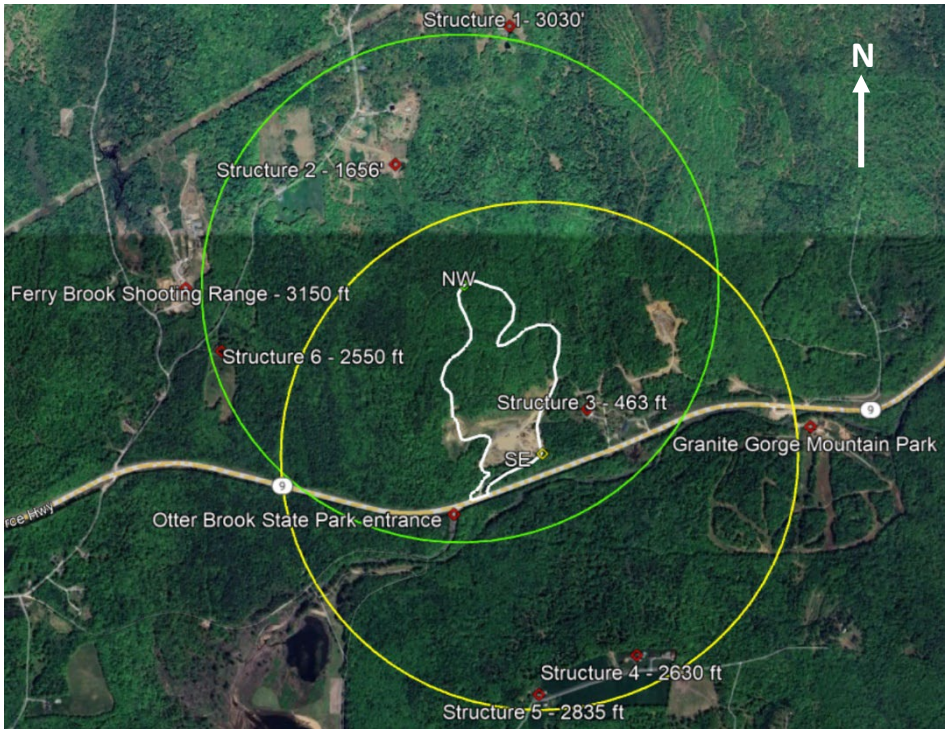

Figure 1. Outline of the Quarry permit area (in white); green and yellow circles represent 3000-ft radii from the closest points of possible blasting along the permit boundary showing distances to various inhabited structures 1 through 6.

State Regulatory Requirements for Blasting in New Hampshire

The following describes the regulatory framework within which quarry rock blasting is conducted in New Hampshire.

<u>Blasters Licenses and Certificates</u>

The Contractor hired to perform blasting at the Keene Quarry must maintain the following current licenses from the New Hampshire Division of State Police:

License to Market and Sell Explosives
License to Store Explosive Material
License to Use, Purchase, and Transport Explosives

In addition, each blaster on the blasting crew who handles explosives must pass a Competency Test and hold a Certificate of Competency for the Use of Explosives endorsed by two holders of current approved certificates of competency and adhere to on-going retaining and re-certification as specified.

This on-going education and training of licensed blasters is available by the International Society of Explosive Engineers (ISEE) and their various Chapters, explosive manufacturers, qualified consultants and others.

Adherence to State Regulations

Saf-C 1600 details requirements for handling, storage, sale, transport and use of explosives materials that must be followed by the Keene Quarry Contractor. These regulations are consistent with federal regulations administered by ATFE (Title XI, Regulation of Explosives 18 U.S.C. Chapter 40), the Department of Transportation (49 CFR), MSHA (Title 30, Chapter 1, Subpart K, Part 56) and OSHA (29 CFR Part 1926 and Section 109) that additionally apply to quarry blasting. In the case of conflict, the more stringent rule applies.

Regulations that apply to the protection of off-site structures are outlined in the New Hampshire Admin. Code section Saf-C 1625.04 Vibration Limits, in which two set of standards are described. It is not clear in the rules if adherence to both or to one alone is required.

The first standard, Table 1625.1 under Item (a), are limits in terms of displacements (in inches) based on the frequency of ground vibrations. As written, the limits are confusing, are not scientifically correct and therefore not recommended.

