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Heineken Manchester, Denmark Road Manchester

Planning Compliance Report
Report 23102.PCR.01

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KP Acoustics Ltd. 2021

KP acoustics

Contents

1.0 INTRODUCTION 1

2.0 SITE SURVEYS 1

2.1 Site Description 1

2.2 Environmental Noise Survey Procedure 2

2.3 Equipment 5

3.0 RESULTS 5

4.0 NOISE ASSESSMENT GUIDANCE 6

4.1 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*' 6

4.2 Local Authority Guidance 8

5.0 NOISE IMPACT ASSESSMENT 8

5.1 Plant Unit Measurements 8

5.2 Plant Units 8

5.3 Noise Sensitive Receivers 10

5.4 Noise Modelling and Calculations 10

6.0 NOISE CONTROL MEASURES 11

6.1 Noisiest Fan Equipment 12

6.2 Barriers 12

6.3 Anti-Vibration Mounting Strategy 14

7.0 CONCLUSION 14

List of Attachments

23102.TH1-4	Environmental Noise Time History
23102.Daytime.LA90 1-4	Statistical analysis for representative daytime L_{A90}
23102.Night-time.LA90 1-4	Statistical analysis for representative night-time L_{A90}
Appendix A	Glossary of Acoustics Terminology
Appendix B	Plant and Equipment Location Plan (Source: Heineken)
Appendix C	Anti-Vibration Mounting Specification Reference Document
Appendix D	Plant Measurement Data

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Norder Design Associates Limited, Beech Lawn, Green Lane, Belper, Derbyshire, DE56 1BY to undertake a noise impact assessment of existing plant and equipment serving the site at Heineken Manchester, Denmark Rd, Manchester, M15 6LD.

An environmental noise survey has been undertaken on site in order to prepare a noise impact assessment in accordance with BS4142:2014 '*Method for rating and assessing industrial and commercial sound'* as part of the planning requirements of Manchester City Council.

This report presents the methodology and results from the environmental survey, followed by calculations in accordance with BS4142 to provide an indication as to the likelihood of the noise emissions from the plant units having an adverse impact on the defined noise sensitive receivers. Mitigation measures are outlined as appropriate.

2.0 SITE SURVEYS

2.1 Site Description

As shown in Figure 2.1, the site is bounded by Greenheys Lane to the North, Princess Road to the West, Moss Lane to the South and local roads to the East. There are commercial buildings to the west of the site over the road and a mix of commercial, residential and civil buildings in other directions.

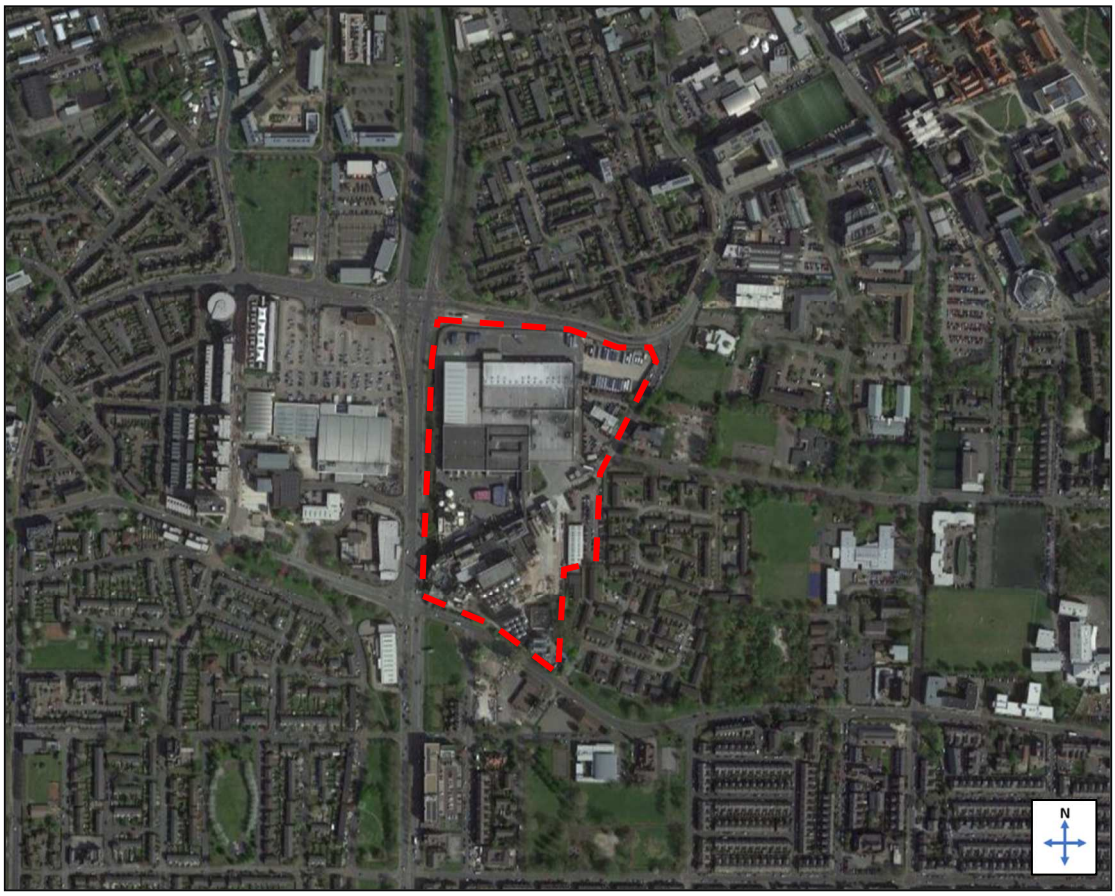

Figure 2.1 Site Location Plan (Image Source: Google Maps)

Initial inspection of the site revealed that the background noise profile at the monitoring locations was typical of an urban cityscape environment, with the dominant observed source being road traffic noise from the surrounding roads.

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 18:46 on 27/09/2021 and 14:41 on 28/09/2021.

The environmental noise measurement positions, proposed plant installation locations and the closest noise sensitive receiver relative to the plant installations are described within Table 2.1 and shown within Figures 2.2.

Icon	Descriptor	Location Description
	Noise Measurement/Proxy Position 1/2 (P1/2)	The microphone was installed on a tree at approximately 2 metre height.
	Noise Measurement/Proxy Position 3 (P3)	The microphone was installed on a tree at approximately 2 metre height.
	Noise Measurement/Proxy Position 4 (P4)	The microphone was installed on a tree at approximately 2 metre height.
	Noise Measurement/Proxy Position 5 (P5)	The microphone was installed on a tree at approximately 2 metre height.
	Noise Sensitive Receiver 1 (R1)	Quinney Crescent to the south west of the site
	Noise Sensitive Receiver 2 (R2)	Barnhill Street to the south of the site
	Noise Sensitive Receiver 3 (R3)	Charles Halle Road to the east of the site
	Noise Sensitive Receiver 4 (R4)	Greenheys Lane to the north of the site
	Noise Sensitive Receiver 5 (R5)	Westwood Street to the south east of the site

Table 2.1 Measurement position and description

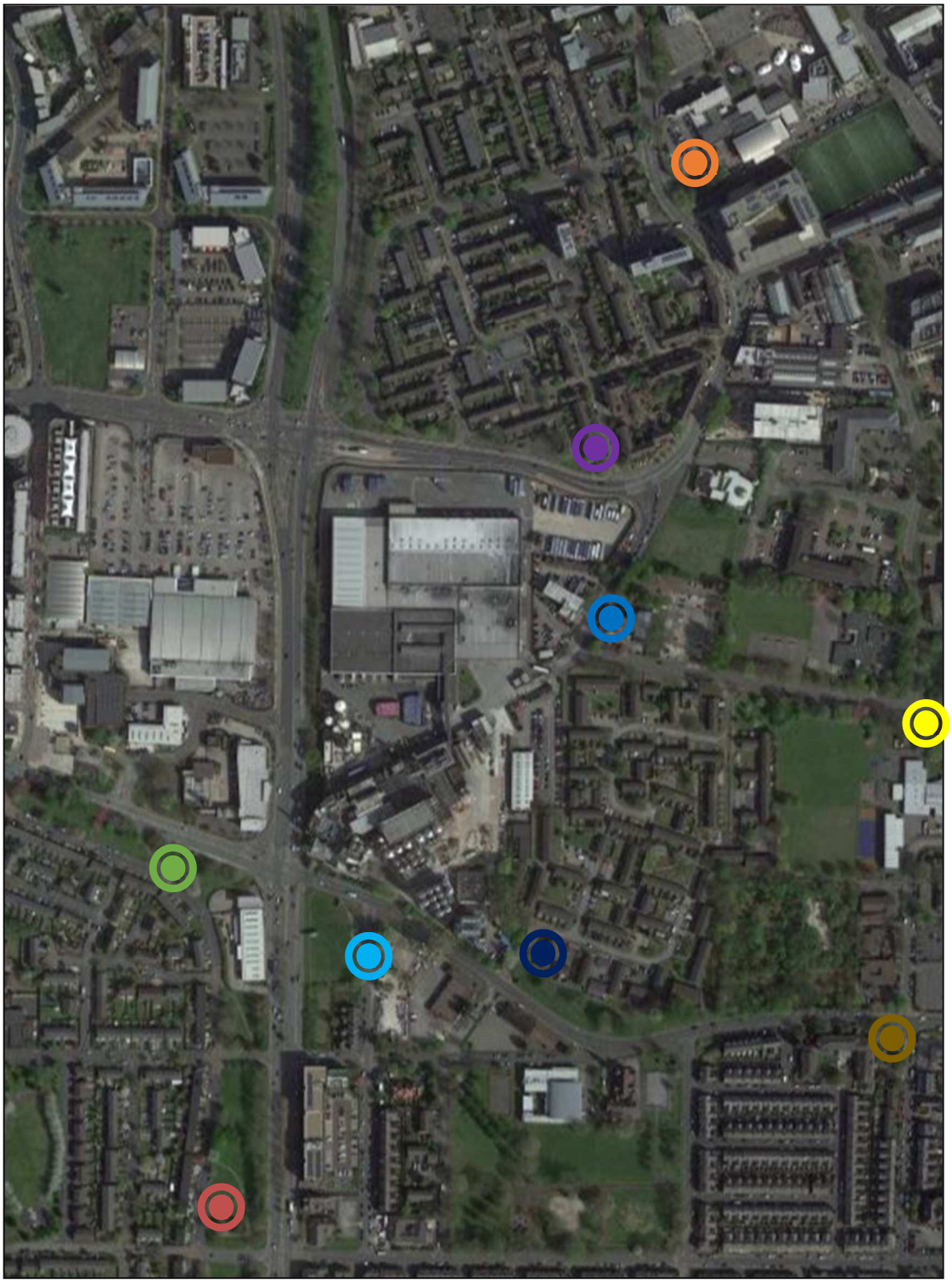

Figure 2.2 Site measurement positions, identified receivers and proposed plant unit installation (Image Source: Google Maps)

The choice of measurement positions was adopted from a previous Noise Impact Assessment completed by Golder Associates in March 2017, which were again used by Resource and Environmental Consultants (REC) Limited in report reference *AC106799-1r0*, dated January 2019. It is understood that these have been accepted by Manchester City Council as representative of the agreed receivers.

As the site is under constant use and many of the elements of plant cannot be turned off, it is not possible to take background measurements directly at the receiver positions with confidence that these measurements would not be affected by existing noise from the site. Therefore the accepted nearby receivers are represented by the measurement positions discussed above.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Equipment

The equipment used in the survey is described within Table 2.3.

Position	Model	Serial Number
1 & 2	NSRTW MK3	AHBcLv0Sc%+3qLtQxwJZHD
3	NSRTW MK3	AFtUrF04+%e9ghtQY8j5ND
4	NSRTW MK3	ANPUj3WSW92XojvAS0jxtD
5	NSRTW MK3	ClpUJ30wU%23gpHAY0JxvD

Table 2.3 Measurement instrumentation

3.0 RESULTS

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figures 23102.TH1-4.

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5\ min}$ levels measured during the environmental noise survey

undertaken on site, as shown in 23102.Daytime.LA90 1-4 and 23102.Night-time.LA90 1-4 attached.

Time Period	Representative background noise level L_{A90} dB(A)			
	Pos. 1 & 2	Pos. 3	Pos. 4	Pos. 5
Daytime (07:00-23:00)	62	62	60	63
Night-time (23:00-07:00)	55	46	49	51

Table 3.1 Representative background noise levels

4.0 NOISE ASSESSMENT GUIDANCE

4.1 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'

British Standard BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*' describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes
- Sound from fixed installations which comprise mechanical and electrical plant and equipment
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

This Standard compares the Rating Level due to the noise source/s under assessment for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) with the existing background noise level in terms of an L_{A90} when the noise source is not operating.

It should be noted that the Rating Level is the Specific Sound Level in question ($L_{Aeq,\ Tr}$), including any relevant acoustic feature corrections, as follows:

- **Tonality** – '*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible*'

- **Impulsivity** – '*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible*'
- **Intermittency** – '*If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied*'
- **Other sound characteristics** – '*Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied*'

Once the Rating Level has been obtained, the representative background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact, as follows:

- 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 could be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context

NOTE: Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

4.2 Local Authority Guidance

The guidance provided in the Manchester City Council Planning & Noise Technical Guidance 2015 for noise emissions of new plant in this instance is as follows:

"The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that: 'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'."

5.0 NOISE IMPACT ASSESSMENT

5.1 Plant Unit Measurements

Measurements were made of plant in situ on 27th and 28th September 2021. Any plant producing noise heard externally was measured, and units around the site were turned on to gather data on noise emission. Each piece of plant measured was turned to full normal duty before measurement.

The equipment used in the plant noise measurements is described within Table 2.3.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 14	Svantek Type 958 Class 1 Sound Level Meter	36554	06/07/2021	1500548-1
	Free-field microphone PCB 377B02			
	Preamp PCB 378M07	127256		
	PCB External Windshield	-	-	-
Larson Davis CAL200 Class 1 Calibrator		17148	27/04/2021	05223/1

Table 5.2 Measurement instrumentation

5.2 Plant Units

The noise emission levels measured for the units are shown in Table 5.2. Each has an equipment number first, which are reflected in the plant location plan in Appendix B. The noise levels represented in the frequency spectrum are shown in Appendix D.

Item Number	Description	Measured Noise Level (dBA)
1	12-off Jaeggi Fans	72
2	1-off CT5 Fan - Lower Part	74
2	1-off CT5 Fan - Upper Part	71
3&4	2-off CT10 Fan & 2-off CT11 Fan	84
5	1-off CT12 Fan	83
6	1-off CT13 Fan	97
7	1-off CT14 Fan	84
8	2-off CT14 Pumps	82
9	5-off Canning Extract Fans	78
10	6-off Canning Cell C02 Extract Fans	74
12	4-off Canning Cell 0 and Cell 1 Personnel Doors, Open	76
13	1-off Canning and Packaging Door, Open	71
16	1-off Upper Engine Room Intake Fan, High	100
17	1-off Upper Engine Room Extract Fan, Low	83
18	1-off Lower Engine Room Intake Fan 1, Low	79
18	1-off Lower Engine Room Intake Fan 2, Low	79
19	3-off Lower Engine Room Extract Fan 1, High	77
19	3-off Lower Engine Room Extract Fan 1, Low	86
19	3-off Lower Engine Room Extract Fan 2, High	98
19	3-off Lower Engine Room Extract Fan 3, High	100
20	2-off WWTP Biogas Boosters	85
21	IC Reactor Pumps 1 & 2 (WWTP)	85
22	Flare Stack in WWTP	80
23	1-off CHP	71
24	1-off Main Boiler House Intake Fan	92

Item Number	Description	Measured Noise Level (dBA)
25&26	6-off Boiler Intake Fans and 1-off Gas Metering Cubicle	80
27	2-off DPR1 C02 Extract Fans	97
33	FV Blocks Extract Fans	76
35	Kitchen Extract Termination	88
37	Freedwater Pumps	80
100	Gas Pipes at West of Site	81

Table 5.2 Plant Units Noise Emission Levels as provided by the manufacturer

5.3 Noise Sensitive Receivers

The locations of noise sensitive receivers around the proposed installation location, shown in Figure 2.2 are:

- R1 - Quinney Crescent to the southwest of the site
- R2 - Barnhill Street to the south of the site
- R3 - Charles Halle Road to the east of the site
- R4 - Greenheys Lane to the north of the site
- R5 - Westwood Street to the southeast of the site

5.4 Noise Modelling and Calculations

SoundPlan computer modelling software was used to create a model of the site and its surroundings. This noise model used building and equipment heights provided by Heineken and Norder and satellite mapping data to provide an overview of the area. Data from plant measurements described in Sections 5.1 and 5.2 was included in the model, and the receivers described in Section 5.3 were added to assess the propagation of noise from on-site equipment and the resulting sound levels at the receivers. After mitigation measures were included noise levels were calculated at 1m from the receivers, and are shown in Tables 5.3 and 5.4. The assessment is limited in scope to the equipment and production on site and does not take into account associated transportation of materials and goods to or from the site.

Criteria are also set in Tables 5.3 and 5.4 based on the measured representative background noise levels shown in Table 3.1, and the Manchester City Council plant noise criteria.

Receiver	Criterion, dB(A)	Noise Level at 1m From the Closest Noise Sensitive Window, dB(A)
1	57	52
2	57	46
3	57	46
4	55	44
5	58	46

Table 5.3 Predicted noise level and criterion at nearest noise sensitive location (daytime)

Receiver	Criterion, dB(A)	Noise Level at 1m From the Closest Noise Sensitive Window, dB(A)
1	50	43
2	50	45
3	41	41
4	44	41
5	46	42

Table 5.4 Predicted noise level and criterion at nearest noise sensitive location (night-time)

As shown in Table 5.3, transmission of noise to the receivers shown in Table 2.1 due to the effects of the plant units and equipment on site satisfies the emissions criterion of Manchester City Council, providing that the mitigation measures outlined in Section 6 are implemented.

6.0 NOISE CONTROL MEASURES

To achieve the specific sound level and subsequent rating level shown in the assessment above, the following noise control strategy should be adopted. It should be noted that the measures below are the minimum recommendations for mitigation to bring the noise level at nearby receivers below the criteria described in Section 5. As the site is likely to need to install further noisy equipment, with certain units already proposed it is recommended that the minimum performance recommendations below are significantly exceeded wherever practical to allow 'headroom' for the cumulative effect of placing later noisy equipment on site.

6.1 Noisiest Fan Equipment

The fans below were found to be the principal sources of noise incident at the nearby receivers around the site. An acoustic attenuator should be installed at each piece of equipment providing the minimum insertion loss values outlined in Table 6.1 below.

Plant Unit	Attenuator	Insertion Loss Levels (dB) in each Octave Frequency Band							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
7 Fan	TBC	2	5	11	17	20	19	12	10
6 CT13 fan	silencer, 1200mm length, 45% free area	3	7	14	21	27	26	17	12
27 fan	TBC	1	2	7	10	11	9	8	7
24 intake fan	silencer, 1500mm length, 50% free area	3	7	13	25	26	25	15	10

Table 6.1 Insertion loss figures to be provided by acoustic silencer

We would recommend the following suppliers of the aforementioned attenuators:

- Environmental Equipment Corporation
- Noico Ltd
- Waterloo Acoustics
- