SANBORN HEAD

MEMORANDUM

To: Megan Fortson, Planner, City of Keene, NH
From: Russell Abell, PG
File: 6741.00
Date: August 22, 2025
Re: Summary of Hydrogeologic Review of G2 Holdings Keene Quarry Expansion Application – Second Addendum Materials/Updates
cc: Mari Brunner, Evan Clements, Emily Duseau

Sanborn Head and Associates, Inc. (Sanborn Head) reviewed revised and additional information provided by G2 Holdings (Applicant) in response to our August 15, 2025 Summary of Hydrogeologic Review of G2 Holdings Keene Quarry Expansion Application Summary Memorandum (August 2025 Memo). As requested, this review of revised/additional information focused on reviewing the following:

1) Frontier Geoservices, GORDON SERVICES – KEENE PIT BRW-12 SLUG TEST DATA & RESULTS, 57 Route 9, Keene, New Hampshire, August 21, 2025.
2) Frontier Geoservices, GORDON SERVICES – KEENE PIT ACID MINE DRAINAGE MONITORING PROGRAM, 57 Route 9, Keene, New Hampshire, August 21, 2025.
3) Granite Engineering, LLC, 2025, Gravel And Earth Removal Plan G2 Holdings LLC, Keene Tax Map 215 Lots 7 & 8, Sullivan Tax Map 5 Lots 46 & 46-1, 57 Route 9, Keene New Hampshire, Cheshire County, Revised August 21.

The following provides the concerns summarized in our August 2025 Memo and Sanborn Head's responses based on review of the information reviewed in items 1-3 above and information stated during an August 18, 2025 meeting (August 2025 Meeting) with the Applicant and their technical/legal team. Each concern from the August 2025 Memo is provided below in italicized text followed by Sanborn Head's response in plain text font.

1. ***Excavation Below the Water Table:*** *The observed water table in newly installed monitoring wells located in proposed excavation area Period 8 represents water table conditions that can be characterized as seasonal low water table conditions. Therefore, the revised Period 8 "Pit Floor" proposed elevation of 860 feet above mean sea level (AMSL) has the potential to be below the water table and/or lower than six feet above the water table during seasonal high water table conditions. This is especially of concern in the northwest portion of the proposed excavation area. In fact, as shown on Figure 2, under current seasonal low water table conditions, the northwest portion of the Period 8 excavation is projected to be below the water table. Seasonal high water conditions may also be a concern for Period 1 as well, especially in the southeastern portion of the*

excavation area. Additional data collection from Period 1 would be needed to determine the water table conditions there.

As requested and agreed upon during the August 2025 Meeting, the Applicant has provided a response to the above concern. The applicant stated with respect to Period 8 that they had revised the final proposed grade elevations for the bottom of the excavation in the northern portion of Period 8 to account for water level elevations in that area and the provided site plans appear to confirm these changes. Discussion during the August 2025 meeting and the revised grade elevations in Period 8 satisfy the above concern as long as a condition of the permit requires seasonal high (e.g., spring conditions) water level monitoring in BRW-09 to confirm the revised grades will be in compliance with the 6 feet above the water table requirement in City of Keene Land Development Code (LDC) Article 25.3.3.

For Period 1, as discussed and agreed upon during the August 2025 meeting, a condition of the permit is recommended to install a monitoring well within Period 1 to confirm the seasonal high water table elevation conditions (e.g., spring conditions) in this area as current data are not sufficient. This is needed to confirm that proposed grade elevations of the base of the Period 1 excavation are in compliance with LDC Article 25.3.3. Addition of this condition will satisfy the above concern with respect to the water table elevation in Period 1.

