



The Millbrook Power (Gas Fired Power Station) Order

Baseline Noise Survey Report and Operational Plan Noise Impact Assessment Report – Revision 1 – Submitted at Deadline 2 – April 2018

Superseding Volume H Appendix 7.2 and Appendix 7.3 of the Environmental Statement, submitted in October 2017

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7.2 Baseline Noise Survey Report – Revision 1

Contents

1	Introduction	1
1.1	Background	1
1.2	Noise Sensitive Receptors	1
1.3	Noise Sources	2
2	Methodology	3
2.1	Consultation with Central Bedfordshire Council	3
2.2	Baseline Noise Survey – August 2014	3
2.3	Baseline Noise Survey – November 2014	4
3	Noise Survey Results	6
3.1	Noise Climate	6
3.2	Results.....	7
4	Summary	9

Figures

Figure 1: Site Location Plan	10
Figure 2: South Pillinge Farm Survey Locations	10
Figure 3: Lower Farm Survey Location	10

Tables

Table 1.1: Description of noise sensitive receptors.....	1
Table 2.1: Instrumentation used during August 2014 survey.....	3
Table 2.2: Instrumentation used during the November 2014 survey	4
Table 3.1: Noise survey results at South Pillinge Farm, August 2014	7
Table 3.2: Noise survey results at South Pillinge Farm, November 2014.....	7
Table 3.3: Noise survey results at Lower Farm, November 2014	8

Appendices

Appendix A	Glossary
Appendix B	Time History Graphs

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1 Introduction

1.1 Background

- 1.1.1 Peter Brett Associates LLP (PBA) has been commissioned to prepare the Noise and Vibration chapter of an Environmental Statement (ES) to support a Development Consent Order (DCO) application for the Millbrook Power Project.
- 1.1.2 The proposed site for a gas fired peaking power generation plant is within the Rookery South Pit, a former clay pit, which is located to the north of Millbrook in Central Bedfordshire.
- 1.1.3 In order to support the noise assessment, two noise surveys have been undertaken. This report presents the survey methodology and results of the surveys.
- 1.1.4 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. To assist the reader, an explanation of the terminology used in this report is contained within **Appendix A**.

1.2 Noise Sensitive Receptors

- 1.2.1 Five noise sensitive receptors (NSR) have been identified in the vicinity of the Project Site. These are the closest residential receptors to the Power Generation Plant Site and associated construction and decommissioning activities. The NSR's are summarised in **Table 1.1**.

Table 1.1: Description of noise sensitive receptors

Receptor	Description
South Pillinge Farm	This NSR is located to the west of the Project Site. It is the closest NSR to the Power Generation Plant Site and the Electrical Connection. It will be affected by the construction, operation and decommissioning of the Power Generation Plant, Electrical Connection and Gas Connection.
Pillinge Cottages	This NSR is located to the south west of the Project Site. Noise levels at South Pillinge Farm have been deemed representative of the noise levels at Pillinge Cottages due to their close proximity.
Moreteyne House	This NSR is located to the south west of the Project Site. Noise levels at South Pillinge Farm have been deemed representative of the noise levels at Moreteyne House due to their close proximity.
Lower Farm	This NSR is located to the south of the Project Site. It is the closest NSR to the Above Ground Installation associated with the Gas Connection to the National Transmission System. It will be affected by the construction and decommissioning of the Gas Connection.
Manor Farm	This NSR is located to the east of the Project Site. It is the closest NSR to an alternative Gas Connection option which is no longer under consideration.

1.3 Environmental Sound Sources

- 1.3.1 The Project Site is bound to the east and west by the Midland Main Line and Marston Vale Line railways which are a dominant noise source at the NSRs.
- 1.3.2 Additionally, Station Lane, Houghton Lane, Millbrook Road and the B530 dual carriageway pass the NSR locations and are deemed to be a dominant source of road traffic noise.
- 1.3.3 The wider road network includes the A421 dual carriageway which runs to the north west of the Project Site and the M1 motorway which runs to the south west of the Project Site.
- 1.3.4 **Error! Reference source not found.** shows the indicative locations of the NSR, the railway lines, the existing overhead line, proposed Electrical Connection and the proposed Power Generation Plant and AGI.

2 Methodology

2.1 Consultation with Central Bedfordshire Council

- 2.1.1 The Public Protection Officer (PPO) at Central Bedfordshire Council (CBC) agreed (verbally) in August 2014 that one noise measurement location at South Pillinge Farm would be sufficient for the purposes of the Preliminary Environmental Information Report (PEIR).
- 2.1.2 The PPO was contacted in November 2014 to confirm the noise survey locations in order to support the full noise and vibration assessment. It was agreed, in writing, that a noise survey at Manor Farm was not required as the option for gas connection route close to this NSR is no longer under consideration.

2.2 Baseline Noise Survey – August 2014

- 2.2.1 A baseline noise survey was undertaken between 14 and 18 August 2014 in order to determine the ambient and background noise levels at South Pillinge Farm and support the preliminary noise assessment included in the PEIR.
- 2.2.2 An unattended environmental noise measurement was undertaken in the garden of South Pillinge Farm. The sound level meter was located approximately 6 m to the north east of the farmhouse with the microphone positioned approximately 1.4 m above ground level. The approximate location of the sound level meter is shown in [Error! Reference source not found.](#) and labelled LTA1.
- 2.2.3 A minimum sampling frequency (logging period) of 15 minutes was used for a continuous survey period of four days.
- 2.2.4 **Table 2.1** provides details of the instrumentation used during the August 2014 survey.

Table 2.1: Instrumentation used during August 2014 survey

Item	Manufacturer	Model	Serial Number	Laboratory Calibration Date
Sound Level Meter	Rion	NL-52	00542902	31 July 2014
Pre-Amplifier	Rion	UC59	42930	
Microphone	Rion	NH-25	06479	

- 2.2.5 Onsite calibration checks were undertaken before and after the survey with no significant drift in calibration observed.
- 2.2.6 A windshield was fitted over the microphone at all times during the survey period.
- 2.2.7 The weather conditions throughout the measurement period were considered to be suitable for environmental noise surveys (overcast with low wind speed).

2.3 Baseline Noise Survey – November 2014

- 2.3.1 A further baseline noise survey was undertaken between 21 and 26 November 2014 to determine the ambient and background noise levels at the nearest noise sensitive receptors to the proposed infrastructure and construction works.
- 2.3.2 Unattended environmental noise measurements were undertaken at the following locations:
- South Pillinge Farm (Location LTN1) – The sound level meter was located approximately 20 m to the east of the farmhouse with the microphone positioned 1.4 m above ground level. The approximate location of the sound level meter is shown in Error! Reference source not found..
 - Lower Farm (Location LTN2) – The sound level meter was located approximately 20 m to the south east of the farmhouse with the microphone positioned 1.4 m above ground level. The approximate location of the sound level meter is shown in Error! Reference source not found..
- 2.3.3 A minimum sampling frequency (logging period) of 15 minutes was used for a continuous survey period of five days.
- 2.3.4 **Table 2.2** provides details of the instrumentation used during the survey.

Table 2.2: Instrumentation used during the November 2014 survey

Item	Manufacturer	Model	Serial Number	Laboratory Calibration Date
South Pillinge Farm				
Sound Level Meter	Rion	NL-52	00542901	31 July 2014
Pre-Amplifier	Rion	UC59	42929	
Microphone	Rion	NH-25	06478	
Lower Farm				
Sound Level Meter	Rion	NL-52	00542902	31 July 2014
Pre-Amplifier	Rion	UC59	42930	
Microphone	Rion	NH-25	06479	

- 2.3.5 Onsite calibration checks were undertaken before and after each of the measurement periods with no significant drift in calibration level observed.
- 2.3.6 Windshields were fitted over the microphones at all times during the survey period.
- 2.3.7 The weather conditions throughout the measurement period were suitable for environmental noise surveys with the exception of heavy rain fall during the daytime on Sunday 23 November.

- 2.3.8 This report refers 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.

3 Noise Survey Results

3.1 Noise Climate

South Pilling Farm – August 2014

- 3.1.1 During the site visits associated with the noise survey undertaken in August 2014, the dominant sound sources were deemed to be distant road traffic, and local wildlife and farm animals.

South Pilling Farm – November 2014

- 3.1.2 Construction work associated with the low level restoration scheme was underway during the November 2014 noise survey at South Pilling Farm.
- 3.1.3 On Friday 21 November, during commencement of the survey, construction activities were being undertaken immediately adjacent to the survey location. Activities included the extraction and transportation of materials from the permitted extraction area to the south of the Rookery South Pit. At the time of the survey, the northern half of the temporary earth bund had been constructed around the Rookery South Pit. The residents of South Pilling Farm confirmed that construction activities are not undertaken over the weekend.
- 3.1.4 The survey was not abandoned due to untypical conditions as evening, night-time and weekend measurements were still considered to be recorded under typical conditions (with the exception of the heavy rainfall on Sunday 23 November). Historically, noise levels measured during these periods are the lowest noise levels. In order to inform the assessment of operational noise, the typical measured $L_{A90,15mins}$ background noise levels will be used.
- 3.1.5 In addition, the duration of the LLRS works were expected to extend beyond the timescales of the preparation of the ES.
- 3.1.6 As the noise survey results which were measured in August 2014 are considered to have been undertaken during typical conditions, these will also be used to inform the assessment of operational, construction and decommissioning noise for the ES.
- 3.1.7 On Wednesday 26 November, when the equipment was collected, construction activities were being undertaken in the pit areas. Construction noise was considerably quieter compared to the commencement of the noise survey. The types of activities being undertaken were unable to be identified without access onto the site.
- 3.1.8 During the site visit on Wednesday 26 November, other noise sources noted comprised distant road traffic including emergency sirens on local roads, aircraft, trains passing by on the Midland Main Line (which were also visible from the survey location), and natural noise sources including birdsong and running water from the nearby brook.

