

8 March 2019

Ms. Archelle Ashworth  
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Re: Acoustical Evaluation of the Westfield 4 Wireless Communication Facility  
1033 Springfield Avenue, Cranford, New Jersey  
LSG&A File 2019011

Dear Ms. Ashworth:

As you requested, Lewis S. Goodfriend & Associates (LSG&A) has completed an evaluation of the expected property line sound pressure levels due to the operation of the equipment planned for installation at the Westfield 4 Wireless Communication Facility (Project), located at 1033 Springfield Avenue, Cranford Township, New Jersey. This letter summarizes the results of our evaluation, including the expected sound pressure levels at the nearest residential and commercial property lines due to the operation of the proposed equipment, compared to the applicable limits of the State and local noise regulations and daytime and nighttime sound pressure levels measured on this site.

The results of the evaluation indicate that the normal operation of the equipment, and routine daytime testing of the emergency generators, are expected to meet the daytime and nighttime residential limits of the NJDEP and Cranford Township noise regulations at the nearest residential and commercial property lines.

## **1.0 SITE LAYOUT**

The Project will be located on a parcel of land located adjacent to the Union County Community College campus. The site is also bordered by the Fairview Cemetery to the west, and residential uses to the north on Princeton Road. The nearest residential property line to the site is located on Princeton Avenue, 170 feet to the north of any sound generating sources at the Project site.

The Project will include wireless communication equipment, consisting of equipment cabinets, HVAC units, an electrical transformer, and emergency generators. LSG&A performed an acoustical evaluation to determine operational sound levels at the adjacent residential and commercial property lines. The site and location of the proposed equipment are shown on Figure 1 at the end of this letter.

## **2.0 AMBIENT SOUND PRESSURE LEVEL MEASUREMENTS**

Ambient sound level measurements were conducted over a 24-hour period on 4 March 2019 through 5 March 2019 at one location on the proposed Project site, approximately 150 feet south of the nearest residential property line. The 24-hour measurement location is also depicted on Figure 1, at the end of this letter.

The contributing sources of sound during the baseline measurements included vehicular traffic on campus roads, distant traffic, aircraft, wildlife, and trains. Meteorological conditions during the measurement period were acceptable for acoustical measurements and included temperatures that ranged from 20 to 38 degrees Fahrenheit, relative humidity of 32 to 66 percent, westerly winds with speeds of generally 0 to 10 miles per hour, and no precipitation.

### **2.1 Data Acquisition and Analysis**

The sound level measurements were performed using one of LSG&A's Rion Type NL-52 sound level meters, equipped with a Rion Type UC-59 microphone. The meter was configured to automatically record statistical A-weighted<sup>1</sup> and one-third octave band sound pressure levels and store the results in memory for later retrieval. The microphone was mounted with a windscreen onto a tripod at a height of approximately 5 feet above grade. The system's calibration was verified before and after the measurements using a Brüel & Kjær Type 4231 acoustical calibrator. The data were later downloaded and transferred to a spreadsheet for evaluation. Copies of the NIST traceable calibration certificates are available upon request

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<sup>1</sup> A-Weighting, also noted as dB(A), is a standardized sound level meter setting having a frequency characteristic similar to the human ear/brain frequency sensitivity and, therefore, provides an overall sound level measurement which correlates with how humans perceive sound.

## 2.2 Results

The measured  $L_{eq}$ <sup>2</sup>,  $L_{90}$ <sup>3</sup>,  $L_{50}$ <sup>4</sup> and  $L_{10}$ <sup>5</sup> 24-hour baseline sound level data are presented in one-hour intervals on Figure 2, at the end of this letter. A review of the data reveals that daytime (7:00 A.M. to 10:00 P.M.) ambient  $L_{90}$  sound levels ranged from 33 dB(A) to 42 dB(A). Nighttime ambient  $L_{90}$  sound levels ranged from 28 dB(A) to 34 dB(A).

