The Millbrook Power (Gas Fired Power Station) Order

6.2 Environmental Statement Appendices – Volume H Appendices 7.1 - 7.3 Noise

Planning Act 2008
The Infrastructure Planning
(Applications: Prescribed Forms and Procedure) Regulations 2009

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Contents – Appendices Volume H - Noise and Vibration

7.1 - Noise Terminology

7.1 – Acoustics Terminology

The acoustic terms used in this report are as follows:

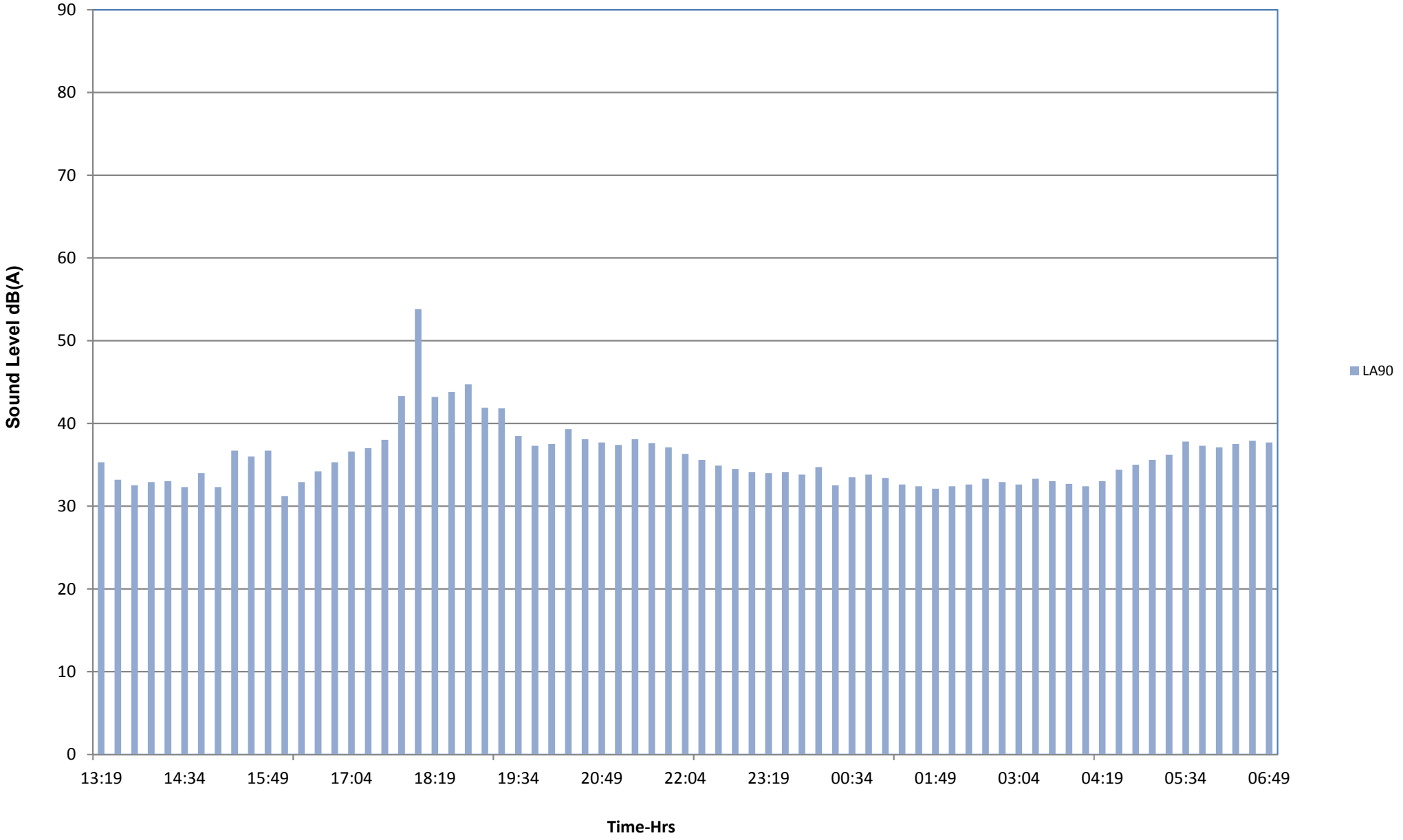
Abbreviation	Definition
dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dBA level. Because of being a logarithmic scale noise levels in dBA do not have a linear relationship to each other. For similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it considers the increased annoyance that results from the non-steady nature of traffic noise.
L_{eq}	The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise,

Abbreviation	Definition
	such as aircraft noise, environmental noise and construction noise. L_{eq} is defined as a notional steady sound level which, over a stated period, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 1 hour). The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward.
L_{max}	L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.
LOAEL	Lowest Observed Adverse Effect Levels
SOAEL	Significant Observed Adverse Effect Levels

7.2 - Detailed Noise Survey Results

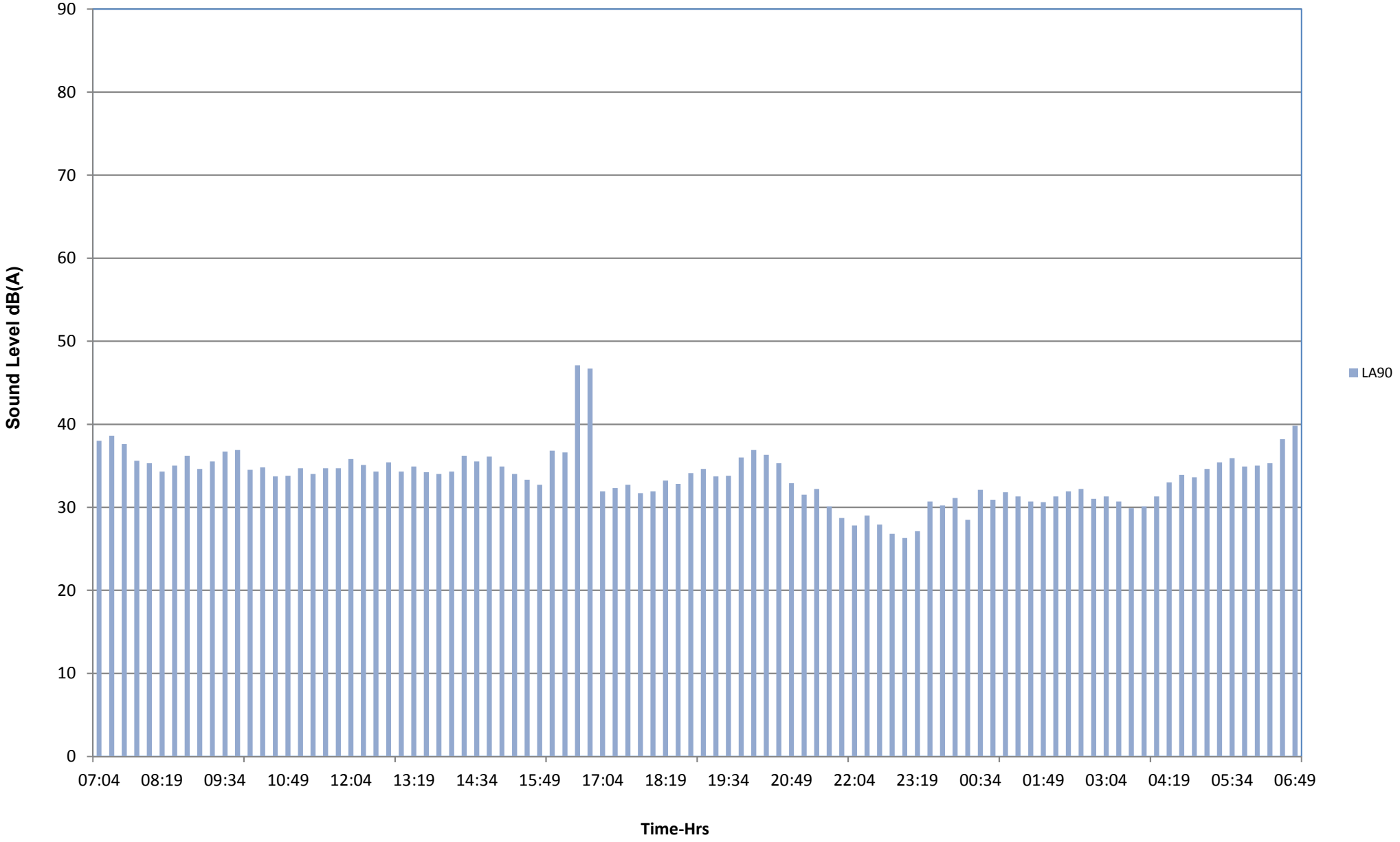
Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Thursday 14/08/14



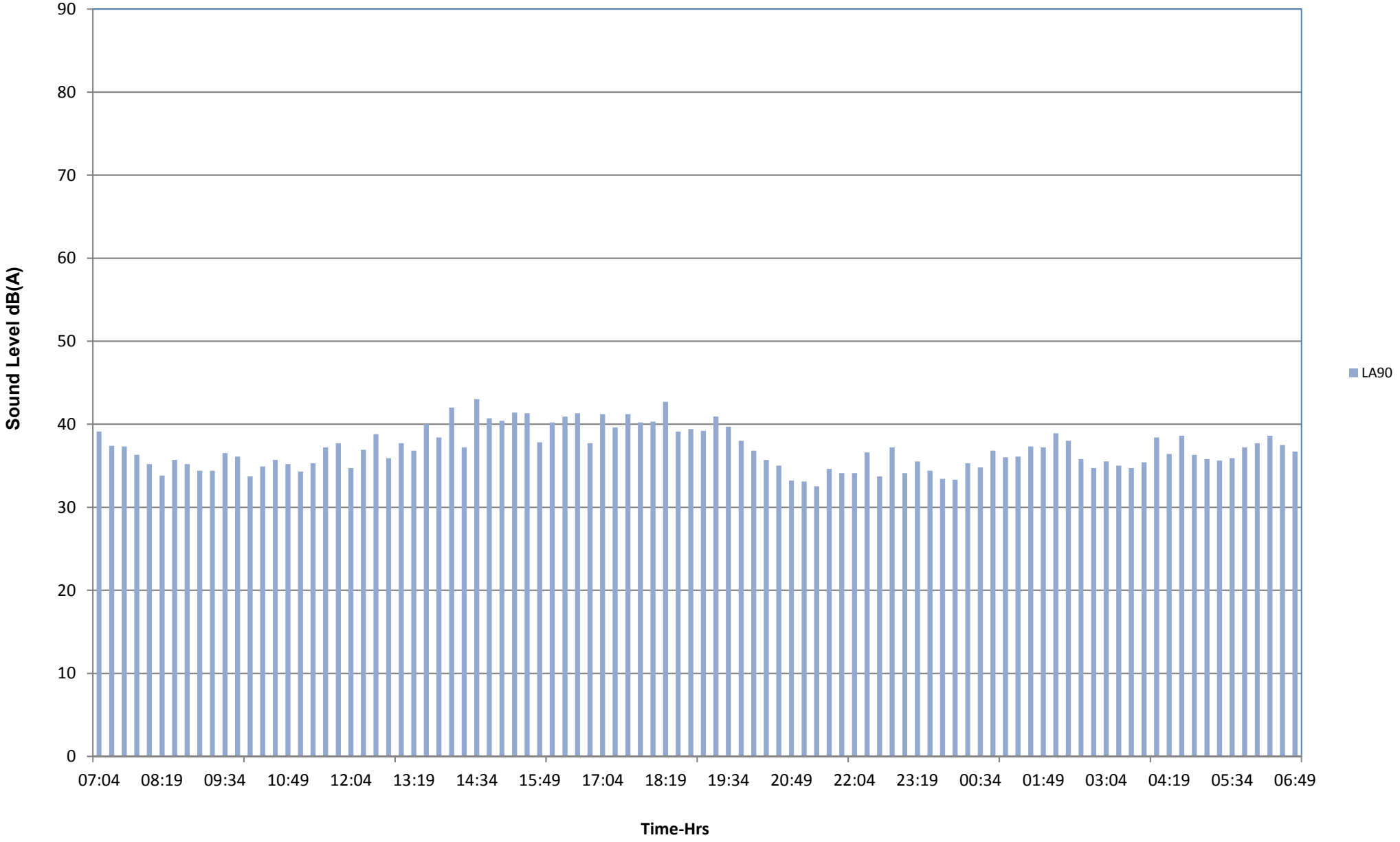
Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Friday 15/08/14



Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Saturday 16/08/14



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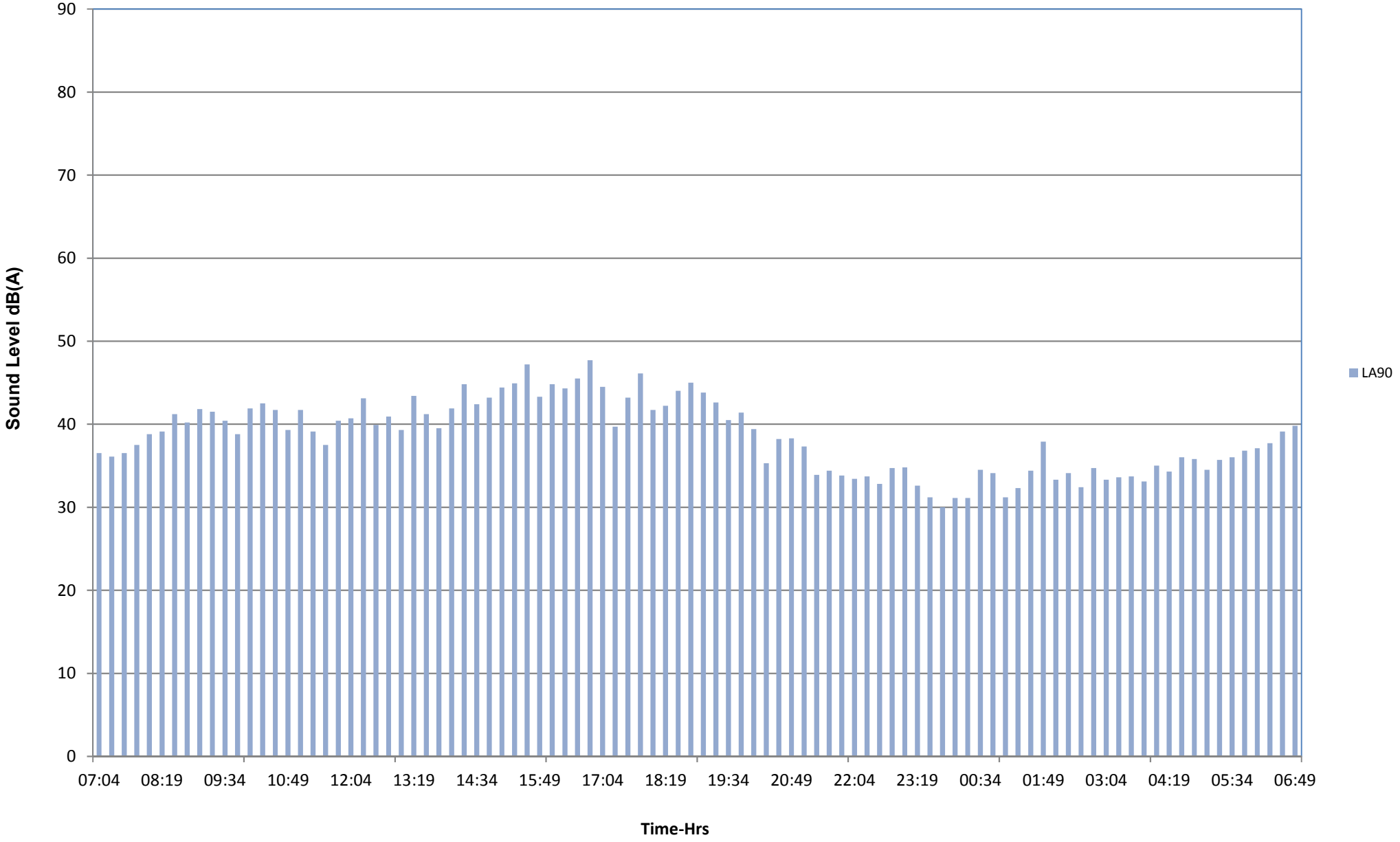
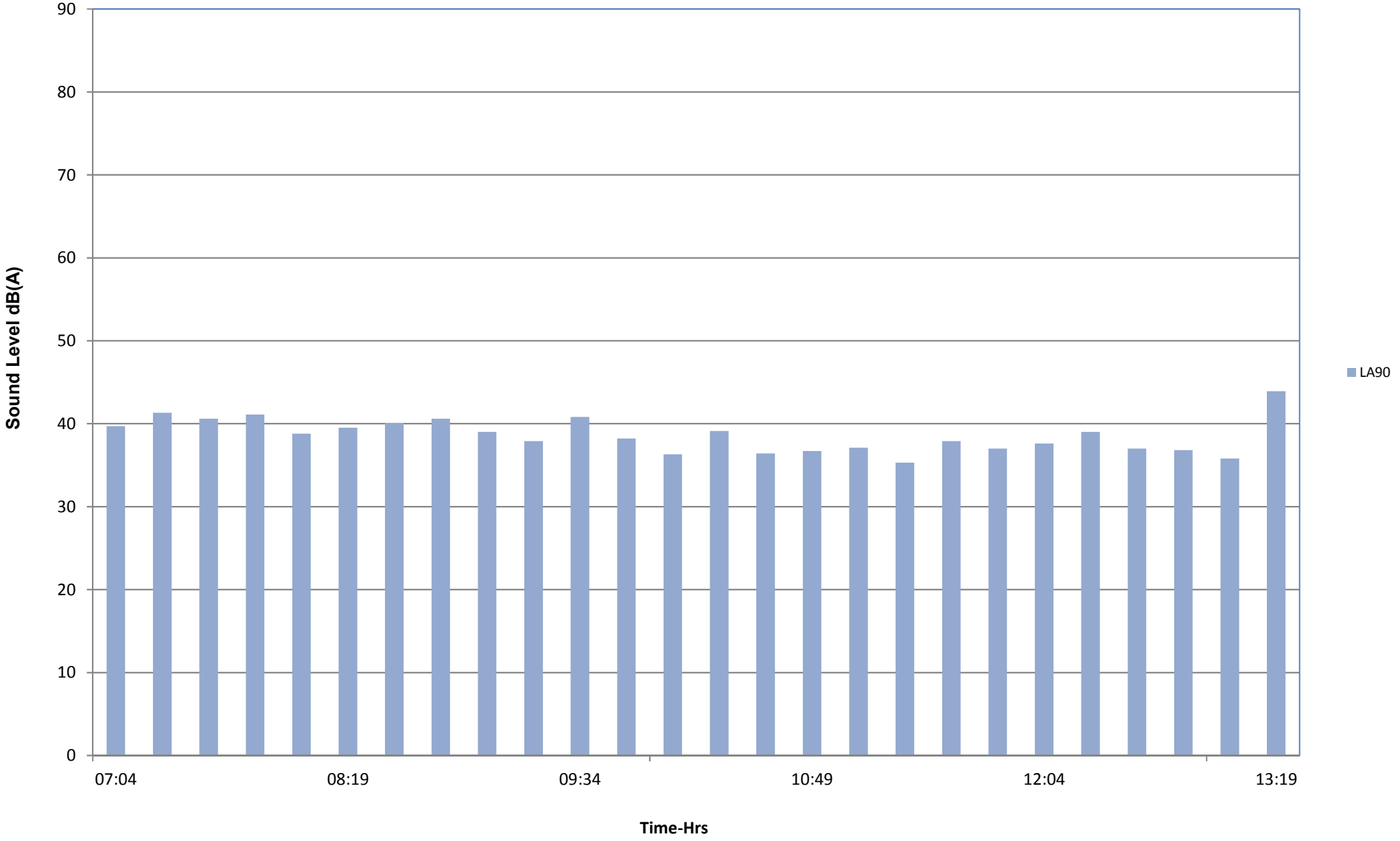
LA90 Background Noise Levels at South Pillinge Farm
Sunday 17/08/14



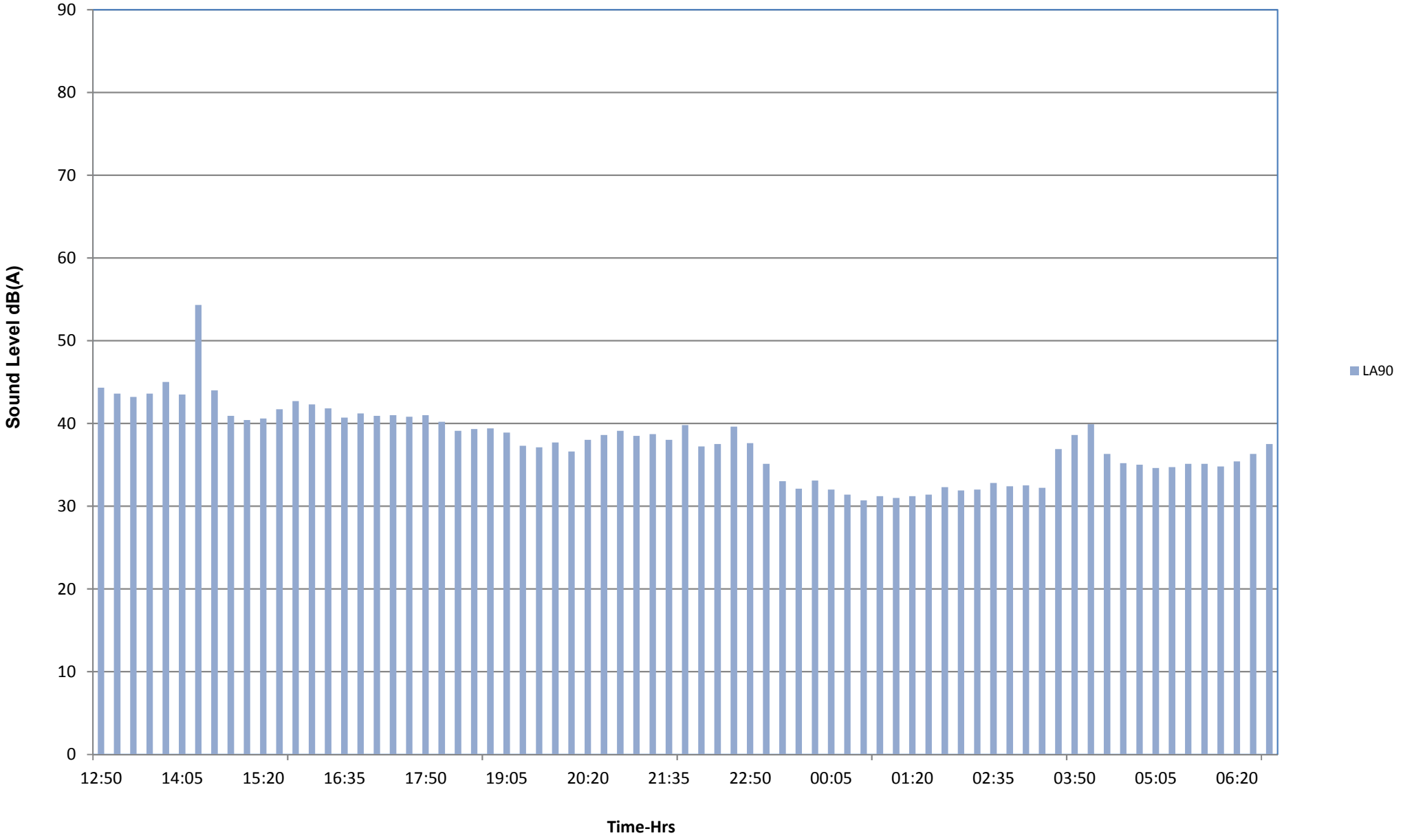
Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Monday 18/08/14



Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Friday 21/11/14



Millbrook

LA90 Background Noise Levels at South Pillinge Farm
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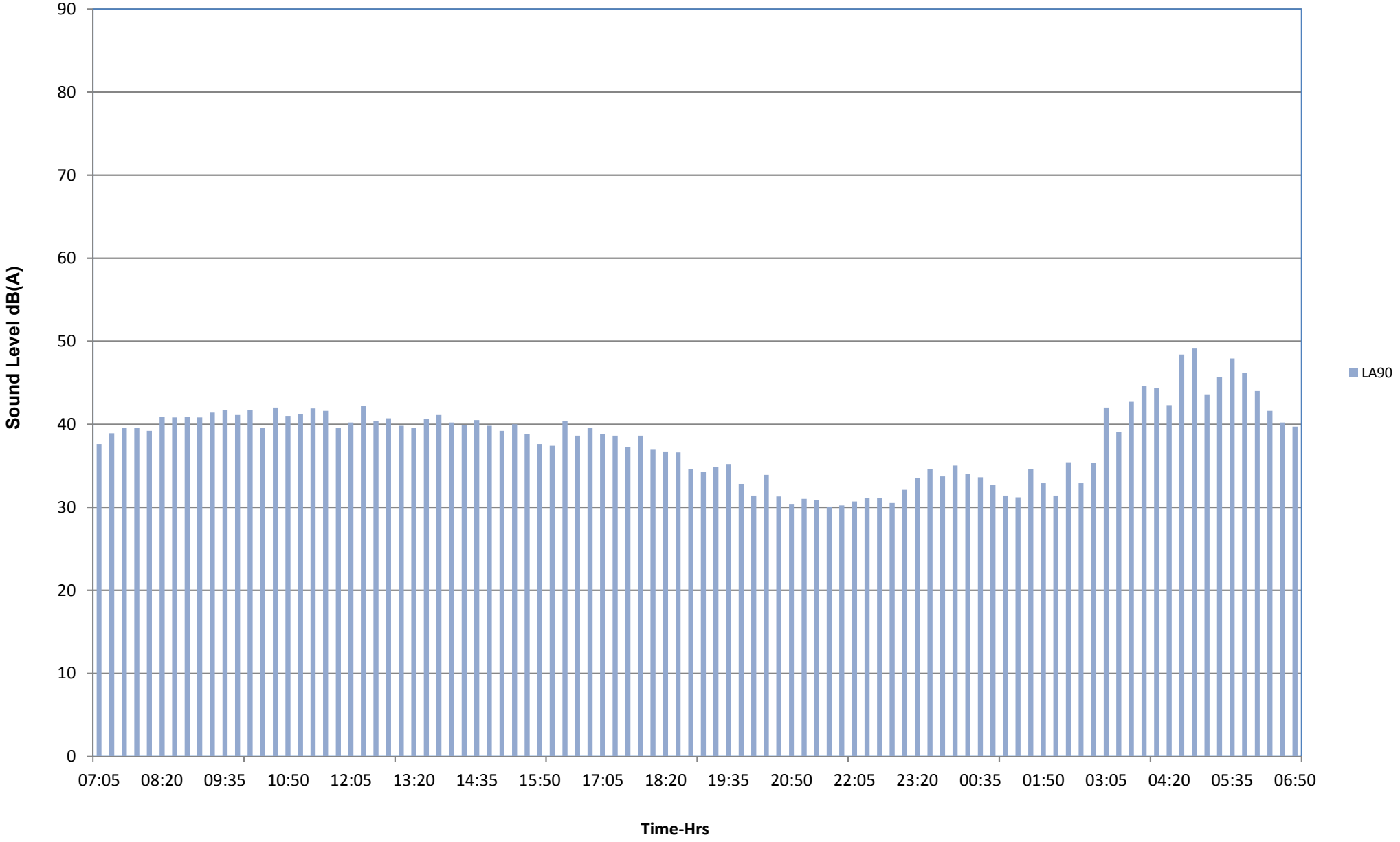
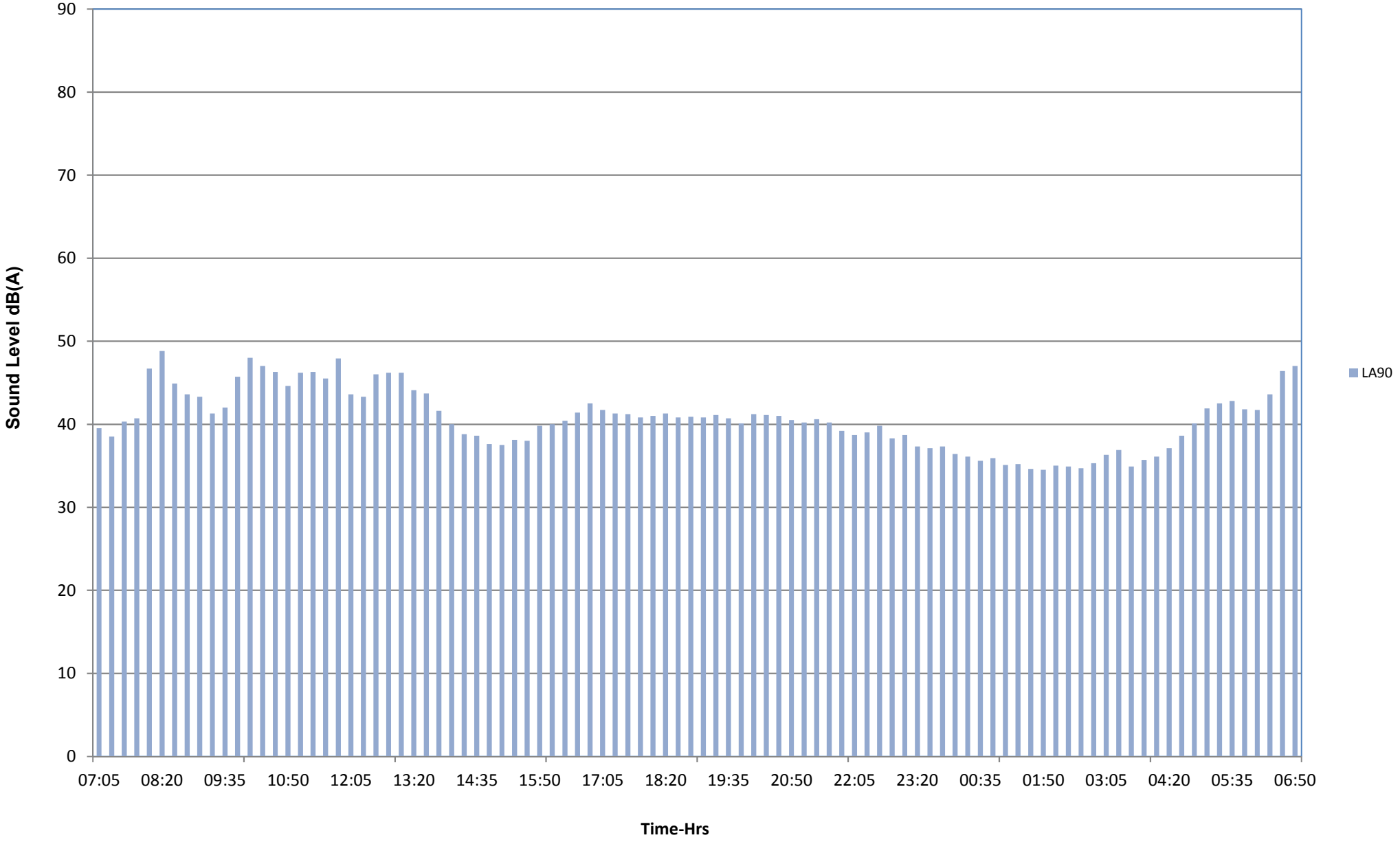