The second, Item (b), that most likely applies to the Quarry blasting, states the following:

> "A peak particle velocity of 2.0 inches per second shall be the maximum of any one of the 3 mutually perpendicular ground motion velocity components of a vibration. These components shall be measured in directions vertical, longitudinal, and transverse to the vibration Source.[4] Any ground vibration over peak particle velocity of 2.0 inches per second shall be reported to the director[5] within 24 hours."

The maximum, not to exceed, ground motion amplitude of 2 in/s peak velocity is consistent with ground vibration limits recommended over 45 years ago based on extensive quarry rock blasting structure response research conducted by Edward and Northwood (1960)[6] and the U.S. Bureau of Mines RI 656 (1971).[7]

[4] Blast location
[5] Most likely the Department of Safety Commissioner
[6] Edwards, A. T. and T. D. Northwood. Experimental Studies of the Effects of Blasting on Structures. The Engineer, v. 210, Sept. 5, 1960.
[7] Nicholls, H. R., C. F. Johnson and W. I. Duvall. Blasting Vibrations and Their Effects on Structures, U.S. Bureau of Mines, Bulletin 656. 1971.

Overview of Blasting Practices Planned for the Keene Quarry

Overview of Quarry Blasting Controls

The science of controlled quarry blasting to protect off-site infrastructure has been well-established for many decades. Licensed drillers and blasters in the U.S. are highly trained to pay careful attention to and accommodate variations in geology and rock structures to ensure each blast is designed for safety and to minimize the off-site impacts of noise and vibrations. Modern blasting products have evolved to supply the correct amount of energy for rock breakage and help blasters fragment and control rock displacement for excavation and processing. Containment of blasting agents preventing excessive noise and limiting rock throw from the top of blast holes or from open rock faces is achieved with properly designed drill hole spacings and angles, the distribution of explosive and delay timing among drilled holes, the sequence of initiation timing among all holes, and quantity of fine crushed rock stemming loaded at the top of each loaded hole. Equations employed to design these parameters have been used successfully for decades and are fundamental to blaster training.

Off-site Ground Vibration and Air Overpressure Limits Imposed on Inhabited Structures

It is industry standard for blasters to deploy seismographs when blasting in the vicinity of above and below ground structures and other protected features to ensure off-site impacts of ground vibration and air overpressure remain within safe limits practiced throughout the U.S. Such practice will take place by the Contractor when blasting at the Keene Quarry. The 2.0 in/s limit will apply to all off-site structures while air overpressures for transient blasts will most likely adhere to a sound pressure level (SPL) of 133 dBL (linear decibels) that is standard practice in the U.S. based on U.S. Bureau of Mines research on air overpressure effects on residential structures.

Blasting-type seismographs

The blasting Contractor will deploy blasting-type seismographs at the closest off-structures for each blast to record ground vibrations and air overpressures. These seismographs adhere to standards for calibration and deployment of geophones and air pressure sensors as adopted by the International Society of Explosives Engineers (ISEE) and follow industry standards for the preparation of post-blast reports.[8] These standards also provide recommended practices for geophone coupling into the ground, trigger levels, sample rate, and requirements for recording precise locations for both the closest blast hole(s) as each seismograph.

Post-blast reports

Post-blast reports will follow industry standards with sufficient details for the drill patterns, hole depths, stemming materials and lengths, delay timing, and sequence of blast hole initiations along with a list of all explosive products consumed as well as unused and removed from the blast site in accordance with State and Federal requirements. Blast hole loading of explosives will be carefully calculated to ensure both ground vibrations and air overpressures remain well below safe and acceptable limits at off-site structures.

[8] ISEE Field Practice Guidelines for Blasting Seismographs 2020 and ISEE Performance Specifications for blasting seismographs 2022

Attached to the blast report will be the seismograph reports summarizing the peak amplitudes of vibrations and air overpressures recorded at the structures with plots of time histories for the geophone components and air pressures converted to L-weighted sound.

Reports will include the names of the blast crew member, date and time of the blast and weather conditions at the time of blasting.

City of Keene Record Keeping Requirements

In accordance with Section 25.3.25 titled Record Keeping within the Land Development Code (referred to "logs" produced during Quarry operation), post-blast and seismograph reports will be retained for a minimum of 5 years by the Quarry operator. The records will be maintained by G2 Holdings, LLC.

