EX. 5.6: Environmental Sound Assessment Study

ENVIRONMENTAL SOUND ASSESSMENT STUDY

AGAWAM, FAIRMONT, LUDLOW, AND WEST SPRINGFIELD SUBSTATIONS

THE GREATER SPRINGFIELD RELIABILITY PROJECT

BY

WESTERN MASSACHUSETTS ELECTRIC COMPANY

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Western Massachusetts Electric

The Northeast Utilities System

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1.0 Introduction

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) has been contracted by Northeast Utilities System (NUS) to conduct an environmental sound assessment study for several of their existing substations in Massachusetts. These substations include Agawam, Fairmont, Ludlow, and West Springfield. NUS is proposing to install new transformers, breakers, and control houses at the existing Agawam and Ludlow substations, as part of the Greater Springfield Reliability Project.

The objectives of this study are to identify local noise ordinances and quantify the noise levels associated with each substation. Quantification of the noise involved measuring ambient noise levels at the existing NUS substations, estimating operational noise levels from the proposed modifications (if applicable), and examining the potential effects of the projected noise levels on the closest sound receivers in the surrounding communities due to operation of any proposed noise sources at the existing substations.

2.0 Acoustical Terminology

Noise is often considered unwanted sound. However, human response to sound is complex and is influenced by a variety of acoustic and non-acoustic factors. Acoustic factors generally include the sound's amplitude, duration, frequency content, and fluctuations. Non-acoustic factors typically include the listener's ability to become accustomed to the sound, the listener's attitude towards the noise and the noise source, the listener's view of the necessity of the noise, and the predictability of the noise. As such, response to noise is highly individualized.

Amplitude and frequency physically characterize sound energy. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. A three dB change in a continuous broadband noise is generally considered "just barely perceptible" to the average listener. Similarly, a six dB change is generally considered "clearly noticeable" and a 10 dB change is generally considered a doubling (or halving) of the apparent loudness.

Frequency is measured in hertz (Hz), which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. The human ear is typically most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to

which the A-weighting scale has been applied is expressed in A-weighted decibels or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common noise sources are listed in Table 2-1.

Table 2-1: 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 during takeoff at a distance of 300 ft	
120	Threshold of feeling	Elevated train	Hard rock band
110		Jet flyover at 1000 ft	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 ft, auto horn at 10 ft, crowd noise at football game	
90		Propeller plane flyover at 1000 ft, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 ft	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner, electric typewriter
60	Moderate	Air-conditioner condenser at 15 ft, near highway traffic	General office
50	Quiet		Private office
40		Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without t.v. and stereo)
20		Rustling leaves	Quiet theater, whisper
10	Just audible		Human breathing
0	Threshold of hearing		

Source: Adapted from Architectural Acoustics, M. David Egan, 1988 and Architectural Graphic Standards, Ramsey and Sleeper, 1994.

There are also objective factors to consider when determining the sound and how people may be affected by the sound. A noise spectrum that contains audible pure tones is typically more annoying than a spectrum with the same overall level, but without the tones. It has been shown that, when noise complaints were received when registering sound levels under 45 dBA, the noise had some tonal components.

Noise in the environment is constantly fluctuating; examples could be when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound levels. The exceedance sound level, L_x, is the sound level exceeded "x" percent of the sampling period and is referred to as a statistical sound level. The most common L_x values are L_{eq}, L_{90}, L_{50}, and L_{10}. The L_{eq} is the equivalent level of a constant sound over a specific time period that has the same sound energy as the actual sound over the same period. The L_{90} is the sound level exceeded 90 percent of the sampling period. The L_{90} represents the sound level without the influence of loud, transient noise sources and is often referred to as the residual or background sound level. The L_{50} is the sound level exceeded 50 percent of the sampling period. The L_{10} represents the occasional louder sounds and is often referred to as the intrusive sound level. The variation between the L_{90}, L_{50}, and L_{10} sound levels can provide an indication of the variability of the acoustical environment. If the acoustical environment is perfectly steady, all values are identical. A large variation between the values indicates highly fluctuating sound levels. For instance, measurements near a roadway with frequent passing vehicles may cause a large variation in the statistical sound levels.

