

10.1 INTRODUCTION

A noise assessment of the proposed Caithness Long Island Energy Center II (CLI-II) was conducted. The assessment consisted of two parts: 1) ambient noise monitoring programs in the vicinity of the facility site in order to characterize the existing noise environment; and 2) a noise modeling/impact evaluation of the facility. The background ambient noise monitoring programs were conducted on September 18-19, 2013 and October 2-3, 2013. The noise impact evaluation consisted of performing computer noise modeling of the major noise producing equipment and evaluating the increased noise due to the proposed facility based upon a project impact criterion (i.e., a 6 dB or more increase in the A-weighted sound level, L_{eq} , was considered to be a significant impact). Modeled project noise levels were also compared against the noise level ordinance of the Town of Brookhaven to determine compliance. The full detailed noise study is contained in Appendix H.

10.2 GENERAL INFORMATION ON NOISE

Noise is defined as unwanted sound. Excessive noise can cause annoyance and adverse health effects. Annoyance can include sleep disturbance and speech interference. It can also distract attention and make activities more difficult to perform (USEPA, 1978).

The range of pressures that cause the vibrations that create noise is large. Noise is therefore measured on a logarithmic scale, expressed in decibels (dB). The frequency of a sound is the “pitch”. The unit for frequency is hertz (Hz). Most sounds are composed of a composite of frequencies. The normal human ear can usually distinguish frequencies from 20 Hz (low frequency) to about 20,000 Hz (high frequency), although people are most sensitive to frequencies between 500 and 4000 Hz. The individual frequency bands can be combined into one overall dB level.

Noise is typically measured on the A-weighted scale, commonly abbreviated as dB(A). The A-weighting scale was developed and has been shown to provide a good correlation with the human response to sound and is the most widely used descriptor for community noise assessments. (Harris, 1991). The faintest sound that can be heard by a healthy ear is about 0 dB(A), while an uncomfortably loud sound is about 120 dB(A). In order to provide a frame of reference, some common sound levels are listed below.

- Pile Driver at 100 feet 90 to 100 dB(A)
- Chainsaw at 30 feet 90 dB(A)
- Truck at 100 feet 85 dB(A)
- Noisy Urban Environment 75 dB(A)
- Lawn Mower at 100 feet 65 dB(A)
- Average Speech 60 dB(A)

- Typical Suburban Daytime 50 dB(A)
- Quiet Office 40 dB(A)
- Quiet Suburban nighttime 35 dB(A)
- Soft Whisper at 15 feet 30 dB(A)

Common terms used in this noise analysis are defined below.

L_{eq} — The equivalent noise level over a specified period of time (i.e., 1-hour). It is a single value of sound that includes all of the varying sound energy in a given duration.

Statistical Sound Levels —The A-weighted sound level exceeded a certain percentage of the time. The L₉₀ is the sound level exceeded 90 percent of the time and is often considered the background or residual noise level. The L₁₀ is the sound level exceeded 10 percent of the time and is a measurement of intrusive sounds, such as aircraft overflight.