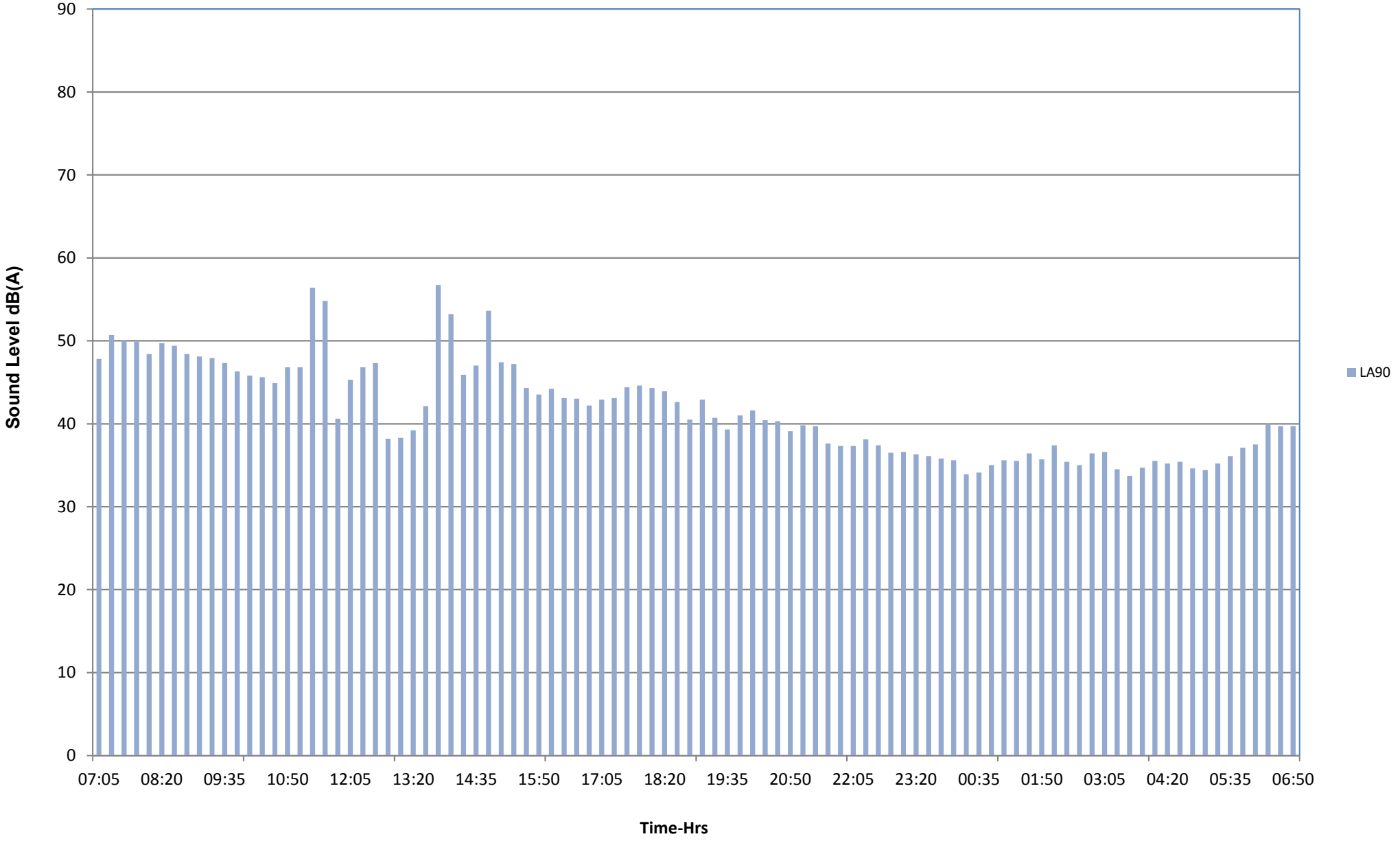
Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Sunday 23/11/14



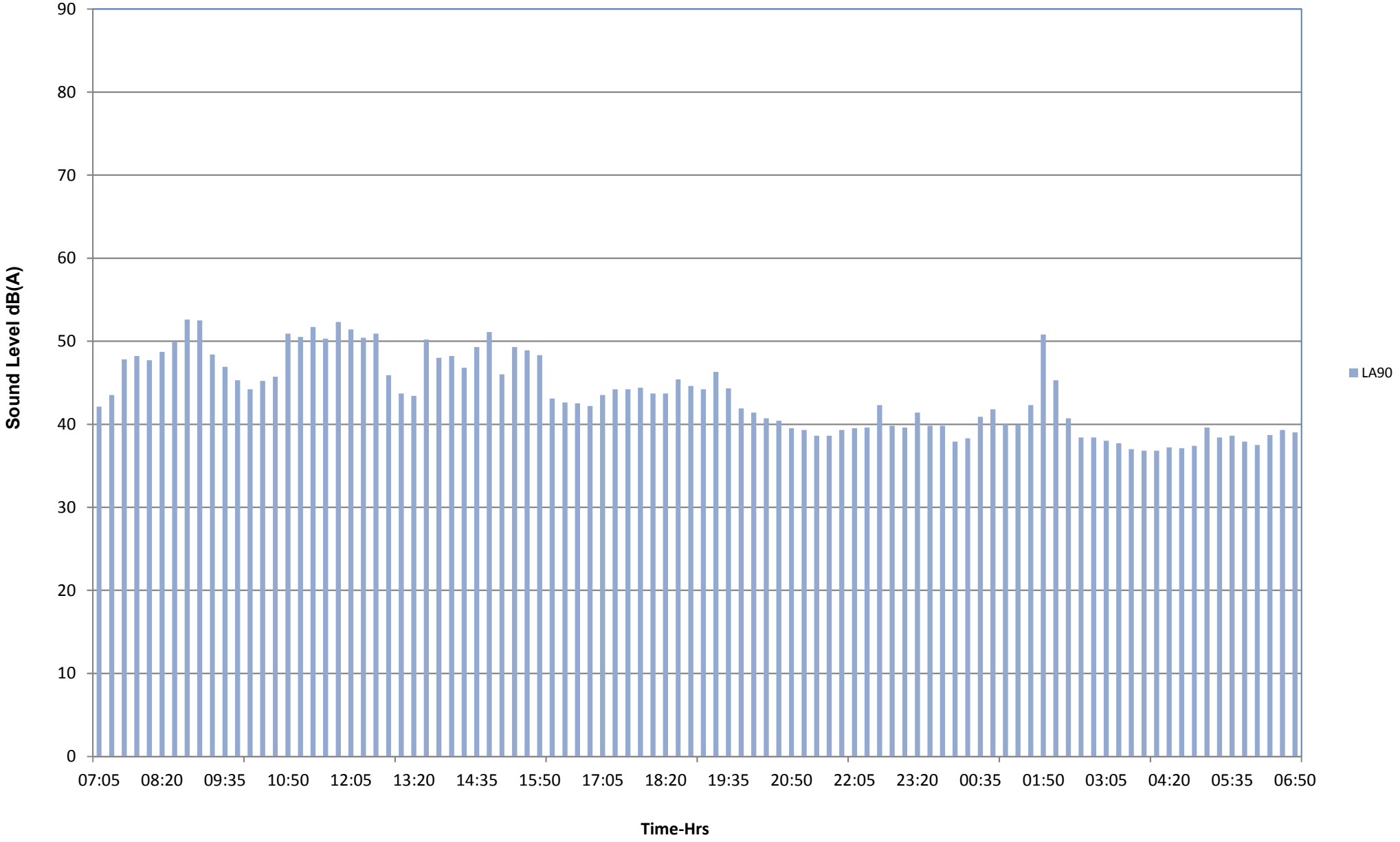
Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Monday 24/11/14



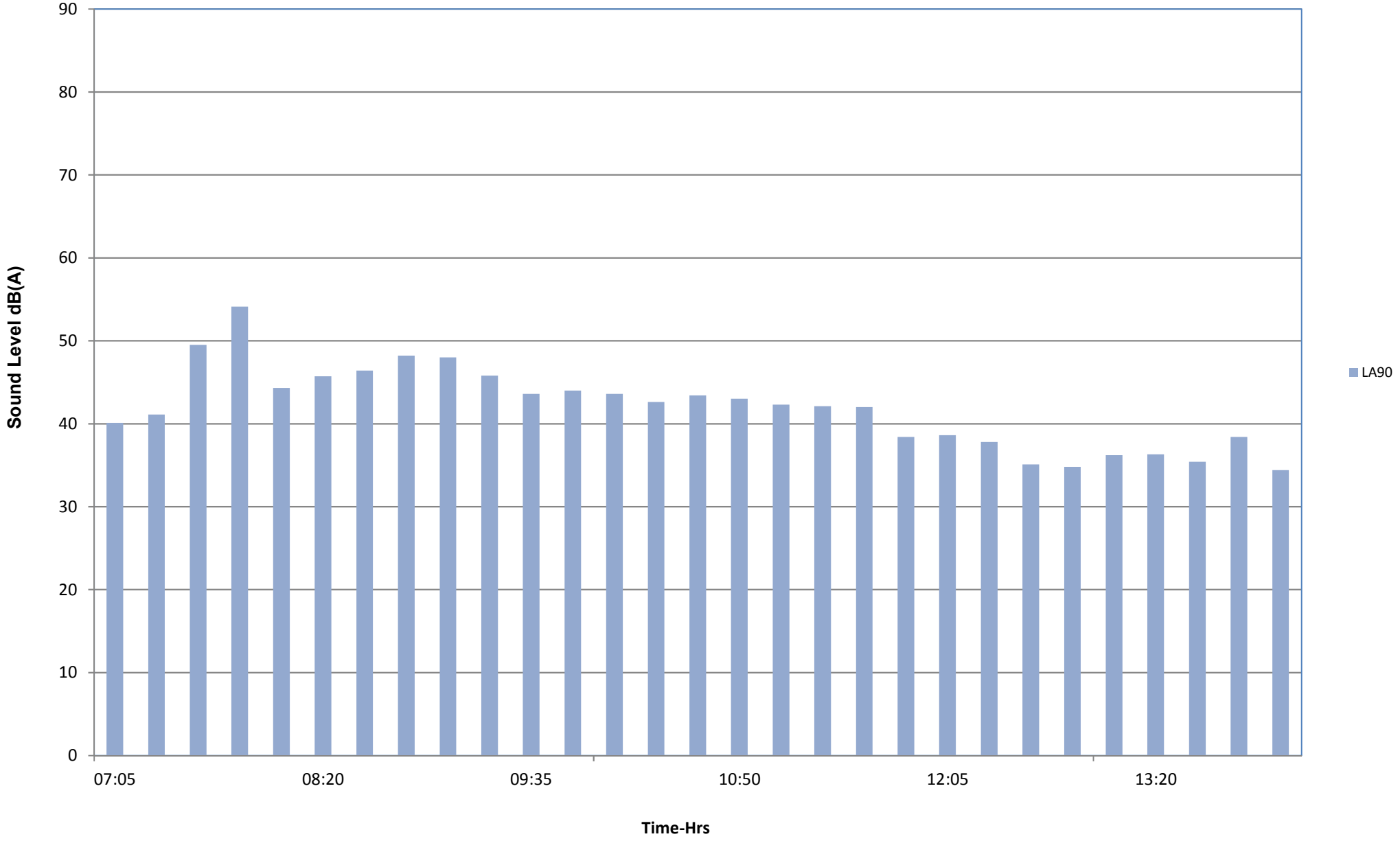
Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Tuesday 25/11/14



Millbrook

LA90 Background Noise Levels at South Pillinge Farm
Wednesday 26/11/14



7.3 - Operational Plant Noise Impact Assessment

Millbrook Power

Operational Plant Noise Impact Assessment Report

On behalf of **Millbrook Power Ltd.**

Millbrook Power
A Drax Group company

Project Ref: 40335 | Rev: AA | Date: October 2017

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Contents

Figures

Tables

Appendices

1 Introduction

1.1 Background

1.1.1 A Preliminary Environmental Information Report (PEIR) was prepared in May 2017 to support the formal consultation stage of the Millbrook Power Project - an up to 299MW Open Cycle Gas Turbine Peaking power generating station, together with an associated Gas and Electrical Connection. CBC have reviewed and provided comment on the PEIR. Since the submission of the PEIR additional acoustic work has been undertaken to assess the potential noise and vibration impact associated with the operational phase of the Project.

1.1.2 Previous acoustic work can be found in the submitted PEIR (Chapter 7).

1.1.3 The purpose of this report is therefore as follows:

- To set out Project proposals relating the potential noise and vibration impact;
- To present the results of the additional environmental sound surveys undertaken at the nearest noise sensitive receptor;
- To set out the assessment criteria to be implemented; and
- To present an assessment that incorporates all up to date and relevant information.