Lower Farm – November 2014

- 3.1.9 The dominant noise sources at Lower Farm were deemed to be road traffic on Houghton Lane and train pass bys on the Midland Main Line to the east of the survey location.
- 3.1.10 Additionally, distant road traffic was noted with natural noise sources including tree movements and birdsong. A number of local businesses operate out of the existing farm buildings to the north of the farmhouse which received a mix of HGV and LGV deliveries during site attendance.

3.2 Results

August 2014

3.2.1 **Table 3.1** presents the $L_{Aeq,16h}$, $L_{Aeq,8h}$ and typical $L_{A90,15mins}$ during the daytime and night-time periods measured during the August 2014 survey at South Pillinge Farm.

Table 3.1: Noise survey results at South Pillinge Farm, August 2014

Date	Daytime $L_{Aeq,16h}$ (dB)	Night-time $L_{Aeq,8h}$ (dB)	Typical Daytime $L_{A90,15mins}$ (dB)	Typical Night-time $L_{A90,15mins}$ (dB)
Thursday 14/08/2014 – Friday 15/08/2014	49	43	31	32
Friday 15/08/2014 – Saturday 16/08/2014	44	40	27	26
Saturday 16/08/2014 – Sunday 17/08/2014	46	42	33	33
Sunday 17/08/2014 – Monday 18/08/2014	50	41	33	30

3.2.2 Time history graphs of the August 2014 survey results are provided in **Appendix B**.

November 2014

3.2.3 **Table 3.2** presents the results of the noise survey undertaken in November 2014 at South Pillinge Farm and **Table 3.3** presents the results of the noise survey undertaken simultaneously at Lower Farm.

Table 3.2: Noise survey results at South Pillinge Farm, November 2014

Date	Daytime $L_{Aeq,16h}$ (dB)	Night-time $L_{Aeq,8h}$ (dB)	Typical Daytime $L_{A90,15mins}$ (dB)	Typical Night-time $L_{A90,15mins}$ (dB)
Friday 21/11/2014 – Saturday 22/11/2014	52	41	37	31
Saturday 22/11/2014 – Sunday 23/11/2014	46	45	30	31
Sunday 23/11/2014 – Monday 24/11/2014	50	42	38	35
Monday 24/11/2014 – Tuesday 25/11/2014	53	44	37	34
Tuesday 25/11/2014 – Wednesday 26/11/2014	51	45	35	37

Table 3.3: Noise survey results at Lower Farm, November 2014

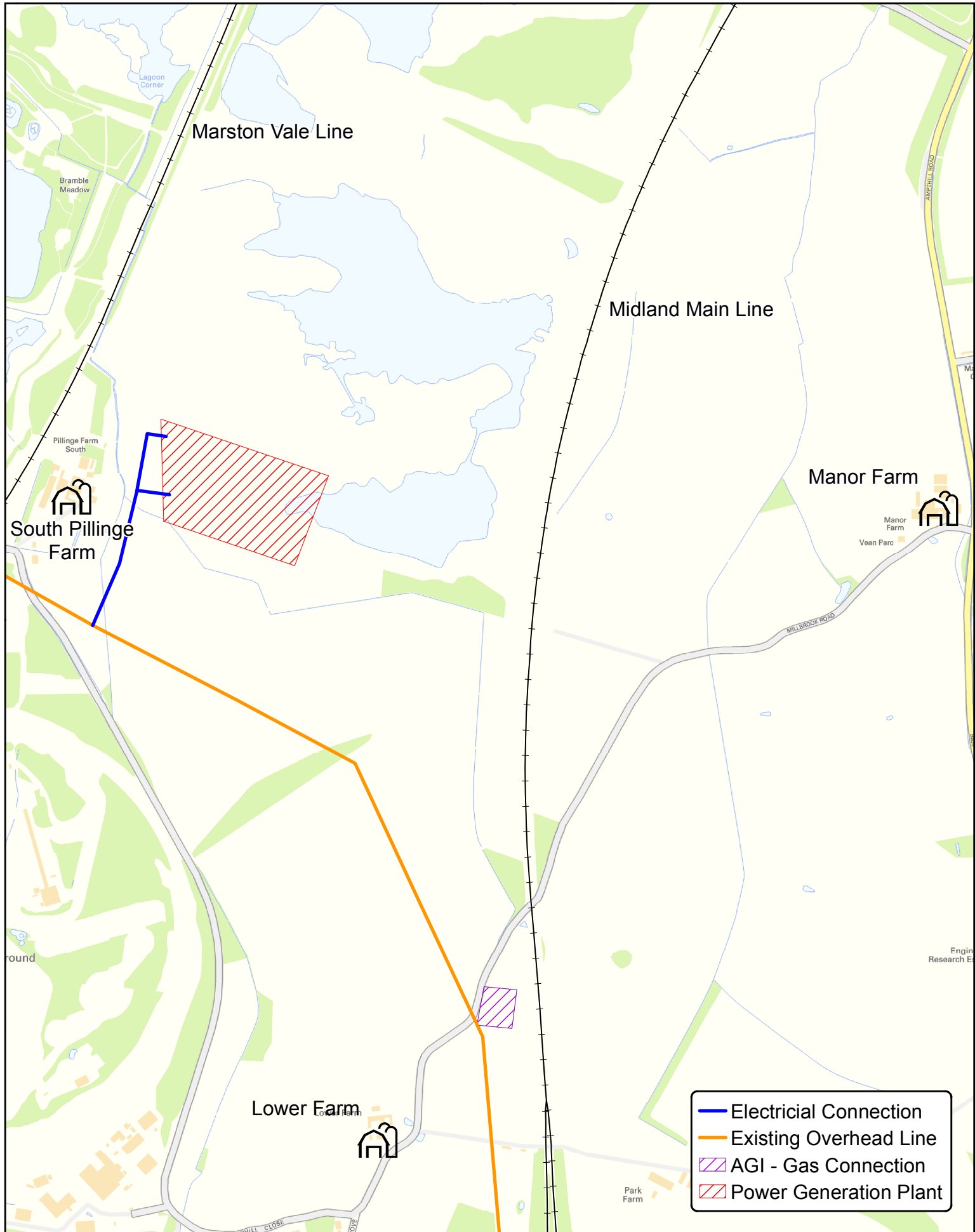
Date	Daytime $L_{Aeq,16h}$ (dB)	Night-time $L_{Aeq,8h}$ (dB)	Typical Daytime $L_{A90,15mins}$ (dB)	Typical Night- time $L_{A90,15mins}$ (dB)
Friday 21/11/2014 – Saturday 22/11/2014	53	46	37	30
Saturday 22/11/2014 – Sunday 23/11/2014	51	44	31	28
Sunday 23/11/2014 – Monday 24/11/2014	51	43	34	29
Monday 24/11/2014 – Tuesday 25/11/2014	53	45	34	27
Tuesday 25/11/2014 – Wednesday 26/11/2014	53	46	32	28

3.2.4 Time history graphs of the November 2014 survey data are provided in **Appendix B**.

4 Summary

- 4.1.1 Peter Brett Associates LLP (PBA) are preparing the Noise and Vibration chapter of an Environmental Statement to support a DCO application for the Millbrook Power Project.
- 4.1.2 The proposed site for a gas fired peaking power generation plant is within the Rookery South Pit, a former clay pit, which is located to the north of Millbrook in Central Bedfordshire.
- 4.1.3 In order to support the noise assessment, two noise surveys have been undertaken. This report presents the survey methodology and results.
- 4.1.4 The noise sensitive receptors in the vicinity of the Project Site have been identified.
- 4.1.5 Consultation with the Environmental Health Department at Central Bedfordshire Council has been undertaken in order to discuss survey methodology.
- 4.1.6 Two unattended, baseline, environmental noise surveys have been undertaken.
- 4.1.7 The first survey was undertaken in August 2014 at South Pillinge Farm in order to support the preliminary assessment included within the PEIR.
- 4.1.8 A second survey was undertaken in November 2014 at South Pillinge Farm and Lower Farm in order to support the full assessment included as part of the Environmental Statement.
- 4.1.9 This report has presented the methodology and results of the two noise surveys.

