CMH165 - Environmental Noise

Assessment

Union Township, Clinton County, Ohio

January 6, 2026

Contents

Executive Summary

Amazon Web Services (AWS) conducted an environmental noise assessment for the proposed data center site. The environmental noise assessment has been prepared at the request of the City of Wilmington, Ohio, to support the permit application process. It presents a summary of the applicable regulations pertaining to sound emissions, the predicted sound emissions from the facility modeled in accordance with industry standards, and an evaluation of the proposed project's compliance with applicable regulatory requirements.

The City of Wilmington Ordinance No. O-24-70 contains requirements applicable to the facility. Section 1.2.c provides a 60 dBA daytime and 55 dBA nighttime sound level limit applicable at receiving residential land.

The data center will operate 24 hours per day, 7 days per week. The primary sources of sound from the facility are expected to include cooling, ventilation, and air conditioning equipment. There are back-up generators associated with the facility. Planned generator operation will occur during daytime hours for a short time period, as part of routine testing. Mitigation in the form intake sound attenuators, interior sound absorption, and low-noise generators have been incorporated into the design to reduce the sound at nearby sensitive receivers.

The sound emissions associated with the proposed data center operation were assessed through predictive acoustical modeling. Under a full load operating condition including all normally operating mechanical equipment operating at 100% load, the project is predicted to meet the 55 dBA nighttime sound level limit at nearby residential land. During routine daytime generator testing, the project is predicted to meet the 60 dBA daytime sound level limit at nearby residential land.

1. Introduction

An environmental sound assessment was conducted for the proposed data center site within Union Township, Clinton County, Ohio, to consider applicable regulations pertaining to sound emissions, and to inform the acoustical design of the project. This report, prepared in support of the permitting process, summarizes the findings of the assessment and details the proposed acoustical design of the facility.

2. Standards

The environmental sound assessment has been conducted in general accordance with applicable provisions specified in relevant industry standards including ANSI S1.13, ANSI S12.9, and ISO 9613.

3. Acoustical Principles and Terminology

To familiarize the reader with terminology used throughout this report, this section introduces general acoustical terminology and describes basic acoustical parameters.

Sound is the transmission of energy in the form of fluctuating pressure waves from a vibrating source through an elastic medium, such as air, that is detectable by the human ear. The pressure fluctuates above and below atmospheric pressure. The amplitude of the pressure fluctuation is typically described in terms of decibels (dB), while the rate of fluctuation per unit time (frequency) is described in hertz (Hz).

The decibel is a logarithmic ratio of a given sound pressure to a reference sound pressure. A logarithmic ratio is used for decibels since human hearing is roughly logarithmic, rather than linear. The reference sound pressure is roughly equal to the threshold of human hearing. Sound pressure levels below the human threshold of hearing are less than 0 dB, while levels above the human threshold of hearing are greater than 0 dB. Differences in sound level are also described in decibels. A 3-dB difference is considered "just noticeable", a 5-dB difference is considered "clearly noticeable", while a 10-dB difference is perceived as a doubling (or halving) in loudness. Table 1 provides a list of common noise sources, their sound level, and their subjective loudness.

Because the decibel is logarithmic, a doubling of sound energy from a noise source produces a 3-dB increase in sound level from that source, not a doubling of the loudness of the sound (which requires a 10-dB increase). For example, if a stationary lawn mower is creating a sound level of 60 dBA at 100 feet, adding a second lawn mower next to the first would cause the sound level at the same 100-foot location to increase to 63 dBA. Such an increase might not be discernible in a complex acoustical environment.

The range of frequencies a healthy human ear can hear is approximately 20 Hz to 20,000 Hz. The human ear is not equally sensitive to all frequencies across the audible frequency spectrum. The human ear is most sensitive to mid frequencies (the frequency range associated with speech) and is less sensitive at low frequencies and very high frequencies. To account for this, frequency weighting networks have been developed to approximate the human ear's frequency response at different sound pressure levels. The A-weighting network is used to approximate the frequency response of the human ear at normal sound levels. Measurements using the A weighting network are described in terms of A-weighted decibels, often abbreviated colloquially as dBA or dB(A).