10.3 EXISTING CONDITIONS

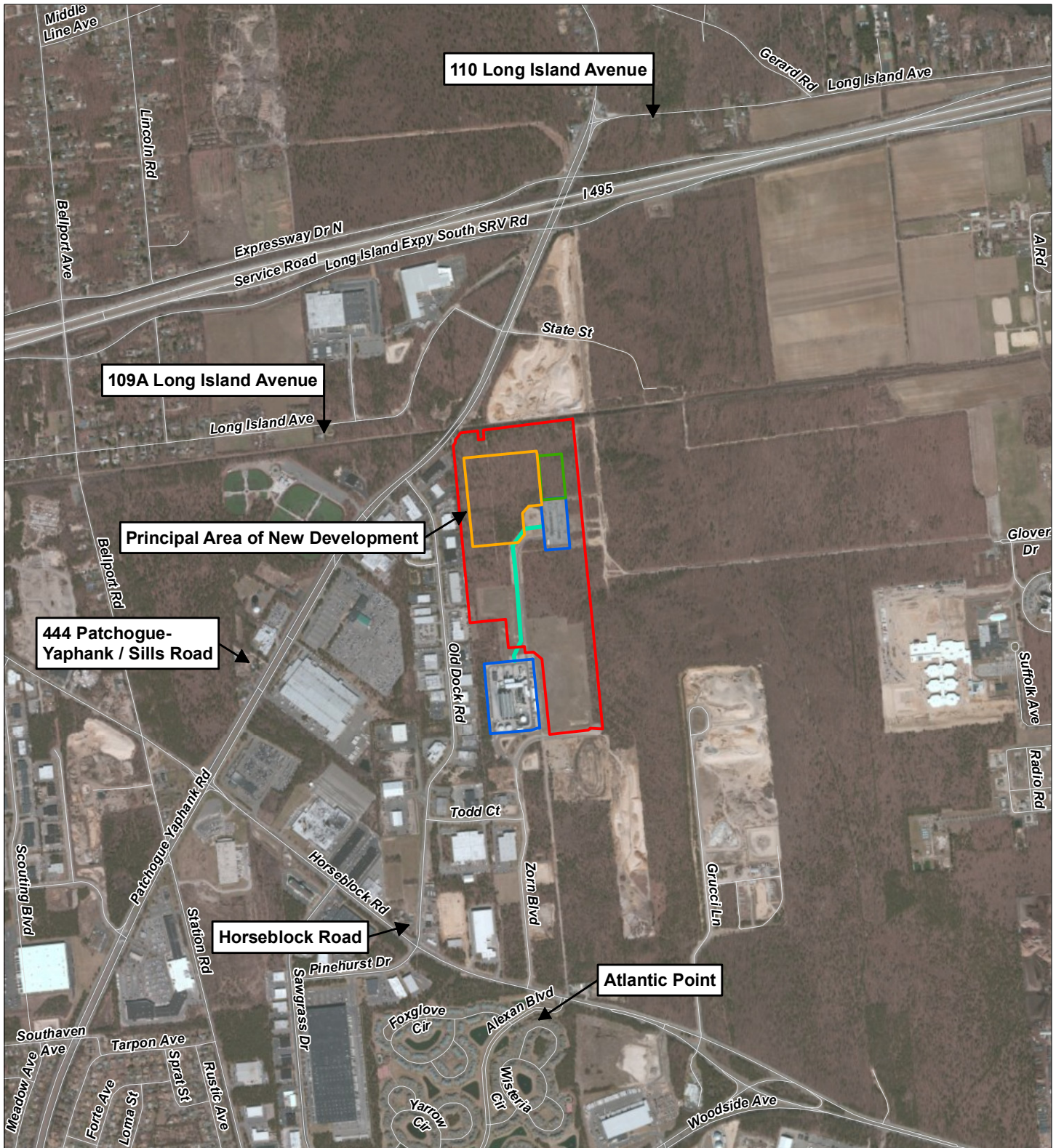
The land uses immediately bordering the proposed site consist of mainly industrial uses and vacant forested industrially-zoned land, although a few single family residences are located less than one-half mile away. The nearest residences are found to the northwest, at 109A Long Island Avenue. The Christian Fellowship Church is located within an industrial building in the industrial zone at the intersection of Old Dock Road and Patchogue-Yaphank Road. The church building is located approximately 250 feet from the closest noise generating equipment at the CLI-II development site. Other noise receptors include additional residences farther away from the site, the New Interdisciplinary School, Maryhaven and the Calvary Full Gospel Church. The Atlantic Point Complex, a residential townhouse development, is located southeast of the site.

The existing noise environment has been characterized through ambient noise monitoring (conducted on September 18-19, 2013 and October 2-3, 2013) at five selected noise sensitive areas, which were identified through the use of topographic maps and later confirmed during the noise monitoring program. The location and distance of each of the receptor sites from the approximate center of the ~~project~~ CLI-II development site is shown below and the location of the receptor sites are shown on Figure 10-1.

- Horseblock Road—4,500 feet south of site
- Atlantic Point Complex—5,300 feet south of site
- Long Island Avenue/Sills Road—4,400 feet northeast of site
- 109A Long Island Avenue—1,700 feet northwest of site
- 444 Patchogue-Yaphank/Sills Road—3,000 feet southwest of site (proximate to New Interdisciplinary School and Calvary Full Gospel Church)

10.3.1. SHORT-TERM MEASUREMENTS

Short-term monitoring (15 minutes in duration at each location) was conducted during the day and late at night during each monitoring program. This short-term monitoring was



- Approximate Site Boundary
- Principal Area of New Development
- Proposed LIPA Facility
- Existing Transmission Line
- Existing Facility



Base Map: Microsoft/Esri, 2011
Roads: NYDOT, 2013



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NOISE RECEPTORS
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FIGURE 10-1

OCTOBER 2013

conducted with a RION NA-27 precision Type 1 octave band analyzer. The instrument was configured to measure and store the L_{eq} , L_{90} and L_{10} one-third octave band levels.

Existing noise sources in the immediate vicinity of the proposed facility consisted of a combination of vehicular traffic noise (particularly from the Long Island Expressway (LIE), Horseblock Road and Patchogue-Yaphank/Sills Road), natural sounds (birds, insects, rustling vegetation), and some industrial sounds from facilities on Old Dock Road. Late at night, vehicular traffic on local roads (Horseblock Road, Patchogue-Yaphank/Sills Road) dominated the noise environment at some locations, while traffic noise from the LIE was dominant at others. Truck traffic was noted on Horseblock Road and Old Dock Road during all hours of the day and night. A tonal sound emanating from an industrial building (not from the existing CLIEC facility) was noted at some locations during the October measurements. Insect noise was present at all times.

