Section 5
Noise

Record Hill Wind LLC (RHW) conducted a sound level assessment in order to enable as-built compliance with Maine Department of Environmental Protection (MDEP) regulatory requirements for sound as set forth in Chapter 375.10 of the MDEP Rules (06-096 CMR 375.10). Included as Appendix 5-1 is a *Sound Level Assessment* by Resource Systems Engineering (RSE). This assessment determines expected sound levels from the project and compares them to the MDEP sound level limits for quiet areas of 45 dBA nighttime and 55 dBA daytime at protected locations.

The majority of protected locations in the Record Hill Wind Project (Project) vicinity are found to the east along Route 17 and to the west along the shore of Roxbury (Ellis) Pond. The Project is bounded to the north and south by undeveloped woodlots. Neither parcel is a protected location. Nevertheless, RHW may elect to negotiate an agreement with these landowners to address sound levels at the parcel boundaries. RHW will supply MDEP with redacted copies of these agreements if and when they are reached.

In an effort to better identify any impact caused by noise generated by the Project, RHW conducted a significant amount of pre-development ambient monitoring to assess existing sound levels surrounding the Project area. The results of this pre-development ambient monitoring are included in the RSE report.

The analysis conducted by RSE is based upon a number of conservative factors, which are input in their model and addressed in their report. Among those conservative factors are the following.

- Utilizing conservative factors for environmental attenuation:
    - specifically mapping the surrounding lakes and ponds as reflective surfaces;
    - excluding potential sound attenuation due to foliage; and
    - assuming only moderate ground absorption.
- Assuming downwind conditions in all directions.
- Adding five dBA to the manufacturer's wind turbine performance specification to account for uncertainty in measurements used to derive turbine sound output.
- Assuming that all turbines are operating simultaneously at continuous full sound output.

The report ultimately concludes that the operation of the Project will not exceed MDEP sound level limits at protected locations during construction or routine operation.

Appendix 5-1

RECORD HILL WIND, LLC
RECORD HILL WIND PROJECT
OXFORD COUNTY
ROXBURY, MAINE

SOUND LEVEL ASSESSMENT

Prepared by:

Resource Systems Engineering
30 Parkers Way, P.O. Box K
Brunswick, Maine 04011-0835
207 725-7896 / Fax 207 729-6245
E-Mail rse@gwi.net

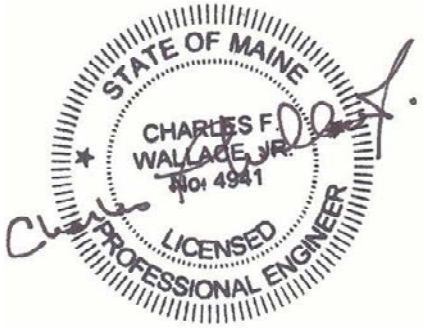
File 070830/2.5.5.2

December 1, 2008

Resource
Systems
Engineering

ACKNOWLEDGMENTS

Resource Systems Engineering (RSE) wishes to acknowledge Record Hill Wind, LLC, Wagner Forest Management Ltd and Stantec Consulting for their contributions to this Sound Level Assessment. RSE personnel responsible for this investigation and report are Charles F. Wallace, Jr., P.E., R. Scott Bodwell, P.E., Tina J. Jones and C. Phillip Botts.



COPYRIGHT

This document is issued for the exclusive use of **Record Hill Wind, LLC** and **Stantec Consulting.** Any use or distribution by others without the written permission of **Resource Systems Engineering** is prohibited. All rights are reserved to **Resource Systems Engineering**.

COPYRIGHT 2008 RESOURCE SYSTEMS ENGINEERING

DISCLAIMER

This document has been prepared in accordance with generally accepted engineering practices associated with environmental acoustics. No other warranty, expressed or implied, is made.

RECORD HILL WIND, LLC
RECORD HILL WIND PROJECT
ROXBURY, OXFORD COUNTY, MAINE
SOUND LEVEL ASSESSMENT

CONTENTS

APPENDICES

LIST OF ACRONYMS

ANSI	American National Standards Institute
dB	Decibel (Unit of Sound Pressure or Sound Power Level)
dBA	Decibel A-weighted
DEP	Maine Department of Environmental Protection
Hz	Hertz (cycles per second)
ISO	International Organization for Standardization
kV	Kilovolt
kVA	Kilo Volt-Ampere
L_{A1}	Sound Level Exceeded 1% of a Measurement Period (dBA)
L_{A10}	Sound Level Exceeded 10% of a Measurement Period (dBA)
L_{A50}	Sound Level Exceeded 50% of a Measurement Period (dBA)
L_{A90}	Sound Level Exceeded 90% of a Measurement Period (dBA)
L_{Aeq}	Equivalent Sound Level
$L_{Aeq\text{-}Hr}$	Hourly Equivalent Sound Level
L_w	Sound Power Level
MW	Megawatts of Electric Power
mph	Miles per hour
MRSA	Maine Revised Statutes Annotated
msl	mean sea level
PDA	Pre-Development Ambient
PL	Receiver Point at a Protected Location
RHW	Record Hill Wind Project
RSE	Resource Systems Engineering
SLM	Sound Level Meter
SDRS	Short Duration Repetitive Sounds
WTG	Wind Turbine Generator

RECORD HILL WIND, LLC
RECORD HILL WIND PROJECT
ROXBURY, OXFORD COUNTY, MAINE

SOUND LEVEL ASSESSMENT

1.0 INTRODUCTION

Resource Systems Engineering (RSE) completed an analysis of sound levels for the Record Hill Wind Project (RHW), a proposed 55 megawatt (MW) wind energy facility to be located in the Town of Roxbury, Oxford County, Maine (see Figure 1-1 Project Site Map). The objectives of the sound assessment were to measure existing (pre-development) ambient sound levels, determine the expected sound levels from routine project operations, compare RHW sound levels with relevant environmental noise standards and compare RHW sound levels with existing sound levels.

Sound levels generated during construction and operation of many types of facilities can be regulated by federal, state, and local noise standards. The Maine Department of Environmental Protection (DEP) regulates noise under authority of the Site Location of Development Law (38 M.R.S.A 481-490). The current DEP noise regulation, Chapter 375.10, *Control of Noise*, was established in November 1989 to protect certain existing land uses, such as residential properties, schools, and recreation areas, from excessive noise levels generated by new or expanded developments.

The following report provides a description of the wind project, land uses in the project vicinity, applicable DEP sound level limits, existing sound levels, sound level estimates for RHW operations, and compares expected future sound levels with existing sound levels. This Sound Level Assessment (Assessment) provides an evaluation of sound levels from construction and operation of the wind turbines. Sound levels from construction and operation of electric collection facilities, the associated substation and the maintenance facility are not addressed. The sound level estimates are compared to DEP sound level limits to demonstrate that the Record Hill Wind Project will meet applicable regulatory limits.

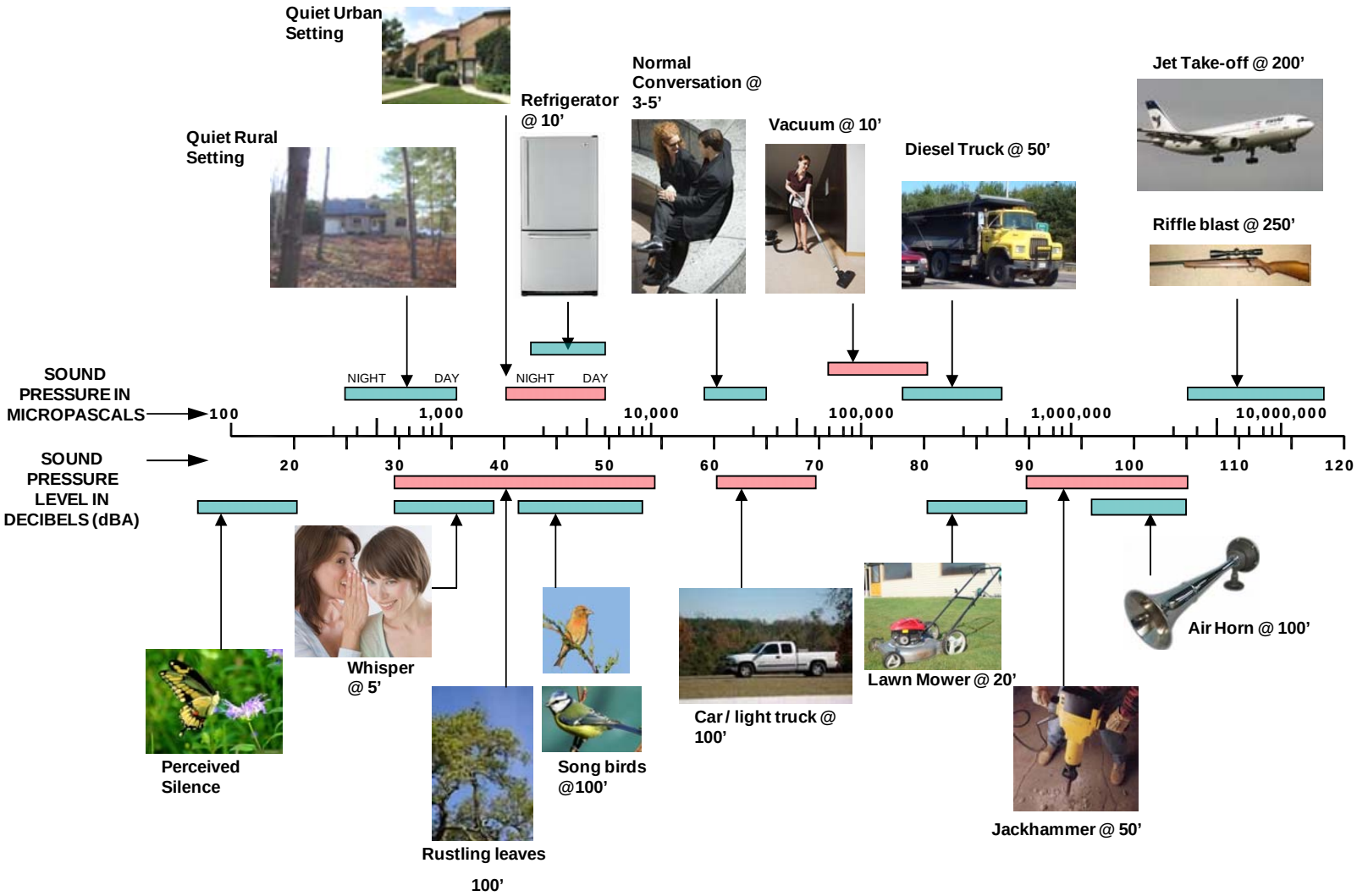
2.0 SOUND AND DECIBELS

Sound is a rapid fluctuation in pressure that the human ear has the potential to detect. The decibel or dB is the unit of measurement for sound. The decibel scale is logarithmic to avoid large unmanageable numbers normally associated with pressure change. Noise is defined by the American National Standard Institute as unwanted sound. Figure 2-1 shows a comparison of sound pressure and decibel levels for some typical sound environments. Further explanation of sound basics can be found in Appendix I.

Figure 1-1
Project Site Map

FIGURE 2-1

RELATION BETWEEN SOUND PRESSURE IN PASCALS AND TYPICAL SOUND PRESSURE LEVELS IN DECIBELS



Compiled by RSE from Multiple Sources Including: RSE measurements; U.S.E.P.A, "Noise from Construction Equipment and Operations, Building Equipment and Home Appliances," Dec. 1971.; Handbook of Acoustical Measurements and Noise Control, Third Edition, edited by C.M. Harris, McGraw-Hill,1991.; "FHWA Highway Traffic Noise Prediction Model," U.S. Dept. of Transportation, Federal Highway Admin, Washington D.C., FHWA-RD-77-108, December 1978.; U.S.E.P.A, "Information on Levels Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety," March 1974.; Handbook of Environmental Acoustics, J.P.Cowan, Van Norstrand Reinhold, 1994.

3.0 NOISE CONTROL STANDARDS AND SOUND LEVEL LIMITS

Noise control standards and sound level limits applicable to RHW are presented in the following sections.

3.1 Noise Control Standards

Relevant noise standards consist of regulations established by the DEP. The DEP Regulation Chapter 375.10, *Control of Noise*, was established in November 1989. The DEP regulation applies hourly sound level limits at facility property boundaries and at nearby *protected locations*. Protected locations are defined as "any location accessible by foot, on a parcel of land containing a residence or approved subdivision.…" Seasonal residences outside the project area are defined as protected locations (ref. DEP 375.10 G 14). In addition to residential parcels, protected locations also include but are not limited to schools, state parks, and designated wilderness areas (ref. DEP 375.10 G 16).

When a development is located in a municipality that has duly enacted a quantifiable noise standard that (1) contains limits that are not higher than the DEP limits by more than 5 dBA, and (2) limits or addresses the types of sounds regulated by the DEP, then the DEP is to apply the local standard rather than the DEP standard. Further, when noise produced by a facility is received in another municipality, the quantifiable noise standards of the other municipality must be taken into consideration (ref. DEP 375.10 B 1). Inquiries to town offices and review of land use ordinances for Roxbury and Byron indicate that no quantitative noise standards have been enacted in either of these municipalities.

DEP sound level limits at protected locations and property lines have been determined for the RHW Project based on landowner agreements, land uses and existing sound levels. Record Hill Wind, LLC is pursuing agreements with local landowners that would exempt the project from sound level limits under the DEP noise regulation. As set forth by DEP 375.10, Section C.5.s, a noise easement exempts the project from DEP limits and remains in effect for the specific noise, parcel of land and term covered by the agreement.

The DEP regulation establishes sound level limits for construction, maintenance, short duration repetitive and tonal sounds as follows:

Construction - Sound from nighttime construction is subject to the same nighttime limits as routine operation. Even though daytime construction limits are contained in DEP Chapter 375.10, normal daytime construction sound levels are exempt from this regulation by Maine Statute (38 M.R.S.A. Section 484). Equipment used in construction must also comply with applicable federal noise regulations and must include environmental noise control devices in proper working condition as originally provided by its manufacturer (ref. DEP 375.10.C.2). Ledge blasting is regulated as part of construction activity.

Maintenance -- Sound from routine, ongoing maintenance activities are considered part of routine operations and subject to the daytime and nighttime limits for routine operation. Sound from occasional, major overhaul activities is regulated as construction activity (ref. DEP 375.10.C.3).

Short Duration Repetitive and Tonal Sounds - When routine operations produce a short duration repetitive or tonal sound, 5 dBA is added to the observed sound levels of these sounds for determining compliance. There is also a maximum sound level (L_{Amax}) limit for certain types of short duration repetitive sounds (ref. DEP 375.10.C.1.d and e).

Table 3-1summarizes the DEP sound level limits.

TABLE 3-1
DEP Sound Level Limits

Location	Daytime Limit (Hourly L_{Aeq})	Nighttime Limit (Hourly L_{Aeq})	Tonal Sounds	Short Duration Repetitive Sounds (SDRS)
Facility Property Line	75 dBA	75 dBA	No 5 dBA assessment	No 5 dBA assessment or L_{Amax} limit
Protected Location zoned Commercial, Industrial or Transportation	70 dBA	60 dBA within 500 feet of sleeping quarters otherwise 70 dBA	5 dBA assessment applies to Tonal Sounds	5 dBA assessment and possible L_{Amax} limit for SDRS
Protected Location zoned Residential, Rural or Similar Land Use	60 dBA	50 dBA within 500 feet of sleeping quarters otherwise 60 dBA	5 dBA assessment applies to Tonal Sounds	5 dBA assessment and possible L_{Amax} limit for SDRS
Quiet Area - Protected Location where existing daytime sound level is 45 dBA and/or less and nighttime sound level is 35 dBA or less	55 dBA	45 dBA within 500 feet of sleeping quarters otherwise 55 dBA	5 dBA assessment applies to Tonal Sounds	5 dBA assessment and possible L_{Amax} limit for SDRS
Noisy Area - Protected Location where existing daytime or nighttime sound level exceeds standard daytime and/or nighttime limits	Pre-development daytime sound level minus 5 dBA (per election of applicant)	Pre-development nighttime sound level minus 5 dBA (per election of applicant)	5 dBA assessment applies to Tonal Sounds	5 dBA assessment and possible L_{Amax} limit for SDRS

Sounds associated with certain activities are exempt from regulation under DEP Chapter 375.10 or by statute. Exempt activities associated with the proposed wind project can include (ref. DEP 375.10.C.5):

- Construction activity during daylight or daytime hours, whichever is longer;
- Emergency maintenance and repairs;
- Snow removal and landscaping;
- Emergency maintenance and repairs;
- Warning signals and alarms;
- Safety and protective devices installed in accordance with code requirements;
- Test operations of emergency equipment occurring in the daytime no more frequently than once per week;
- Major concrete pours that must be extended after 7:00 pm, when started before 3:00 pm; and
- A force majeure event and other causes not reasonably within the control of the owners or operators of the development.

3.2 RWH Sound Level Limits

The most restrictive DEP sound level limit of 45 dBA applies to RHW during nighttime hours (7:00 pm to 7:00 am) at locations on residential parcels that are within 500 feet of a residence. The quiet daytime limit of 55 dBA applies during daytime hours (7:00 am to 7:00 pm) and during all hours at locations on residential parcels that are over 500 feet from a residence. The RHW project must be in compliance with the DEP sound limits applicable to construction, routine operation and routine maintenance.

Figure 3-1 presents a Vicinity Site Plan that shows residential parcels in relation to the RHW project area. Also shown on Figure 3-1 are parcels where the most restrictive sound level limits apply and other points of interest for local landowners. These locations are identified by the symbol PL. Table 3-2 presents a list of the mapped PLs, their approximate distance from the nearest proposed wind turbine and the applicable DEP limits.

Table 3-2
RHW Hourly Sound Level Limits (dBA)

Protected Location [A]	Description	Approximate Distance From Nearest Wind Turbine (ft)	DEP Hourly Limit (dBA)		Limit Basis
			Daytime	Nighttime	
PL1	Northeast of Turbine 1, on the Roxbury/Byron Town Line and Property Line of project	6,000 (1,800 m)	55	55 [B]	Residential Property Line >500 ft from Dwelling
PL2	Northeast of Flathead Mtn. at Property Line and Residential Lot Line	6,800 (2,100 m)	55	55 [B]	Residential Property Line >500 ft from Dwelling
PL3	East of Partridge Peak at Property Line	2,800 (900 m)	55	55 [B]	Residential Property Line >500 ft from Dwelling
PL4	East of Partridge Peak at Property Line	3,100 (1,000 m)	55	45	Residential Property Line within 500 ft of Dwelling
PL5	South of Partridge Peak, Property Line	3,100 (900 m)	55	45	Residential Property Line within 500 ft of Dwelling
PL6	West of Partridge Peak, Property Line	3,500 (1,100 m)	55	55 [B]	Residential Property Line >500 ft from Dwelling
PL7	Southeast Shore of Roxbury Pond, Residential Area	8,100 (2,500 m)	55	45	Residential Property Line within 500 ft of Dwelling
PL8	Southwest Shore of Roxbury Pond, Residential Area	11,500 (3,500 m)	55	45	Residential Property Line within 500 ft of Dwelling
PL9	Northwest of Turbine 1,along the East Shore of Little Roxbury Pond (Residential Area in Byron)	11,300 (3,400 m)	55	45	Residential Property Line within 500 ft of Dwelling

[A] See Figure 3-1, Vicinity Site Plan.
[B] Applies at property boundary and when ≤500 feet to dwelling 45 dBA.

4.0 SITE/PROJECT DESCRIPTION

The Record Hill Wind project will be located in the Town of Roxbury on a north-south ridgeline including the south side of Record Hill, Flathead Mountain, Mine Notch and Partridge Peak. A Project Site Map (Figure 1-1) and Vicinity Site Plan (Figure 3-1) show the proposed wind turbine layout, electric collector lines, substation and maintenance facility in relation to topography and surrounding land uses. Figure 3-1 also shows property boundaries and residences in the vicinity of the project. The area is mountainous terrain with active logging roads and ATV trails throughout. In relation to the proposed wind turbines, Route 17 is to the east, Roxbury Notch Road (Route 120) is to the south, Shore Road and Roxbury Pond are to the west and the Town of Byron and Record Hill peak are to the north. Permanent and seasonal residential properties are located along Route 17, Roxbury Notch Road and Shore Road along Roxbury Pond. There is a concentration of permanent residences in the village of Roxbury along Route 17 and both permanent and seasonal residences along the east and south shores of Roxbury Pond.

Based on aerial photography, field surveys and local tax records, uses in the vicinity of the project consist of undeveloped/forestry land in areas surrounding the proposed turbine sites. Rural residential and seasonal properties are located to the east, south and west of the project area with the nearest residential property (PL3) approximately 2,800 feet to the east of the nearest proposed wind turbine on Partridge Peak. The approximate distance from the proposed wind turbines on Partridge Peak to the nearest residential property (PL5) to the southwest is 3,100 feet. The approximate distance from the proposed wind turbines on Partridge Peak to the nearest residential property (PL6) to the west is 3,500 feet. The approximate distance to the nearest residential property (PL2) in the Roxbury Village area and east of the nearest proposed wind turbine (midway between Record Hill and Flathead Mountain) is 6,800 feet. All of the closest residential properties in the vicinity of the project are located in the Town of Roxbury.

Record Hill Wind, LLC holds a lease with a local landowner to install and operate wind turbines at the proposed locations. Record Hill Wind, LLC is pursuing other agreements with abutting landowners. Parcels for which the developer has a lease, easement or pursuing other agreements in the vicinity of the project are indicated on Figure 3-1.

The majority of the proposed turbine area is presently used for commercial forestry operations and contains developed logging roads. Existing logging roads will be upgraded and used, where appropriate, to minimize clearing and wetland impacts. The project area is also extensively used for recreation including ATV and snowmobile trails and hunting. The proposed turbines will run along a north-south oriented ridgeline with base elevations, above mean sea level (msl), ranging from approximately 2,033 feet on Record Hill at the north end; 2,160 feet midway on Flathead Mountain to 1,970 feet on Partridge Peak to the south. In addition to the turbine structures, the project will include construction of an operations and maintenance facility to the southwest of Partridge Peak and a substation to the southeast of Flathead Mountain.

RHW consists of a 22 turbine array along with its associated electrical interconnection infrastructure and ridgeline meteorological tower. The turbine array is located entirely within the town of Roxbury, Maine. The wind turbine array starts from just south of the Roxbury-Byron town line on Record Hill and extends approximately 3.5 miles south to Partridge Peak. Originally RHW was conceived to include land in the adjoining town of Byron where the ridge continues north to Old Turk Mountain. However, the RHW scope was reduced after the residents of Byron opted not to amend its height ordinance to allow for wind turbines. Access to the ridgeline is proposed to be provided by upgrading and extending existing logging roads from Route 120.

RHW proposes to use Clipper C96 wind turbines (each 2.5 megawatts (MW) capacity) on towers that will place the hub height at 80 meters (262 feet) and have blades that reach heights of about 128 meters (420 feet) above ground level. The total nameplate capacity of RHW will be 55 MW.

Power generated by the turbine array will be collected by 34.5 kilovolt (kV) lines and carried approximately one mile east down the ridge to a collector substation located alongside an existing Central Maine Power transmission line right of way. The voltage will be increased to 115 kV at the collector substation, then transferred to the adjacent Central Maine Power system and ultimately delivered to the New England grid.

5.0 EXISTING SOUND LEVELS

On July 7 to 10, 2008 (Monitoring Period 1) and August 5 to 13, 2008 (Monitoring Period 2), RSE recorded existing (ambient) sound measurements at five monitoring positions in the vicinity of RHW (RH-1 through RH-5 on Figure 3-1). These two periods were selected to represent typical summer conditions. Existing sounds were measured on 13 separate days and recorded 251 hours of total data. Ten-minute average surface wind speeds were equal to or less than 12 mph for all 251 hours. Variable weather conditions and instrument limitations dictated measurements during two separate periods in order to obtain sufficient data to adequately characterize existing sound levels. Of the 251 hours measured, analysis indicated the utility of over 200 hours of data. Total measurements exceeded the data required to comply with the DEP protocol

for measuring ambient sounds. DEP requires 120 hours of measurements to be recorded during 24-hour periods when the ground level wind speeds are equal to or less than 12 mph at the surface level near the sound level meter and there is no measureable precipitation during the measurements (ref. DEP 375.10 H 3.1). DEP also requires that measurements be recorded on three weekdays and two weekend days when operations will be 24 hours per day and 7 days per week.

Referring to the Vicinity Site Plan (Figure 3-1), existing (ambient) sound levels were measured at five community positions in the vicinity of RHW. All the measurement positions were selected to represent existing sound levels within 500 feet of nearby dwellings as follows:

Position	Description
RH-1	Located in a field near a residential property on Roxbury Road (Route 17). Position RH-1 represents ambient sound levels at the nearest residential property east of RHW in the village area. RH-1 is approximately 402 ft. above msl, approximately 320 ft. west of the centerline of Route 17, located within 250 ft. of a nearby dwelling and 7,500 ft from the nearest proposed wind turbine. RH-1 is farther from Route 17 than the nearest dwelling.
RH-2	Located east of Partridge Peak. Position RH-2 represents the ambient sound levels at protected locations, east of the south end of the proposed turbine array and north of Roxbury Notch Road. RH-2 is approximately 962 ft. above msl, 1,100 ft. north of the centerline of Roxbury Notch Road (Route 120) and 4,500 ft. east of the nearest proposed wind turbine on Partridge Peak. RH-2 is approximately 750 feet farther from the road and 550 ft. farther from a mountain stream than the nearest dwelling. As a result, RH-2 would tend to understate the existing sounds at the nearby dwellings.
RH-3	Located southwest of Partridge Peak. Position RH-3 represents ambient sound levels at protected locations south of the wind project along Roxbury Notch Road. RH-3 is approximately 1300 ft. above msl, 530 ft. north of the centerline of Roxbury Notch Road, 3,400 ft. from the nearest proposed wind turbine on Partridge Peak, and within 450 ft. of a nearby dwelling.
RH-4	Located at the Public Boat Launch facility on Roxbury Pond. Position RH-4 represents ambient sound levels at residential properties west of the proposed wind project along the east shore of Roxbury Pond. RH-4 is approximately 790 ft. above msl, 350 ft. west of the centerline of Shore Road, 30 ft. from the nearest dwelling and 7,500 ft. from the nearest proposed wind turbine.
RH-5	Located in a former log yard. Position RH-5 represents ambient sound levels at the nearest residential properties west of the RHW turbine array between Record Hill and Flathead Mountain. RH-5 is approximately 1,100 ft. above msl, 1,600 ft. east of the centerline of Shore Road, 400 ft. from the nearest dwelling and 6,000 ft. from the nearest proposed wind turbine.

Weather conditions were measured simultaneously with sound levels using a combination of permanent meteorological stations on the ridge top and portable stations at the tree top and ground surface levels. Portable stations were co-located with sound meters. The following subsections present instrumentation used and measurement procedures. Ambient results are presented in Section 6.

5.1 Instrumentation and Calibration

Sound levels were recorded using tripod-mounted sound level meters equipped with a microphone and windscreen recommended by the meter's manufacturer. The sound level meters meet Type 1 (precision) performance requirements of American National Standard Institute, ANSI S1.4: *Specifications for Sound Level Meters*. Although the specified accuracy varies by octave band frequency, the overall accuracy for measurement of A-weighted broadband sound is generally considered to be plus or minus 1.5 dBA for Type 1 meters. The microphones were fitted with standard windscreens and mounted on tripods at a height of five feet above the ground. The sound level meters were calibrated before and after each monitoring period using a Bruel & Kjaer 4231 Sound Level Calibrator. Additionally, a certified laboratory performs a calibration within 12 months of the measurements. Calibration certificates are available upon request.

Sound equipment deployed included Larson-Davis Model 812 Integrating Sound Level Meters, Larson-Davis Model 824 Sound Level Meter and Real Time Analyzers, and CEL Model 593 Sound Level

Analyzer. Three meteorological stations were co-located on one fixed tower near the ridge top of Flathead Mountain. The fixed stations recorded weather conditions at 30, 40 and 50 meter heights. The fixed station measurements were used to compute wind speeds expected at the turbine hub height. Portable weather instrumentation included one Casella NOMAD weather station and six HOBO Micro Stations. Portable stations measured weather conditions at the ground surface level (2 to 3 meters above grade) and tree top levels (10 to 15 meters above grade). HOBO Micro Stations were co-located in close proximity to sound meters and mounted on field-erected masts. A Kestrel 2500 hand held wind meter was used to spot check surface winds near sound meters during periodic observations. Maps provided by Stantec and a hand-held Garmin Rhino Model 530HCX were used to locate the monitoring positions. Video and still cameras were used to supplement observations and record monitoring position placement. Table 5-1 provides a listing of portable equipment used during the measurement of existing conditions.

Table 5-1
Instrumentation

July 7 to 10, 2008 (Monitoring Period 1)			
Monitoring Position	Model Number	Serial number	Notes
RH-1	LD824	3395	
RH-2	LD812	0473	
RH-2	LD824	0646	Co-located
RH-3	LD812	A0528	
RH-4	LD812	A0549	
RH-5	CEL593	20281317	
RH-1	NOMAD met	47090	7/7-7/9/08
RH-5	NOMAD met	47090	7/9-7/10/08
August 5 to 13, 2008 (Monitoring Period 2)			
Monitoring Position	Model Number	Serial number	
RH-1	LD812	0473	
RH-1	LD824	3395	Co-located
RH-2	LD812	A0526	
RH-3	LD812	0308	
RH-4	LD812	A0549	8/8-8/13/08
RH-5	LD812	A0549	8/5-8/8/08
RH-5	LD824	0646	8/8-8/13/08
RH-1	HOBO met (2)		Stantec's
RH-2	HOBO met (2)		Stantec's
RH-5	HOBO met (2)		Stantec's

5.2 Measurement Procedures

Measurements were taken in accordance with MDEP Chapter 375.10 H (3.1), Pre-Development Ambient Sound. Continuous measurements were recorded for two monitoring periods as previously described. Periods of rain and high winds required that measurement periods be extended to ensure weather conditions suitable for data analysis that would be generally consistent with applicable DEP and ANSI standards. Data used for analysis excluded periods of rain and sustained events with unusually high sound levels. All measured wind speed data at the surface and tree top levels were at or below 12 mph for all 251 hours during sound level measurements. Measurements and observations were conducted in accordance with a written field plan by personnel well qualified by training and experience in measurement and evaluation of environmental sound. Monitoring positions, shown on the Vicinity Site Plan (Figure 3-1), were selected based on aerial photography, local knowledge of Wagner Forest Management personnel and field observations to represent ambient conditions at nearby residential parcels and RHW property lines. Periodic observations and meter checks were performed at all monitoring positions during daytime and nighttime hours. Sound sources were noted during observation periods. Weather conditions were noted during observations including wind speed measurements using a handheld Kestrel 2500 anemometer. A digital video camera was periodically used to record activity during observations. A digital still camera was used

to photograph each monitoring position and record the local surroundings. Observation watches and all instrumentation clocks were time synchronized before the start of each monitoring period.

For Monitoring Period 1 (4 days and nights from July 7 to 10, 2008), sound recording instrumentation consisted of three Larson-Davis Model 812 Integrating Sound Level Meters, which were programmed to measure sound levels continuously and calculate statistics at both ten-minute and thirty-second intervals. The LD812s were located at RH-2, RH-3 and RH-4. Two Larson-Davis Model 824 Sound Level Meter and Real Time Analyzers were programmed to measure sound levels continuously, including one-third octave band data, and calculate statistics at both ten-minute and thirty-second intervals. The LD824s were located at RH-1 and co-located at RH-2. One CEL593 Sound Level Analyzer was programmed to measure sound levels continuously, including one-third octave band measurements, and calculate statistics at 10-minute intervals. The CEL593 was located at RH-5.

A single NOMAD portable meteorological (met) station measured and recorded wind speed, direction, temperature and relative humidity in close proximity to the sound meters. The NOMAD measured surface conditions at 15-second intervals at 2 meters above ground level. The NOMAD was located on the east side of the ridgeline in an open field near RH-1 from July 7 at 1230 through July 9 at 0823. To obtain surface winds west of the ridgeline, the NOMAD was re-located to an open area of a former log yard at RH-5 from July 9 at 0912 through July 10 at 1450. A fixed tower with three co-located met stations was located on Flathead Mountain (Figure 1-1). The fixed station was programmed to record data at heights of 40, 50 and 60 meters (131, 164 and 196 feet) above ground level. The ground elevation at the fixed met station is 652 meters (2155 feet) above mean sea level. The fixed met station recorded data at 10-minute intervals. Data from the three met stations co-located on the fixed tower were used to estimate hub height wind speed and the turbine power output that could be expected for weather conditions that occurred during the ambient sound level measurements.

For Monitoring Period 2 (7 days and nights from August 5 to 13, 2008), sound recording instrumentation consisted of four Larson-Davis Model 812 Integrating Sound Level Meters, which were programmed to measure sound levels continuously and calculate statistics at both ten-minute and thirty-second intervals. The LD812s were located at RH-1 (August 5 to 13, 2008), RH-2 (August 5 to 13, 200), RH-3 (August 8 to 13, 2008), RH-4 (August 8 to 13, 2008), and RH-5 (August 5 to 8, 2008). Two Larson- Davis Model 824 Sound Level Meter and Real Time Analyzers were programmed to measure sound levels continuously, including one-third octave band data, and calculate statistics at both ten-minute and thirty-second intervals. The LD824s were located at RH-1 (co-located with the LD812 from August 8 to 13, 2008) and RH-5 (August 8 to 13, 2008).

Observations and limited wind data during Monitoring Period 1indicated the likely variability between surface and tree top winds at different sound monitoring positions. Observations and preliminary analysis of Monitoring Period 1 data also indicated that even light wind near the ground surface and in the trees significantly affected existing ambient sound levels. To help determine the relationship between ground and tree top wind, the single NOMAD was replaced by three met stations with six HOBO met data loggers, two each at monitoring positions RH-1, RH-2 and RH-5. The HOBO met stations measured weather data at position RH-1 approximately 6 feet (2 meters) above ground (752 feet above msl) and approximately 50 feet (15 meters) above ground (798 feet above msl); RH-2 approximately 10 feet (3 meters) above ground (992 feet above msl) and approximately 50 feet (15 meters) above ground (1036 feet above msl) and RH-5 approximately 10 feet (3 meters) above ground (1065 feet above msl) and approximately 40 feet (12 meters) above ground (1095 feet above msl). The height of the upper HOBO station varied among the positions as necessary to provide met data at tree top levels. Tree top levels varied by monitoring position. The HOBO met stations recorded data at 10-minute intervals to correlate with sound level measurements and ridge top winds. The HOBO met stations also recorded wind gusts as the highest three second wind speed that occurred during any single ten minute averaging period. The same fixed tower and met stations located on Flathead Mountain during Monitoring Period 1 were also used in Monitoring Period 2 and provided data at 10-minute intervals. Fixed met station data were used to estimate hub height wind speed that could be

expected for weather conditions that occurred during the ambient sound level measurements. These data could also be used to estimate the turbine power output for these wind speeds.

6.0 AMBIENT SOUND LEVEL RESULTS

This section presents the results of measuring existing sound levels at five monitoring positions during two monitoring periods. Monitoring positions are shown on Figure 3-1. Wind data collected during these periods is also presented. As used here, surface wind refers to wind measured at 2 to 3 meters above ground level. Wind roses present daily wind speeds and direction for surface winds. Each wedge represents wind direction and the segments of the wedge represent wind speed (mph). The black line running from the center of the diagram to the outer edge represents the mean angle of the data and the arcs extending to either side represent the 95% confidence limits of the wind direction.

6.1 Ambient Monitoring Period 1

On July 7 to 10, 2008, ambient sound levels were measured simultaneously for approximately 73 hours at the five monitoring positions in the vicinity of RHW.

Temperatures ranged from 52 to 90 degrees F and relative humidity ranged from 39% to 100%. At RH-1 surface winds were sampled every 15-seconds; from July 7 through July 9 wind speeds were 0 to 11 mph mostly from the north and northwest. At RH-5 surface winds were sampled every 15-seconds; from July 9 through July 10 wind speeds were 0 to 10 mph mostly from the northeast. Skies were mostly clear during the day and night except for brief rain showers on July 8 from approximately 1930 to 2000 and on July 9 from approximately 1700 to 1745. Ridge top wind speeds were 0 to 32 mph averaged over 10-minute periods and were mostly from the north and northwest.