3.0 Applicable Regulations

The Commonwealth of Massachusetts noise regulation (310 CMR 7.10) restricts any facility from increasing sound levels by more than 10 dBA above ambient sound. Ambient is defined as the background A-weighted sound level that is exceeded 90% (L_{90}) of the time measured during equipment operating hours. The noise regulation also restricts any facility from producing pure-tone conditions both at the property line and the nearest inhabited residence. A pure-tone is defined as any octave band frequency sound pressure level that exceeds the two adjacent center frequency sound pressure levels by 3 dB or more.

4.0 Existing Noise Measurements

Ambient noise levels were measured at the existing Agawam, Fairmont, Ludlow, and West Springfield substations in Massachusetts on January 7th, 8th, and 9th, 2008 at various hours of the day and night. Sound level measurements were taken at various locations around each of the existing substations (see Figures 5-1 through 5-4 in Section 5). The measurement point locations were selected because they were deemed to be representative of existing environmental conditions, are near sensitive noise receivers, and were accessible.

Measurements were taken using two Larson-Davis Model 824 Type I sound level meters. The sound level meter was calibrated before each set of measurements. None of the calibration level changes exceeded ± 0.3 dB. A windscreen was used at all times on the meter, and the meter was mounted on a tripod, approximately five feet above ground with the microphone directed toward the substation. The meter measured overall sound levels along with octave band and one-third octave band frequency sound levels.

At each location, sound levels at each frequency band were measured and logged by the noise meter. Each of the measurement periods lasted fifteen minutes. The sound levels varied at each measurement point depending on the proximity to the substation and the extraneous sounds that occurred during the measurement points that were not attributable to the existing substations. The measurement points were located at approximately the same elevation as the existing substations.

5.0 Existing Substations

A description of the each existing substation (Agawam, Fairmont, Ludlow, and West Springfield) is provided in the following sections. Each sections contains documentation of the measurement points chosen for each substation, documentation of extraneous sounds that occurred at each substation during the measurement periods, and the measured ambient sound levels at each substation. New noise sources will be installed at the Agawam and Ludlow substations. A discussion is therefore provided in regards to the predicted operational noise levels of the proposed transformers at these substations.

5.1 Agawam Substation

On January 7, 2008, between the hours of 6:00 P.M. and 7:00 P.M. and between 11:00 P.M. and 1:00 A.M, and on January 8, 2008, between the hours of 4:00 A.M. and 5:00 A.M. and between 9:00 A.M. and 10:00 A.M., Burns & McDonnell personnel obtained environmental sound level measurements to capture the ambient sound levels near the existing Agawam substation, located in the town of Agawam, Massachusetts (see Figure 5-1). The land use surrounding the Agawam substation consists of mainly residential areas with some commercial areas.

Figure 5-1
Greater Springfield Reliability Project
Measurement Locations
Agawam Substation

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Weather conditions were favorable for conducting ambient sound measurements during all survey periods. On January 7, 2008, winds were from the south/southeast and ranged between 0 and 3 miles per hour (mph) both in the early evening (6:00 P.M. to 7:00 P.M.) and the night-time (11:00 P.M. to 1:00 A.M.) measurement periods. Temperatures were approximately 37 degrees Fahrenheit with 92 percent relative humidity during the early evening and 34 degrees Fahrenheit with 94 percent relative humidity during night-time measurements. On January 8, 2008, wind speeds varied between 0 and 3 mph out of the southeast in the early morning (4:00 A.M. to 5:00 A.M.) and between 2 and 5 mph out of the south/southeast in the late morning (9:00 A.M. to 10:00 A.M.). Temperatures were approximately 38 degrees Fahrenheit with 100 percent relative humidity during the early morning readings and 46 degrees Fahrenheit with 96 percent relative humidity during the late morning readings.

The predominant extraneous noise during the measurement periods was associated with vehicle noise from highway and local traffic. Other extraneous noises during the measurement periods included noise associated with airplanes, nearby construction, and birds. The existing Agawam substation was audible during most of the measurement periods. The measured, A-weighted, L_{90} sound levels are presented in Table 5-1.