Modeling Off-site Impacts of Blasting at the Keene Quarry

An analog model assessing off-site blasting impacts on surrounding structurers was developed for blasting at the Gilsum Quarry operated by G2 Holdings, LLC. The Quarry perimeter (in green) and surrounding instrument locations at three structures are shown in Figure 2. Plots of available velocities and air overpressures records in terms of sound pressure for blast-to-seismograph distances are given in Figure 3 . Five blasts were conducted by the blasting Contractor between March and May 2025 at distances ranging 600 to 1600 ft from seismograph locations at structures.

Figure 2. Outline of the Gilsum Quarry permit area (in green) showing the locations of 5 blasts and three structures (Badger Balm, Eaton Hill and Lovell Dr) where seismographs were deployed. The white dashed line indicates an elevated ridgeline 200 ft above the Quarry elevation.

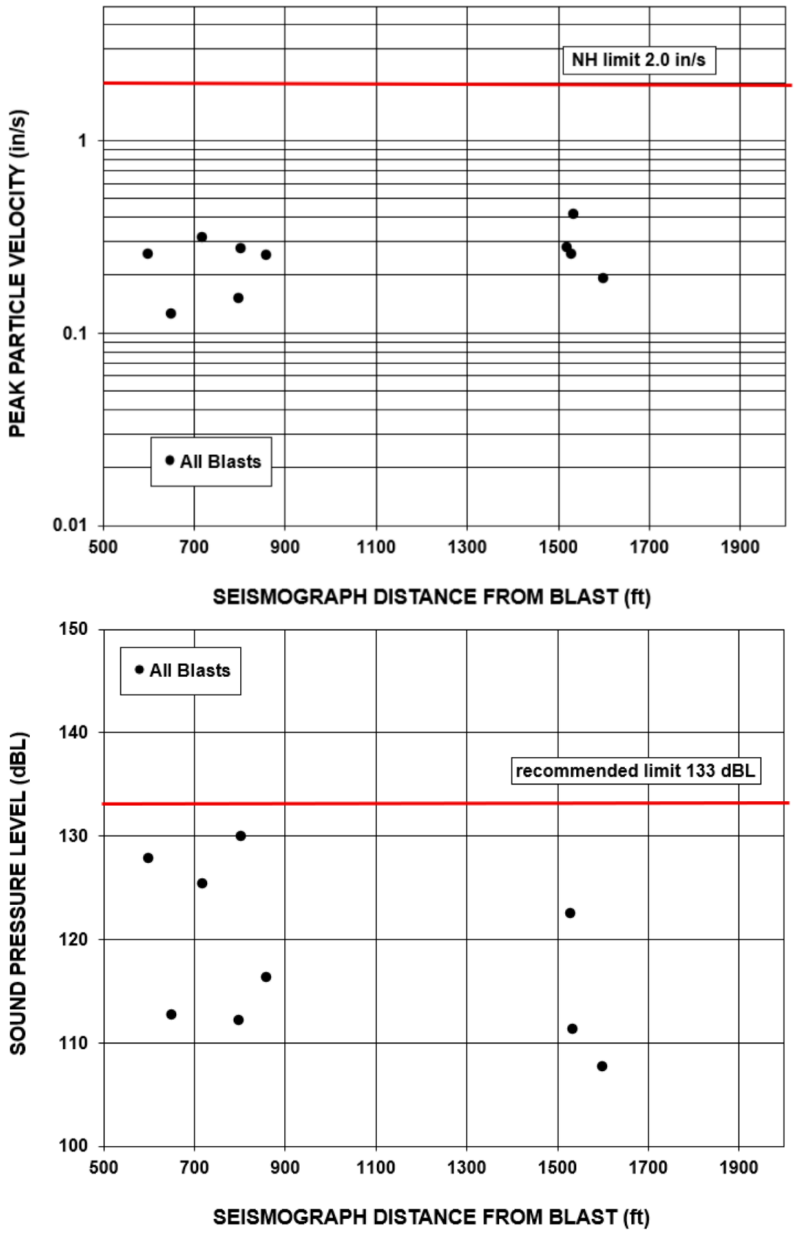

Figure 3. Peak particle velocity in the ground (top) and sound pressure level (bottom) as a function of seismograph-to-blast distances showing the New Hampshire regulated limit for velocity and recommended upper limit to sound pressure.

