Exhibit M

Turbine Information

6011 Greenwich Windpark, LLC

DESIGNED TO PERFORM

GENERATION GAMMA – THE 2.5 MW EFFICIENCY CLASS

N90/2500
N100/2500
N117/2400

NORDEX
We've got the power.

CONTENTS

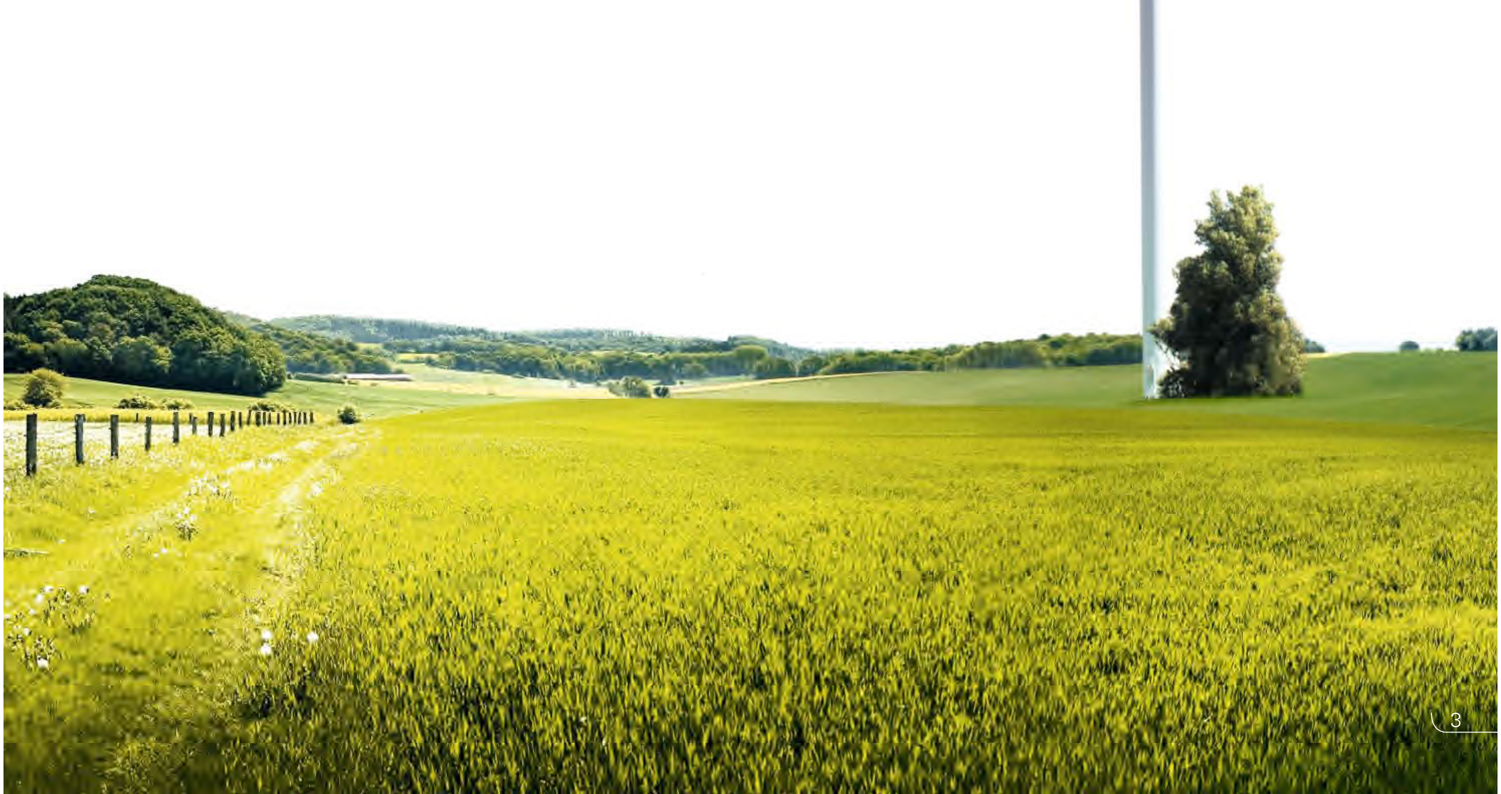
NORDEX – A PROFILE

Dependable power plants for a clean environment

Economic prosperity, progress and environmental protection – for Nordex these go hand in hand. Since 1985, we have been developing increasingly effective wind turbines that help meet the growing global demand for energy while reducing the impact on the environment.

As an internationally expanding company,
Nordex has a footprint in all the growth markets. Our factories in Germany, China and the United States serve the markets in the core regions of Europe, Asia and the Americas. We deliver tailor-made, all-round solutions to our customers – from planning a wind farm, through turnkey installation, to maintenance and service.
The "Nordex Academy" provides high quality training to all our staff, guaranteeing superior expertise as a supplier of sophisticated products and services.

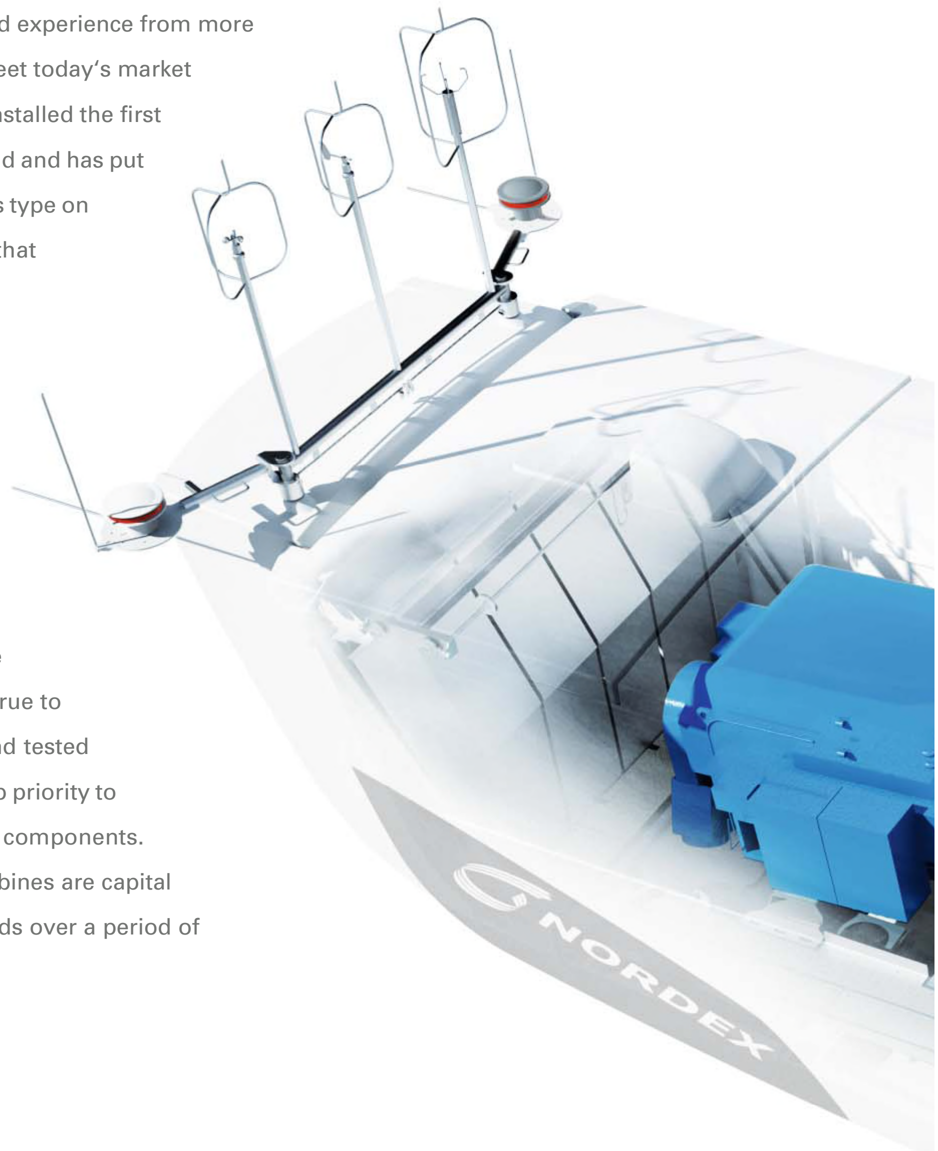
Our core competence is wind turbines in the power range up to 2.5 MW. In the Gamma Generation: Efficiency Class we offer different types of machines for each wind class using a common technical platform. Nordex customers can be sure they'll have the most effective product for every location.



THE EFFICIENCY CLASS
Experience puts us one step ahead

The Efficiency Class combines the latest research and development with know-how and experience from more than a decade of operation to meet today's market requirements. In 2000, Nordex installed the first 2.5 MW series turbine in the world and has put more than 2,100 machines of this type on grid since then. When we say that our turbines offer high quality, mature technology and dependable performance even in extreme locations, we know what we're talking about.

Nordex continues to develop the Efficiency Class. Yet we remain true to proven principles, using tried and tested series engineering and giving top priority to the dependability of all system components. We ensure that Nordex wind turbines are capital goods that generate reliable yields over a period of at least 20 years.



The Efficiency Class combines proven, reliable technology with enhanced performance.

The Nordex Efficiency Class

sets the highest standards for

- yield
- grid code compliance
- quality

YIELD
Maximum wind yield at any location

Our commitment to continuous development ensures that Nordex wind turbines offer a high level of technical availability of more than 97 percent, making it even more worthwhile to invest in a turbine of the Efficiency Class.

The perfect machine for every type of wind

With its N90/2500, N100/2500 and N117/2400 turbines the Efficiency Class achieves the maximum yield at every site. Nordex offers the N90/2500 for regions with strong winds and the N100/2500 for areas with moderate wind conditions. The N117/2400 has been specially designed for locations with light winds and with a rotor diameter of 117 metres it is the largest turbine in its power class.

Smart options

Many good wind locations are in regions with extreme temperatures. To capitalise on the potential of these locations, Nordex offers the machines in the Efficiency Class with a hot-climate package or an anti-icing system. Turbines in the hot-climate design have an extended operating range and are available for outside temperatures up to 45 degrees Celsius. The anti-icing system is an innovative Nordex component that heats the rotor blades, freeing them from icing and preventing new ice from forming. These two options make operation of the turbines even more profitable for our customers.

The Nordex Efficiency Class also includes a 141-metre hybrid tower

Service – simple, fast and safe

Thanks to the service-friendly design of the turbines, Nordex has reduced maintenance time to the minimum. Service can be carried out under a closed roof regardless of weather conditions. Continuous work surfaces with sufficient space and light support fast and safe servicing. All components are directly accessible and can be easily, safely and inexpensively maintained with the aid of the internal crane. In addition, reliable turbine operation is supported by low-maintenance and maintenance-free components.

Round-the-clock performance checks

To ensure maximum availability, Nordex keeps a constant eye on its customers' wind turbines. In the event of any divergence from normal operation, Nordex Remote Monitoring immediately intervenes. In addition, the optional Condition Monitoring System checks the state of wear-critical components, reducing downtime through a programme of preventive maintenance.

High in the sky for a better yield

Wind conditions differ from region to region and wind quality usually improves in line with altitude. To maximise potential, Nordex offers the machines in the Efficiency Class on modular tubular steel towers or on hybrid towers with heights ranging from 65 to 141 metres.

GRID CODE COMPLIANCE
Active support for every grid

The turbines in the Efficiency Class are characterised by excellent control capabilities for maintaining the voltage and stabilising the frequency of the public grid. They meet all the requirements for the German system service bonus (known as the SDL-Bonus).* Their fault-ride-through capability enables them to bridge effortlessly any dips in voltage. The Nordex wind farm management system allows the grid operator to directly control the rated and reactive power of the wind farm in the grid.

With these features, the turbines are certified for the grids of the most demanding international markets. They can also be adapted to new and complex connection requirements ensuring seamless integration into the local grid.

Always striving to progress

Our aim is to offer the best power quality on the market. Nordex intensively tests grid connection technology, both in the field and on the test bench. This is why our wind turbines have long been recognised for quality and dependability of supply equal to or better than those of conventional power plants.

Nordex makes sure that the machines in the Efficiency Class always comply with the latest grid requirements.

* The requirements for the SDL bonus are regulated in Germany in the System Service Ordinance (SDLWindV). They are among the strictest grid guidelines in Europe.

QUALITY
Top-quality engineering – simply routine for us

Thanks to their sophisticated design, the wind turbines in the Efficiency Class are certified quality products. From the earliest development phase Nordex engineers check the stress levels of materials and components using advanced computer-aided calculation routines. These are followed by extensive testing in the Nordex Test Centre and in the field.

Extreme testing of hardware and software

In the Nordex Test Centre our engineers inspect the components and systems of the prototypes under simulated wind and weather conditions. By subjecting them to stress exceeding the usual specifications, such as extreme climate and vibration tests, Nordex ensures that they meet all quality criteria and that a high-quality and technically mature product goes into series production.

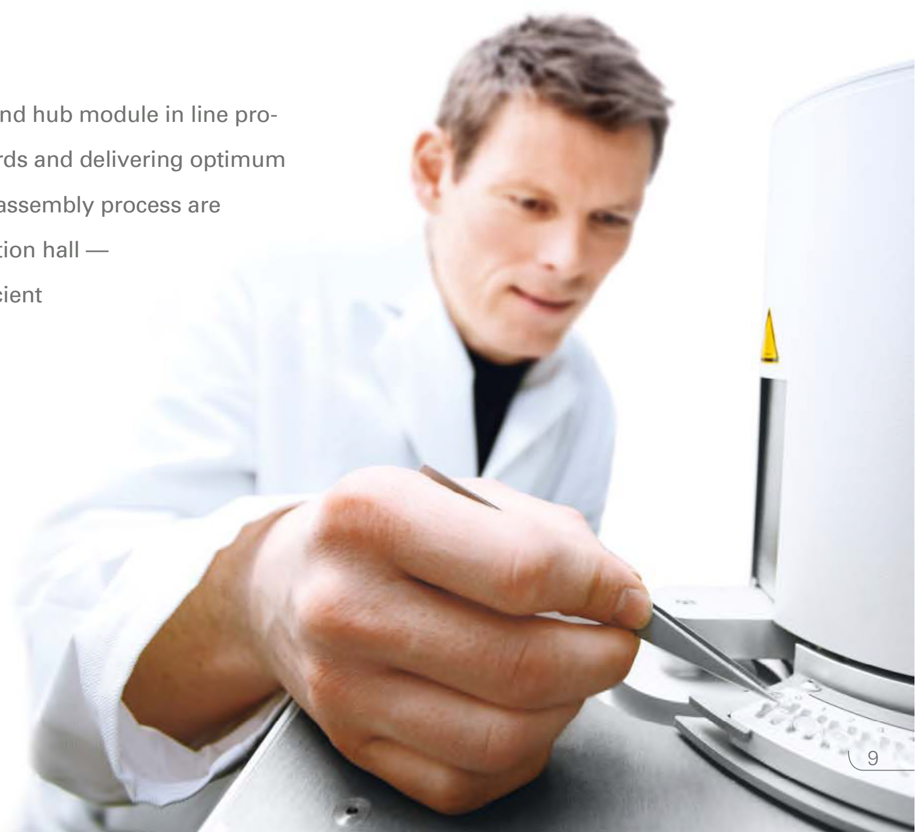
Quality-assured rotor blades

Nordex sets especially high standards when it comes to the materials used for our rotor blades, which can be up to 58 meters in length. Automated production processes, monitored by the latest measuring and testing methods, guarantee that each rotor blade works reliably.

Highest industry standards

Nordex manufactures the nacelle and hub module in line production, setting the highest standards and delivering optimum product quality. Many steps in the assembly process are performed in the protected production hall — a key prerequisite for the most efficient installation of turbines at the wind farm.

An eye for detail: in the laboratory Nordex checks the materials for the rotor blade.



SOLUTION FOR STRONG WIND
Dependable yields in rough climates

Wind locations with rough climates require mature, robust technology. The IEC-1-certified N90/2500 has been specifically designed for these conditions. For any strong wind site, it is the first choice for its price/performance ratio.

Nordex has already connected the N90/2500 to the grid hundreds of times in Europe, Asia and North America.

The N90/2500 is the most frequently installed turbine in the Efficiency Class and has proven itself around the globe.

FACTS AND FIGURES

	N90/2500 IEC I
Operating data	
Rated power	2,500 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	25 m/s
Rotor	
Diameter	90 m
Swept area	6,362 m²
Operating range rotational speed	10.3 - 18.1 rpm
Rated rotatinal speed	16.1 rpm
Tip speed	75 m/s
Speed control	Variable via microprocessor
Overspeed control	Pitch angle
Gearbox	
Construction	Combined spur/planetary gear or differential gearbox
Generator	
Construction	Double-fed asynchronous generator
Cooling system	Liquid/air cooling
Voltage	660 V
Grid frequency	50/60 Hz
Control	
Control centre	PLC controlled
Grid connection	Via IGBT converter
Distance control	Remote controlled surveillance system
Brake system	
Main brake	Pitch angle
Secondary brake	Disk brake
Lightning protection	Fully compliant with EN 62305
Tower	
Construction	Tubular steel tower
Rotor hub height/Certification	65 m/IEC 1a 70 m/IEC 1a 80 m/IEC 1a

SOLUTION FOR MODERATE WIND
Profitable at varied locations

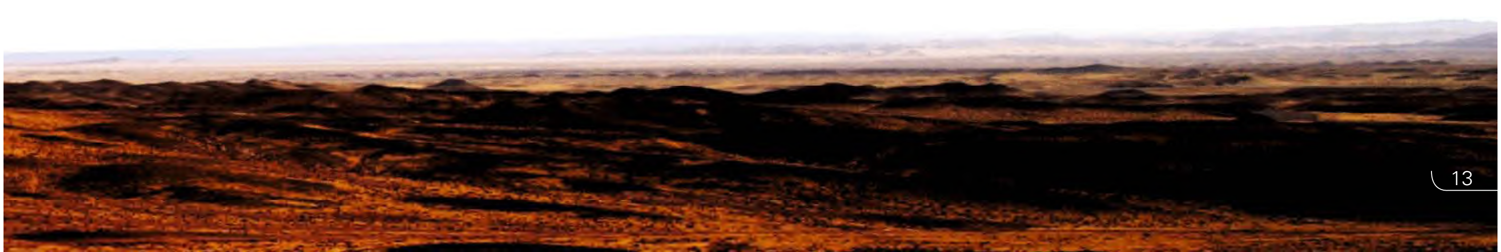
For projects with moderate wind speeds Nordex offers the N100/2500 turbine. The N100/2500 is one of the machines with the highest yield at IEC 2 locations. For even more efficiency Nordex has raised the cut-out wind speed from 20 to 25 m/s.

