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# Cabin John Shopping Center Phase I Transportation Noise Analysis

Montgomery County, Maryland

Report #180427  
Project No. EYA1701

For: EYA

By: Jeff Ford  
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*Acoustical Engineering Solutions.*

## 1 EXECUTIVE SUMMARY

Phoenix Noise & Vibration has conducted an analysis of transportation noise impact upon the proposed Cabin John Shopping Center residential development in Montgomery County, Maryland. This noise analysis, limited to noise impact from Tuckerman Lane, Seven Locks Road, and I-270, included:

- On-site 24-hour noise level measurements.
- Determination of existing and future noise levels.

Due to the distance from the roadways, roadway noise impact upon the proposed townhomes will be below 65 dBA Ldn. According to Montgomery County's residential noise regulations, no further analysis or additional mitigation will be required for the proposed Cabin John Shopping Center development.

## **2 NOISE TERMINOLOGY**

### **2.1 dB vs. dBA**

While the standard unit of measurement for sound is the decibel (dB), discussions of noise impacting the human ear use “dBA.” The “A” refers to a frequency weighting network used to simulate the human ear’s unequal sensitivity to different frequencies. The A-weighted noise level is therefore more representative of a human’s perception of a noise environment than the unweighted overall noise level in dB and is currently used in most all environmental noise studies.

### **2.2 Ldn**

The day-night average noise level, or Ldn, is the equivalent sound pressure level averaged over a 24-hour period, obtained by adding 10 dB to sound pressure levels measured from 10 PM to 7 AM. This 10 dB “penalty” accounts for the added sensitivity caused by noise generated during the nighttime hours.

The Ldn is NOT a measurement of the instantaneous noise level. It is very possible to have several short term events (tractor trailer, emergency vehicle siren, car horn, etc.) which generate a relatively high noise level (e.g. 85 dBA) during a given time period, yet have a more moderate overall Ldn value (e.g. 65 dBA Ldn).

### **2.3 Summing Noise Levels**

Noise levels from multiple sources do not add arithmetically; i.e. when two noise sources generate 60 dB individually, they do not produce 120 dB when combined. Noise levels are measured using a logarithmic scale; therefore they must be summed logarithmically. In the decibel scale, two identical, non-coherent noise sources having the same noise level produce a 3 dB increase above the condition of one source alone (i.e. two 80 dB lawnmowers running at the same time generates 83 dB).

Similarly, two different noise sources with a difference of 10 dB in their individual levels results in no measurable increase in noise when they are combined. Put another way, the quieter noise source does not increase the overall noise generated by the louder source; i.e. adding an 80 dB lawnmower into a noise environment where a 90 dB lawnmower is already running does not increase the noise level above 90 dB.

### 3 NOISE REGULATION

Traffic noise impact for proposed residential developments in Montgomery County is governed by Table 2-1 (reprinted in Table 1) on page 8 of the *Staff Guidelines for the Consideration of Transportation Noise Impacts In Land Use Planning and Development* (June 1983).

Accompanying this table is Map 2-1 (see Figure 1), indicating outdoor noise level requirements not to be exceeded throughout the County.

**Table 1: Maximum Levels for Exterior Noise & Building Line<sup>1</sup> For Noise Sensitive Land Uses (Table 2-1).**

Guideline Value	Area of Application
Ldn = 55 dBA	This guideline is suggested as an appropriate goal in permanent rural areas of the County where residential zoning is for five or more acres per dwelling unit and background levels are low enough to allow maintenance of a 55 dBA Level. This guideline is consistent with Federal, State, and County goals for residential areas.
Ldn = 60 dBA	This is the basic residential noise guideline which will be applied in most areas of the County where suburban densities predominate. Maintenance of this level will protect health and substantially prevent activity interference both indoors and outdoors. Noise attenuation measures will be recommended to allow attainment of this level.
Ldn = 65 dBA	This guideline will generally be applied in the urban ring, freeway, and major highway corridor areas, where ambient levels are such that application of a stricter guideline would be infeasible or inequitable. Significant activity interference will occur outdoors and indoors if windows are partially opened, but available evidence indicates hearing is adequately protected. Noise attenuation measures will be strongly recommended to attain this level.

<sup>1</sup> Building line as used here refers to habitable structures only. It does not include garages, sheds, or recreational accessory buildings.

According to Map 2-1, Cabin John Shopping Center is located within the 65 dBA Ldn noise zone, indicating that noise levels in outdoor activity areas throughout the site should be maintained at or below 65 dBA Ldn. Any outdoor area exposed to future transportation noise levels above 65 dBA Ldn typically requires further analysis to determine the mitigation designs necessary to comply with this requirement.

