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September 11, 2023

Joe Wilder, Director
Frederick County Public Works
107 N. Kent Street, Second Floor
Winchester, Virginia 22601

RE: Emergency Sinkhole Backfill Recommendations
Crystal Lake at Shawneeland Subdivision
Rosenberger Lane, Winchester, Virginia
VEPC Project No. PTL-222909

Mr. Wilder:

Due to the prolonged drought conditions over the past several months, the water level of Crystal Lake has dropped over 11 feet below the normal pool elevation. As a result, the two (2) apparent sinkholes located along the eastern shore have increased in the surface size caused by recent collapses; subsequently, making these features a public safety concern. Therefore, we suggest filling the sinkholes in an effective manner as soon as possible. Please note that our recommendation is to promote public safety and not to remedy the sinkhole problem at this time. Actual measurement of the sinkholes was not taken during our site visit conducted on September 8, 2023; however, an estimated combined area of the sinkholes is 30 x 40 feet and approximately 8 to 10 feet deep at the mean height of the bank relative to the current water elevation.



Recommendations to fill sinkhole area:

- Develop construction equipment access to the sinkhole area, remove existing fencing as necessary to import and place fill material in a safe manner.
- Excavate cracked portions of sidewalls to prevent excess amounts of material from falling inward during the filling process. Keep heavy construction equipment at least 8 feet from the sinkhole to prevent additional sidewall collapse.
- Place large boulders comparable to VDOT Class II riprap into the sinkholes and press into loose soils exposed at depth. Two lifts of boulders may be necessary to develop a suitable side wall support and foundation for additional fill material.
- Subsequently, place several feet of VDOT #1 stone (or comparable) as needed to effectively choke out voids in the underlying Class II riprap.
- Backfill to grade with dirty tailings typically available from nearby quarry in 12-inch lifts after firmly tracking to consolidate.
- Continue placing and consolidating lifts to grade and shape surface contour to meet existing bank slope.
- Fence out this area upon completion and post warnings accordingly.

As mentioned, this backfill procedure is intended to promote public safety as soon as possible and does not serve to seal the sinkhole feature(s). Therefore, routine maintenance will be required as future pipes or internal erosion occurs. A plan to cap the area can be developed after the underlying karst feature is effectively sealed.



Mark A. Viola, M.S.C.E., P.E.
Principal Engineer/Owner