Thanks to their robust technology, the N100/2500 is ideal for wind farms in the widely different climatic conditions prevailing around the world.

The N100/2500 is one of the highest yielding machines at IEC 2 locations.

FACTS AND FIGURES

	N100/2500 IEC II
Operating data	
Rated power	2,500 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	25 m/s
Rotor	
Diameter	99.8 m
Swept area	7,823 m²
Operating range rotational speed	9.6 - 16.8 rpm
Rated rotatinal speed	14.9 rpm
Tip speed	77 m/s
Speed control	Variable via microprocessor
Overspeed control	Pitch angle
Gearbox	
Construction	Combined spur/planetary gear or differential gearbox
Generator	
Construction	Double-fed asynchronous generator
Cooling system	Liquid/air cooling
Voltage	660 V
Grid frequency	50/60 Hz
Control	
Control centre	PLC controlled
Grid connection	Via IGBT converter
Distance control	Remote controlled surveillance system
Brake system	
Main brake	Pitch angle
Secondary brake	Disk brake
Lightning protection	Fully compliant with EN 62305
Tower	
Construction	Tubular steel tower
Rotor hub height/Certification	75 m/IEC 2a 80 m/IEC 2a 100 m/IEC 2a



SOLUTION FOR LIGHT WIND
Maximum economic efficiency

To make IEC 3 locations economically viable, project operators need a turbine that can exploit even low winds to the maximum. With a rotor sweep of 10,715 square metres, the N117/2400 is the IEC 3 turbine with the highest yield in its category. The maximum acoustic power level is 105 decibels, which means that the machine can be installed nearer to residential areas and that a wind farm can be optimally laid out in the available space.

With a capacity factor of 40 percent, the N117/2400 is the most profitable solution for low wind locations.

The 117-metre diameter rotor makes the N117/2400 the best solution for low wind sites.

FACTS AND FIGURES

	N117/2400 IEC III
Operating data	
Rated power	2,400 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	20 m/s
Rotor	
Diameter	116,8 m
Swept area	10,715 m²
Operating range rotational speed	7.5 - 13.2 rpm
Rated rotatinal speed	11.8 rpm
Tip speed	72 m/s
Speed control	Variable via microprocessor
Overspeed control	Pitch angle
Gearbox	
Construction	Combined spur/planetary gear or differential gearbox
Generator	
Construction	Double-fed asynchronous generator
Cooling system	Liquid/air cooling
Voltage	660 V
Grid frequency	50/60 Hz
Control	
Control centre	PLC controlled
Grid connection	Via IGBT converter
Distance control	Remote controlled surveillance system
Brake system	
Main brake	Pitch angle
Secondary brake	Disk brake
Lightning protection	Fully compliant with EN 62305
Tower	
Construction	Tubular steel tower, Hybrid tower (141 m)
Rotor hub height/Certification	91 m/IEC 3a, DIBt2 120 m/IEC 3a, DIBt2 141 m/IEC 3a, DIBt2

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Exhibit N

Typical Construction Photos and Details

6011 Greenwich Windpark, LLC

Photo 01

Preliminary Access Road

Photo 02

Restoration of land adjacent to access road

Photo 03

Typical finished access road

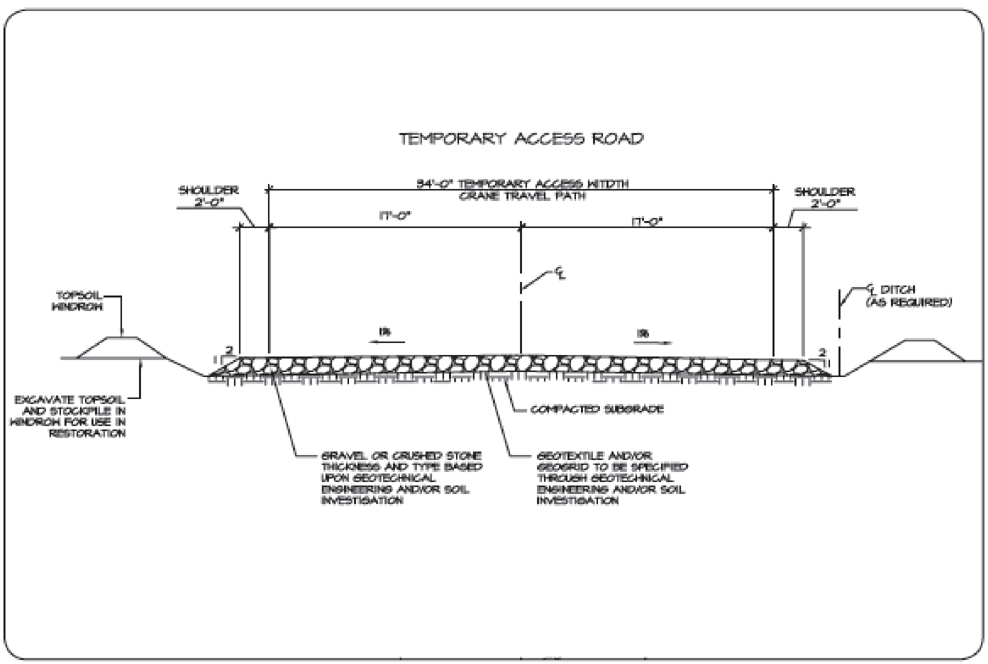

Photo 04

Access road typical detail

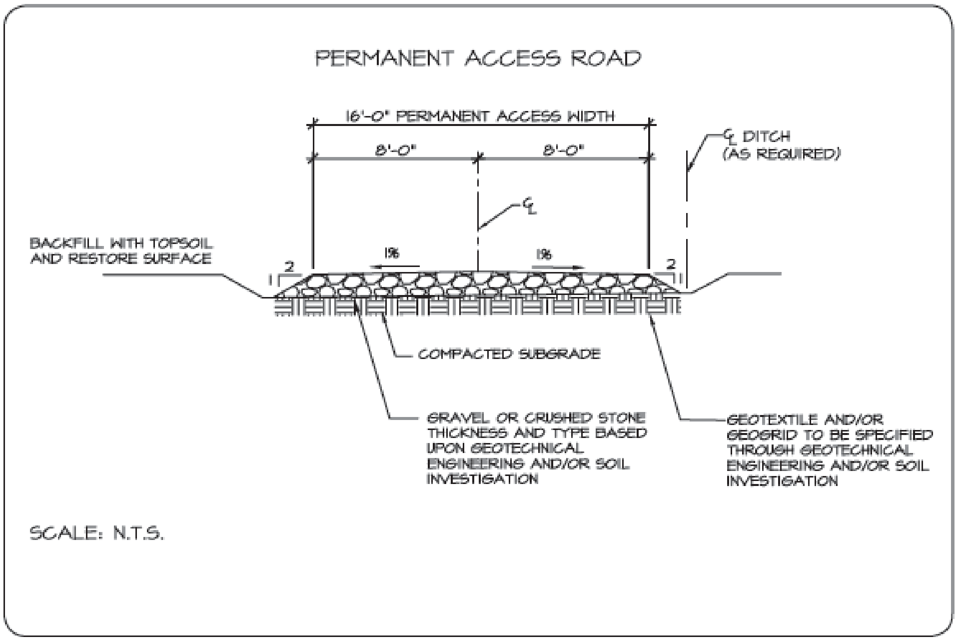

Photo 05

Access road typical detail

Photo 06

Buried interconnect installation

Photo 07

Typical trench associated with buried interconnect installation

Photo 08

In-progress restoration of buried interconnect impact

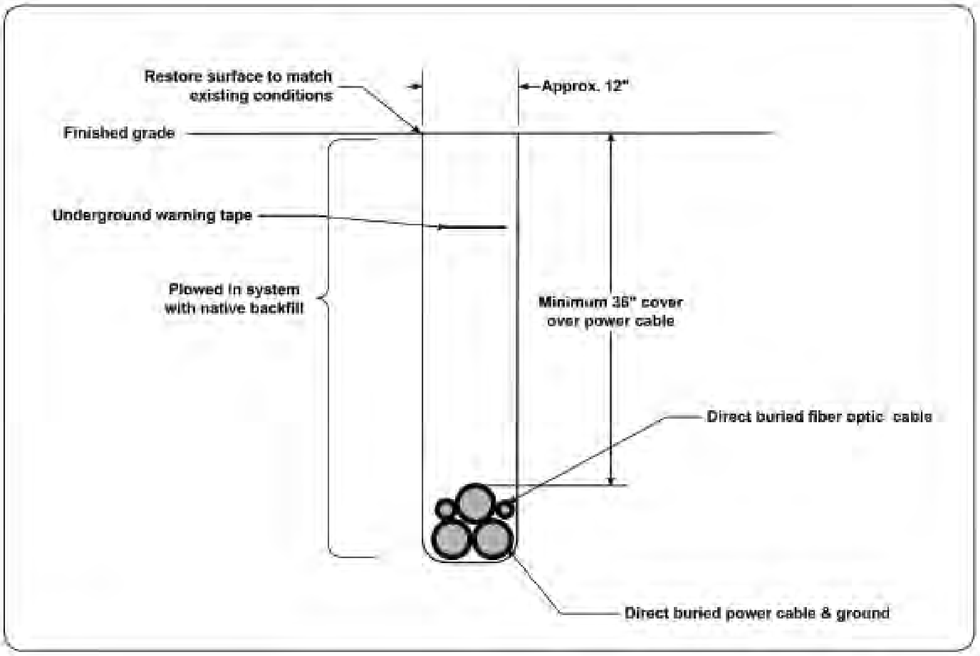

Photo 09

Buried interconnect typical detail

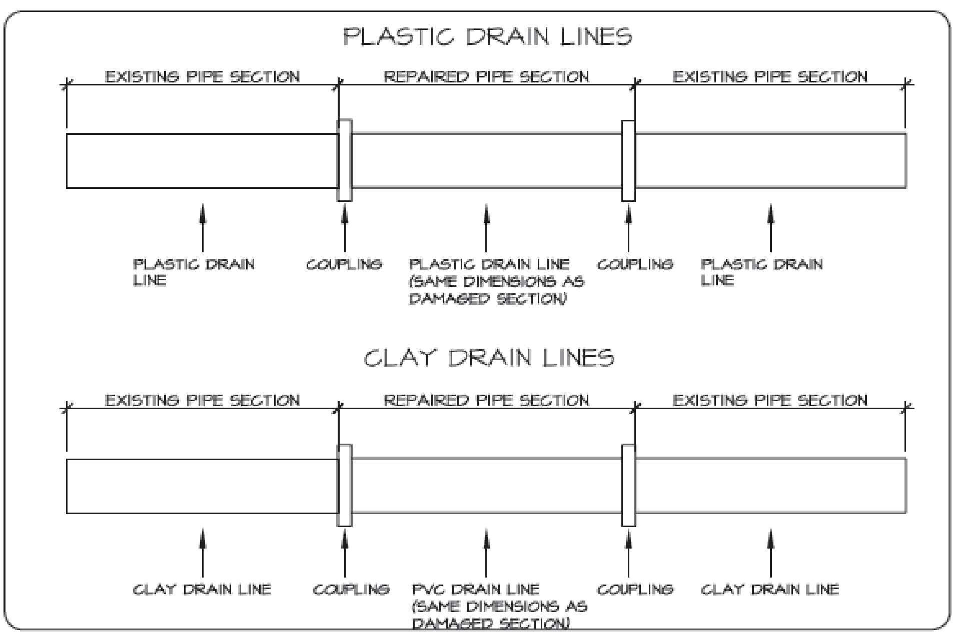

Photo 10

Drain line repair typical detail

Photo 11

Turbine foundation construction

Photo 12

Turbine foundation construction

Photo 13

Turbine foundation construction

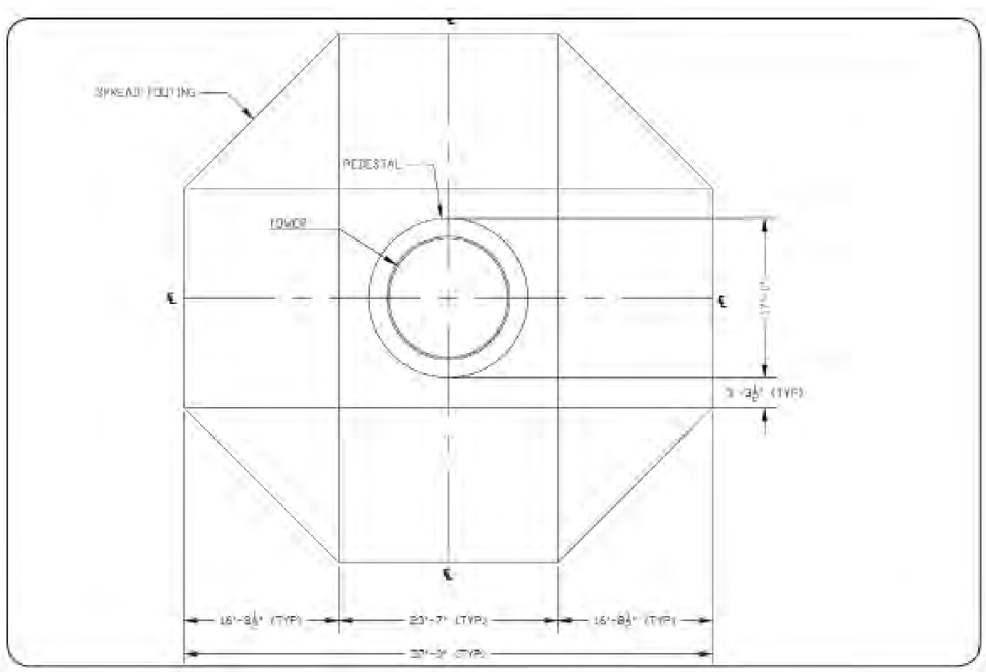

Photo 14

Turbine foundation typical detail

Photo 15

Transportation of turbine components

Photo 16

Typical turbine workspace

Photo 17

Erection of turbine

Photo 18

Typical operational turbines

Photo 19

Typical substation

Photo 20

Typical substation

Photo 21

Public road improvement

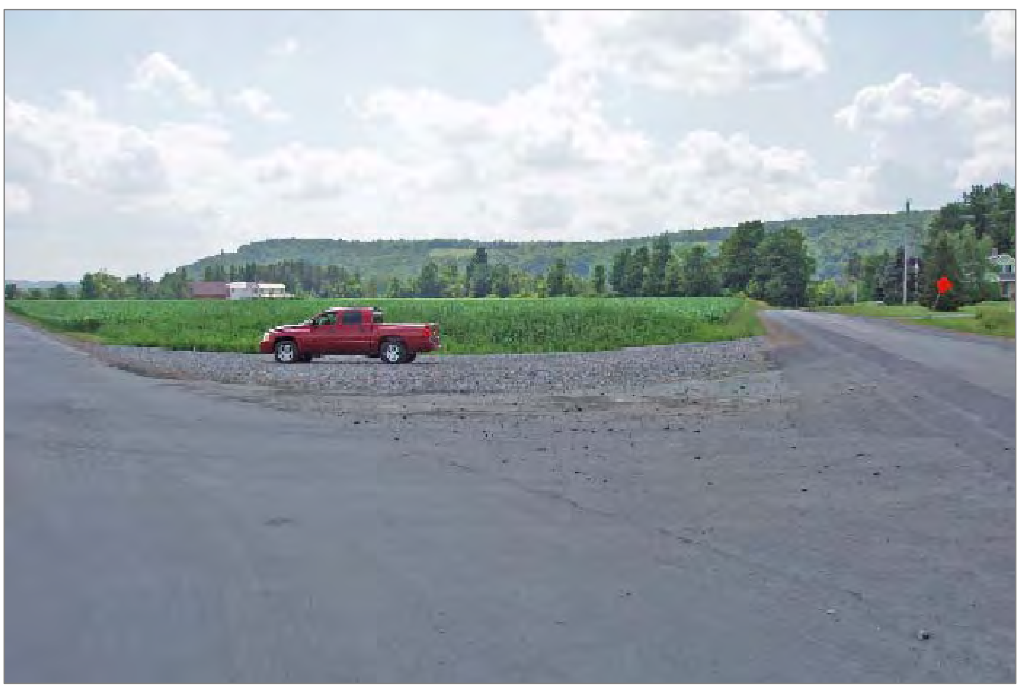

Photo 22

Turning radius public road improvement

Photo 23

Typical meteorological tower

Photo 24

Base of a meteorological tower being constructed

Photo 25

Typical operations and maintenance (O&M) building

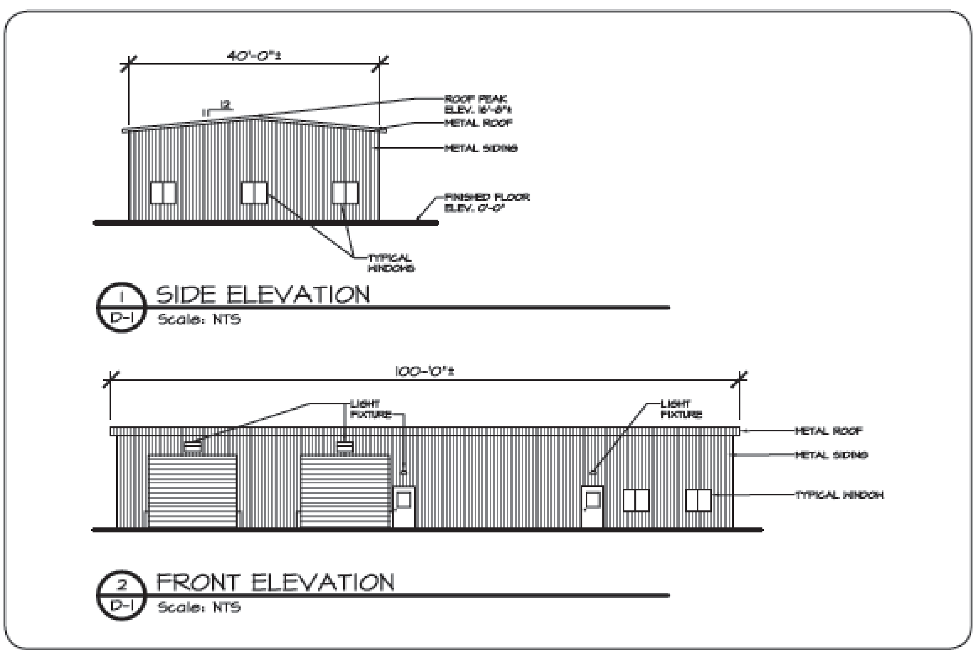

Photo 26

O&M building typical detail

Exhibit O

Sound Survey & Noise Acoustic Assessment

Acentech Report No. 436
Acentech Project No. 623183

Acoustical Study of Proposed Greenwich Wind Farm
Huron County, OH

October 2013

James D. Barnes

Submitted by:

Acentech Incorporated
33 Moulton Street
Cambridge, MA 02138

Prepared for:

Windlab Developments USA Ltd
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1. Executive Summary

Acentech Incorporated conducted a sound study and developed construction and operation sound level estimates for the proposed Greenwich Wind Farm. Continuous measurements obtained over a nominal one week period from 5 to 17 June 2013 at six locations around the site indicated overall average Leq sound levels of 51 to 63 dBA during the day and 46 to 62 dBA during the night. These levels represent an arithmetic average of all days and nights. Based on these data, 51 dBA/day and 46 dBA/night could be employed as a conservative representation of the average daytime and average nighttime long-term A-weighted Leq sound levels for the project area.

