



February 3, 2023

Mike Connell
Corgan
401 North Houston Street
Dallas, TX 75202

Project: Warrenton Data Center Response Letter
Location: Town of Warrenton, Virginia

Dear Mr. Connell,

Polysonics was forwarded an email that was sent to the Warrenton Town Council and Mayor from a Dr. John Lyver. In this email, Dr. Lyver was critical of the Polysonics Noise Level Impact Analysis (Report #6246, January 9, 2023).

Polysonics Background

Polysonics was founded in 1958 as an acoustics firm, primarily for testing and development of designs to solve noise isolation issues. Over time, the company has evolved into providing technology design services (AV, IT, Security, Lighting, Rigging, Curtains) along with our acoustic design and testing services, our award-winning work being featured in some of the most recognizable buildings in the world.

Polysonics has also been part of many local Warrenton and Fauquier County projects, including the OVH Data center in Vint Hill, the Path Foundation, Fauquier High School, and Fauquier Community Theater. The accuracy and quality of our work can be readily reviewed by visiting any of the above sites.

Letter Responses

Below are responses to each of Dr. Lyver's bullet points. Dr. Lyver's information is shown verbatim, shown in bold.

- **The same contractor, same "SoundPLAN" model, and very similar assumptions were used in both studies.**

Polysonics – All of the information used in Polysonics' analysis is sourced in the report. The testing and modeling are based on industry standards, which are detailed in the report.

As stated in our report, SoundPLAN is based on ISO 9613-2: 1996: Attenuation of sound during propagation outdoors – Part 2: General method of calculation. This method of calculating noise is the industry standard. SoundPLAN has been in use since 1987 to calculate environmental noise.

The calculation includes variables for (just a few):

- Source types
- Topography
- Site geometry
- Shielding
- Reflections
- Meteorological conditions
- Atmospheric absorption
- Ground effect

A graphic of our model is shown in Figure 1 in the report. Our report considers the height of the equipment, the type of noise source (line, area, point), the building height, the building shielding, the ground absorption effect, and interaction with topography. As seen in the bulleted list above, these are industry standards for noise propagation.

- **The noise study did NOT incorporate the Town Zoning Administrator, Mr. Walton's, guidance letter to Mr. Foote on December 16, 2022. In fact, they again analyzed for the wrong conditions, locations and measurement requirements. Nor did they analyze against the -10 dB(Z) and -15 dB(Z) corrections to the Town Zoning Ordinance noise limits.**

Polysonics – Dr. Lyver is incorrect. Per the report, page 3 under “Town of Warrenton Noise Limits”, the report states the Town of Warrenton Zoning Ordinance of April 2002 by reference and provides the appropriate Maximum Noise Levels (Table 1). Further, per page 4 of the report, the Noise Determination letter (and meeting leading up to the letter) has been referenced and thereby incorporated.

The -10dB(Z) and -15dB(Z) correction, as per the referenced “Noise Determination “ letter are clearly shown in the Table 1 “Maximum Noise Levels” on page 3 of the report.

- **The study cited the August 2022 SUP provided materials and did not update for the October and December design changes.**

Polysonics – Dr. Lyver is incorrect. The latest information and design changes were incorporated into the modeling and associated report.

- **The study recognizes that noise from diesel-electric generators will increase the overall noise levels. However, does not cite the noise that they will produce.**

Polysonics – Dr. Lyver is incorrect. As shown in the report on page 7, “Table 8: Modeled Noise Levels – Generator”, shows the noise levels associated with generator noise and the results are shown in Table 8.

- **The study states: generators will only run for a “limited time” but do not cite what that time is. At other Amazon sites in Northern Virginia, generators run for time periods beyond the cited ANSI S12.9-defined short duration period. Plus, Amazon regularly runs generators in a contiguous series, making the noise generation well beyond the ANSI direction for measurement periods.**

Polysonics – The time the generators are ran did not factor into our analysis, because the limited time change was not used in the analysis. Polysonics only used the noise limits shown in Table in our report and did not use the limited time correction factor. The report shows the noise levels of a generator being tested during the daytime (refer to “Table 8: Modeled Noise Levels – Generator” as found on page 7 of the report).

- **The study does not cite references, nor do they cite verifiable data. For example, the study cites noise from a generic Trane Corporation brand chiller but do not cite the source or the noise data itself. Trane produces a wide variety of chilling systems and sizes, so it is impossible to verify the assumptions made.**

Polysonics – All input data can be found in the report. Please refer to the tables as shown on pages 5 – 7 and the report Appendix for more clarity.

The design of the mechanical systems and final selection of the equipment is still being reviewed. The report utilizes manufacturer provided acoustic data (as shown on Pages 5-6). The associated 3rd octave data was received from Trane directly on October 11, 2022.

- **When the study does cite noise readings, the study does not cite the distance where the noise was taken. This makes it impossible to validate the calculations. Noise decreases by a ratio of $[(1/r)^{1.5}]$, where r is the ratio of the cited distance to the observed distance.**

Polysonics – Polysonics is unclear whether the comment refers to the measurements performed by Polysonics or Trane.

Polysonics only performed measurements at adjacent properties to establish existing background noise levels, which is unrelated to the distance from the data center. The measurement locations are shown in the report in Figure 6.

The manufacturer sound data is supplied in Sound Power, which does not have an associated distance, but would hypothetically be 0 distance from the source.

The formula provided by Dr. Lyver is incorrect. The formulas for noise propagation are:

Point Source: $Lp(R2)=Lp(R1)-20 \log (R2/R1)$

Line Source: $Lp(R2)=Lp(R1)-10 \log (R2/R1)$

Where,

$L_{p(R1)}$ = Sound Pressure at the first location

$L_{p(R2)}$ = Sound Pressure at the second location

R_1 = Distance from noise source to first location

R_2 = Distance from second location

These formulas result in a reduction of 6 dB for each doubling of distance for a spherical expansion from a point source and 3 dB for each doubling of distance for cylindrical expansion for a line source.

However, even using the basic formulas for noise propagation would not be accurate, as it does not include all of the variables listed in our SoundPLAN answer above on page 2.

- **The study does not combine the noise sources on the property into a single noise level. The study only cites individual levels. Mr. Walton's letter clearly states that total noise from the site is what must be compared to the Ordinance. When the noise levels are combined, they clearly exceed the Ordinance limits in nearly all cases.**

Polysonics – This statement is inaccurate. All rooftop noise sources were combined for the unmitigated/mitigated levels. One generator (for testing) and all rooftop was included to show the noise levels of testing of the generator.

The single receiver results show the loudest impacted point at the property line along each cardinal direction.

- **The study cites a drop of 5 dB(A) to 10 dB(A) noise generation decrease at night for a building operating at steady state 24/7. This is not correct. Plus the Ordinance uses dB(Z), making the claim difficult to explain.**

Polysonics – This statement shows a misunderstanding of the sound data and how mechanical equipment operates. The utilized Trane data is based on chiller loading of 100% at all times. The difference between daytime and nighttime operation is the ambient air temperature. The lower ambient air temperature at night allows the chillers to produce 100% cooling capacity at a lower operating point (reduced compressor/fan RPM). The reduced compressor and fan RPM power results in a lower sound output. Table 3 (page 5) in the report shows the sound levels with these operating point differences.

The resulting data is shown in Tables 6, 7 & 8 in both dBA (overall) and dBZ (octave). .

- **The Study does not follow commonly used scientific principles in plots or how topography interacts with noise waves. They have topographic low areas stopping sound and hills increasing noise in some plots. Same as in Sept report.**

Polysonics – The above shows a misunderstanding of our report and the noise contours presented. The noise contours are shown at 59’ above the ground, where topography is not likely a factor. Polysonics disagrees that a calculation following ISO 9613-2: 1996 would not be considered a commonly used scientific principle.

Figure 1 in our report shows the building, noise sources, and the topography around the site that would affect our calculations.

- **The study’s plots show the center of the isopleth ‘circles,’ not at a noise source, but rather, in the road on the north side of the building. This factor alone discredits the entire analyses as poor modeling.**

Polysonics – The above shows a misunderstanding of noise propagation.

Figures 4 and 5 on pages 17 and 18 in the report show the noise sources and the impact of the generated noise to the surrounding area. The model uses 80 noise sources on the roof top (of varying types; point, line, area) The resulting contours are developed from a grid of thousands of receivers throughout the model. The complexity of noise contours is inherent in the propagation.

Polysonics limited the scale in Figures 4 and 5 to 60 dBA to highlight the noise levels in the community, rather than showing a clutter of contours on the rooftop.

- **As for the SoundPLAN model, it does not consistently use similar modeling between frequency octaves. The sound attenuation modeling per distance varies. Same issues as in Sept.**

Polysonics – As stated above SoundPLAN is a recognized industry standard and is based on the ISO 9613-2:1996.

- **The background reading plots show that the modeling was done at 15-25 dB(Z) lower than what was measured.**

Polysonics – The above shows a misunderstanding of the Background Noise Comparison graphs. The ambient noise measurements would not be affected by the proposed data center.

The blue lines, shown on the graphs, represent field measurements of the ambient background noise levels for each of the five locations (M1 – M5). The gray line represents the calculated noise being generated by the data center for each location. These graphs provide a comparison of background noise to generated noise. As is shown on each of the comparison graphs, the existing ambient noise levels exceed the data center generated noise levels.

- **The Warrenton Zoning Ordinance Chapter 11, section 11-3.10.2, Item #8 REQUIRES “Noise impact and abatement studies to determine potential impact on adjoining properties and neighborhoods.” There is no discussion of impacts due to noise.**

Polysonics – The Adjacent Property Results and Conclusions (report pages 8 through 9) are based on the community noise impact. We provided noise contours throughout the community, provided ambient noise measurements in the community, and also compared those measurements to calculated noise.

- **Finally, there is no mention of the study for the data center's impact or compliance with the Fauquier County Noise Ordinance, even though over 1,000 residents of Fauquier County (living outside the Town boundary) will be affected by the noise.**

Polysonics – See the response to the item above.

Conclusions

Polysonics is extremely cognizant of the community reaction to noise, understanding our services may be wanted on either side of any project (community or developer).

Polysonics' analysis followed industry standards for an acoustic analysis. The report shows the data center meeting the Town of Warrenton limits with the use of sound mitigation. The noise levels shown to the adjacent communities is shown to be generally well below the existing background noise levels.

Please let me know if you would like any further information.

Sincerely,
Polysonics



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