Table 5-1: Agawam Existing Ambient Noise Level Measurements (L_{90})

Time Period	Measurement Point	Location Description	Existing Ambient Noise (dBA)
1/7/08; 6 P.M. - 7 P.M.	MP1	South of substation near fenceline	50.6
	MP2	North of substation near fenceline	47.5
1/7/08; 11 P.M. - 1 A.M.	MP1	South of substation near fenceline	45.3
	MP2	North of substation near fenceline	41.5
1/8/08; 4 A.M. - 5 A.M.	MP1	South of substation near fenceline	50.8
	MP2	North of substation near fenceline	41.0
1/8/08; 9 A.M. - 10 A.M.	MP1	South of substation near fenceline	51.4
	MP2	North of substation near fenceline	47.1

The existing ambient levels are typical for areas with this mixture of residential and commercial installations. A more in depth analysis of the ambient measurements indicates that there are currently pure tones present at 1,000 Hz for MP1 during the early morning, late morning, and early evening measurement periods, and for MP2 during the early evening measurement period.

5.1.1 Operational Noise Levels

NUS plans to install two sets of transformers at the Agawam substation with each set consisting of three, single-phase, 115-kilovolts (kV) units. NUS also plans to install additional breakers and a control house at the existing substation. The only new noise sources at the substation will be the proposed transformers as the proposed breakers and control house are not expected to create any additional noise. In order to evaluate the sound predicted from the new transformers, the proposed noise sources were modeled using industry-accepted sound modeling software which calculated the expected sound levels at the identified receivers. The program used to model the new transformers was the Computer Aided Design for Noise Abatement (CadnaA), Version 3.7, published by DataKustik, Ltd., Munich, Germany. The CadnaA program is a scaled, three-dimensional program which takes into account each piece of noise-emitting equipment on the Project site and predicts sound levels in circular contours of equal sound pressure. Appropriate sound generation sources are applied for all sound radiating surfaces and points. The model calculates sound propagation based on ISO 9613-2:1996, General Method of Calculation. ISO 9613, and therefore CadnaA, assesses the sound levels based on the Octave Band Center Frequency range from 31.5 to 8,000 Hz.

The sound power levels emitted from the transformers were predicted based on vendor's data. Table 5-2 presents the sound power level at each of the octave bands, as well as the overall sound power levels emanated from each of the six transformers. Vendor data for the sound power level at the lower and higher octave bands was not available. As a conservative approach, existing buildings and structures were not included in the model.

Table 5-2: New Transformer Sound Power Levels at Each Octave Band Frequency

Equipment	dB at Octave Band Frequency (Hz)									Total Sound Power Level (dB)	Total Sound Power Level (dBA)
	32	63	125	250	500	1000	2000	4000	8000		
Transformer	---	76.9	85.8	79.5	70.6	62.1	---	---	---	87.3	74.6

The predicted sound levels from the CadnaA noise model at each measurement point are presented in Table 5-3. These sound levels are a result of the proposed noise-emitting equipment (transformers) that will be installed at the Agawam substation as part of this Project. Existing background measurements (which include the current Agawam substation operation) were logarithmically added to the expected

sound levels from the proposed Project to determine total sound levels at each measurement location when the new Project is operational, and are presented in Table 5-3 as well.

Table 5-3: Predicted Sound Pressure Levels – Agawam Substation

Measurement Point	Time Period	Existing Ambient Noise Levels (dBA)	Estimated Noise Levels from Project (dBA)	Overall Projected Noise Levels (Existing Ambient with New Project Operating) (dBA)	Increase in Overall Projected Noise Levels over Existing Ambient Noise Levels (dBA)
MP1	6 P.M. – 7 P.M.	50.6	16.8	50.6	0.0
MP2	6 P.M. – 7 P.M.	47.5	23.7	47.5	0.0
MP1	11 P.M.- 1 A.M.	45.3	16.8	45.3	0.0
MP2	11 P.M.- 1 A.M.	41.5	23.7	41.6	0.1
MP1	4 A.M. – 5 A.M.	50.8	16.8	50.8	0.0
MP2	4 A.M. – 5 A.M.	41.0	23.7	41.1	0.1
MP1	9 A.M. – 10 A.M.	51.4	16.8	51.4	0.0
MP2	9 A.M. – 10 A.M.	47.1	23.7	47.2	0.0

5.1.2 Conclusions and Recommendations

As shown by the above results, it is predicted that there may be a very minimal increase (0.1 dBA) in noise levels over the existing ambient noise levels as a result of the new transformers. This increase, however, is well within the Massachusetts noise regulation limit which restricts any facility from increasing sound levels by more than 10 dBA over the ambient sound. Also, because the predicted sound levels from the Project at each of the measurement points are significantly less than the existing ambient noise levels that were measured at each point, it is determined that the operation of the new transformers will not create any new pure tone conditions. Therefore, the proposed modifications at the Agawam substation will comply with all Massachusetts noise regulations.

5.2 Fairmont Substation

On January 7, 2008, between the hours of 6:00 P.M. and 7:00 P.M., on January 8, 2008, between the hours of 1:00 A.M. and 3:00 A.M and between 9:00 A.M. and 11:00 A.M., and on January 9, 2008, between the hours of 4:00 A.M. and 6:00 A.M., Burns & McDonnell personnel obtained environmental sound level measurements to capture the ambient sound levels near the existing Fairmont substation located in the town of Chicopee, Massachusetts (see Figure 5-2). The land use surrounding the Fairmont substation consists of mainly residential areas.

Figure 5-2
Greater Springfield Reliability Project
Measurement Locations
Fairmont Substation

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Weather conditions were favorable for conducting ambient sound measurements during all survey periods. On January 7, 2008, winds were out of the south/southeast and varied from 0 to 3 mph and temperatures were approximately 45 degrees Fahrenheit with a relative humidity of 79 percent. On January 8, 2008, wind speeds varied from 0 to 2 mph during both measurement periods and temperatures were approximately 44 degrees Fahrenheit with 71 percent relative humidity during the early morning (1:00 A.M. to 3:00 A.M.) readings and approximately 47 degrees Fahrenheit with 54 percent relative humidity during the late morning (9:00 A.M. to 11:00 A.M.) readings. On January 9, 2008, winds were out of the south/southwest and varied from 1 to 5 mph and temperatures were approximately 48 degrees Fahrenheit with a relative humidity of 93 percent.

Sound level measurements were taken at three locations chosen to be representative of sensitive receptors near the Fairmont substation as shown in Figure 5-2. The predominant extraneous noise during the measurement periods was associated with vehicle noise from traffic. Noise associated with the existing Fairmont substation was not audible during any of the measurement periods. The measured, A-weighted L_{90} sound levels are presented in Table 5-4.

Table 5-4: Fairmont Existing Ambient Noise Level Measurements (L_{90})

Time Period	Measurement Point	Location Description	Existing Ambient Noise (dBA)
1/7/08; 6 P.M. - 7 P.M.	MP1	SW of substation near fenceline	56.5
	MP2	East of substation on Ingham St. near residence	50.2
	MP3	NW of substation on Prospect St. near residence	55.4
1/8/08; 1 A.M. - 3 A.M.	MP1	SW of substation near fenceline	39.4
	MP2	East of substation on Ingham St. near residence	39.8
	MP3	NW of substation on Prospect St. near residence	40.9
1/8/08; 9 A.M. - 11 A.M.	MP1	SW of substation near fenceline	51.2
	MP2	East of substation on Ingham St. near residence	48.9
	MP3	NW of substation on Prospect St. near residence	52.3
1/9/08; 4 A.M. - 6 A.M.	MP1	SW of substation near fenceline	45.0
	MP2	East of substation on Ingham St. near residence	41.0
	MP3	NW of substation on Prospect St. near residence	43.2

5.2.1 Operational Noise Levels

NUS does not plan to install any new equipment at this substation. Therefore, the existing Fairmont substation ambient noise levels listed above are not expected to change.

5.2.2 Conclusions and Recommendations

Since there are no expected increases in noise levels, this facility will meet the Massachusetts noise regulation limit which restricts any facility from increasing sound levels by more than 10 dBA over the ambient sound. Also, because there are no predicted sound level increases, it is determined that the operation of the new transformers will not create any new pure tone conditions. Therefore, the Fairmont substation will comply with all Massachusetts noise regulations.

5.3 Ludlow Substation

On January 7, 2008, between the hours of 5:00 P.M. and 6:00 P.M., on January 8, 2008, between the hours of 12:00 A.M. and 2:00 A.M. and between 8:00 A.M. and 10:00 A.M., and on January 9, 2008 between the hours of 6:00 A.M. and 7:00 A.M., Burns & McDonnell personnel obtained environmental sound level measurements to capture the ambient sound levels near the existing Ludlow substation, located in the town of Ludlow, Massachusetts (see Figure 5-3). The land use surrounding the Ludlow substation consists of a mixture of residential, industrial, and undeveloped areas.

Weather conditions were favorable for conducting ambient sound measurements during all survey periods. On January 7, 2008, winds were out of the south and varied from 0 to 3 mph and temperatures were approximately 39 degrees Fahrenheit with a relative humidity of 85 percent. On January 8, 2008, winds were out of the south and varied between 1 and 4 mph during both measurement periods and temperatures were approximately 36 degrees Fahrenheit with 89 percent relative humidity during the night (12:00 A.M. to 2:00 A.M.) readings, and approximately 41 degrees Fahrenheit with 86 percent relative humidity during the morning (8:00 A.M. to 10:00 A.M.) readings. On January 9, 2008, winds were out of the south and varied from 5 to 10 mph and temperatures were approximately 55 degrees Fahrenheit with a relative humidity of 69 percent.

The predominant extraneous noise during the measurement periods was associated with vehicle noise from traffic on Center Street. Other extraneous noises during the measurement periods included noise associated with large dump trucks from a neighboring gravel company. The existing Ludlow substation was only audible during the night-time reading when traffic was much lighter. The measured, A-weighted, L_{90} sound levels are presented in Table 5-5.

Table 5-5: Ludlow Existing Ambient Noise Level Measurements (L_{90})

Time Period	Measurement Point	Location Description	Existing Ambient Noise (dBA)
1/7/08; 5 P.M. - 6 P.M.	MP1	SE of substation near Center St.	54.9
	MP2	South of substation near Center St.	50.9
1/8/08; 12 A.M. - 2 A.M.	MP1	SE of substation near Center St.	38.4
	MP2	South of substation near Center St.	40.0
1/8/08; 8 A.M. - 10 A.M.	MP1	SE of substation near Center St.	51.1
	MP2	South of substation near Center St.	48.8
1/9/08; 6 A.M. - 7 A.M.	MP1	SE of substation near Center St.	48.6
	MP2	South of substation near Center St.	48.8

Further analysis of the ambient measurements indicates that there are currently not any pure tones present.

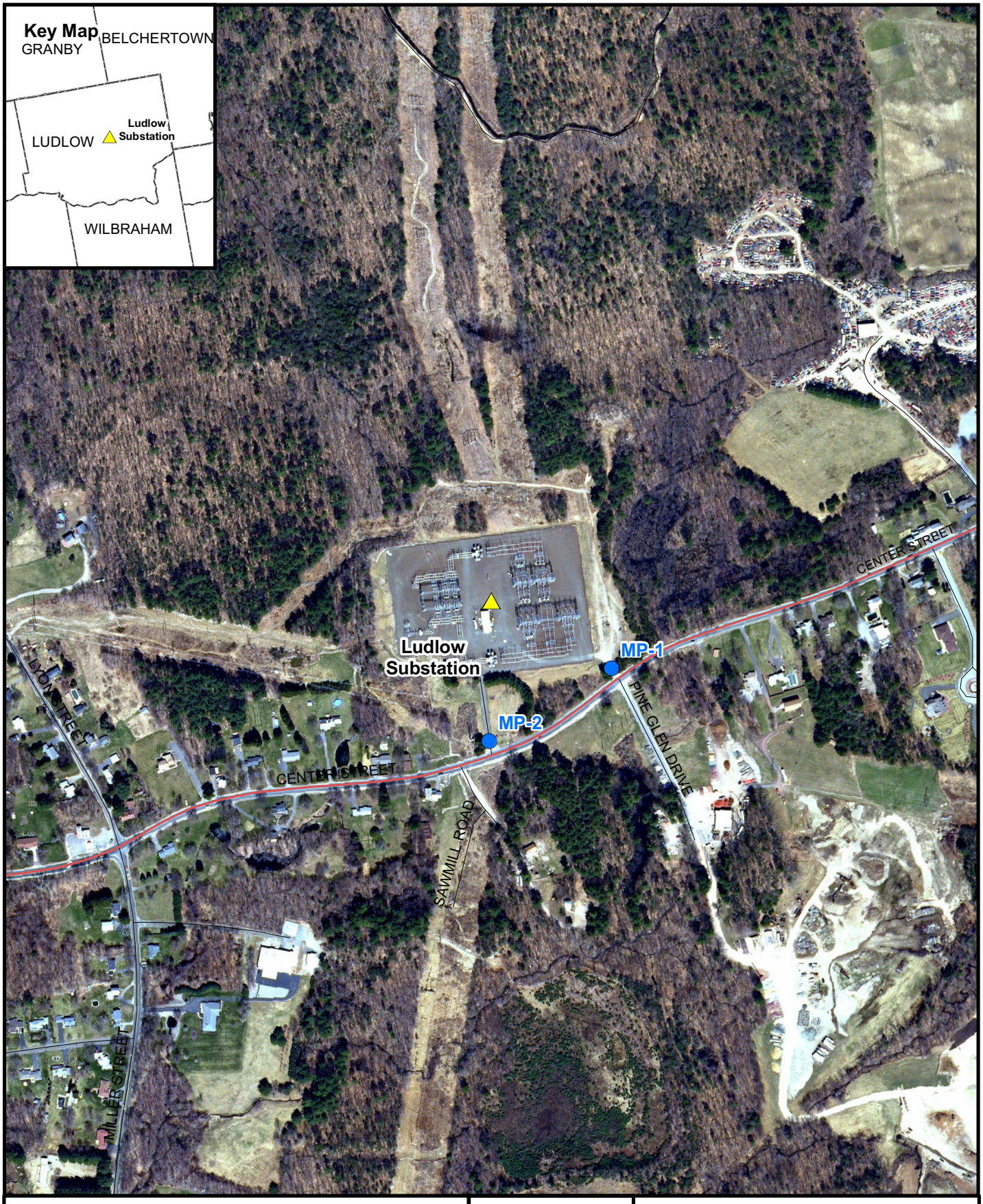

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Figure 5-3
Greater Springfield Reliability Project
Measurement Locations
Ludlow Substation

5.3.1 Operational Noise Levels

NUS plans to possibly install three sets of transformers at the Ludlow substation with each set consisting of three, single-phase, 115-kilovolts (kV) units. One set of transformers will be completely new with the other two sets possibly replacing two existing units. As a conservative estimate, all three sets of transformers were modeled as new noise sources. NUS also plans to install additional breakers; however, the only new noise sources at the substation will be the proposed transformers as the breakers are not expected to create any additional noise. In order to evaluate the sound predicted from the new transformers, the proposed noise sources were modeled using CadnaA.

The sound power levels emitted from the transformers were predicted based on vendor's data. Table 5-2 (in Section 5.1.1) presents the sound power level at each of the octave bands, as well as the overall sound power levels for each of the nine transformers. Vendor data for the sound power level at the lower and higher octave bands was not available. As a conservative approach, existing buildings and structures were not included in the model.

The predicted sound levels from the CadnaA noise model at each measurement point are presented in Table 5-6. These sound levels are a result of the proposed noise-emitting equipment (transformers) that will be installed at the Ludlow substation as part of this Project. Existing background measurements (which include the current Ludlow substation operation) were logarithmically added to the expected sound levels from the proposed Project to determine total sound levels at each measurement location when the new Project is operational, and are presented in Table 5-6 as well.

Table 5-6: Predicted Sound Pressure Levels – Ludlow Substation

Measurement Point	Time Period	Existing Ambient Noise Levels (dBA)	Estimated Noise Levels from Project (dBA)	Overall Projected Noise Levels (Existing Ambient with New Project Operating) (dBA)	Increase in Overall Projected Noise Levels over Existing Ambient Noise Levels (dBA)
MP1	5 P.M. – 6 P.M.	54.9	22.9	54.9	0.0
MP2	5 P.M. – 6 P.M.	50.9	17.8	50.9	0.0
MP1	12 A.M.- 2 A.M.	38.4	22.9	38.5	0.1
MP2	12 A.M.- 2 A.M.	40.0	17.8	40.1	0.1
MP1	8 A.M. – 10 A.M.	51.1	22.9	51.1	0.0
MP2	8 A.M. – 10 A.M.	48.8	17.8	48.8	0.0
MP1	6 A.M. – 7 A.M.	48.6	22.9	48.7	0.1
MP2	6 A.M. – 7 A.M.	48.8	17.8	48.8	0.0

5.3.2 Conclusions and Recommendations

As shown by the above results, it is predicted that there may be a very minimal increase (0.1 dBA) in noise levels over the existing ambient noise levels as a result of the new transformers. This increase, however, is well within the Massachusetts noise regulation limit which restricts any facility from increasing sound levels by more than 10 dBA over the ambient sound. The predicted sound levels from the Project at each of the measurement points are less than the existing ambient noise levels that were measured at these points. Also, because the predicted sound levels from the Project at each of the measurement points are significantly less than the existing ambient noise levels that were measured at each point, it is determined that the operation of the new transformers will not create any new pure tone conditions. Therefore, the proposed modifications at the Ludlow substation will be in compliance with all Massachusetts noise regulations.