Figures 6-1 through 6-5 present ambient 10-minute L_{Aeq} and L_{A90} values for each measurement position in relation to surface wind, hub height wind and estimated total wind project electrical power output. The L_{Aeq} represents the average energy level of all sounds present during the measurement period. The L_{A90} is the sound level exceeded 90% of the time during the measurement period. These figures show the full range of RHW sounds expected from wind turbine operations at the respective monitoring positions. RHW operating sound levels are discussed in Section 7. Wind roses are also presented on Figures 6-1 through 6-5, showing the distribution of surface wind speeds, directions, means and confidence intervals for each day.

Ambient sound level measurements recorded in the vicinity of the RHW site and photos of each position are presented in Appendix II. The measurements include hourly L_{Aeq}, L_{A10}, L_{A50}, L_{A90}, L_{Amin} and L_{Amax} values for each measurement position. The hourly L_{Aeq} is the parameter specified by the DEP for establishing pre-development ambient sound levels and for compliance determinations. L_{A10} is the sound level exceeded 10% of the time during the measurement period. Likewise, L_{A50} and L_{A90} are the sound levels exceeded 50% and 90% of the time during the measurement period. Appendix II includes graphs that plot the measured sound levels in relation to surface, estimated hub height (80 meters) wind speeds and range of estimated wind turbine sound levels.

The following hourly ranges and averages of L_{Aeq}s do not include periods of observed rain and possible rain indicated by data recorded at Berlin Airport or time periods of sustained events with unusually high sound levels. Even during rain events surface winds were less than 12 mph.

At position RH-1during DEP daytime hours (7:00 a.m. to 7:00 p.m.), hourly L_{Aeq}s ranged from 42 to 61 dBA with an average of 49 dBA. During DEP nighttime hours (7:00 p.m. to 7:00 a.m.), hourly L_{Aeq}s ranged from 36 to 56 dBA with an average of 45 dBA. Prominent sound sources observed at position RH-1 during daytime hours included residential activity, traffic on Route 17, and birds. Prominent sound sources noted during nighttime hours were traffic on Route 17, frogs, insects and wind in trees.

At position RH-2, daytime hourly L_{Aeq}s ranged from 34 to 51 dBA with an average L_{Aeq} of 41 dBA. Nighttime hourly L_{Aeq}s ranged from 28 to 48 dBA with an average L_{Aeq} of 36 dBA. Prominent sound sources observed at position RH-2 during daytime hours included residential activity, traffic on Route 120, birds, wind in trees and rustling leaves. Prominent sound sources noted during nighttime hours included traffic on Route 120, an easterly flowing mountain stream to the south of RH-2, wind in trees, dogs barking, birds and frogs.

At position RH-3, daytime hourly L_{Aeq}s ranged from 38 to 62 dBA with an average L_{Aeq} of 43 dBA. Nighttime hourly L_{Aeq}s ranged from 34 to 58 dBA with an average L_{Aeq} of 40 dBA. Prominent sound sources observed at position RH-3 during daytime hours included birds, a westerly flowing mountain stream to the north and south of RH-3 and rustling leaves. During nighttime hours prominent sound sources noted included traffic, rustling leaves, the stream, and water dripping from trees, and birds at daybreak.

At position RH-4, daytime hourly L_{Aeq}s ranged from 39 to 87 dBA with an average L_{Aeq} of 52 dBA. Observations indicate substantial beach activity and ATVs were operating on and in the vicinity of the Public Boat Launch when the high end of the sound level range was recorded. Nighttime hourly L_{Aeq}s ranged from 26 to 53 dBA with an average L_{Aeq} of 39 dBA. Prominent sound sources observed at position RH-4 during daytime hours included activity from the boat launch and the beach, ATVs on the boat launch and on Shore Road, traffic on Shore Road and residential activity. Prominent sound sources noted during nighttime hours included residential activity, owls, frogs and waves from Roxbury Pond.

At position RH-5, hourly daytime L_{Aeq}s ranged from 35 to 47 dBA with an average L_{Aeq} of 40 dBA. Nighttime hourly L_{Aeq}s ranged from 30 to 50 dBA with an average L_{Aeq} of 36 dBA. Prominent sound sources observed at position RH-5 during daytime hours included rustling leaves and birds. Prominent sound sources noted during nighttime hours included distant traffic, rusting leaves and birds at daybreak.

A summary of ambient daytime and nighttime hourly sound levels is presented in Table 6-1. Table 6-1 includes the range of daytime and nighttime hourly L_{Aeq} sound levels and the average daytime and nighttime hourly L_{Aeq} at each position.

Table 6-1
Ambient Daytime and Nighttime Sound Levels (dBA)
July 7 to 10, 2008

Monitoring Position	Range of Hourly L_{Aeq}s		Average Hourly L_{Aeq}	
	Daytime 7 am to 7pm	Nighttime 7 pm to 7 am	Daytime 7 am to 7pm	Nighttime 7 pm to 7 am
RH-1	42 to 61	36 to 56	49	45
RH-2	34 to 51	28 to 48	41	36
RH-3	38 to 62	34 to 58	43	40
RH-4	39 to 87	26 to 53	52	39
RH-5	35 to 47	30 to 50	40	36

Figure 6-1

Record Hill Wind (RH-1 LD824)
Pre-Development Ambient Ten Minute Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008

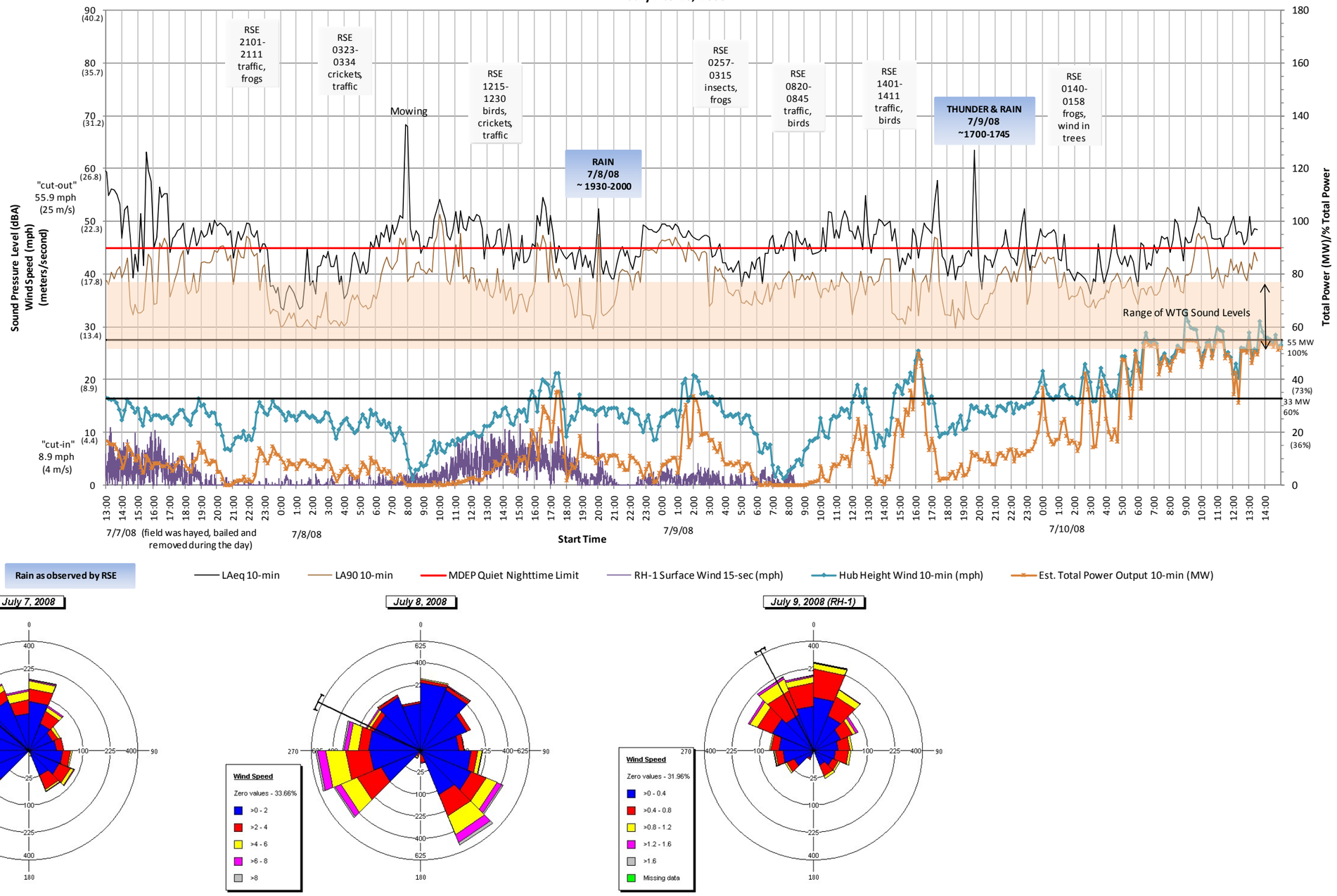
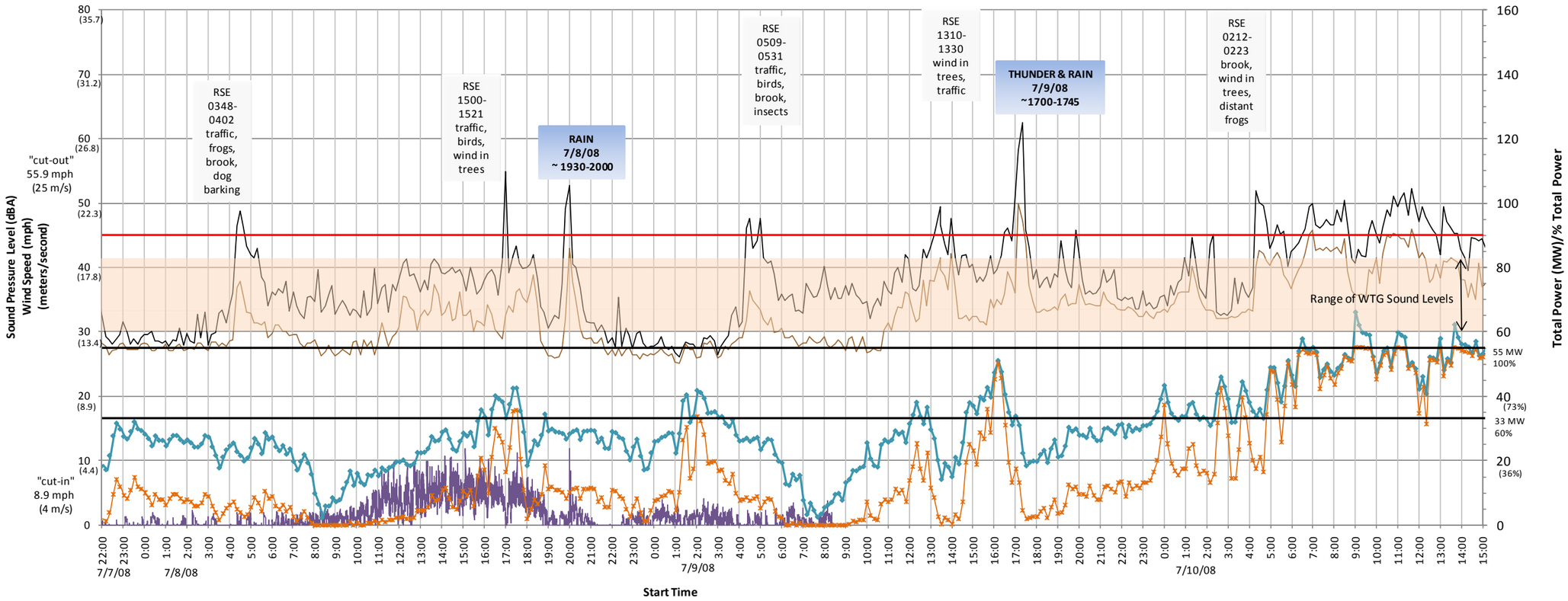
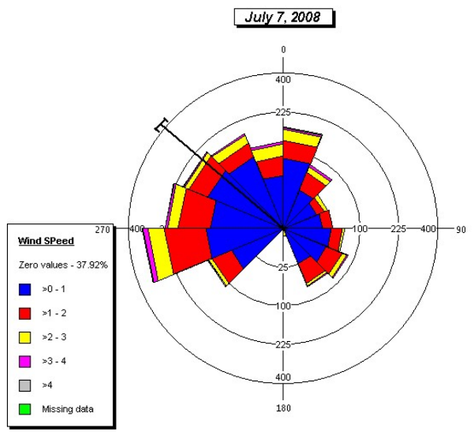
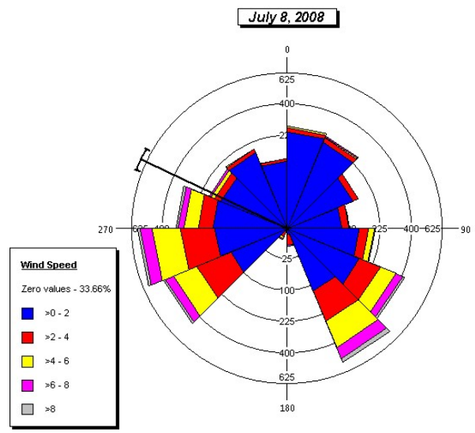


Figure 6-2

Record Hill Wind (RH-2 LD812)
Pre-Development Ambient Ten Minute Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008







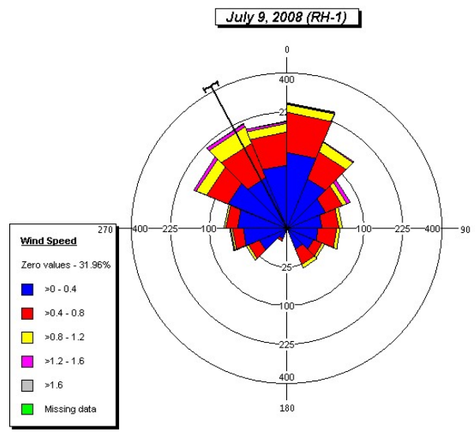


Figure 6-3

Record Hill Wind (RH-3 LD812)
Pre-Development Ambient Ten Minute Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008

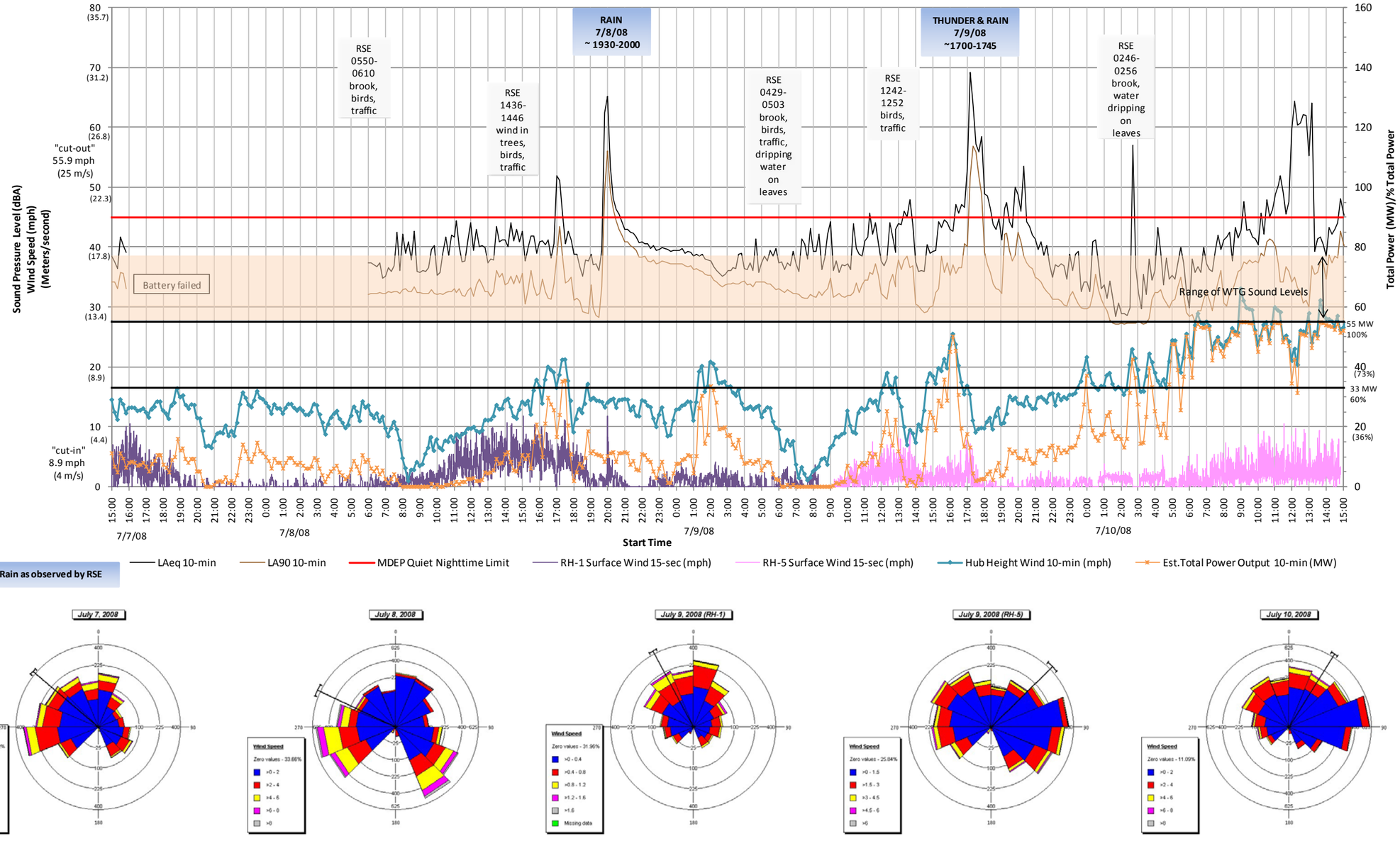


Figure 6-4
Record Hill Wind (RH-4)
Pre-Development Ambient Ten Minute Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008

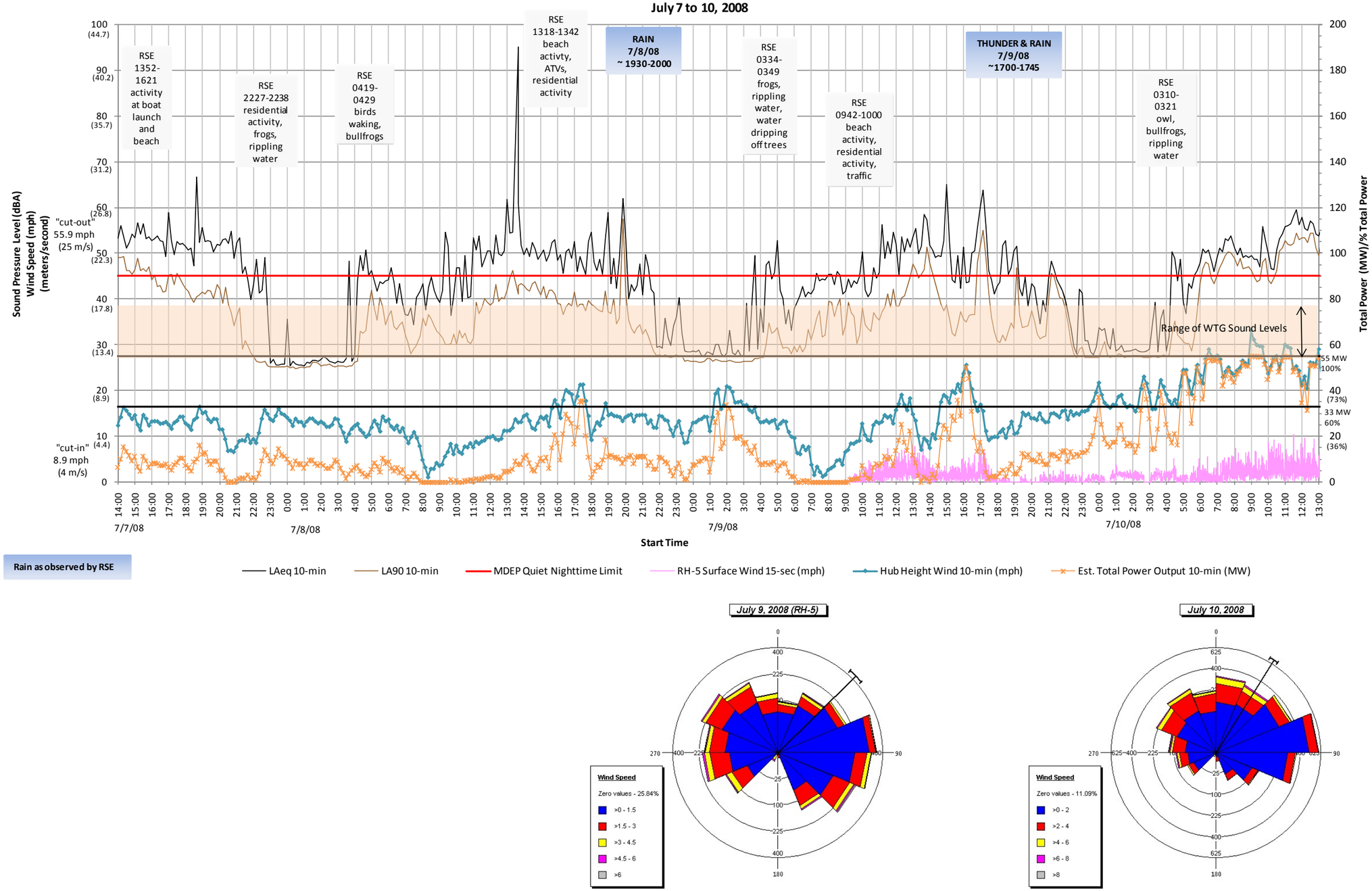
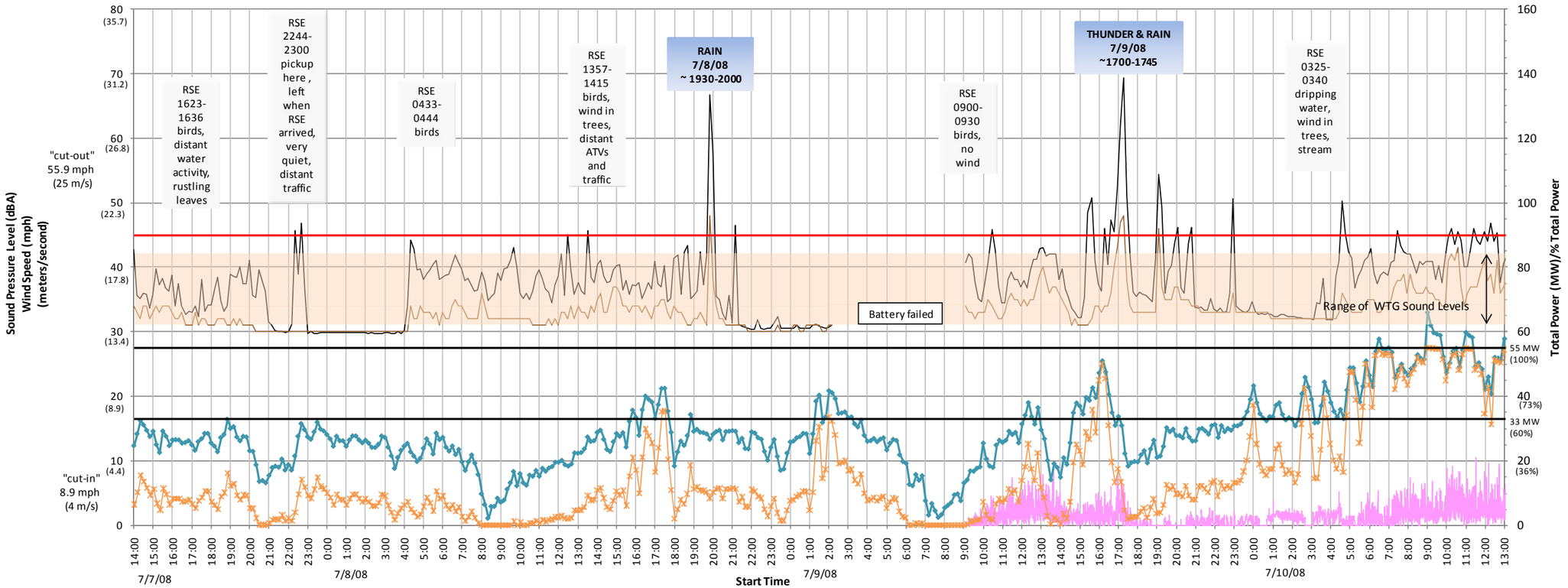
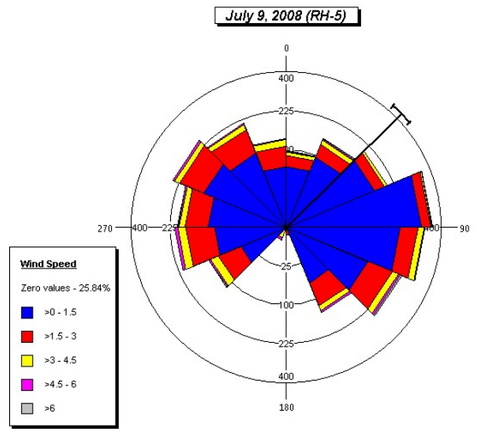
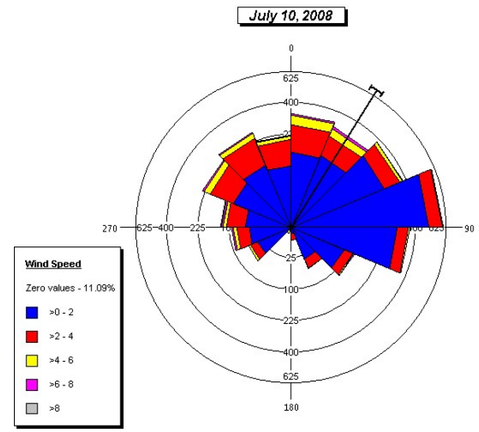


Figure 6-5

Record Hill Wind (RH-5 CEL593)
Pre-Development Ambient Ten Minute Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008







6.2 Ambient Monitoring Period 2

On August 5 to August 13, 2008, ambient sound levels were measured simultaneously for approximately 178 hours at three (RH-1, RH-2, and RH-5) of the same five monitoring positions used in July in the vicinity of the Record Hill Wind Project as shown on Figure 3-1. These positions included co-located surface and tree top met stations. Sound meters were added at positions RH-3 and RH-4 without surface and tree top met stations.

On August 5 to August 13, 2008, temperatures ranged from 47 to 77 degrees F and relative humidity ranged from 54% to 98%. Surface and tree top winds were sampled once per minute and then averaged for 10-minute periods synchronized to the 10-minute average wind speeds reported at the hub height. At RH-1 surface winds were 0 to 12 mph mostly from the northeast and southeast and tree height winds were 0 to 9 mph from the north and northwest. Surface wind gusts were up to 28 mph. At RH-2 surface winds were 0 to 6 mph from variable directions and tree height winds were 0 to 7 mph from variable directions. Surface wind gusts were up to 20 mph. At RH-5 surface winds were 0 to 5 mph from variable directions and tree height winds were 0 to 8 mph from variable directions. Surface wind gusts were up to 16 mph.

Figures 6-6 through 6-10 present 10-minute L_{Aeq} and L_{A90} values for each measurement position in relation to surface wind, tree top wind and hub height wind. Wind roses are also presented on Figures 6-6 through 6-10, showing the distribution of surface wind speeds, directions, means and confidence intervals for each day.

Ambient sound level measurements recorded in the vicinity the RHW site and pictures of each position are presented in Appendix II. The measurements include hourly L_{Aeq}, L_{A10}, L_{A50}, L_{A90}, L_{Amin} and L_{Amax} values for each measurement position. Appendix II includes graphs that plot the measured sound levels in relation to surface and the estimated hub height (80 meters) wind speeds.

The following ranges and averages of L_{Aeq}s do not include periods of observed rain and possible rain indicated by data recorded at Berlin Airport. However, the ranges do include the after effects of rain such as water dripping from the trees, increased flow in the Swift River and nearby mountain streams, increased sound from insects and frogs during wet periods and traffic on wet road surfaces. Rainy periods were the hours beginning 1800 through 2000 on August 5; 0600 on August 6 through 0200 on August 7; 1200 through 1500 on August 7; and 0700 through 1200 on August 10, 2008.

At position RH-1during DEP daytime hours (7 a.m. to 7 p.m.), hourly L_{Aeq}s ranged from 44 to 71 dBA, with an average of 49 dBA. During DEP nighttime hours (7 p.m. to 7 a.m.), hourly L_{Aeqs} ranged from 36 to 46 dBA with an average of 41 dBA. Prominent sound sources observed at position RH-1 during daytime hours included residential activity, traffic on Route 17, rushing water from increased flow in Swift River, insects and birds. Prominent sound sources noted during nighttime hours included traffic on Route 17, rushing water flowing in Swift River and insects.

At position RH-2, daytime hourly L_{Aeq}s ranged from 38 to 84 dBA with an average L_{Aeq} of 48 dBA. Nighttime hourly L_{Aeq}s ranged from 37 to 70 dBA with an average L_{Aeq} of 45 dBA. Prominent sound sources observed at position RH-2 during daytime hours included residential activity, dogs barking, traffic on the Roxbury Notch Road (Route 120), birds and rustling leaves. No observations were made at position RH-2 during nighttime hours.

At position RH-3, a sound meter was added on August 8, 2008. Daytime hourly L_{Aeq}s ranged from 40 to 60 dBA with an average L_{Aeq} of 44 dBA. Nighttime hourly L_{Aeq}s ranged from 41 to 48 dBA with an average L_{Aeq} of 44 dBA. Prominent sound sources observed at position RH-3 during daytime hours included traffic on Roxbury Notch Road (Route 120), birds, a westerly flowing mountain stream to the east and south of RH-2 and insects. No observations were made at position RH-3 during nighttime hours.

At position RH-4, a sound meter was added on August 8, 2008. Daytime hourly L_{Aeq}s ranged from 41 to 68 dBA, with an average L_{Aeq} of 56 dBA. Nighttime hourly L_{Aeq}s ranged from 34 to 61 dBA, with an average L_{Aeq} of 46 dBA. Prominent sound sources observed at position RH-4 during daytime hours included activity at the Public Boat Launch and on beach, wind in bushes and trees and residential activity. No observations were made at position RH-4 during nighttime hours.

At position RH-5, daytime hourly L_{Aeq}s ranged from 38 to 60 dBA, with an average L_{Aeq} of 45 dBA. Nighttime hourly L_{Aeq}s ranged from 36 to 52 dBA, with an average L_{Aeq} of 43 dBA. Prominent sound sources observed at position RH-5 during daytime hours included rustling leaves, distant cars and boats, ATV's, insects and birds. No observations were made at position RH-5 during nighttime hours.

A summary of ambient daytime and nighttime hourly sound levels is presented in Table 6-2. This includes the range and average of daytime and nighttime hourly L_{Aeq} at each position. Average hourly nighttime sound levels at RH-2. RH-3, RH-4 and RH-5 in August were 4 to 9 dBA higher than in July. This increase in the average sound levels was most likely due to increases in sounds from flowage in the Swift River and other streams as indicated by observations and interpretation of the L_{A90} statistic. Unusual heavy rains in August are likely to be representative of periodic and seasonal periods of high rainfall runoff and the associated increased stream flows. At RH-1, average hourly nighttime sound levels were 4 dBA less in August than July. This could be due to differences in traffic on Route 17 as suggested by examination of the L_{A50}s and L_{A90}s found in Appendix II. Both average hourly L_{Aeq}s and L_{A50}s are higher in July than August and the average hourly L_{A90}s are the same.

Table 6-2
Ambient Daytime and Nighttime Sound Levels (dBA)
August 5 to 13, 2008

Monitoring Position	Range of Hourly L_{Aeq}s		Average Hourly L_{Aeq}	
	Daytime 7 am to 7pm	Nighttime 7 pm to 7 am	Daytime 7 am to 7pm	Nighttime 7 pm to 7 am
RH-1	44 to 71	36 to 46	49	41
RH-2	38 to 84	37 to 70	48	45
RH-3	40 to 60	41 to 48	44	44
RH-4	41 to 68	34 to 61	56	46
RH-5	38 to 60	36 to 52	45	43

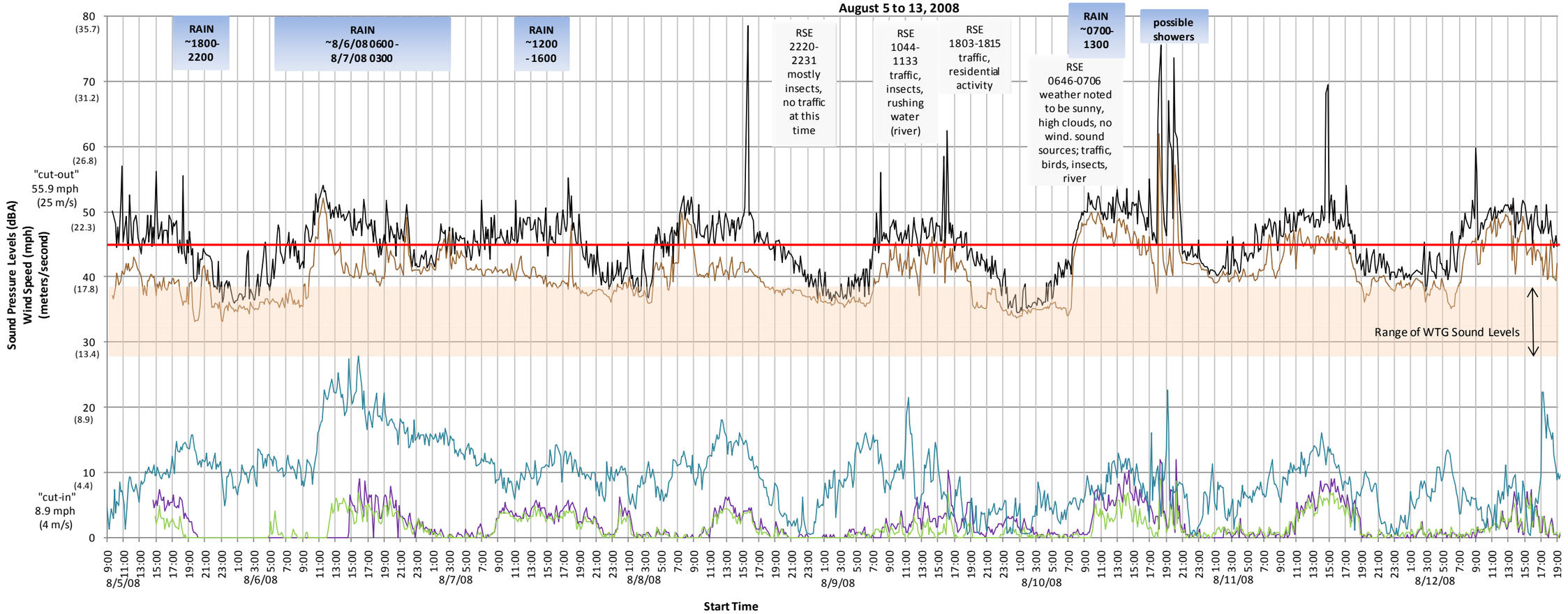
Table 6-3 presents a summary of all measured ambient daytime and nighttime hourly sound levels. This includes the range and average of daytime and nighttime hourly L_{Aeq} at each position from the July period (Monitoring Period 1) and the August period (Monitoring Period 2) combined.

