SITE PREPARATION
NOISE IMPACT ASSESSMENT

Land off Lightfoot Green Lane
Preston
Lancashire
PR4 0AP

Prepared for:

pwa planning
GETTING DEVELOPMENT MOVING

Report Ref: 12-467-R03
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e3p | Environmental | Energy | Engineering

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APPENDICES

1. INTRODUCTION

E3P has been commissioned by PWA Planning to undertake a preliminary impact assessment of site preparation work noise from the proposed development site at land off Lightfoot Green Lane, Preston to the nearest noise sensitive receptor.

The preliminary impact assessment is presented in this report.

2. OBJECTIVES

- To undertake a preliminary impact assessment of site preparation work noise to the nearest noise sensitive receptors based on information received from the contractor and noise level data for site equipment and activities from BS 5228-1:2009+A1:2014.
- To assess the calculated noise levels and provide comments on the acceptability in terms of achieving the requirements of BS 5228-1:2009+A1:2014.
- If required, to propose mitigation measures for site preparation work noise in order to achieve the requirements of BS 5228-1:2009+A1:2014.

3. SITE DESCRIPTION

The proposed development is at the existing agricultural land off Lightfoot Green Lane, Preston.

The site is bound by agricultural land to the north, trainline to the east, M55 motorway to the south and Lightfoot Green Lane/footpath to the west.

Bradleys Sand Pit and Jackson Skips and Recycling commercial premises are situated to the west of the site opposite Lightfoot Green Lane/footpath.

The nearest existing residential property is situated approximately 70m to the south west of the site at the end of Lightfoot Green Lane.

The site plan below indicates the extent of the site and the surrounding environment.

Figure 3.1 Site plan indicating the extent of the site and the surrounding environment

4. ENVIRONMENTAL SOUND SURVEY

4.1 Introduction

A detailed environmental sound survey has previously been undertaken in order to establish existing environmental sound levels at the proposed residential development due to surrounding transportation sound sources.

The results measured at Position C are considered to be representative of those at the nearest existing residential property. The survey methodology and results are presented in the following sections.

4.2 Measurements

Automated environmental sound measurements were undertaken from 14:00 hours on Tuesday 10 April 2018 to 14:00 hours on Wednesday 11 April 2018. During this period the L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels were measured continuously over 15 minute periods along with the corresponding octave band sound pressure levels.

4.3 Weather Conditions

At the start of the survey period there was a gentle easterly breeze (<5m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 9°C.

At the end of the survey period there was a gentle easterly breeze (<5m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 8°C.
Based on publicly available weather data for the survey period it is understood that weather conditions remained similar for the duration of the survey with no periods of significant rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

4.4 Measurement Positions

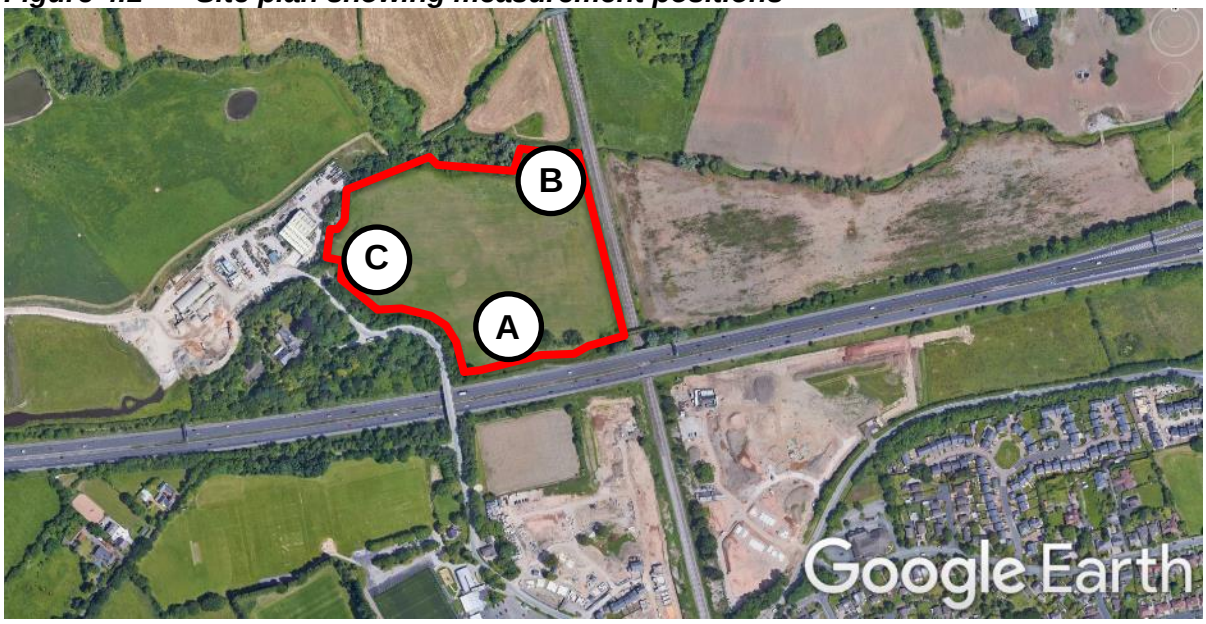
Environmental sound levels were measured at three positions on-site as described in the table below.