5 Figures



	Electrical Connection
	Existing Overhead Line
	AGI - Gas Connection
	Power Generation Plant

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Client

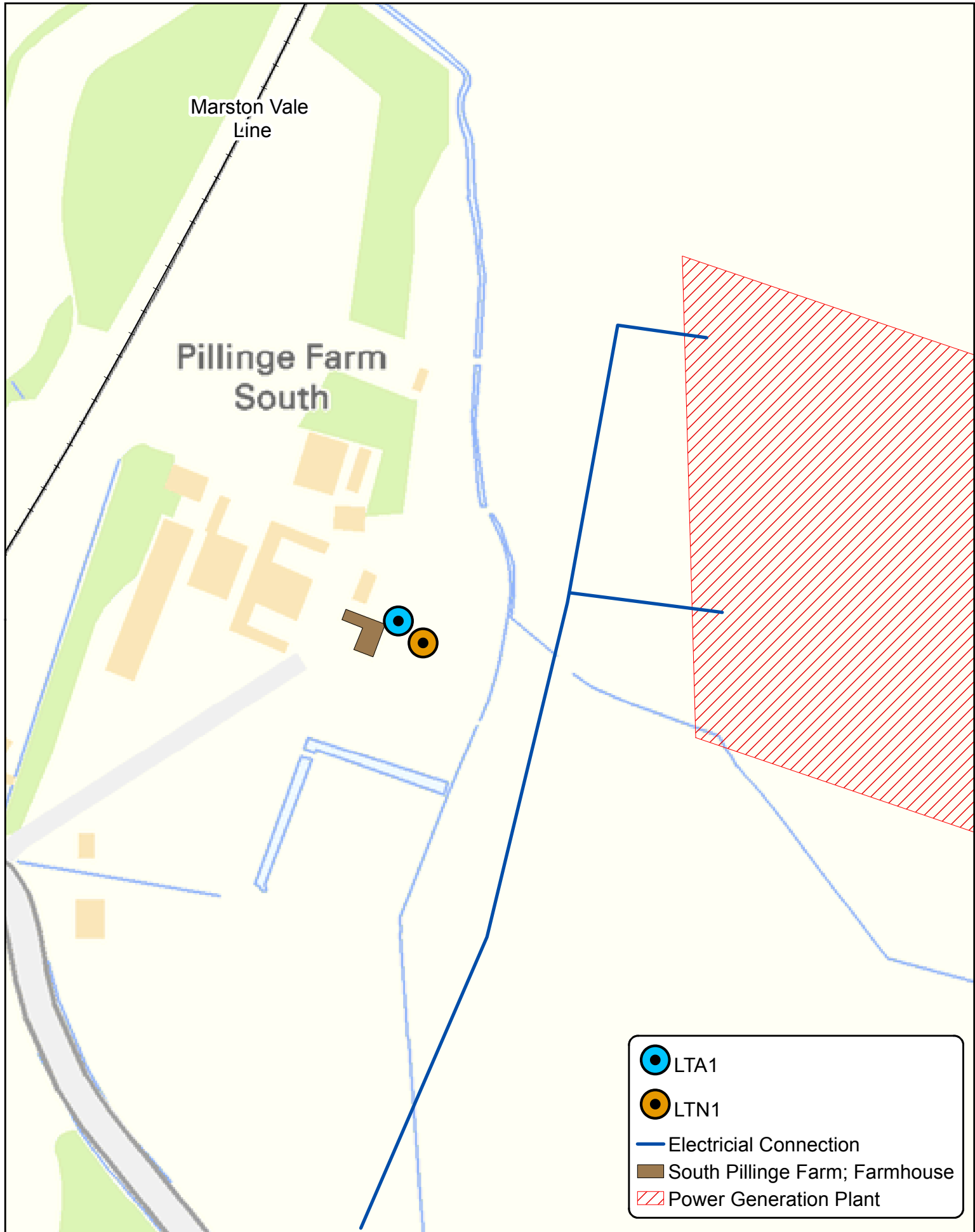
0 0.15 0.3 Kilometers

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Site Location Plan

Date	02/2015
Scale	1:11,300 @ A4
Drawn By	HF
Checked By	RE
Revision Number	01
Figure Number	Figure 1



	LTA1
	LTN1
	Electrical Connection
	South Pilling Farm; Farmhouse
	Power Generation Plant

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Tel: 0118 950 0761 Fax: 0118 959 7498

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0 0.03 0.06 Kilometers

N





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South Pilling Farm Survey Location

Date	02/2015
Scale	1:2,400 @ A4
Drawn By	HF
Checked By	RE
Revision Number	01
Figure Number	Figure 2

Lower Farm

Midland Mainline

-  LTN2
-  Existing Overhead Line
-  AGI - Gas Connection
-  Lower Farm; Farmhouse



Client

0 25 50 Meters



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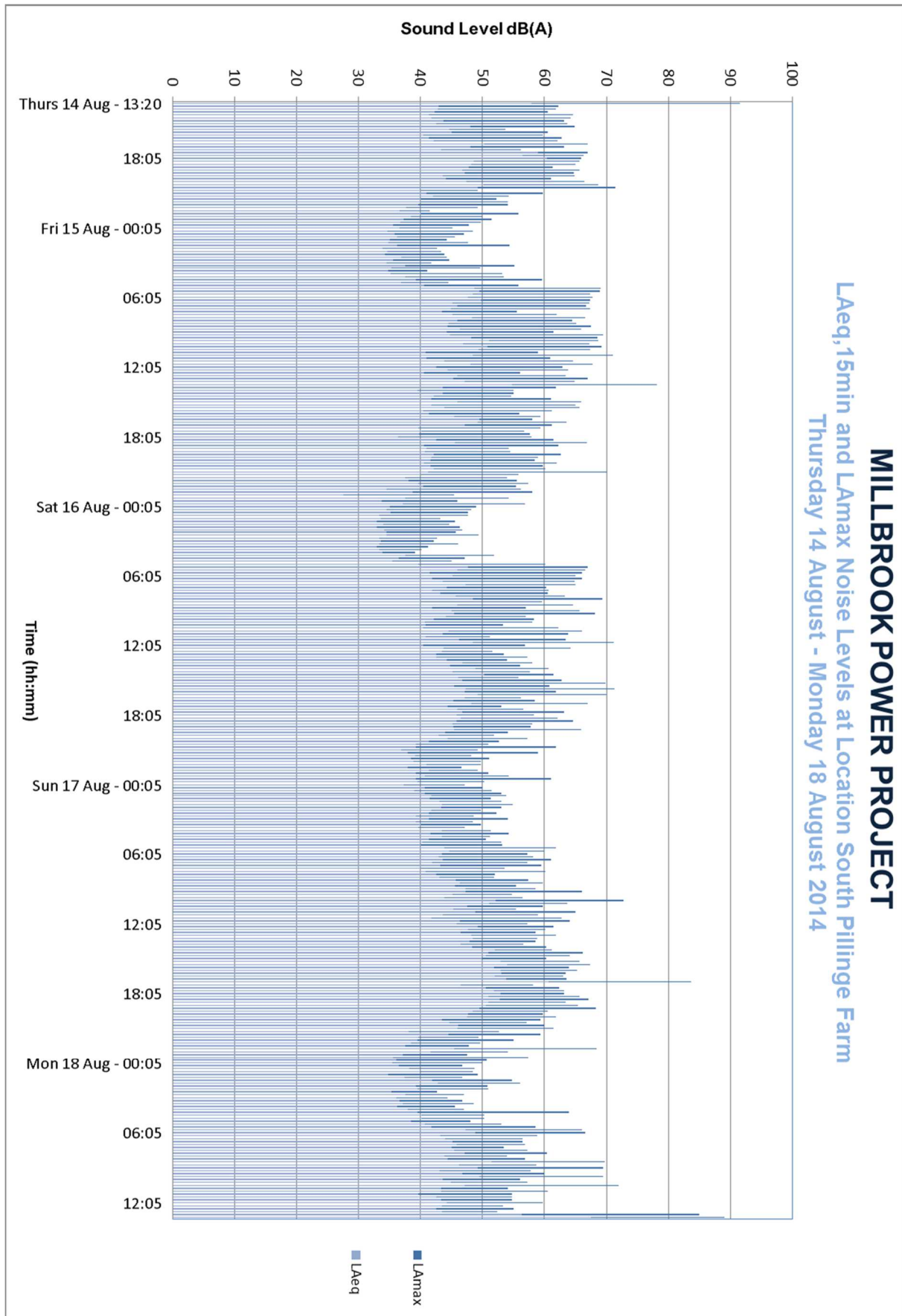
Lower Farm Survey Location