Construction activities at the wind farm such as facility access road work, site clearing, excavation, foundation, and backfill and equipment installation work, will be audible at times to nearby residents. Facility construction is expected to occur mostly during the daytime and any evening and nighttime work is expected to consist of relatively quiet activities. The increased construction noise will be temporary and relatively short term (2 to 3 weeks) for any single residence.

Operation of the wind farm is estimated to produce typical upper levels of 44 dBA at the nearest residences to the turbines and lower sound levels at more distant locations, which is lower than both the day and night Leq sound levels currently experienced in the project area. The turbine will also produce lower sound levels during periods with lower wind speeds.

2. Introduction

Windlab Developments USA Ltd proposes to construct the Greenwich Wind Farm, a wind-powered electric generating facility in Huron County, Ohio (the “project”). The plans for this nominal 60 MW wind project consist of 25 Nordex N117 Gamma Series 2.4 MW wind turbines generators (WTGs) with 91 meter towers to be installed on about 4,650 acres of agricultural and tree-covered land. Figures 1 and 2 are aerial photographs of the project area that show the turbine locations, substation, project boundary, one-mile buffer boundary, and non-participant residential structures within the one-mile boundary.

The turbines have a nominal “cut-in speed” of 3 meters per second [m/s; 9 miles per hour (mph) at standard 10 meter elevation]. In support of this project, Acentech Incorporated was requested to perform an ambient sound study and develop construction and operation sound level estimates for the proposed turbine layout. Information on the State of Ohio noise requirements for wind turbine projects, the existing ambient sound levels, and the construction sound levels and potential mitigation measures are presented in the following sections.

3. State Noise Requirements

The Ohio Power Siting Board (OPSB) has adopted rules that implement certification requirements for wind-powered electric generation facilities. Subsection (A) Health and safety of Sec. 4906-17-08 Social and ecological data, of the rules specifically require the wind power applicant to:

(a) Describe the construction noise levels expected at the nearest property boundary. The description shall address:

- Dynamiting activities
- Operation of earth moving equipment
- Driving of piles
- Erection of structures
- Truck traffic
- Installation of equipment

(b) For each turbine, evaluate and describe the operational noise levels expected at the property boundary closest to that turbine, under both day and nighttime conditions. Evaluate and describe the cumulative operational noise levels for the wind facility at each property boundary for each property adjacent to the project area, under both day and nighttime operations. The applicant shall use generally accepted computer modeling software (developed for wind turbine noise measurement) or similar wind turbine noise methodology, including consideration of broadband, tonal, and low-frequency noise levels.

(c) Indicate the location of any noise-sensitive areas within one mile of the proposed facility.

(d) Describe equipment and procedures to mitigate the effects of noise emissions from the proposed facility during construction and operation.

4. Preconstruction Ambient Sound Measurements

The purpose of the survey was to characterize the existing land uses, sound sources, acoustic environment, and specifically, the A-weighted Leq sound levels at participating and non-participating residential areas within one mile of the project area over day and night periods. Weather during the survey was seasonal and ranged from clear to cloudy skies with rain at times in the region; calm to windy conditions from various directions; and temperatures typically ranging from 60ºF to 80ºF over the days and 55ºF to 65ºF over the nights.

Table 1 lists the instruments that were employed for the ambient survey that Acentech conducted over a nominal one-week period of 5 to 17 June 2013. These instruments meet the Type 1 provisions of ANSI S1.4 or IEC 651 and the provisions in ANSI S1.11 or IEC 225. The sound level monitors were field calibrated just prior to and directly following the measurements. In addition, the monitors had been laboratory calibrated within 12 months prior to the measurements. A windscreen was fitted on each microphone in order to reduce the potential influence of local wind-induced noise on the measured data without significantly attenuating the actual ambient sounds. The windscreens used for this ambient sound survey, which are constructed of open-cell polyurethane foam, were engineered and supplied by the acoustic instrumentation vendors Bruel & Kjaer and Rion.

Figure 3 is an aerial photo of the project site and long-term community sound measurement Locations 1 to 6. In early June 2013 an experienced Acentech sound consultant toured the site and observed the acoustic environment and land uses in the area with a Windlab/Greenwich Project representative. Based on the tour and observations, the project team identified monitoring locations that were judged representative of the noise sensitive receptors, such as residences, in the area. The selection of specific monitoring locations considered numerous factors, including the range of sound environments around the project area, the proximity to the proposed turbine sites and to major and secondary roadways, the various farm and non-farm settings and their local activities and sources, and also, the security of the monitoring equipment.

Figures 4 through 9 display photographs and aerial views of the six locations where Acentech deployed equipment described in Table 1 to monitor continuously the ambient A-weighted sound levels. The specific monitoring locations were:

- Loc. 1 – Rome Greenwich Rd. South of Plymouth East Rd
- Loc. 2 – Rt. 13 South of Rt. 224
- Loc. 3 – South of Rt. 224 East of Rt. 13
- Loc. 4 – Alpha Rd East of Rt. 13
- Loc. 5 – Alpha Rd East of RR tracks
- Loc. 6 – North of Rt. 224 East of Rt. 13

Each microphone was typically positioned a similar distance (e.g., about 50 ft to 150 ft and greater) from the major local sound sources (e.g., road and rail traffic) as the homes in the area. The field team also observed sound sources, which included at times local and distant road and rail traffic, birds, wind in trees and brush, distant jet aircraft, and farm equipment.

Figures 10 through 16 show the L1, Leq, and L90 A-weighted sound levels for each 10-minute interval over the nominal one-week period at the six long-term monitoring locations. These figures indicate strong, repeatable patterns in the sound levels at the six locations, with the highest and lowest levels typically measured, respectively, during the day and night. These figures also plot the local wind speed, which was measured by a project met tower at the 60 meter elevation. The Leq sound levels include both the steady background sounds (e.g., distant traffic, steady wind in trees) plus the short-term intrusive sounds (e.g., bird chirps or local car and train passbys). The L1 sound levels represent the nominal maximum sounds, such as bird chirps, thunder, or local road and rail traffic sounds, that must occur for at least 1% of each interval (i.e., six seconds of each 10-minute interval). The L90 sound levels characterize the lowest background, or residual sound level that is exceeded for 90% of the time of each interval (i.e., nine minutes of each 10-minute interval). The L90 sound level occurs when short-term intrusive sound sources, such as local traffic passbys or aircraft flyovers, are absent and the sound level returns to a lower residual value.

Figures 17 through 22 are plots of the average Leq A-weighted sound levels for the day and night periods and the maximum, minimum, overall energy average, and standard deviation values for the day and night periods for each location. Figures 23 and 24 compare the day and night Leq values, respectively, for all six locations. The overall average A-weighted Leq values for the full measurement period, which are summarized in Table 2, ranged from 51 to 63 dBA during the day and 46 to 62 dBA during the night across all six locations. We note that the highest values of 63 dBA (day) and 62 dBA (night) were measured near a residence that is located near a very active rail line. Based on our observations and these data, we suggest that 51 dBA and 46 dBA, respectively, could be very conservatively employed as representative of the average daytime and average nighttime long-term A-weighted Leq sound levels for the whole site. Table 3 summarizes the long-term average L90 sound levels that were measured in the June 2013 survey. These results show an overall average daytime range of 39 to 43 dBA and nighttime range of 33 to 35 dBA in the long-term average L90 sound levels across the six locations. During this survey, the L90 sound levels were typically controlled by sounds of distant road traffic and breeze in trees and bushes. In addition, we measured the C-weighted Leq sound levels at the six locations for each 10-minute interval over the whole monitoring program. The C-weighted sound level is more strongly influenced by lower frequency sound than the A-weighted sound level. Table 4 summarizes the measured overall C-weighted Leq values for the full measurement period and indicates values of 61 to 70 dBC during the day and 58 to 70 dBC during the night across the six locations.

The final figure with ambient data, Fig. 25, presents a scatter plot of the measured A-weighted Leq sound levels at all six monitoring locations versus the measured wind speed at the project's meteorological tower (60 meter elevation) over the nominal one-week ambient sound survey. The data indicate that the A-weighted Leq sound levels were not strongly correlated with the wind speed measured during the monitoring program, however, the sound levels typically increased from 30 to 45 dBA with the wind speeds from 6 to 10 meters per second.

5. Construction Sound Estimates and Mitigation Measures

Construction of Greenwich Wind Farm is currently planned to start in 2014. Initial activities (Construction Phase A) will include improvements and new construction of facility access roads; then clearing where needed, excavation, foundation, and backfill work at the WTGs and the substation. Concrete for the project will be made at a temporary on-site batch plant using trucked-in materials or will be directly trucked-in from an offsite plant. Phase A activities will be followed by Phase B activities, which are comprised of erection of the WTG towers and installation of the WTGs; trenching and installation of the electrical collection system; and installation of substation equipment. Finally, prior to commercial operation, the individual equipment items and the entire facility will be tested and commissioned during Phase C.

A majority of the construction activities associated with the proposed project will be conducted during daylight hours. At times over the planned construction schedule, the construction activities will be audible to nearby residents. Any construction at the facility in the evening and nighttime is expected to be limited to relatively quiet activities and to be less noticeable than in the daytime.

The following mitigation measures will be employed during the construction phases of the project:

- Effective exhaust mufflers in proper working condition will be installed on all engine-powered construction equipment at the site. Mufflers found to be defective will be replaced promptly.

- Contractors will be required to comply with federal limits on truck noise.

- Contractors will be required to ensure that their employee and delivery vehicles are driven responsibly.

- Nighttime construction work that does occur will generally be limited to relatively quiet activities, such as welding and installing equipment, cabling, and instrumentation.

- Contractors will be required to notify the community in advance of any blasting activity; however, no blasting is anticipated at this time.

Construction sound that may be heard off-site will vary from hour-to-hour and day-to-day in accordance with the equipment in use and the operations being performed at the site. Since the construction activity at the site will be temporary, will occur mostly in the daytime hours, and will produce sounds that are already familiar to the community, including sounds from farming activity, and home and other mid-size building construction, its overall noise impact on the community beyond 1,000 ft of the nearest turbine is not expected to be significant.

Typical on-site equipment used to construct the wind farm project will include trucks, cranes, dozers, excavators, trenchers, graders, and batch plants. Representative average sound levels (equivalent sound levels, Leq) associated with this construction equipment during the workday are listed in Table 5. For example, with 2 trucks, 1 dozer, and 1 excavator operating at a WTG or substation site, the calculated equivalent sound level during the workday is 56 dBA at 1470 ft, the approximate minimum distance from the WTG site to the nearest residence, and 55 dBA at 1690 ft, the approximate minimum distance from the substation site to the nearest residence.

The construction sound level at the nearest property boundary could be greater than this value, depending on the actual distances from the construction activity to the boundary. Table 5 also lists the sound estimates at one mile from the equipment. These reported sound levels are based on the results of extensive previous acoustical studies of engine-powered construction equipment.

6. Project Operation Sound Estimates and Mitigation Measures

To assess the noise contributions of the proposed project to the ambient sound levels in the community, Acentech evaluated the noise producing features of the proposed project and then used a state-of-the-art computer model to calculate expected sound levels from the project. This section describes the sound characteristics of the project, the computer model used to analyze the project, and the predicted sound levels.

Noise-Producing Features of the Project

When operating, the primary source of noise will be from the wind turbines, which produce low level broad band sound that varies with wind speed, and from the substation. For this analysis, Acentech modeled the sound of the 25 wind turbines and one substation main transformer. Noise from the wind turbines is primarily aerodynamic sound created by wind flowing over the moving wind turbine blades. Mechanical noise is minimized by design features that include:

- Noise insulation of the gearbox and generator
- Reduced-noise gearbox
- Reduced-noise nacelle
- Vibration isolation mounts
- Quieted-design rotor blades

Nordex, the manufacturer of the proposed 1.7-100 wind turbines, has performed field testing of this unit in accordance with IEC Standard 61400-11 to quantify the apparent sound power level of the total noise emissions from the wind turbine. The maximum sound power level emission for the Nordex N117 wind turbine with a 91 meter hub height is 105 dBA, which occurs when wind speeds are nominally 7 m/sec and greater when measured at the standard 10 meter height. Table 6 shows the overall A-weighted sound power level emissions for the N117 turbine across its range of operating wind speeds and Table 7 lists the A-weighted octave band sound power levels associated with the maximum sound output condition (7 m/s and greater wind speed) from the turbine vendor documentation. Each turbine was modeled to be a point source located at the actual proposed turbine hub height, 91 meters above local ground elevation. For a very basic case with no atmospheric absorption or ground effects and with the wind turbine modeled as a point source, the resulting estimated sound level would be 55 dBA at 400 ft from a single turbine hub; and since sound diminishes ideally by 6 dB for every doubling of distance from a point source, the calculated level would reduce to 49 dBA at 800 ft from the turbine hub.

Description of Sound Model

The estimated sound levels and contours, which apply to both daytime and nighttime hours for the operating phase, were developed with the computer noise modeling program, Cadna/A. This commercial software program, which was developed by DataKustik GmbH (www.datakustik.de), is widely-accepted by the international acoustics community for the calculation of community sound levels due to industrial sources. The calculations are performed for industrial sources according to the following international standards:

- ISO 9613-1: Acoustics - Attenuation of sound during propagation outdoors, Part 1: Calculation of the absorption of sound by the atmosphere, and

- ISO 9613-2: Acoustics - Attenuation of sound during propagation outdoors, Part 2: General method of calculation.

Inputs to the program include: source locations and associated sound power emissions, receptor locations, land topography, and meteorological conditions. The calculations account for spreading losses, atmospheric attenuation, ground effects, and any terrain shielding between each source and each receptor. For this study, the sound propagation routines in the Cadna/A model are based on octave band sound pressure levels and on downwind conditions with a moderate temperature inversion. The following describes significant parameters used in the sound model:

- Turbine, project boundary, 1-mile boundary, and residence locations – the shape files with these data were provided by the project team. The proposed project with 25 turbines has 906 non-participating residential structures within about one mile of the turbines.

- Land elevation contours – the shape files with these data were provided to Acentech by project team.

- Nordex N117 turbine data. The octave band sound power levels for the Nordex N117 were from the vendor documentation for the turbine’s nominal maximum sound output condition. The sound power levels used as model inputs are shown in Tables 6 and 7.

- Meteorological conditions are 10°C (50°F) and 70%RH, moderate inversion.
- All receptors downwind from turbines, a conservative scenario compared to actual wind farm operation under typical conditions.
- Ground conditions – moderate soft ground with parameter G = 0.5 and spectral calculations for all sources.
- Receptor heights – 1.5m above local ground elevation.

Sound measurements obtained on other operating wind projects have shown results that support the Cadna/A modeling procedure.

Sound Model Results

Figure 26 presents a map of the estimated cumulative sound levels from all of the proposed wind turbines under maximum noise output conditions, i.e., with wind speeds at or above 7 m/s at the standard 10 meter height. In addition to sound contours, the Figure 26 map shows locations of the 25 turbines, the project boundary, the one-mile project buffer boundary, and the 906 non-participating residences approximately within the one-mile boundary.

The sound model allows extraction of expected maximum sound levels at every residence in the project area. Figure 27 is a scatter plot that displays the estimated sound levels during moderate to high wind conditions (7 m/s and greater at 10 m height) at all non-participating residences vs. their respective distances from the nearest turbine hub. Note that the levels represent the sound of the entire project and that more than just the one nearest turbine may contribute significantly to the overall sound levels at a specific receptor. As shown in Figure 27 and also in Table 8, the typical maximum sound level is expected to be 44 dBA or less at all non-participating residences. Table 8 lists the 39 non-participating residential structures with estimated turbine (and substation transformer) sound levels of 40 dBA or greater in the project area. Table 8 also lists the estimated C-weighted sound levels associated with the above 39 non-participant locations, the levels are all below 66 dBC and typically are comparable to the ambient long-term average C-weighted sound levels measured in the area. Under conditions of wind speeds less than 7 m/s, the estimated sound levels in the community will be lower than the values shown in Figures 26 and 27 and Table 8.

7. Noise Impact Assessment

As noted in Section 5, the majority of the construction activities associated with the project will be conducted during the daylight hours, and it will vary over time, depending on the equipment in use and the operations being performed at the site. The temporary noise associated with construction of the project will be similar to the noise produced during excavation, grading, and steel erection activities at other mid-size building projects and farming activities in the region.