Table 4.1 Measurement Positions

POSITION	DESCRIPTION
A	Microphone situated approximately 15m from the southern site boundary at 2.0m above ground level in free field conditions.
B	Microphone situated approximately 20m from the eastern site boundary at 2.0m above ground level in free field conditions.
C	Microphone situated along the western site boundary at 2.0m above ground level in free field conditions.

The measurement positions are shown in Figure 4.1 below.

Figure 4.1 Site plan showing measurement positions



The measurement positions were selected in order to assess typical environmental sound levels at the site.

4.5 Equipment

The following equipment was used to undertake the environmental sound survey.

Table 4.2 Equipment

EQUIPMENT	MANUFACTURER	MODEL	SERIAL NO.	CALIBRATION DATE
Class 1 Sound Level Meter	Casella	633C	5262813	23/03/2017
Preamplifier	Casella	495	003391	23/03/2017
Microphone	Casella	251	1031	23/03/2017
Class 1 Sound Level Meter	Casella	633C	0721319	08/09/2017
Preamplifier	Casella	495	001446	08/09/2017
Microphone	Casella	251	1996	08/09/2017
Class 1 Sound Level Meter	Casella	633C	2811231	10/05/2017
Preamplifier	Casella	495	001239	10/05/2017
Microphone	Casella	251	1841	10/05/2017
Class 1 Sound Calibrator	Casella	120/1	3864878	13/11/2017
Environmental Noise Kits	Casella	6847	-	-
Microphone Extension Cables	Casella	C6717/5	-	-
Weather Protection Systems	Casella	6737	-	-

Field calibration checks were performed on the sound level meters prior to and on completion of the survey and were found to be within acceptable tolerance limits.

4.6 Results

4.6.1 Time History Graphs

The results of the environmental sound survey are presented on Time History Graphs 0355/THG1 to 0355/THG3 enclosed at the rear of the report.

4.6.2 $L_{Aeq,T}$ Ambient Sound Levels

In order to compare the results of the environmental sound survey with the calculated site preparation work sound levels it is necessary to convert the $L_{Aeq,15min}$ sound levels into single figure daytime $L_{Aeq,12hour}$ sound levels (07:00 to 19:00 hours). This has been calculated using the following formula:

$$L_{Aeq,T} = 10\,log_{10}\left(\frac{1}{N}\sum_{i}^{N} 10^{L_{Aeq,15min}{}^{i}/10}\right)$$

The calculated daytime $L_{Aeq,12hour}$ sound levels at each measurement position are presented in the table below.

Table 4.3 Calculated Sound Levels

POSITION	DAYTIME $L_{AEQ,12HOUR}$ (dB)
A	77
B	63
C	65

4.7 Discussion of Sound Climate

At the start and end of the survey period the dominant sound source at Position A was noted to be constant road traffic along the M55 motorway. Regular train movements along the west coast mainline also contributed towards the measured sound climate along with birdsong.