The trend of peak velocity with distance in Figure 3 is fairly "flat" while vibrations at structures 2 and 3 were slightly elevated from those at structure 1 most likely due to changes in surface geology and less surface soil layers along the elevated ridgeline. Sound pressures on the other hand are affected by atmospheric conditions and somewhat by topography. Peaks around 125 to 130 dBL are shown at

structure 1, 600 to 800 ft away from blasting where sound pressures were slightly elevated west of the quarry that were affected by easterly winds and/or cloud cover that persisted at the time of blasting.[9]

Other Non-blast Quarry Issues

Non-blasting Noise Compliance

The Land Development Code Section 25.3.15 titled Noise refers to quarry operational activities that generate on-going, continuous noise sources as opposed to transient, short lived sound pressure from blasting. The most noticeable continuous noise source within quarries is that of blasted rock crushing performed on site for gravel production prior to transport to end users. This section in the Code describes the use of the "A" weighted system for noise measurements and reporting of continuous sound levels.

The limits for A-weighted continuous noise are given in Land Development Code Section 18.2.3 titled Noise and Vibrations where the daytime sound level limit for non-residential zoning that applies at boundary of the Quarry property is given in Table 18-1 as 70 dBA.

To illustrate the application of this limit at the Keene Quarry, a crusher noise study conducted by Aimone-Martin at a basalt quarry is used to determine the placement of a crusher within the Quarry permit boundary. Sound measurements as a function of distance from the crusher were recorded with an ANSI approved sound meter and are shown in Table 1 and plotted within the semi-log graph in Figure 4. The best-fit propagation model predicting A-weighted sound with distance was used to compute the distance to the Keene permit boundary at which the sound level is reduced to 70 dBA. Rearranging the best-fit log function to solve for "D" requires the following steps setting the Sound Level to 70:

$$70 = -7.414 \ln(D) + 106.55$$

Rearranging $$\ln(D) = (70 - 106.55)/ -7.424$$

$$\ln(D) = 4.923 \text{ where } D = e^{4.923} \text{ and } e = 2.71828$$

Therefore, $$D = 2.71828^{4.923} = 137 \text{ ft from the property line}$$

This distance is easily accomplished within the Quarry permit area.

Table 1. Sound levels as a function of distance from a rock crusher.

Distance (ft)	Sound Level (dBA)
3.3	96
25	84
100	74.5
775	56.7
960	55.2
925	54.9

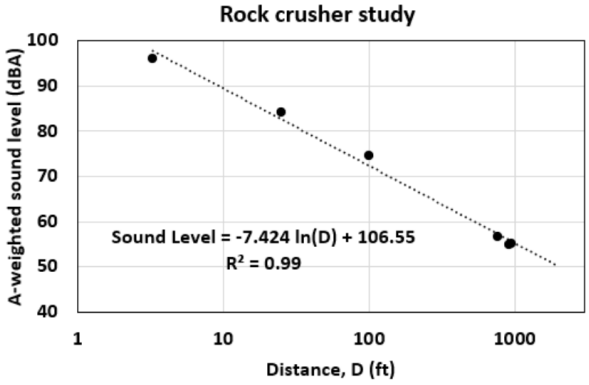

Figure 4. Propagation model of rock crusher sound level as a function of distance.

[9] Lebanon, NH regional airport Weather History; observations are only speculations based as the airport is 41 miles north of the Quarry.

Ambient Noise from Continuous Quarry Operations

Item E under Section 25.3.15 in the Land Development Code discusses how to deal with ambient noise complaints while a process to deal with transient blasting concerns is not directly addressed. It is not expected that ambient noise from continuous operations at the Quarry will be perceived at inhabited structures based on the far distances shown in Figure 1. However, G2 Holdings is committed to ensuring that property owner concerns regarding noise and vibrations will be addressed through a monitoring program.

Concerns from Blast-induced Vibrations and Sound Pressure Levels

It may be the case that people residing within structures around the Quarry perceive low level structure vibrations based on the transmission of ground vibrations and air overpressure into the structures. Such perceived motions can occur at or above 0.3 in/s and 117 dBL ground and air sound pressure levels depending on the type of structure. Such low levels cannot possibly cause structure distress or specifically wall strain amplitudes that might create cosmetic cracking.