The proposed wind turbine facility will be available to operate 24-hours per day and seven days per week; and it will be heard at times in the community during turbine operation. It is expected that routine operation will typically produce sound levels in the community that are similar to or lower than the measured long-term average daytime and nighttime ambient A-weighted and C-weighted sound levels.

Figure 1.
Aerial Photo of Proposed Greenwich Wind Farm Site with 25 Turbines (+), Substation, Project Boundary (Red), and One-Mile Project Buffer Boundary (Blue).

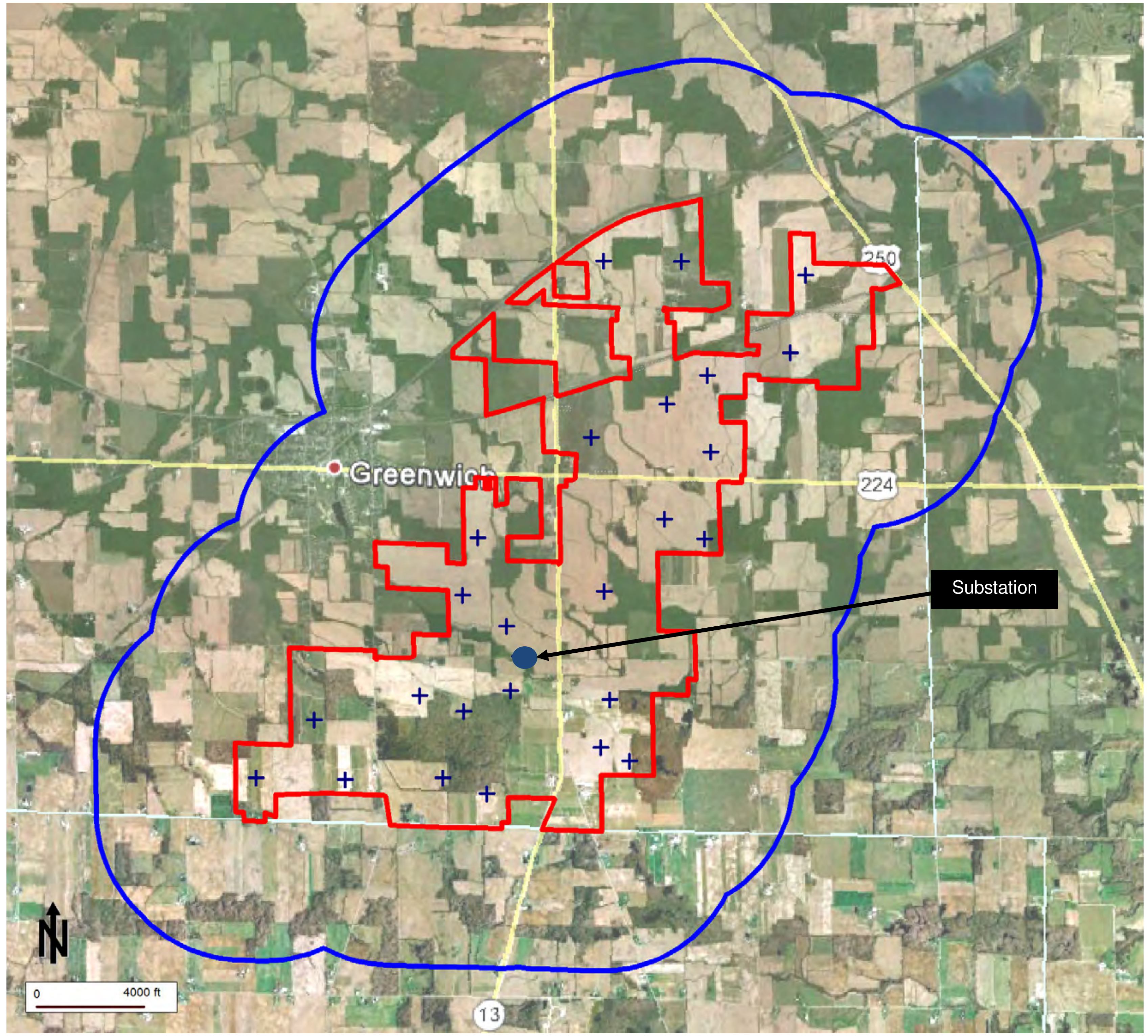


Figure 2.
Aerial Photo of Proposed Greenwich Wind Farm Site with 25 Turbines (+), Substation, Project Boundary (Red), and 906 Non-Participant Residential Structures within One-Mile Project Buffer Boundary (Blue).

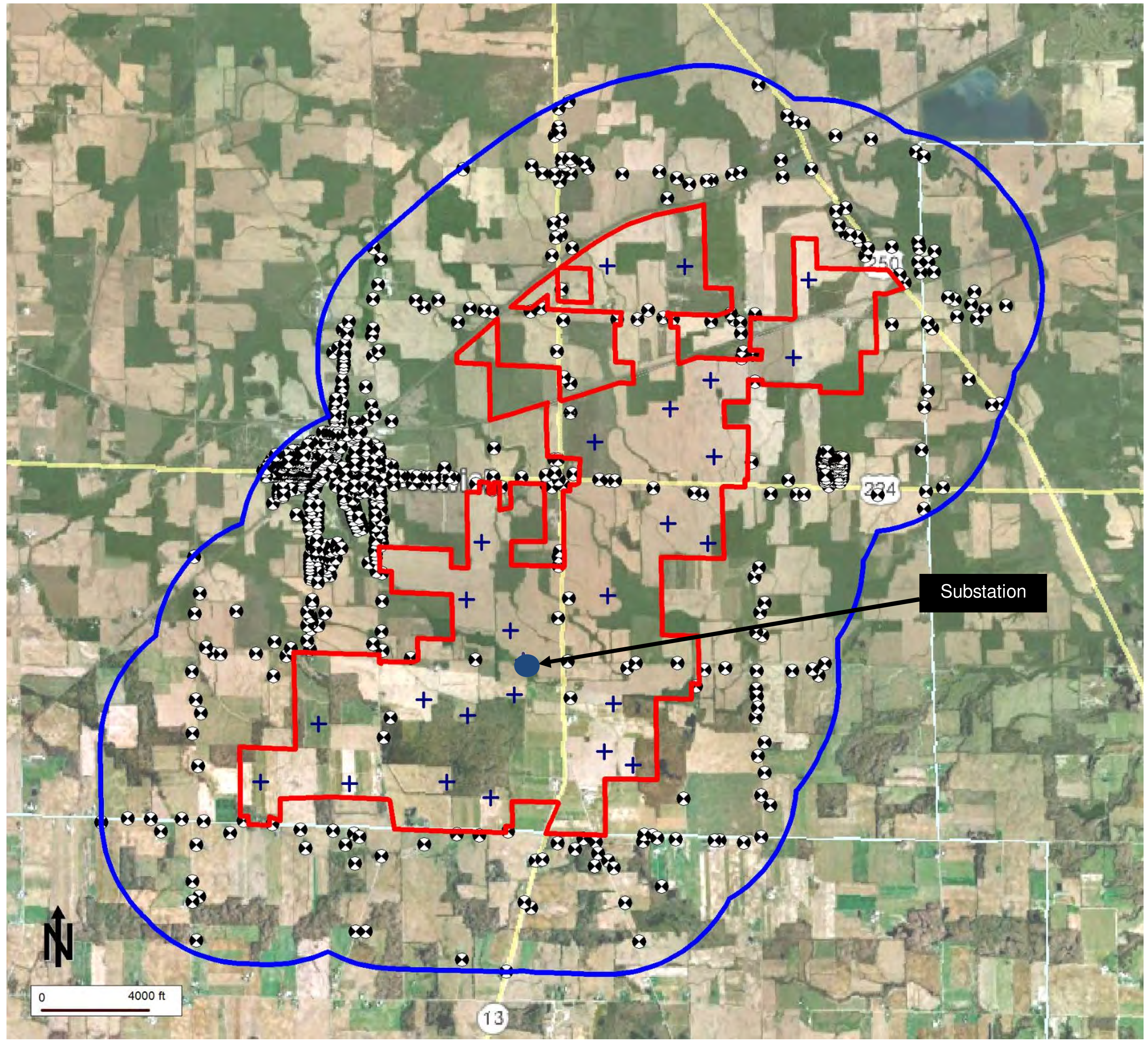


Figure 3.
Aerial Photo of Proposed Greenwich Wind Farm Site with 25 Turbines (+), Substation, Project Boundary (Red), One-Mile Project Buffer Boundary (Blue), and Ambient Sound Measurement Locs. 1 to 6.

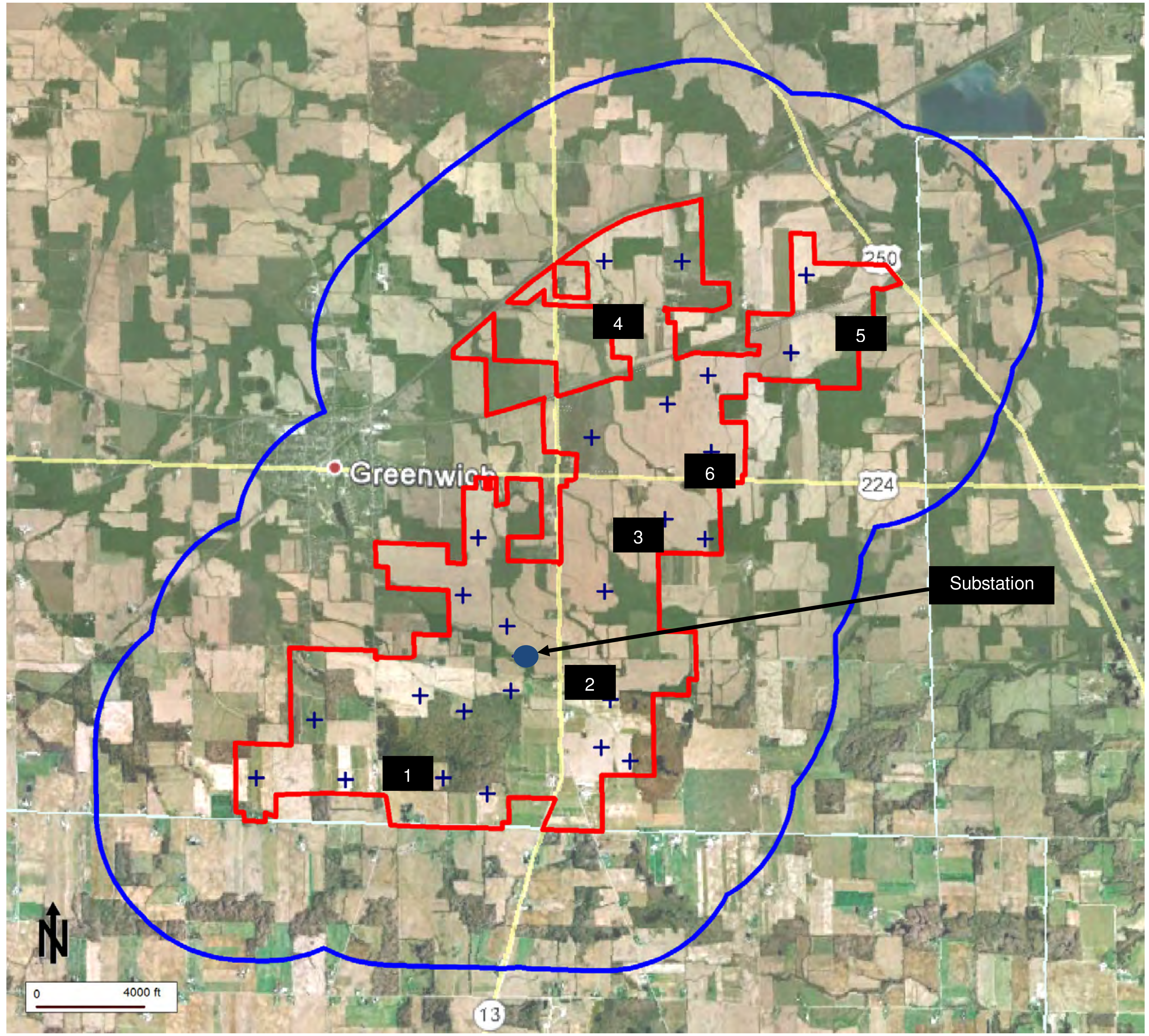


Figure 4.
Views of Loc. 1.

Looking Southeast

Figure 5.
Views of Loc. 2.

Looking North

N

Figure 6.
Views of Loc. 3.

Looking North

Figure 7.
Views of Loc. 4.

Looking Southeast

N

Figure 8.
Views of Loc. 5.

Looking North

N

Figure 9.
Views of Loc. 6.

Looking Southeast

Figure 10.
Existing Ambient A-Weighted L1, Leq, and L90 Sound Levels Measured over 10-Minute Intervals at Loc. 1 (6/5-17/2013).

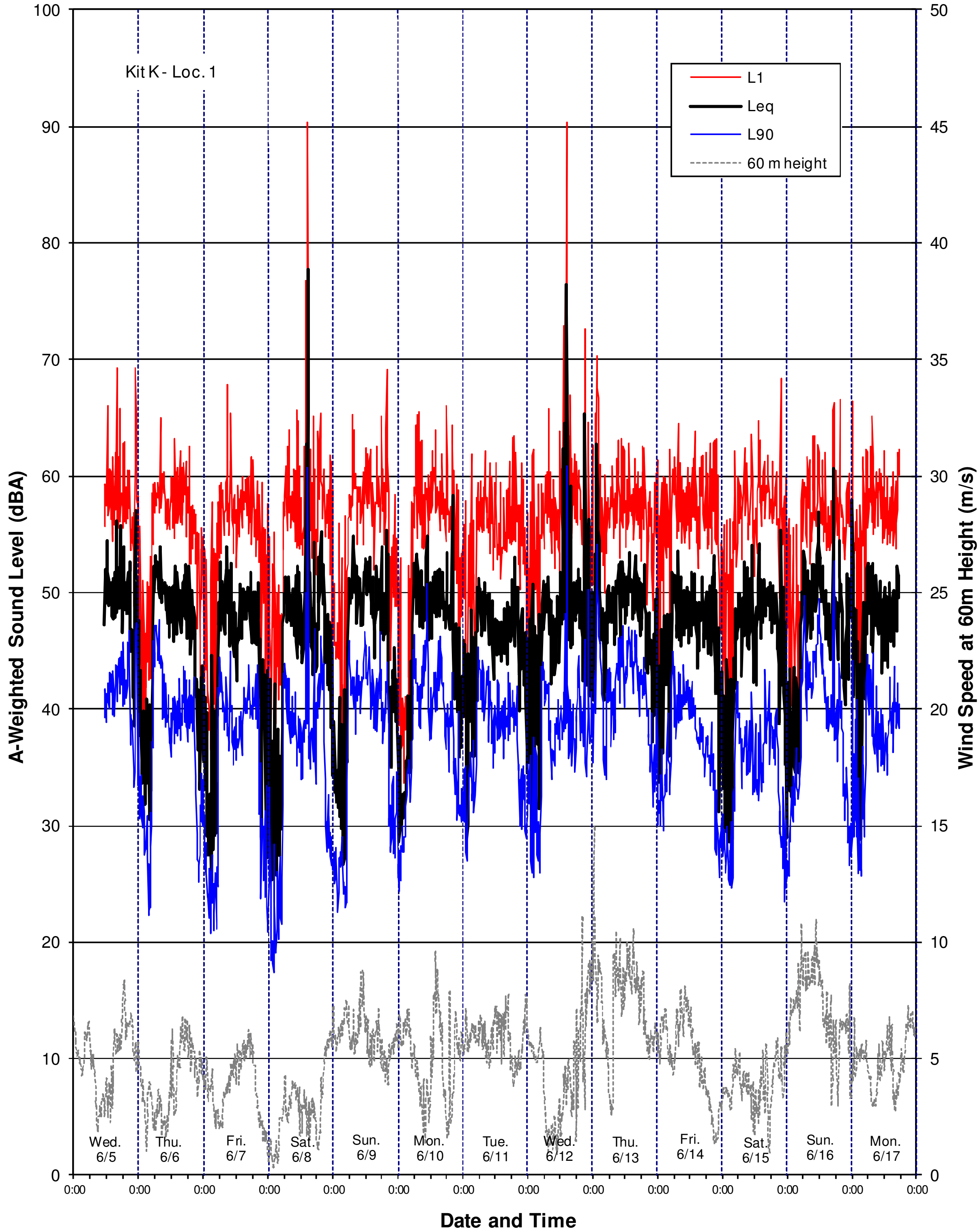


Figure 11.
Existing Ambient A-Weighted L1, Leq, and L90 Sound Levels Measured over 10-Minute Intervals at Loc. 2 (6/5-17/2013).