At the start and end of the survey period the dominant sound source at Position B was noted to be constant road traffic along the M55 motorway. Regular train movements along the west coast mainline also contributed towards the measured sound climate along with birdsong.

At the start and end of the survey period the dominant sound source at Position C was noted to be constant road traffic along the M55 motorway. Regular train movements along the west coast mainline and frequent HGV road traffic along Lightfoot Green Lane also contributed towards the measured sound climate along with birdsong.

Whilst we are unable to comment on dominant sound sources or individual sound events during the survey period, based on the surrounding environment it is likely that road traffic and train movements remained the dominant sound sources.

5. BS 5228-1:2009+A1:2014

5.1 Introduction

BS 5228-1: 2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise”, provides guidance concerning methods of predicting sound from construction sites and assessing its impact on those exposed to it.

Sound levels for numerous types of site equipment and activities is provided along with calculation methods for predicting sound from construction sites which take the following factors into account:

- Sound level of site equipment/activities;
- Periods of operation;
- Distance from source to receivers;
- Presence of screening;
- Reflection of sound;
- Soft ground attenuation.

Three methods to identify the likely significance of sound levels from construction sites are described.

5.2 Potential significance based on fixed noise limits

The older and more simplistic method is based upon the exceedance of fixed noise limits.

Noise from construction sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. Noise levels, between say 07:00 and 19:00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- 70dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise;
- 75dB(A) in urban areas near main roads in heavy industrial areas.

These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments – and when working outside the normal hours say between 19:00 and 22:00 hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10dB(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22:00 and 07:00 hours.

5.3 Potential significance based upon noise change – The ABC method

Table 5.1 shows an example of the threshold of potential significant effect at dwellings when the site noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5dB. This is then compared with the site noise level. If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated.

The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.

Table 5.1 Example threshold of potential significant effect at dwellings

ASSESSMENT CATEGORY AND THRESHOLD VALUE PERIOD	THRESHOLD VALUE, IN DECIBELS (DB) ($L_{AEQ,T}$)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (23.00−07.00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	65	70	75

NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.
NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise.
NOTE 3 Applied to residential receptors only.

[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

[B)] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

[C)] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

[D)] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

5.4 Potential significance based upon noise change – 5dB(A) change

Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut-off values of 65dB, 55dB and 45dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.

These evaluative criteria are generally applicable to the following resources:

- Residential buildings;
- Hotels and hostels;
- Buildings in religious use;
- Building in educational use;
- Buildings in health and/or community use.

For public open space, the impact might be deemed to cause significant effects if the total noise exceeds the ambient noise $L_{Aeq,T}$ by 5dB or more for a period of one month or more.

However, the extent of the area impacted relative to the total available area also needs to be taken into account in determining whether the impact cases a significant effect.

5.5 Summary

The above methods to identify the likely significance of sound levels from construction sites are summarised in Table 5.2.

Table 5.2 Summary of methods to identify likely significant effect at receptor

POTENTIAL SIGNIFICANCE (DAYTIME)		
Fixed noise limits	**Noise change ABC method**	**Noise change 5dB(A) change**
Site noise >70dB $L_{Aeq,12hour}$ since site is in rural, suburban and urban areas away from main road traffic and industrial noise	Site noise >70dB $L_{Aeq,12hour}$ since ambient noise levels when rounded to the nearest 5dB are 65dB $L_{Aeq,12hour}$	Where site noise >65dB $L_{Aeq,12hour}$ then site noise + ambient noise ≥ ambient noise + 5dB for one month or more

6. SITE PREPARATION PHASE ASSESSMENT DATA

6.1 Assessment Methodology

The assessment has been undertaken in general accordance with the methods described in BS 5228-1: 2009+A1:2014 “Code of practice for noise and vibration control on construction and open sites – Part 1: Noise”, and ISO 9631-2: 1996, “Acoustics – Attenuation of sound during propagation outdoors – General method of calculation”.