## 3.0 REQUIREMENTS OF THE APPLICABLE NOISE REGULATIONS

The sound emanating from any commercial, industrial, or public property is subject to the state and local noise regulations at all times of the day and night. The New Jersey Department of Environmental Protection (NJDEP) maintains a statewide noise regulation, and the Cranford Township code also includes regulations regarding sound.

The NJDEP<sup>6</sup> and Cranford<sup>7</sup> noise regulations exempt the sound emissions associated with “emergency electricity generators at an industrial, commercial, or community service facility in use during an electrical outage.” Therefore, the sound emissions due to the emergency operation of the generators would be exempt from the limits of the regulations. It is our understanding that periodic testing will occur only during daytime hours and therefore the generators will only be subject to the daytime limits of the NJDEP noise regulation at the adjacent property lines.

### 3.1 NJDEP Noise Regulation (N.J.A.C. 7:29)

The NJDEP noise regulation limits the A-weighted sound levels produced by a commercial facility, when measured at a residential property line, to the following sound levels:

Daytime	(7:00 AM -to- 10:00 PM)	–	65 dB(A)
Nighttime	(10:00 PM -to- 7:00 AM)	–	50 dB(A)

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2 The  $L_{eq}$  represents the energy-averaged continuous sound pressure level during the measurement period.

3 The  $L_{90}$  is the sound pressure level exceeded 90 percent of the time, and represents the continuous sound pressure levels during the measurement period.

4 The  $L_{50}$  is the sound pressure level exceeded 50 percent of the time during the measurement.

5 The  $L_{10}$  is the sound pressure level exceeded 10 percent of the time, and represents the transient sound pressure levels during the measurement period.

<sup>6</sup> NJAC 7:29, Section 1.5.(a).14

<sup>7</sup> Code of the Township of Cranford, Section 290-6.A.(1)

The NJDEP regulation also provides limits for sound pressure levels in the preferred octave bands with center frequencies between 31.5 and 8000 hertz during the daytime and nighttime hours, as summarized in Table 1.

<b>Table 1 - Daytime and Nighttime Limits [dB re: 20μPa] of the NJDEP Noise Regulation for Residential Property Receivers (NJAC 7:29).</b>									
	<b>Octave Band Center Frequency, Hz</b>								
	<b>31.5</b>	<b>63</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>
<b>Daytime</b> Sound Pressure Level Limits	96	82	74	67	63	60	57	55	53
<b>Nighttime</b> Sound Pressure Level Limits	86	71	61	53	48	45	42	40	38

The NJDEP regulation also limits the sound pressure levels for commercial and community facility receiving property lines. These limits are equivalent to the daytime limits described above, but are imposed 24 hours a day.

### 3.2 Cranford Township Noise Regulation

The local noise regulation is set forth in Chapter 290 of the Code of the Township of Cranford. Section 290-5 (*Maximum permissible sound levels*) provides the same sound pressure level limits as the NJDEP noise regulation. However, the NJDEP noise regulation states that the measured sound pressure levels may not *exceed* the given decibel levels, whereas the Township's noise ordinance states that the measured sound pressure levels may not *equal or exceed* the decibel limits. This effectively makes the Township's noise regulation one decibel more stringent than the NJDEP regulation

LSG&A understands that the testing of the generators is proposed to be done during daytime hours only. The remaining mechanical equipment is expected to operate during daytime and nighttime hours.

## 4.0 ACOUSTICAL EVALUATION

The proposed sound generating pieces of equipment that were included in this acoustical evaluation are summarized in Table 2 below.

<b>Table 2 - Summary of the Proposed Equipment Included in the Acoustical Evaluation, Westfield 4 Wireless Communication Facility, Cranford, New Jersey</b>		
<b>Equipment</b>	<b>Make / Model</b>	<b># of Units</b>
30 kW Emergency Generator	Cummins	1
25 kW Emergency Generator	Generac	1
30 kW Emergency Generator	MTU	1
Equipment Cabinet	Vertic	1
Equipment Cabinet	Ericsson	1
Equipment Cabinet	Telcordia	1
Air Conditioner	Dantherm	1
300 kVA Transformer	N/A	1

Sound emissions data for the above proposed equipment were provided by the manufacturers and LSG&A understands that the proposed emergency generators will be housed within acoustical enclosures.