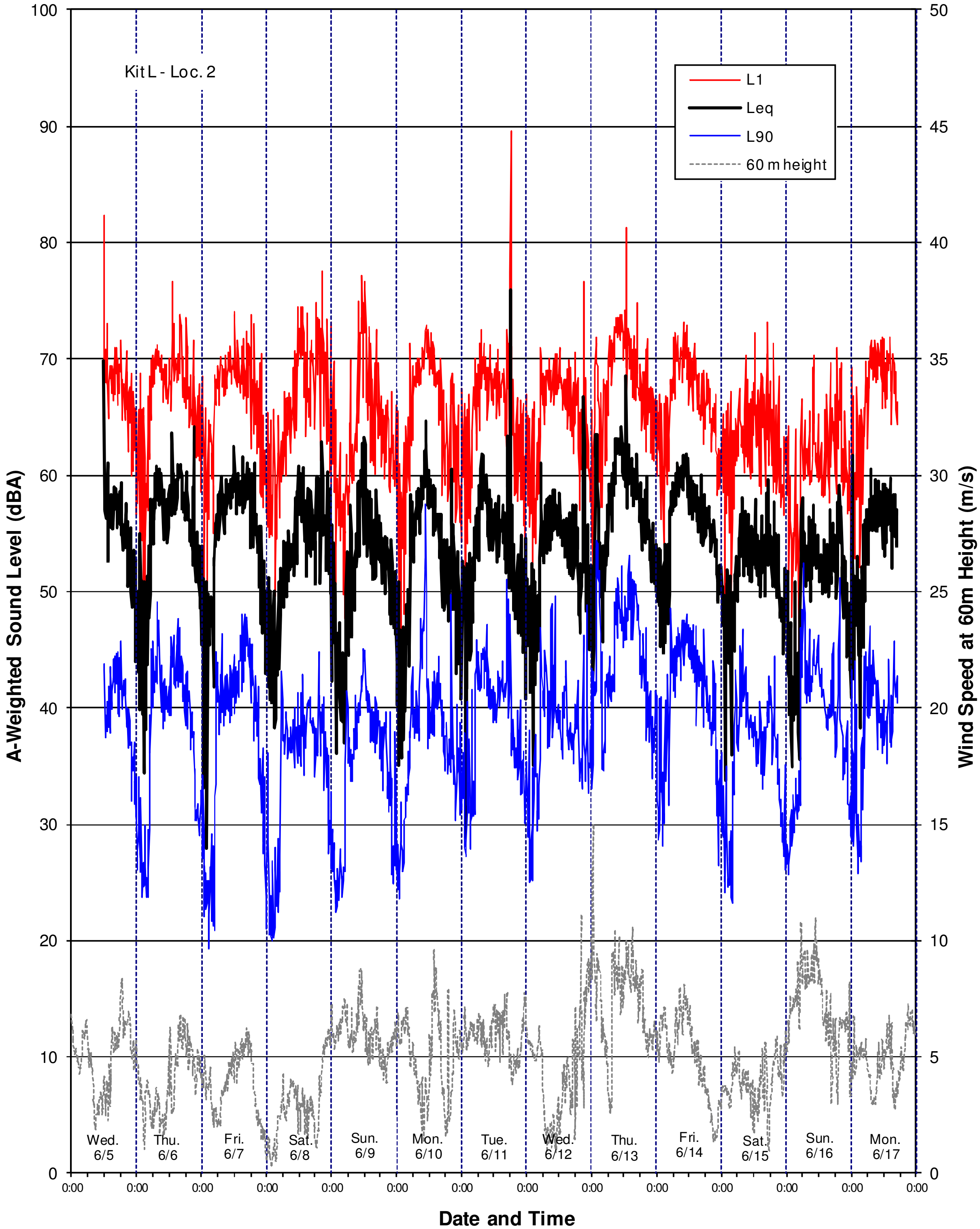


Figure 12.
Existing Ambient A-Weighted L1, Leq, and L90 Sound Levels Measured over 10-Minute Intervals at Loc. 3 (6/5-17/2013).

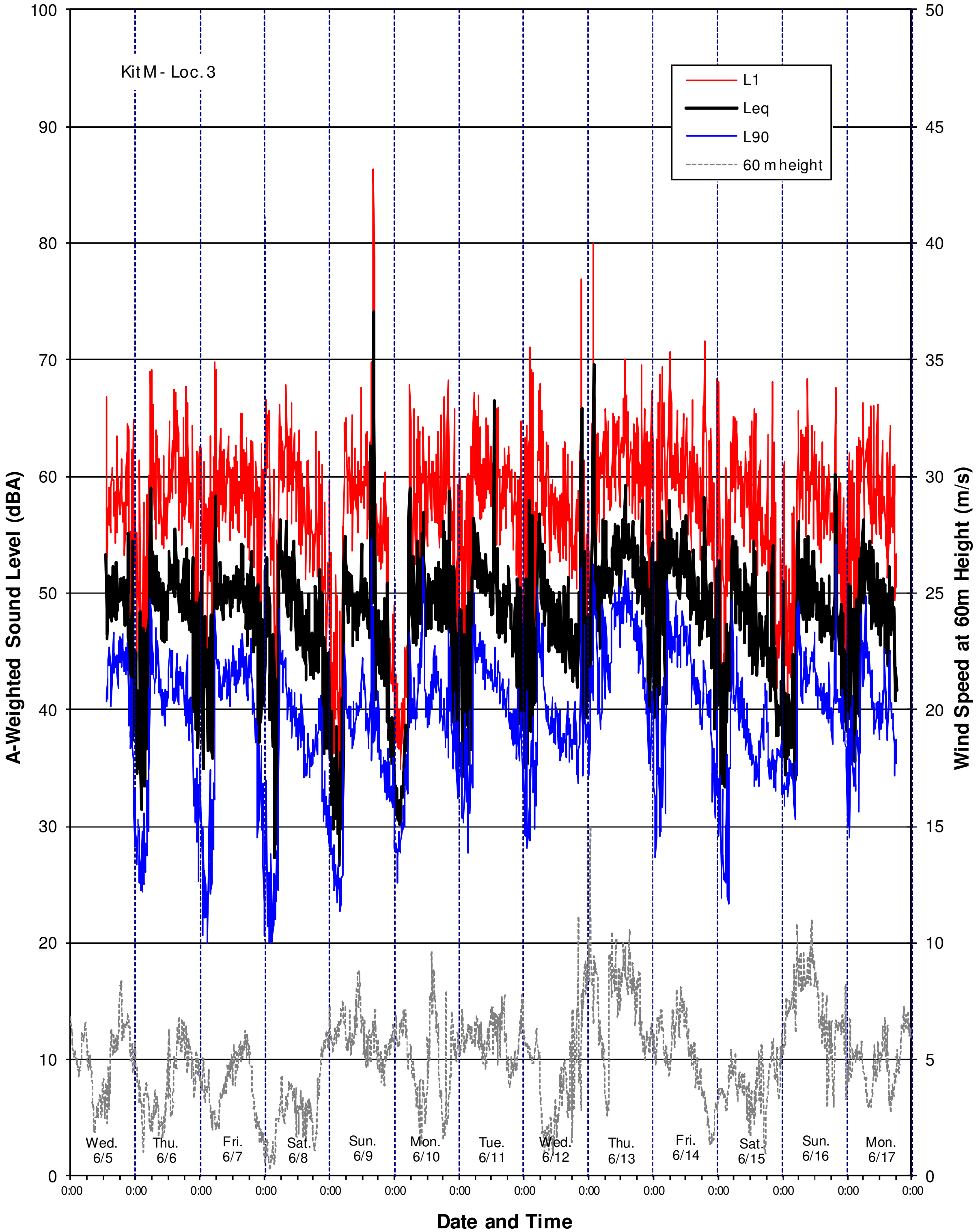


Figure 13.
Existing Ambient A-Weighted L1, Leq, and L90 Sound Levels Measured over 10-Minute Intervals at Loc. 4 (6/5-17/2013).

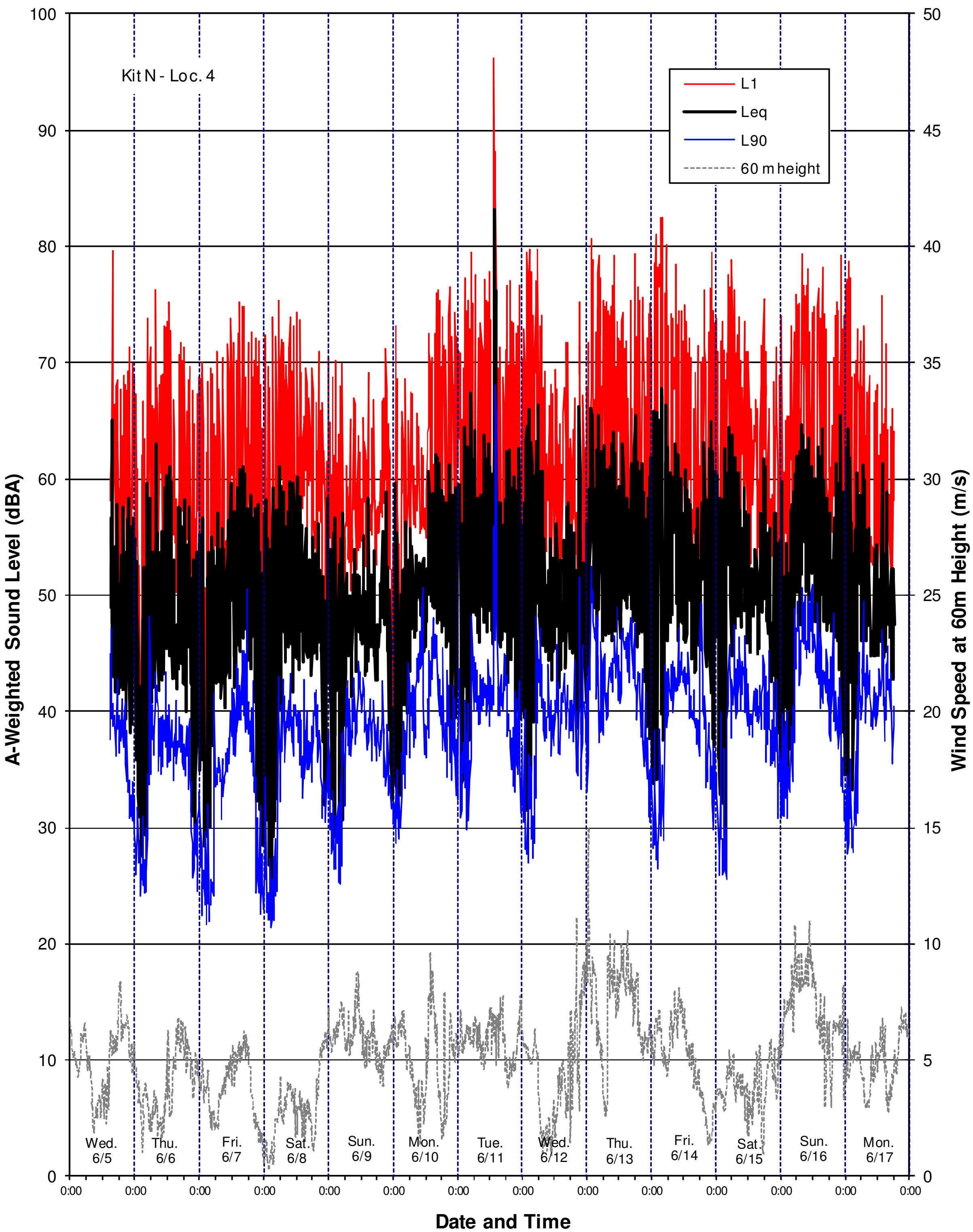


Figure 14.
Existing Ambient A-Weighted L1, Leq, and L90 Sound Levels Measured over 10-Minute Intervals at Loc. 5 (6/5-17/2013).

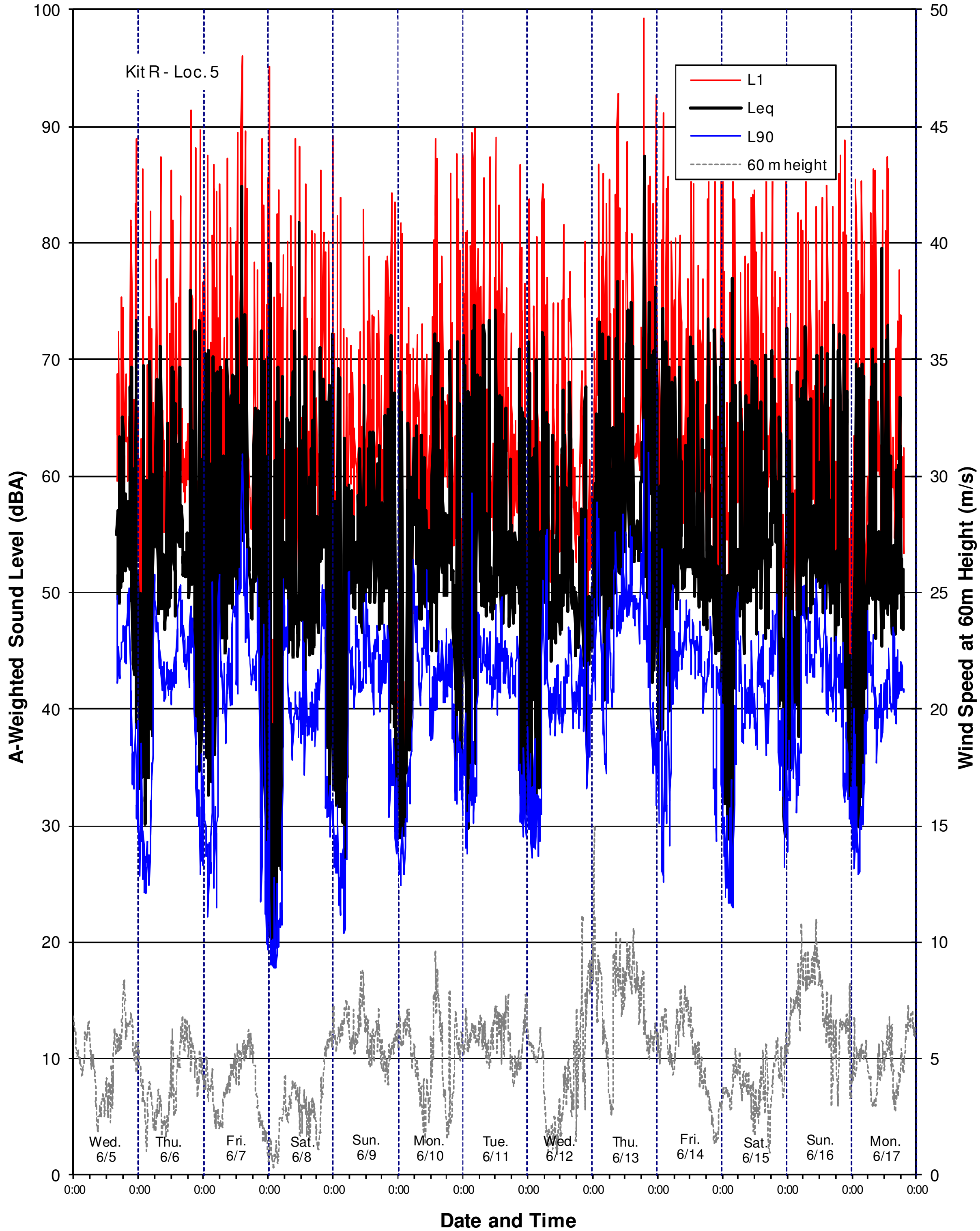


Figure 15.
Existing Ambient A-Weighted L1, Leq, and L90 Sound Levels Measured over 10-Minute Intervals at Loc. 6 (6/5-17/2013).

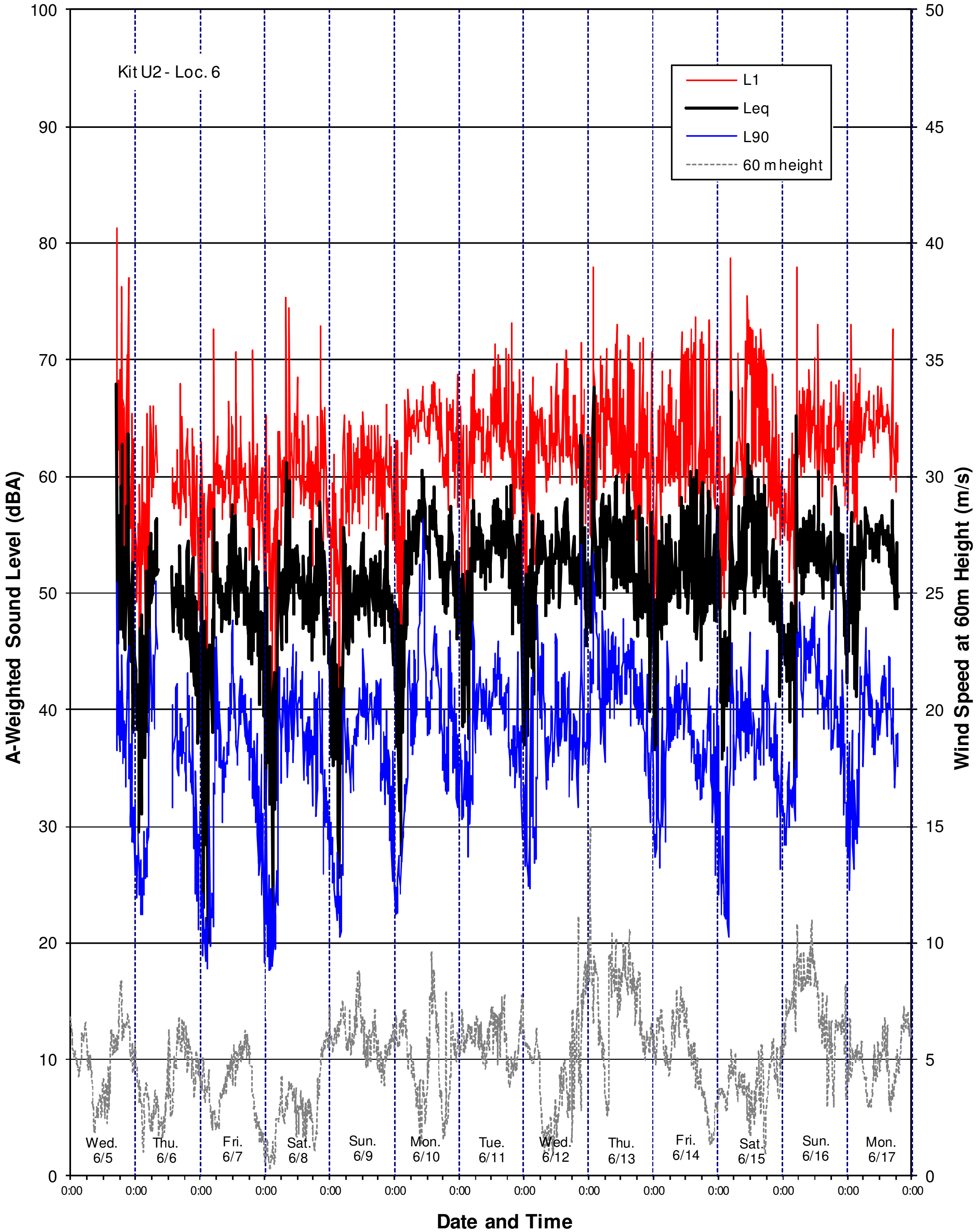


Figure 16.
Existing Ambient A-Weighted Leq Sound Levels Measured over 10-Minute Intervals at Locs. 1 to 6 (6/5-17/2013).