6.2 Hours of Work

It is understood that the proposed hours of work for the site preparation works are between 07:00 and 19:00 hours on weekdays and 07:00 and 13:00 on Saturdays. It is assumed that there will be two 30 minute breaks between 10:00 to 10:30 and 13:00 to 13:30. The total working hours for a weekday are therefore 11 hours. The duration of the site preparation works are not known at this stage.

6.3 Site Equipment

The proposed site equipment for the site preparation works has not yet been determined. The assessment is therefore based on typical site equipment expected for the type of site preparation works proposed (moving material and levelling site).

Table 6.1 details the typical site equipment assessed along with associated sound level data taken from BS 5228-1:2009+A1:2014.

Table 6.1 Typical site equipment sound level data

SITE EQUIPMENT	REF NO.	$L_{AEQ,T}$ SOUND PRESSURE LEVEL (DB)	MEASUREMENT DISTANCE (M)
Dozer (1No.)	C.2 13	78	10
Articulated Dump Truck (2No.)	C.2 32	74	10

Smaller items of site equipment are likely to produce insignificant sound levels in comparison to those above and subsequently have not been included in the assessment.

6.4 Assessment Scenarios

Given the transient nature of site preparation works two scenarios have been assessed in order to estimate the likely range of sound levels at the nearest noise sensitive receptors.

The ‘best case’ is based upon the typical expected on-time of site equipment, maximum distance between site equipment and the nearest noise sensitive receptors, no reflections from site structures, an allowance for soft ground attenuation and no allowance for screening by proposed structures.

The ‘worst case’ is based upon a continuous on-time of site equipment, minimum distance between site equipment and the nearest noise sensitive receptors, no reflections from site structures and soft ground attenuation no allowance for soft ground attenuation and no allowance for screening by proposed structures.

Actual sound levels at the nearest noise sensitive receptors are likely to vary between the calculated 'best case' and 'worst case' sound levels for the majority of the works. It should be noted that the 'worst case' scenario is unlikely to occur for sustained periods, if at all.

6.5 Operating Hours

Table 6.2 details the 'best case' and 'worst case' operating hours for site equipment over a 11 hour working weekday period.

Table 6.2 Operating hours for site equipment

SITE EQUIPMENT	OPERATING HOURS	
	BEST CASE (TYPICAL)	WORST CASE (CONTINUOUS)
Bulldozer (1No.)	7	11
Articulated Dump Truck (3No.)	7	11

6.6 Site Layout

The site boundary has been taken from the site layout drawing shown in **Error! Reference source not found.**.

Table 6.3 Site Layout Drawing

AUTHOR	DRAWING NO.	REVISION	DATE
FWP Limited	6126_L101	-	March 2018

6.7 Nearest Noise Sensitive Receptor

The nearest noise sensitive receptor to the proposed development site is the SPA situated to the east of the site. The residential receptors have not been included in the assessment since it has only been requested for the SPA to the east of the site.

Table 6.4 details the 'best case' and 'worst case' distances between the site equipment (based on the site boundary) and nearest noise sensitive receptor.

Table 6.4 Site equipment distances

NEAREST NOISE SENSITIVE RECEPTOR	SITE EQUIPMENT DISTANCE (M)	
	BEST CASE (FURTHEST)	WORST CASE (NEAREST)
South West	380	70

6.8 Ground Effect Attenuation

An allowance for porous ground between the site and nearest noise sensitive receptor has been made for the 'best case' scenario whilst no allowance for porous ground between the site and nearest noise sensitive receptor has been made for the 'worst case' scenario.

6.9 Screening Attenuation

A worst case assessment has been undertaken by not taking any allowance for screening attenuation that may be provided by existing earth mounds or proposed structures between the development site and the nearest noise sensitive receptor.

6.10 Reflections

No allowance has been made for reflections of site equipment sound from site structures towards the nearest noise sensitive receptors since no structures are proposed.

6.11 Atmospheric Absorption Attenuation

A worst case assessment has been undertaken by not taking any allowance for atmospheric absorption attenuation.