LSG&A prepared an acoustical model of the Project using SoundPLAN software. The acoustical model included all of the above equipment operating with and without all three of the emergency generators being tested simultaneously. Calculation of the property line sound pressure levels was based on the distances between the equipment and the receiving property lines, and the effects of topography. The ground cover throughout the area was assumed to be partially acoustically absorptive, and no attenuation was considered for foliage or atmospheric absorption.

Discrete receptor points were evaluated along the nearest residential property line (Princeton Road) and the nearest commercial property line (Fairview Cemetery). The property line receptors were evaluated at approximately 5 feet above grade. The evaluation locations are shown on Figure 1, at the end of this letter.

## 5.0 RESULTS AND DISCUSSION

The expected sound pressure levels due to simultaneous operation of the proposed equipment, with and without simultaneous testing of the emergency generators, are shown in Table 3, below. The results are compared to the limits of the noise regulations and the measured ambient  $L_{90}$  sound levels.

<b>Table 3 – Expected A-weighted Sound Levels due to the Proposed Equipment, Compared to the Limits of the Noise Regulations and the Measured Ambient Levels, Westfield 4 Wireless Communications Facility, Cranford, New Jersey.</b>				
	<b>Daytime Sound Levels, dB(A)</b>		<b>Nighttime Sound Levels, dB(A)</b>	
<b>Location</b>	<b>Project Sound with Emergency Generators</b>	<b>Measured <math>L_{90}</math> Ambient</b>	<b>Project Sound without Emergency Generators</b>	<b>Measured <math>L_{90}</math> Ambient</b>
Nearest Residential Property Line	50	33-42	39	28-34
<b>Limit</b>	<b>65</b>		<b>50</b>	
Nearest Commercial Property line	56	33-42	44	28-34
<b>Limit</b>	<b>65</b>		<b>65</b>	

Figures 3 through 5, at the end of this letter, show the expected octave band sound pressure levels at the nearest property line receiver locations, with and without simultaneous testing of the emergency generators. The results of the evaluation are compared to the daytime and nighttime limits of the noise regulations, respectively. As shown on the figures, the sound pressure levels due to operation of the proposed equipment are expected to be in compliance with the daytime and the nighttime limits of the NJDEP and the Township of Cranford noise regulations at the nearest property lines.

I trust that this information is sufficient for your present needs. Please call me if you have questions.

Very truly yours,  
LEWIS S. GOODFRIEND & ASSOCIATES

A handwritten signature in blue ink, appearing to read 'Anthony Agresti', is written over the company name.

Anthony Agresti, INCE  
Project Manager

ACA:aca  
Enclosures

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Figure 1 – Aerial view showing the Westfield 4 Project Site, Proposed Equipment, and Acoustical Evaluation Locations, Cranford, New Jersey.



All Locations Approximate  
Not to Scale

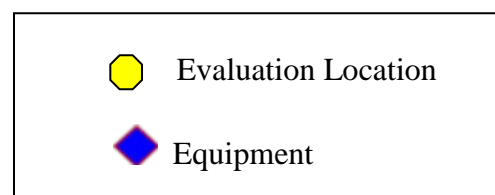




Figure 2 – Measured Hourly Ambient Sound Levels, Westfield 4 Wireless Communication Facility, Cranford Township, New Jersey, 4-5 March 2019.