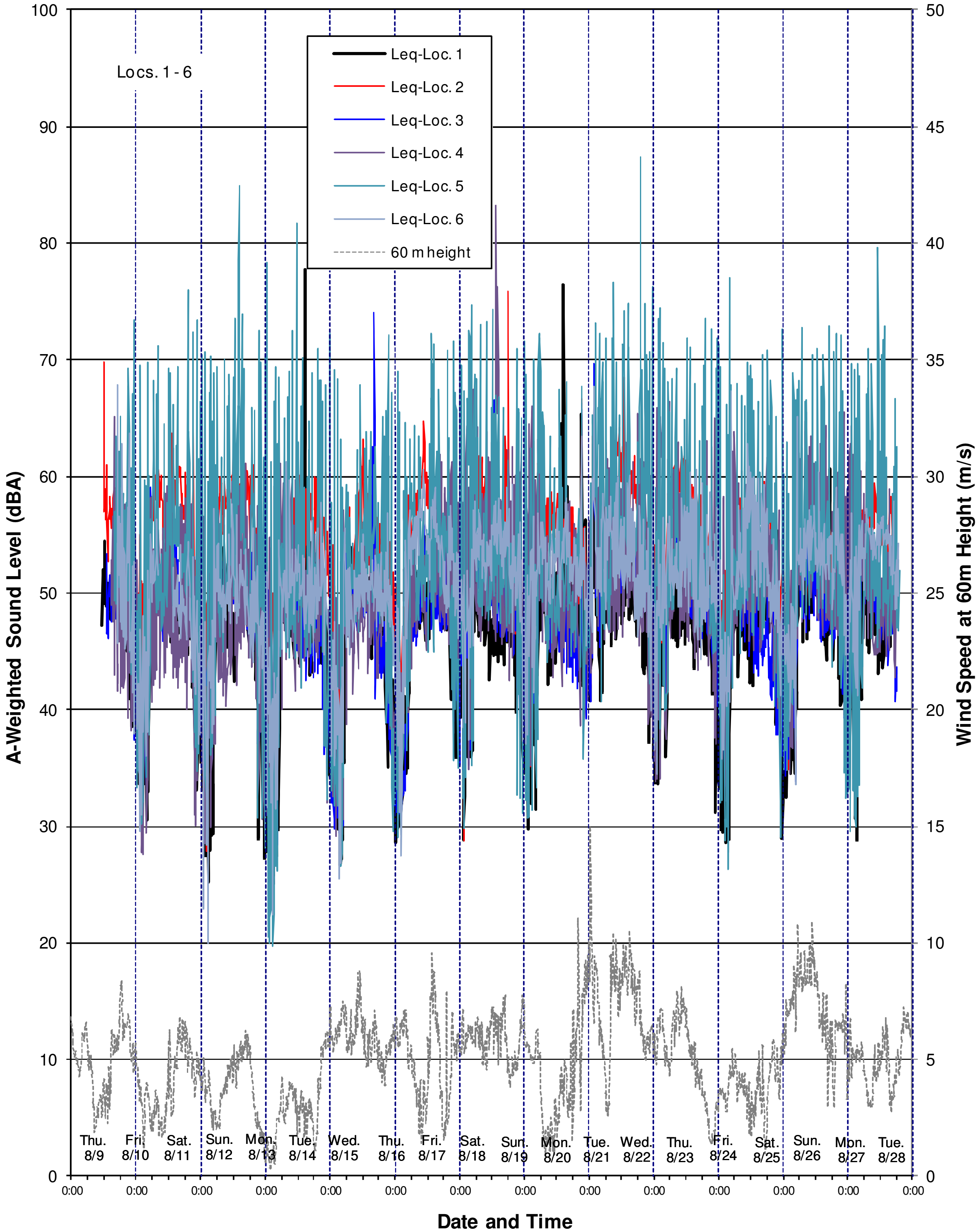


Figure 17.
Average Ambient Sound Levels (Leq, dBA) Measured for Day and Night Periods at Loc. 1 (6/5-17/2013).

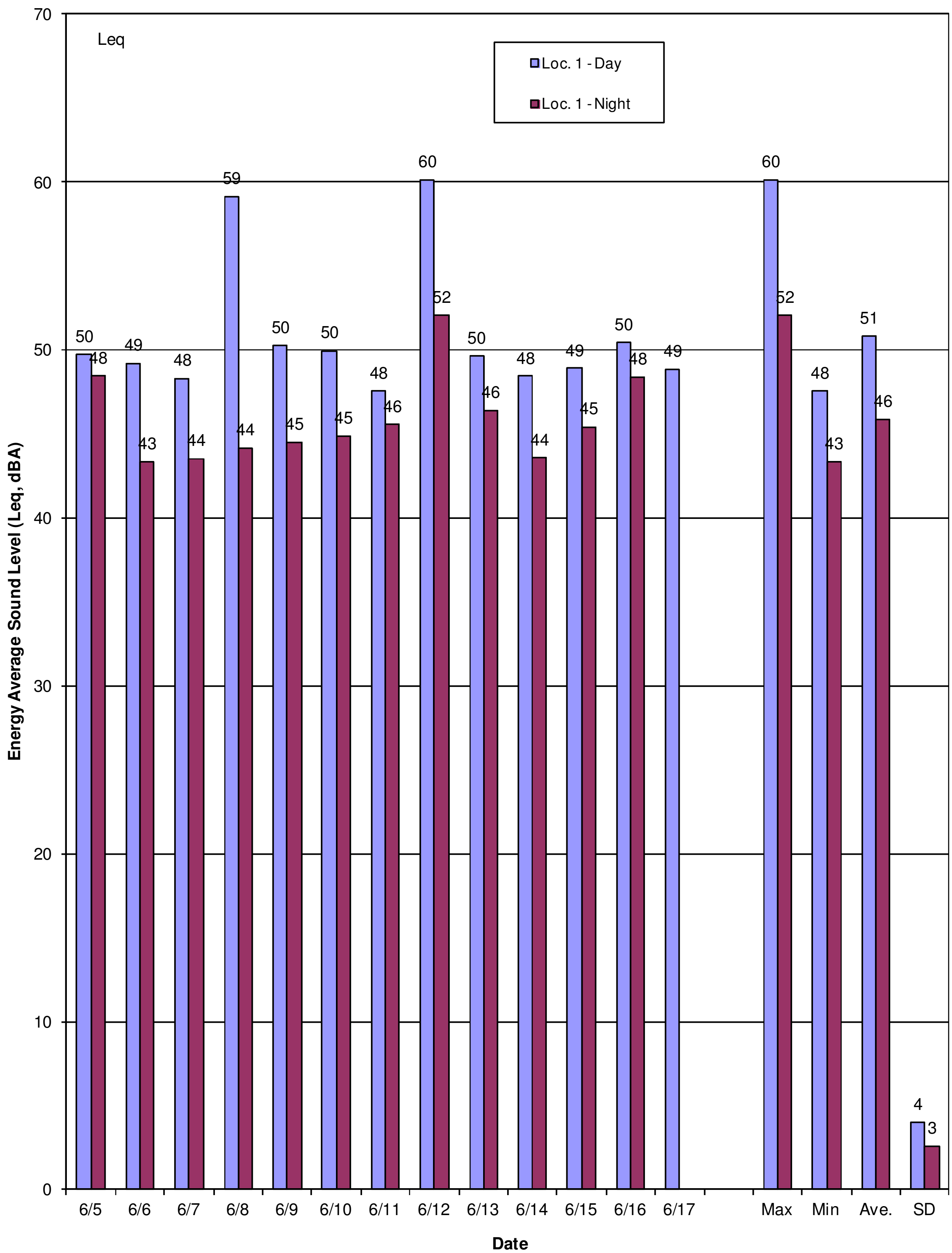


Figure 18.
Average Ambient Sound Levels (Leq, dBA) Measured for Day and Night Periods at Loc. 2 (6/5-17/2013).

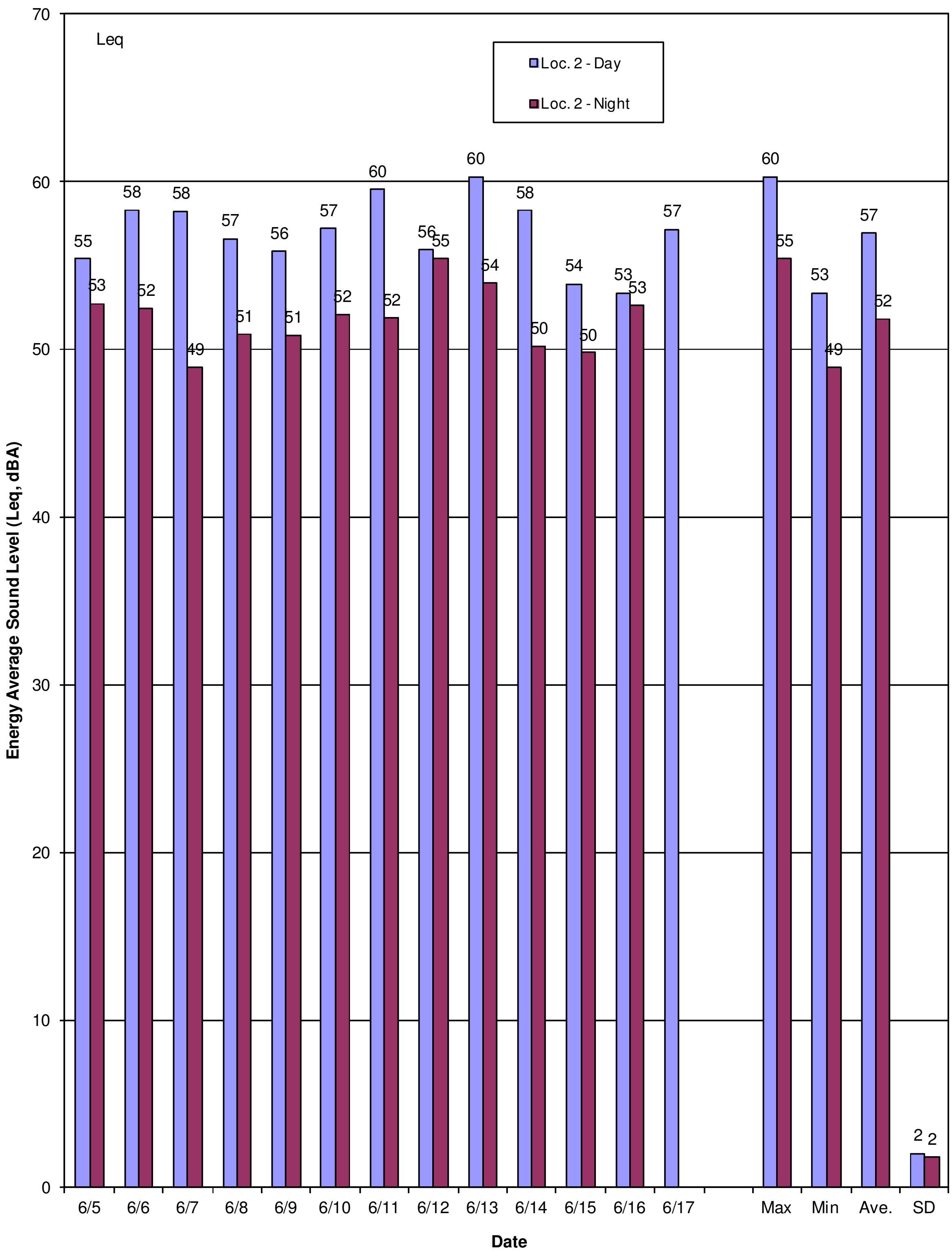


Figure 19.
Average Ambient Sound Levels (Leq, dBA) Measured for Day and Night Periods at Loc. 3 (6/5-17/2013).

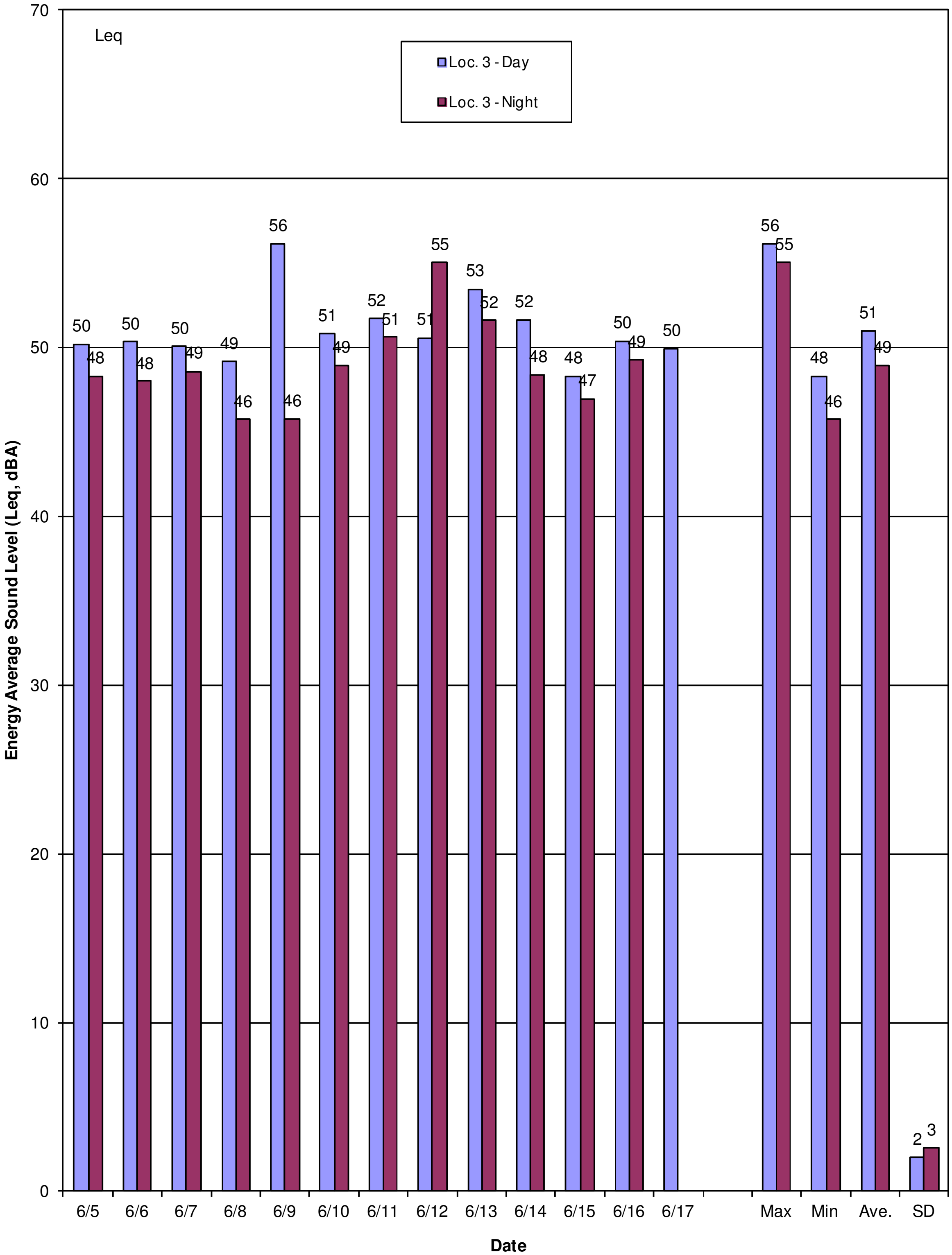


Figure 20.
Average Ambient Sound Levels (Leq, dBA) Measured for Day and Night Periods at Loc. 4 (6/5-17/2013).

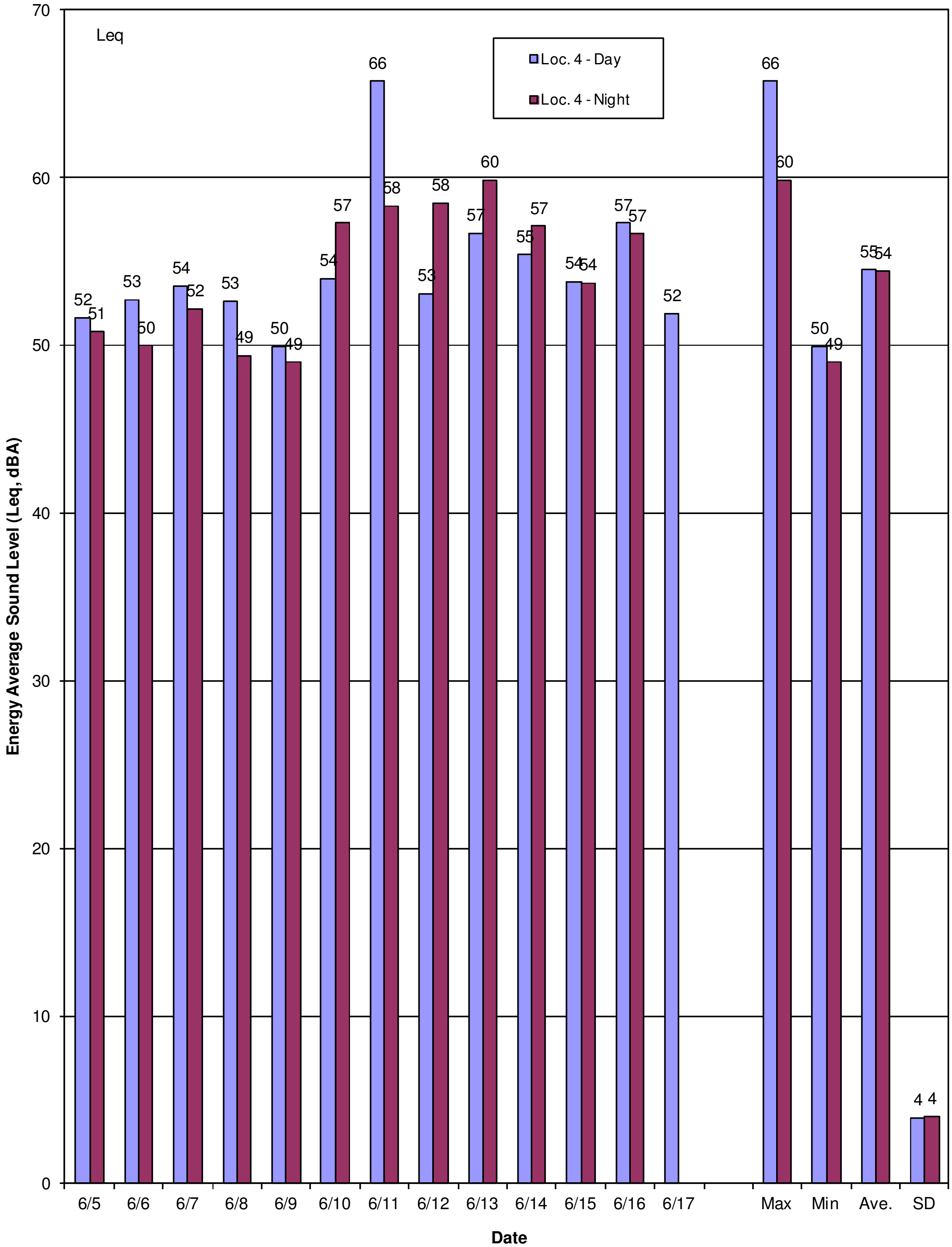


Figure 21.
Average Ambient Sound Levels (Leq, dBA) Measured for Day and Night Periods at Loc. 5 (6/5-17/2013).