Table 6-3
Ambient Daytime and Nighttime Sound Levels (dBA)
July 7 to 10, 2008 and August 5 to 13, 2008 (~211 hours)

Monitoring Position	Range of Hourly L_{Aeq}s		Average Hourly L_{Aeq}	
	Daytime 7 am to 7pm	Nighttime 7 pm to 7 am	Daytime 7 am to 7pm	Nighttime 7 pm to 7 am
RH-1	42 to 71	36 to 56	49	42
RH-2	34 to 84	28 to 70	45	42
RH-3	38 to 62	34 to 58	43	42
RH-4	39 to 87	26 to 61	54	43
RH-5	35 to 60	30 to 52	44	42

Figure 6-6

Record Hill Wind
RH-1 (LD812)
Pre-Development Ambient Ten-minute Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



Periods of Rain Berlin, NH

LAeq 10-min — LA90 10-min — MDEP Quiet Nighttime Limit — RH-1 Surface Wind 10-min (mph) — RH-1 Tree Top Wind 10-min (mph) — Hub height Wind 10-min (mph)

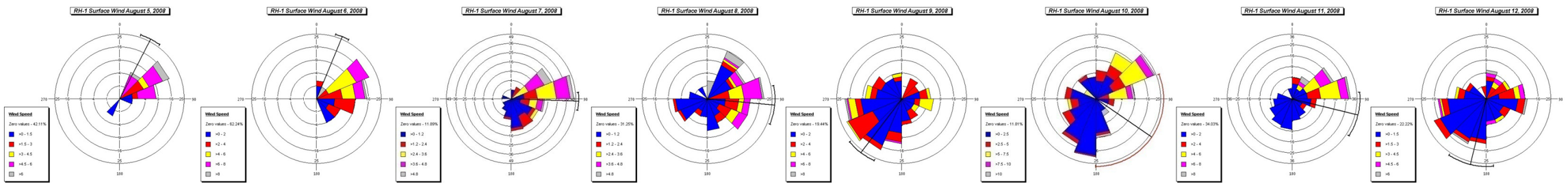


Figure 6-7

Record Hill Wind
RH-2 (LD812)
Pre-Development Ambient Ten-minute Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008

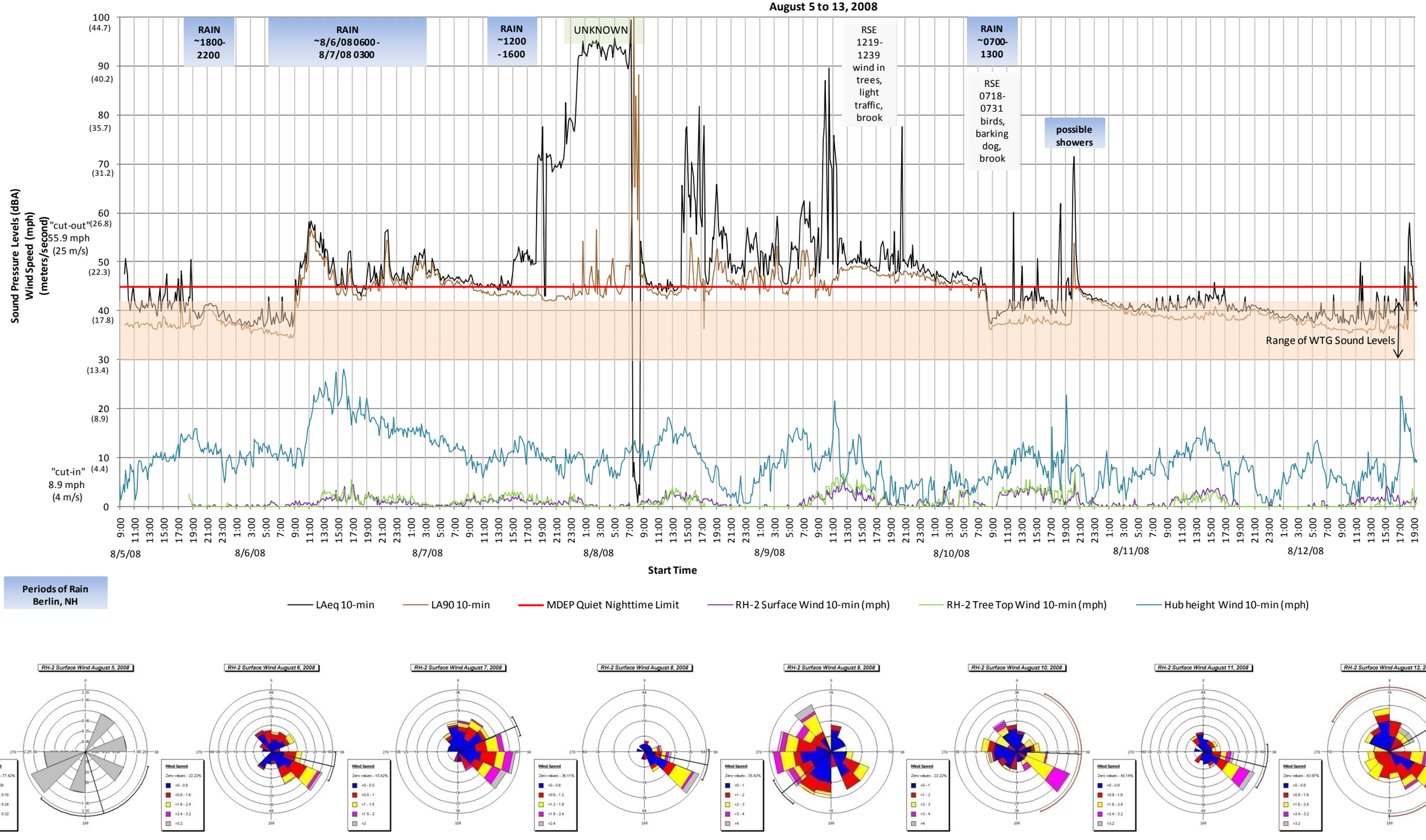


Figure 6-8

Record Hill Wind
RH-3 (LD812)
Pre-Development Ambient Ten-minute Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008

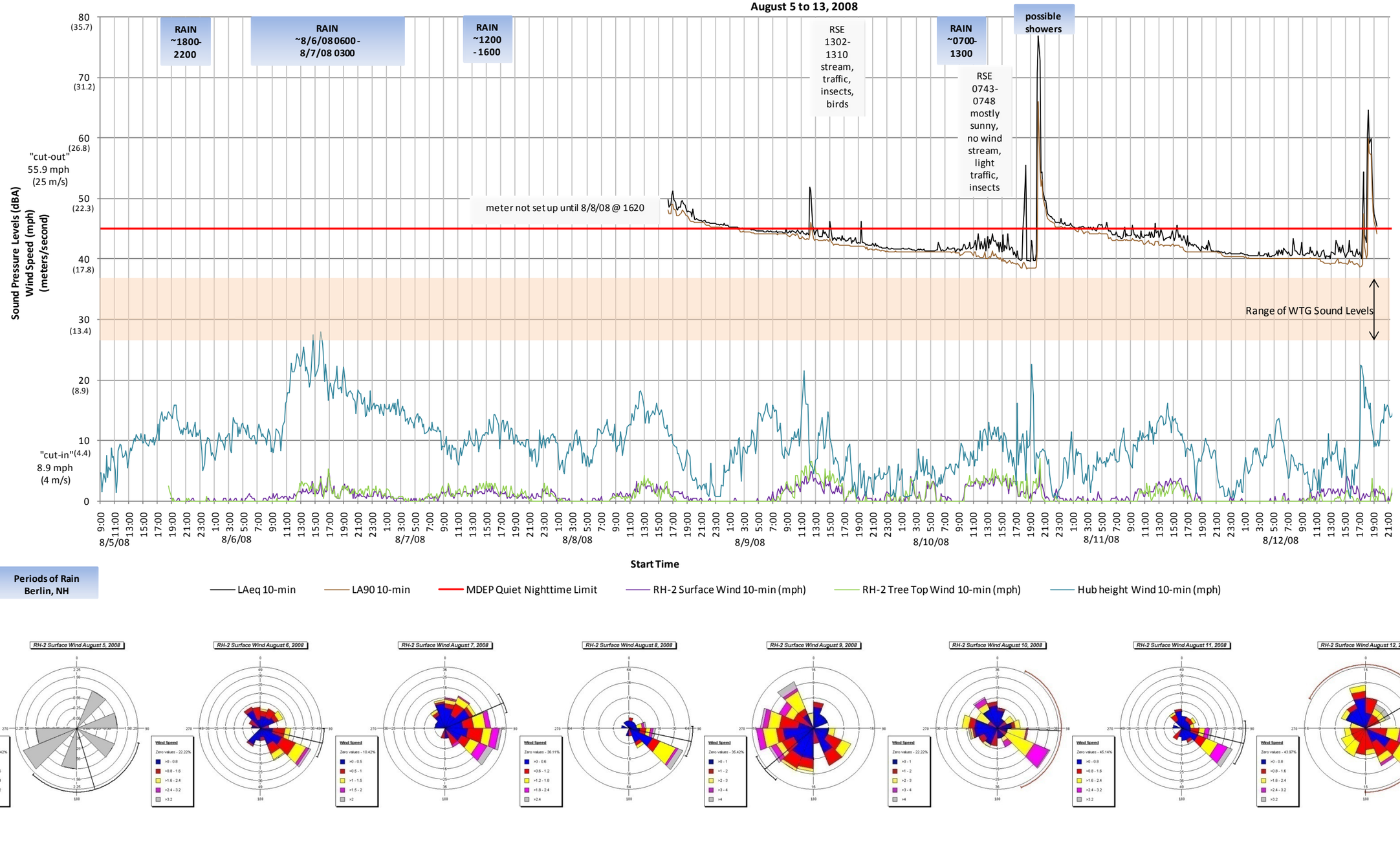


Figure 6-9

Record Hill Wind
RH-4 (LD812)
Pre-Development Ambient Ten-minute Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008

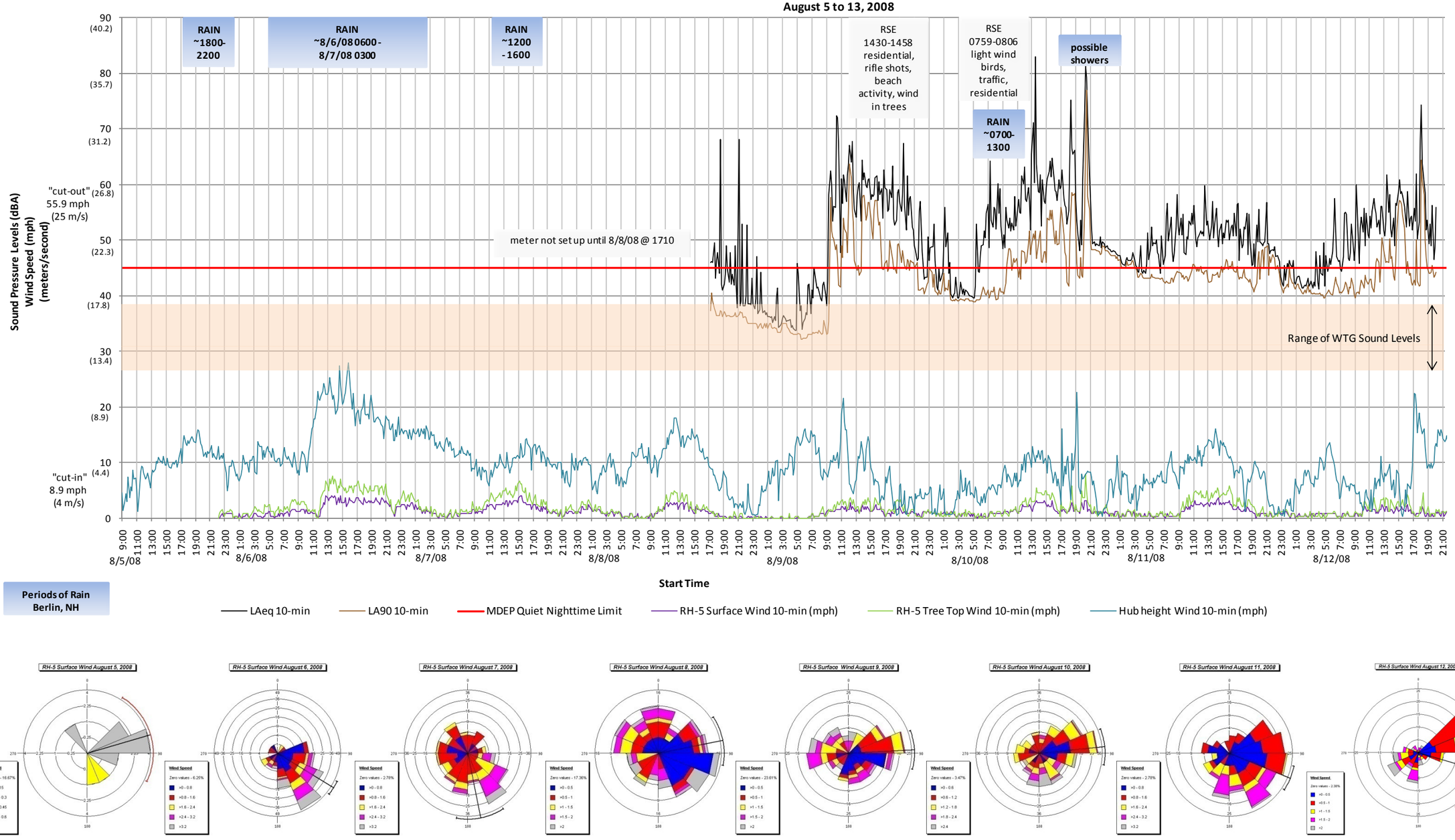
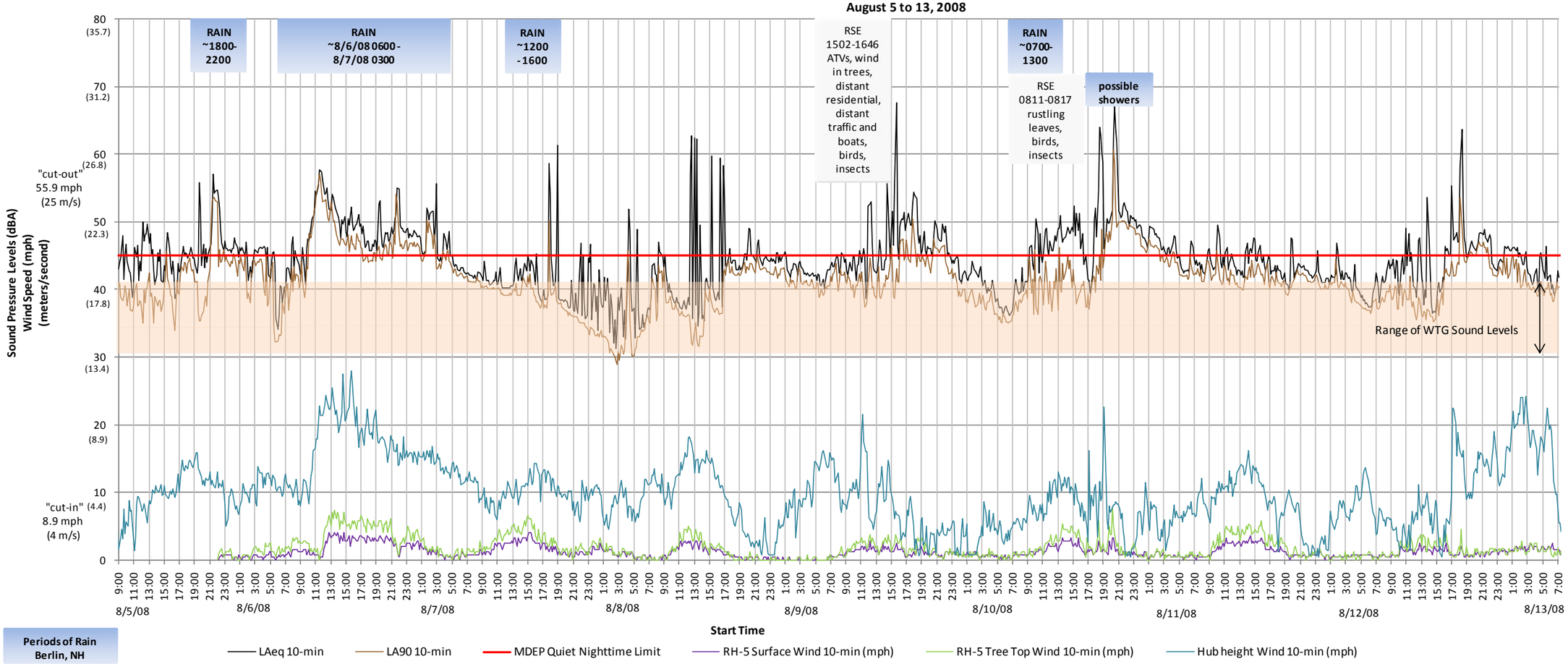
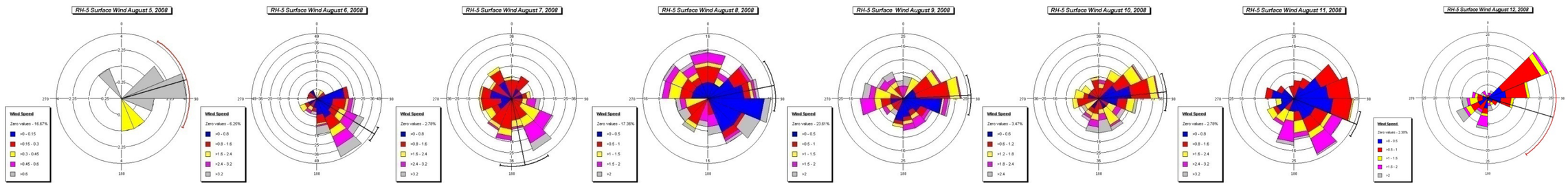


Figure 6-10

Record Hill Wind
RH-5 (LD812 and LD824)
Pre-Development Ambient Ten-minute Sound Levels vs. Surface Wind , Tree Top Wind and Hub Height Wind
August 5 to 13, 2008





7.0 RECORD HILL WIND SOUND LEVELS

Future project sound levels will be produced by construction activity plus operation and maintenance of the wind turbine generators, electric collection facilities, substation and maintenance facility. This report presents sound expected from construction and operation of wind turbines. RHW sounds will be combined with ambient (non-project) sources to produce total sound at protected locations. This section describes construction sound, sound from wind turbines and the combined effect of operations with non-project sounds.

7.1 Construction

Sound from construction activity is both temporary and variable. Many construction machines operate intermittently and equipment varies with each construction phase. A variety of construction equipment will be used to build the wind project including earth-moving equipment for land clearing, excavation, site grading and cranes to erect the wind turbines. Typical earth moving equipment and cranes generate sound levels of 75 to 88 dBA at a distance of 50 feet. These sound levels are typical front end loaders, bulldozers, gravel trucks, skidders, log harvesters and logging trucks commonly used in the Town of Roxbury.

Sound levels from construction may be noticeable in the vicinity of the site, especially during blasting, excavation and grading. However, construction sound will be reduced at protected locations by the distance from the construction site and intervening terrain. Topographic features at the construction sites in relation to noise sensitive receivers provide full or partial barrier effects thereby reducing construction sounds. Local traffic during construction is expected to increase on some public roads along with associated sound levels from construction vehicles. Traffic and construction sound are expected to be in the range of sounds from existing logging and associated trucking activity. Because of the temporary nature of construction, no adverse or long-term effects are anticipated.

The mobile nature of construction equipment and the manner in which construction work must be done makes complete control of construction sound infeasible. With the possible exception of nighttime blade lifts, construction activity will occur between the hours of 7 a.m. and 7 p.m. or daylight hours when ambient background sounds generally tend to be higher. Daylight construction is not subject to DEP sound limits. Sound from nighttime crane lifts is not expected to exceed sound levels from routine operation and will be required to comply with DEP nighttime limits between 7 pm and 7 am or after dark (one-half hour after sunset to one-half hour before sunrise) whichever is the shorter period.

Other measures to mitigate construction sound levels will include compliance with federal regulations limiting sound from trucks and portable compressors, ensuring that equipment and sound muffling devices provided by the manufacturer (or equivalent) are kept in good working condition and no nighttime blasting.

7.2 Proposed Operation

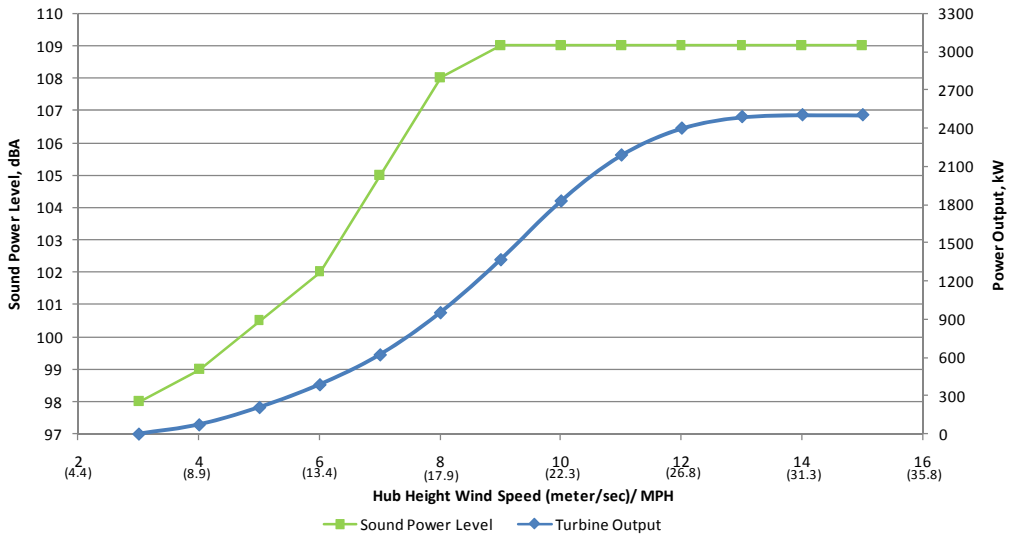
Operation of the proposed project will consist of 22 wind turbines operating up to 24 hours per day, seven days per week producing up to 55 MW of electrical power. The actual level of power production will be governed by the wind speed at the hub height. The actual level of wind turbine sound will vary with electric power production. During wind turbine operations future sound levels will include existing sounds plus wind turbine sounds.

RSE developed a sound level prediction model to estimate sound levels from operation of the proposed Record Hill Wind Project. The acoustic model was developed using the CADNA/A software program performing calculations in accordance with the generally recognized standard for estimating the propagation of sound in the environment promulgated by the International Standards Organization (ISO) as

Chapter 9613-2, *Attenuation of Sound During Propagation Outdoors* . CADNA/A uses three dimensional terrain, proposed wind turbine characteristics and locations plus environmental factors to calculate outdoor sound propagation from the wind turbines. Area topography and wind turbine locations, for entry into CADNA/A, were provided to RSE by Stantec Consulting based on USGS topographic information and project design. Information for the project study area is presented on Figure 3-1 and includes the turbine locations, USGS topographic contours, parcel mapping with hatching to show parcels with easements or agreements, dwelling locations, public and private roads, and water bodies.

The wind energy project will be capable of operating any time of the day or night, including holidays and weekends. However, the wind turbines will begin to rotate as the hub-height wind speed increases from 0 to 4 m/s (0 to 9 mph), the "cut-in" wind speed. When the wind incident on the turbine hub is at or above the "cut-in" wind speed of 4 m/s (9 mph) electrical power will be delivered to the grid. During periods of light or calm hub winds, sound level emissions from RHW will be very low. As wind speed increases, the turbines begin to rotate and will reach full sound power output at approximately 9 meters per second (20 mph) or approximately 60% of rated power output. Full electrical power output occurs when the hub-height wind speed is at or above 13 meters per second (29 mph). The turbines shutdown or "cut-out" when hub-height winds reach 25 meters per second (56 mph). Figure 7-1 presents a plot of electrical production and sound power level versus wind speed at the turbine hub for wind speeds ranging from 3 to 15 meters per second (7 to 34 mph). Figure 7-1 shows that moderate to full electrical output is produced with wind speeds at or above 9 meters per second (20 mph) at the turbine hub. Figure 7-1 also indicates that full sound power occurs when hub-height wind is at or above 9 meters per second. The sound power level is approximately 4 dBA less at a hub wind speed of 7 meters per second (16 mph) and 11 dBA less at 3 meters per second (7 mph).

Figure 7-1. Sound Power Level and Power Output of Clipper Liberty 2.5 Wind Turbine in relation to Hub Wind Speed

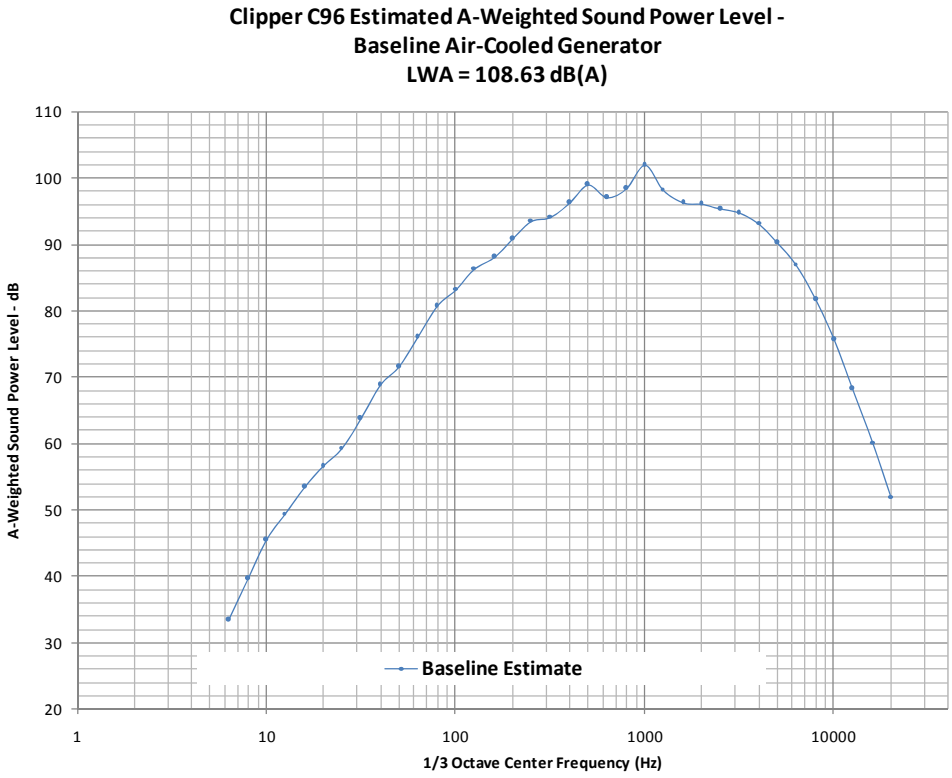


Source: Clipper C96 Specifications

RSE calculated sound levels for simultaneous operation of the Clipper Liberty C96 2.5 MW wind turbines at all 22 prospective locations. Calculations were based on the apparent sound power spectrum produced at full sound power provided by Clipper Wind Power. The wind turbines were treated as point sources at the hub height of 80 meters (262 feet) above base/grade elevation using sound power levels provided by Clipper Wind Power and presented in Table 7-1 and Figure 7-2. RSE computed sound power for whole octaves from the one-third octave spectrum provided by Clipper.

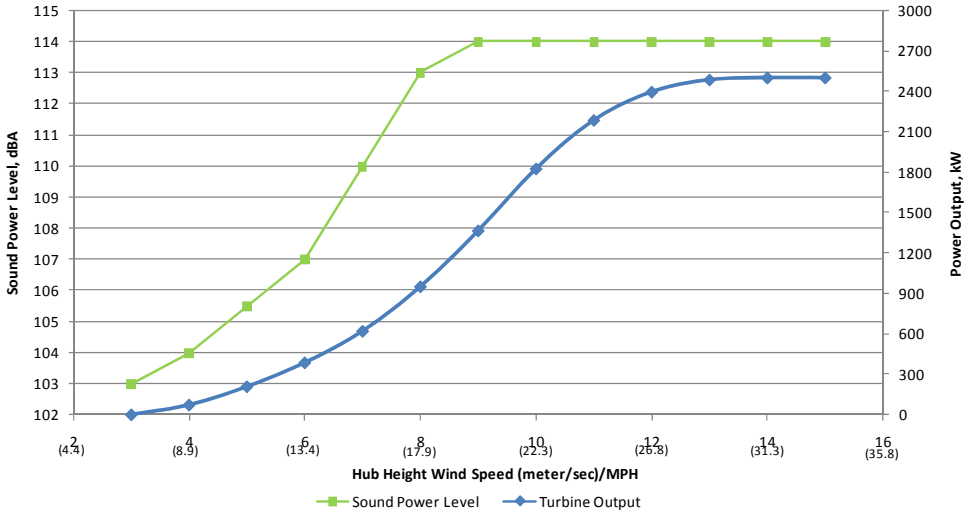
TABLE 7-1 WIND TURBINE SOUND POWER LEVELS (Wind Speed = 12.6 m/s at turbine hub)			
3rd Octave Band Center Frequency, Hz	**Sound Power Level, dBA**	**Octave Band Center Frequency, Hz**	**Sound Power Level, dBA**
50	71.6		
63	76.1	63	82.4
80	80.8		
100	83.2		
125	86.3	125	91.1
160	88.1		
200	90.9		
250	93.5	250	97.8
315	94.1		
400	96.3		
500	99	500	102.4
630	97.1		
800	98.5		
1000	102	1000	104.7
1250	98.2		
1600	96.3		
2000	96.1	2000	100.7
2500	95.4		
3150	94.8		
4000	93.1	4000	97.9
5000	90.3		
6300	86.9		
8000	81.7	8000	88.3
10000	75.7		
SUM	**108.6**	**SUM**	**108.6**
Source: Clipper C96 Specifications, July 30, 2008			

Figure 7-2.



RSE sound level model estimates are based on the maximum sound power level specification provided by Clipper plus uncertainty factors for wind turbine sound power and outdoor propagation. Figure 7-3 presents the sound power level as a function of wind speed and electrical power production with 5 dBA added by RSE to account for uncertainty factors.

Figure 7-3. Sound Power Level and Power Output of Clipper Liberty 2.5 Wind Turbine in relation to Hub Wind Speed with 5 dBA added to Clipper Specifications



Source: Clipper C96 Specifications

Using the sound prediction model, sound level contours for operation of the proposed wind project were calculated for the entire study area and are presented in Figure 7-4. Sound level contours of 55 dBA and 45 dBA are highlighted to correspond to DEP quiet daytime and nighttime limits respectively. The 35 dBA contour is also highlighted and shows how sound propagation differs over water when compared to over land. From these contours, the expected sound levels during 60 % to 100% of full rated electrical production can be determined for any point within the study area. This range of operations produces the maximum sound power levels emitted by the wind turbines. Selected positions representing the nearest protected locations to the turbines are shown on Figures 3-1 and 7-4. Also shown are the five positions where existing (pre-development ambient) sounds were measured in July and August, 2008. Calculated sound levels at the selected protected locations and monitoring positions are indicated on these figures. Table 7-2 shows distances of protected locations from the nearest proposed wind turbine and compares estimated sound levels with the most stringent DEP nighttime sound level limits applicable to each position. Table 7-2 also presents distances from the nearest proposed wind turbine to the monitoring positions and compares existing averages of measured sound levels with the most stringent DEP nighttime sound level limits.

Sound levels from wind turbine operation are presented for nine residential receiver points (PL1 to PL9) in the vicinity of the proposed wind project. Selected points represent nearby protected locations where the most stringent DEP nighttime limits apply and other points of local interest (e.g. PL8 and PL9). Monitoring position RH-5 also represents nearby protected locations as previously described. Sound levels at these points have the greatest potential to exceed applicable DEP limits. Landowner agreements are expected at protected locations closer to the wind turbines than the nearest receiver points and RH-5 (see Figures 3-1 and 7-4). Under these agreements no sound level limits will apply at these properties (ref. DEP 375.10, Section C 5.s).

Sound level attenuation from the wind turbines was calculated by the acoustic model in accordance with ISO 9613-2. ISO 9613-2 is an international standard commonly used for predicting sound levels from a noise source for moderate downwind condition in all directions. Attenuation is calculated for distance, atmospheric absorption and intervening terrain. Conservative factors were applied for ground absorption assuming a mix of hard and soft ground. The surfaces of nearby lakes were specifically mapped and lake surfaces were assigned no ground absorption as appropriate for a hard, reflective surface. The model calculations exclude attenuation from foliage, which has the potential to reduce sound levels.

TABLE 7-2
ESTIMATED (Modeled) SOUND LEVELS FROM WIND TURBINE OPERATION

Residential Receiver Position	Distance to Nearest Wind Turbine, Feet	Estimated Hourly Sound Level, L_{Aeq-Hr}	DEP Nighttime Limit, dBA	Difference between WTG Estimated Hourly Sound Level and DEP Nighttime Limit (dBA)
PL1	6,000	36	55	-19
PL2	6,800	39	55	-16
PL3	2,800	44	55	-11
PL4	3,100	41	45	-14
PL5	3,100	43	45	-2
PL6	3,500	45	55	-10
PL7	8,100	37	45	-8
PL8	11,500	37	45	-8
PL9	11,000	33	45	-12

Monitoring Position	Distance to Nearest Wind Turbine, Feet	Estimated Hourly Sound Level, L_{Aeq-Hr}, dBA	Measured Average Nighttime Ambient Sound Level, L_{Aeq-Hr} (dBA)	DEP Nighttime Limit, dBA	Difference between WTG Estimated Hourly Sound Level and DEP Nighttime Limit (dBA)
RH-1	7,500	38	42	45	-7
RH-2	4,500	41	42	45	-4
RH-3	3,400	38	42	45	-7
RH-4	7,500	39	43	45	-6
RH-5	6,000	42	42	45	-3

The results presented in Figure 7-4 and Table 7-2 indicate that sound levels at full operation of the wind project will be from 2 to 19 dBA below the most stringent DEP nighttime sound level limits at the closest protected locations. Table 7-2 also shows that the hourly sound levels from RHW within 500 feet of the nearest dwellings are estimated to be 0 to 7 below the existing (July and August 2008) average hourly nighttime sound levels.

7.3 Proposed Operation and Ambient Sound

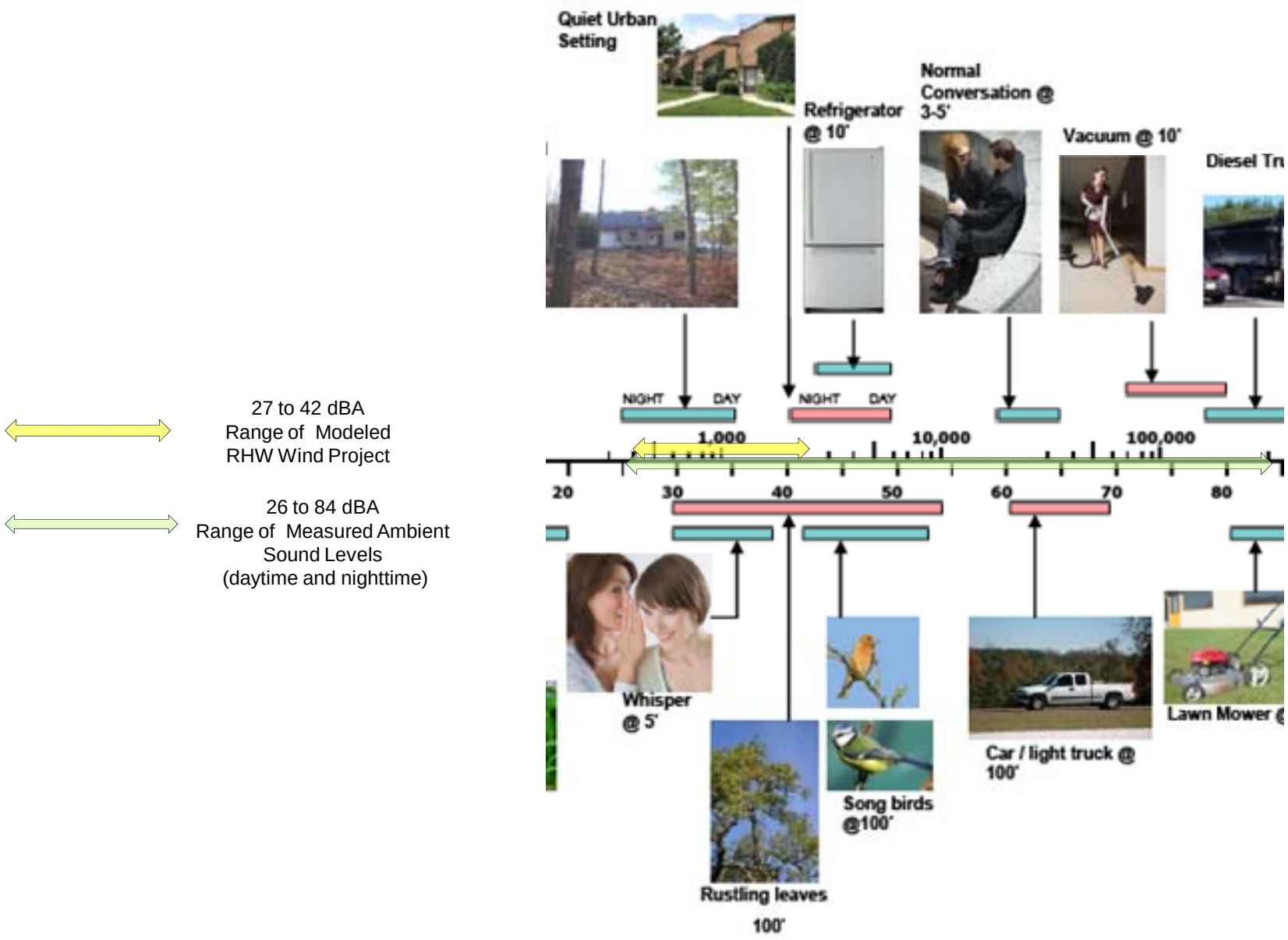
In addition to wind speed and pre-development ambient sound levels, Figures 6-1 through 6-10 and Appendix II show the range of sound levels predicted from wind turbine operations at the monitoring positions. These figures show that existing ambient sound levels exceed sound levels expected from wind turbine operations under the conditions that occurred during this measurement period. Observations indicated that natural sounds and man-made sounds each contributed significantly to the measured ambient sound levels. Observations and measurements also show that wind induced sounds account for a significant portion of the variability in measured ambient sound levels.