In order to conduct a more conservative measure of the existing ambient noise environment (i.e., that which may occur during cold weather months when insect noise is not present), the measured noise levels were analyzed to estimate the amount of insect noise present. Insect noise is typically present in the higher frequency ranges of 4,000 to 8,000 Hz. When the one-third octave data are plotted, insect noise is revealed as spikes at these frequencies. In most outdoor environments without insect sound, the one-third octave data will show higher sound levels in the lower frequencies and the sound level will gradually taper off into the higher frequencies. It is therefore possible to remove the insect sound by eliminating the spikes at the higher frequencies such that the plot gradually tapers off instead of spiking, then recombining the octave band data into a single dBA level. This methodology was used to remove insect noise from the measured levels at all locations. All subsequent tables and monitoring results herein present the sound levels after insect noise has been removed.

A summary of the insect-corrected overall A-weighted L_{eq} , L_{90} and L_{10} data collected during noise monitoring is presented in Table 10-1 below. Detailed data summaries of both the raw data and the data with insect noise removed are presented in Appendix H.

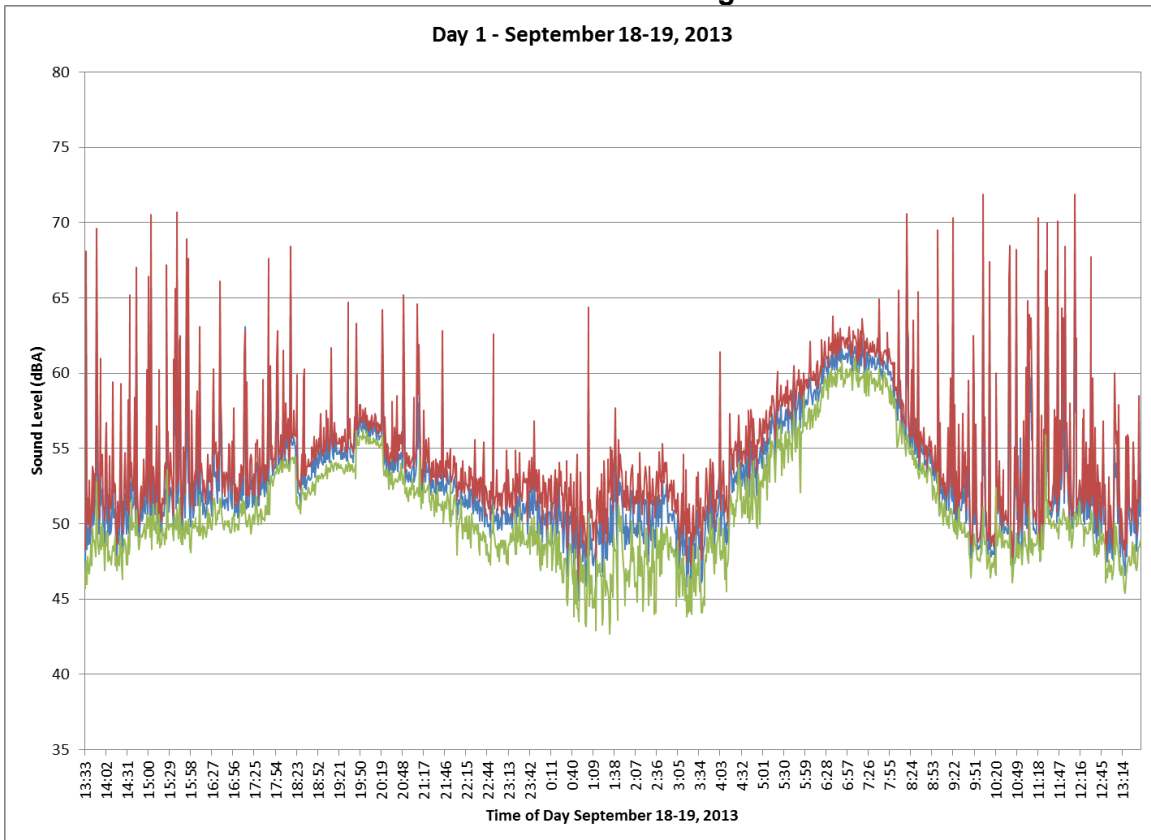
Table 10-1
Measured Ambient Noise Level Data – Insect Noise Removed (dB(A))