It is well established that the amplitudes of ground vibration currently used in regulations are highly conservative and cannot possibly lead to structure cosmetic or minor wall cracking in plaster, drywall or mortar materials. Since 1999, Aimone-Martin has performed over 480 structure response studies throughout the US at mines, quarries, and construction sites to demonstrate safe levels of blasting with the ultimate goal to establish limits of actual cracking from blasting. Recently, residential structures at four quarries were made available to establish crack limits. While one study is currently on-going, cracking limits were established at one quarry where peak ground vibrations were recorded in excess of 11 in/s and a wall shear strain of 700 micro resulting in the first ever recorded cracking of internal drywall and external mortar surface overlying CMU bricks.[10] This strain amplitude corroborated laboratory simulated mechanical shaking of a CMU wall conducted by the U.S. Bureau of Mines where a mortar crack appeared at precisely 700 micro.[11]

Extensive on-going research conducted by Aimone-Martin and others measure the effects of natural and expected forces occurring everyday within inhabited structures that can result in wall strains and cracking that are normal and expected. These include the daily (day-night) temperature and humidity swings, large amplitudes changes during extreme storms, wind loading, aging of construction materials and human activities inside residences. These forces have been shown to far exceed those resulting from the highly conservative ground vibration and air overpressure limits to which blasting must comply.

Summary

It is well-established in the literature that there are no adverse impacts of quarry blasting on inhabited structures at distances shown in Figure 1 based on over 60 years of peer-reviewed research by blasting and structure response experts. Dr. Aimone-Martin has been conducting research on structure response to quarry blasting since 2002 and has proven that the universally-accepted regulated limit of 2.0 in/s peak ground vibration cannot possibly lead to cosmetic cracking in structures.

[10] Aimone-Martin, C.T., S. Lenker, and J. Senules, B. Meins and O. Meins, 2022, Structure Responses to a Confined Opening Cut Blast, Sumterville, FL, 48th Annual Conference on Explosives & Blasting Technique, January 2022, ISEE, Las Vegas.

[11] Stagg, M. S, D. E. Siskind, M. G. Stevens M. G, and Dowding, C. H., 1984, "Effects of Repeated Blasting on a Wood-Frame House", RI 8896, U.S. Bureau of Mines, Washington, DC.

Quarry Development: Balancing Community Welfare with Regional Economy

Rural U.S. quarry development has increased over recent years to meet societal needs relying on sustainable and ethical engineering practices. This trend is expected to continue at an increasing rate resulting from building material demands for data processing centers, infrastructure improvements, and other local construction projects that can significantly improve community qualify of life with essential services and enhanced safety. The expansion of the Keene Quarry represents a potential contribution to the regional economy with the extraction of aggregate resources based on current and future demand and location to this demand. Positive benefits include the opportunities for anticipated economic growth and employment. In this respect, the planned quarry will certainly contribute in a positive manner.

This is consistent with the preamble set forth in New Hampshire RSA 155-E:1 with the amendment inserting paragraph V. This was written as follows:

> *"1 Purpose. The general court finds that availability of construction material affects the cost of roads and other governmental infrastructure. Whenever the supply shrinks, prices increase. Although New Hampshire has an abundance of sand, gravel, and deposits suitable for production of construction aggregate, their availability is being curtailed by development, over-regulation, or both. Making up for dwindling supply raises the cost of production and transportation. This in turn raises the cost of roads and other public infrastructure. Additionally, it is clear that the existing local regulatory scheme needs clarification. Useful material is available only where it has been deposited, and if it must be transported long distances, the cost of construction increases. Thus, existing sources of supply must be identified and utilized, without undue disruption of local land use plans and patterns, without creating simultaneous state and local regulations of the same activity, and without allowing some excavations, such as stationary manufacturing plant sites and sites covered by voluntary pit agreements, to continue to be completely unregulated. It is found that except where state regulations apply or where sites are exempt or excepted by RSA 155-E, comprehensive and extensive local regulation of excavation of rock, sand, and gravel for the production of construction materials is in the best interest of the citizens and taxpayers of New Hampshire. It is also found that such regulation and its implementation should give weight both to state and local needs for nearby available material and to the land use plans and patterns of the municipalities in which these deposits are situated."*