7. SITE PREPARATION PHASE BS 5228-1:2009+A1 ASSESSMENT

The results of the BS 5228-1:2009+A1:2014 assessment are presented in the following sections.

7.1 Best Case Assessment

Table 7.1 Best Case Assessment

DESCRIPTOR			SITE EQUIPMENT	
			BULLDOZER	ARTICULATED DUMP TRUCK
Sound Pressure Level $L_{Aeq,T}$ at 10m (dB)			78	74
Duration of Activity, T (hours)			7	7
Duration of Activity as Percentage of 12hour (%)			58	58
On time correction (dB)			-2	-2
Sound Pressure Level $L_{Aeq,12hour}$ at 10m (dB)			76	72
Number of Units (#)			1	3
Correction (dB)			0	5
Distance to Receptor (m)			380	380
Distance Loss (dB)			-32	-32
Ground Attenuation (dB)			-5	-5
Screening Attenuation (dB)			0	0
Reflection (dB)			0	0
Resultant Activity Level $L_{Aeq,12hour}$ at Receptor (dB)			39	40
Site Noise Level $L_{Aeq,12hour}$ at Receptor (dB)			43	
Typical Ambient Sound Level $L_{Aeq,12hour}$ at Receptor (dB)			65	
Total Noise Level $L_{Aeq,12hour}$ at Receptor (dB)			65	
Potential Significance (Daytime)	**Fixed noise limits** Site noise >70dB $L_{Aeq,12hour}$	**Noise change ABC method** Site noise >70dB $L_{Aeq,12hour}$	**Noise change 5dB(A) change** Site noise + ambient noise ≥ ambient noise + 5dB for one month or more	
Difference (dB)	-27	-27	+0	

The ‘best case’ assessment indicates that site preparation works are unlikely to result in a significant effect at the receptor.

7.2 Worst Case Assessment

Table 7.2 Worst Case Assessment

DESCRIPTOR			SITE EQUIPMENT	
			BULLDOZER	ARTICULATED DUMP TRUCK
Sound Pressure Level $L_{Aeq,T}$ at 10m (dB)			78	74
Duration of Activity, T (hours)			11	11
Duration of Activity as Percentage of 12hour (%)			92	92
On time correction (dB)			0	0
Sound Pressure Level $L_{Aeq,12hour}$ at 10m (dB)			78	74
Number of Units (#)			1	3
Correction (dB)			0	5
Distance to Receptor (m)			70	70
Distance Loss (dB)			-17	-17
Ground Attenuation (dB)			0	0
Screening Attenuation (dB)			0	0
Reflection (dB)			0	0
Resultant Activity Level $L_{Aeq,12hour}$ at Receptor (dB)			61	61
Site Noise Level $L_{Aeq,12hour}$ at Receptor (dB)			64	
Typical Ambient Sound Level $L_{Aeq,12hour}$ at Receptor (dB)			65	
Total Noise Level $L_{Aeq,12hour}$ at Receptor (dB)			68	
Potential Significance (Daytime)	**Fixed noise limits** Site noise >70dB $L_{Aeq,12hour}$	**Noise change ABC method** Site noise >70dB $L_{Aeq,12hour}$	**Noise change 5dB(A) change** Site noise + ambient noise ≥ ambient noise + 5dB for one month or more	
Difference (dB)	-6	-6	+3	

The ‘worst case’ assessment indicates that site preparation works are unlikely to result in a significant effect at the receptor.

8. CONCLUSIONS

A preliminary BS 5228-1:2009+A1:2014 impact assessment of site preparation work noise to the nearest noise sensitive receptors has been undertaken.

The ‘best case’ and ‘worst case’ assessments indicate that site preparation works are unlikely to result in a significant effect at the receptor.