Location	Daytime			Late Night		
	L_{90}	L_{10}	L_{eq}	L_{90}	L_{10}	L_{eq}
September 18-19, 2013						
Horseblock Road	52.5	68.4	66.6	45.8	54.8	52.9
Atlantic Point Complex	43.4	56.7	54.2	43.5	53.3	50.9
Long Island Avenue/Sills Road	53.3	60.2	58.7	49.8	60.4	57.0
109A Long Island Avenue	47.4	52.6	51.6	50.3	55.9	53.7
Patchogue-Yaphank/Sills Road	47.4	62.1	59.3	41.9	50.2	48.4
October 2-3, 2013						
Horseblock Road	51.5	64.0	61.8	49.7	57.5	58.2
Atlantic Point Complex	43.6	58.2	57.9	44.1	60.3	56.2
Long Island Avenue/Sills Road	50.7	59.5	58.3	50.5	60.2	57.4
109A Long Island Avenue	54.2	57.8	56.5	46.0	54.0	51.3
Patchogue-Yaphank/Sills Road	48.3	61.1	58.5	46.2	53.8	51.5

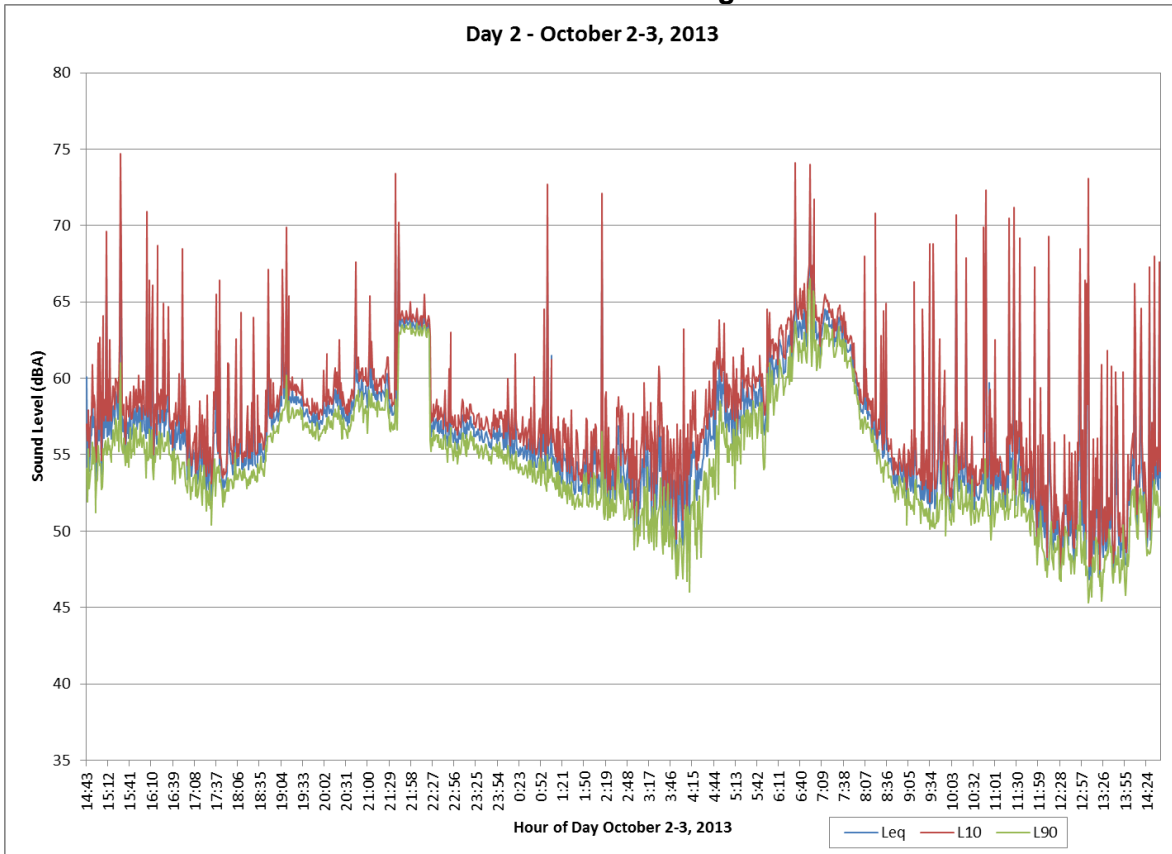
10.3.2. CONTINUOUS 24-HOUR MEASUREMENTS

Continuous monitoring (over a 24-hour period) of the existing overall L_{eq} , L_{90} and L_{10} noise levels was also conducted near the nearest identified residential location on 109A Long Island Avenue during each noise monitoring program. Continuous data were collected utilizing a RION NA-21 integrating sound level meter. The data summaries from these monitoring programs are presented graphically in Figures 10-2 and 10-3.

Figure 10-2
Measured Sound Levels – 109A Long Island Avenue



**Figure 10-3
Measured Sound Levels – 109A Long Island Avenue**



The data presented in these figures reveal that A-weighted L_{eq} noise levels increased into the evening hours as insect noise increased, then gradually diminished into the late night hours. Ambient sound levels then increase again into the morning hours and dropped off again during the midday period. The lowest L_{eq} levels were measured late at night, typically ranging between 50 dBA and 55 dBA, with some briefly lower excursions. The continuous data were also combined into one hour averages. The lowest one hour L_{eq} averages were 49.4 dBA and 53.5 dBA during the September and October monitoring programs, respectively, in good general agreement with the short term measured levels.

10.4 APPLICABLE STANDARDS/GUIDELINES

10.4.1. INTRODUCTION

There are no state or federal noise standards directly applicable to the proposed facility. For impact evaluation, the project adopted the 6 dB(A) L_{eq} relative impact criteria contained in New York State Department of Environmental Conservation (NYSDEC) noise guidance. The Town of Brookhaven has a noise ordinance which was evaluated for compliance.

10.4.2. NYSDEC NOISE GUIDANCE DOCUMENT

NYSDEC issued a program guidance document entitled “Assessing and Mitigating Noise Impacts” on October 6, 2000. The guidance discusses various aspects of noise and suggested steps for performing noise assessments. Further, it provides suggestions on evaluating significant increases in noise levels.

The guidance notes that an increase in ambient noise of 10 dB(A) is perceived by the majority of people to be a doubling of the loudness of a sound. For example, if the ambient sound level is 50 dB(A), and is then increased to 60 dB(A), most people would perceive the new noise level as twice as loud. The guidance recommends that for non-industrial settings, the A-weighted SPL (Sound Pressure Level) should probably not exceed ambient noise levels by more than 6 dB(A) at a given receptor. The addition of any noise source, in a non-industrial setting, should not raise the total future ambient noise level above a maximum of 65 dB(A). This would be considered the “upper end” limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Noise levels in industrial or commercial areas should not exceed 79 dB(A).

The NYSDEC guidance explicitly states that the 6 dB(A) increase is to be used as a general guideline. There are other factors that should also be considered. For example, in settings with very low ambient sound levels, a greater increase may be acceptable since sound levels are so low. For purposes of evaluating impacts for the CLI-II, the NYSDEC guidance of an increase in noise levels of 6 dB(A) or more was considered to be a significant adverse noise impact.

10.4.3. TOWN OF BROOKHAVEN NOISE ORDINANCE

The Town of Brookhaven has a noise ordinance (Chapter 50 of the Town Code) which limits allowable noise levels from a facility by the land use category that the receiver is located in, including industrial, commercial and residential. The noise ordinance does not specifically address churches. The aforementioned Christian Fellowship Church is located within an industrial building in the industrial zone.

The most restrictive levels are for residential land uses, for which there are different daytime and nighttime limits. These limits are summarized in Table 10-2 below.

Table 10-2

Town of Brookhaven Noise Ordinance (dB(A))

Receiving Property Category	Daytime (7 am to 10 pm)	Nighttime (10 pm to 7 am)
Residential	65	50
Commercial	65	65
Industrial	75	75

Construction noise is exempt from the ordinance, but is limited to the hours of 7 am to 6 pm on weekdays. Construction noise impacts are addressed in Section 15.6.3.

10.5 NOISE MODELING

10.5.1. METHODOLOGY

Computer noise modeling of the major facility sources was conducted using the CadnaA model. The major sources at the facility will generate steady noise levels, and the facility as a whole will generate broad band sound (i.e., there will be no distinct tonal sounds).

Estimated sound power level data for most major facility noise sources were obtained from GE. Other data were developed based on performance characteristics of the source (e.g., horsepower, MVA, etc.) utilizing the Edison Electric Institute's Electric Power Plant Environmental Noise Guide. Modeling was conducted for the project under full load, normal operating conditions.