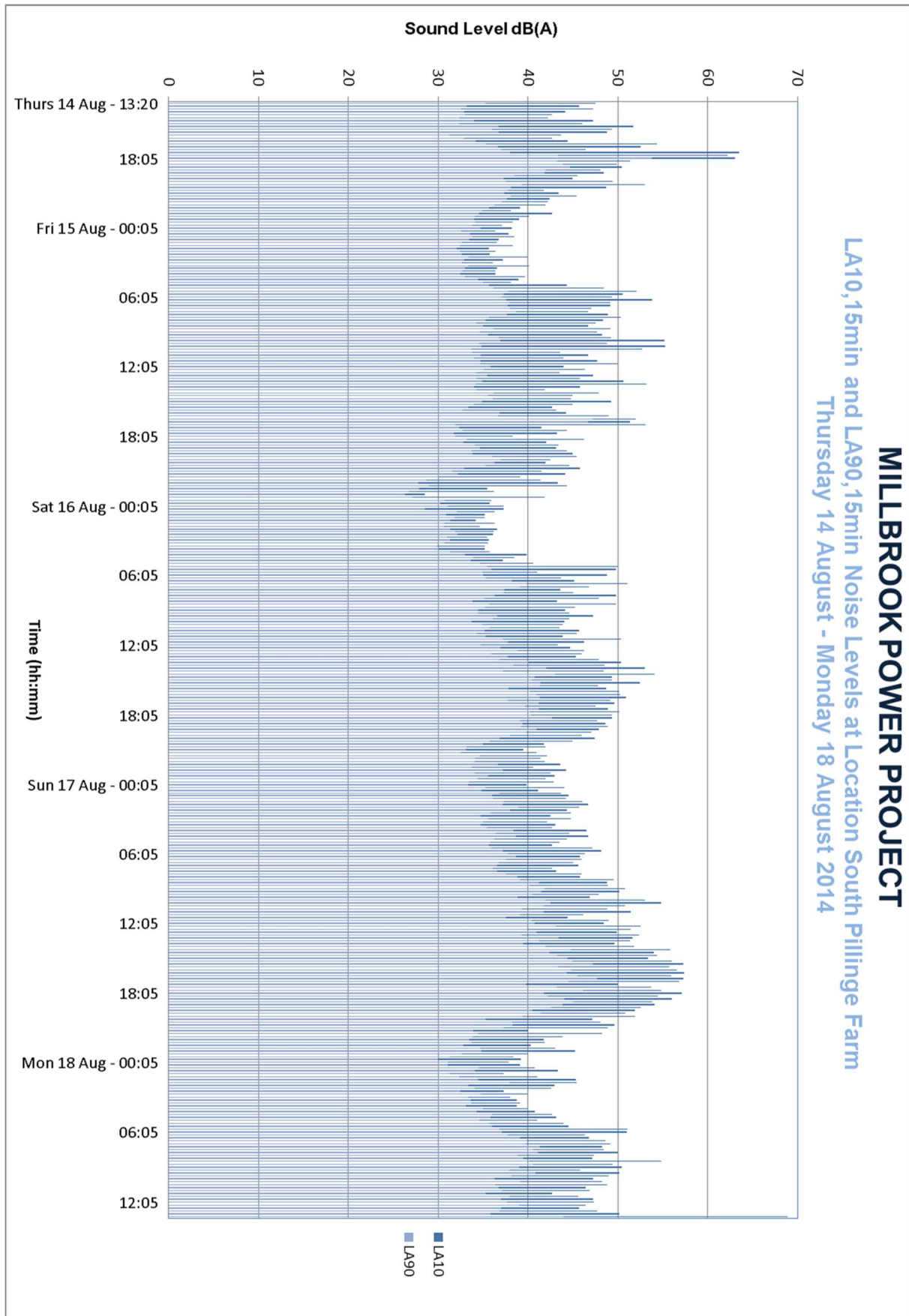
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Revision Number	01
Figure Number	Figure 3

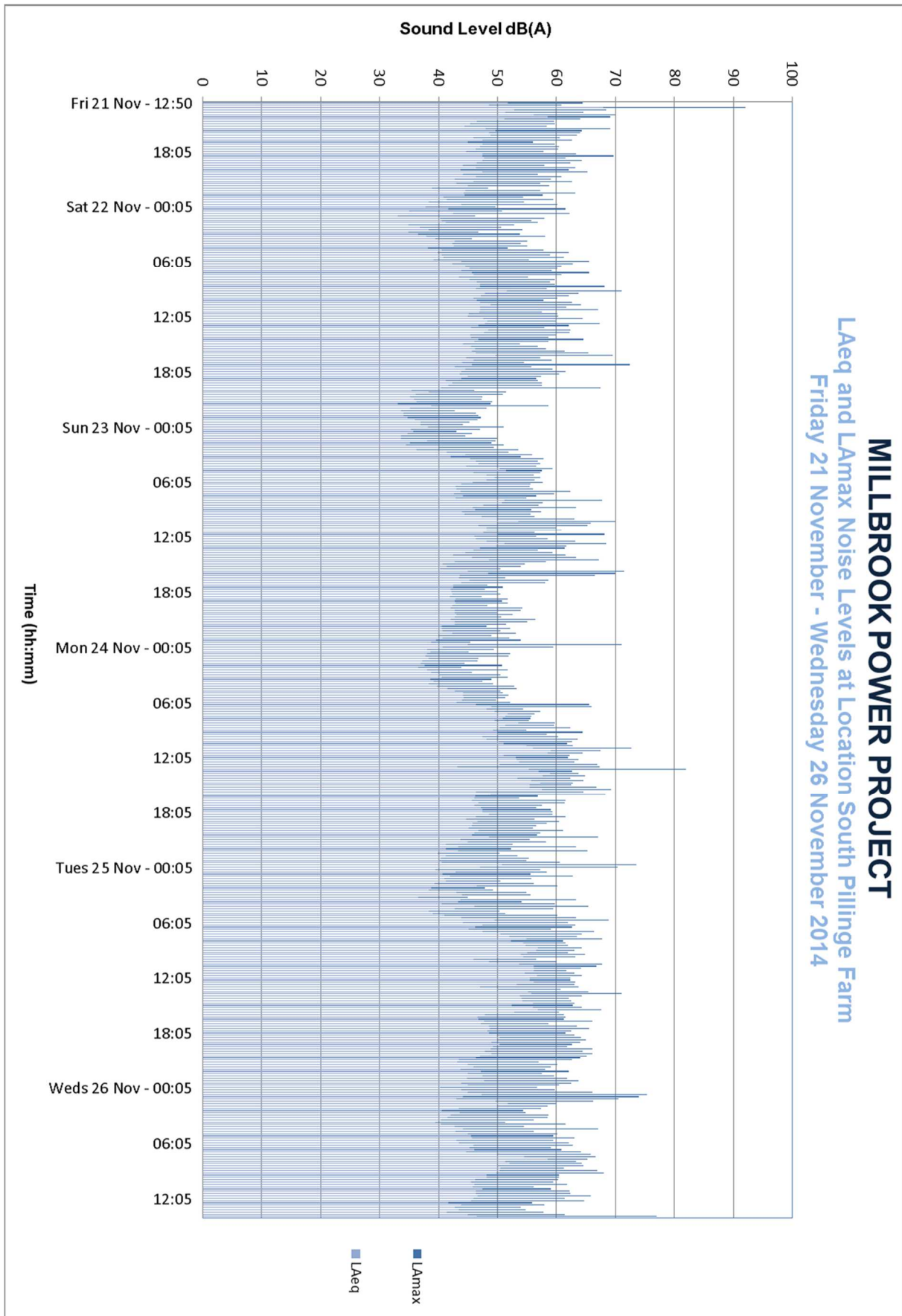
Appendix A Glossary

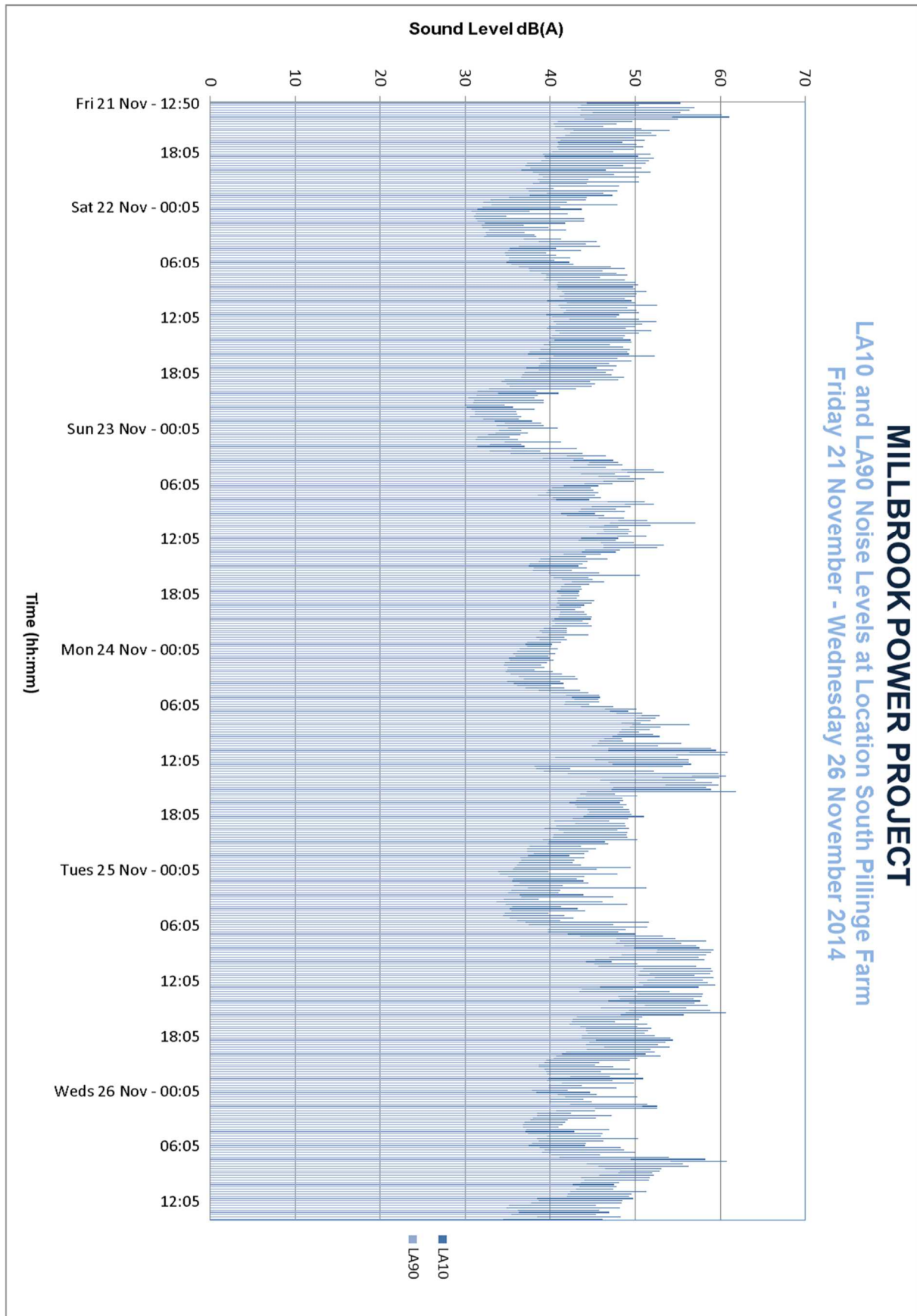
Ambient Noise	Total encompassing sound in a given situation at a given time, usually composed of sound from many sources far and near.
Background Noise	In BS 4142 this is defined as the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T ($L_{A90,T}$)
Daytime	Extrapolated from BS 8233 as the period 07:00-23:00 hours (as night-time is 23:00-07:00 hours) or defined in BS 5228-1 as the period 07:00-19:00 hours.
Decibel (dB)	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure levels the reference quantity is 20 uPa. 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.
L_{Ax}	Denotes use of frequency weighting 'A' which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. A weighted measurements broadly agree with people's assessment of loudness.
Evening	Defined in BS 5228-1 as the period 19:00-23:00 hours.
$L_{A10,T}$	The A-weighted noise level exceeded for 10% of the measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic. $L_{A10,18h}$ is the arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{A90,T}$	The A-weighted noise level exceeded for 90% of the measurement period, T. This is defined in BS 4142 as the background noise level.
$L_{Aeq,T}$	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many noises and can be measured directly with an integrating sound level meter.
L_{Amax}	The highest A-weighted noise level recorded during a noise event. The time weighting (slow or fast) should be stated.
Night-time	Defined in BS 8233 and BS 5228-1 as the period from 23:00 to 07:00 hours.