1.1.4 This report is technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in **Appendix A**.

2 Project Proposals

2.1.1 A full description of the Project is provided in Chapters 1 and 3 of the submitted PEIR.

2.1.2 However, in brief, the Project comprises:

- A new Power Generation Plant;
- A new gas pipeline connection to bring natural gas to the Generating Equipment from the National Transmission System (The Gas Connection); and
- a new electrical connection to export power from the Generating Equipment to the National Grid Electricity Transmission System (the Electrical Connection) comprising an underground double circuit Tee-in. This would require one new tower (which will replace an existing tower and be located in the existing Grendon – Sundon transmission route corridor, thereby resulting in no net additional towers). This option would require two SECs, one located on each side of the existing transmission line, and both circuits would then be connected via underground cables approximately 500 metres in length to a new substation (the 'Substation'*).* The Power Generation Plant is in the form of an OCGT peaking power generating station, fuelled by natural gas with a rated electrical output of up to 299 Megawatts (MW). This is the output of the generating station as a whole, measured at the terminals of the generating equipment. The Power Generation Plant comprises:
- generating equipment including one Gas Turbine Generator with one exhaust gas flue stack and Balance of Plant (together referred to as the 'Generating Equipment'), which are located within the 'Generating Equipment Site';

2.1.3 It is likely that the only components of the Project that have the potential to cause an adverse noise and vibration effect during operation are elements associated with the Power Generation Plant (e.g. turbine blades and cooling equipment in the form of Fin-Fan Coolers. Justification to scope out the other elements of the development are provided in the submitted PEIR which also reports on any impacts from the construction of the Project.

2.1.4 Since the submission of the PEIR, further discussions with potential EPC contractors have been undertaken to ascertain feasible reductions in the noise emissions from the Generating Equipment to reduce the likely noise impact from the Project using a combination of improved enclosures and lower noise generating equipment. The following acoustic attributes and dimensions are now being proposed by the Applicant to inform the assessments undertaken.

Table 2.1 Acoustic and Dimension Attributes

Model Input	Approximate Dimensions (m) (Elements of Generating Equipment which emit noise)	Sound level presented in PEIR (dB)	Revised Sound Level (dB)
Gas Turbine Generator	W = 13 L = 50 H = 25	85 dBA at 1m	75 dBA at 1m
Fin Fan Coolers	W = 14 L = 28 H = 9	112dBA at 1m	85 dBA at 1m
Stack	H = 35 Diameter = 7	106 dB Sound Power Level	106 dB Sound Power Level

3 Assessment Criteria

3.1.1 All relevant national policies, local policies and technical guidance are documented in the submitted PEIR.

3.1.2 The type of noise produced by the Generating Equipment is classified as industrial noise. Technical guidance to assess such noise is presented in British Standard 4142:2014 "*Methods for rating and assessing industrial and commercial sound.*

3.1.3 The procedure contained in BS4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur.

3.1.4 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:

- Typically, the greater this difference, the greater the magnitude of the impact;
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3.1.5 BS 4142 does not provide specific values for LOAELs and SOAELs for sound from commercial/industrial sources however based on the above definitions it would be reasonable to consider *"a difference of around +5 dB"* as corresponding to the LOAEL and *"a difference of around +10 dB"* as corresponding to the SOAEL.

3.1.6 With regards to all appropriate policies and guidance, the proposed assessment criteria for the Project are therefore set out below in **Table 3.1**. The following values are as originally set out in the PEIR.

Table 3.1 Proposed LOAEL and SOAELs

Adverse Effect Level	Difference Between Rating Level (LAr,Tr) and Background Sound Level (LA90,T)
LOAEL	+ 5 dB
SOAEL	+ 10 dB

3.2 Context

3.2.1 The significance of sound of an industrial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. A new industrial development is being introduced to the noise climate that has the potential to cause an adverse impact on noise sensitive receptors. Where background noise levels are relatively low, if the calculated rating levels exceed the background

noise levels, absolute levels might be as relevant than the margin by which the rating level exceeds the background.

4 Environmental Sound Surveys

4.1 Methodology

4.1.1 Previous noise measurements (as reported in the PEIR) were undertaken in 2014 and 2015. Given the time that has elapsed since the original surveys an additional fully automated environmental sound survey was undertaken over a period of 1 week from approximately 09:00 hours on Friday 08 September 2017 to approximately 09:00 hours on Friday 15 September 2017 in order to determine the current sound climate at the closest noise sensitive receptor.

4.1.2 Sound measurements were undertaken at a single position, as agreed with CBC, and are indicated in **Figure 1** and summarised in **Table 4.1.**

Figure 1: Approximate Noise Survey Location

Table 4.1: Measurement Positions

Position	Description
LT1	The microphone was located on the western boundary of the Project Site approximately 10 m to the east of the closest façade of South Pillinge Farm. The microphone was located at a height of approximately 1.5 m.

4.1.3 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, using historic data from the Weather Company LLC, (obtained from www.wunderground.com) heavy rain is likely to have occurred between 16:00 – 17:00 hours and 14:00 – 15:00 hours on the 08 September 2017 and 09 September 2017 respectively. These periods have been excluded from the results. In addition, heavy rain occurred for the majority of the night-time period on 12 September 2017 and has therefore been excluded from the assessment. The temperature ranged between 12°C to 18°C over the survey period.

4.1.4 The A-weighted $L_{eq,T}$, $L_{90,T}$ and L_{FMax} were measured over full 15 minute periods at position LT1.

4.2 Instrumentation

4.2.1 The instrumentation used in the survey is listed in **Table 4.2**. Field calibrations were performed before and after the measurements with no significant fluctuation recorded (<0.5dB). Calibration certificates are available upon request.

Table 4.2: Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	Rion	NL-52	1043456	15/02/2017
Pre-amplifier		UC-59	43485	
½" Pre-polarised microphone		NH25	07231	
Calibrator		NC-74	34746691	17/07/2017

4.3 Environmental Sound Climate

4.3.1 The dominant noise source at the measurement position was noted to be noise associated with farmyard activities. Vehicular movements on the surrounding road network along with train movements from the nearby Millbrook station were also audible.

4.4 Assumptions/Limitations

4.4.1 The site engineer noticed nothing unusual in terms of the noise climate at the time of the survey. This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

4.5 Environmental Sound Survey Results

The results of the sound survey have been plotted on Time History Graphs enclosed in **Appendix B**, presenting the 15 minute A-weighted (dB) L_{10}, L_{90}, L_{eq} and L_{max} levels at the measurement position throughout the duration of the survey.

Table 4.3: Summary of Typical Background Sound Levels

Position	Date	Typical Background Sound Levels $L_{A90,8hr}$ dB	
		Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
LT1	08/09/2017	46	38*
	09/09/2017	39	35*
	10/09/2017	47	42
	11/09/2017	50	38
	12/09/2017	45	58**
	13/09/2017	50	36
	14/09/2017	47	39

*Excluding periods of rain as identified in paragraph 4.1.3.

**It is understood that the measurement location was subject to a sustained thunderstorm during the night time measurement period. This period has therefore been excluded from the calculation of the average background sound levels.

4.6 Background Noise Levels

4.6.1 For the purpose of this assessment typical background sound levels have been derived using the most recent environmental sound survey results measured during the proposed operational periods. Thies are detailed in **Table 4.4**.

Table 4.4: Background Noise Levels

Operational Period	Typical Background Sound Level ($L_{A90,15mins}$) dB	
	2015/2016 PEIR	2017
Daytime (07:00 – 23:00 hours)	43	46
Night-time (23:00 – 07:00 hours)	36	39

4.6.2 The typical background sound levels are around 3dB above the background sound levels presented in the submitted PEIR from surveys undertaken in 2014 / 2015. There were no obvious sources of noise in the vicinity of the survey location that were not present during those previous surveys. It is therefore considered that the increase in measured background sound levels is as a result of a general increase in sound levels due to increased development in the area around the Project Site. The LLRS construction works were not audible at the measurement location and are not operational at night, therefore it is unlikely that the construction works have influenced the measured noise levels.

5 Noise Impact Assessment

5.1 Acoustic model

5.1.1 To undertake detailed noise calculations of the Generating Equipment, the acoustic modelling software SoundPLAN version 7.4 has been used. The acoustic model has been used to predict the rating levels of the Generating Equipment at the closest noise sensitive receptors.

5.2 Operational Noise – Power Generation Plant

5.2.1 The worst case situation of the Generating Equipment has been modelled comprising one Gas Turbine Generator with dimensions of 50 m (length) x 13 m (width) x 25 m (height). These dimensions represent elements of the Gas Turbine Generator which could emit noise. The Gas Turbine Generator has a stack height of up to 35 m as per the maximum dimensions stated in Chapter 3 of the PEIR. The model also considers the Fin Fan Cooler unit with dimensions of 10 m (Height) x 28 m (Length) x 14 m (Width). As above, these dimensions represent elements of the Fin Fan coolers which could emit noise.

5.2.2 **Table 5.1** presents the calculated rating level of the Generating Equipment at the closest noise sensitive receptor (South Pillinge Farm). They are external free field noise levels predicted outside the windows of the property.

Table 5.1 Calculated Rating Level

Power Generating Equipment	Calculated Rating Level at Closest Noise Sensitive Receptor (dBA)
Gas Turbine Generator, Stack and Fin Fan Coolers	38

5.2.3 **Table 5.2** presents an indicative assessment of the potential noise impact from the Generating Equipment.

Table 5.2 Indicative Assessment

Calculation Description	BS4142 Assessment Summary during Time Period	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00)
Combined Project Rating Level (dB $L_{Ar,Tr}$) at Noise Sensitive Receptor	38	38
Background Sound Level (dB $L_{A90,\ 15\ min}$)	46	39
Excess of Rating over Background Sound Level (dB)	-8	-1
Assessment of Impact	Indication of the specific sound source having a low impact, depending on the context	Indication of the specific sound source having a low impact, depending on the context

5.2.4 Calculations indicated that the rating level associated with the operation of the Generating Equipment is likely to fall below the background sound level at South Pillage Farm by approximately 8dB during the daytime and 1dB during the night-time. With reference to BS4142 this is an indication of the specific sound source having a low impact, depending on the context.

Contextual factors

5.2.5 In addition to the assessment provided above, it is noted that there are several contextual factors which should be taken into consideration as follows:

- The Generating Equipment could run up to a maximum of 2,250 hours in any given year, provided that the 5 year rolling average does not exceed 1,500 hours. For the purposes of the EIA, a worst case yearly maximum of 2,250 running hours has been assessed);
- The likely operating regime of the Generating Equipment (i.e. likely to be run during hours of peak electricity demand which is typically during the daytime (e.g. outside the time when the lowest background noise levels will occur).
- The likely non-tonal nature of cumulative noise from the Generating Equipment;
- A single worst affected NSR;
- The location of the nearby Marston Vale Railway Line;
- The location of the nearby Bedford – London Railway Line;
- Minimal levels of operational vibration;
- The location of the nearby proving ground;
- The location of windows on the NSR which do not overlook the Generating Equipment; and
- Potential noise from nearby developments.

5.2.6 With reference to BS4142 this is an indication of the specific sound source having a low impact, depending on the context. In considering the context of the application as outlined above it is not considered necessary to modify the indicative numerical assessment.