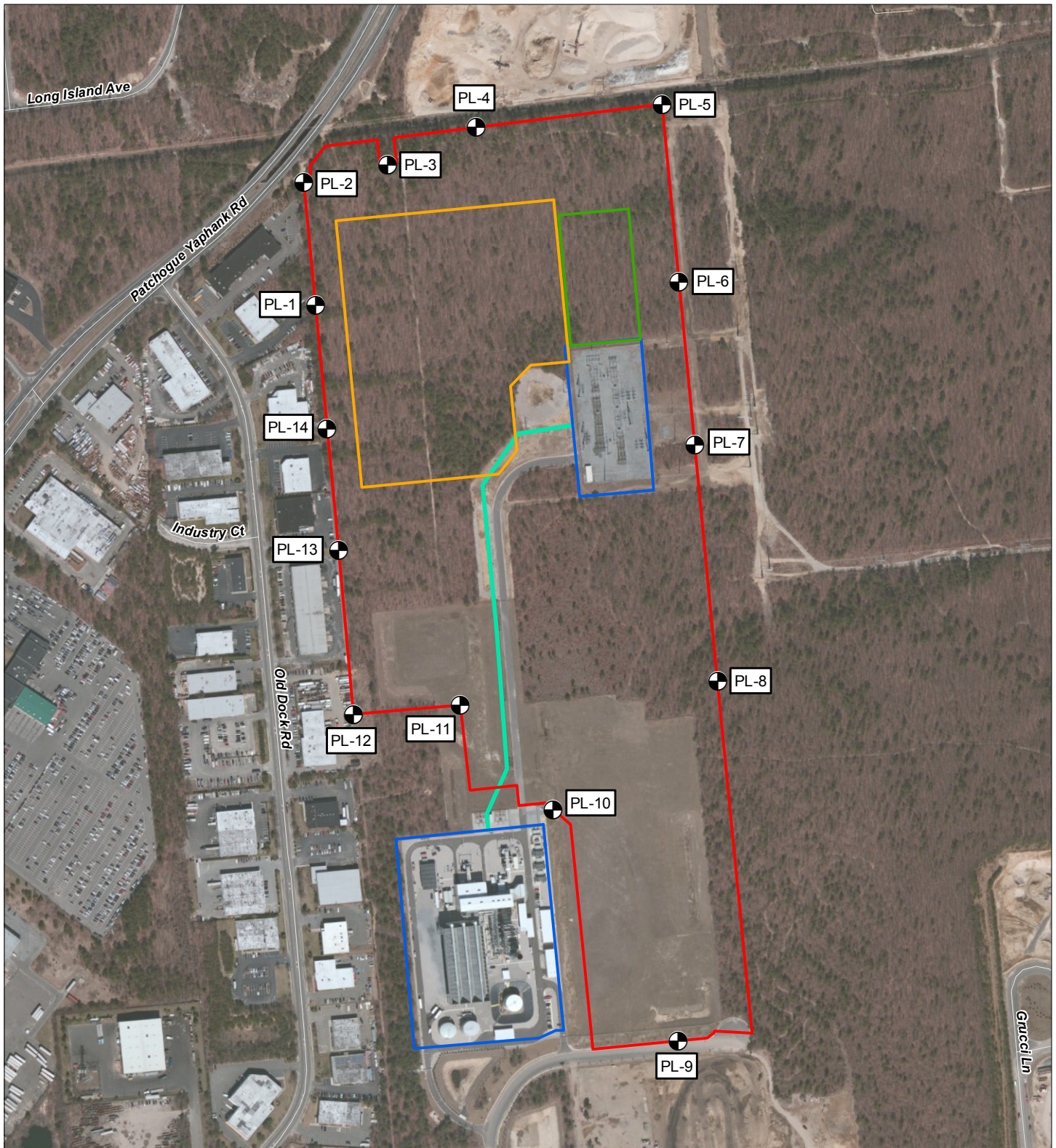
The modeling considered hemispherical spreading and atmospheric absorption for this analysis. Standard conditions of 50° F and 70 percent relative humidity were assumed. In order to remain conservative in the analysis, no credit was taken for tree foliage. Also, no credit was taken for any existing offsite industrial and commercial buildings, which in reality would act as physical buffers that further reduce noise levels at locations farther away. Partial credit was taken for the existing undeveloped ground cover in the area.

Modeling receptors were chosen in the same residential locations as where monitoring was performed, in order that direct comparison to existing noise levels could be made. Receptors were also placed, as depicted in Figure 10-4, along the boundary of the parcel.

The modeling analysis for the CLI-II facility factored in a number noise attenuation features that are available, including:

- building housing the combustion turbine and steam turbine and generator;
- noise limits for the heat recovery steam generator and exhaust stack;
- combustion turbine air intake silencer;
- building housing the boiler feed water pumps;
- noise limits and design requirements for the air cooled condenser;
- building housing the fuel gas compressors;
- noise limit and design requirements for transformers;
- noise limits for the gas compressor coolers; and,
- noise limits for the fin fan coolers.

The above noise control features were developed and incorporated based on the current design for licensing purposes. It should be noted that the goal of the project is to comply with the Town of Brookhaven noise ordinance limits and the NYSDEC noise impact criterion. Compliance would be achieved through an array of facility design features, and use of noise control measures or equipment noise specifications that would be finalized during the final detailed-engineering design prior to construction. The final noise design



- ▭ Approximate Site Boundary
- ▭ Principal Area of New Development
- ▭ Proposed LIPA Facility
- ▭ Existing Transmission Line
- ▭ Existing Facility
- Industrial Property Line Noise Modeling Receptors

Base Map: Microsoft/Esri, 2011
Roads: NYDOT, 2013



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**INDUSTRIAL PROPERTY LINE
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FIGURE 10-4

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for the project will draw on the above and equivalent noise abatement measures as needed, as well as construction specifications, to ensure compliance.

10.5.2. MODELING RESULTS

The noise modeling results for the sensitive receptor locations are presented in Table 10-3 below. Also presented in the table are the measured late night L_{eq} noise levels, and projected increases at each location. The late night period, when ambient noise levels were lowest, was selected for comparison in order to provide a more conservative assessment. (Modeling results for compliance with the Town of Brookhaven noise criteria are provided in Section 10.6.1). Additionally, the lowest measured ambient level from the two monitoring programs was utilized. A noise contour map, depicting the modeled noise levels in the area surrounding the project, is provided as Figure 10-5.