5.4 West Springfield Substation

On January 7, 2008, between the hours of 7:00 P.M. and 8:00 P.M. and between 11:00 P.M. and 12:00 A.M, and on January 8, 2008, between the hours of 4:00 A.M. and 5:00 A.M. and between 9:00 A.M. and 10:00 A.M., Burns & McDonnell personnel obtained environmental sound level measurements to capture the ambient sound levels near the existing West Springfield substation, located in the town of West Springfield, Massachusetts (see Figure 5-4). The existing West Springfield substation is located in an urban area adjacent to a power plant.

Figure 5-4
Greater Springfield Reliability Project
Measurement Locations
West Springfield Substation

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Weather conditions were favorable for conducting ambient sound measurements during all survey periods. On January 7, 2008, winds were from the south/southeast and ranged between 0 and 3 mph both in the evening (7:00 P.M. to 8:00 P.M.) and the night-time (11:00 P.M. to 12:00 A.M.) measurement periods. Temperatures were approximately 37 degrees Fahrenheit with 92 percent relative humidity during the evening and 34 degrees Fahrenheit with 94 percent relative humidity during night-time measurements. On January 8, 2008, wind speeds varied between 0 and 3 mph out of the southeast in the early morning (4:00 A.M. to 5:00 A.M.) and between 2 and 5 mph out of the south/southeast in the late morning (9:00 A.M. to 10:00 A.M.). Temperatures were approximately 38 degrees Fahrenheit with 100 percent relative humidity during the early morning readings and 46 degrees Fahrenheit with 96 percent relative humidity during the late morning readings.

Sound level measurements were made at two locations chosen to be representative of sensitive receptors near the West Springfield substation as shown in Figure 5-4. Extraneous noises associated with the power plant, vehicles, airplanes, trains, and other noise sources dominated environmental noise near the substation. Noise produced by the West Springfield substation was not audible during any of the measurement periods. The measured, A-weighted L_{90} sound levels are presented in Table 5-7.

Table 5-7: West Springfield Existing Ambient Noise Level Measurements (L_{90})

Time Period	Measurement Point	Location Description	Existing Ambient Noise (dBA)
1/7/08; 7 P.M. - 8 P.M.	MP1	Northwest of substation near Agawam Ave.	55.3
	MP2	West of substation near Agawam Ave.	53.1
1/7/08; 11 P.M. - 12 A.M.	MP1	Northwest of substation near Agawam Ave.	53.7
	MP2	West of substation near Agawam Ave.	51.4
1/8/08; 4 A.M. - 5 A.M.	MP1	Northwest of substation near Agawam Ave.	50.8
	MP2	West of substation near Agawam Ave.	50.8
1/8/08; 9 A.M. - 10 A.M.	MP1	Northwest of substation near Agawam Ave.	55.9
	MP2	West of substation near Agawam Ave.	54.4

These existing ambient levels are typical for an urban area adjacent to a power plant. A more in depth analysis of the ambient measurements indicates that there are currently pure tones present at 1,000 Hz for MP1 and MP2 during the late morning, early evening, and late evening measurement periods. The existing West Springfield substation ambient noise levels are not expected to change as no new noise sources are being installed at this substation.

5.4.1 Operational Noise Levels

NUS does not plan to install any new equipment at this substation. Therefore, the existing West Springfield substation ambient noise levels listed above are not expected to change.

5.4.2 Conclusions and Recommendations

Since there are no expected increases in noise levels, this facility will meet the Massachusetts noise regulation limit which restricts any facility from increasing sound levels by more than 10 dBA over the ambient sound. Also, because there are no predicted sound level increases, it is determined that the operation of the new transformers will not create any new pure tone conditions. Therefore, the West Springfield substation will comply with all Massachusetts noise regulations.