2. ***AMD Potential:*** *The Application supporting documentation has presented a concern for [acid mine drainage] AMD potential as a result of excavation of bedrock in each of the proposed Periods. The recently observed presence of the mineral pyrite (an iron sulfide mineral with chemical formula FeS_2) in drill cuttings generated during the installation of monitoring wells in Period 8 further supports this concern. Although the available information does not allow for a more thorough assessment of AMD development potential, several existing lines of evidence also point to it being a concern. While the Application has provided a monitoring program, best management practice of lining surface water detention and retention ponds with limestone aggregate, and excavation will be terminated if necessary, additional monitoring should be considered and appears warranted*.

   As requested and agreed upon during the August 2025 Meeting, the Applicant has provided a revised Acid Mine Drainage Monitoring Plan that includes the additional requested items. These items include:

   - installation and monitoring of an additional bedrock monitoring well downgradient (north) of Period 8;
   - quarterly monitoring for a year for each monitoring location with a change to semi-annual if results do not indicate a concern for AMD for each excavation area (Period);
   - clarification that stormwater basins will be part of the monitoring program as they are constructed; and

- field screening of pH will occur monthly in the active stormwater basins (at the time) and "BRW" series monitoring wells that are identified as part of the program.

The modified monitoring plan satisfies this concern.

3. ***Period 8 Stormwater Infiltration:*** *Although not a focus of this review, another concern identified relates to the stormwater management plan for the proposed project. Based on our preliminary review and understanding, an existing infiltration basin (retention basin) and a newly constructed basin in Period 8 will serve to infiltrate all stormwater that emanates at the Site during the implementation of the project. The documentation appears to show the newly constructed Period 8 retention basin will be constructed on the bedrock pit "floor" (or will be excavated into bedrock), and will exist as the only infiltration basin during the late stages of the project (excavation of Period 8), if it is not also active earlier in the project. With the base located on bedrock, even if saprolite or highly weathered (typically clay-rich) materials are present, it seems unlikely that an infiltration rate of 0.3 inches per hour will be achieved as the Application used to determine stormwater management. It is possible that the actual infiltration rate could be close to zero (if competent, unfractured bedrock), or as much as an order of magnitude lower (if weathered bedrock or saprolite). Therefore, it appears unlikely that stormwater will infiltrate in this Period 8 basin, especially at the rate used to model stormwater management*.

   As discussed and requested during the August 2025 Meeting, the Applicant has also responded to this concern with information stated in the meeting and an additional field test completed at the site. The Applicant provided the results of an in-situ hydraulic conductivity test, which measures the capacity of the subsurface materials to transmit water. Sanborn Head has reviewed this information and analysis, which indicates that the underlying material at the approximate elevation of the planned Period 8 stormwater infiltration basin has a similar hydraulic conductivity to a silty sand. The estimated infiltration rate used in the Applicant's stormwater modeling is for a similar material and estimated at 0.3 inches per hour. Based on the following, this concern is satisfied by the additional information provided:

   - The hydraulic conductivity testing results in BRW-12 indicates a conductivity similar to a silty sand material, which is similar to the estimated infiltration rate of the material used in the stormwater model;
   - The Applicant's technical team stated that during the drilling of monitoring wells in Period 8 competent bedrock was not observed;
   - The Applicant's technical team stated that monitoring wells in Period 8 recharged quickly after removal of groundwater for sampling (purging) and well development, which is consistent with the conductivity testing results above; and
   - The Applicant's technical team stated that the current infiltration basin located in Period 8 is in the same material (albeit at a higher elevation), and they have

observed infiltration occurring quickly after significant rain events (e.g., the basin mostly drained within 24 hours after filling during a rain event.)

Based on the above, this concern is satisfied.

At this time, as long as the two recommended conditions are included in the permit, Sanborn Head does not have additional concerns with the proposed excavation permit plans with respect to the two areas we were retained to review: LDC Article 25.3.3.B and LDC Article 25.3.6 waivers. Also, concerns expressed previously regarding the infiltration basin in Period 8 have been satisfied and Sanborn Head does not have further concerns for this item.

We trust this information meets your needs at this time. Please contact me should you have questions regarding this information. We appreciate the opportunity to support the Town's review of the Application.

RHA/SRN: rha