5.2.7 A comparison of the calculated rating level with the LOAEL and SOAEL identified in **Section 3** indicate that the rating level associated with the operation of the facility falls significantly below the proposed LOAEL.

Cumulative Operational Noise Impact

5.2.8 The DCO granted for the Covanta RRF Project sets out the operational noise limits at noise sensitive receptors provided in Table 5.3.

Table 5.3 Noise Limits set out in the DCO granted for the Covanta RRF Project dated 2011

NSR	Operational Noise Limit	
	Daytime $L_{Aeq,1h}$ (dB)	Night-time $L_{Aeq,5min}$ (dB)
South Pillinge Farm	39	35

5.2.9 Based on the information set out above an indicative cumulative noise assessment has been undertaken using the calculated rating level of the Generating Equipment set out in Table 5.3. the assessment is presented in Table 5.5.

Table 5.4 Indicative Cumulative Noise Assessment

Calculation Description	BS4142 Assessment Summary during Time Period	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00)
Cumulative Combined Rating Level (dB $L_{Ar,Tr}$) at Noise Sensitive Receptor	42	40
Background Sound Level (dB $L_{A90,\ 15\ min}$)	46	39
Excess of Rating over Background Sound Level (dB)	-4	+1
Assessment of Impact	Indication of the specific sound source having a low impact, depending on the context	Indication of the specific sound source having a low impact, depending on the context

5.2.10 Calculations indicated that the cumulative rating level associated with the operation of both the Generating Equipment and the Covanta RRF project is likely to be around 1dB above background sound levels at South Pillinge Farm during the night-time and -4 dB below the background sound levels during the daytime.

5.2.11 With reference to BS4142 this is an indication of the specific sound source having a low impact, depending on the context. In considering the context of the application (as outlined in Paragraph 5.2.5) it is not considered necessary to modify the indicative numerical assessment.

5.2.12 A comparison of the calculated rating level with the LOAEL and SOAEL identified in **Section 3** indicate that the cumulative rating levels associated with the operation of the proposed facility and the Covanta RRF Project are likely to fall below the proposed LOAEL.

Proposed Noise Requirement

5.2.13 Based on the assessment presented above, and taking into consideration the contextual factors presented, we would suggest that a Requirement is attached to the DCO which states:

"Control of noise during operation

12.—(1) Prior to the date of final commissioning a written noise scheme providing for the control of noise generated during the operation of the authorised development must be submitted to and approved by the relevant planning authority. The noise scheme must include the following:

(a) the locations at which noise will be monitored;
(b) the defined representative background sound level at South Pillinge Farm house;
(c) the method of noise measurement (which must be in accord with BS 4142:2014, an equivalent successor standard or other agreed noise measurement methodology appropriate to the circumstances) and when such measurements will be carried out; and
(d) a complaints procedure.

(2) Except in the case of an emergency, noise (in terms of the BS 4142:2014 rating level) emitted from the operation of the authorised development must be no greater than the defined representative background sound level as approved in the noise scheme submitted pursuant to sub-paragraph (1)

(3) The noise scheme must be carried out as approved".

6 Conclusion

6.1.1 A PEIR was submitted in May 2017 for the Millbrook Power Project which included a preliminary noise impact assessment. Since the submission of the PEIR additional acoustic work has been undertaken to assess the potential noise and vibration impact associated with the operational phase of the proposed development based on revised parameters and additional mitigation. This report summarises those results.

6.1.2 All relevant national policies, local policies and technical guidance are documented in the submitted PEIR. Based on the relevant technical guidance suitable assessment criteria have been suggested.

6.1.3 A fully automated environmental sound survey was undertaken over a period of 1 week from approximately 09:00 hours on Friday 08 September 2017 to approximately 09:00 hours on Friday 15 September 2017 in order to determine the current sound climate at the closest noise sensitive receptor. For the purpose of this assessment typical background sound levels have been derived using the results of the most recent environmental sound surveys.

6.1.4 Since the submission of the PEIR, further discussions with EPC contractors have been undertaken to ascertain feasible reductions in the noise emissions from the Generating Equipment to reduce the likely noise impact from the Project. Based on the revised plant proposals a revised noise impact assessment has been undertaken.

6.1.5 Calculations indicated that the rating level associated with the Generating Equipment is likely to fall below the background sound levels at South Pillage Farm by approximately 8dB during the daytime and 1dB during the night-time. With reference to BS4142 this is an indication of the specific sound source having a low impact, depending on the context.

6.1.6 A comparison of the calculated rating level with the LOAEL and SOAEL identified in **Section 3** indicate that the rating level associated with the operation of the facility falls significantly below the proposed LOAEL.

6.1.7 Calculations indicated that the cumulative rating level associated with Generating Equipment and the Covanta RRF project is likely to be around 1dB above background sound levels at South Pillinge Farm during the night-time and -4 dB below the background sound levels during the daytime.

6.1.8 With reference to BS4142 this is an indication of the specific sound source having a low impact, depending on the context. In considering the context of the application it is not considered necessary to modify the indicative numerical assessment.

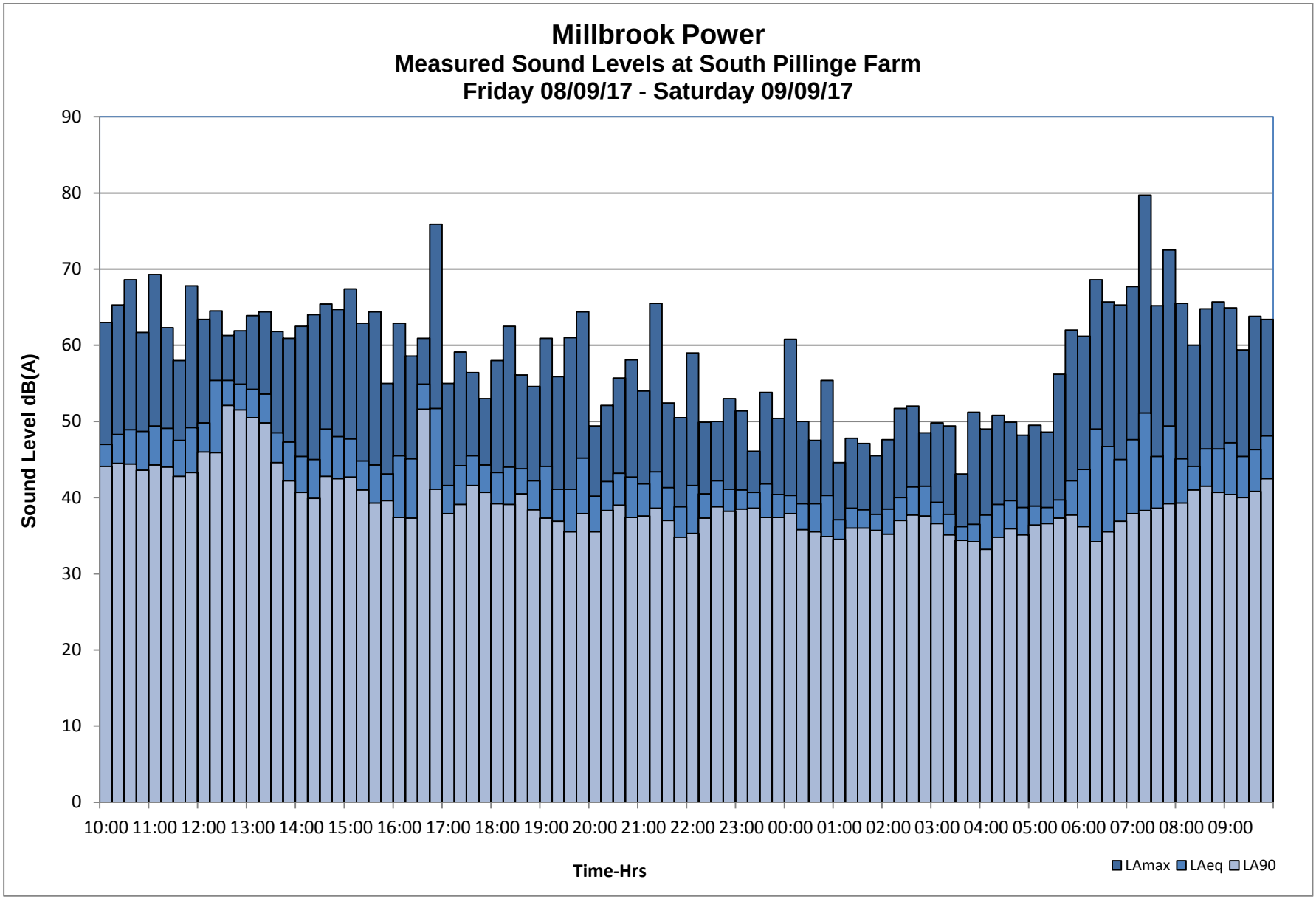
6.1.9 A comparison of the calculated rating level with the LOAEL and SOAEL identified in **Section 3** indicate that the cumulative rating levels associated with the operation of the proposed facility and the Covanta RRF Project are likely to fall below the proposed LOAEL.