There are large fluctuations in wind speed from the hub height of the wind turbines at 262 feet to the regulated height of four to five feet above ground level. This can be a significant factor in sound emissions and outdoor propagation from both the wind project and ambient, non-turbine sound levels. The quietest periods of the day or night generally occur when surface winds are light or calm. In addition, as the wind speed incident on a wind turbine drops, sound levels from the turbine are reduced as shown in Figure 7-1 and Figure 7-3. Ambient, non-turbine sound levels, particularly from wind forces acting on trees and vegetation, may increase significantly when the hub height wind speed reaches 9 meters per second or greater, as required for full sound power.

Variations in wind speed with elevation (wind gradient) may result in very different wind speeds near the surface and tree tops than at turbine/rotor heights. In addition, there may be areas near the ground that are shielded from winds from certain directions. For example, with the general ridge line direction running north-south, lower land to the east would be protected from a westerly wind. Under these conditions, high winds may be present near the top and to the west of the wind turbines, but winds may be relatively calm just east of the ridgeline. However, dwellings are located well east of the ridgeline where shielding from wind would be less. Consequently, the degree of masking by wind-induced ambient sound will fluctuate depending on the wind speed, direction, and location. Figures 6-6 through 6-10 and Appendix II present wind speeds and directions measured simultaneously at ground, tree tops and hub height. To show localized variability in wind speed and direction, Figure7-5, Figure 7-6 and Figure 7-7 compare surface winds, hub winds and surface wind gusts. Figures 7-5 through 7-7 show that high surface wind gusts can occur locally when average surface wind speeds range from 0 to 12 mph. These figures also indicate that wind gusts do not always occur simultaneously at the nearest protected locations. This wind gustiness most likely accounts for some of the variability of existing sound levels and the differences between the equivalent sound levels, $L_{Aeq.}$ The implications of these results is that other statistical parameters, such as the L_{A50} or L_{A90} may be more reliable indications for assessing compliance with DEP limits during RHW operations.

Figure 7-8 presents the range of estimated RHW sounds in relation to existing ambient sounds and typical sounds. Figure 7-8 shows that RHW sounds are expected to be at the low end of existing sound levels and comparable to a quiet rural setting, whispering, song birds and the low end of rustling leaves.

Figure 7-8
RHW, Existing and Typical Sound Levels



7.4 Tonal and Short Duration Repetitive Sound

A regulated tonal sound occurs when the sound level in a one-third octave band exceeds the arithmetic average of the sound levels in the two adjacent one-third octave bands by a specified dB amount based on octave center frequencies (ref. DEP 375.10.G.24). Clipper C96 turbine performance specifications shown in Figure 7-2 indicate some potential for tonal sounds to occur in the 500 and 1000 Hz third-octave bands. Clipper C96 specifications indicate that the tonal threshold of 8 dBA is not likely to be exceeded. Therefore, the Clipper C96 wind turbines are not expected to generate regulated tonal sounds.

Short duration repetitive (SDR) sounds are a sequence of sound events each clearly discernible that causes an increase of 6 dBA or more in the sound level observed before and after the event. SDR sound events are typically less than 10 seconds in duration and occur more than once within an hour. Published studies of noise from wind turbine operations indicate that sound levels can fluctuate over brief periods as noted by the passage of wind turbine blades and typically range from 2 to 4 dBA.[1] Consequently, RHW operations are not expected to result in the 6 dBA increase required to be SDR sounds as set forth in DEP 375.10.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The primary objectives of the Sound Level Assessment were to determine existing sound levels, applicable sound level limits at protected locations and lot lines, estimate future sound levels from the proposed wind power project, and evaluate compliance with applicable sound level limits. Existing land uses were identified using a combination of site maps, aerial images, and field observations. Sound level estimates of future wind operation were calculated using a terrain-based acoustic model.

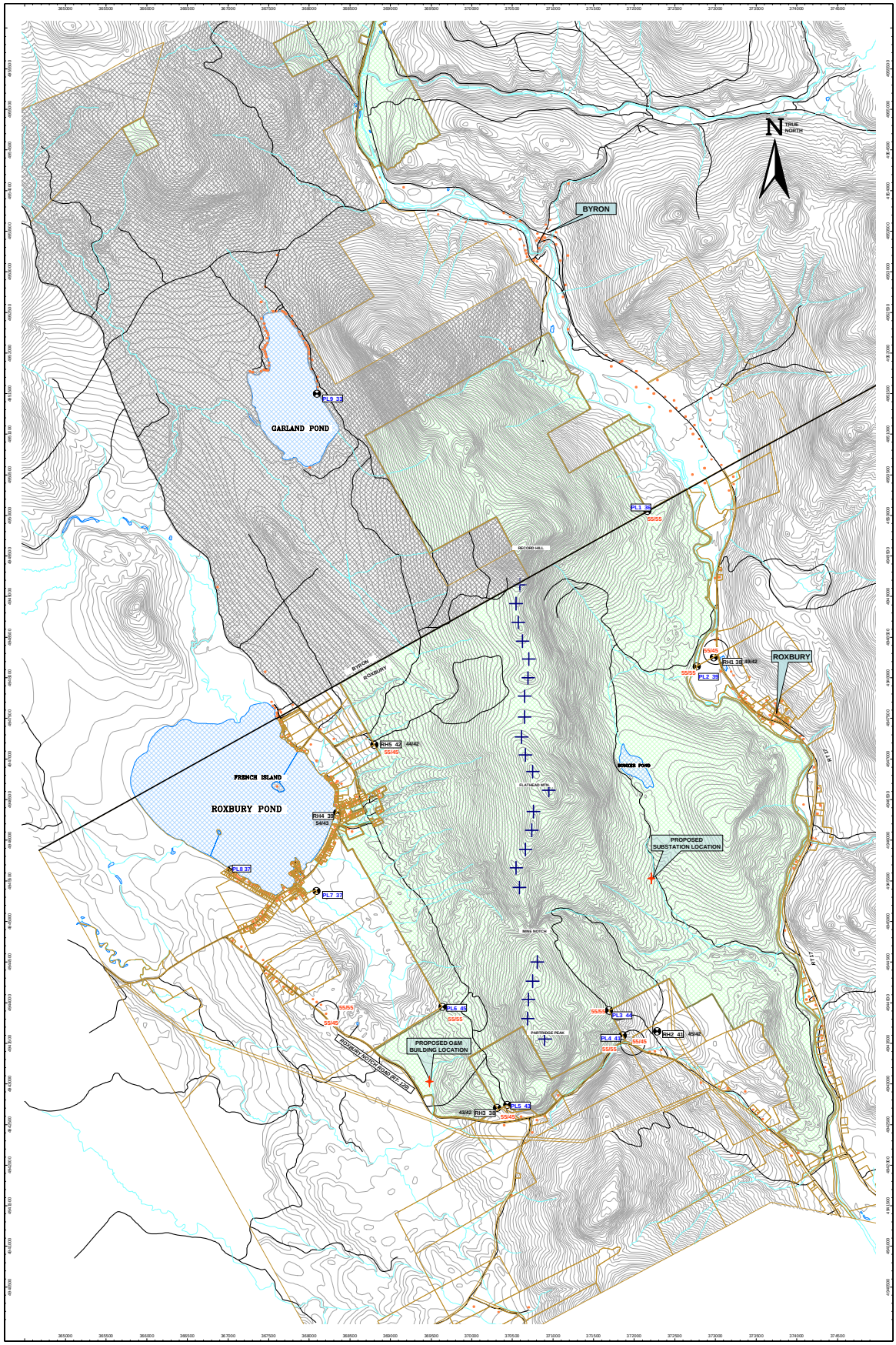
Sound level limits were applied per DEP 375.10 based on land use mapping and landowner agreements. To be conservative with this sound level assessment, quiet limits of 45 dBA nighttime and 55 dBA daytime were utilized per DEP regulations even though some pre-development sound levels measured during conditions suitable for wind turbine operation exceeded DEP thresholds for existing sound levels in a quiet area.

Summertime sound levels measured when surface winds were 0 to 5 mph and no rain show that existing nighttime sound levels can be significantly higher than DEP quiet nighttime limits. Table 7-2 shows that the hourly sound levels from RHW within 500 feet of the nearest dwellings are estimated to be at or below the existing average hourly nighttime sound levels. Ambient sound levels measured in August were higher than in July due to unusually heavy rains and water flow in nearby rivers and streams. Sound levels are likely to fluctuate due to seasonal conditions and activity.

The results of this assessment indicate that sound levels from wind turbines are not expected to exceed DEP sound level limits during construction or routine operations. Specifically, model estimates show that sound levels from the wind project will be below the DEP nighttime limit of 45 dBA within 500 feet of any dwelling at all protected locations.

Once construction and startup of the wind project are complete, RSE recommends monitoring sound levels during routine operations to verify sound level compliance with relevant DEP sound level limits.

[1] ETSU-R-97, The Assessment and Rating of Noise from Wind Farms, 1996.



RELATIVE COORDINATE MODEL GRID SYSTEM – (METERS)

Record Hill Wind

Figure 3-1

VICINITY SITE PLAN

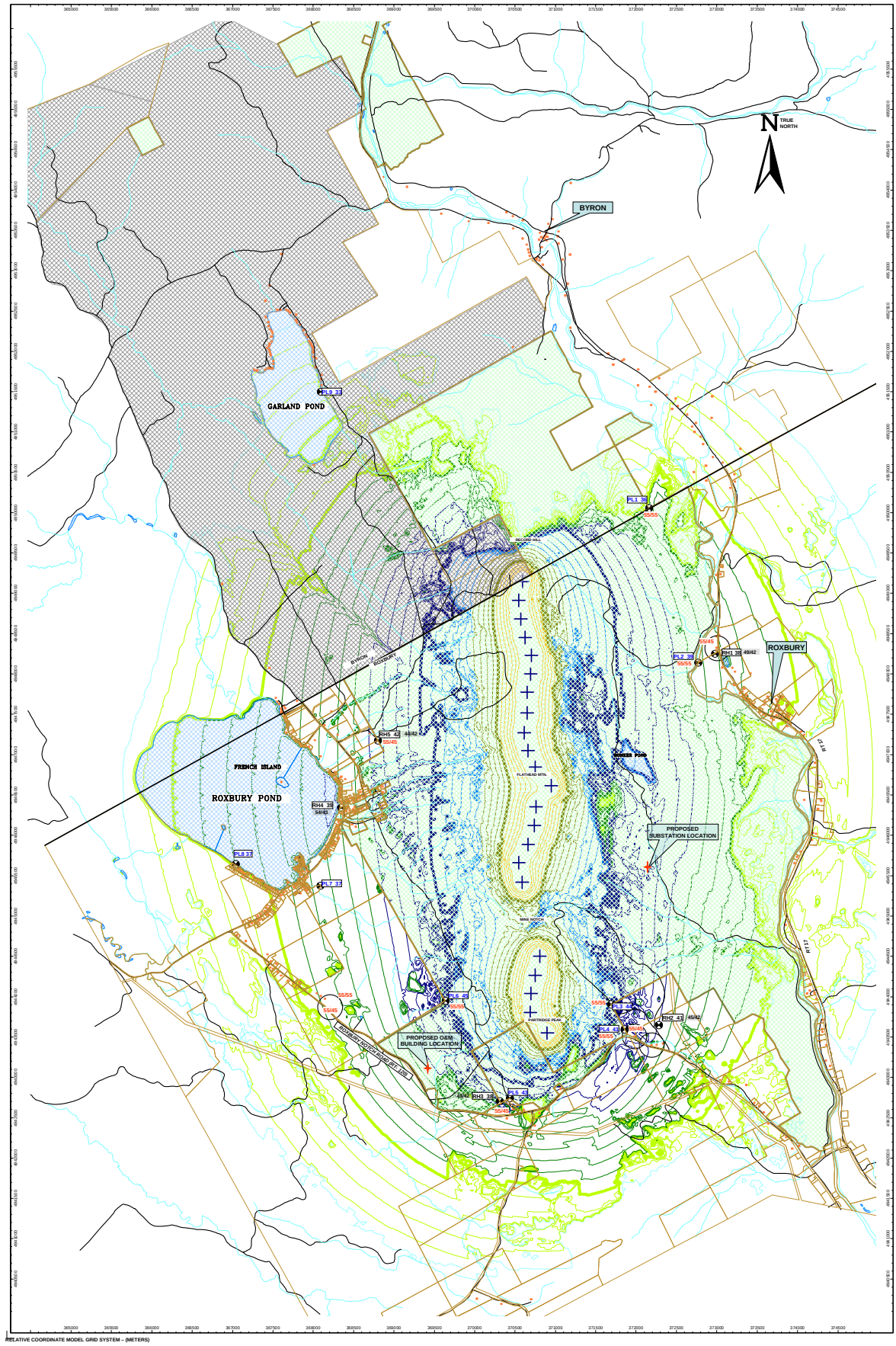
CLIPPER C96 WIND TURBINES

LEGEND

- WIND TURBINE LOCATION
- DWELLING
- RECEIVER POINT & ESTIMATED SOUND LEVEL
- 500' RADIUS FROM RESIDENCE
- 55/45 MEDEP DAYTIME/ NIGHTTIME LIMIT (dBA)
- BYRON / ROXBURY TOWN BOUNDARY
- 45/42 AMBIENT DAYTIME/ NIGHTTIME SOUND LEVEL (dBA)
- RH – AMBIENT MONITORING POSITION
- PL – PROTECTED LOCATION RECEIVER POSITION
- WATER BODY
- PROJECT BOUNDARY
- PARCELS BOUNDARY
- PROJECT AREA AND LAND OWNER AGREEMENTS
- PENDING LANDOWNER AGREEMENT

Resource Systems Engineering

DECEMBER 2008



35 dBA Sound Level Contour

45 dBA (Maine DEP Quiet Nighttime Limit)

55 dBA (Maine DEP Daytime Quiet Limit)

Record Hill Wind

Figure 7-4

Sound Level Contours

CLIPPER C96 WIND TURBINES

CONTOURS RANGE 28-60 dBA

1 dBA INTERVALS

DECEMBER 2008

LEGEND

- WIND TURBINE LOCATION
- DWELLING
- RECEIVER POINT & ESTIMATED SOUND LEVEL
- 500' RADIUS FROM RESIDENCE
- 55/45 MEDEP DAYTIME/ NIGHTTIME LIMIT (dBA)
- BYRON / ROXBURY TOWN BOUNDARY
- 45/42 AMBIENT DAYTIME/ NIGHTTIME SOUND LEVEL (dBA)
- RH – AMBIENT MONITORING POSITION
- PL – PROTECTED LOCATION RECIEVER POSITION
- WATER BODY
- PROJECT BOUNDARY
- PARCELS BOUNDARY
- PROJECT AREA AND LAND OWNER AGREEMENTS
- PENDING LANDOWNER AGREEMENT

RELATIVE COORDINATE MODEL GRID SYSTEM – (METERS)

Resource Systems Engineering

Figure 7-5
RH-1
Ground Level Wind Speeds vs. Ground Level Wind Gusts vs. Hub Height Wind
August 5 to 13, 2008

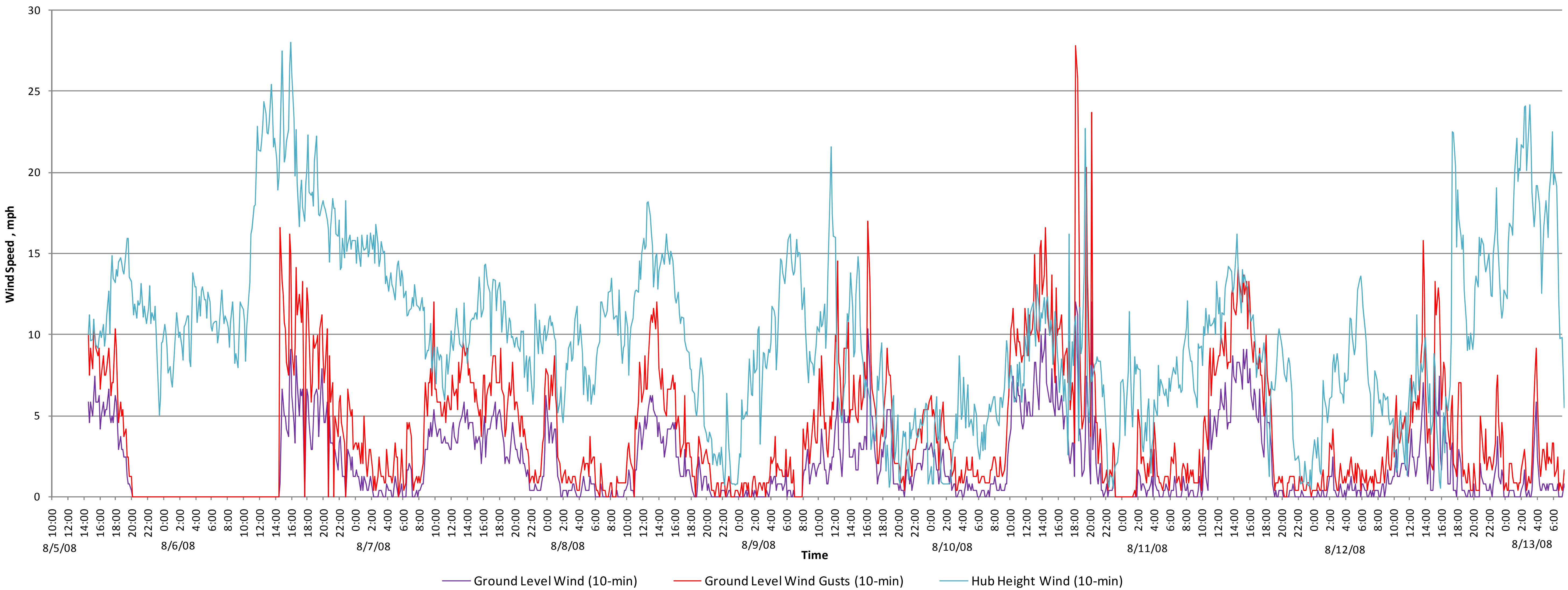


Figure 7-6
RH-2
Ground Level Wind Speeds vs. Ground Level Wind Gusts vs. Hub Height Wind
August 5 to 13, 2008

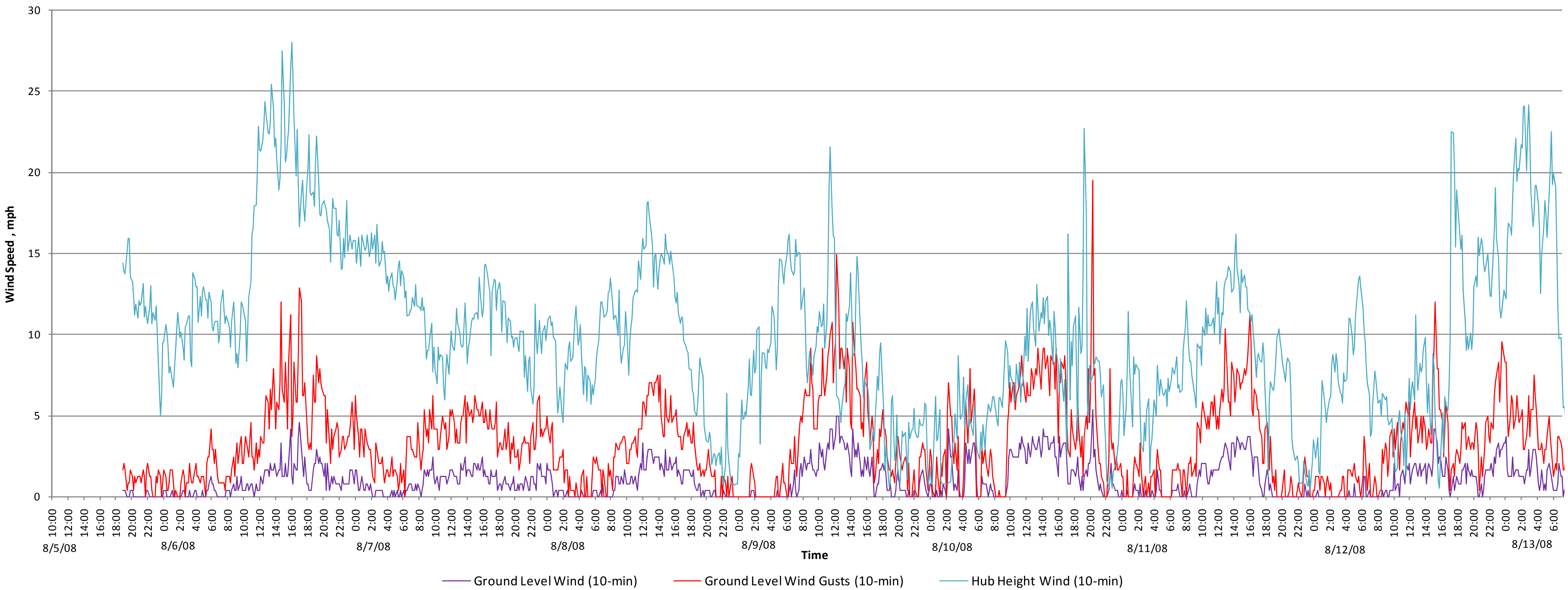
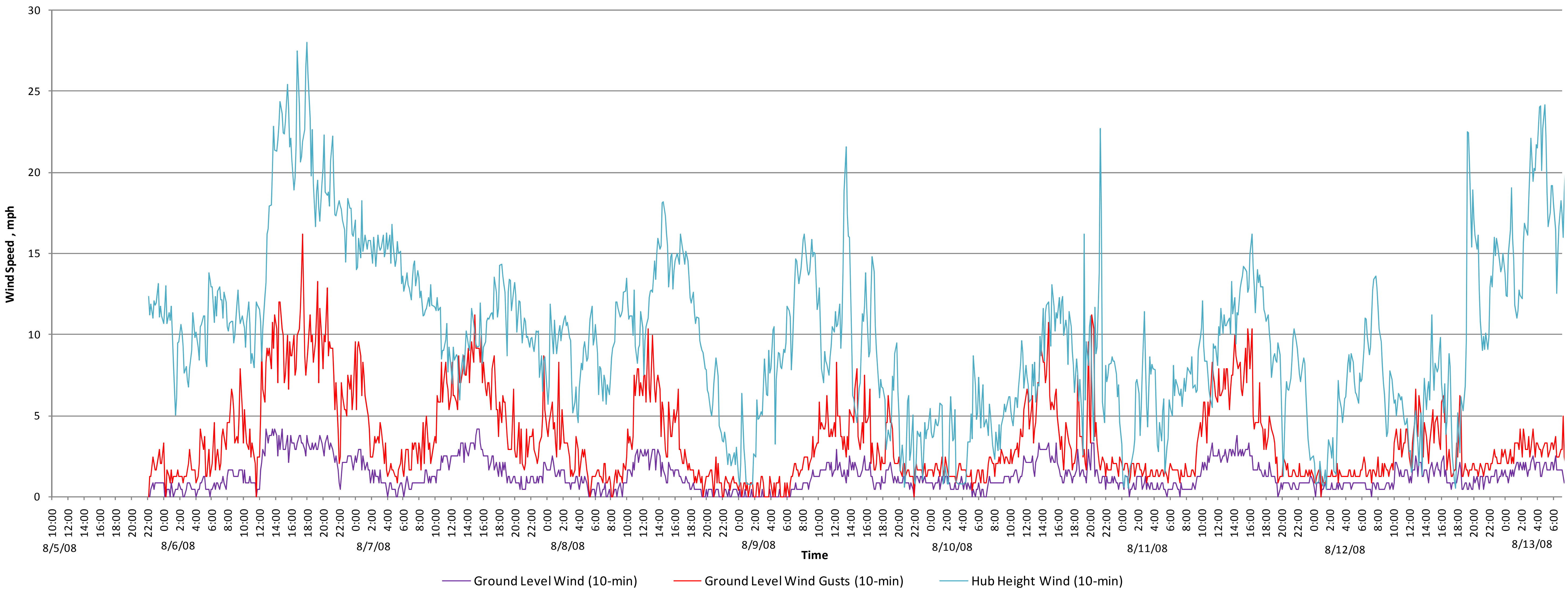


Figure 7-7
RH-5
Ground Level Wind Speeds vs. Ground Level Wind Gusts vs. Hub Height Wind
August 5 to 13, 2008



SOUND AND DECIBELS

Sound is a rapid fluctuation in pressure that the human ear has the potential to detect. The decibel or dB is the unit of measurement for sound. The decibel scale is logarithmic to avoid large unmanageable numbers normally associated with pressure change. The following figure shows a comparison of sound pressure and decibel levels for some typical sound environments.

Sound level performance specifications often provide the sound power level emitted by a particular noise source such as a transformer. Similar to sound pressure level, the sound power level or L_w is a logarithmic measure of sound expressed in decibels compared to a specified reference level. The difference is that the reference level for sound power is 10^{-12} watts compared to the reference level for sound pressure which is in units of micropascals.

Undesirable sound is generally referred to as *noise*. The effects of noise depend both on its frequency (or pitch), decibel level, and duration, particularly in relationship to changes in existing sound levels. The frequency of a sound generally refers to the number of vibrations per second, measured in hertz (Hz). The frequencies of sounds audible to humans range from about 20 Hz to 20,000 Hz, with greater sensitivity to frequencies above 1,000 Hz.

Sound may consist of a single frequency known as a pure tone, but is generally a disorderly mixture of many frequencies. When measuring sound, the A-weighted sound levels are typically used in order to simulate the hearing response of the human ear to varying sound level frequencies. A-weighted sound levels are expressed as dBA.

Sound propagation in air can be compared to ripples on the surface of a pond. The ripples spread out uniformly in all directions of the pond surface decreasing in amplitude as they move further from the source. For every doubling of distance from a stationary hemispherical noise source, the sound level drops by 6 dB. Thus if the sound level is 50 dBA at 500 feet, the sound level at 1000 feet will be 44 dBA, and will be 38 dBA at 2000 feet. With an obstacle in the sound path, such as intervening terrain or a building, part of the sound is reflected, part is absorbed and the remainder is transmitted through or around the object. The amount of sound that is reflected, absorbed or transmitted depends on the properties of the object, its size, and the frequency (Hz) of the sound. Properties of an object and its effect on sound propagation are primary considerations in the design of noise control measures.

For constant sounds, a brief measurement close to the source can generally quantify the level of sound over both long and short periods. However, when sound sources vary, longer sampling periods are needed to accurately quantify the sound levels. Integrating sound level meters are commonly used to measure fluctuating sound sources. These meters record the sound level every 1/8 of a second when set to fast response and every one-second on slow response. When set to fast, the instrument records 480 sound level measurements every minute and over 28,000 measurements in an hour. Due to the large number of readings, statistical parameters are used for analysis and comparison of measurement data.

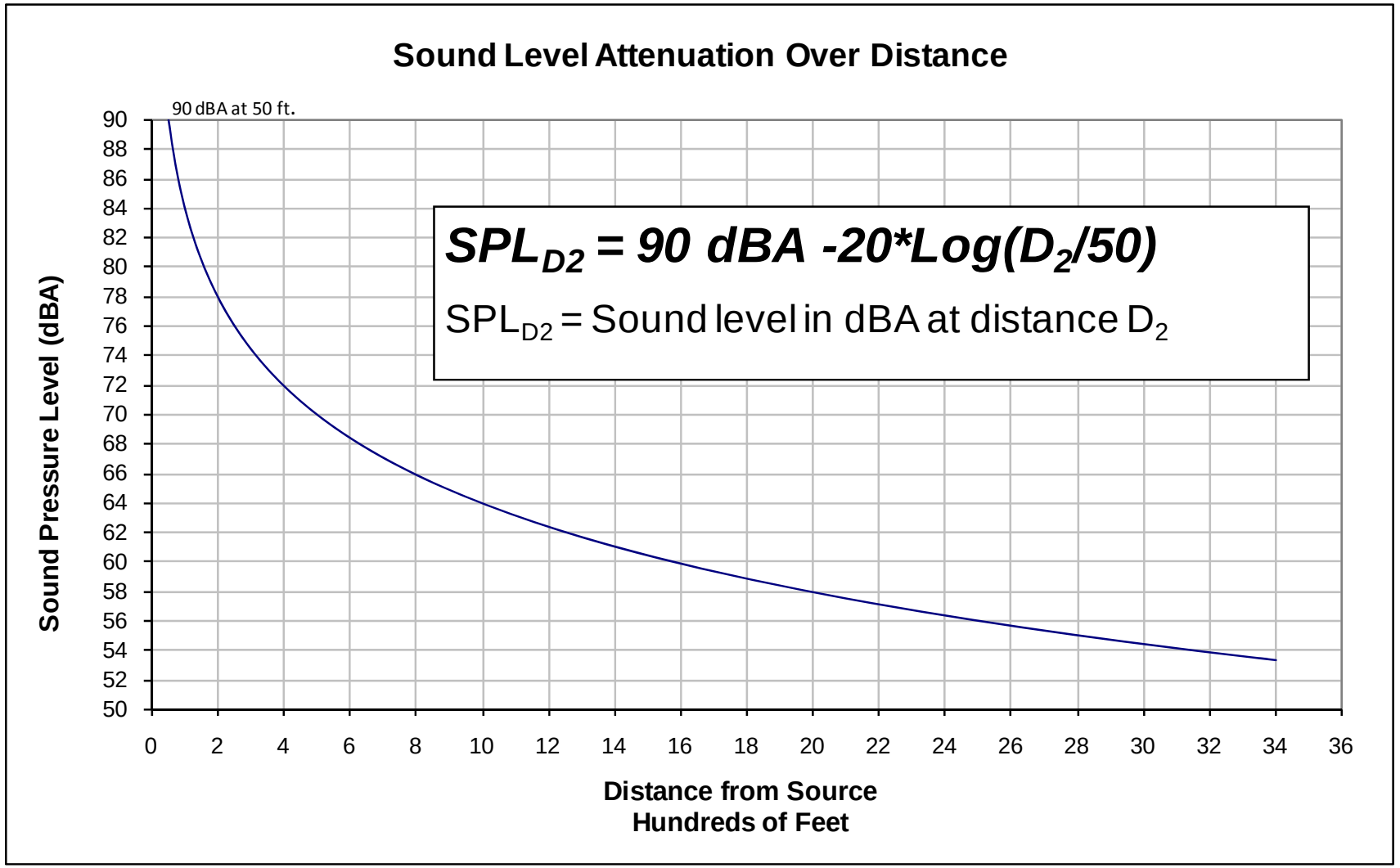
The most commonly used parameter is the A-weighted equivalent sound level or L_{Aeq}. The L_{Aeq} is used to represent the sound energy during a given sampling period as a constant decibel level.

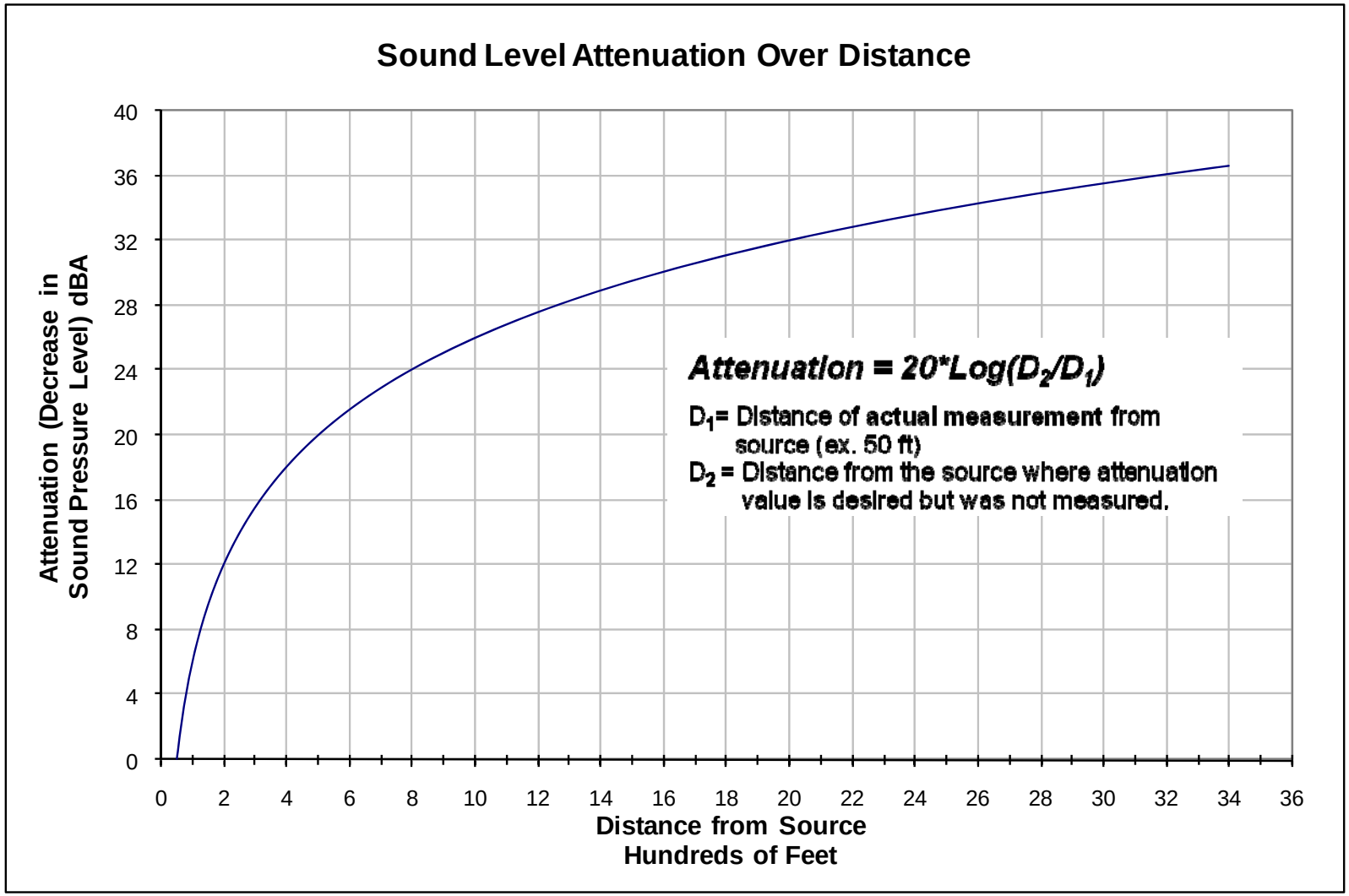
The L_{Aeq} takes all sound level fluctuations into account similar to an averaging technique; however, this is accomplished mathematically to deal with decibels as logarithmic expressions. At a site influenced by variable sounds such as vehicle or aircraft traffic, the L_{Aeq} distributes the traffic sound energy over the entire measurement period to calculate a single decibel level. Short periods of elevated sound levels can significantly increase L_{Aeq} over a measurement period. For example, if the sound level over an hour were 30 dBA except for five minutes when traffic noise measured 60 dBA, the L_{Aeq} for the hour would be 49 dBA.

Other common statistical parameters include L_{A1}, L_{A10}, L_{A50} and L_{A90}, which represent the sound level exceeded 1%, 10%, 50%, and 90% of the time during the measurement, respectively. The L_{A10} is used to describe the average of the maximum sound levels during a measurement. The L_{A90} excludes most transient or intermittent noise sources and therefore, is commonly used to determine the value of constant or *background* sound during a measurement.