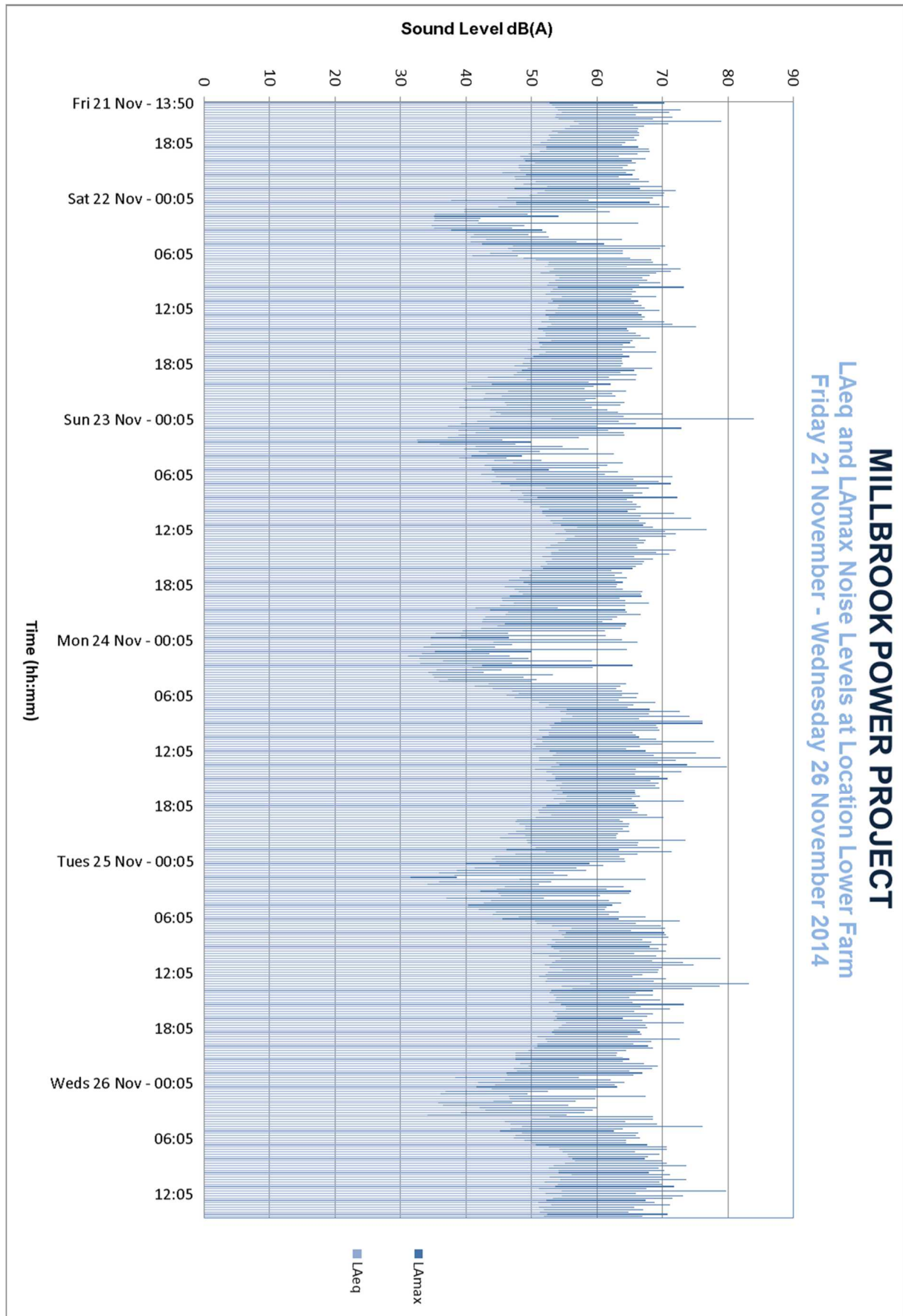
Appendix B Time History Graphs

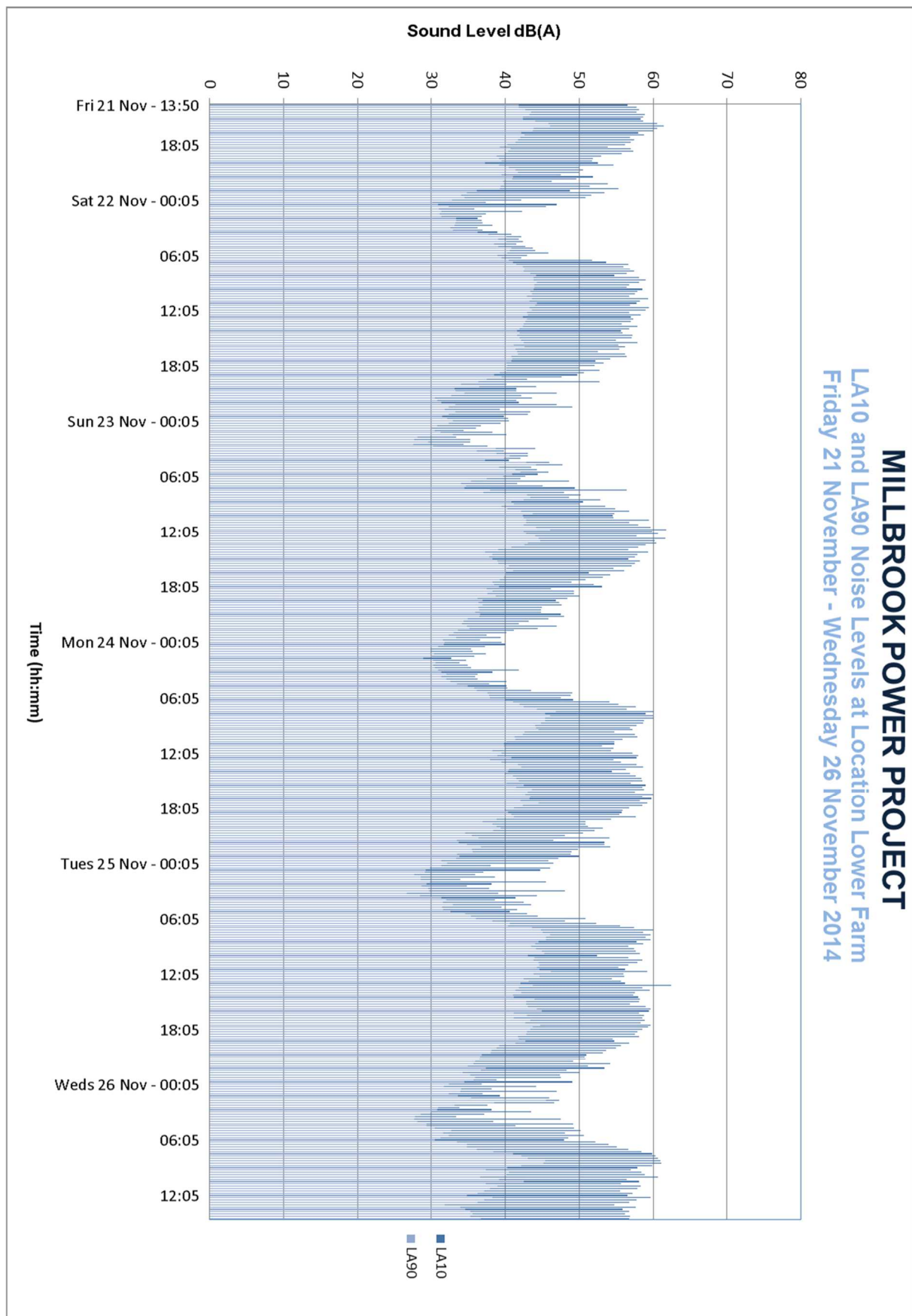












7.3 Operational Plant Noise Impact Assessment – Revision 1

Contents

1 Introduction 1
 1.1 Background 1

2 Project Proposals 2

3 Assessment Criteria..... 3
 3.2 Context 3

4 Environmental Sound Surveys 5
 4.1 Methodology 5
 4.2 Instrumentation..... 6
 4.3 Environmental Sound Climate 6
 4.4 Assumptions/Limitations..... 6
 4.5 Environmental Sound Survey Results 6
 4.6 Background Noise Levels..... 7

5 Noise Impact Assessment..... 8
 5.1 Acoustic model 8
 5.2 Operational Noise – Power Generation Plant 8

6 Conclusion 11

Figures

Figure 1: Approximate Noise Survey Location 5

Tables

Table 2.1 Acoustic and Dimension Attributes..... 2

Table 3.1 Proposed LOAEL and SOAELs..... 3

Table 4.1: Measurement Positions 5

Table 4.2: Instrumentation..... 6

Table 4.3: Summary of Typical Background Sound Levels 7

Table 4.4: Background Noise Levels..... 7

Table 5.1 Calculated Rating Level 8

Table 5.2 Indicative Assessment..... 8

Table 5.3 - Noise Limits set out in the DCO granted for the Covanta RRF Project dated 2011 9

Table 5.4 Indicative Cumulative Noise Assessment 10

Appendices

- Appendix A Acoustic Terminology
- Appendix B Time History Graphs

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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 (L _{A,r} ,T _r) and Background Sound Level (L _{A90,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 Pilling 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 Pilling 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 $L_{A,r,T,r}$) at Noise Sensitive Receptor	38	38
Background Sound Level (dB $L_{A90, 15 \text{ min}}$)	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 Pilling 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 Pilling 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 Pillage 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.

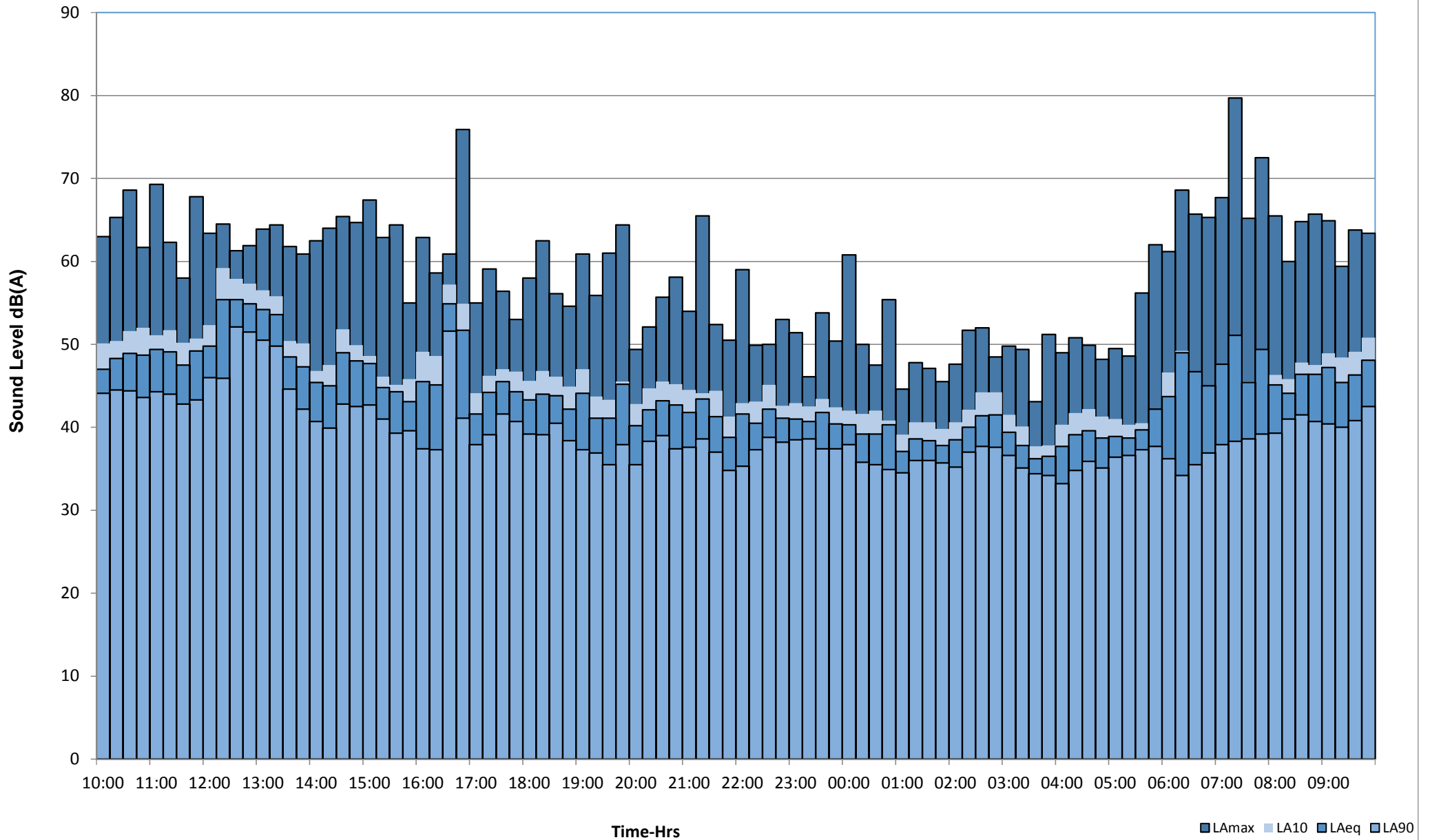
Appendix A Acoustic Terminology

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 $20 \log_{10} (s1/s2)$. 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.
L10,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.
L90,T or Background Noise Level	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.