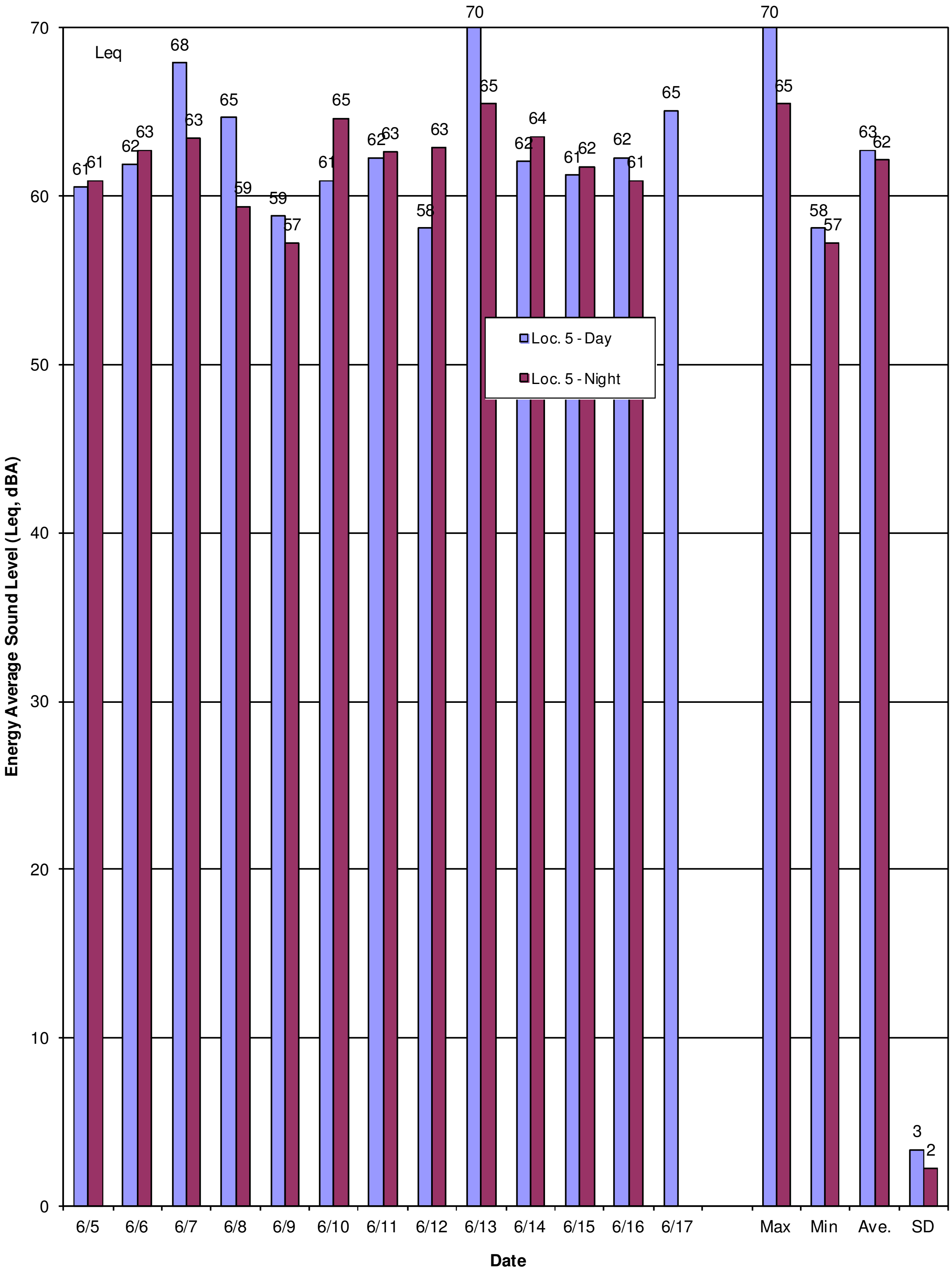


Figure 22.
Average Ambient Sound Levels (Leq, dBA) Measured for Day and Night Periods at Loc. 6 (6/5-17/2013).

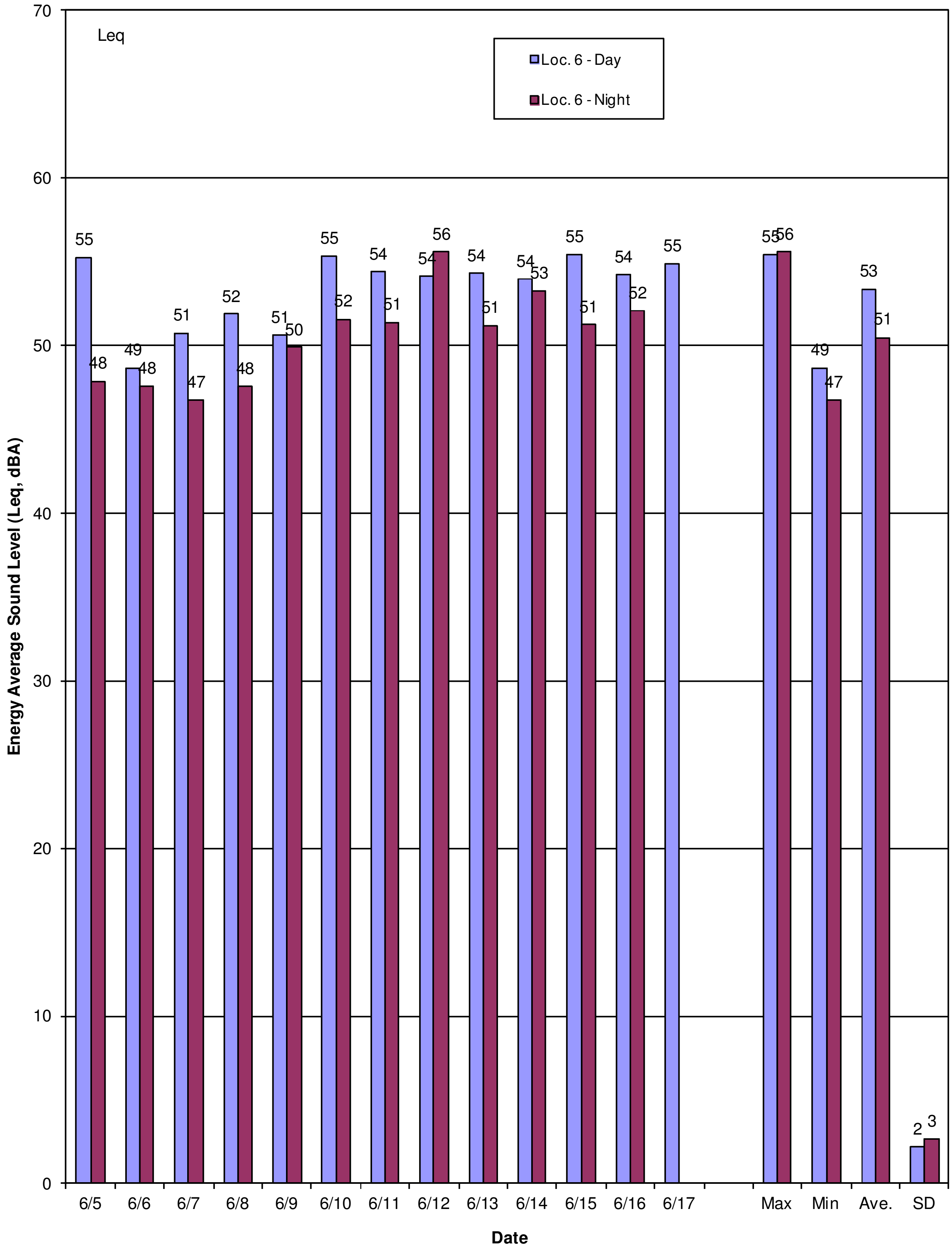


Figure 23.
Comparison of Average Ambient Sound Levels (Leq, dBA) Measured for Day Periods at Locs. 1 to 6 (6/5-17/2013).

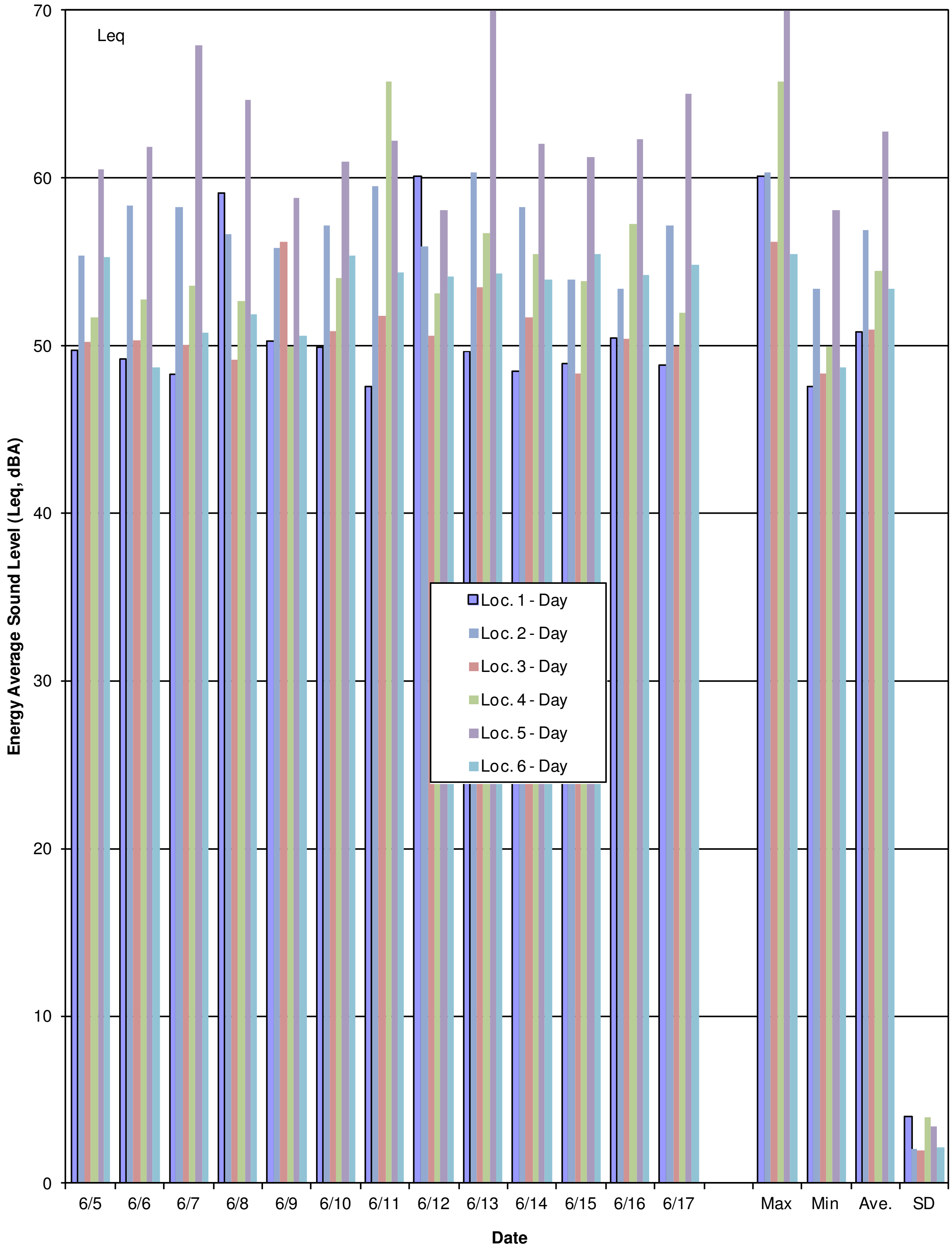


Figure 24.
Comparison of Average Ambient Sound Levels (Leq, dBA) Measured for Night Periods at Locs. 1 to 6 (6/5-17/2013).

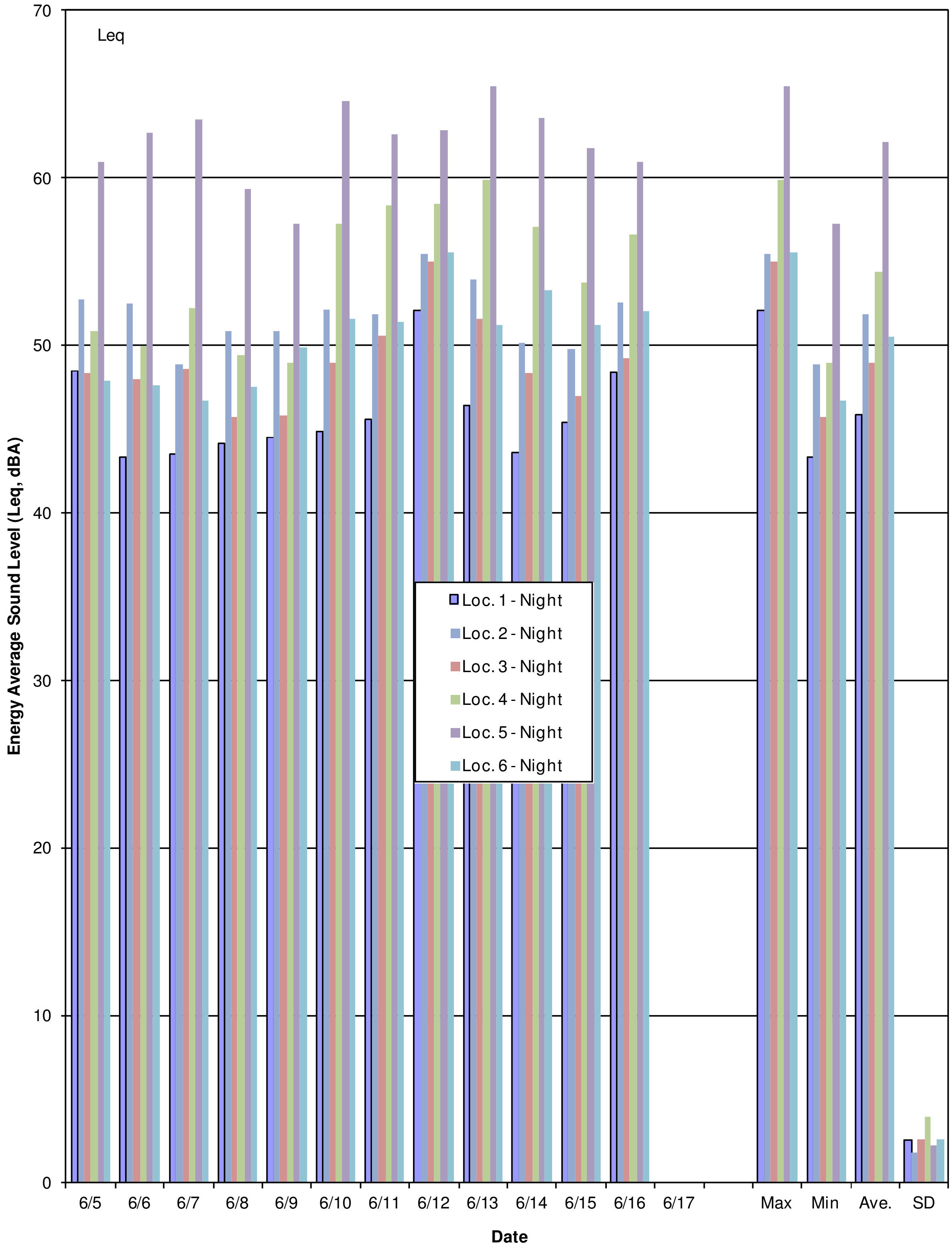


Figure 25.
A-Weighted Leq Sound Levels vs. Wind Speed Measured at 10-Minute Intervals at Locs. 1 to 6 (6/5-17/2013).

