

Date

**August 14, 2023**

# **PRELIMINARY SOUND MODELING REPORT**

Chantilly Premier  
Fairfax County, Virginia

## Executive Summary

Kimley-Horn has retained Ramboll to conduct a preliminary acoustical evaluation for a proposed data center site, "Chantilly Premier", within Fairfax County, Virginia. The following information is intended to present acoustical design considerations and evaluate potential impacts from the data center site on the surrounding area.

The project will include one 3-story data center building, which will operate 24 hours per day, 7 days per week. The primary sources of sound emissions are expected to be ventilation equipment, including rooftop exhaust fans and indoor air handling units, and emergency generators. The equipment and associated sound emissions considered in this assessment were based on available project information and Ramboll's experience with equipment typical of data center facilities.

The sound emissions associated with the proposed data center operation were assessed through predictive acoustical modeling. Under normal operation, compliance with Fairfax County Code of Ordinances is expected to require implementation of mitigation as described in this report, namely the use of upgraded rooftop exhaust fans and the installation of silencers (or acoustically equivalent) for air handling unit inlets on the east side of the building. With the implementation of these upgrades, the project is expected to be below the regulatory requirement for all surrounding zoning districts and align with land use compatibility guidelines for nearby residential receptors.

The sound emissions during two other operating scenarios were also evaluated: generator maintenance/testing, and emergency generator operation due to power loss. The predicted sound emissions during these scenarios represent increases over the normal operating conditions, but generator maintenance/testing is expected to occur within the parameters for exemption from the noise regulations described in Section 108.1-5-1(g) of the Fairfax County Code of Ordinances.

## 1. Regulatory Framework

An overview of the legislative/regulatory framework for the applicable jurisdictions as related to sound and vibration emissions is presented below.

### 1.1 Environmental Sound Emissions

#### 1.1.1 Commonwealth of Virginia

No applicable regulatory requirements were discovered for the Commonwealth of Virginia.

#### 1.1.2 Fairfax County

The Fairfax County Code of Ordinances establishes noise limits based on the land use and zoning district classification specific to the property of the sound source or at any point within the property affected by the sound. Zoning district classification is determined based on the scheme of land use classifications contained in the Fairfax County Zoning Ordinance. The Code of Ordinances establishes limits for both continuous and impulsive sounds. Since the proposed facility is not expected to emit impulsive sounds, only the limits for continuous sound are identified below:

Use and Zoning District	Maximum Continuous Sound Levels (dBA)	
	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Residential Areas in Residential Districts - Residential area shall mean a parcel on which a residential dwelling is located and any contiguous rights-of-ways	60	55
Non-Residential Areas in Residential Districts - Non-residential area shall mean a parcel in a residential district that does not contain a residential dwelling and contains non-residential uses	60	60
Mixed Use Area - Mixed use area means the parcel on which one or more residential dwellings and at least one other non-residential use are located and any contiguous rights-of-ways	65	60
Commercial Districts	65	65
Industrial Districts	72	65

*Emergency Operations* - The emission of sound in the performance of emergency work is exempt from the Fairfax County Code of Ordinances. Additionally, the emission of sound associated with the operation of back-up generators during power outages resulting from storms and other emergencies is specifically exempt from the noise ordinance limits per Section 108.1-5-1(g).

*Emergency Generator Testing/Maintenance* - Routine testing and maintenance of back-up generators is exempt from the noise ordinance limits per Section 108.1-5-1(g) when the following conditions are met:

- Testing and maintenance occur during daytime hours (7 a.m. and 9 p.m.); and
- Testing and maintenance occur for no more than two hours a day.

*Construction Activities* - Noise from construction activities is exempt from the County ordinances per Section 108.1-5-1(k) provided the activities occur between 7 a.m. and 9 p.m. and provided such activities do not exceed 90 dBA in a residential area. Construction is prohibited per Section 108.1-4-1(b) between the hours of 9 p.m. and 7 a.m. on Sunday through Thursday, or between 9 p.m. and 9 a.m. on Fridays, Saturdays, and the day before a Federal holiday.