END OF REPORT

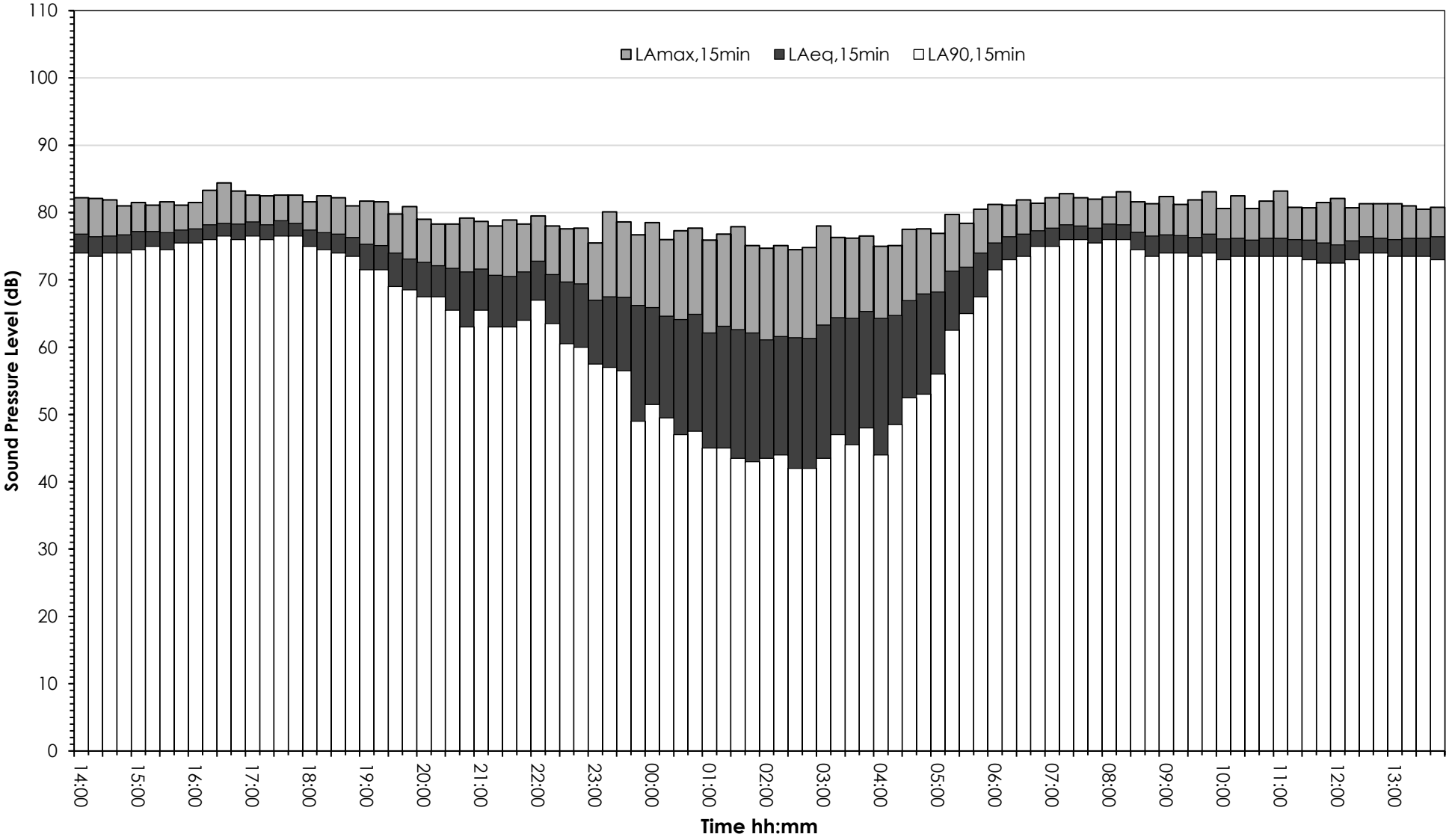
APPENDIX I
TIME HISTORY GRAPHS

0355/THG1

Lightfoot Green Lane, Preston

Time History Graph - Tuesday 10 April 2018 to Wednesday 11 April 2018

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A

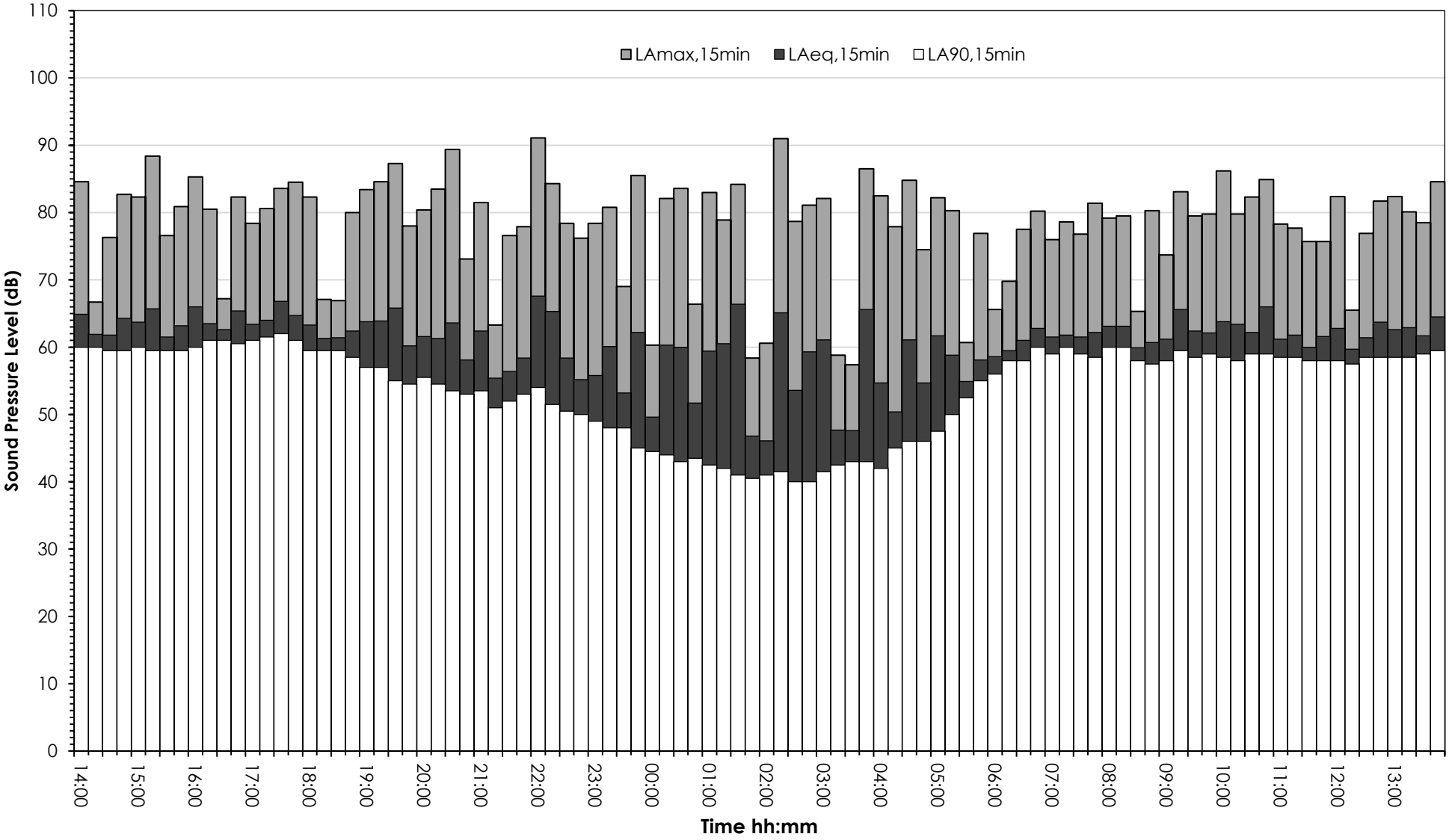


0355/THG2

Lightfoot Green Lane, Preston

Time History Graph - Tuesday 10 April 2018 to Wednesday 11 April 2018

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position B



0355/THG3

Lightfoot Green Lane, Preston

Time History Graph - Tuesday 10 April 2018 to Wednesday 11 April 2018

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position C