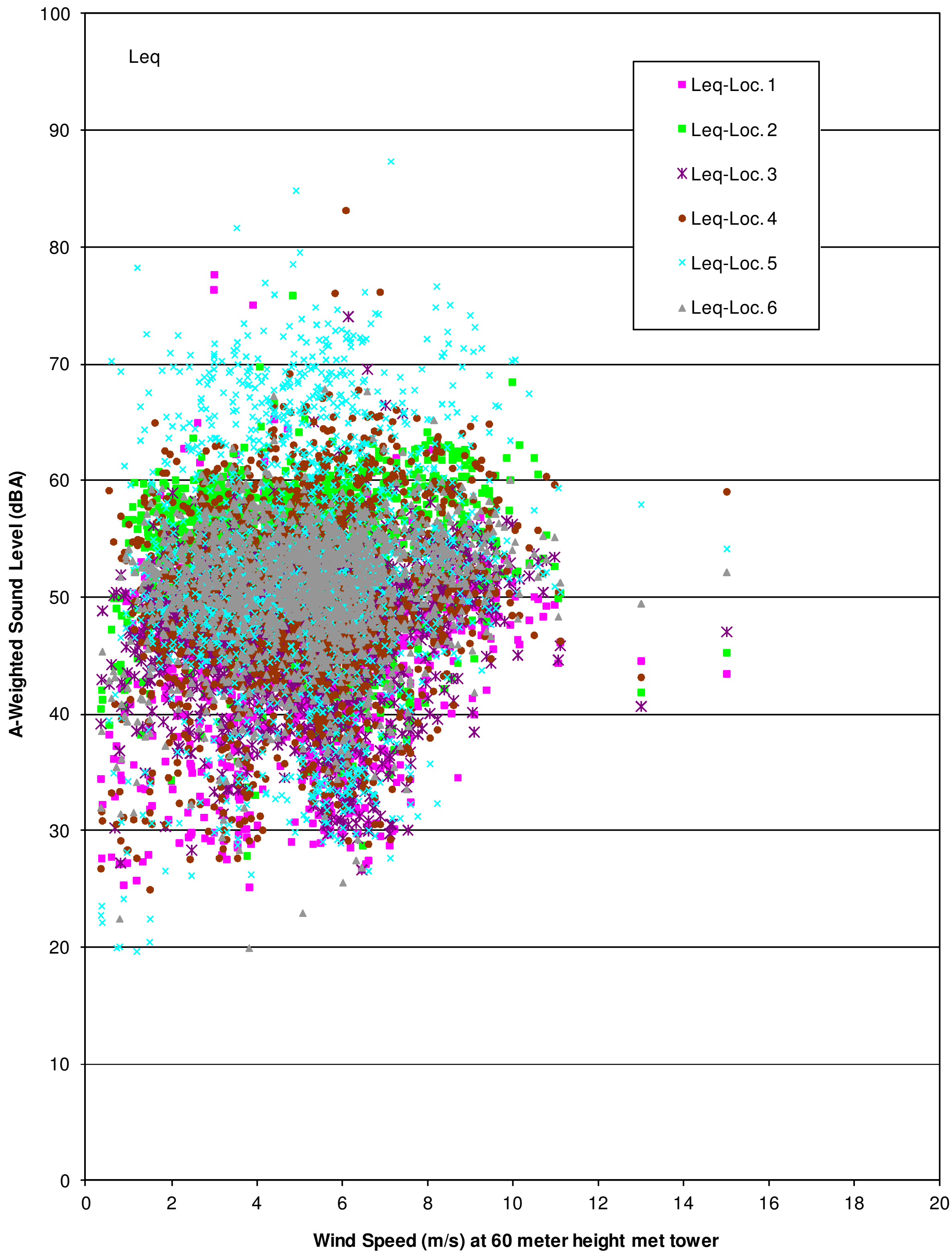
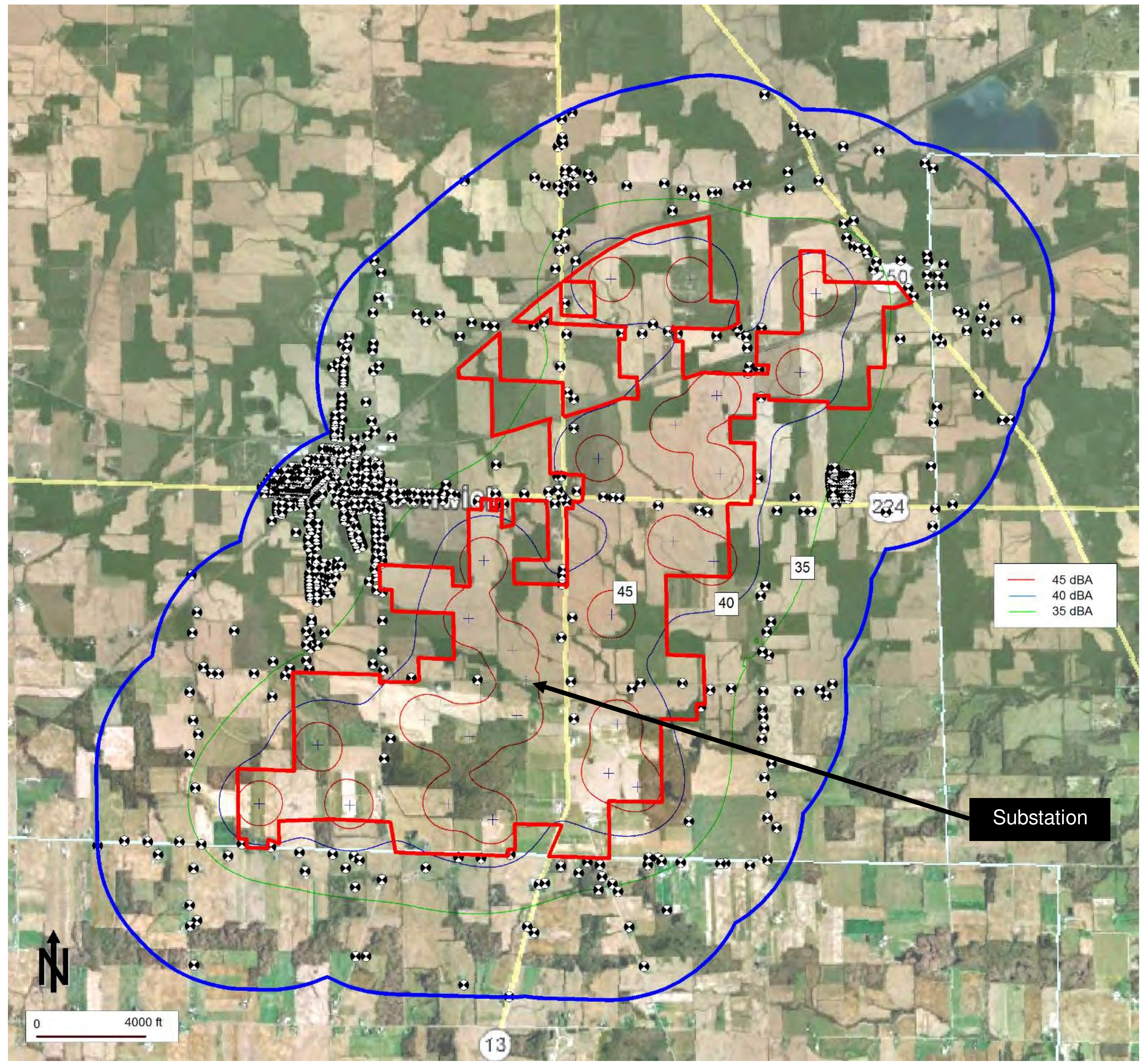


Figure 26.
Layout of Proposed Greenwich Wind Farm with Estimated Operation Sound Level (dBA) Contours for 25 Nordex N117 Turbines.
Project Boundary is Red and One-Mile Project Buffer Boundary is Blue
(Operating condition at max sound output for each Nordex N117 turbine, i.e., A-weighted sound power level of 105 dBA with 7 m/s and greater wind speed at 10 m standard height.)



Note: Contours of operation sound only. Contours do not include contributions of ambient sound.

Figure 27.
Scatter Plot of Estimated Overall Turbine Facility Sound Levels (dBA) vs. Distances (ft) to Nearest Nordex N117 Turbine Hub for Residential Structures within Approximately One-Mile Boundary of Project Site.
(Operating condition at max sound output for each Nordex N117 turbine, i.e., A-weighted sound power level of 105 dBA with 7 m/s and greater wind speed at 10 m standard height.)

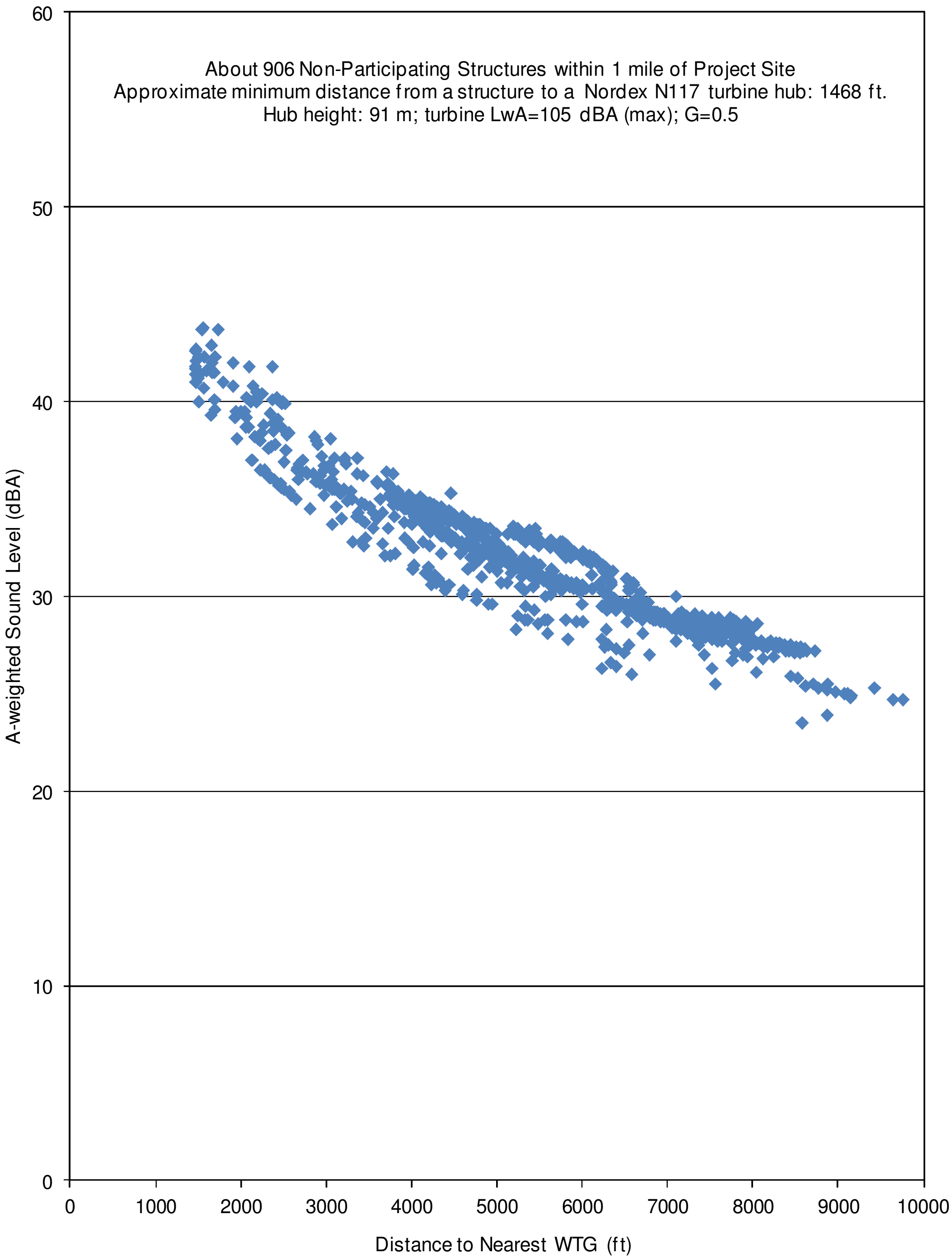


Table 1.
Type of Acoustic Instrumentation Used for Ambient Sound Survey (6/5-17/2013).

Instrument Type	Manufacturer	Model
Continuous Sound Level Monitors	Rion	NL-31 & NL-32
Preamplifiers	Rion	NH-21
½" Microphones	Rion	UC-53A
Acoustic Calibrator	GenRad	1987

Table 2.
Long-Term Average* A-Weighted Leq Sound Levels Measured over Nominal One-Week Ambient Sound Survey (6/5-17/2013).

Location	Sound Level (Leq, dBA)	
	Day (0700-2200)	Night (2200-0700)
1 – Rome Greenwich Rd. South of Plymouth East Rd.	51	46
2 – Rt. 13 South of Rt. 224	57	52
3 – South of Rt. 224 East of Rt. 13	51	49
4 – Alpha Rd. East of Rt. 13	55	54
5 – Alpha Rd. East of RR tracks	63	62
6 – North of Rt. 224 East of Rt. 13	53	51

*Arithmetic average of each day and night's energy average A-weighted sound level.

Table 3.
Long-Term Average* A-Weighted L90 Sound Levels Measured over Nominal One-Week Ambient Sound Survey (6/5-17/2013).

Location	Sound Level (L90, dBA)	
	Day (0700-2200)	Night (2200-0700)
1 – Rome Greenwich Rd. South of Plymouth East Rd.	40	33
2 – Rt. 13 South of Rt. 224	41	33
3 – South of Rt. 224 East of Rt. 13	41	35
4 – Alpha Rd. East of Rt. 13	40	34
5 – Alpha Rd. East of RR tracks	43	35
6 – North of Rt. 224 East of Rt. 13	39	33

*Arithmetic average of all days and nights.

Table 4.
Long-Term Average* Leq C-Weighted Sound Levels Measured over Nominal One-Week Ambient Sound Survey (6/5-17/2013).

Location	Sound Level (Leq, dBC)	
	Day (0700-2200)	Night (2200-0700)
1 – Rome Greenwich Rd. South of Plymouth East Rd.	61	58
2 – Rt. 13 South of Rt. 224	69	63
3 – South of Rt. 224 East of Rt. 13	61	60
4 – Alpha Rd. East of Rt. 13	66	65
5 – Alpha Rd. East of RR tracks	70	70
6 – North of Rt. 224 East of Rt. 13	65	63

*Arithmetic average of each day and night's energy average C-weighted sound level.

Table 5.
Estimated Equivalent A-Weighted Sound Levels* (Leq, dBA) of Representative Construction Equipment at Various Distances.

Equipment	Distance	
	1470 ft	**1 mile**
Phase I – Preparation & Foundation		
Blasting	62**	43**
Pile Driving	61**	42**
Dozer	51	32
Excavator	52	33
Trencher	52	33
Grader	50	31
Roller	47	28
Trucks	46	27
Batch Plant	43	24
Phase II – Erection & Installation		
Trucks	46	27
Crane	52	33
Phase III – Test & Commission		
Trucks	46	27

Note: 1470 ft is the approximate minimum distance from a turbine hub to nearest non-participant residence.

* Estimated Leq sound levels over a 10-hour daytime shift.

** Estimated values for blasting and pile driving are maximum (Lmax) sound levels, not Leq.

Reference: ESEERCO Power Plant Construction Noise Guide, BBN Report No. 3321, May 1977.

Table 6.
Overall A-Weighted Sound Power Levels (LwA, dBA)* for Nordex N117 Wind Turbine Generator (WTG) Source in Operation Model.
(wind speeds at standard 10 m height)

Source	Sound Power Level (dBA)
WTG at 7 m/s to cut-out	105
WTG at 6 m/s	104.5
WTG at 5 m/s	104
WTG at 4 m/s	100
WTG at 3 m/s	97

Table 7.
A-Weighted Octave Band Sound Power Levels (LwA, dBA)* Used for Turbines in Operation Model.

	Octave Band Center Frequency (Hz)									
Source	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**A**
Nordex N117 (≥7 m/s wind at 10 m height)	84.5	84.5	91.4	98.2	100.7	99.2	94.4	86.5	74.7	105

*Nordex K0818_030005_EN Rev02 2011-09-28 with 91 m hub height. The octave sound power levels of the Nordex N117/2400 are determined on basis of aerodynamic calculations and expected sound power levels according to Nordex Document F008_238_A03_EN_R02. These values are valid for the hub height 91 m.

Table 8.
Estimated A-Weighted and C-Weighted Sound Levels for Non-Participant Structures with Estimated A-Weighted Sound Levels Equal to and Greater than 40 dBA during High Wind Conditions for 25 Nordex N117 Turbine Layout. All Residences within Approximately One-Mile Boundary of Project Site.
(Operating condition at max sound output for each Nordex N117 turbine, i.e., A-weighted sound power level of 105 dBA with 7 m/s and greater wind speed at 10 m standard height.)

Acentech ID #	A-Weighted Sound Level (dBA)	C-Weighted Sound Level (dBC)	Latitude X (m)	Longitude Y (m)	Elevation Z (m)	XYZ distance to nearest hub (ft)
1	43.8	65.3	376662.51	4542985.46	330.68	1561
2	43.7	65.4	374139.36	4541059.34	336.78	1735
3	43.7	65.2	376756.11	4542960.66	330.68	1545
4	42.9	64.8	375237.07	4540614.29	345.32	1659
5	42.7	64.5	376192.67	4543038.51	330.68	1475
6	42.6	64.4	373152.61	4540389.87	336.78	1473
7	42.6	64.1	377212.35	4544542.65	318.49	1471
8	42.3	64.2	375214.93	4541767.05	336.78	1504
9	42.3	63.9	377338.69	4544583.99	318.12	1571
10	42.3	63.9	377364.84	4544266.62	318.93	1699
11	42.1	64	375892.99	4540959.9	348.97	1476
12	42	64.1	375095.27	4541542.17	339.43	1912
13	42	63.7	377229.21	4544617.07	318.49	1663
14	41.8	64	375202.73	4541036.84	344.67	2370
15	41.8	63.8	373079.68	4540163.58	336.78	2099
16	41.8	63.8	375568.64	4543139.26	326.32	1470
17	41.7	63.5	377331.25	4543342.32	327.35	1471
18	41.6	63.7	375683.02	4543125.49	326.25	1601
19	41.5	63.6	373388.26	4541075.89	335.24	1665
20	41.5	63.6	375749.48	4543124.12	325.85	1692
21	41.4	63.1	374181.1	4539032.28	352.51	1521
22	41.4	63.2	374512.73	4539079.34	355.07	1468
23	41.2	63.3	375267.87	4543202.18	324.6	1499
24	41	63.3	375991.3	4541022.87	348.97	1796
25	41	62.9	375233.74	4543912.59	318.49	1473
26	40.8	62.7	373921.8	4539045.18	348.97	1909
27	40.8	62.8	377208.36	4544829.84	316.23	2146
28	40.7	62.8	375091.81	4543374.57	323.8	1567
29	40.5	63.1	375100.93	4542143.59	331.5	2182
30	40.4	62.5	376859.43	4544966.69	315.77	2250
31	40.3	62.3	377367.95	4545048.33	313.44	2205
32	40.2	62.3	376416.27	4544994.4	315.95	2069
33	40.2	62.3	377196.69	4544951.9	314.86	2421
34	40.1	62.8	375101.53	4542245.62	330.68	2371
35	40.1	62.5	375050.17	4543372.09	323.87	1693
36	40	62.2	376134.1	4545095.39	315.24	2186
37	40	62.2	376308.8	4545012.61	316.07	2120
38	40	62.2	377126.31	4544990.19	314.34	2492
39	40	61.5	375257.11	4545813.77	309.58	1508