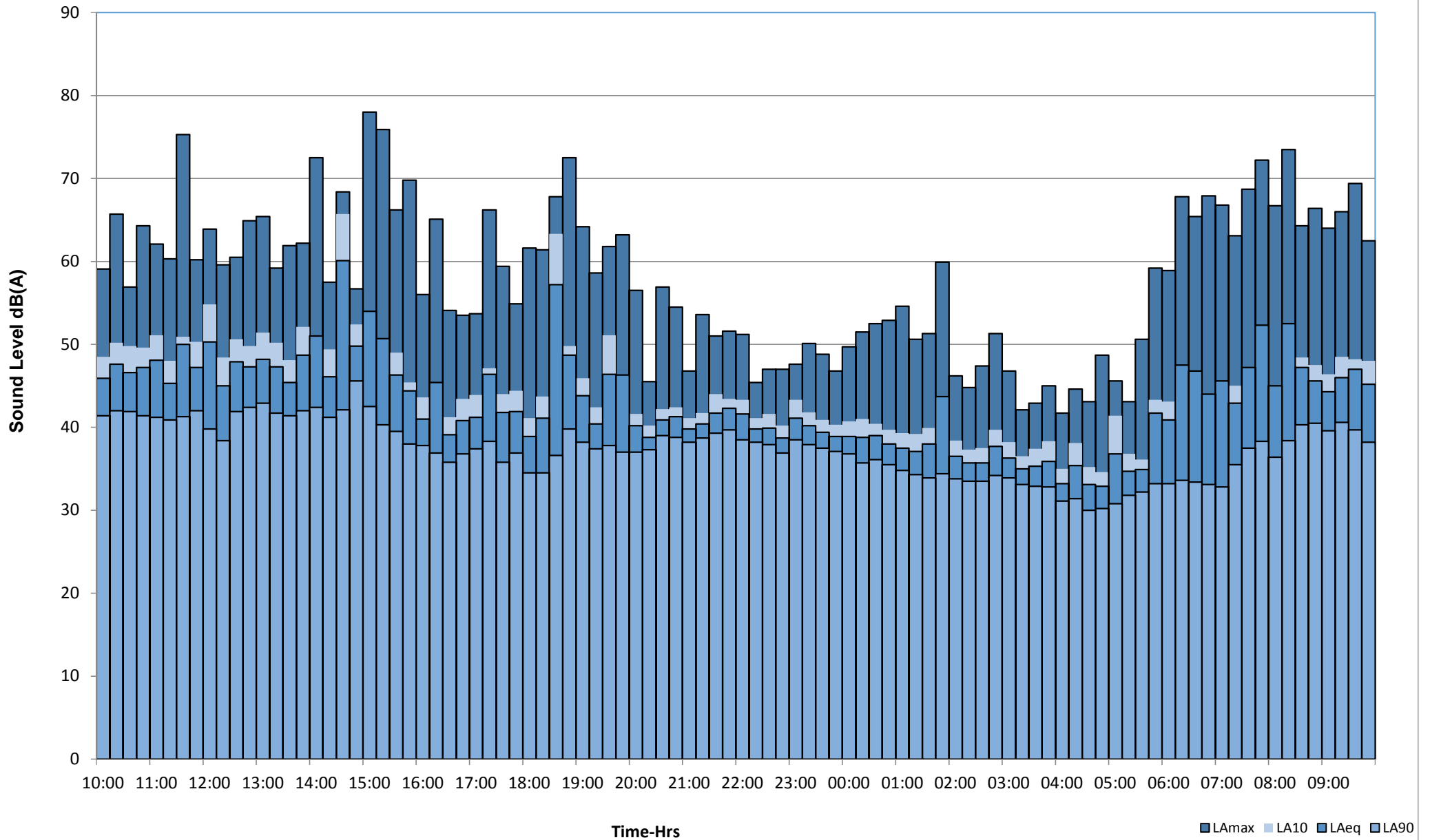
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Night-time	The period 23:00-07:00 hours.
NOEL	No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable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

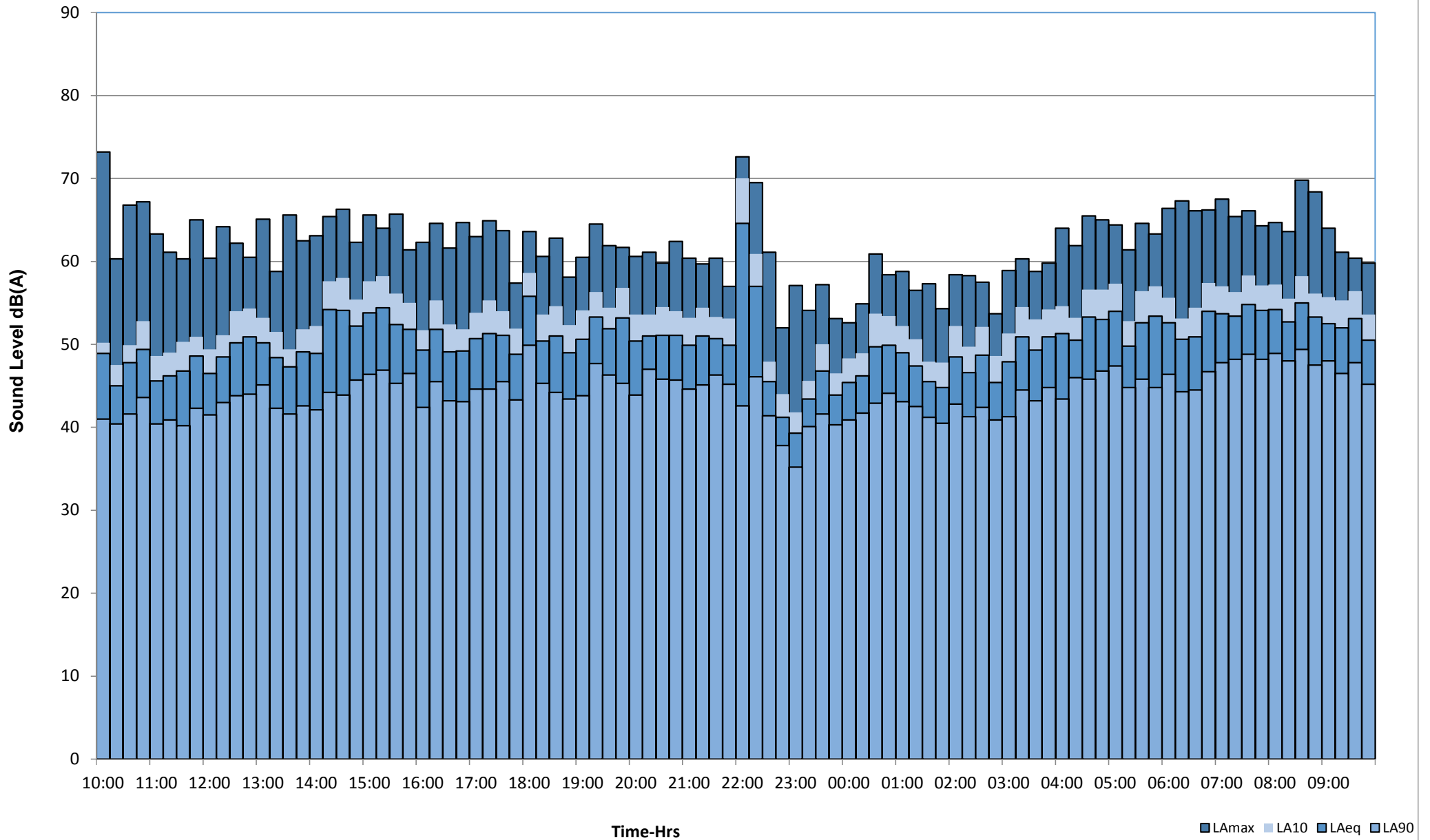
Millbrook Power
Measured Sound Levels at South Pilling Farm
Friday 08/09/17 - Saturday 09/09/17



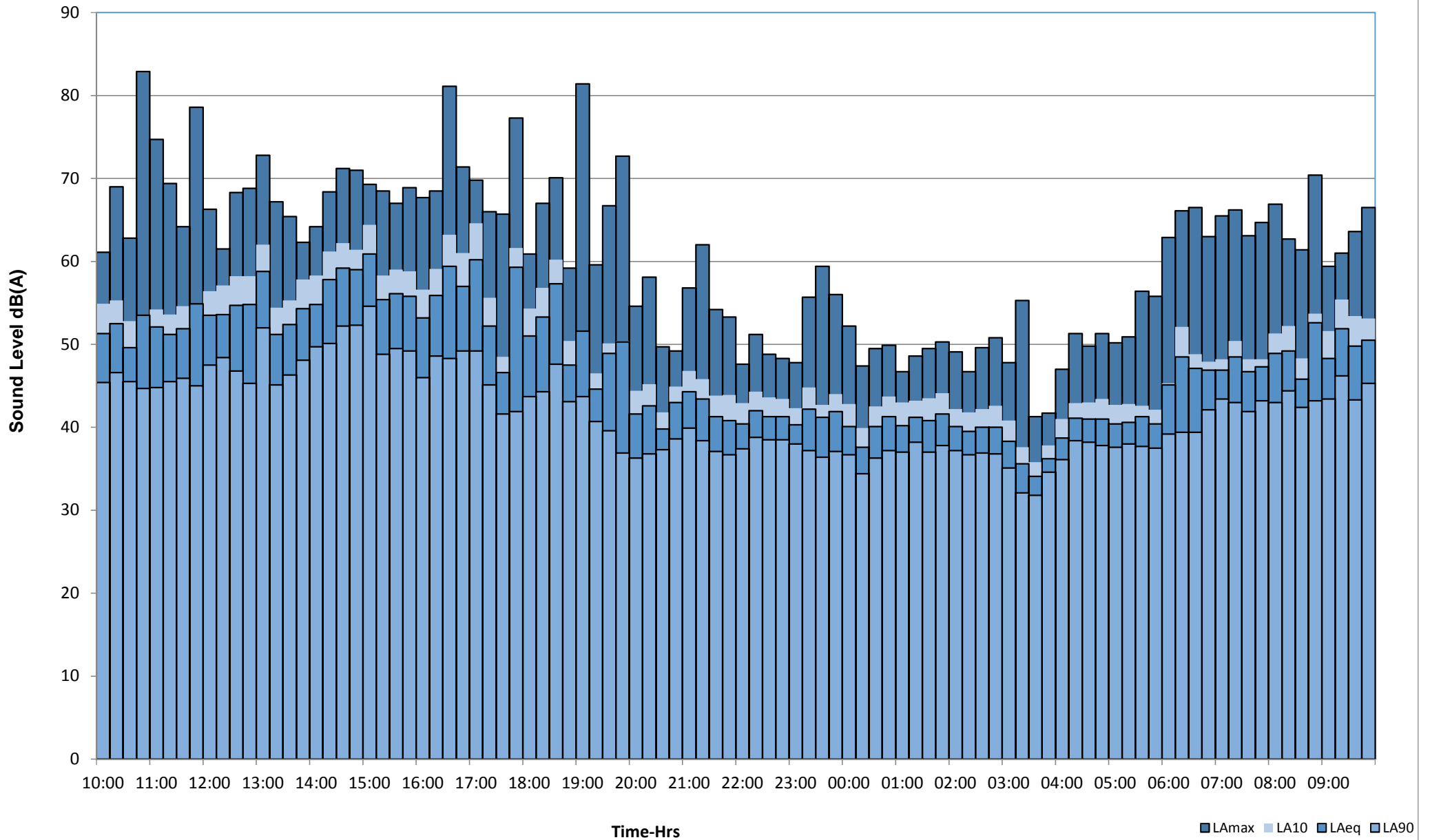
Millbrook Power
Measured Sound Levels at South Pilling Farm
Saturday 09/09/17 - Sunday 10/09/17