Table 1 - Typical Sound Pressure Levels Associated with Common Noise Sources

Typical Sound Pressure Levels Associated with Common Noise Sources			
Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 ft	
130	Threshold of pain	Jet aircraft at 300 ft during takeoff	
120	Threshold of feeling		Rock band concert
110	Extremely Loud	Accelerating motorcycle at a few feet away.	
100	Very Loud	Auto horn at 10 ft	
90		Jackhammer at 50 ft	Noisy factory
80	Loud	Diesel truck (40 mph) at 50 ft	Cafeteria with sound-reflecting surfaces
		Noisy urban street	
70	Moderately Loud	Busy highway at 100 ft	Vacuum cleaner at 10 ft
60	Moderate		Face-to-face conversation
50	Quiet	Small town residence	Open office area
40			Quiet dishwasher
30	Very quiet		Bedroom, typical residence (without TV or sound system)
20		Rustling leaves	Audiometric testing room
			Whisper
10	Just audible		Human breathing
0	Threshold of hearing		

Source: Adapted from *Architectural Acoustics*, M. David Egan (1988) and *Noise Control in Buildings*, Cyril M. Harris, (1994).

4. Regulatory Setting

The City of Wilmington Ordinance No. O-24-70 contains requirements applicable to the facility. Section 1.2.c provides a 60 dBA daytime and 55 dBA nighttime sound level limit applicable at receiving residential land. Figure 1 provides the project building locations, aerial imagery, site boundary, and surrounding City of Wilmington zoning districts.

Figure 1 – Aerial Imagery, Site Boundary, and City of Wilmington Zoning

5. Project Description

The data center will operate 24 hours per day, 7 days per week. The primary sources of sound from the facility are expected to include cooling, ventilation, and air conditioning equipment. There are back-up generators associated with the facility. Planned generator operation will occur during daytime hours for a short time period, apart of routine testing. Mitigation in the form intake sound attenuators, interior sound absorption, and low-noise generators have been incorporated into the design to reduce the sound at nearby sensitive receivers.

6. Predicted Project Sound Levels

Methodology

Potential project-related sound emissions were evaluated using a sound prediction software package, CadnaA, 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 specific sources. The modeling 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.

Acoustical Model Inputs and Evaluated Scenarios

A "full load" operations scenario including all normally operating mechanical and electrical equipment operating at 100% load was evaluated. Full load operations include contributions from ventilation and cooling equipment, which are the primary source of sound emissions from the

project. A “generator testing” scenario was also evaluated, including all sources from the “full load” scenario plus select generators operational for routine, daytime testing.

Acoustical Modeling Results

Sound emissions during full load operation of the data centers with acoustical mitigation are expected to comply with both the City of Wilmington 60 dBA daytime and 55 dBA nighttime sound level limit applicable at receiving residential land. Figure 2 shows the full load scenario with the 55 dBA nighttime sound contour. Figure 3 shows the generator testing scenario with the 60 dBA daytime sound contour.