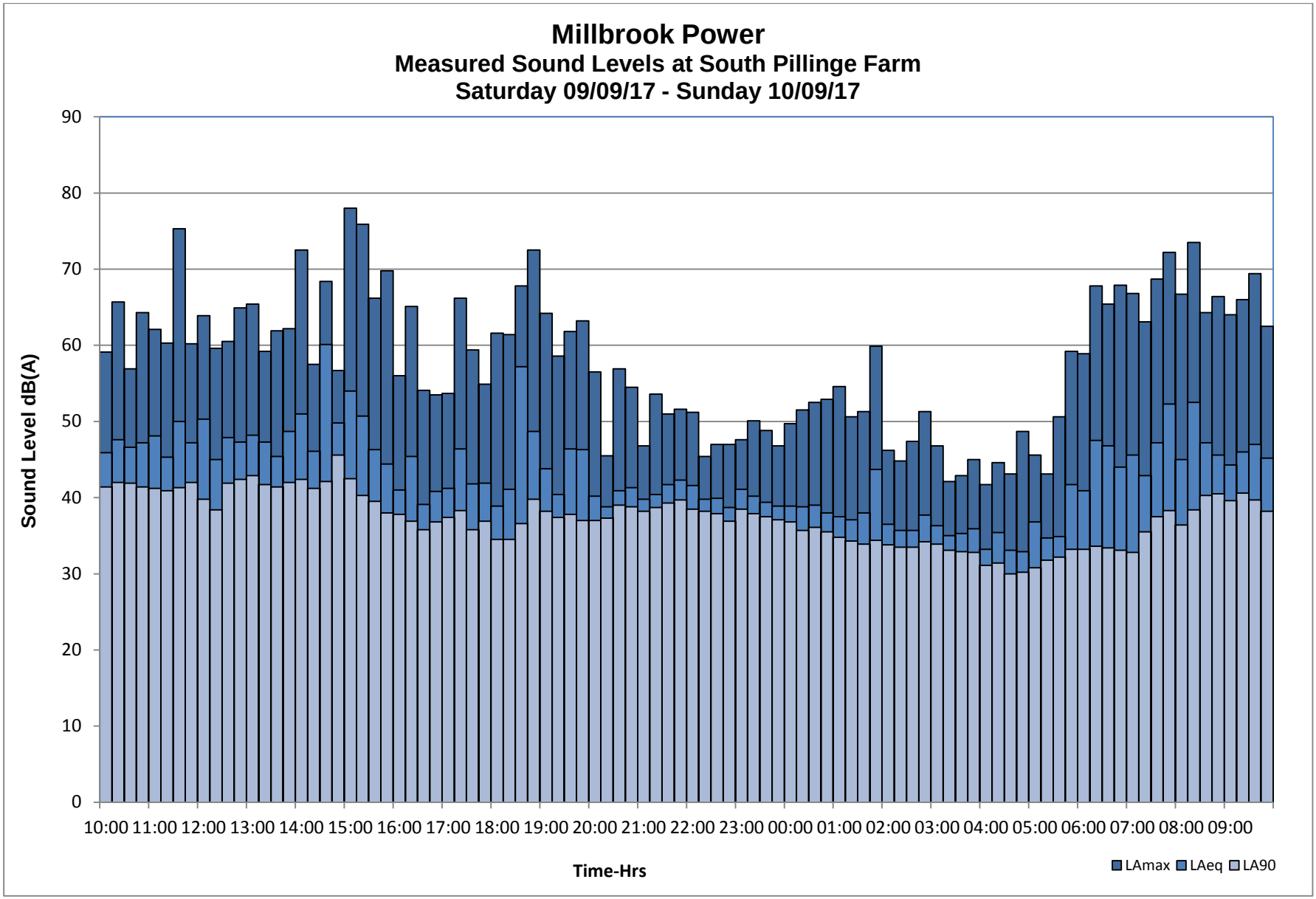
Appendix A Acoustic Terminology

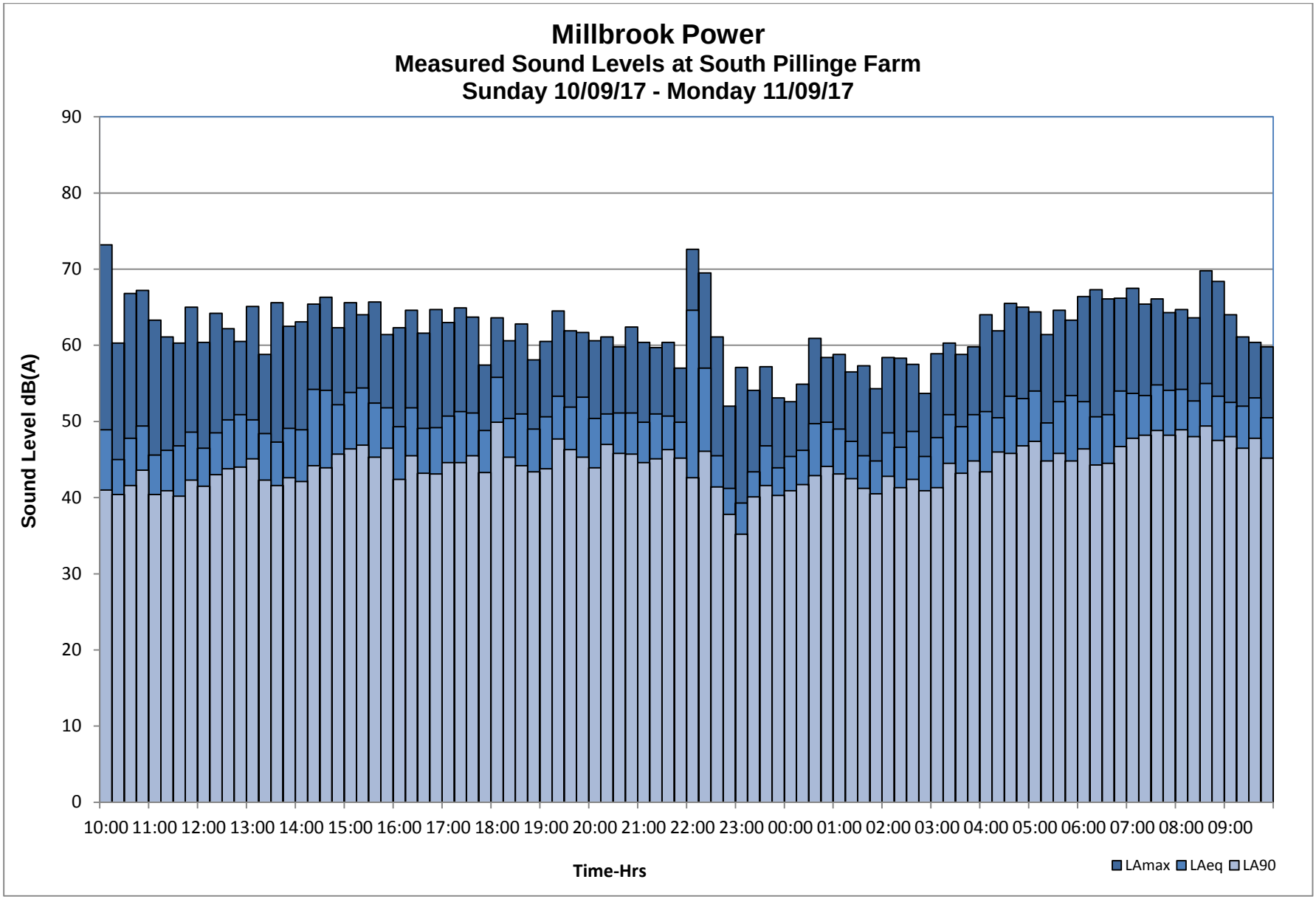
Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LAeq,T).
Daytime	The period 07:00-23:00 hours.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), LAx	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
LAeq,T	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
Lmax,T	A noise level index defined as the maximum noise level recorded during a noise event with a period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. LA10,18h is the A –weighted arithmetic average of the 18 hourly LA10,1h values from 06:00-24:00.
$L_{90,T}$ or Background Noise Level	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.

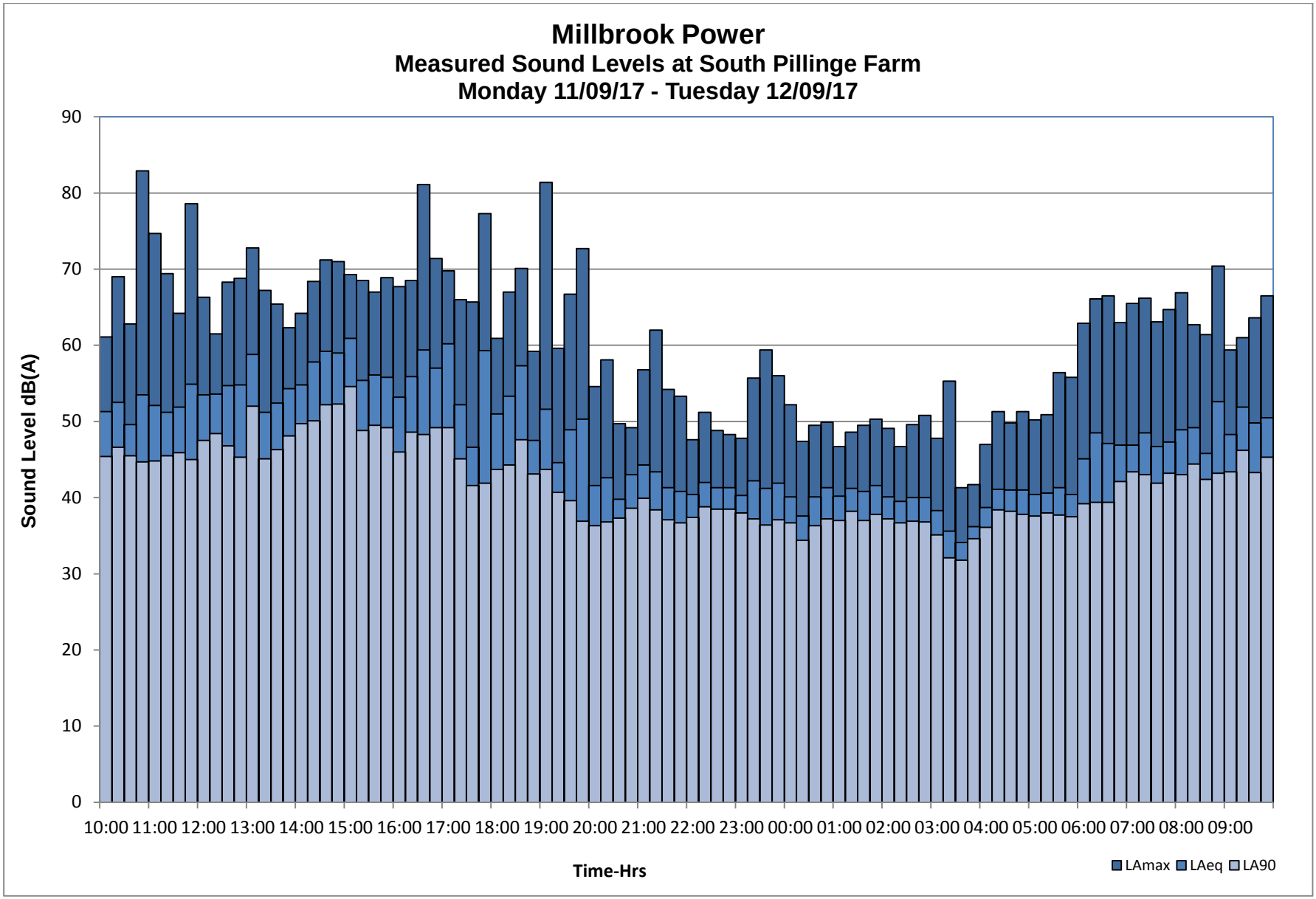
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Night-time	The period 23:00-07:00 hours.
NOEL	No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
SOAEL	Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