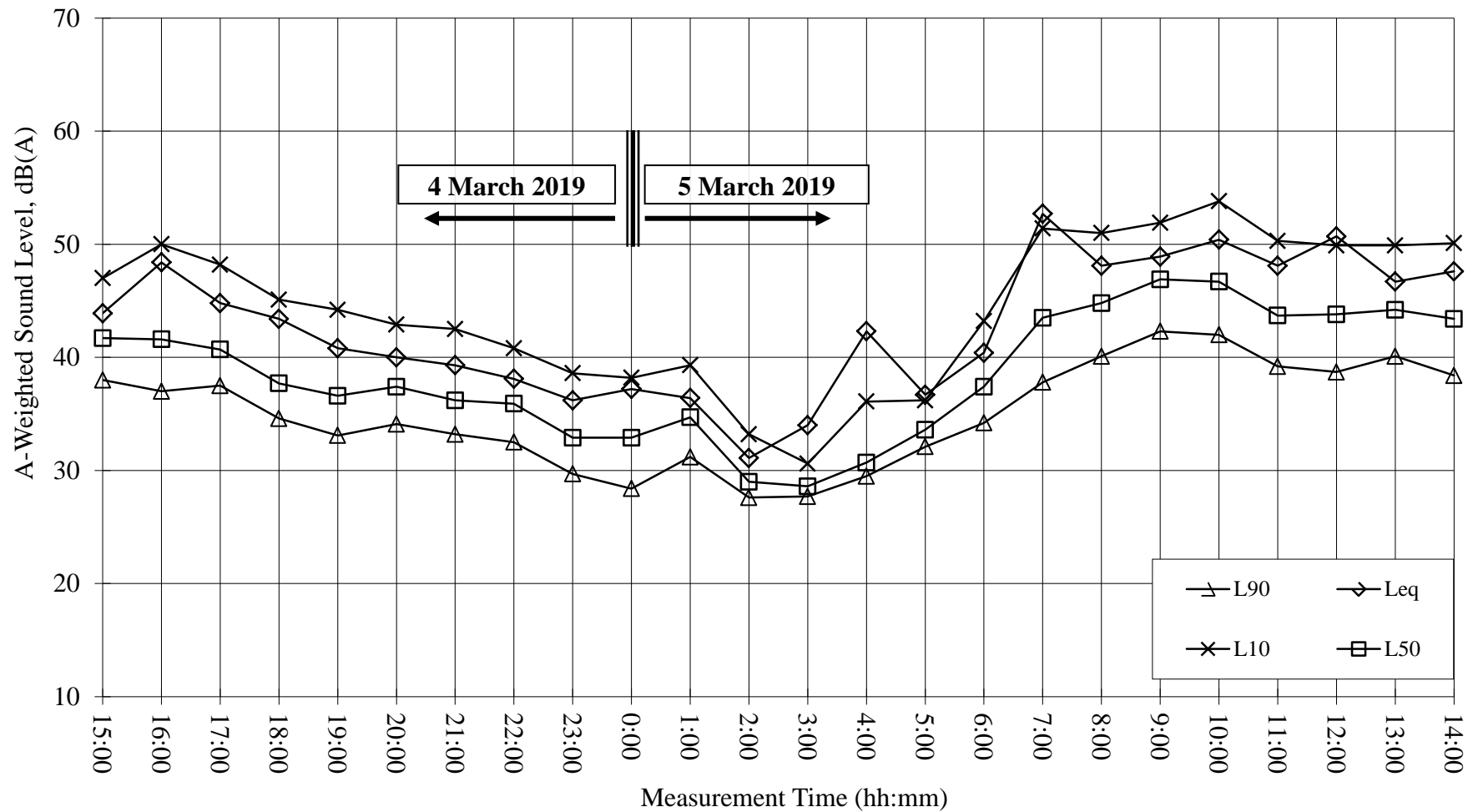


Figure 3 – Expected Daytime Sound Pressure Levels (Lp) due to the Equipment, Compared to the Limits of the Noise Regulations, Westfield 4 Wireless Communications Facility, Cranford, New Jersey.