**Table 10-3
Noise Modeling Results (dB(A))**

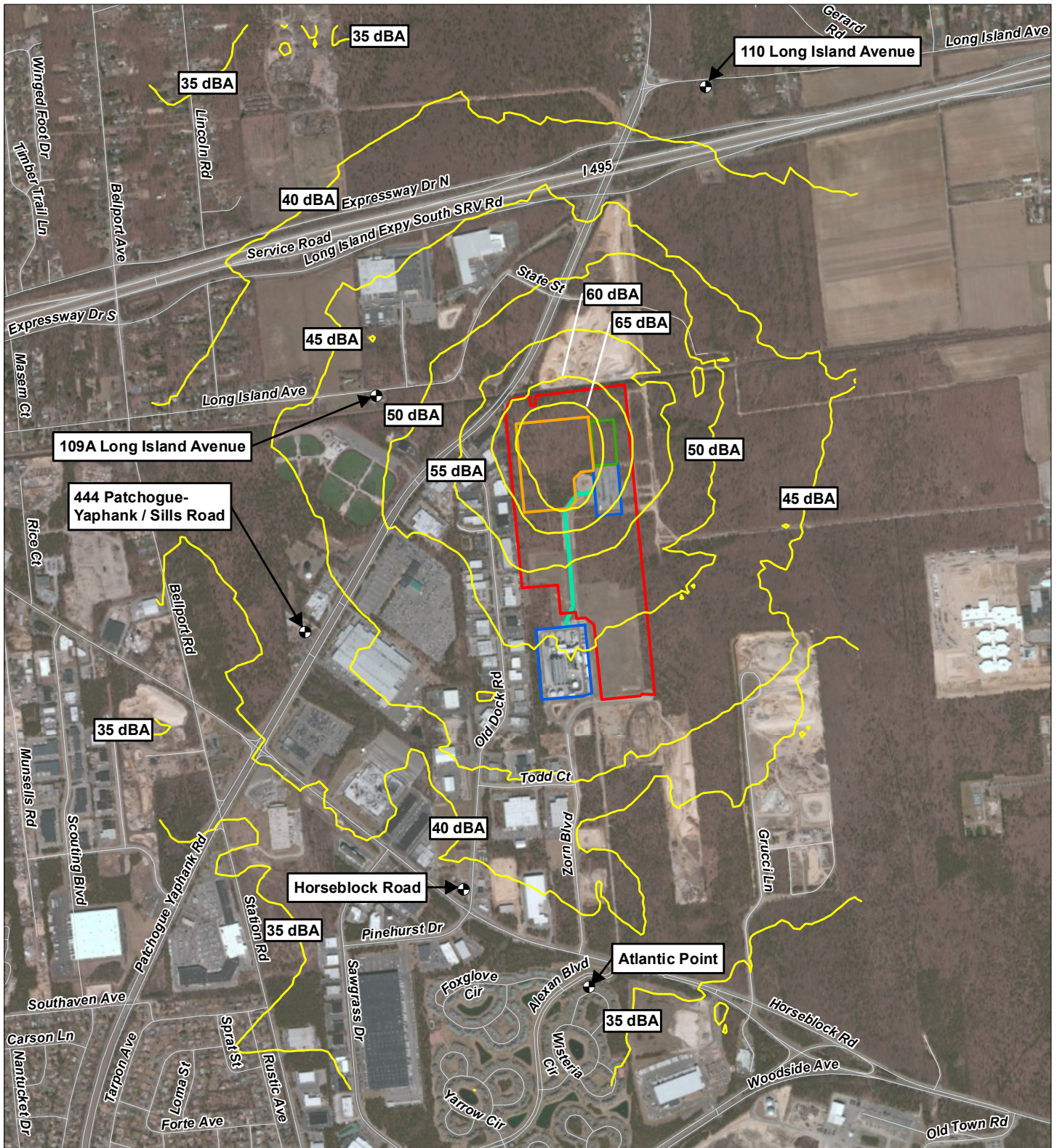
Location	Calculated Facility Noise Level L_{eq}	Measured Ambient Late Night L_{eq}	Projected Future Total Noise Level L_{eq}	Maximum Increase Over Existing Late Night Noise Level L_{eq}
Horseblock Road	38	53	53	0
Atlantic Point Complex	36	51	51	0
Long Island Avenue/ Sills Road	39	57	57	0
109A Long Island Avenue	48	51	53	2
Patchogue-Yaphank/ Sills Road (school/church)	43	48	49	1

10.6 POTENTIAL IMPACTS

A review of the data in Table 10-3 above reveals that projected increases in noise levels are well within the project impact criterion of 6 dB(A). In fact, increases at all nearby sensitive receptor locations are shown to be 2 dB(A) or less, which is considered to be a barely perceptible increase. No significant noise impacts would therefore be anticipated due to project operation.