In order to calculate sound levels resulting from multiple noise sources, such as multiple wind turbines, it is necessary to combine decibel levels from each source. Decibel levels must be added mathematically to reflect the logarithmic nature of the decibel unit. When two sounds of the same decibel level are combined, the resulting combined sound level is just 3 dB higher than the individual sound levels (i.e. 50 dB + 50 dB = 53 dB). Sound level meters per ANSI are designed to integrate all sounds received at a particular location and report the combined result.

The American National Standards Institute (ANSI S1.1-1994) and the Maine DEP have similar definitions of **ambient sound level**. The ANSI definition is: *"All-encompassing sound at a given place, usually a composite of sounds from many sources near and far."* The Maine DEP definition is found in Chapter 375.10, Control of Noise, Section G (1): *"At a specified time, the all-encompassing sound associated with a given environment, being usually a composite of sounds from many sources at many directions, near and far, including the specific development."* The DEP definition of **pre-development ambient sound level** is: "*The ambient sound at a specified location in the vicinity of a development site prior to the construction and operation of the proposed development or expansion.*" [Ref. 375.10 G (15)].


Sound Level Attenuation Over Distance
90 dBA at 50 ft.
$SPL_{D2} = 90\ dBA - 20*Log(D_2/50)$
SPL_{D2} = Sound level in dBA at distance D_2
Sound Pressure Level (dBA)
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
58
56
54
52
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
Distance from Source
Hundreds of Feet


Sound Level Attenuation Over Distance
Attenuation (Decrease in Sound Pressure Level) dBA
0
4
8
12
16
20
24
28
32
36
40
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
Distance from Source Hundreds of Feet
Attenuation = 20*Log(D2/D1)
D1= Distance of actual measurement from source (ex. 50 ft)
D2 = Distance from the source where attenuation value is desired but was not measured.

OUTDOOR SOUND PROPAGATION

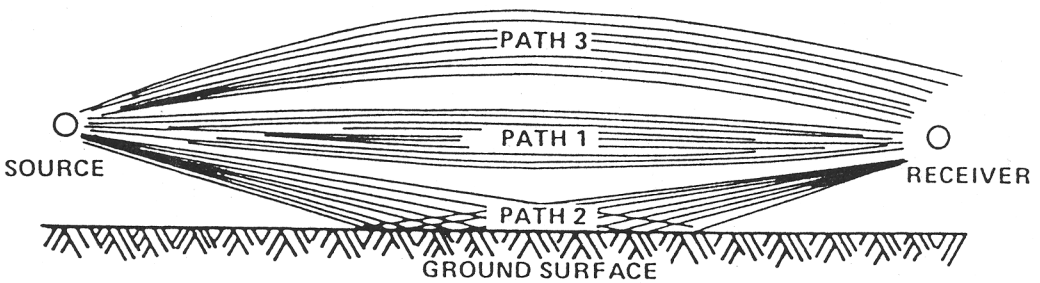
TERRAIN AND VEGETATION

Sound travels from a source to a receiver by three general paths:

Path 1 Direct Line-of-Sight

Path 2 Ground Reflected Path

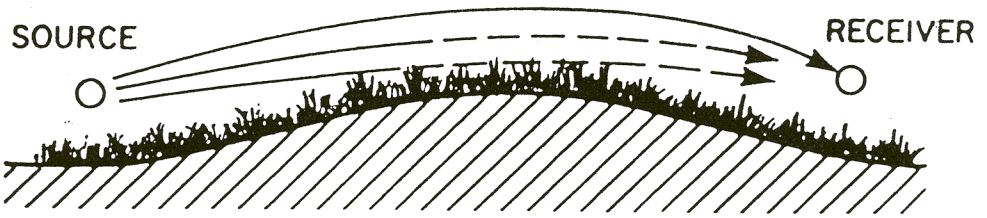
Path 3 Above the Ground Surface



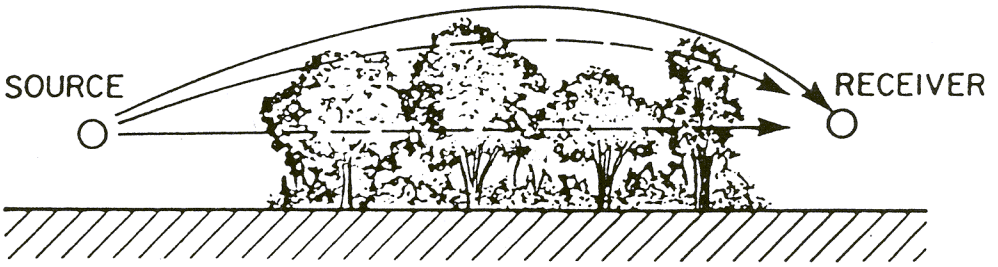
Concept of three paths involved in outdoor sound propagation: Path 1, direct sound; Path 2, ground-reflected path; Path 3, refracted and scattered path.

TERRAIN AND VEGETATION (Continued)

The attenuation due to absorptive ground cover increases over distance. Line-of-sight sound levels may be significantly reduced.



Path 3 provides sound energy when ground terrain absorbs or blocks direct sound path.



Path 3 Feeds Scattered Sound Energy over the Tops of Woods and Barriers When Direct Sound is Sufficiently Reduced

- Attenuation rates developed based on type of ground cover.
- Use conservatively in Maine due to frozen ground conditions resulting in reflection instead of absorption.

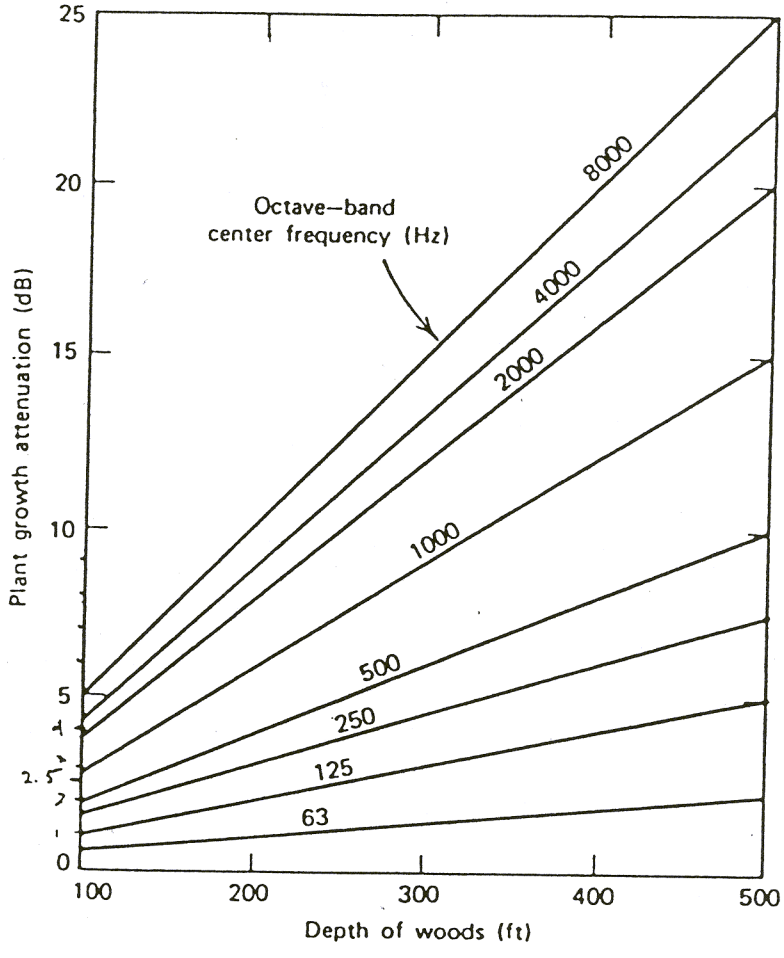
TERRAIN AND VEGETATION (Continued)

EXCESS SOUND ATTENUATION FOR SOUND TRANSMISSION ABOVE OR THROUGH ABSORPTIVE GROWTH

(attenuation in dB per 10 m Path Length)

Octave Frequency Band (Hz)	Sound Path Over or through Tall Thick Grass or Shrubbery [3]	Sound Path through Medium-Dense Woods [3]
31	—	0.3
63	0.1	0.4
125	0.7	0.5
250	1.2	0.6
500	1.8	0.8
1000	2.3	1.0
2000	2.8	1.3
4000	3.4	1.6
8000	3.9	2.0

TERRAIN AND VEGETATION (Continued)

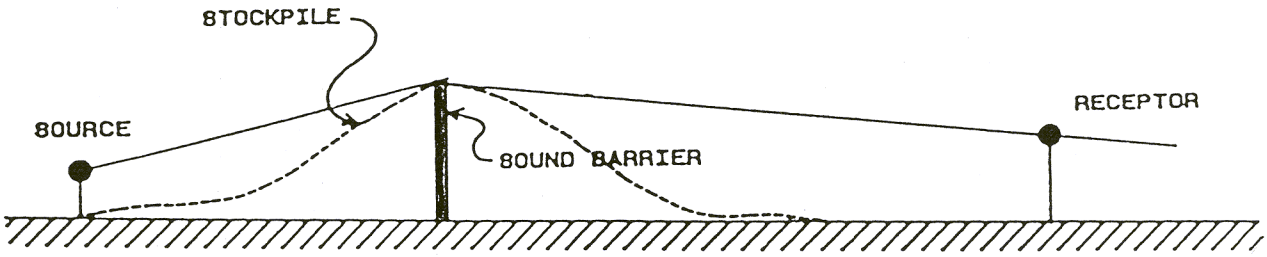


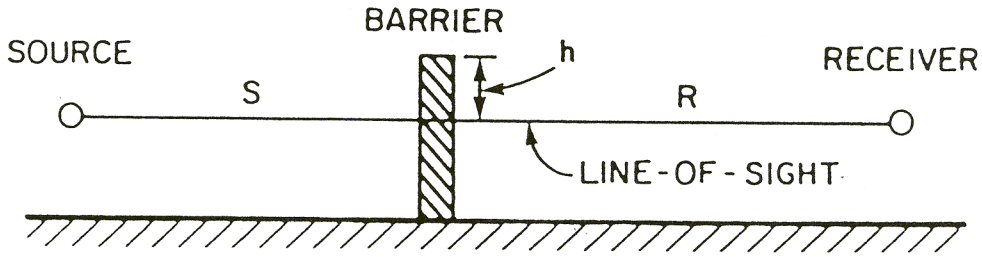
Approximate attenuation of sound because of dense woods having a visibility penetration of 70 to 100 ft. (Courtesy of the American Petroleum Institute, ref. 22).

EFFECTS OF BARRIERS

- Barriers block the line-of-sight path between a sound source and receiver resulting in sound reduction in the shadow zone.
- Barriers may consist of buildings, walls, hills, material stockpiles, or other solid structures.

TYPICAL SOUND BARRIER PROFILE



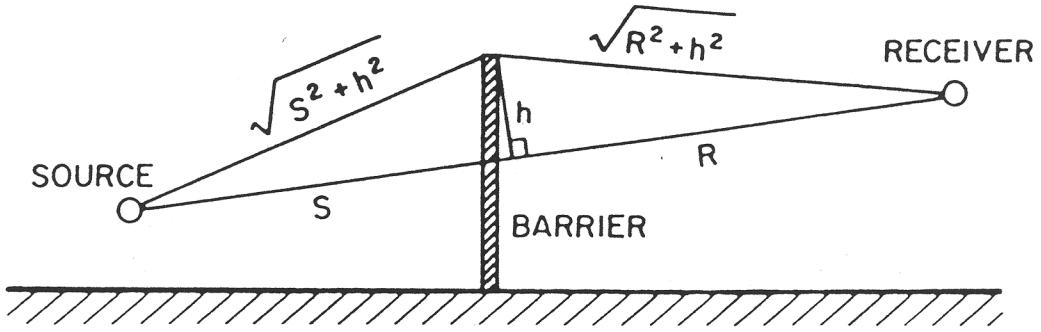


Geometrical details involved in evaluating the attenuation or insertion loss of a sound barrier.

EFFECTS OF BARRIERS (Continued)

To estimate the sound level reduction of the barrier:

(1) Calculate the "path length difference" or the difference between the length of the path traveled by sound and the line-of-sight difference.



Right triangle construction can be used to determine essential dimensions involved in barrier attenuation.

$$PLD = (\sqrt{S^2 + h^2} + \sqrt{R^2 + h^2}) - (S+R)$$

EFFECTS OF BARRIERS (Continued)

(2) Estimate barrier attenuation by frequency using the following chart:

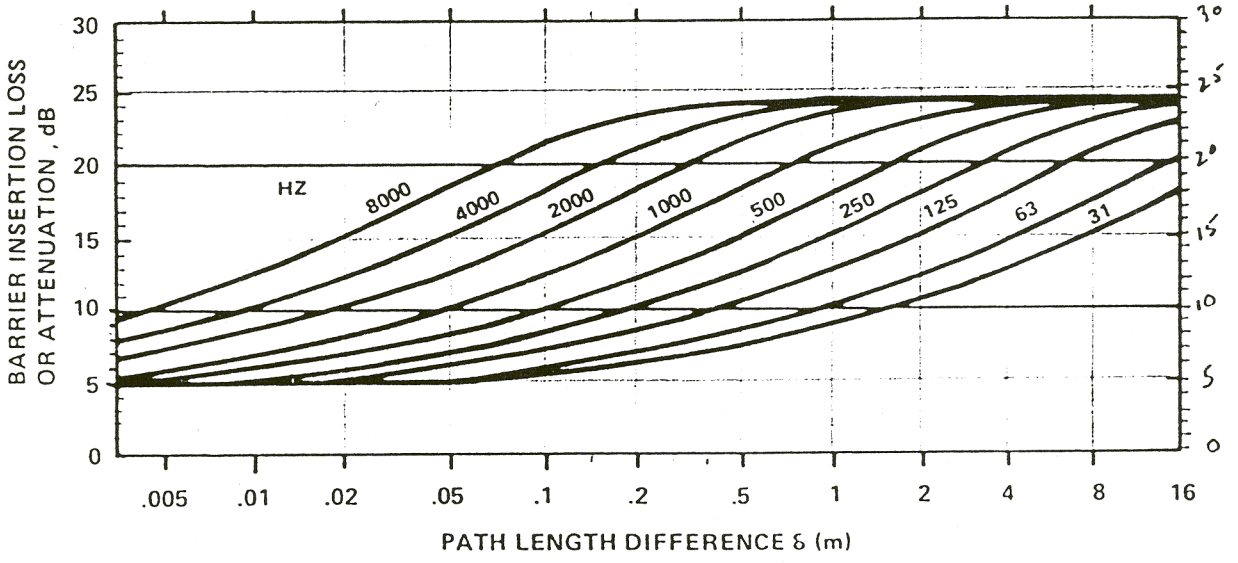


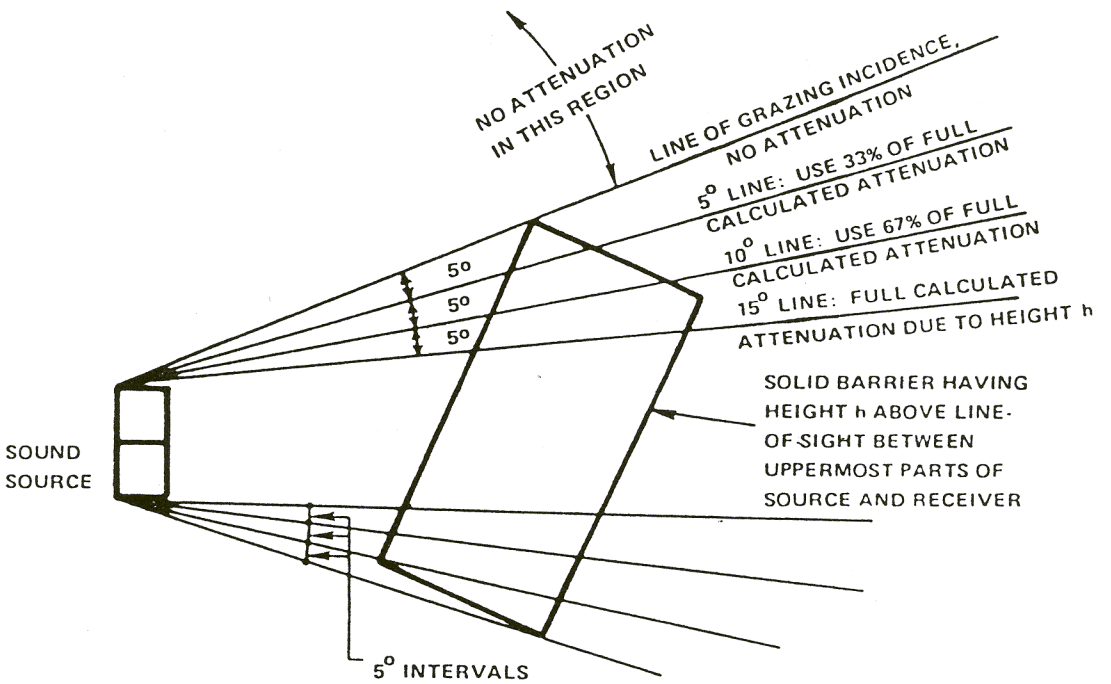
Chart for estimating maximum barrier attenuation at octave frequencies for a range of path length differences

(3) Subtract the barrier attenuation by frequency from the octave band sound levels.

(4) Calculate the total sound level by adding the resulting octave-band sound levels.

RESTRICTIONS

- Barrier attenuation depends on the length of the barrier relative to the source and receiver.
- Both S and R are less than 1,000 feet. Reduction of 10% can be applied for each additional 1,000 feet.
- For natural barriers, such as hills, that have different heights at different angles from the source, evaluate the sound attenuation along each radial line of interest from the source using the barrier height encountered by that radial line.



Plot plan showing regions of reduced attenuation at edges of shadow zone.

APPENDIX II

PRE-DEVELOPMENT AMBINET SOUND LEVELS

JULY 7 TO 10, 2008

view to the east

view to the west

RH-1
Pre-development Ambient Monitoring
July 7-10, 2008

view to the west

Record Hill Wind Project

Pre-Development Ambient Hourly Sound Level Measurements

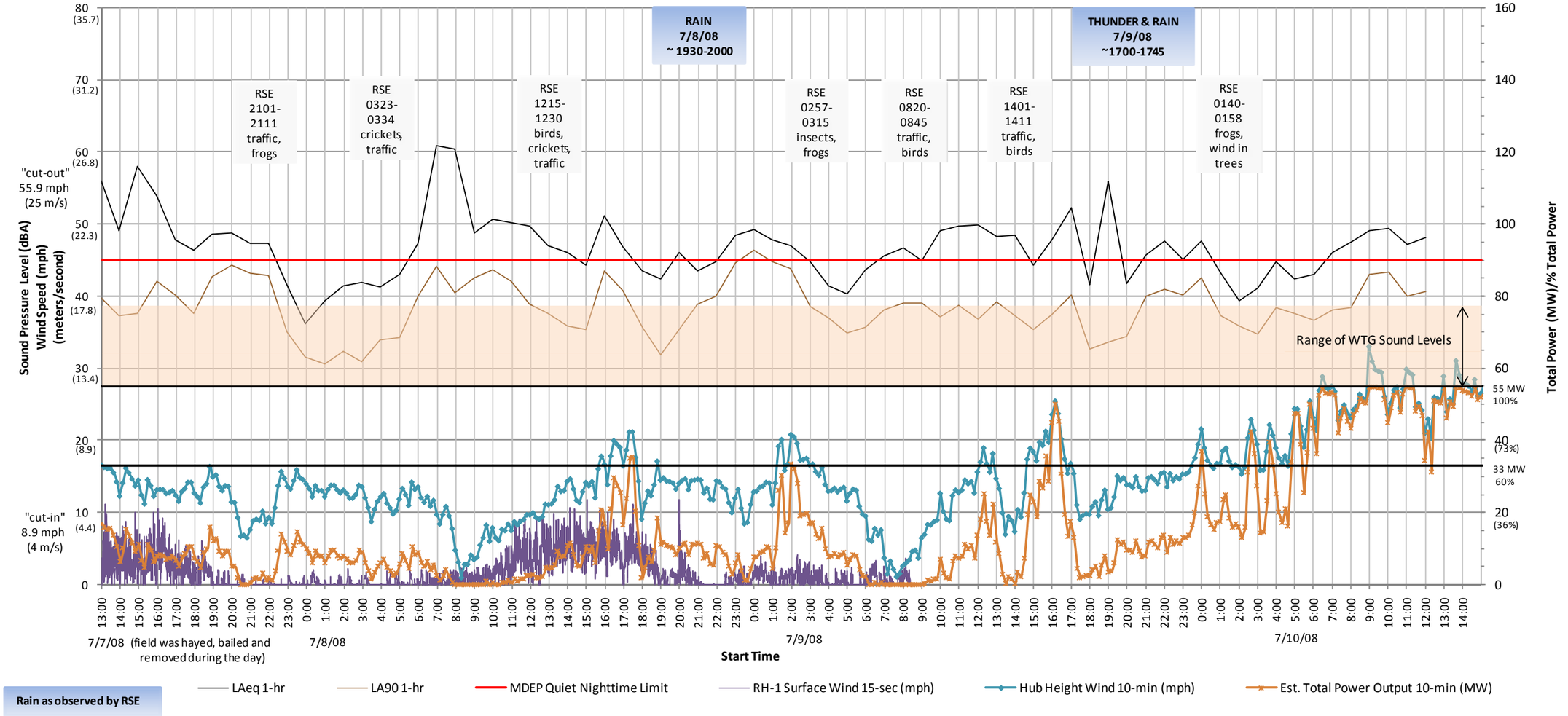
Position RH-1 (LD824)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA)						
			L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{Amin}	L_{Amax}
7/7/08	13:00	60	56	68	63	45	40	37	73
	14:00	60	49	57	53	42	37	34	63
	15:00	60	58	64	58	42	38	35	72
	16:00	60	54	62	58	48	42	38	66
	17:00	60	48	54	52	46	40	34	60
	18:00	60	46	55	51	43	38	34	57
	19:00	60	49	54	52	47	43	37	57
	20:00	60	49	55	52	48	44	39	59
	21:00	60	47	52	50	46	43	38	54
	22:00	60	47	51	50	46	43	37	54
	23:00	60	42	46	43	39	35	32	51
7/8/08	0:00	60	36	43	40	34	32	29	47
	1:00	60	39	47	42	33	31	29	51
	2:00	60	41	50	46	38	32	29	53
	3:00	60	42	54	46	35	31	29	58
	4:00	60	41	50	45	37	34	31	55
	5:00	60	43	54	47	38	34	31	58
	6:00	60	47	57	51	44	40	34	62
	7:00	60	61	63	56	48	44	37	67
	8:00	60	60	59	54	44	41	37	63
	9:00	60	49	54	52	47	43	37	57
	10:00	60	51	57	54	48	44	37	60
	11:00	60	50	58	54	48	42	36	62
	12:00	60	50	57	54	47	39	34	60
	13:00	60	47	58	52	42	38	34	63
	14:00	60	46	56	51	40	36	33	60
	15:00	60	44	55	50	39	35	32	59
	16:00	60	51	59	55	47	43	40	62
	17:00	60	47	54	50	44	41	37	58
	18:00	60	43	52	49	40	36	32	57
	19:00	60	42	52	49	37	32	29	56
	20:00	60	46	51	48	39	35	33	55
	21:00	60	43	50	46	42	39	35	54
	22:00	60	45	49	47	43	40	35	52
	23:00	60	48	52	51	48	45	35	53
7/9/08	0:00	60	49	53	52	49	46	39	55
	1:00	60	48	51	50	48	45	40	53
	2:00	60	47	50	49	47	44	38	51
	3:00	60	45	51	47	44	39	34	57
	4:00	60	41	51	44	40	37	33	54
	5:00	60	40	50	44	37	35	32	54
	6:00	60	44	54	47	39	36	32	58
	7:00	60	46	56	51	42	38	33	61
	8:00	60	47	57	51	43	39	34	61
	9:00	60	45	54	50	42	39	34	57
	10:00	60	49	58	54	42	37	33	64
	11:00	60	50	59	56	45	39	34	63
	12:00	60	50	59	53	42	37	34	65
	13:00	60	48	57	53	44	39	36	63
	14:00	49	49	58	52	43	37	33	65
	15:00	60	44	55	50	39	35	32	59
	16:00	60	48	57	52	43	37	32	62
	17:00	60	52	59	55	45	40	38	64
	18:00	60	42	52	47	37	33	30	55
	19:00	25	56	59	51	37	34	32	64
	20:00	60	42	51	47	38	34	32	55
	21:00	60	46	51	49	44	40	35	54
	22:00	60	48	51	49	45	41	36	53
	23:00	60	45	50	48	43	40	36	52
7/10/08	0:00	60	48	52	51	47	43	37	53
	1:00	60	43	49	47	40	37	36	56
	2:00	60	39	44	43	39	36	33	47
	3:00	60	41	47	44	38	35	33	51
	4:00	60	45	53	48	41	38	36	57
	5:00	60	42	52	47	40	38	36	56
	6:00	60	43	52	47	39	37	35	58
	7:00	60	46	57	51	42	38	36	63
	8:00	60	47	56	52	43	38	36	63
	9:00	60	49	56	53	46	43	41	62
	10:00	60	49	58	53	47	43	41	65
	11:00	60	47	56	52	44	40	37	62
	12:00	60	48	57	53	45	41	38	63
MEDEP Daytime Avg (7 am to 7 pm)			49	57	53	44	39	35	62
MEDEP Nighttime Avg (7 pm to 7 am)			45	51	47	41	38	34	55

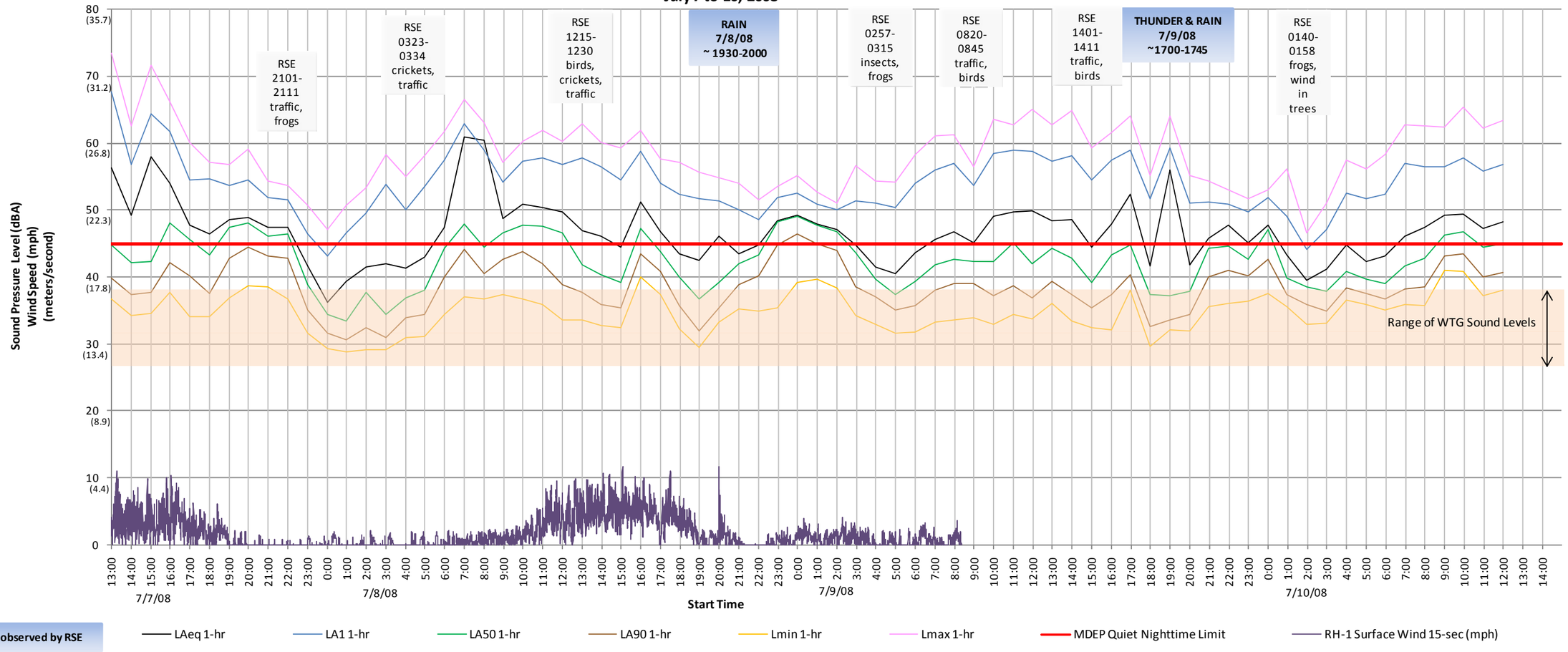
Nighttime periods

Periods of Rain (not included in Avgs)

Record Hill Wind (RH-1 LD824)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008



Record Hill Wind
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind Speed
RH-1 (LD824)
July 7 to 10, 2008



RH-2
Pre-development Ambient Monitoring
July 7-10, 2008

view to the south/southwest

view to the north

Record Hill Wind Project

Pre-Development Ambient Hourly Sound Level Measurements

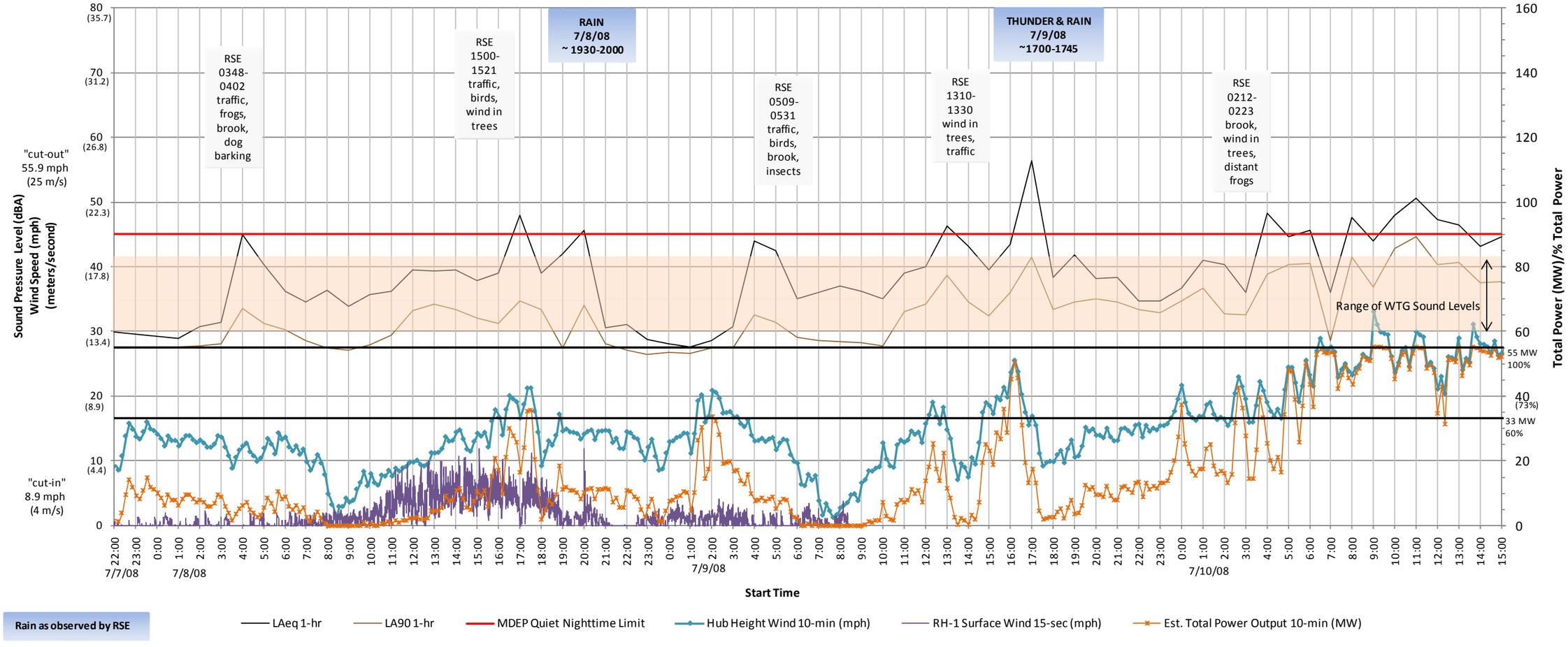
Position RH-2 (LD812)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{Amin}	L_{Amax}
7/7/08	22:00	60	30	36	31	28	27	27	40
	23:00	60	29	34	31	28	28	27	40
7/8/08	0:00	60	29	35	30	28	28	27	39
	1:00	60	29	32	30	28	28	27	36
	2:00	60	31	37	31	29	28	27	42
	3:00	60	31	37	32	29	28	27	46
	4:00	60	45	51	46	39	33	30	56
	5:00	60	40	47	43	37	31	29	52
	6:00	60	36	45	38	33	30	29	52
	7:00	60	35	43	37	31	29	27	49
	8:00	60	36	45	39	31	27	26	50
	9:00	60	34	43	36	30	27	26	49
	10:00	60	36	44	37	31	28	26	49
	11:00	60	36	45	39	33	29	27	50
	12:00	60	39	47	42	37	33	31	52
	13:00	60	39	46	41	37	34	31	51
	14:00	60	39	45	43	38	33	30	48
	15:00	51	38	45	40	35	32	29	54
	16:00	60	39	47	42	36	31	29	51
	17:00	60	48	51	46	40	35	31	54
	18:00	60	39	44	41	37	33	31	48
	19:00	60	42	45	38	32	27	26	50
	20:00	60	46	47	41	37	34	32	54
	21:00	60	30	37	33	29	28	28	39
	22:00	60	31	37	31	28	27	27	43
	23:00	60	29	34	30	27	26	26	39
7/9/08	0:00	60	28	31	29	28	27	26	37
	1:00	60	28	30	28	27	27	26	33
	2:00	60	29	31	29	28	27	27	34
	3:00	60	31	36	31	28	27	27	40
	4:00	60	44	48	43	38	33	29	55
	5:00	60	42	48	45	37	31	29	56
	6:00	60	35	44	38	32	29	27	51
	7:00	60	36	45	38	32	29	26	51
	8:00	60	37	45	40	33	28	26	51
	9:00	60	36	46	39	32	28	26	50
	10:00	60	35	43	38	32	28	26	49
	11:00	60	39	46	42	36	33	31	50
	12:00	60	40	46	42	37	34	31	50
moved meter to higher ground	13:00	45	46	53	47	42	39	36	57
	14:00	60	43	51	45	39	35	32	57
	15:00	60	39	48	42	36	32	31	53
	16:00	60	43	50	46	41	36	34	55
	17:00	60	56	56	52	49	41	40	62
	18:00	60	38	47	41	35	33	33	53
	19:00	60	42	48	43	38	35	34	52
	20:00	60	38	43	39	36	35	34	47
	21:00	60	38	46	40	36	35	33	50
	22:00	60	35	39	36	34	33	33	42
	23:00	60	35	40	36	34	33	32	44
7/10/08	0:00	60	37	42	38	36	35	34	44
	1:00	60	41	46	42	39	37	36	48
	2:00	60	40	42	38	34	33	32	51
	3:00	60	36	43	36	33	33	32	46
	4:00	60	48	54	48	42	39	36	58
	5:00	60	45	51	46	43	40	38	57
	6:00	60	46	53	47	43	40	38	59
	7:00	60	36	45	38	32	29	26	51
	8:00	60	48	55	50	45	41	39	60
	9:00	60	44	52	46	40	37	35	57
	10:00	60	48	54	50	45	43	41	58
	11:00	60	51	58	54	48	45	42	62
	12:00	60	47	55	50	45	40	37	57
	13:00	60	46	54	49	44	41	39	58
	14:00	60	43	50	46	41	37	36	53
	15:00	60	45	52	46	41	38	36	58
MEDEP Daytime Avg (7 am to 7 pm)			41	48	43	37	34	31	53
MEDEP Nighttime Avg (7 pm to 7 am)			36	41	37	33	31	30	46