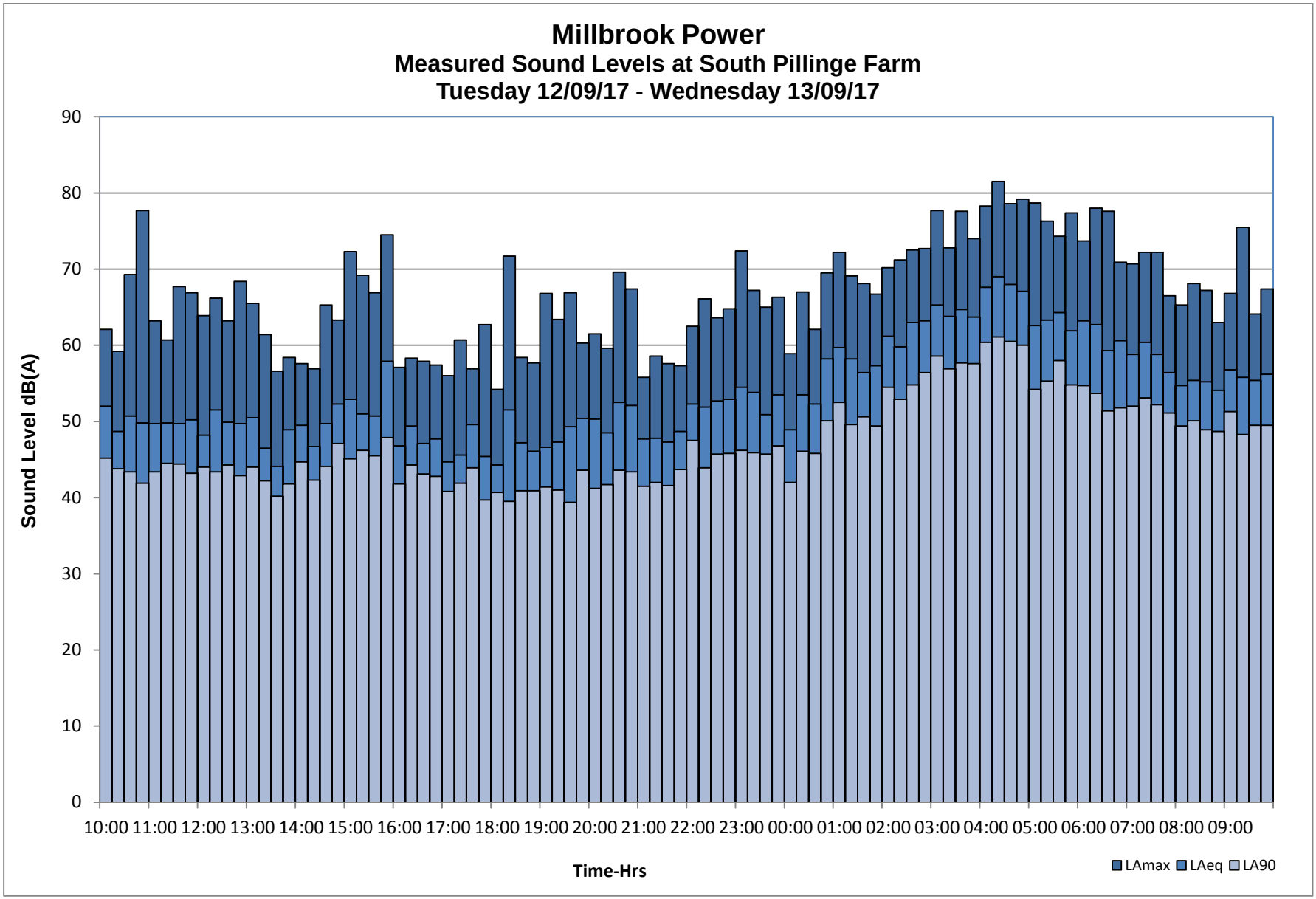
Appendix B Time History Graphs

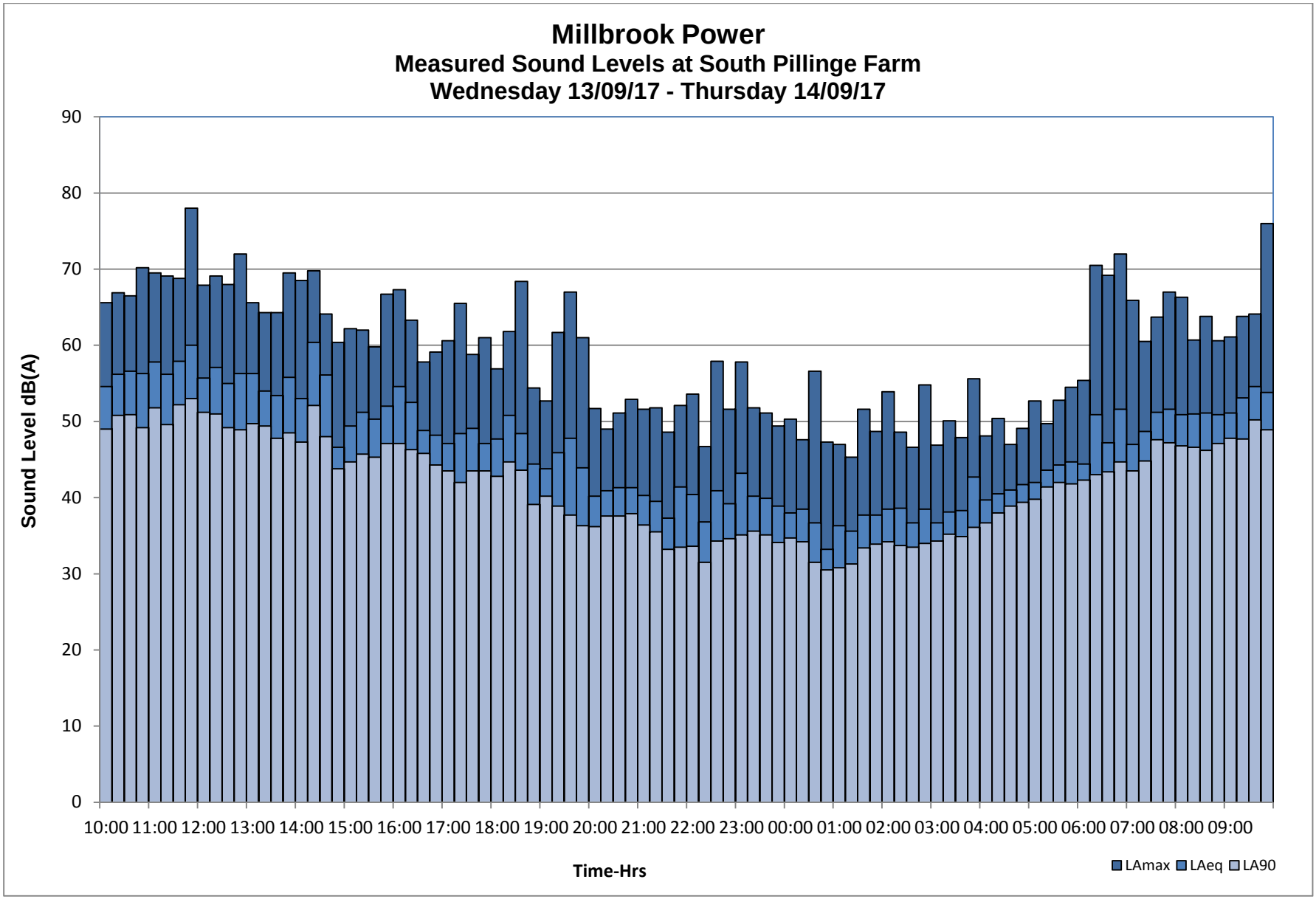

Millbrook Power
Measured Sound Levels at South Pillinge Farm
Friday 08/09/17 - Saturday 09/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90

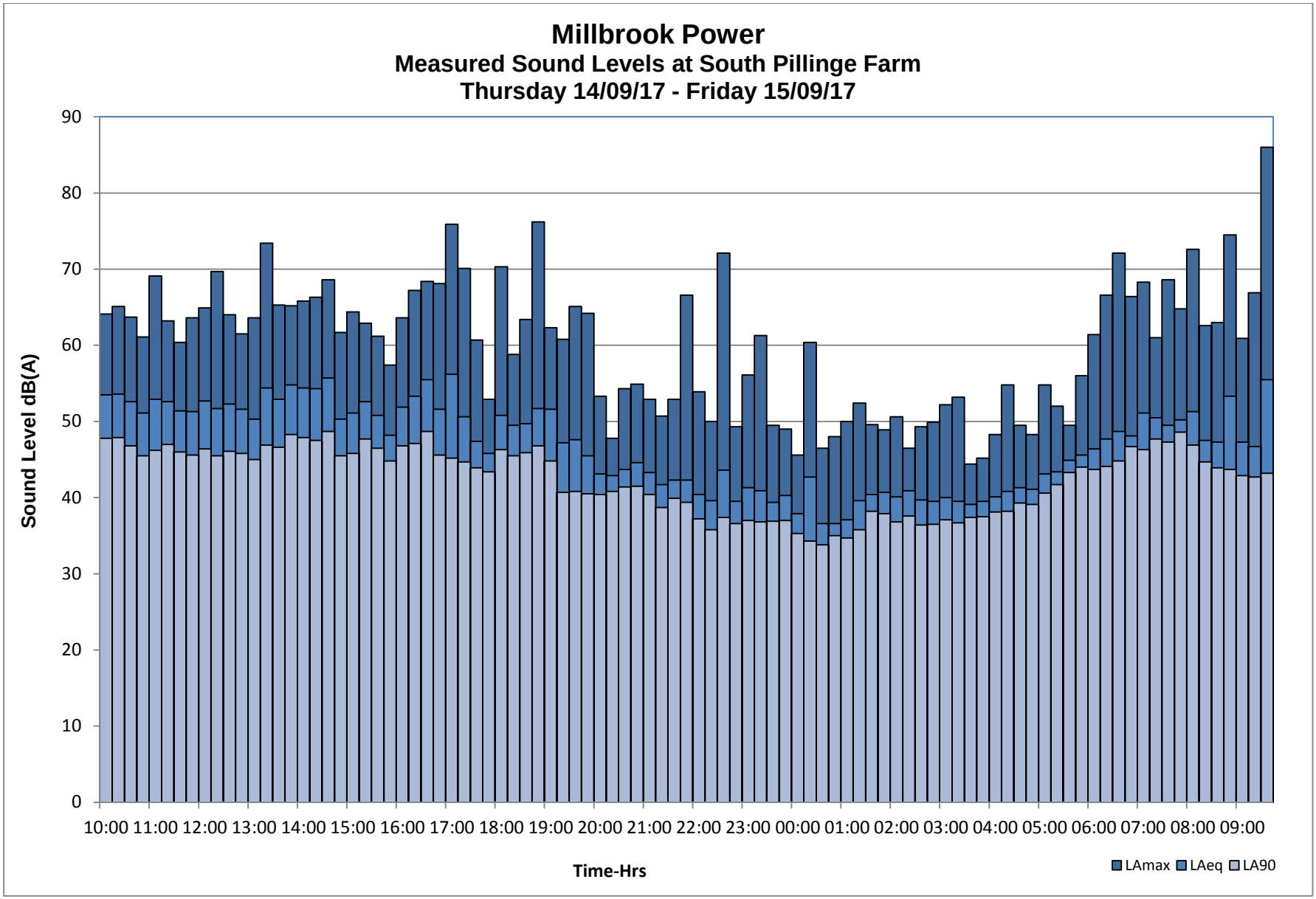

Millbrook Power
Measured Sound Levels at South Pillinge Farm
Saturday 09/09/17 - Sunday 10/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90


Millbrook Power
Measured Sound Levels at South Pillinge Farm
Sunday 10/09/17 - Monday 11/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90


Millbrook Power
Measured Sound Levels at South Pillinge Farm
Monday 11/09/17 - Tuesday 12/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90


Millbrook Power
Measured Sound Levels at South Pillinge Farm
Tuesday 12/09/17 - Wednesday 13/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90


Millbrook Power
Measured Sound Levels at South Pillinge Farm
Wednesday 13/09/17 - Thursday 14/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90


Millbrook Power
Measured Sound Levels at South Pillinge Farm
Thursday 14/09/17 - Friday 15/09/17
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00
Time-Hrs
LAmax
LAeq
LA90