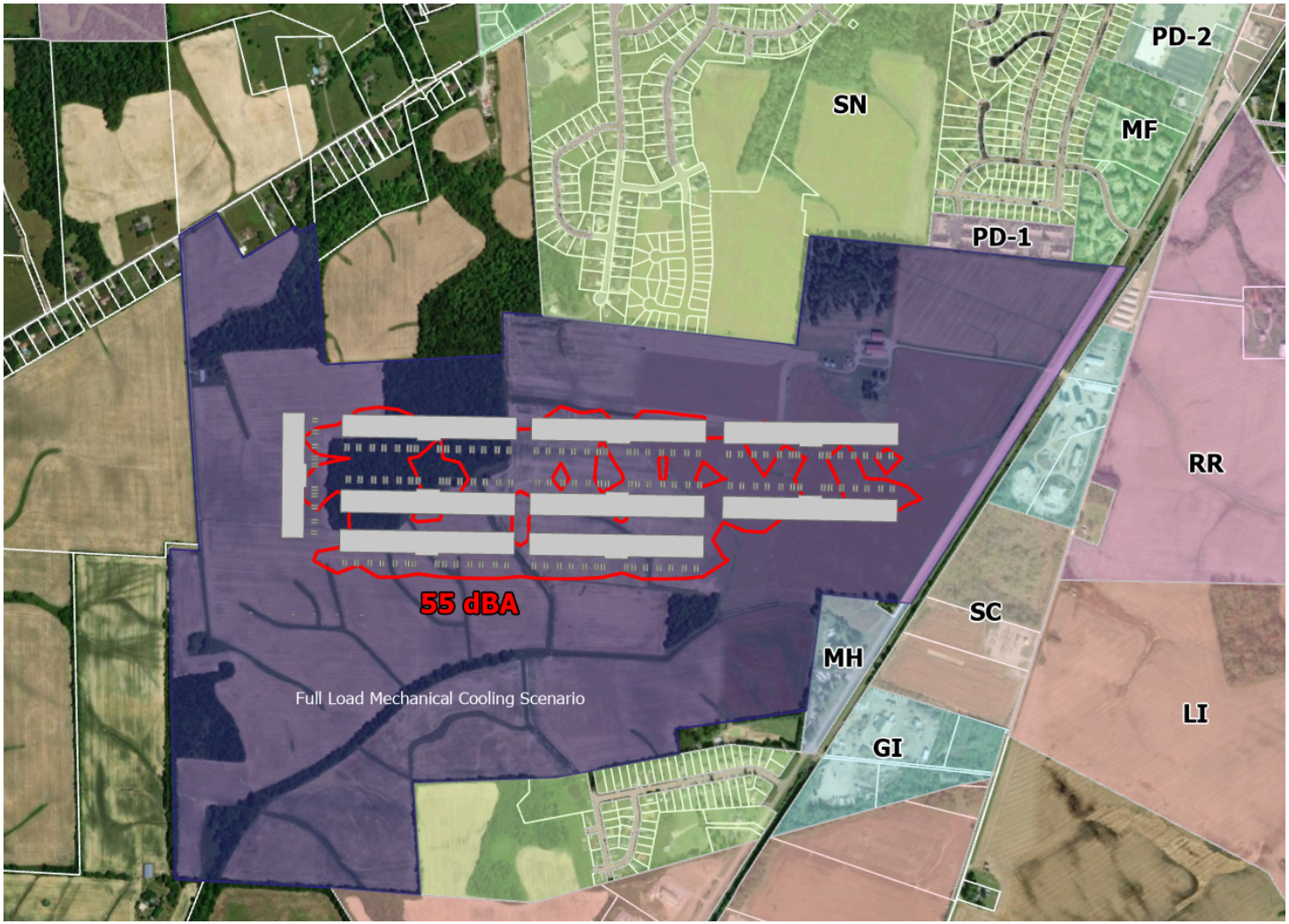

Figure 2 - Predicted Sound Level Contours for Full Load Operations (55 dBA nighttime limit at residential property)