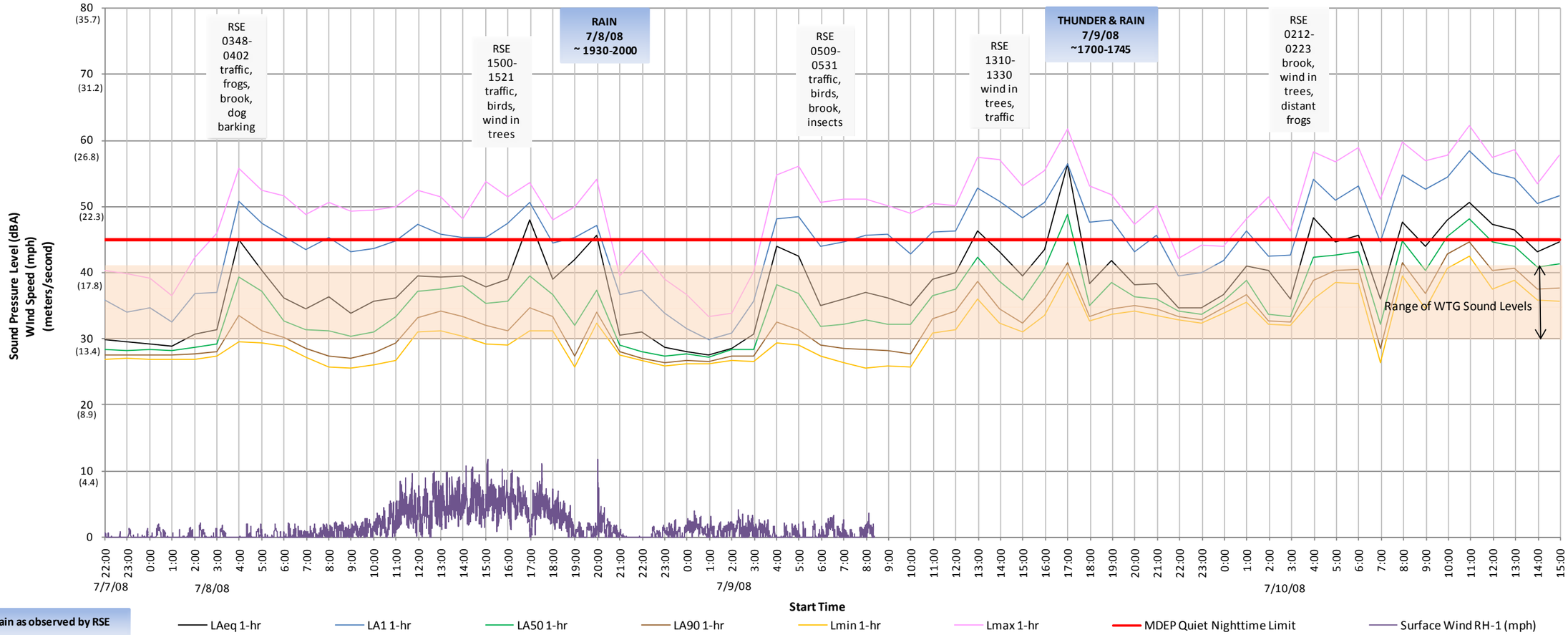
Nighttime periods

Periods of Rain (not included in Avgs)

Record Hill Wind (RH-2 LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008



Record Hill Wind
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind Speed
RH-2 (LD812)
July 7 to 10, 2008



RH-3
Pre-development Ambient Monitoring
July 7-10, 2008

view to the northeast

view to the west

Record Hill Wind Project

Pre-Development Ambient Hourly Sound Level Measurements

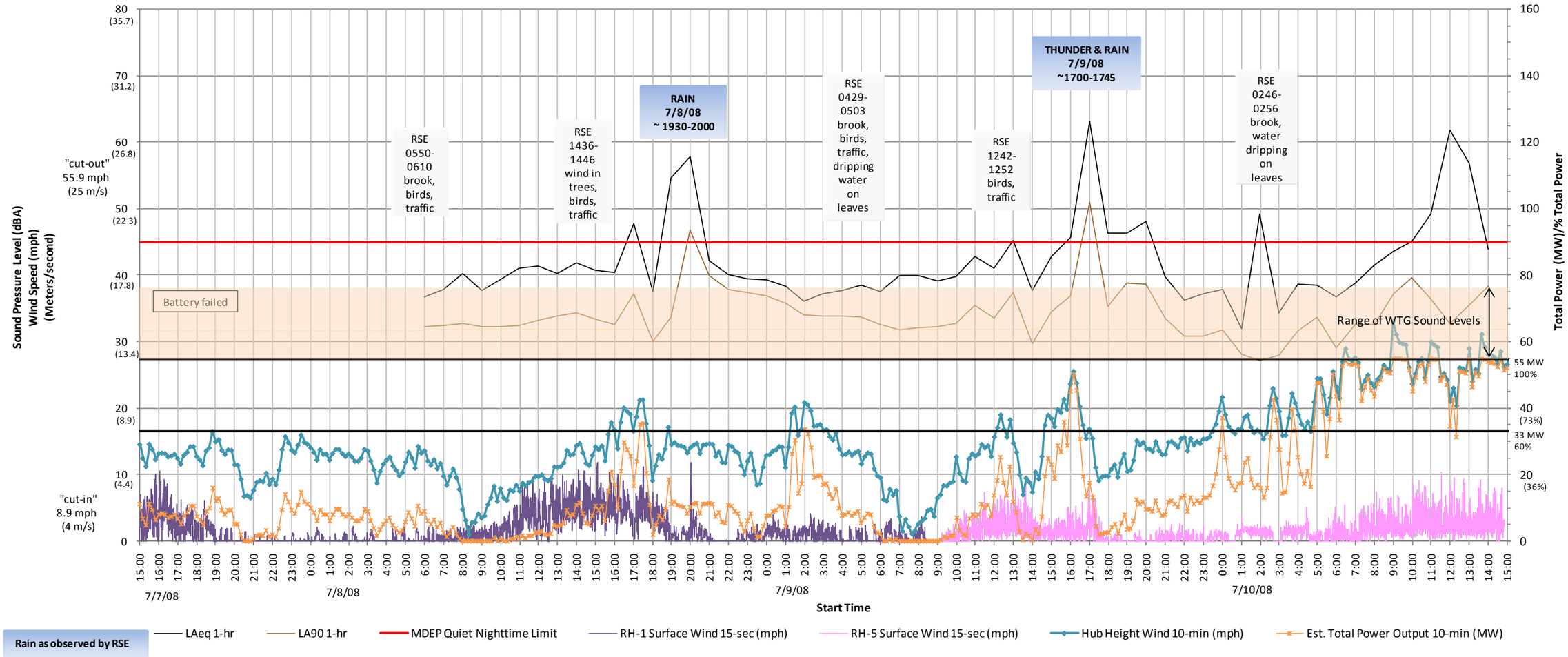
Postion RH-3 (LD812)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA)						
			L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{Amin}	L_{Amax}
7/7/08	15:00	56	39	45	42	37	34	33	49
			battery failure						
7/8/08	6:00	60	37	45	39	34	32	32	54
	7:00	60	38	45	40	34	32	32	48
	8:00	60	40	49	43	35	33	32	54
	9:00	60	38	46	40	34	32	32	49
	10:00	60	39	48	42	35	32	32	50
	11:00	60	41	50	44	37	32	31	55
	12:00	60	41	50	44	37	33	32	53
	13:00	60	40	47	43	38	34	32	48
	14:00	60	42	50	44	39	34	32	56
	15:00	60	41	49	44	38	33	31	52
	16:00	60	40	49	44	38	33	30	51
	17:00	60	48	54	49	43	37	34	56
	18:00	60	38	46	41	34	30	29	48
	19:00	60	55	49	45	38	34	31	58
	20:00	60	58	55	53	49	47	45	59
	21:00	60	42	47	44	42	40	38	56
	22:00	60	40	46	42	40	38	36	55
	23:00	60	40	45	41	39	37	35	52
7/9/08	0:00	60	39	44	41	39	37	35	54
	1:00	60	38	43	40	38	36	34	53
	2:00	60	36	41	38	36	34	33	48
	3:00	60	37	45	39	36	34	32	50
	4:00	60	38	44	38	35	34	33	52
	5:00	60	39	47	41	36	34	32	53
	6:00	60	38	46	41	34	33	32	52
	7:00	60	40	50	40	34	32	31	59
	8:00	60	40	48	43	36	32	31	50
	9:00	60	39	46	41	35	32	31	48
	10:00	60	40	48	42	35	33	31	52
	11:00	60	43	50	46	40	35	33	53
	12:00	60	41	48	44	37	34	32	55
	13:00	60	45	52	49	43	37	34	56
	14:00	60	38	47	41	32	30	29	51
	15:00	60	43	51	46	39	35	32	54
	16:00	60	46	53	49	42	37	33	56
	17:00	60	63	67	60	56	51	48	73
	18:00	60	46	55	44	38	35	33	77
	19:00	60	46	54	46	42	39	35	70
	20:00	60	48	53	44	41	39	37	76
	21:00	60	40	46	40	36	34	31	68
	22:00	60	36	43	37	33	31	29	64
	23:00	60	37	43	37	33	31	29	63
7/10/08	0:00	60	38	44	38	34	32	30	59
	1:00	60	32	39	33	30	28	27	50
	2:00	60	49	39	31	28	27	26	59
	3:00	60	34	42	34	30	28	27	57
	4:00	60	39	48	40	34	32	30	51
	5:00	60	39	47	41	36	34	32	53
	6:00	60	37	46	39	31	29	28	49
	7:00	60	39	48	42	35	33	31	50
	8:00	60	42	50	45	38	33	30	53
	9:00	60	44	50	46	41	37	35	53
	10:00	60	45	52	48	42	40	37	60
	11:00	60	49	55	44	40	36	34	78
	12:00	60	62	45	41	36	33	31	97
	13:00	60	57	47	42	38	35	34	69
	14:00	60	44	51	46	41	38	36	53
MEDEP Daytime Avg (7 am to 7 pm)			43	49	44	38	34	32	56
MEDEP Nighttime Avg (7 pm to 7 am)			40	45	40	36	34	32	57

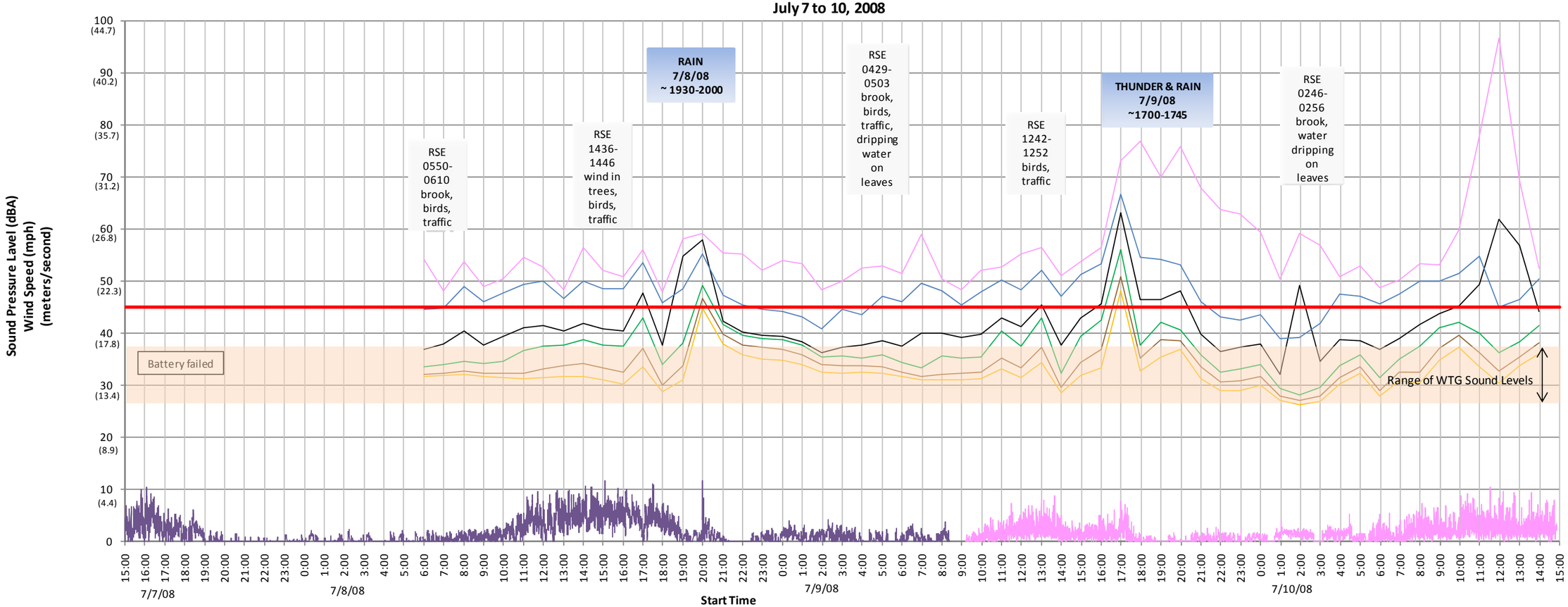
Nighttime periods

Periods of Rain (not included in Avgs)

Record Hill Wind (RH-3 LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Hub Height Wind and Estiamted RHW Power Output
July 7 to 10, 2008



Record Hill Wind
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind Speed
RH-3 (LD812)
July 7 to 10, 2008



RH-4
Pre-development Ambient Monitoring
July 7-10, 2008

view to the north/northeast

view to the north

Record Hill Wind Project

Pre-Development Ambient Hourly Sound Level Measurements

Position RH-4 (LD812)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA)						
			L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{Amin}	L_{Amax}
7/7/08	14:00	60	54	63	56	50	48	44	73
	15:00	60	55	63	58	51	47	43	70
	16:00	60	53	62	56	48	43	38	69
	17:00	60	54	62	55	49	45	41	73
	18:00	60	59	62	53	46	41	35	78
	19:00	60	53	62	55	48	42	33	74
	20:00	60	53	63	55	46	39	32	71
	21:00	60	49	59	49	39	32	28	68
	22:00	60	46	58	37	28	26	25	65
	23:00	60	26	29	27	26	25	25	38
7/8/08	0:00	60	30	32	27	26	25	25	40
	1:00	60	26	28	27	26	26	25	34
	2:00	60	27	30	28	26	25	25	38
	3:00	60	41	35	29	26	25	25	41
	4:00	60	47	54	48	37	32	28	61
	5:00	60	44	53	46	41	38	33	60
	6:00	60	44	55	43	38	35	32	61
	7:00	60	39	49	40	33	30	28	55
	8:00	60	42	52	44	38	35	32	59
	9:00	60	49	55	46	37	31	28	62
	10:00	60	46	56	46	36	31	29	63
	11:00	60	51	62	52	43	37	33	70
	12:00	60	51	61	53	45	40	34	70
	13:00	47	87	75	66	51	43	39	82
	14:00	60	51	60	53	47	43	38	68
	15:00	60	51	60	54	47	41	38	70
	16:00	60	49	60	52	44	38	34	68
	17:00	60	50	59	51	44	39	35	71
	18:00	60	51	59	50	44	39	34	70
	19:00	60	56	60	53	45	40	36	65
	20:00	60	47	56	46	39	35	33	62
	21:00	60	45	53	42	34	31	28	63
	22:00	60	33	41	33	29	27	26	52
	23:00	60	35	42	34	28	27	26	52
7/9/08	0:00	60	28	34	30	27	26	26	44
	1:00	60	29	34	30	28	27	26	44
	2:00	60	30	36	29	27	26	26	49
	3:00	60	43	45	34	28	27	26	56
	4:00	60	45	54	45	36	31	28	59
	5:00	60	39	53	40	33	30	28	58
	6:00	60	41	53	41	33	30	28	60
	7:00	60	44	51	48	40	33	29	56
	8:00	60	45	52	47	43	38	33	57
	9:00	60	44	53	47	41	35	32	60
	10:00	60	46	54	47	40	35	31	63
	11:00	60	53	63	55	44	39	34	71
	12:00	60	52	62	54	46	41	36	70
	13:00	60	55	63	57	51	47	43	72
	14:00	60	51	60	52	46	42	38	71
	15:00	60	58	59	51	42	35	31	71
	16:00	60	51	59	52	44	38	33	64
	17:00	60	58	61	55	48	44	42	66
	18:00	60	49	59	51	38	32	29	65
	19:00	60	47	54	47	41	36	34	58
	20:00	60	40	49	42	36	33	31	54
	21:00	60	45	51	46	44	42	40	55
	22:00	60	38	39	37	33	31	29	44
	23:00	60	35	39	32	29	28	27	48
7/10/08	0:00	60	33	39	34	30	28	27	49
	1:00	60	29	33	30	28	27	27	46
	2:00	60	29	33	29	28	27	27	47
	3:00	60	36	45	31	28	27	27	55
	4:00	60	47	51	45	37	31	28	58
	5:00	60	43	54	44	35	31	29	60
	6:00	60	49	56	51	48	46	43	61
	7:00	60	52	58	54	51	48	46	64
	8:00	60	50	55	52	49	48	45	60
	9:00	60	52	58	52	49	46	43	64
	10:00	60	51	56	53	49	47	44	60
	11:00	60	57	65	59	55	53	50	71
	12:00	60	56	61	58	55	53	51	65
	13:00	60	56	61	58	55	53	50	69
MEDEP Daytime Avg (7 am to 7 pm)			52	59	52	45	41	37	67
MEDEP Nighttime Avg (7 pm to 7 am)			39	46	38	33	31	29	54

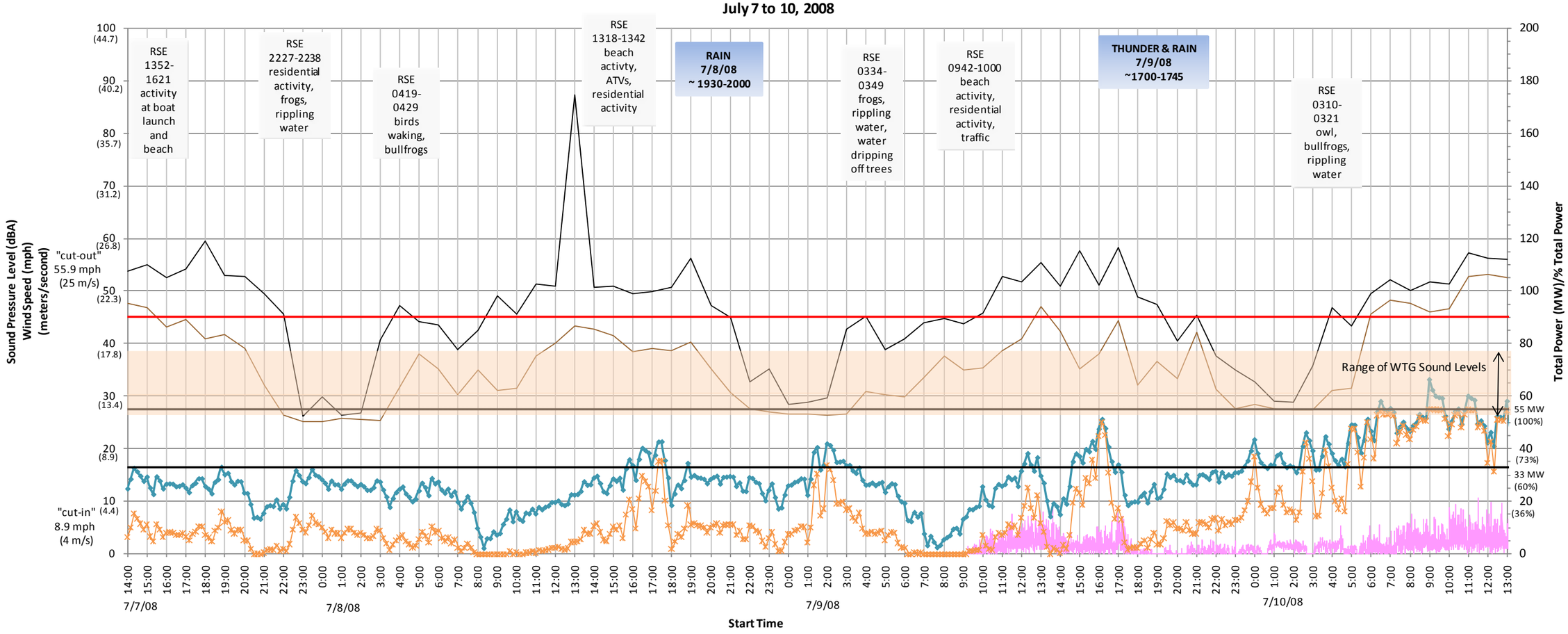
Nighttime periods

Periods of Rain (not included in Avgs)

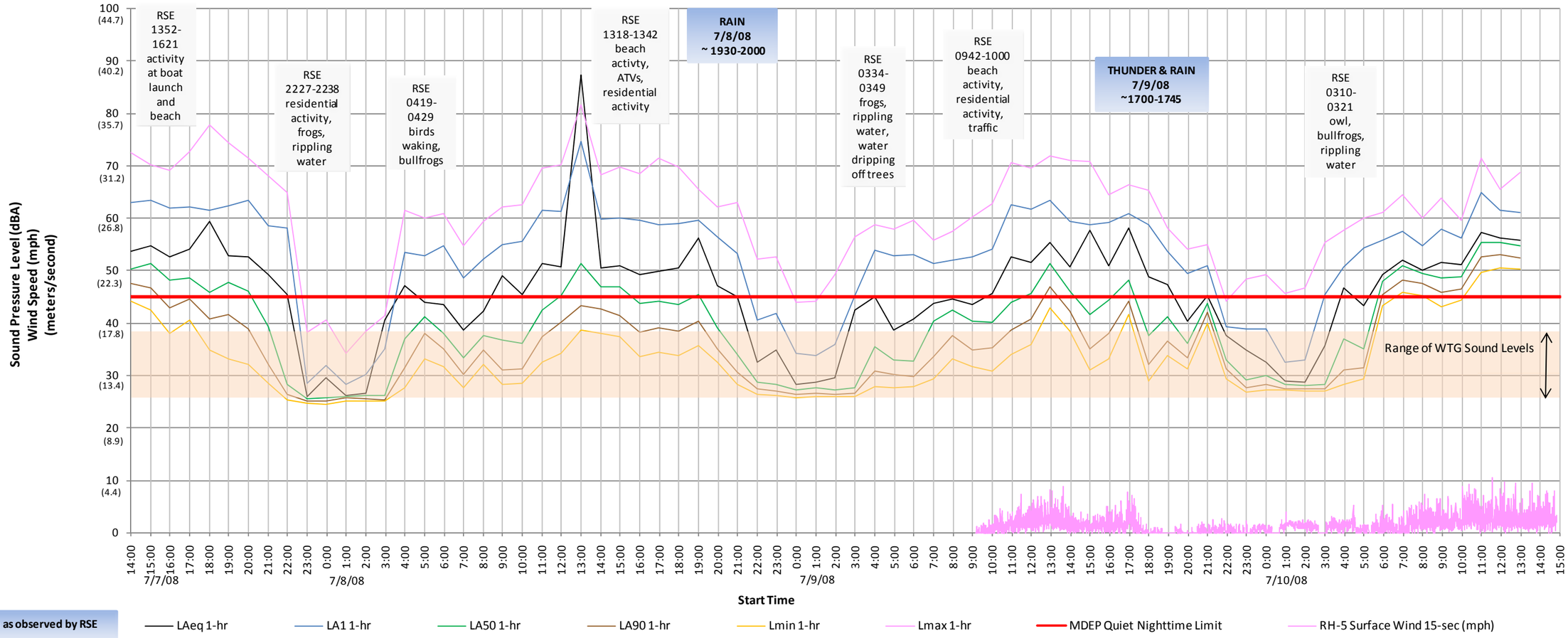
November 2008

Resource Systems Engineering

Record Hill Wind (RH-4 LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008



Record Hill Wind
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind Speed
RH-4 (LD812)
July 7 to 10, 2008



RH-5
Pre-development Ambient Monitoring
July 7-10, 2008

view to the west

view to the west/southwest

Record Hill Wind Project

Pre-Development Ambient Hourly Sound Level Measurements

Position RH-5 (CEL593)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{Amin}	L_{Amax}
7/7/08	14:00	60	38	43	39	35	33	51
	15:00	60	38	46	39	36	34	52
	16:00	60	36	42	37	33	32	50
	17:00	60	35	41	36	33	32	49
	18:00	60	36	44	38	33	32	49
	19:00	60	39	49	42	33	31	55
	20:00	60	38	50	40	31	30	56
	21:00	60	31	34	31	30	30	42
	22:00	60	42	48	36	31	30	60
	23:00	60	30	31	30	30	30	35
7/8/08	0:00	60	30	31	30	30	30	32
	1:00	60	30	30	30	30	30	35
	2:00	60	30	30	30	30	30	32
	3:00	60	30	31	30	30	30	34
	4:00	60	41	47	41	35	32	56
	5:00	60	40	48	43	36	33	54
	6:00	60	40	48	43	37	33	54
	7:00	60	38	46	41	35	33	50
	8:00	60	38	45	40	35	33	52
	9:00	60	41	49	45	36	32	54
	10:00	60	36	45	39	33	32	51
	11:00	60	37	45	40	34	31	50
	12:00	60	41	49	40	35	33	58
	13:00	60	40	46	40	36	33	53
	14:00	60	39	46	42	38	35	54
	15:00	60	38	44	40	37	35	47
	16:00	60	37	44	39	35	33	51
	17:00	60	38	43	40	37	34	48
	18:00	60	41	51	39	34	32	58
	19:00	60	59	52	48	39	35	58
	20:00	60	50	45	40	35	33	51
	21:00	60	39	38	35	31	31	46
	22:00	60	31	33	32	31	30	35
	23:00	60	31	33	31	31	30	40
	0:00	60	31	32	31	31	31	35
	1:00	60	31	32	31	31	31	33
			battery failure					
7/9/08	9:06	60	40	47	41	35	33	56
	10:06	60	41	47	43	37	33	52
	11:06	60	38	43	40	37	35	46
	12:06	60	40	46	43	39	36	48
	13:06	60	42	47	45	40	37	53
	14:06	60	36	40	37	35	33	48
	15:06	60	46	50	43	34	32	54
	16:06	60	47	55	45	40	37	63
	17:06	60	62	59	52	44	39	68
	18:06	60	37	45	39	34	33	53
	19:06	60	48	53	46	40	38	64
	20:06	60	43	50	41	36	35	59
	21:06	60	34	36	34	34	33	44
	22:06	60	43	40	37	35	34	49
	23:06	60	34	36	34	33	33	42
7/10/08	0:06	60	33	35	33	33	33	39
	1:06	60	33	33	33	32	32	36
	2:06	60	32	33	32	32	32	33
	3:06	60	35	39	34	32	32	47
	4:06	60	45	50	44	38	34	55
	5:06	60	40	48	43	37	34	53
	6:06	60	40	47	43	37	34	52
	7:06	60	43	49	46	41	37	53
	8:06	60	41	46	43	40	37	50
	9:06	60	40	48	43	38	35	50
	10:06	60	44	50	47	43	40	51
	11:06	60	44	51	47	41	38	54
	12:06	60	44	51	45	41	38	56
	13:06	60	43	49	45	41	38	52
MEDEP Daytime Avg (7 am to 7 pm)			40	46	41	37	34	52
MEDEP Nighttime Avg (7 pm to 7 am)			36	40	36	33	32	45

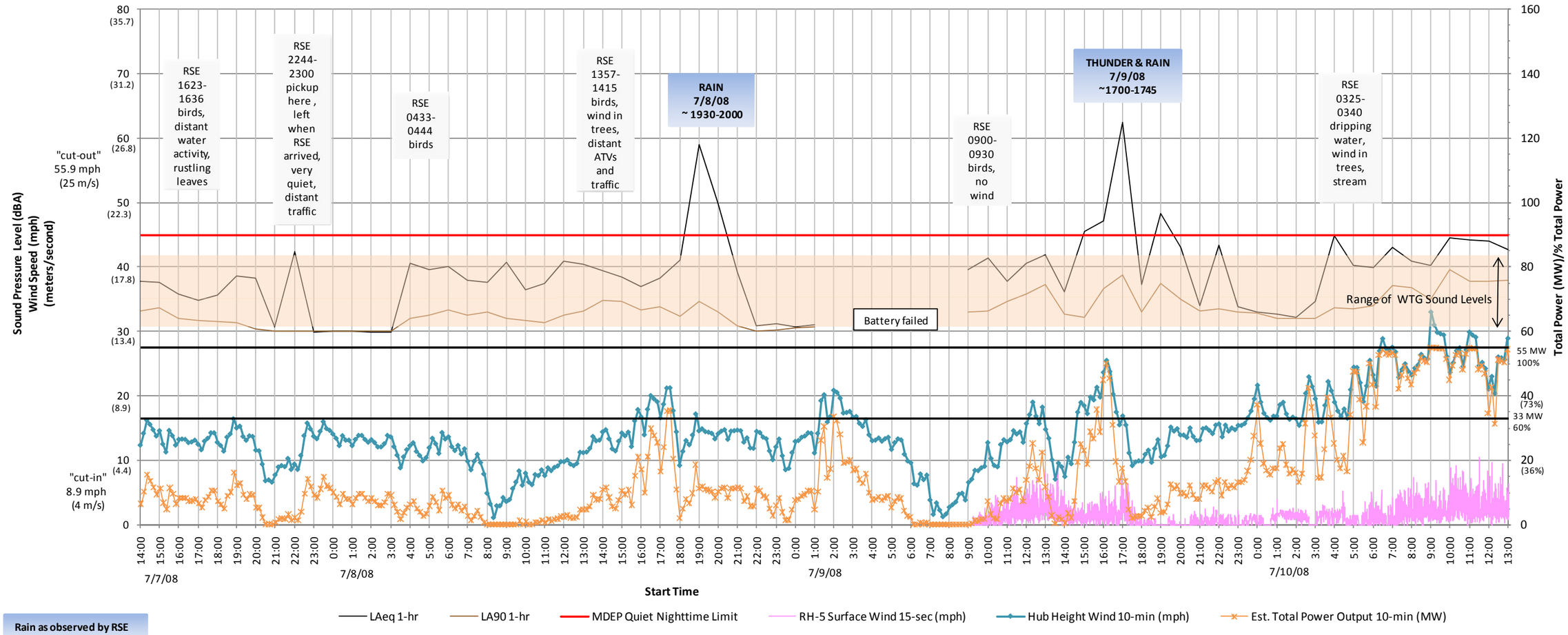
Nighttime periods

Periods of Rain (not included in Avgs)

November 2008

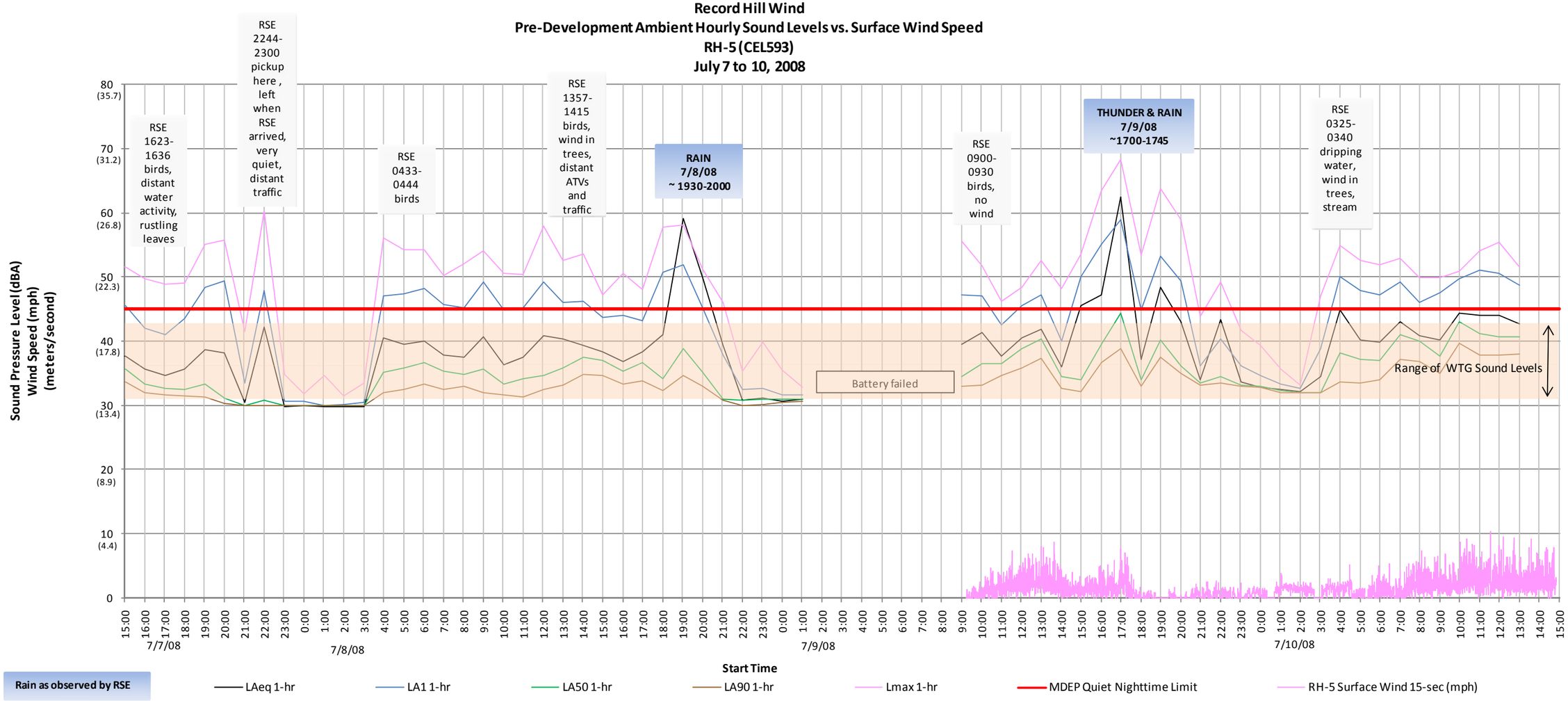
Resource Systems Engineering

Record Hill Wind (RH-5 CEL593)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Hub Height Wind and Estimated RHW Power Output
July 7 to 10, 2008



Rain as observed by RSE

Record Hill Wind
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind Speed
RH-5 (CEL593)
July 7 to 10, 2008



