



MEMORANDUM

To: Brian Wrenn (NC DEMLR)
From: Erich Thalheimer (WSP)
Date: May 25, 2021
Project Name: Wake Stone Quarry Noise
Project Number: 31402799.000
Subject: Responses to Additional DEMLR Noise Questions

This memo is intended to respond to recent additional questions from DEMLR regarding the results of our noise analysis supporting Wake Stone's expansion into Pit 2. DEMLR has expressed additional concerns about two areas, (1) quarry noise affecting the Dunn Residence, and (2) quarry noise affecting the area at and around Foxcroft Lake.

It should be noted that we continue to endorse the definition of "*significantly adverse [noise] effect*" as being an increase in future noise levels of 10 decibels or more. We feel this definition is fully (legally) defensible given the reasons discussed in our noise report dated 3/12/21. With that said, none of the areas outside of Wake Stone's permit boundary are expected to be exposed to an increase of 10 decibels or more.

It is also worth reiterating that our Cadna-A noise modeling was done with very conservative assumptions incorporated into it, including the following:

- It was assumed all equipment would be operating simultaneously. In reality, this would be a rare event if it ever actually happens.
- Any ground areas not covered by natural forest growth were modeled as being partially reflective.
- No sound attenuation was assumed for foliage or tree growth.
- Per ISO 9613 guidelines, favorable wind conditions (i.e. amplification) was assumed for all receptors regardless of their locations relative to the noise sources.

Item (1) Dunn Residence

The Dunn Residence, located along Old Reedy Creek Road, is not part of Umstead State Park, and thus was not the primary focus of concern for this noise study. To be clear, the anticipated change in noise level at the shared property line is only 5 decibels, however, the residence itself is located uphill from the property line, and thus will be exposed to slightly more noise from Pit 2. That said, Wake Stone has already committed to install a visual and noise berm in this area, and the berm height around the Dunn property was designed to account for topography, potential noise, and visual impacts to this neighbor.

It should also be appreciated by DEMLR that Figure 14 in our final report simple shows the worst-case changes in noise level expected for Wake Stone quarry noise only. It intentionally does not reflect cumulative noise which would take into account background noise sources such as traffic on I-40 and aircraft noise from Raleigh-Durham International Airport. These other noise sources were

taken into account in the ambient noise measurements which revealed a sound level of 55 dBA Leq during daytime work hours of 7 AM to 5 PM. Thus, the anticipated loudest phase of Pit 2 activities, which amounted to 49 dBA for overburden stripping, should be masked by these other ambient noise sources. Moreover, quarry noise levels will only decrease in the future as Pit 2 gets deeper and deeper.

Item (2) Foxcroft Lake

Regarding the anticipated noise levels at and around Foxcroft Lake, it is important to remember that Wake Stone’s work activities will be moving farther away from the lake as Pit 2 development progresses. Also, the noise reduction benefits as Pit 2 gets deeper and deeper also apply at Foxcroft Lake.

Finally, it is important to remember that the area surrounding Foxcroft Lake is characterized by fully mature forest growth which Wake Stone has no intention of disturbing. As shown below, previously accepted acoustic studies (Beranek, 1971) have shown that even less thick forests can reduce sound propagation by as much as 5 to 12 dB/100 m (326 ft). As stated above, our Cadna-A modeling, which did not account for excess foliage attenuation, was particularly conservative. Therefore, based on the results of the complete acoustical noise study and the additional information provided herein, no further mitigation measures should be required beyond those to which Wake Stone has already committed.

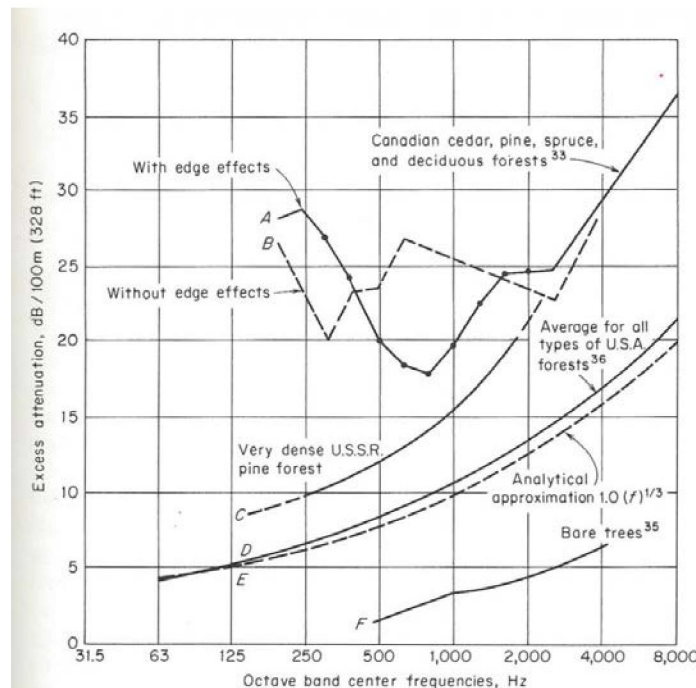


Fig. 7.12 Measured excess attenuation for sound propagation in tree zones (forests). For very thick forests, the upper two curves show excess attenuations of 10 to 25 dB per 100 m (328 ft) at frequencies below 2,000 Hz. For less thick forests, the average curve shows excess attenuations of 5 to 12 dB per 100 m at these frequencies. Deciduous trees without their leaves (bare) yield excess attenuations of 0 to 5 dB/100 m. Curves *A* and *B* are Canadian; *C* is Russian; *D* is American; *E* is Eq. (7.23); and *F* is German.