When outdoor noise levels exceed 65 dBA Ldn, Montgomery County also requires an analysis of indoor noise levels in residential buildings. According to Sections 2.2.2 and 2.2.3 of the *Staff Guidelines*, any residential building impacted by noise levels above 65 dBA Ldn must be evaluated to certify that the building structure will be capable of maintaining indoor noise levels at 45 dBA Ldn.



#### 4 SITE DESCRIPTION

The proposed Cabin John Shopping Center development (shown on Figure 2, site outline in red) is located to the north of Tuckerman lane and East of Seven Locks Road. The site is also approximately 1,800 feet to the west of I-270.

In the vicinity of the site, Tuckerman Lane is composed of two westbound travel lanes and one eastbound travel lane. Seven Locks Road is composed of two southbound travel lanes and one northbound travel lanes. Both roads consist of several turning lanes forming throughout the area. Route 193 is composed of two northbound and two southbound lanes. I-270 consists of five southbound lanes and six northbound lanes.

**Figure 2: Existing site (proposed site outlined in red) and surroundings. Aerial image dated December 19, 2016, courtesy of Google Earth.**



## 5 NOISE MEASUREMENTS

On December 14 – 15, 2018, Phoenix Noise & Vibration conducted an on-site noise measurement survey to determine existing roadway noise levels throughout the site. This involved continuous noise level measurements and monitoring for one 24-hour period. Measurements were made using two Norsonic Type 118 and three Norsonic Type 140 Precision Integrating Sound Level Meters. All meters were calibrated prior to the survey traceable to National Institute of Standards and Technology (NIST). Each meter meets the ANSI S1.4 standard for Type 1 sound level meters.

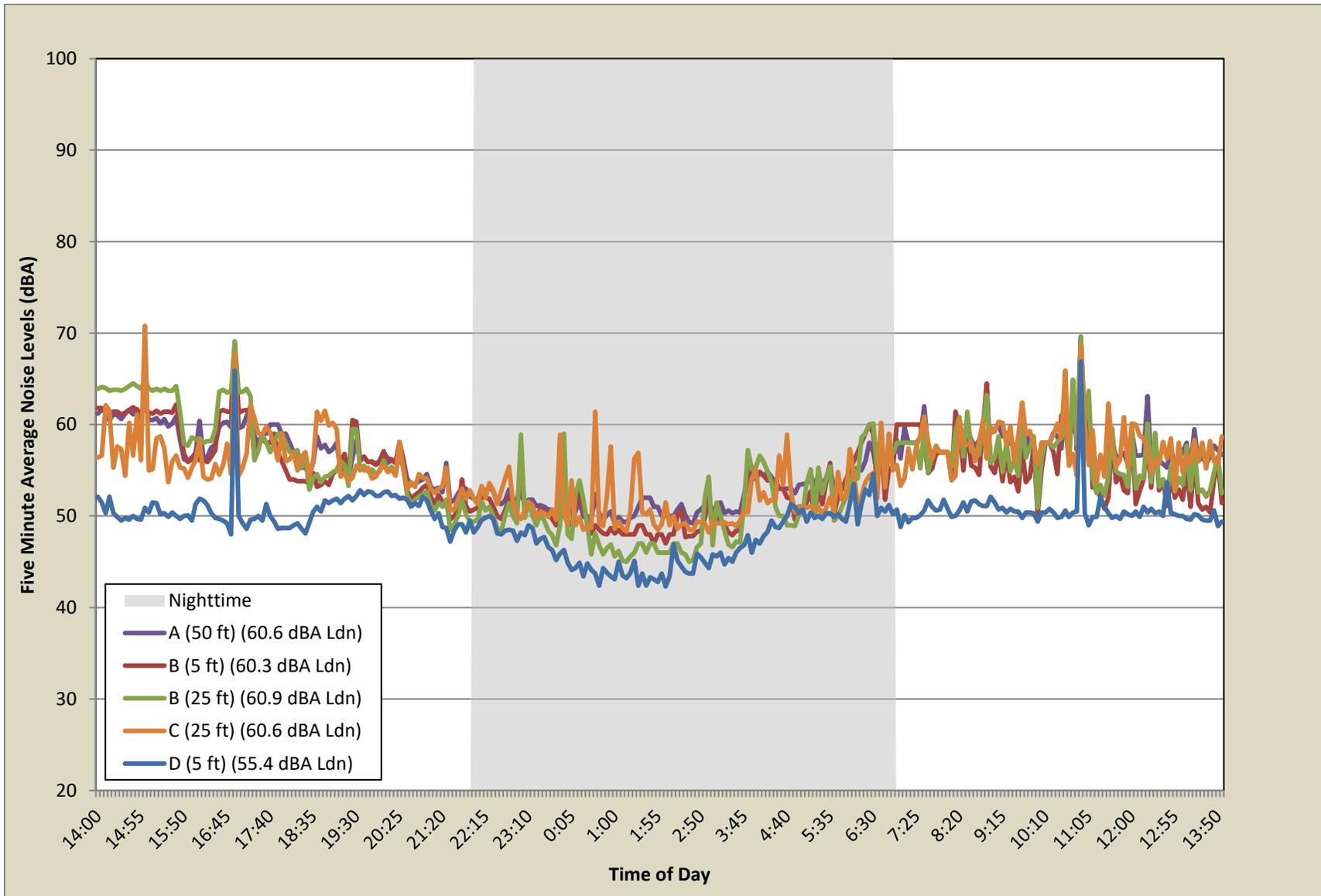
During the 24-hour measurement, noise levels were recorded and averaged over five minute time intervals. Noise measurements were then used to calculate the site’s 24-hour average day-night noise level (Ldn), which includes the 10 dBA penalty for noise levels measured during nighttime hours. Noise level measurements were made at the locations shown on Drawing 1 of the Appendix. Measurements were made at 5 feet, and 25 feet, and 50 feet above adjacent grade to simulate noise impact upon future townhomes and rooftop terraces. Measurement results are presented in Table 2.