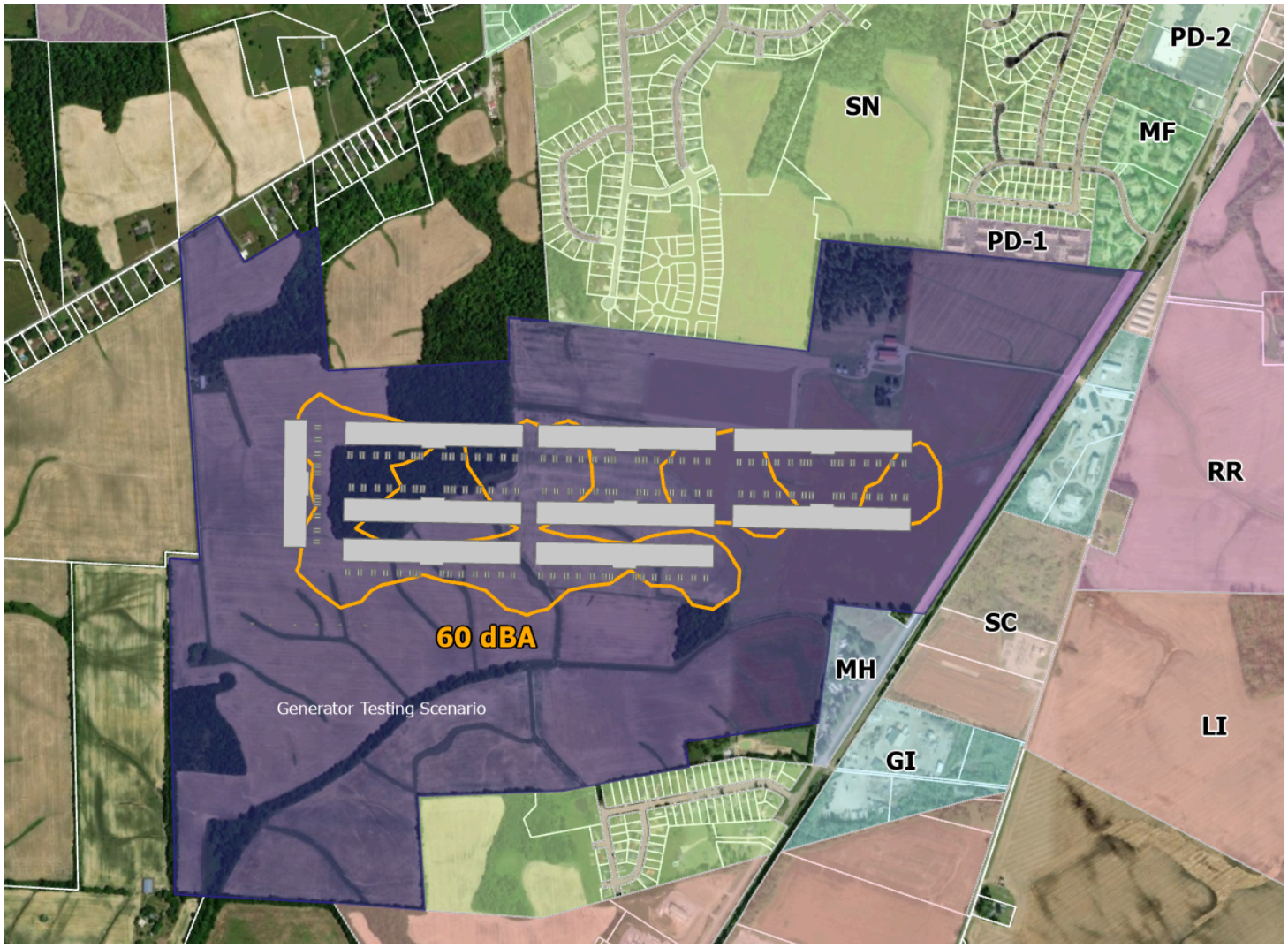

Figure 3 - Predicted Sound Level Contours for Generator Testing Operations (60 dBA daytime limit at residential property)

7. Conclusions

This environmental noise assessment has been prepared by AWS in support of the permit application process for the proposed CMH165 data center in Union Township, Clinton County, Ohio. The assessment presents a summary of the applicable regulations pertaining to sound emissions, the predicted sound emissions from the facility modeled in accordance with industry standards, and a determination of the proposed project's compliance with applicable regulatory requirements.

This assessment was prepared based on information available at the current stage of project design and the assumptions and conditions set forth in this report and has been conducted in general accordance with applicable provisions specified in relevant industry standards including ANSI S1.13, ANSI S12.9, and ISO 9613.

Based on the information presented in this report, the following conclusions can be summarized:

The project is expected to comply with all applicable regulatory requirements during the full load and generator testing operations.