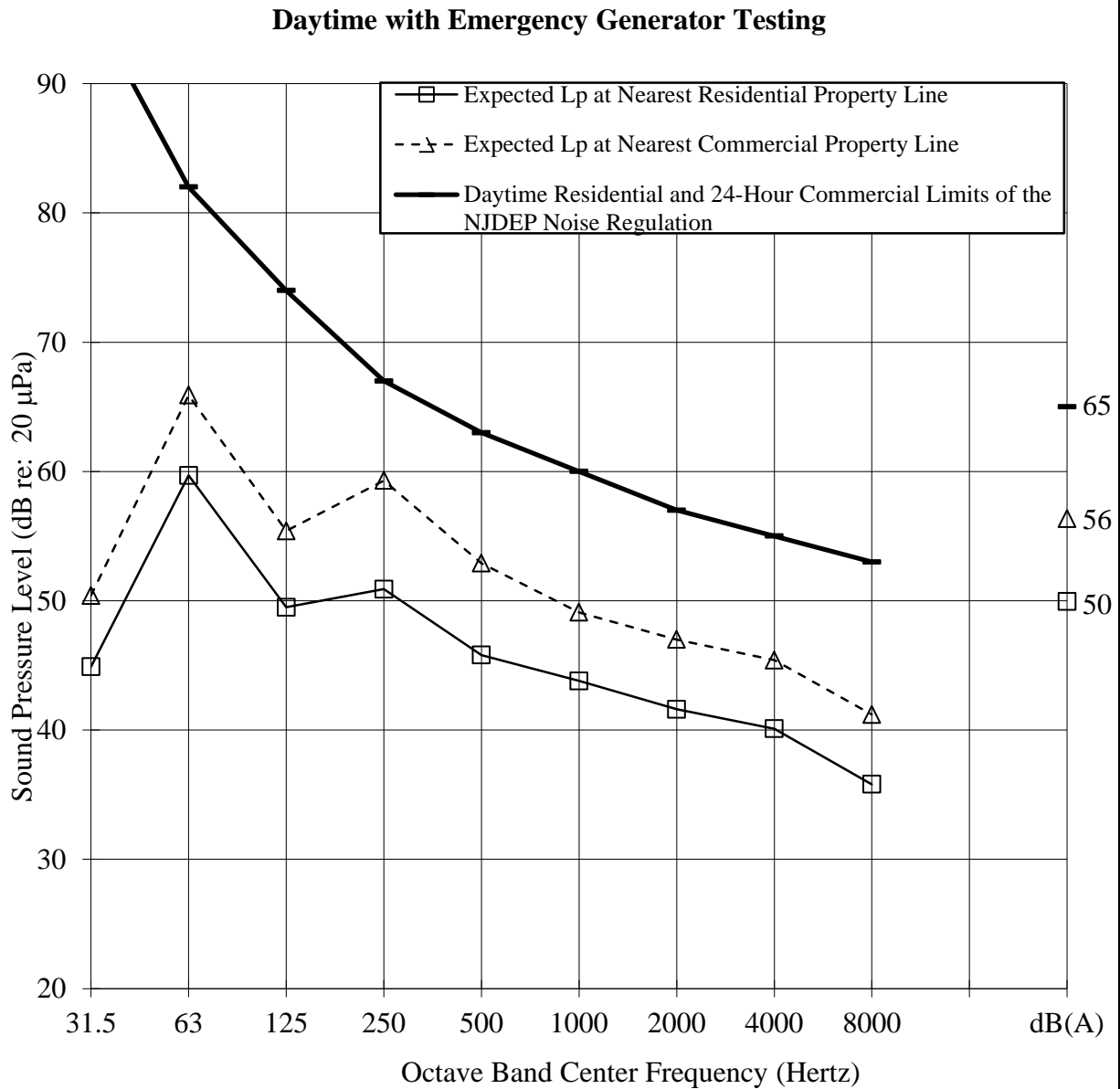


Figure 4 – Expected Nighttime Sound Pressure Levels (Lp) due to the Equipment, Compared to the Limits of the Noise Regulations, Westfield 4 Wireless Communications Facility, Cranford, New Jersey.