**Table 2: Transportation noise measurement results.**

Measurement Location	Distance Above Grade	Measured Noise Level (dBA Ldn)
A	50 feet	61
B	5 feet	60
	25 feet	61
C	25 feet	61
D	5 feet	55

Figure 3 presents the measurement results graphically, showing the noise level as measured in five minute increments throughout the survey. While the 10 dBA nighttime penalty is not shown graphically, it was included in the Ldn calculations. Throughout the duration of the 24-hour period, the loading dock behind Giant generated a significant amount of noise impact. Therefore, using observations by the field technician, the known noise generated by the loading dock has been removed in Figure 3. Note that while a portion of the loading dock noise has been removed from the measurements, Figure 3 and the resulting Ldn values in Table 2 still contain some loading dock noise that could not be separated from the transportation noise. Therefore, it is expected the noise impact solely from transportation noise will be less than the indicated noise levels in Table 2 and Figure 3.

**Figure 3: Five minute average noise levels recorded during 24-hour noise survey with known loading dock noise removed.**



## 6 FUTURE NOISE IMPACT

Noise levels measured on the site were projected 20 years into the future.<sup>1</sup> Using a conservative 2% increase in traffic compounded annually until 2038, noise impact from roadway traffic will typically increase approximately 2 dBA Ldn. The projected noise levels for the measurement locations are presented in Table 3.

**Table 3: Projected transportation noise impact.**

Measurement Location	Distance Above Grade	Measured Noise Level (dBA Ldn)
A	50 feet	63
B	5 feet	62
	25 feet	63
C	25 feet	63
D	5 feet	57

Using the conservative 2 dBA increase in transportation noise impact, the proposed Cabin John Shopping Center will not be exposed to noise levels above 65 dBA Ldn. Additionally, since some loading dock noise could not be removed from the noise measurements, it is expected that transportation noise impact will be lower than the values shown on Table 3. Therefore, site requires no further analysis or modifications to comply with Montgomery County’s residential noise regulation.