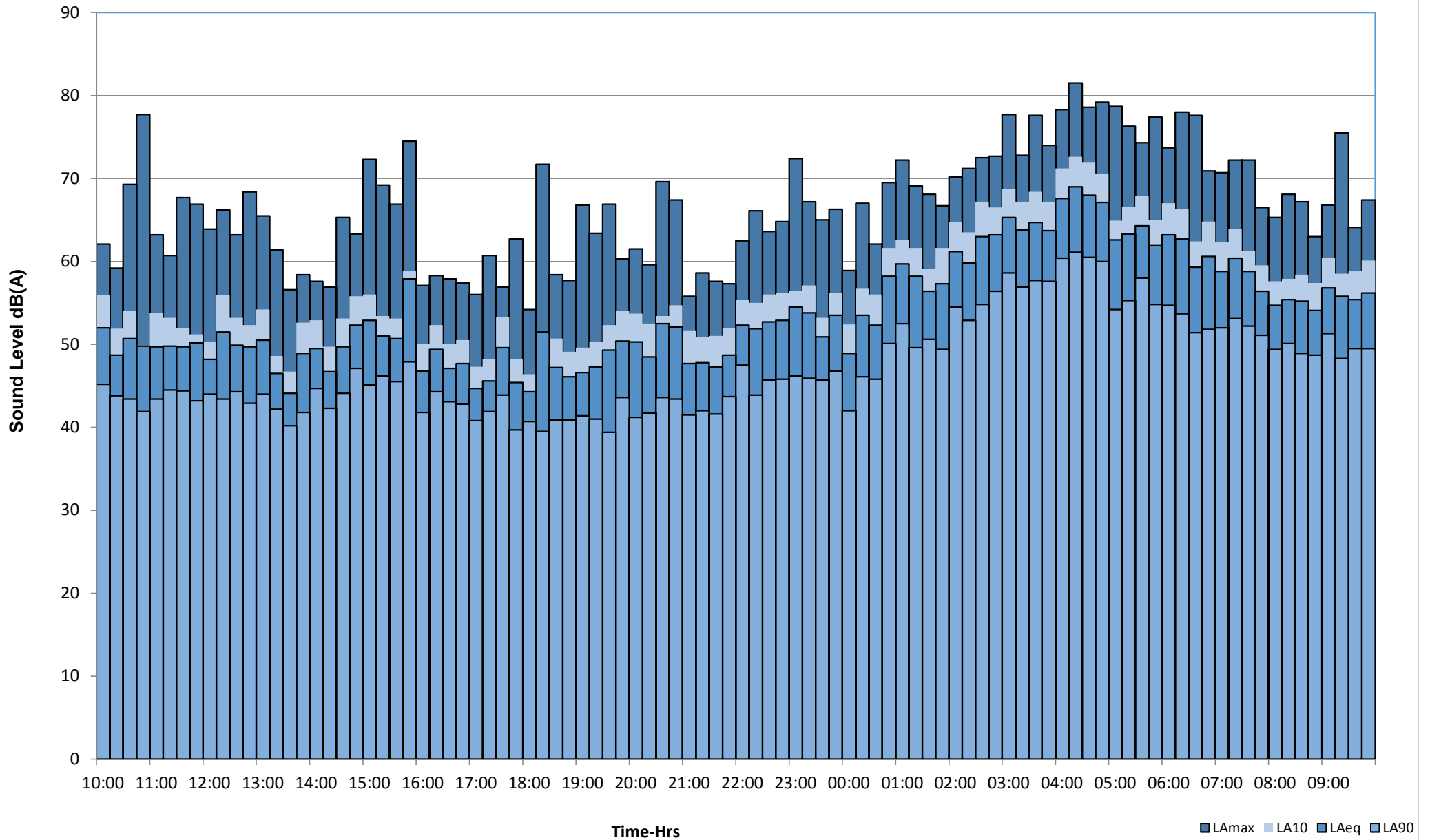
Millbrook Power
Measured Sound Levels at South Pilling Farm
Sunday 10/09/17 - Monday 11/09/17



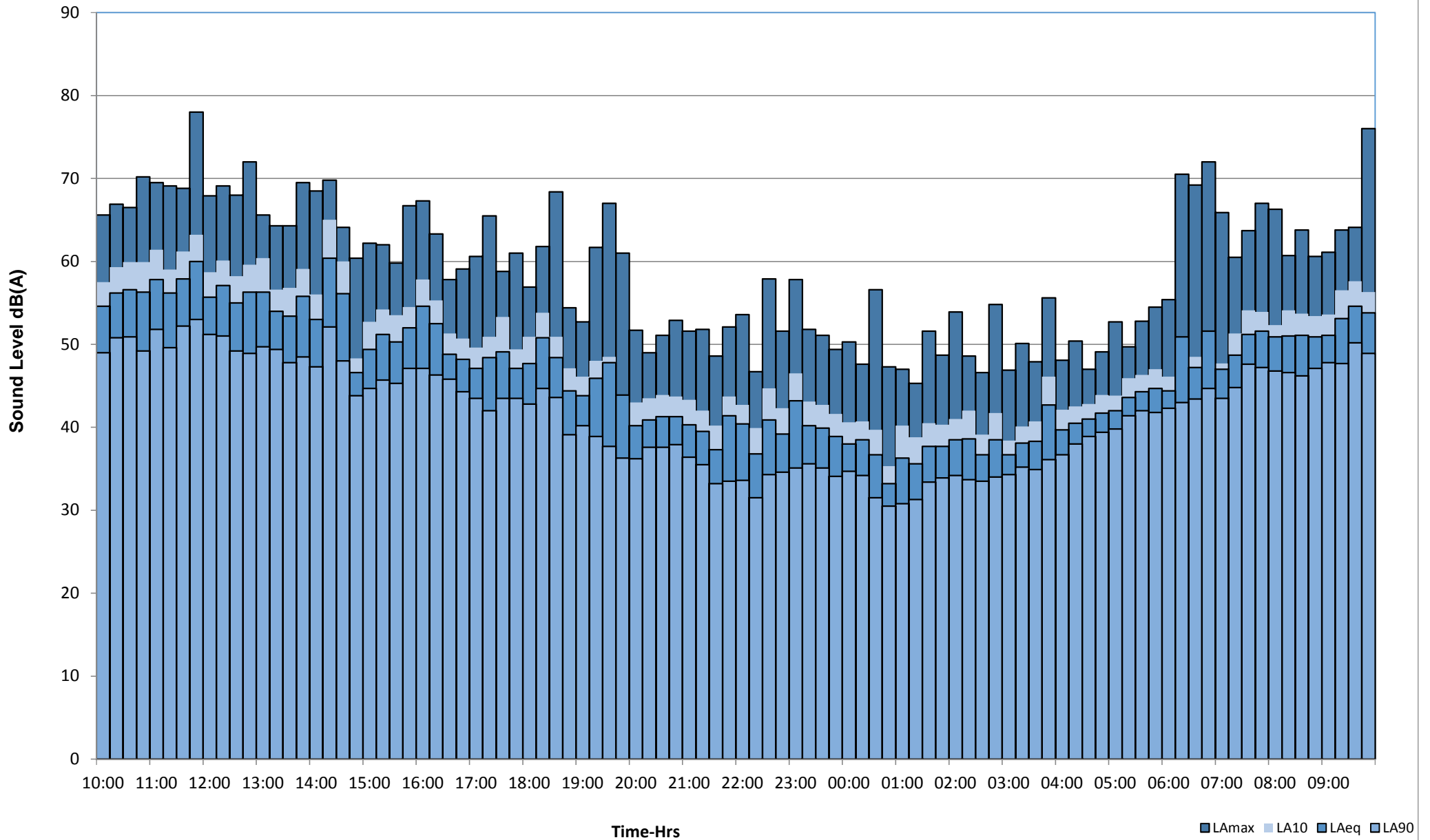
Millbrook Power
Measured Sound Levels at South Pilling Farm
Monday 11/09/17 - Tuesday 12/09/17



Millbrook Power
Measured Sound Levels at South Pilling Farm
Tuesday 12/09/17 - Wednesday 13/09/17



Millbrook Power
Measured Sound Levels at South Pilling Farm
Wednesday 13/09/17 - Thursday 14/09/17



Millbrook Power
Measured Sound Levels at South Pilling Farm
Thursday 14/09/17 - Friday 15/09/17