Qualifications of Dr. Catherine Aimone-Martin

Dr. Aimone-Martin is President of Aimone-Martin Associates, LLC. Cathy has over 45 years' experience in blast consulting and monitoring specializing in ultra close-in blast effects on above and below ground structures and sensitive features during mine, quarry and construction blasting, underwater blasting, and structure demolitions. She served as a Professor and Department Chair of Mining at New Mexico Tech directing research in explosives and blasting. In 2002, she developed specialized instrument systems to evaluate global structure wall strains from blasting that ultimately resulted in the establishment of a global strain criteria adopted as a rule within the Fire Department the City of New York (FDNY) for all construction blasting. Dr. Aimone-Martin is author of over 100 publications and conducts training courses for blaster certification and licenses. She is a regular speaker at ISEE Annual and Chapter meetings and serves as Chair of the ISEE Seismograph Section setting policies for the use of blasting seismographs. Cathy was the 2012 recipient of the ISEE Distinguished Service Award and a former member of the ISEE Board of Directors. She is currently working with the European Federation of Explosives Engineers on several structure response studies and the modifications to improve blasting standards used in various countries.

STATE OF New Mexico)
)
COUNTY OF Socorro)

AFFIDAVIT OF DR. CATHERINE AIMONE-MARTIN

I, Catherine Aimone-Martin, PhD, being duly sworn, do hereby state as follows:

1. I submit this Affidavit in support of my report with respect to the Keene Quarry Earth Excavation Permit application of G2 Holdings, LLC, dated **July 22, 2025**.

2. A summary of my qualifications is contained in the referenced report.

3. I have reviewed the relevant materials provided to or obtained by me, as listed in the referenced report and I have applied generally accepted principles and methods within my field to assess the facts.

4. To the best of my knowledge, information, and belief, formed after an inquiry reasonable under the circumstances, the facts expressed in the above-referenced report are true and correct.

5. Based on my education, training, experience, and the materials I reviewed, the professional opinions stated in my report are true and correct to a reasonable degree of engineering certainty.

Dated: 8/4, 2025

Signed: Catherine Aimone-Martin

Catherine Aimone-Martin, PhD
Senior Principal, Aimone-Martin Associates, LLC

Notary Acknowledgment

State of **New Mexico**)
County of **Socorro**)

On this 4 day of August, 2025, before me, the undersigned notary public, personally appeared **Catherine Aimone-Martin**, who is known to me (or satisfactorily proven) to be the person whose name is subscribed to the within affidavit, and who, being duly sworn, made oath that the statements contained in the affidavit are true to the best of his knowledge and belief.

Notary Public
[Seal]

JOSHUA D MONTOYA
Notary Public
State of New Mexico
Comm. # 2002606
My Comm. Exp. Mar 18, 2028

My Commission Expires: 3/18/2028

August 18, 2025

To Whom It May Concern,

I am a licensed real estate agent with experience in evaluating and marketing residential properties in this region. My work includes providing professional opinions of value and guiding clients on how surrounding uses may influence buyer perception.

In my professional opinion, the planned quarry operations at the G2 Holdings Site on Route 9 in Keene are not expected to cause a measurable decline in nearby residential property values. This conclusion is informed by:

- The rural setting of the site and the presence of other nearby commercial uses.
- Market data and sales from comparable areas where property values have remained stable in proximity to regulated operations.
- The mitigation measures in place to limit noise, dust, and traffic impacts.

It has been my experience that residential buyers tend to weigh property features, school districts, commuting distances, and neighborhood amenities more heavily than regulated industrial activity that is buffered and monitored.

This letter represents my professional opinion based on available information and experience. It is not a formal appraisal or a legal determination of value.

Sincerely,

James Weidner

James Weidner

Weidner Real Estate / eXp Realty

April 1, 2025

To: Planning Board
Town of Sullivan, NH
Re: G2 Holdings, LLC Proposed Permit to Remove Gravel & Earth

Dear Planning Board,

Granite Gorge Partnership LLC, operating as Granite Gorge Mountain Park (the "Gorge"), writes in support of our neighbor, G2 Holdings LLC ("G2") and its effort to expand operations.

Over the course of the Gorge's re-opening and ongoing operations, the Gorge has found G2 to be a conscientios and valued neighbor. Upon becoming aware of this project, G2 shared its plans with the Gorge. Throughout the conversation, G2 represented its intent to not only comply with the vast array of regulatory requirements associated with its operation, but also its desire to mitigate, as reasonably possible, its impacts of operations on neighboring landowners. The Gorge fully believes G2 will carry forth on this commitment.

Respectfully for the LLC,

Bryan Granger
Granite Gorge Partnership, LLC