AUGUST 5 to 13, 2008

view to the west/southwest

view to the west

RH-1
Pre-development Ambient Monitoring
August 5-13, 2008

view to the east/northeast

Record Hill Wind Project

Hourly Ambient Sound Level Measurements

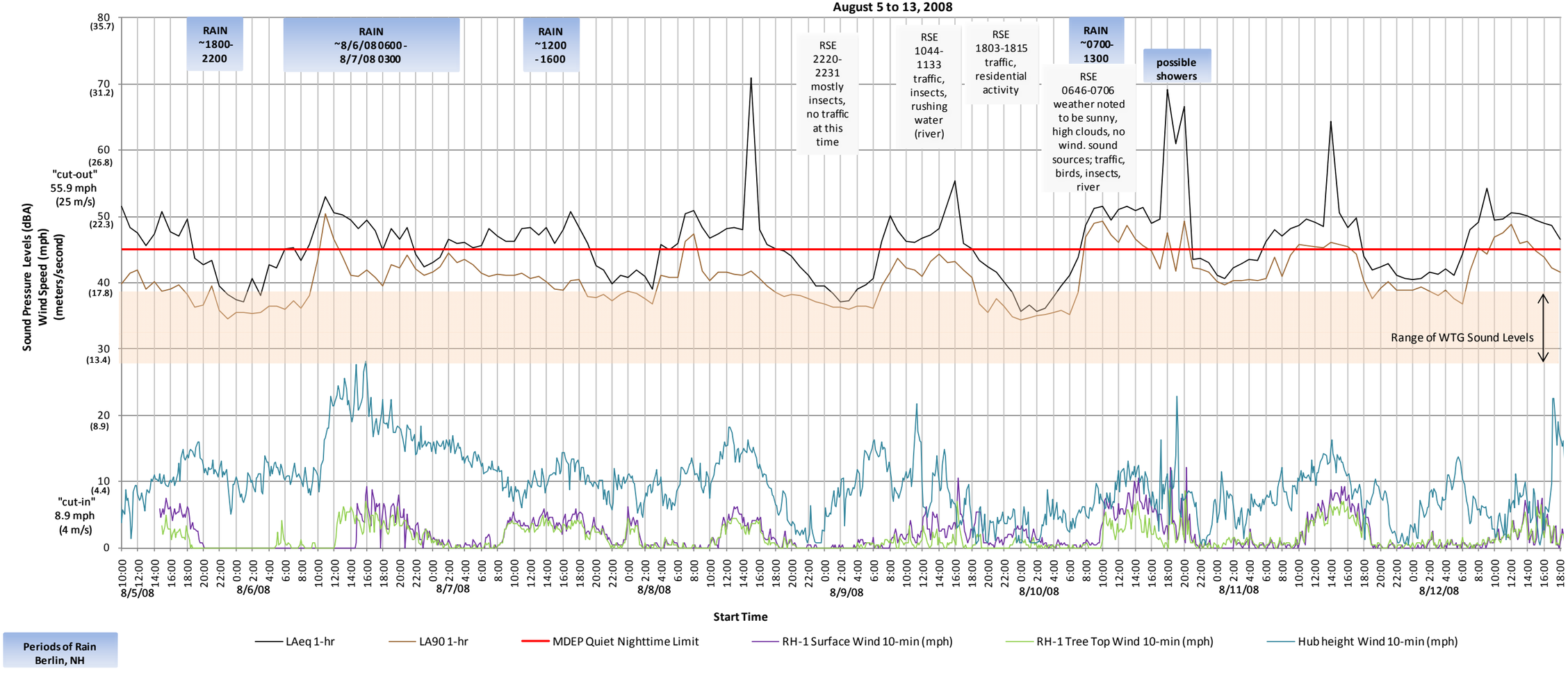
Postion RH-1 (LD812)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{min}	L_{max}
8/5/08	10:00	60	51	58	49	43	40	37	73
	11:00	60	48	57	49	43	41	39	63
	12:00	60	47	58	49	44	42	40	63
	13:00	60	46	54	49	42	39	37	59
	14:00	60	47	58	48	42	40	38	66
	15:00	60	51	60	51	42	39	37	66
	16:00	60	48	58	50	42	39	37	65
	17:00	60	47	57	50	43	40	37	62
	18:00	60	50	58	50	41	38	36	61
	19:00	60	44	53	45	40	36	34	58
	20:00	60	43	52	44	39	37	34	55
	21:00	60	43	51	44	42	39	35	54
	22:00	60	39	49	40	37	36	35	52
	23:00	60	38	46	39	36	35	33	51
8/6/08	0:00	60	37	41	39	37	35	34	42
	1:00	60	37	40	38	37	35	34	42
	2:00	60	41	47	40	37	35	34	49
	3:00	60	38	43	39	37	35	34	47
	4:00	60	43	53	43	38	36	35	56
	5:00	60	42	53	41	38	36	35	57
	6:00	60	45	56	46	39	36	34	60
	7:00	60	45	56	48	40	37	35	60
	8:00	60	43	54	45	38	36	35	58
	9:00	60	46	55	48	41	38	37	59
	10:00	60	49	58	51	46	44	42	62
	11:00	60	53	59	55	52	50	49	64
	12:00	60	51	58	53	48	47	46	61
	13:00	60	50	59	53	47	44	43	66
	14:00	60	49	60	53	44	41	40	64
	15:00	60	48	58	52	43	41	39	61
	16:00	60	49	59	53	44	42	41	62
	17:00	60	48	58	51	43	41	39	62
	18:00	60	45	55	47	41	39	39	60
	19:00	60	48	56	50	44	43	41	60
	20:00	60	46	56	47	43	42	41	61
	21:00	60	48	57	49	46	44	44	61
	22:00	60	44	49	45	43	42	42	52
	23:00	20	42	47	43	42	41	40	51
8/7/08	0:00	60	43	46	43	42	42	41	52
	1:00	60	44	46	44	43	42	42	49
	2:00	60	46	50	47	46	44	44	55
	3:00	60	46	54	45	44	43	42	58
	4:00	60	46	54	46	45	44	43	59
	5:00	60	45	55	45	44	43	42	58
	6:00	60	45	56	46	42	41	41	58
	7:00	60	48	59	49	42	41	40	63
	8:00	60	47	57	48	42	41	40	61
	9:00	60	46	56	49	42	41	40	60
	10:00	60	46	56	49	43	41	40	60
	11:00	60	48	57	50	43	41	40	60
	12:00	60	48	59	51	43	40	39	66
	13:00	60	47	57	51	43	41	39	59
	14:00	60	48	58	52	43	40	39	63
	15:00	60	46	55	50	41	39	38	59
	16:00	60	48	58	51	42	39	38	65
	17:00	60	51	59	51	43	40	38	67
	18:00	60	48	57	51	43	40	40	61
	19:00	60	46	56	49	39	38	37	60
	20:00	60	43	53	44	39	38	37	58
	21:00	60	42	51	42	39	38	38	54
	22:00	60	40	49	40	38	37	37	53
	23:00	60	41	51	41	39	38	37	55
8/8/08	0:00	60	41	46	42	40	39	38	49
	1:00	60	42	46	43	40	38	38	48
	2:00	60	41	47	40	38	37	37	49
	3:00	60	39	45	39	37	37	36	48
	4:00	60	46	55	46	43	41	40	59
	5:00	60	45	52	47	43	41	40	55
	6:00	60	46	56	46	43	41	40	59
	7:00	60	50	58	51	47	46	46	62
	8:00	60	51	60	52	48	47	47	64
	9:00	60	48	57	51	43	42	41	63
	10:00	60	47	56	48	42	40	40	67
	11:00	60	47	56	50	43	41	41	63
	12:00	60	48	57	51	43	41	40	63
	13:00	60	48	57	52	44	41	40	60
	14:00	60	48	57	52	44	41	40	59
	15:00	47	71	64	52	44	42	41	73
	16:00	60	48	57	51	43	41	40	64
	17:00	60	46	56	49	41	39	39	61
	18:00	60	45	55	48	40	38	38	62
	19:00	60	45	55	47	39	38	37	60
	20:00	60	44	55	46	40	38	37	58
	21:00	60	42	52	44	39	38	37	55
	22:00	60	41	51	42	38	38	37	54
	23:00	60	39	49	39	38	37	36	54
8/9/08	0:00	60	39	46	40	38	37	36	48
	1:00	60	38	46	38	37	36	36	49
	2:00	60	37	40	38	37	36	36	41
	3:00	60	37	42	38	37	36	36	43
	4:00	60	39	47	39	37	36	36	50
	5:00	60	40	49	40	37	36	36	53
	6:00	60	41	50	41	37	36	36	58
	7:00	60	46	55	46	41	39	37	66
	8:00	60	50	57	49	44	41	39	67
	9:00	60	48	55	51	46	44	41	58
	10:00	60	46	54	49	44	42	40	57
	11:00	60	46	53	49	45	42	39	55
	12:00	60	47	55	48	44	41	39	65
	13:00	60	47	54	49	46	43	41	57
	14:00	60	48	56	50	46	44	41	61
	15:00	60	52	56	51	45	43	41	61
	16:00	60	55	58	51	46	43	40	63
	17:00	60	46	54	49	44	42	40	57
	18:00	60	45	54	48	42	41	39	57
	19:00	60	43	53	47	39	37	35	56
	20:00	60	42	52	46	37	35	35	55
	21:00	60	42	51	43	39	37	36	54
	22:00	60	40	50	40	38	36	36	54
	23:00	60	39	47	39	36	35	34	51
8/10/08	0:00	60	36	40	36	35	34	34	42
	1:00	60	37	41	37	35	35	34	43
	2:00	60	36	37	36	36	35	34	38
	3:00	60	36	40	37	36	35	35	43
	4:00	60	38	44	38	36	35	35	47
	5:00	60	40	47	40	37	36	35	51
	6:00	60	41	53	42	36	35	35	58
	7:00	60	44	52	45	40	39	37	60
	8:00	60	49	53	50	48	47	46	58
	9:00	60	51	56	53	50	49	48	58
	10:00	60	51	57	53	51	49	48	62
	11:00	60	49	55	51	49	47	45	58
	12:00	60	51	59	52	48	46	44	69
	13:00	60	51	58	53	50	49	47	61
	14:00	60	51	59	52	48	46	45	64
	15:00	60	51	62	53	48	46	43	67
	16:00	60	49	56	52	47	45	42	60
	17:00	60	50	56	51	44	42	40	61
	18:00	60	69	70	60	54	47	46	83
	19:00	60	61	68	53	45	42	41	80
	20:00	60	67	70	59	52	49	48	79
	21:00	60	44	49	44	43	42	42	52
	22:00	60	44	50	44	43	42	42	52
	23:00	60	43	46	43	42	41	41	47
8/11/08	0:00	60	41	44	42	41	40	40	46
	1:00	60	41	43	41	41	40	39	44
	2:00	60	42	45	42	41	40	40	47
	3:00	60	43	49	42	41	40	40	52
	4:00	60	44	51	44	42	40	39	53
	5:00	60	43	52	44	42	40	39	56
	6:00	60	46	57	48	42	41	39	59
	7:00	60	48	57	50	45	44	42	64
	8:00	60	47	57	49	42	41	39	63
	9:00	60	48	56	49	46	44	43	64
	10:00	60	49	55	50	47	46	44	59
	11:00	60	50	58	51	47	46	44	63
	12:00	60	49	56	52	47	45	44	64
	13:00	60	49	56	50	47	45	43	63
	14:00	60	64	66	54	48	46	44	71
	15:00	60	51	57	52	48	46	44	67
	16:00	60	48	55	50	47	45	44	59
	17:00	60	50	57	51	46	44	43	64
	18:00	60	44	53	46	42	40	39	56
	19:00	60	42	50	44	39	37	36	53
	20:00	60	42	50	44	40	39	37	54
	21:00	60	43	51	44	41	40	39	55
	22:00	60	41	48	42	40	39	38	50
	23:00	60	41	47	42	40	39	37	49
8/12/08	0:00	60	40	44	41	40	39	37	46
	1:00	60	41	43	42	40	39	38	45
	2:00	60	42	45	41	40	39	37	46
	3:00	60	41	48	41	39	38	37	51
	4:00	60	42	50	42	40	39	37	53
	5:00	60	41	51	42	39	37	36	54
	6:00	60	44	55	45	39	37	35	59
	7:00	60	48	59	49	43	42	40	63
	8:00	60	49	55	50	47	45	44	65
	9:00	60	54	61	52	46	44	42	66
	10:00	60	49	54	51	49	47	45	58
	11:00	60	50	53	51	49	48	45	54
	12:00	60	51	55	52	50	49	47	58
	13:00	60	50	57	52	49	46	43	61
	14:00	60	50	56	52	49	46	42	60
	15:00	60	49	58	52	47	45	42	64
	16:00	60	49	55	51	47	44	42	58
	17:00	60	49	58	51	45	42	40	62
	18:00	60	47	55	48	44	42	40	59
MDEP Daytime Avg (7 am to 7 pm)			49	57	50	45	43	41	62
MDEP Nighttime Avg (7 pm to 7 am)			41	49	42	39	38	37	52

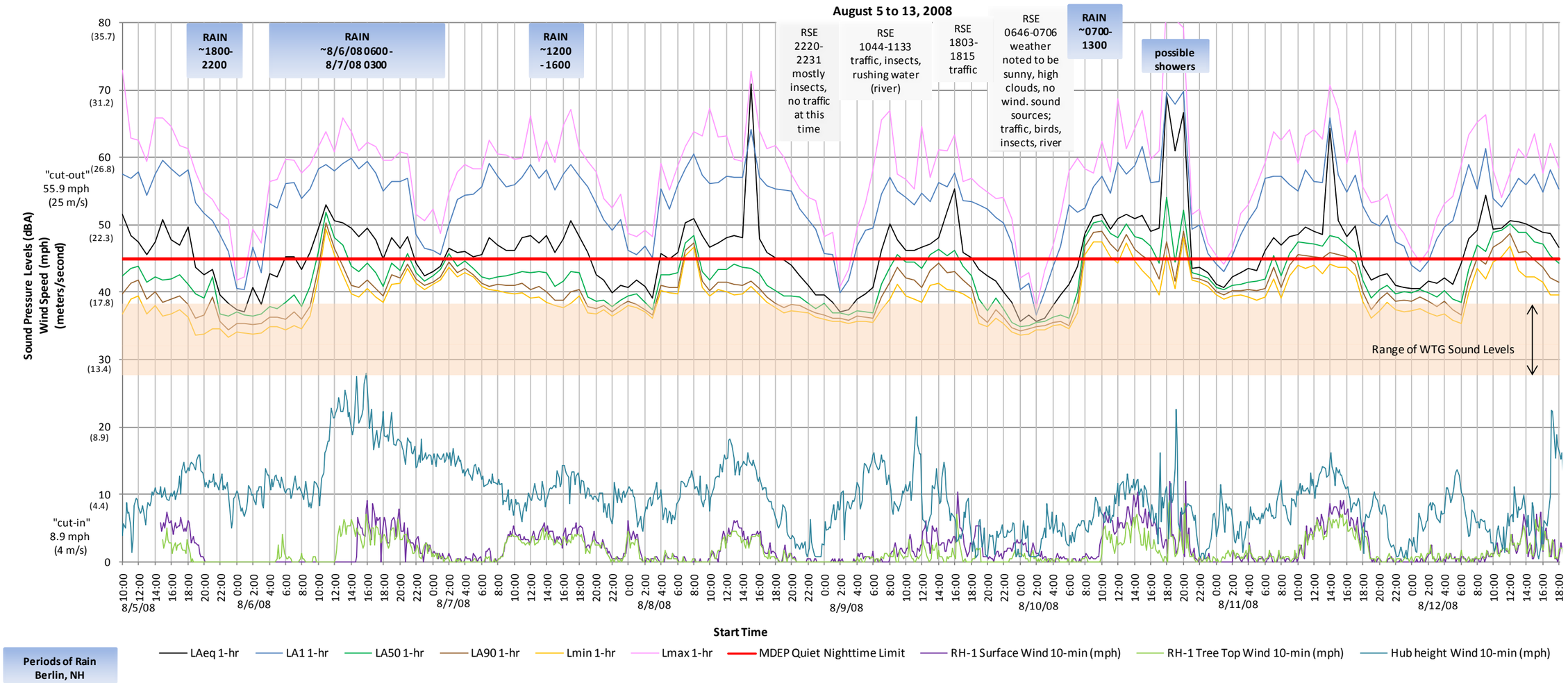
Nighttime Periods

Periods of Rain (not included in Avgs)

Record Hill Wind
RH-1 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



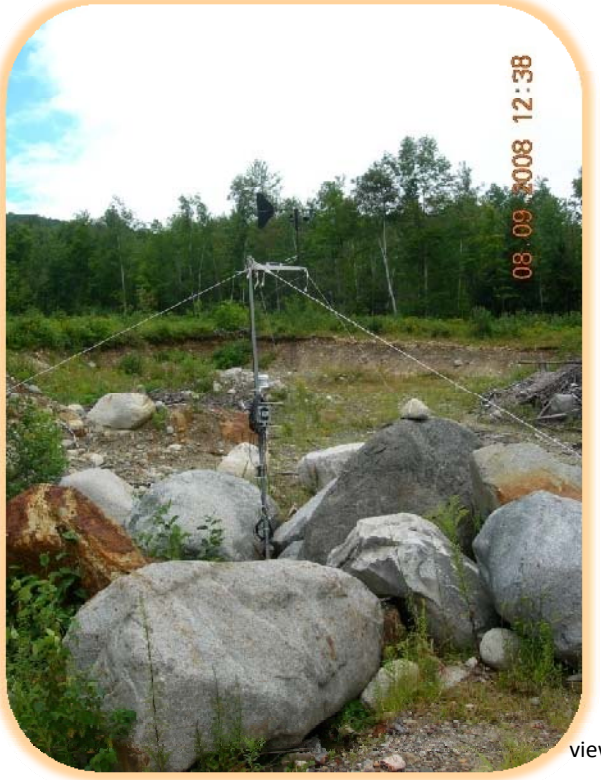
Record Hill Wind
RH-1 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



view to the northeast

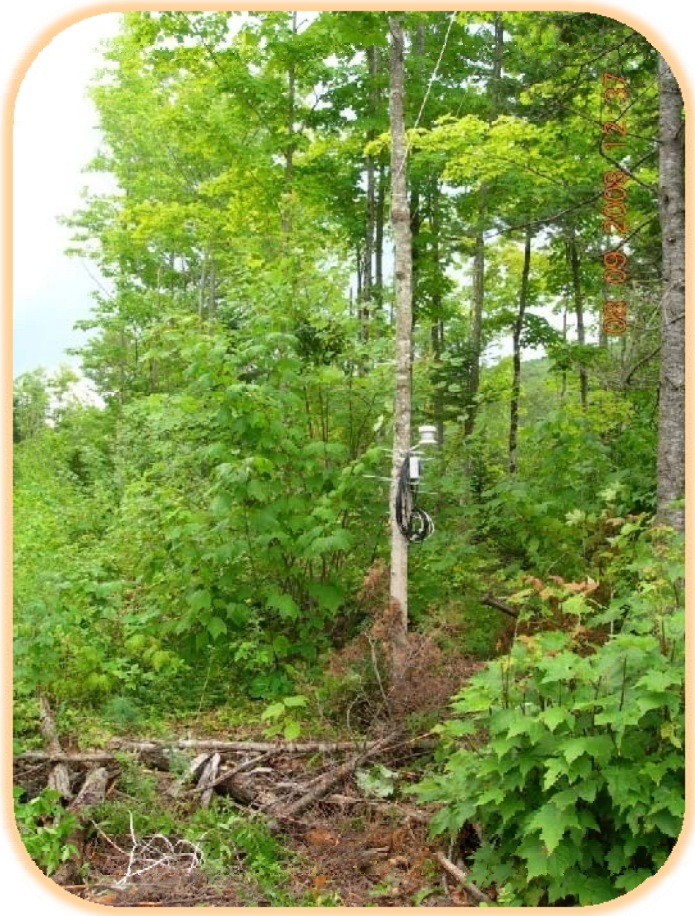
view to the northeast

RH-2
Pre-development Ambient Monitoring
August 5-13, 2008



view to the west

RH-2
Tree Top Meteorological Station
August 5-13, 2008



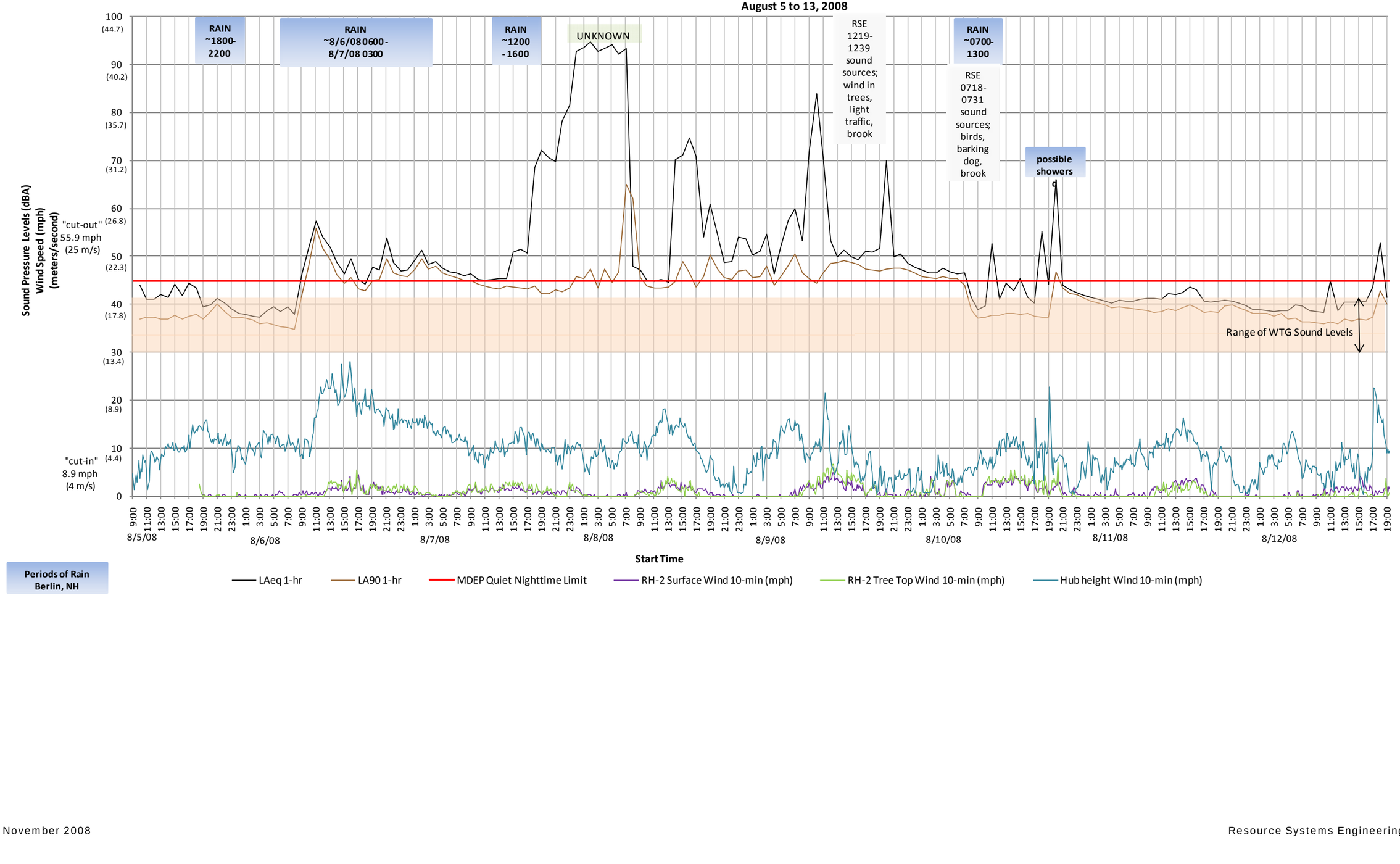
view to the northwest

Record Hill Wind Project
Hourly Ambient Sound Level Measurements
Position RH-2 (LD812)

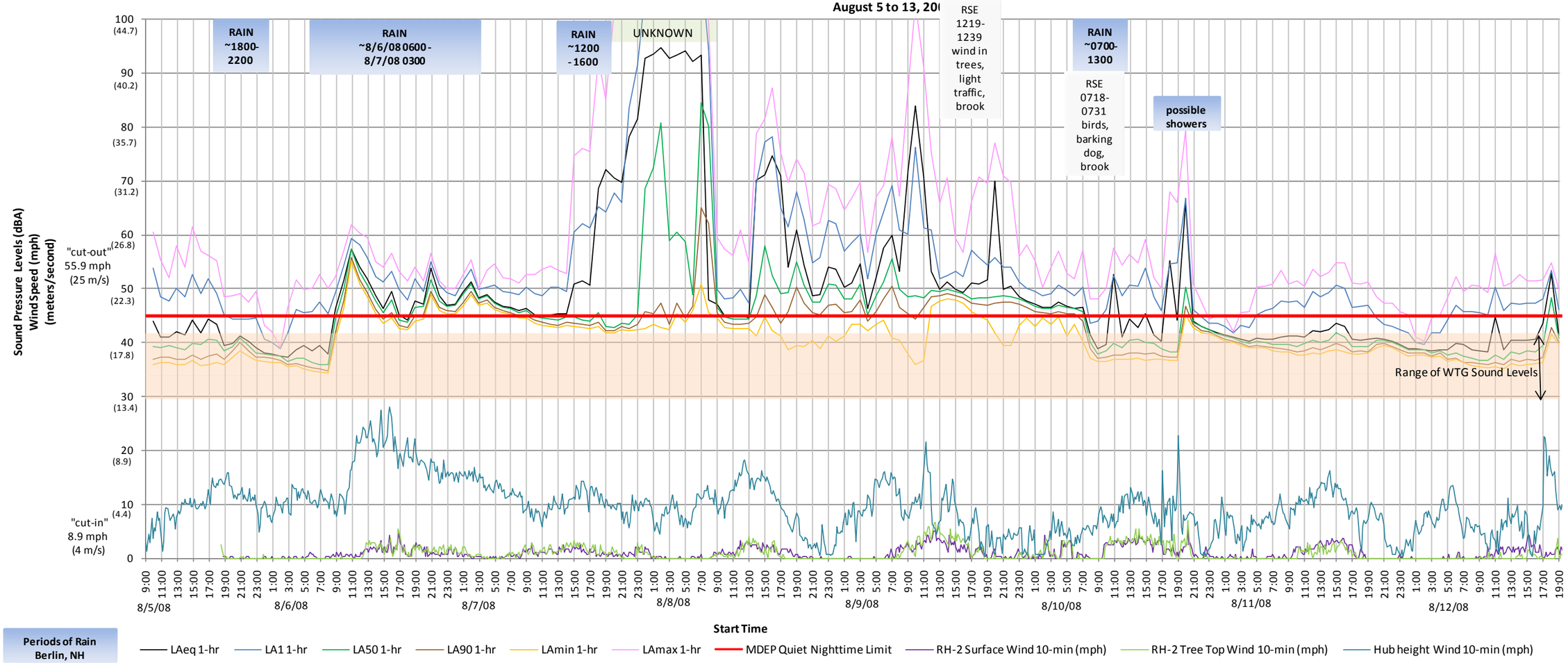
Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{min}	L_{max}
8/5/08	10:00	60	44	54	45	39	37	36	60
	11:00	60	41	49	43	39	37	36	55
	12:00	60	41	48	44	39	37	36	52
	13:00	60	42	50	44	39	37	36	58
	14:00	60	41	48	43	39	37	36	54
	15:00	60	44	53	45	40	38	37	61
	16:00	60	42	49	45	40	37	36	57
	17:00	60	44	52	46	41	38	36	56
	18:00	60	43	49	45	40	38	36	55
	19:00	60	39	45	42	38	37	36	48
	20:00	60	40	44	41	39	38	37	49
	21:00	60	41	44	42	41	40	39	49
	22:00	60	40	44	42	40	39	38	47
	23:00	60	39	45	41	38	37	37	50
8/6/08	0:00	60	38	41	39	38	37	37	43
	1:00	60	38	40	39	38	37	36	42
	2:00	60	38	39	38	38	37	36	39
	3:00	60	37	42	38	37	36	36	46
	4:00	60	39	46	40	37	36	36	52
	5:00	60	39	46	41	37	36	35	50
	6:00	60	39	46	41	36	35	35	50
	7:00	60	39	48	41	36	35	35	53
	8:00	60	38	45	40	36	35	34	50
	9:00	60	46	49	47	45	42	41	52
	10:00	60	52	54	53	50	48	47	57
	11:00	60	57	59	58	57	56	55	62
	12:00	60	54	58	55	53	52	51	60
	13:00	60	52	56	53	51	49	48	60
	14:00	60	49	52	50	48	46	45	55
	15:00	60	46	51	48	46	44	44	54
	16:00	60	50	53	51	48	46	45	57
	17:00	60	45	50	47	44	43	43	53
	18:00	60	44	48	45	44	43	42	51
	19:00	60	48	52	50	47	45	44	54
	20:00	60	47	50	48	47	45	44	51
	21:00	60	54	55	54	52	50	49	56
	22:00	60	49	51	49	48	47	46	51
	23:00	20	47	49	48	47	46	45	50
8/7/08	0:00	60	47	49	48	47	46	45	50
	1:00	60	49	51	50	49	47	47	52
	2:00	60	51	54	53	51	49	49	55
	3:00	60	48	50	49	48	47	47	50
	4:00	60	49	50	50	49	48	47	53
	5:00	60	48	51	48	47	46	46	55
	6:00	60	47	49	48	47	46	46	52
	7:00	60	47	49	47	46	46	45	52
	8:00	60	46	49	47	46	45	45	51
	9:00	60	46	50	47	46	45	45	53
	10:00	60	45	49	46	45	44	44	53
	11:00	60	45	49	46	45	44	43	54
	12:00	60	45	50	47	45	43	43	54
	13:00	60	45	50	47	44	43	43	53
	14:00	60	45	49	47	45	44	43	53
	15:00	60	51	60	48	45	44	43	75
	16:00	60	51	62	46	44	43	43	76
	17:00	60	51	61	47	44	43	43	75
	18:00	60	69	65	50	46	44	43	93
	19:00	60	72	64	46	43	42	42	85
	20:00	60	71	68	44	43	42	42	102
	21:00	60	70	66	45	44	43	42	102
	22:00	60	78	83	47	44	43	42	106
	23:00	60	82	92	54	45	43	43	107
8/8/08	0:00	60	93	105	97	69	46	43	111
	1:00	60	93	105	98	73	45	43	110
	2:00	60	95	106	100	81	47	43	110
	3:00	60	93	106	95	59	43	42	110
	4:00	60	93	106	96	61	47	45	111
	5:00	60	94	107	98	59	44	44	111
	6:00	60	92	105	93	49	47	46	110
	7:00	60	93	110	105	84	65	51	112
	8:00	60	48	94	90	80	62	46	99
	9:00	60	47	50	48	47	45	45	60
	10:00	60	45	48	46	45	44	43	57
	11:00	60	45	48	46	44	43	43	56
	12:00	60	45	50	46	44	43	43	61
	13:00	60	45	47	45	44	44	43	55
	14:00	60	70	70	54	49	45	41	79
	15:00	60	71	77	71	58	49	45	82
	16:00	60	75	78	63	53	47	42	87
	17:00	53	71	65	59	49	44	41	75
	18:00	60	54	61	56	49	46	39	70
	19:00	60	61	68	62	55	50	40	74
	20:00	60	54	63	56	51	47	39	71
	21:00	60	49	55	51	48	46	40	62
	22:00	60	49	56	51	48	45	39	62
	23:00	60	54	63	57	51	47	41	69
8/9/08	0:00	60	54	62	56	51	47	40	69
	1:00	60	50	57	52	48	45	41	65
	2:00	60	51	59	53	48	46	43	67
	3:00	60	55	60	55	51	48	43	70
	4:00	60	46	52	48	45	44	42	57
	5:00	60	52	60	55	49	46	43	67
	6:00	60	57	64	59	51	48	44	69
	7:00	60	60	69	62	56	50	41	78
	8:00	60	53	61	56	50	46	41	67
	9:00	60	72	60	53	49	45	38	87
	10:00	60	84	76	56	49	44	36	103
	11:00	60	71	61	52	48	47	37	91
	12:00	60	53	61	54	50	48	47	75
	13:00	60	50	52	51	50	49	48	66
	14:00	60	51	52	51	50	49	48	70
	15:00	60	50	53	50	50	49	48	59
	16:00	60	49	52	50	49	48	47	57
	17:00	60	51	57	50	48	47	46	66
	18:00	60	51	56	50	48	47	45	71
	19:00	60	52	54	50	48	47	44	69
	20:00	60	70	56	50	49	47	42	77
	21:00	60	50	54	50	49	48	40	71
	22:00	60	50	54	50	49	48	40	70
	23:00	60	48	51	50	48	47	43	56
8/10/08	0:00	60	48	50	49	48	47	45	58
	1:00	60	47	49	48	47	46	43	55
	2:00	60	47	49	48	46	46	45	50
	3:00	60	47	49	48	46	45	44	54
	4:00	60	48	51	49	47	46	45	57
	5:00	60	47	50	48	47	45	41	53
	6:00	60	46	49	47	46	45	44	52
	7:00	60	47	50	48	46	44	40	57
	8:00	60	41	44	42	40	39	37	48
	9:00	60	39	44	41	38	37	37	48
	10:00	60	40	46	42	39	37	37	50
	11:00	60	53	52	46	40	38	37	58
	12:00	60	41	49	43	39	38	37	54
	13:00	60	44	51	45	41	38	37	56
	14:00	60	43	50	45	41	38	37	55
	15:00	60	45	54	46	40	38	37	59
	16:00	60	42	48	44	40	38	37	52
	17:00	60	40	46	43	39	38	37	50
	18:00	60	55	55	42	38	37	37	68
	19:00	60	44	55	42	38	37	37	66
	20:00	60	66	67	58	50	47	45	79
	21:00	60	44	46	44	44	43	43	51
	22:00	60	43	45	44	43	42	42	47
	23:00	60	42	44	43	42	42	42	44
8/11/08	0:00	60	42	44	42	42	41	41	45
	1:00	60	41	43	42	41	41	40	45
	2:00	60	41	42	42	41	40	40	42
	3:00	60	41	43	41	40	40	39	45
	4:00	60	40	43	41	40	39	39	46
	5:00	60	41	45	42	40	40	39	50
	6:00	60	41	46	42	40	39	39	50
	7:00	60	41	46	42	40	39	39	51
	8:00	60	41	48	43	40	39	38	53
	9:00	60	41	47	43	40	39	38	51
	10:00	60	41	48	44	39	38	38	51
	11:00	60	41	47	43	40	39	38	50
	12:00	60	42	49	45	41	39	38	54
	13:00	60	42	49	44	40	39	38	52
	14:00	60	42	49	44	41	39	39	53
	15:00	60	44	51	46	42	40	39	55
	16:00	60	43	50	45	41	39	38	55
	17:00	60	41	46	43	39	38	38	51
	18:00	60	40	47	42	39	39	38	51
	19:00	60	41	47	42	39	38	38	51
	20:00	60	41	45	42	40	40	39	49
	21:00	60	41	43	41	41	40	40	47
	22:00	60	40	43	41	40	39	39	47
	23:00	60	40	42	40	40	39	38	46
8/12/08	0:00	60	39	42	40	39	38	38	45
	1:00	60	39	40	39	39	38	38	41
	2:00	60	39	40	39	39	38	38	40
	3:00	60	38	42	39	38	38	37	45
	4:00	60	39	42	39	39	38	38	45
	5:00	60	39	44	40	38	37	37	48
	6:00	60	40	47	42	38	37	37	52
	7:00	60	40	46	41	37	36	36	50
	8:00	60	39	46	41	37	36	36	51
	9:00	60	38	46	40	37	36	36	50
	10:00	60	38	45	40	37	36	35	49
	11:00	60	45	50	42	38	36	36	56
	12:00	60	39	46	40	37	36	35	50
	13:00	60	40	47	43	38	37	36	51
	14:00	60	41	47	43	38	37	36	53
	15:00	60	41	47	43	38	37	36	51
	16:00	60	41	47	43	38	37	36	51
	17:00	60	44	48	45	40	37	36	52
	18:00	60	53	53	52	48	43	42	55
	19:00	60	41	46	43	41	40	40	50
MDEP Daytime Avg (7 am to 7 pm)			48	52	47	43	41	40	59
MDEP Nighttime Avg (7 pm to 7 am)			45	49	46	44	42	40	54

Nighttime Periods
Periods of Rain (not included in Avgs)
Unknown (not included in Avgs)

Record Hill Wind
RH-2 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



Record Hill Wind
RH-2 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 20



RH-3
Pre-development Ambient Monitoring
August 5-13, 2008

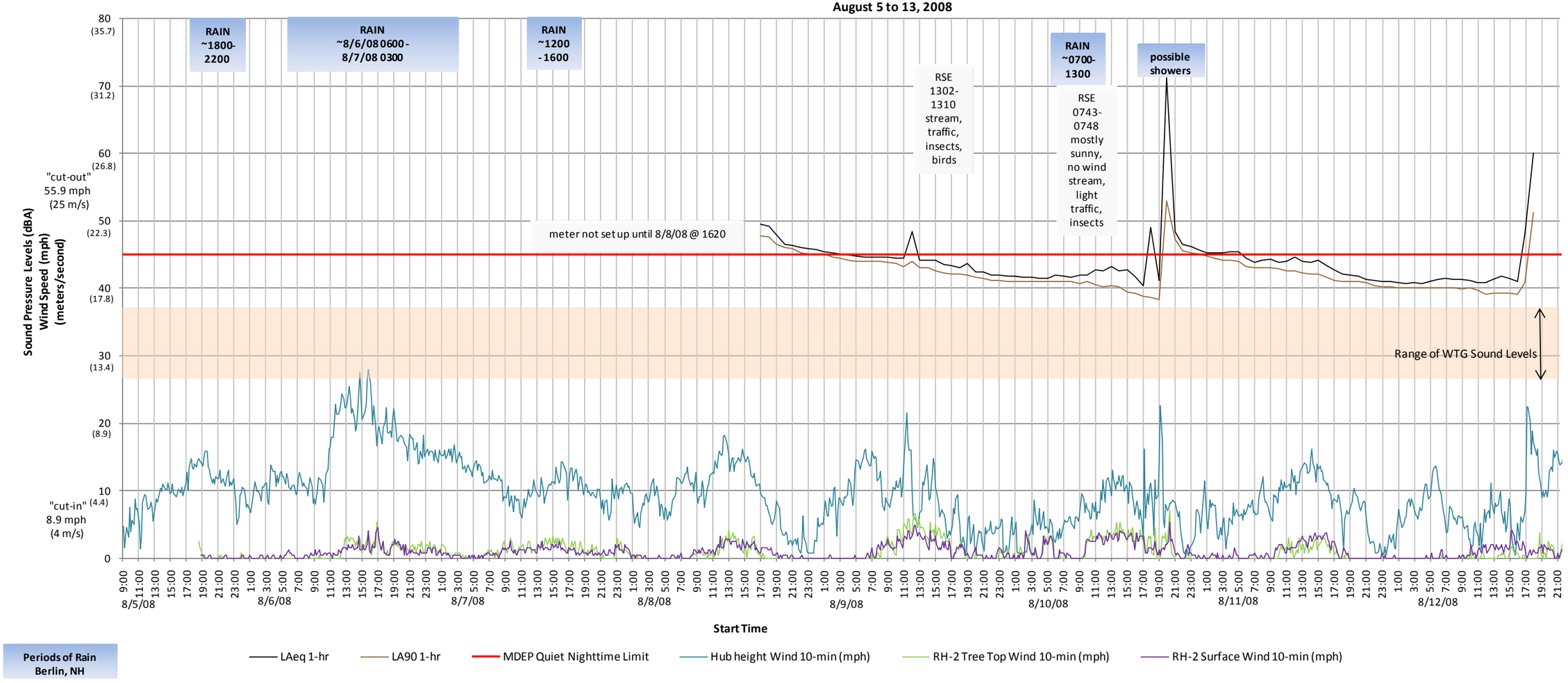
view to the northeast

Record Hill Wind Project
Hourly Ambient Sound Level Measurements
Position RH-3 (LD812)