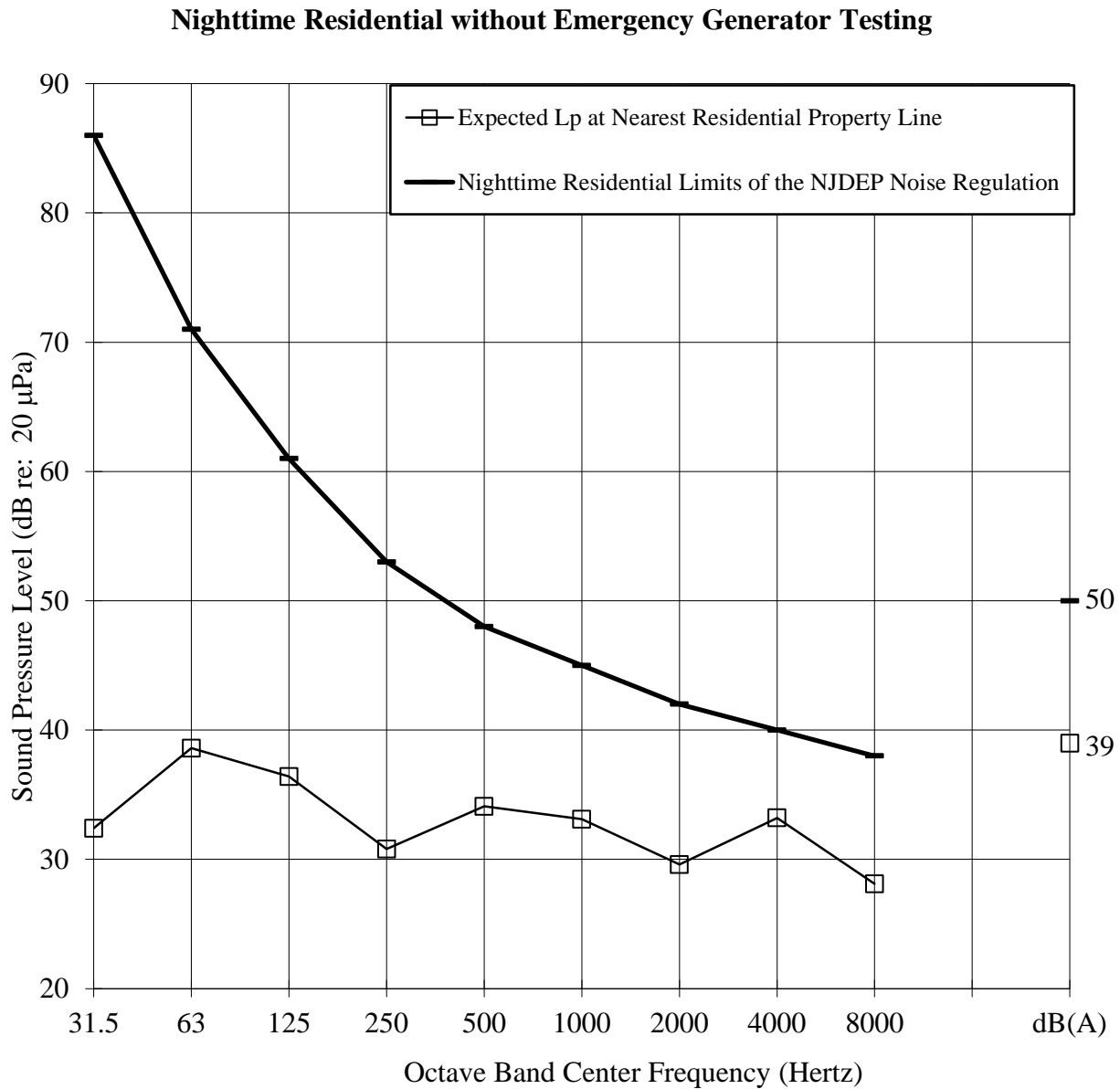


Figure 5 – Expected Nighttime Sound Pressure Levels (Lp) due to the Equipment, Compared to the Limits of the Noise Regulations, Westfield 4 Wireless Communications Facility, Cranford, New Jersey.