10.6.1. COMPLIANCE WITH TOWN OF BROOKHAVEN STANDARDS

The calculated facility levels at the five noise sensitive residential receptor locations and at the industrial property line locations were compared to the Town of Brookhaven Noise Ordinance in Table 10-4 below.



- Approximate Site Boundary
- Principal Area of New Development
- Proposed LIPA Facility
- Existing Transmission Line
- Existing Facility
- Noise Level Contour
- Noise Receptors



Base Map: Microsoft/Esri, 2011



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NOISE CONTOUR MAP
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FIGURE 10-5

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Table 10-4
Calculated Facility Noise Levels Compared to the
Town of Brookhaven Noise Ordinance (dB(A))

Location	Calculated Facility Noise Level <i>L_{eq}</i>	Applicable Daytime Standard (7 am to 10 pm)	Applicable Nighttime Standard (10 pm to 7 am)
Horseblock Road	38	65	50
Atlantic Point Complex	36	65	50
110 Long Island Avenue	39	65	50
109A Long Island Avenue	48	65	50
Patchogue-Yaphank/ Sills Road	43	65	50
Christian Fellowship Church Property Line	64	---	---
Christian Fellowship Church Building	61	---	---
Property Line*	64	75	75

Notes: * Highest modeled level at any location along the property line.

A review of the data in the above table reveals that facility operational noise levels would comply with the Town of Brookhaven noise ordinance limits for both the residential locations and the industrial property lines, for both daytime and nighttime operation. Slightly higher facility generated noise levels would occur for brief periods during any start-ups and shut downs.

The calculated noise level at the property line adjacent to the Christian Fellowship Church is 64 dBA. A level of 61 dBA is calculated at the church building. Although the Brookhaven noise ordinance does not specifically address churches, calculated noise levels at the church would be below the commercial property line limits (65 dBA all hours), and below the residential limit for daytime hours (65 dBA from 7 am to 10 pm), when church use would be anticipated.

10.6.2. STARTUP AND SHUTDOWN NOISE

An additional modeling analysis was conducted to evaluate noise levels anticipated during facility startup and shutdown. Additional noise will be generated during startup and shutdown by the combustion turbines, steam turbine, the HRSGs, and by the steam bypass duct when steam is dumped directly to the air cooled condenser. Estimated sound power level data for startup and shutdown were provided by GE. The same aforementioned methodology and receptor locations utilized for normal operation were utilized to evaluate startup and shutdown noise. Noise modeling results are presented in Tables 10-5 and 10-6.

Table 10-5
Startup/Shutdown Noise Modeling Results (dB(A))

<u>Location</u>	<u>Calculated Facility Noise Level</u> <u>L_{eq}</u>	<u>Measured Ambient</u> <u>Late Night L_{eq}</u>	<u>Projected Future</u> <u>Total Noise Level</u> <u>L_{eq}</u>	<u>Maximum Increase</u> <u>Over Existing Late</u> <u>Night Noise Level</u> <u>L_{eq}</u>
Horseblock Road	39	53	53	0
Atlantic Point Complex	37	51	51	0
Long Island Avenue/ Sills Road	39	57	57	0
109A Long Island Avenue	49	51	53	2
Patchogue-Yaphank/ Sills Road (school/church)	44	48	49	1

Table 10-6
Calculated Facility Startup/Shutdown Noise Levels Compared to the
Town of Brookhaven Noise Ordinance (dB(A))

<u>Location</u>	<u>Calculated Facility</u> <u>Noise Level</u> <u>L_{eq}</u>	<u>Applicable Daytime</u> <u>Standard</u> <u>(7 am to 10 pm)</u>	<u>Applicable Nighttime</u> <u>Standard</u> <u>(10 pm to 7 am)</u>
Horseblock Road	39	65	50
Atlantic Point Complex	37	65	50
Long Island Avenue/ Sills Road	39	65	50
109A Long Island Avenue	49	65	50
Patchogue-Yaphank/ Sills Road	44	65	50
Christian Fellowship Church Property Line	64	---	---
Christian Fellowship Church Building	62	---	---
Property Line*	64	75	75

Notes: * Highest modeled level at any location along the property line.

A review of the data in Tables 10-5 and 10-6 , reveals that noise levels due to facility startup and shutdown would be only 1 dBA or less higher than noise levels during normal operation. Calculated startup and shutdown noise levels would remain below the Town

of Brookhaven noise ordinance limits, and no changes would occur to the increases projected over existing minimum ambient conditions for normal operation.

10.7 CONCLUSION

Operation of the project would result in no significant noise impacts and would comply with the Town of Brookhaven noise ordinance limits. *