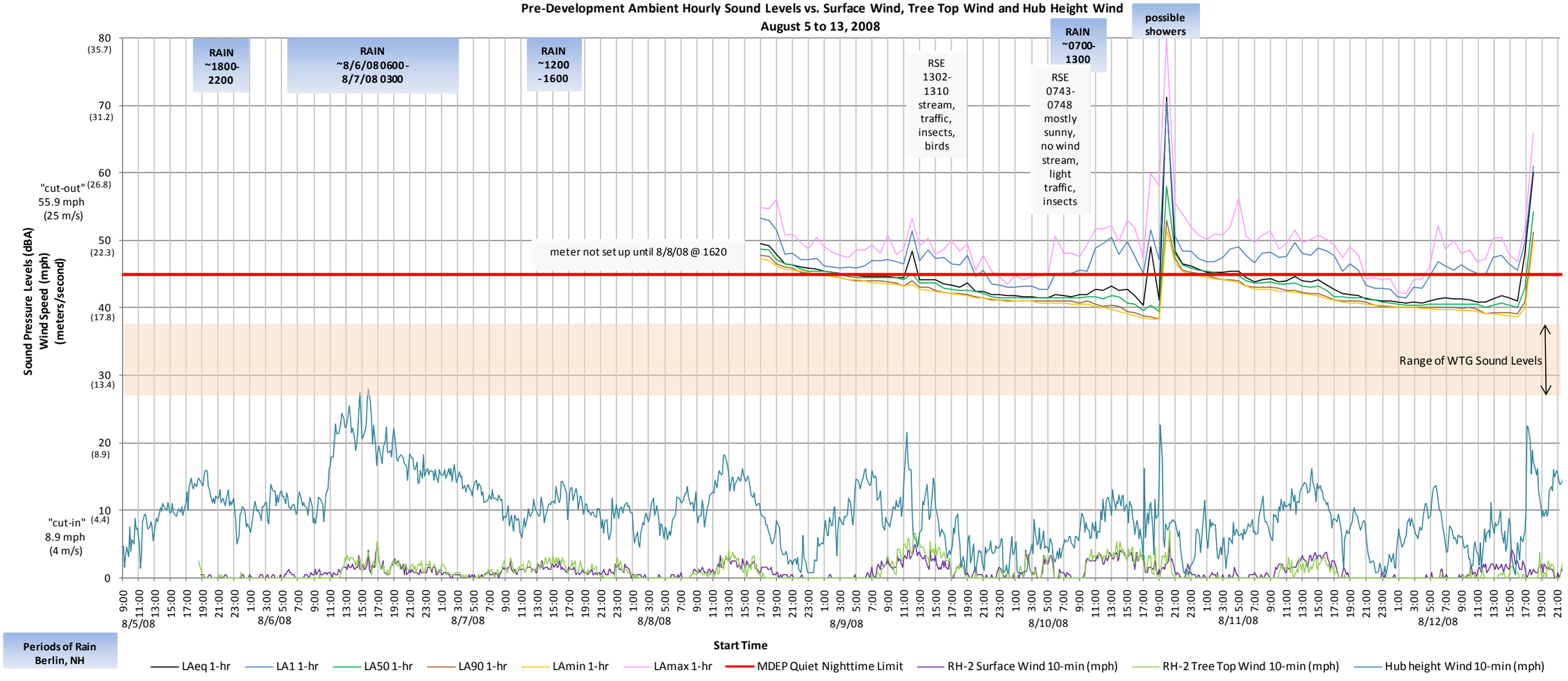
Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{min}	L_{max}
8/8/08	17:00	60	49	53	51	49	48	47	55
	18:00	60	49	53	51	49	48	47	55
	19:00	60	48	52	49	47	47	46	56
	20:00	60	47	48	47	47	46	46	51
	21:00	60	46	48	47	46	46	46	51
	22:00	60	46	47	47	46	45	45	50
	23:00	60	46	47	46	46	45	45	49
8/9/08	0:00	60	46	47	46	46	45	45	50
	1:00	60	45	46	46	46	45	45	49
	2:00	60	45	46	46	45	45	45	48
	3:00	60	45	46	46	45	44	44	48
	4:00	60	45	46	45	45	44	44	47
	5:00	60	45	46	45	45	44	44	49
	6:00	60	45	46	45	45	44	44	49
	7:00	60	45	47	45	45	44	44	49
	8:00	60	45	47	45	45	44	44	48
	9:00	60	45	47	45	45	44	44	51
	10:00	60	45	47	45	45	44	44	48
	11:00	60	44	47	45	44	43	43	49
	12:00	60	48	52	49	45	44	44	53
	13:00	60	44	47	45	44	43	43	49
	14:00	60	44	49	45	44	43	43	50
	15:00	60	44	47	45	44	43	42	48
	16:00	60	44	48	45	43	42	42	49
	17:00	60	43	47	44	43	42	42	50
	18:00	60	43	46	44	43	42	42	48
	19:00	60	44	48	44	43	42	42	50
	20:00	60	42	45	43	42	42	42	46
	21:00	60	42	46	43	42	42	41	48
	22:00	60	42	44	43	42	41	41	45
	23:00	60	42	43	42	42	41	41	45
8/10/08	0:00	60	42	43	42	42	41	41	44
	1:00	60	42	43	42	42	41	41	45
	2:00	60	42	43	42	42	41	41	44
	3:00	60	42	43	42	42	41	41	45
	4:00	60	42	43	42	42	41	41	45
	5:00	60	41	43	42	42	41	41	45
	6:00	20	42	45	42	42	41	41	51
	7:00	60	42	45	43	42	41	41	48
	8:00	60	42	45	43	42	41	41	48
	9:00	60	42	46	43	42	41	41	48
	10:00	60	42	45	43	42	41	41	49
	11:00	60	43	49	44	42	41	40	52
	12:00	60	43	50	44	41	40	40	52
	13:00	60	43	51	45	42	40	40	52
	14:00	60	43	48	45	42	40	40	50
	15:00	60	43	50	44	41	40	39	53
	16:00	60	42	48	43	41	39	39	52
	17:00	60	40	45	42	40	39	39	47
	18:00	60	49	52	43	41	39	38	60
	19:00	60	41	47	42	40	38	38	58
	20:00	60	71	71	64	58	53	52	80
	21:00	60	48	51	49	48	47	47	56
	22:00	60	46	48	47	46	46	45	54
	23:00	60	46	48	47	46	45	45	52
8/11/08	0:00	60	46	47	47	46	45	45	51
	1:00	60	45	47	46	45	45	45	50
	2:00	60	45	47	46	45	45	44	51
	3:00	60	45	48	46	45	44	44	51
	4:00	60	45	49	46	45	44	44	52
	5:00	60	45	49	47	45	44	44	56
	6:00	60	44	48	45	44	43	43	51
	7:00	60	44	47	45	44	43	43	50
	8:00	60	44	48	45	44	43	43	51
	9:00	60	44	48	46	44	43	43	51
	10:00	60	44	47	45	44	43	43	49
	11:00	60	44	48	46	44	43	42	50
	12:00	60	45	50	46	44	43	42	52
	13:00	60	44	48	45	43	42	42	50
	14:00	60	44	48	45	43	42	42	50
	15:00	60	44	49	46	43	42	42	51
	16:00	60	43	48	45	43	42	41	50
	17:00	60	43	48	44	42	41	41	49
	18:00	60	42	46	43	42	41	41	47
	19:00	60	42	47	43	42	41	41	49
	20:00	60	42	46	42	42	41	41	48
	21:00	60	41	43	42	41	41	41	44
	22:00	60	41	43	42	41	40	40	44
	23:00	60	41	43	42	41	40	40	44
8/12/08	0:00	53	41	43	42	41	40	40	44
	1:00	60	41	42	41	41	40	40	42
	2:00	60	41	42	41	41	40	40	42
	3:00	60	41	43	41	41	40	40	44
	4:00	60	41	43	41	41	40	40	44
	5:00	60	41	45	42	41	40	40	46
	6:00	60	41	47	42	41	40	40	52
	7:00	60	41	46	43	41	40	40	49
	8:00	60	41	46	42	41	40	40	50
	9:00	60	41	47	43	41	40	40	48
	10:00	60	41	46	43	41	40	40	49
	11:00	60	41	45	42	41	40	40	47
	12:00	60	41	45	42	40	39	39	47
	13:00	60	41	48	43	40	39	39	50
	14:00	60	42	48	44	41	39	39	51
	15:00	60	41	47	43	41	39	39	48
	16:00	60	41	46	43	40	39	39	47
	17:00	60	48	50	47	43	41	40	52
	18:00	60	60	61	59	54	51	50	66
MDEP Daytime Avg (7 am to 7 pm)			44	48	45	43	42	42	50
MDEP Nighttime Avg (7 pm to 7 am)			44	46	44	43	43	43	48

Nighttime Periods
Periods of Rain (not included in Avgs)

Record Hill Wind
RH-3 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



Record Hill Wind
RH-3 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



RH-4
Pre-development Ambient Monitoring
August 5-13, 2008

view to the north

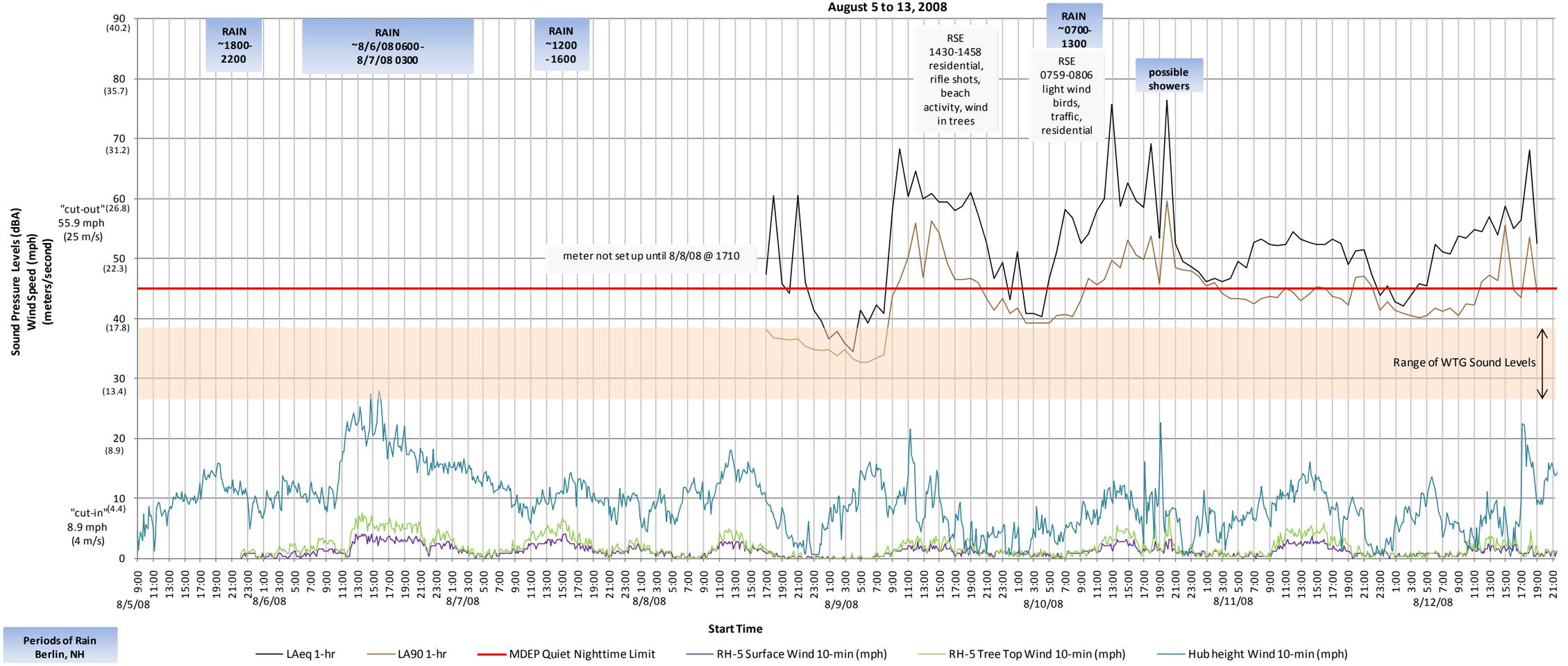
Record Hill Wind Project
Hourly Ambient Sound Level Measurements
Position RH-4 (LD812)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{min}	L_{max}
8/8/08	17:00	54	47	58	48	41	38	37	69
	18:00	60	61	55	44	38	37	36	73
	19:00	60	46	53	45	39	37	36	67
	20:00	60	44	53	43	37	36	36	65
	21:00	60	61	51	41	37	37	36	67
	22:00	60	46	53	39	36	35	35	64
	23:00	60	41	49	38	36	35	34	63
8/9/08	0:00	60	40	46	37	36	35	34	63
	1:00	60	37	39	37	36	35	34	60
	2:00	60	38	39	36	35	34	33	60
	3:00	60	36	37	37	36	35	34	50
	4:00	60	34	36	35	34	33	33	42
	5:00	60	41	49	39	34	33	32	59
	6:00	60	39	49	38	34	33	32	58
	7:00	60	42	54	41	35	33	33	63
	8:00	60	41	51	43	36	34	33	59
	9:00	60	58	61	54	48	44	39	65
	10:00	60	68	62	57	51	46	44	86
	11:00	60	60	69	63	55	50	45	74
	12:00	60	64	71	64	60	56	53	78
	13:00	60	60	69	60	51	47	42	78
	14:00	60	61	70	62	59	56	53	76
	15:00	60	59	67	61	57	54	52	74
	16:00	60	59	69	60	53	49	46	76
	17:00	60	58	70	60	51	46	43	77
	18:00	60	59	68	60	50	47	43	73
	19:00	60	61	69	61	51	47	43	74
	20:00	60	57	67	58	50	46	42	75
	21:00	60	52	61	49	45	43	40	69
	22:00	60	47	53	45	43	41	40	58
	23:00	60	49	60	47	45	43	40	65
8/10/08	0:00	60	43	47	44	42	41	40	51
	1:00	60	51	58	49	44	42	40	67
	2:00	60	41	43	42	40	39	39	46
	3:00	60	41	45	42	40	39	39	50
	4:00	60	40	43	41	40	39	39	48
	5:00	60	47	50	42	40	39	39	66
	6:00	20	51	62	52	43	40	39	70
	7:00	60	58	67	54	44	41	39	78
	8:00	60	57	69	57	44	40	39	76
	9:00	60	52	64	53	46	43	41	68
	10:00	60	54	64	56	49	47	44	72
	11:00	60	58	68	59	51	46	42	75
	12:00	60	60	71	59	51	46	43	79
	13:00	60	76	79	64	54	50	46	88
	14:00	60	59	68	61	53	48	45	76
	15:00	60	63	73	65	58	53	48	79
	16:00	60	60	70	62	55	51	47	77
	17:00	60	59	68	60	53	50	47	73

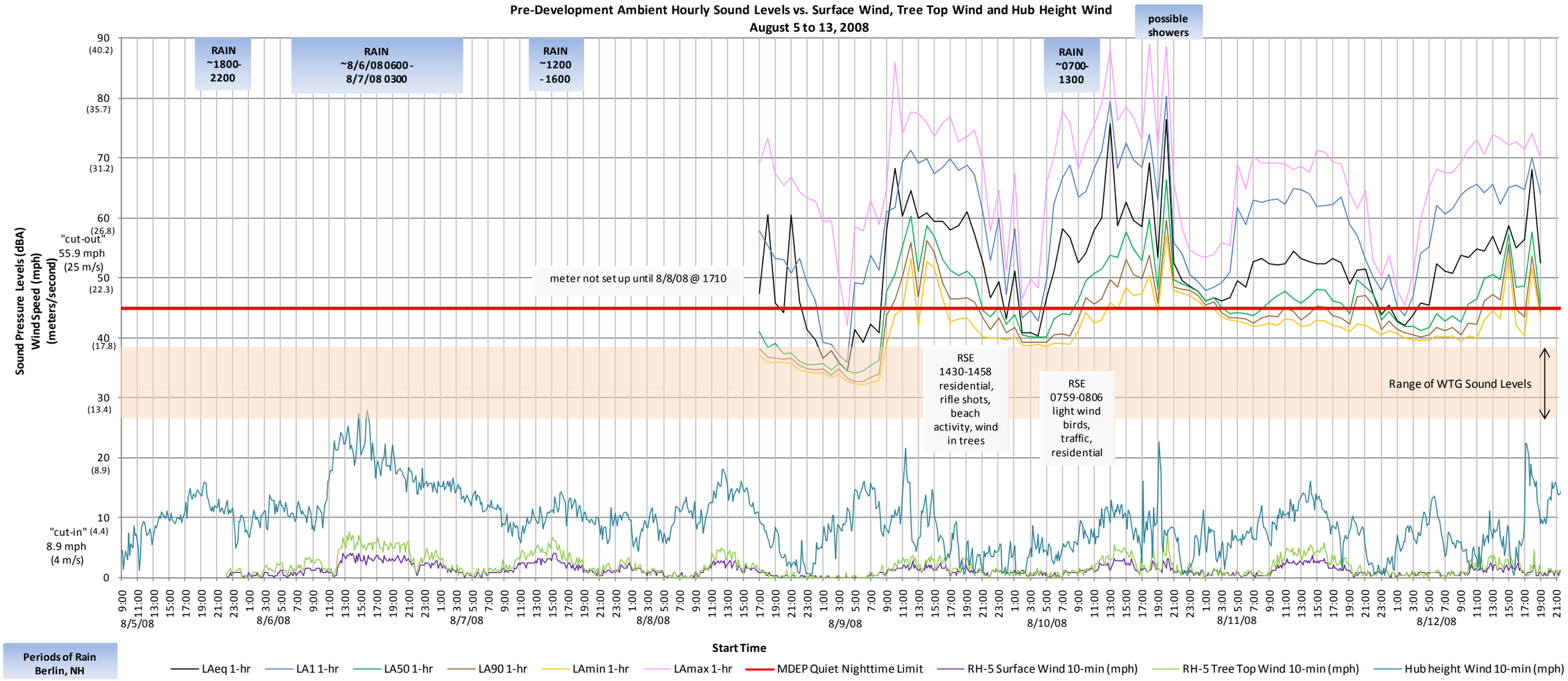
Nighttime Periods
Periods of Rain (not included in Avgs)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{Amin}	L_{Amax}
	18:00	60	69	74	67	60	54	50	89
	19:00	60	53	63	54	48	46	44	72
	20:00	60	76	80	73	66	60	57	89
	21:00	60	52	56	52	50	48	48	66
	22:00	60	49	54	50	49	48	47	58
	23:00	60	49	51	49	48	48	47	55
8/11/08	0:00	60	48	49	48	48	47	46	54
	1:00	60	46	48	47	46	45	45	53
	2:00	60	47	48	48	47	46	45	54
	3:00	60	46	49	46	45	44	43	56
	4:00	60	47	51	45	44	43	43	55
	5:00	60	50	62	48	44	43	43	69
	6:00	60	49	59	47	44	43	42	65
	7:00	60	53	63	50	44	42	42	70
	8:00	60	53	63	52	45	43	42	69
	9:00	60	52	63	55	46	44	42	69
	10:00	60	52	63	53	47	43	42	69
	11:00	60	52	62	53	48	45	43	69
	12:00	60	54	65	55	47	44	43	68
	13:00	60	53	65	55	46	43	42	69
	14:00	60	53	64	54	47	44	42	68
	15:00	60	52	62	54	48	45	43	71
	16:00	60	52	62	54	48	45	43	71
	17:00	60	53	62	54	46	44	42	69
	18:00	60	53	63	54	46	43	42	69
	19:00	60	49	59	48	44	42	41	64
	20:00	60	51	57	51	50	47	42	61
	21:00	60	51	53	50	49	47	42	65
	22:00	60	47	50	48	47	45	41	53
	23:00	60	44	48	45	43	41	41	50
8/12/08	0:00	53	45	51	46	44	43	41	54
	1:00	60	43	45	44	43	41	41	48
	2:00	60	42	44	43	42	41	40	45
	3:00	60	44	47	43	42	41	40	51
	4:00	60	46	54	43	41	40	40	60
	5:00	60	45	55	44	42	40	40	65
	6:00	60	52	62	52	44	42	40	68
	7:00	60	51	61	49	43	41	40	68
	8:00	60	51	61	50	44	42	40	68
	9:00	60	54	64	51	43	41	39	69
	10:00	60	53	65	54	46	42	40	71
	11:00	60	55	66	56	46	42	40	73
	12:00	60	54	64	56	50	46	43	71
	13:00	60	57	66	57	51	47	44	74
	14:00	60	54	62	55	50	46	43	73
	15:00	60	59	65	60	57	56	53	72
	16:00	60	55	66	57	48	45	42	73
	17:00	60	56	65	58	49	43	40	71
	18:00	60	68	70	66	58	54	52	74
	19:00	60	53	64	50	46	44	43	70
MDEP Daytime Avg (7 am to 7 pm)			56	64	56	49	45	43	72
MDEP Nighttime Avg (7 pm to 7 am)			46	52	45	42	41	40	59

Record Hill Wind
RH-4 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



Record Hill Wind
RH-4 (LD812)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind, Tree Top Wind and Hub Height Wind
August 5 to 13, 2008



RH-5
Pre-development Ambient Monitoring
August 5-13, 2008

view to the northwest

view to the southwest

view to the west

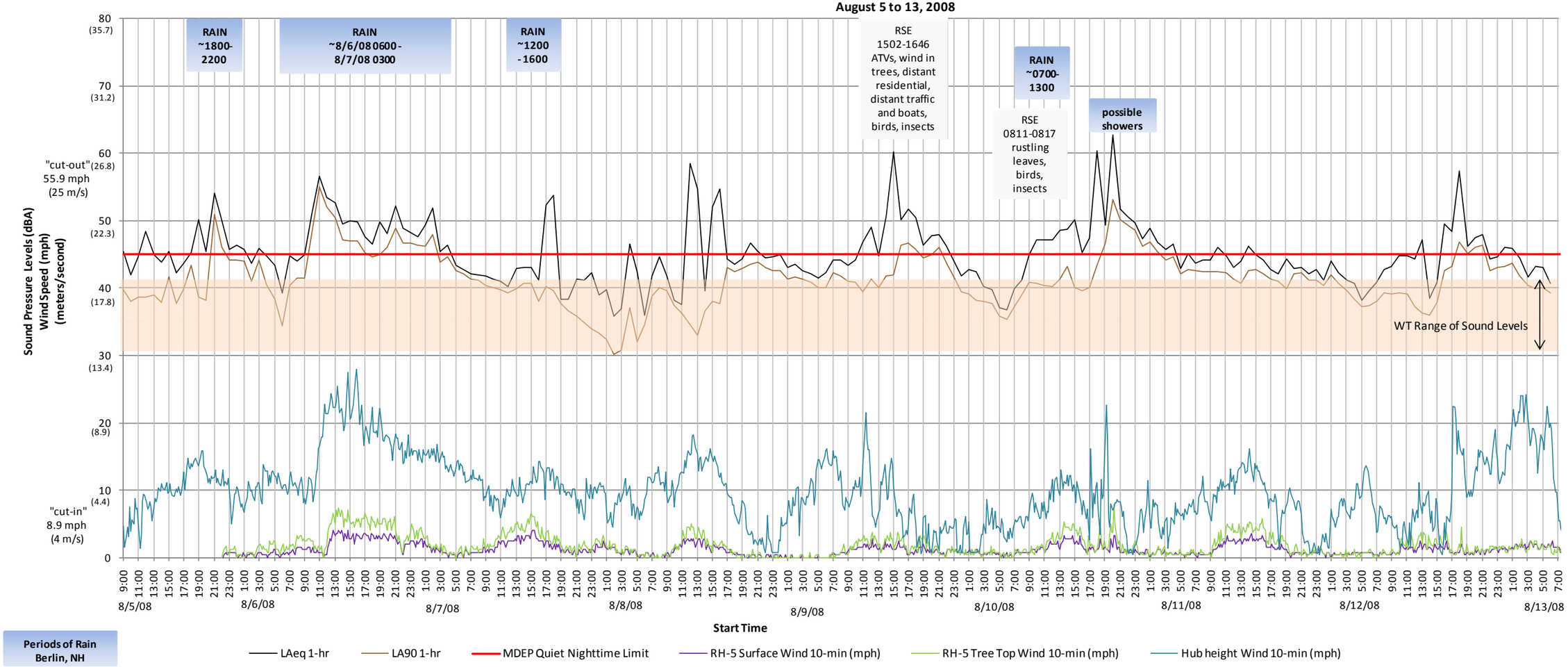
view to the northwest

Record Hill Wind Project
Hourly Ambient Sound Level Measurements
Position RH-5 (LD812 and LD824)

Date	Start Time	Duration (min.)	Measured Sound Levels (dBA) L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}	L_{min}	L_{max}
8/5/08	9:00	60	45	51	48	43	40	36	54
LD812	10:00	60	42	48	43	41	38	35	53
	11:00	60	45	50	48	43	39	35	53
	12:00	60	48	56	53	44	39	34	59
	13:00	60	45	51	47	43	39	35	56
	14:00	60	44	51	44	41	38	35	58
	15:00	60	45	49	47	44	42	38	52
	16:00	60	42	46	45	41	38	35	48
	17:00	60	44	47	45	43	40	36	48
	18:00	60	45	48	47	45	43	41	49
	19:00	60	50	56	46	41	39	36	62
	20:00	60	45	56	46	42	38	36	68
	21:00	60	54	58	54	52	51	49	69
	22:00	60	50	54	51	48	46	43	58
	23:00	60	46	48	47	46	44	41	50
8/6/08	0:00	60	46	50	48	46	44	40	52
	1:00	60	46	48	47	46	44	39	49
	2:00	60	44	47	45	43	41	37	48
	3:00	60	46	48	47	46	44	39	48
	4:00	60	45	47	47	44	41	37	48
	5:00	60	43	45	43	42	38	35	48
	6:00	60	39	44	41	39	35	33	47
	7:00	60	45	49	46	44	40	35	52
	8:00	60	44	46	46	44	42	36	48
	9:00	60	45	47	46	44	41	39	49
	10:00	60	51	53	53	50	48	48	55
	11:00	60	57	58	58	56	55	54	60
	12:00	60	54	56	55	53	52	51	57
	13:00	60	53	57	54	52	50	49	58
	14:00	60	50	54	52	49	47	46	55
	15:00	60	50	56	51	49	47	45	59
	16:00	60	50	54	52	49	47	46	57
	17:00	60	48	52	49	47	45	44	54
	18:00	60	47	50	48	46	45	44	52
	19:00	60	50	54	52	47	45	44	55
	20:00	60	48	52	50	48	46	45	54
	21:00	60	52	54	53	51	49	47	55
	22:00	20	49	51	50	49	47	45	51
	23:00	60	48	51	50	48	47	45	51
8/7/08	0:00	60	48	50	49	47	46	45	50
	1:00	60	49	51	50	48	46	46	52
	2:00	60	52	53	52	50	48	47	59
	3:00	60	45	48	46	45	44	43	62
	4:00	60	46	50	47	46	45	44	62
	5:00	60	43	45	44	43	43	42	55
	6:00	60	43	44	44	43	42	41	53
	7:00	60	42	43	43	42	41	41	53
	8:00	60	42	43	43	42	41	40	53
	9:00	60	42	43	42	41	40	40	48
	10:00	60	41	44	42	41	40	39	48
	11:00	60	41	44	42	41	40	39	47
	12:00	60	40	42	41	40	39	39	50
	13:00	60	43	44	43	41	40	39	61
	14:00	60	43	47	44	42	41	40	54
	15:00	60	43	48	44	42	41	40	59
	16:00	60	41	45	41	39	38	37	50
	17:00	60	52	49	46	44	40	39	57
	18:00	60	54	52	45	42	40	39	64
	19:00	60	38	40	39	38	38	37	49
	20:00	60	38	39	38	37	37	36	49
	21:00	60	41	38	37	37	36	35	64
	22:00	60	41	38	36	36	35	34	64
	23:00	60	42	37	36	35	34	33	72
8/8/08	0:00	60	39	37	36	34	33	32	66
	1:00	60	40	39	36	34	32	31	70
	2:00	60	36	35	34	32	30	29	61
	3:00	60	37	36	35	32	31	29	61
	4:00	60	47	51	44	40	37	35	66
	5:00	60	42	41	35	33	32	32	66
	6:00	60	36	39	37	35	35	34	55
	7:00	60	42	47	43	41	39	38	59
	8:00	60	45	50	46	42	40	39	62
	9:00	60	42	45	42	41	40	39	59
	10:00	60	38	40	39	38	38	37	46
	11:00	60	38	41	38	37	36	36	50
	12:00	60	58	44	37	36	35	34	81
	13:00	60	55	45	36	34	33	32	71
	14:00	60	40	46	39	38	37	36	61
	15:00	60	52	45	40	39	38	38	63
LD824	16:00	54	55	49	43	39	38	35	72
	17:00	60	44	47	45	44	43	43	49
	18:00	60	44	46	44	43	43	42	48
	19:00	60	44	46	45	44	43	42	48
	20:00	60	47	52	46	45	44	42	54
	21:00	60	45	48	46	45	44	43	49
	22:00	60	44	47	46	44	43	42	50
	23:00	60	45	48	46	44	43	41	51
8/9/08	0:00	60	45	49	47	44	43	41	51
	1:00	60	43	47	44	43	41	40	49
	2:00	60	44	48	45	43	42	40	53
	3:00	60	43	45	44	43	41	40	48
	4:00	60	42	45	43	42	41	40	47
	5:00	60	42	44	43	41	40	39	46
	6:00	60	42	45	44	42	40	39	47
	7:00	60	44	47	46	44	42	41	49
	8:00	60	44	47	46	44	42	41	49
	9:00	60	43	47	45	44	42	41	48
	10:00	60	44	48	46	44	42	41	51
	11:00	60	47	49	45	42	39	38	55
	12:00	60	49	53	50	45	41	40	55
	13:00	60	45	50	48	43	40	38	52
	14:00	60	51	56	48	44	42	39	65
	15:00	60	60	59	50	46	42	38	69
	16:00	60	50	54	53	50	46	41	58
	17:00	60	52	57	54	50	47	42	59
	18:00	60	51	53	51	48	46	43	58
	19:00	60	46	49	47	46	44	43	55
	20:00	60	48	51	49	47	45	43	52
	21:00	60	48	51	50	47	46	44	54
	22:00	60	46	49	48	45	44	42	50
	23:00	60	44	47	46	44	42	39	49
8/10/08	0:00	60	42	47	44	41	39	38	48
	1:00	60	43	48	46	42	39	37	50
	2:00	60	42	47	45	41	38	36	49
	3:00	60	40	44	42	40	38	37	45
	4:00	60	40	43	41	39	38	37	45
	5:00	60	37	40	39	37	36	35	44
	6:00	60	37	40	38	36	35	35	41
	7:00	60	40	43	42	39	37	36	45
	8:00	60	41	45	42	40	39	37	48
	9:00	60	45	48	47	43	41	39	50
	10:00	60	47	51	49	45	41	37	54
	11:00	60	47	53	50	46	41	37	59
	12:00	60	47	53	50	46	40	35	55
	13:00	60	49	54	51	48	41	36	56
	14:00	60	49	53	51	48	43	38	55
	15:00	60	50	59	51	46	40	36	64
	16:00	60	45	52	47	43	40	37	55
	17:00	60	47	50	48	43	40	36	55
	18:00	60	60	66	56	48	43	42	79
	19:00	60	49	53	51	49	47	43	60
	20:00	60	63	68	62	57	53	51	77
	21:00	60	52	55	53	51	50	50	59
	22:00	60	51	53	52	50	49	48	55
	23:00	60	50	53	51	49	49	48	54
8/11/08	0:00	60	47	50	48	47	46	46	51
	1:00	60	49	52	51	49	47	45	54
	2:00	60	47	49	48	47	46	44	50
	3:00	60	46	48	47	45	44	43	50
	4:00	60	46	49	48	46	45	43	50
	5:00	60	43	45	44	43	42	42	49
	6:00	60	45	47	46	44	43	42	48
	7:00	60	44	46	45	44	43	42	48
	8:00	60	44	46	45	44	42	41	46
	9:00	60	44	47	45	44	42	42	47
	10:00	60	46	50	48	44	42	41	53
	11:00	60	45	49	47	44	42	41	50
	12:00	60	43	46	45	43	41	40	48
	13:00	60	44	48	46	43	41	40	50
	14:00	60	46	50	48	46	43	40	52
	15:00	60	45	49	47	45	43	41	52
	16:00	60	44	49	45	44	42	41	52
	17:00	60	43	47	43	42	41	41	54
	18:00	60	42	45	43	42	41	40	48
	19:00	60	44	49	42	41	40	39	51
	20:00	60	43	44	44	43	42	41	45
	21:00	60	43	45	44	43	42	41	48
	22:00	60	42	43	43	42	41	40	44
	23:00	60	43	44	44	42	41	40	45
8/12/08	0:00	60	41	43	42	41	40	39	44
	1:00	60	44	45	45	43	42	40	46
	2:00	60	42	44	43	42	41	40	45
	3:00	60	41	44	42	41	40	38	47
	4:00	60	41	46	42	40	38	38	49
	5:00	60	38	41	39	38	37	37	47
	6:00	60	40	43	41	39	37	37	47
	7:00	60	41	44	43	40	38	37	46
	8:00	60	43	47	45	42	39	38	50
	9:00	60	43	48	46	42	39	38	49
	10:00	60	45	51	46	42	39	36	54
	11:00	60	45	50	46	43	39	36	53
	12:00	60	44	52	42	39	37	36	56
	13:00	60	47	50	44	39	36	36	57
	14:00	60	39	42	40	38	36	35	44
	15:00	60	41	44	43	40	38	36	46
	16:00	60	49	53	49	45	43	38	56
	17:00	60	48	56	49	46	43	40	60
	18:00	60	57	56	55	50	47	46	59
	19:00	60	46	49	47	46	45	44	50
	20:00	60	47	49	49	47	46	44	50
	21:00	60	48	50	49	48	46	44	51
	22:00	60	44	46	45	44	43	42	47
	23:00	60	45	46	46	45	43	42	47
8/13/08	0:00	60	46	48	47	46	43	41	48
	1:00	60	46	48	47	46	44	41	48
	2:00	60	44	47	46	44	42	40	48
	3:00	60	42	45	43	41	40	40	46
	4:00	60	43	47	45	41	40	39	50
	5:00	60	43	47	44	41	40	39	50
	6:00	60	41	42	42	41	39	39	44
MDEP Daytime Avg (7 am to 7 pm)			45	48	45	42	40	38	54
MDEP Nighttime Avg (7 pm to 7 am)			43	46	44	42	41	39	51

Nighttime Periods
Periods of Rain (not included in Avgs)

Record Hill Wind
RH-5 (LD812 and LD824)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind ,T ree Top Wind and Hub Height Wind
August 5 to 13, 2008



Record Hill Wind
RH-5 (LD812 and LD824)
Pre-Development Ambient Hourly Sound Levels vs. Surface Wind , Tree Top Wind and Hub Height Wind
August 5 to 13, 2008