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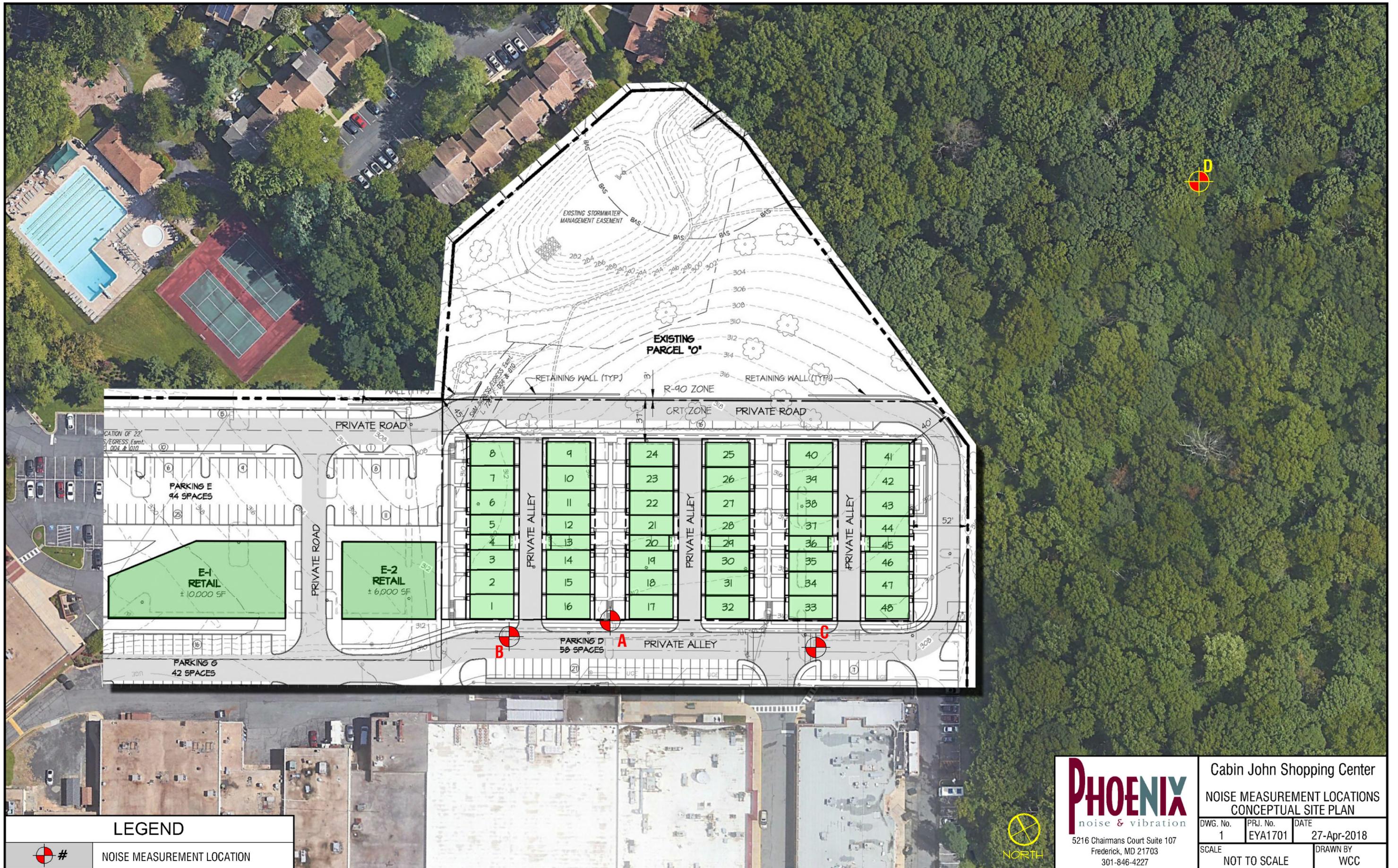
<sup>1</sup>Montgomery County typically requires that roadway noise impact studies be conducted using the projected traffic volumes 20 years from the date of the study.

## 7 CONCLUSION

Noise impact upon the proposed Cabin John Shopping Center development has been determined using the 24-hour on-site noise measurements. The measured noise levels have been increased by a conservative 2 dBA Ldn at all locations due to the projected increase in traffic volumes over the next 20 years. Additionally, some loading dock noise is still present in the data due to the inability to separate all transportation noise from loading dock noise. While this analysis accounts for these factors, the proposed Cabin John Shopping Center development will still not be exposed to roadway noise levels above 65 dBA Ldn. According to Montgomery County noise level requirements for residential developments, no further analysis or additional mitigation will be required.

**Please note:** The results of this Phase I Noise Analysis have been based upon the site information made available at the time of this study, including the proposed building layout. Should this information be altered, including significant modifications to roadway alignment and projected roadway data, additional analysis will be required to determine if the results and recommendations presented herein are capable of reducing exterior and indoor noise levels to comply with Montgomery County's noise level requirements for residential development.

## **APPENDIX**



**LEGEND**



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NOISE MEASUREMENT LOCATION



NORTH



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**Cabin John Shopping Center**

**NOISE MEASUREMENT LOCATIONS  
 CONCEPTUAL SITE PLAN**

DWG. No. 1	PRJ. No. EYA1701	DATE 27-Apr-2018
SCALE NOT TO SCALE		DRAWN BY WCC