**1.1.3 References**

Ramboll reviewed the following regulatory sources in August 2023. Links to the sources reviewed are provided below:

- Fairfax County Code of Ordinances, Chapter 108.1, Noise - [CHAPTER 108.1. - Noise Ordinance. | Code of Ordinances | Fairfax County, VA | Municode Library](#)
- Fairfax County Zoning Ordinance - <https://www.fairfaxcounty.gov/planning-development/zoning-ordinance>
- Fairfax County GIS and Zoning Maps - <https://www.fairfaxcounty.gov/planning-development/maps-and-geographic-applications>

**2. Sound Emissions Analyses**

**2.1 Methodology**

The noise emissions assessment for the project was completed using a sound prediction software package, Cadna/A, published by Datakustik GmbH, which is configured to implement the ISO 9613

environmental sound propagation algorithms. It allows the creation of complex acoustical models and predicts sound pressure levels due to sound emissions from a specific source(s). The modelling considers many factors that influence sound propagation including source sound level and directivity, distance attenuation, source-receptor geometry, barrier effects of buildings and topography, and ground and atmospheric attenuation.

## 2.2 Facility Design and Equipment

The equipment and associated sound emissions considered in this assessment were based on available project information and Ramboll’s experience with equipment typical of data center facilities. The facility equipment and associated equipment sound level data considered in the acoustical model are identified in the table below.

Estimated Equipment Sound Levels				
Equipment Type		Location	Sound Level (dBA)	Quantity
Cooling and Ventilation System	Upgraded Exhaust Fans - Daytime (100% speed)	Exhaust fans on the roof and directed upward	91 <sup>1</sup>	115
	Upgrade Exhaust Fans - Nighttime (83% speed)		87 <sup>1</sup>	
	Air Handling Unit - West side	Inlet Louver Face	85 <sup>2</sup>	9 per building side. East side includes effects of inlet silencers.
	Air Handling Unit - East side (with inlet silencer)		71 <sup>3</sup>	
Emergency Power Generators (≤ 2.75 MW)		Generator yard	105 <sup>4</sup>	27
Emergency Power Generators - House (≤ 1 MW)		Generator yard per building	105 <sup>5</sup>	1
Load Bank		Atop each generator	109 <sup>1</sup>	1 per generator
<ol style="list-style-type: none"> <li>1. Vendor furnished sound power levels.</li> <li>2. Vendor furnished sound power level (per square meter) for air-handling unit at 100% load.</li> <li>3. Vendor furnished sound power level (per square meter) for air-handling unit at 100% load. Includes silencer with minimum insertion loss of 14 dB.</li> <li>4. Vendor provided sound power level for emergency power generators with upgraded enclosures, based on expected sound pressure level rating of 75 dBA at 23 feet. Based on conceptual layout, a portion of the generators are expected to be stacked.</li> <li>5. Vendor provided sound power level for house generator, based on sound pressure level rating of 75 dBA at 23 feet.</li> </ol>				

## 3. Normal Operations

### Typical Daily Operation

As previously discussed, the data center will operate 24 hours per day, 7 days per week. During nighttime hours, select building ventilation equipment operates at a capacity below typical daytime operation. During typical operation, sound will emanate from both the ventilation systems (i.e., air inlet and exhaust fans) for the building. Daytime operation was considered as the worst-case operating condition for assessing compliance with local limits since rooftop ventilation equipment sound emissions are higher during the day, and regulatory limits for commercial (65 dBA) and nonresidential areas in a residentially zoned district (60 dBA) do not change from day to night. Figure 1 presents the modeled project sound emissions during normal operations.



Figure 1 - Project sound emissions full load daytime operation

### Code Compliance

Based on the results of the acoustical model, mitigation measures as described in the previous section (upgraded rooftop exhaust fans and air handling unit inlet silencers, or other mitigation measures of comparable performance) will be required to achieve compliance at the commercial boundary east of the site. As shown in Figure 1, sound emissions from the facility are expected to be 52 – 61 dBA at the commercial boundary to the west, and 40 - 42 dBA at the residential area to the southwest during daytime hours. Project sound emissions during nighttime hours will be lower since fan operating speed will be reduced at night. Sound emissions at all site boundaries are predicted to comply with regulatory limits as shown in the following table:

<b>Preliminary Sound Modeling Results – Normal Operations, Daytime</b>			
	<b>Location</b>		
	<b>Commercial Boundary (East)</b>	<b>Residential Boundary (Southwest)</b>	<b>Industrial Boundary</b>
Predicted Project Sound Level	52 - 61 dBA	40 - 42 dBA	45 - 55 dBA
Applicable Regulatory Limit	65 dBA	60 dBA	72 dBA

#### 4. Generator Maintenance/Testing and Emergency Operations

The emergency generators are expected to operate occasionally for a short duration to test and ensure readiness, and all generators will operate during any potential power outages. As noted previously, noise emission from generator maintenance and testing are exempt from the limits set forth in the Fairfax County Zoning Ordinance provided that the maintenance and testing occur between 7 a.m. and 9 p.m. and provided such activities occur for no more than two hours per day. Emergency generator operations during power outages resulting from storms and other emergencies are also exempt from the noise ordinance limits.

The following table summarizes the predicted project sound emissions at the property boundary during maintenance and emergency operations. Modeled sound level contours for single generator maintenance scenarios and during emergency operations are presented in Figure 2 and Figure 3 below.

<b>Preliminary Sound Modeling Results – Generator Maintenance and Emergency Operations</b>			
<b>Scenario</b>	<b>Location</b>		
	<b>Commercial Boundary (East)</b>	<b>Residential Boundary (Southwest)</b>	<b>Industrial Boundary</b>
Maintenance/Testing - Single Generator	47 - 61 dBA	41 - 47 dBA	45 - 54 dBA
Maintenance/Testing - All Generators	49 - 61 dBA	46 - 52 dBA	52 - 63 dBA
Emergency Operations	49 - 61 dBA	46 - 52 dBA	52 - 63 dBA

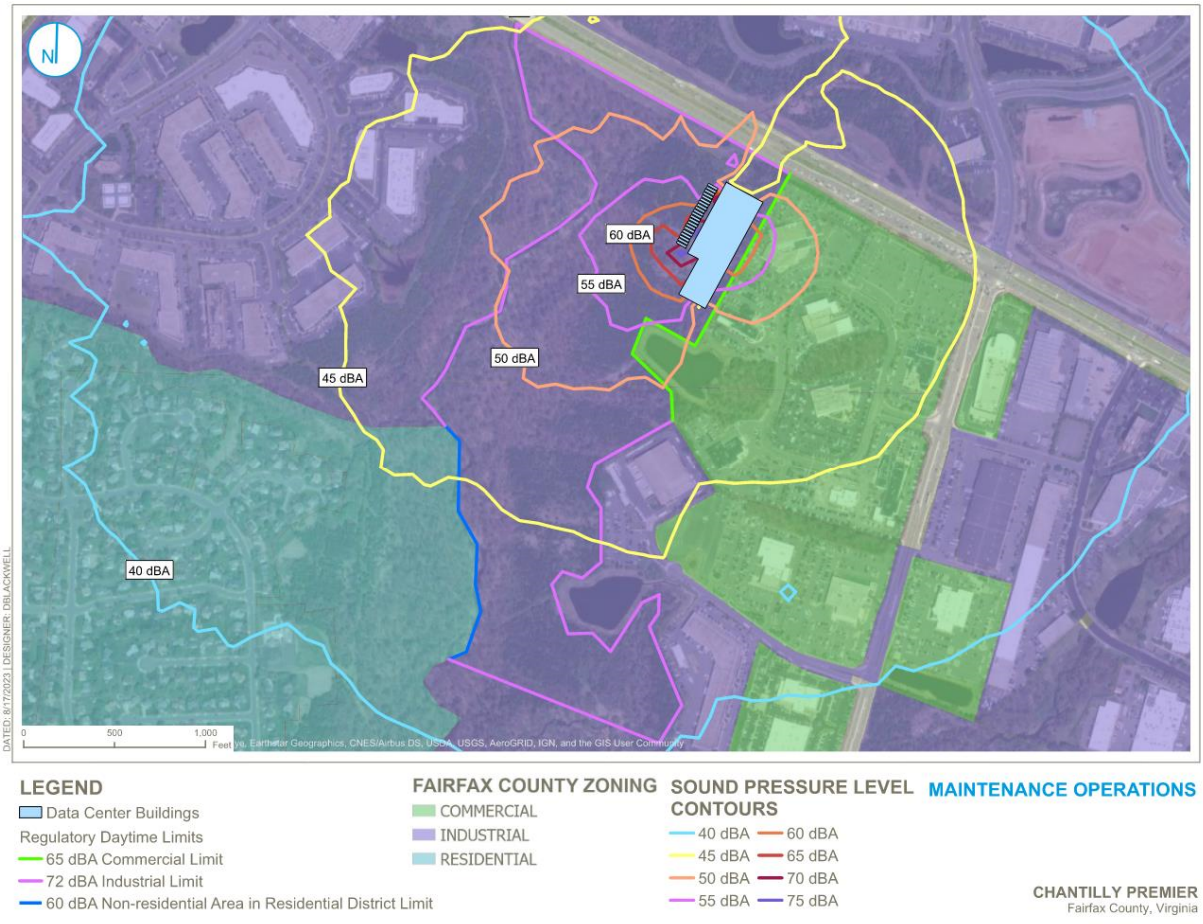


Figure 2 - Project sound emissions during single generator maintenance activities



Figure 3 - Project sound emissions during emergency operations and simultaneous testing of all generators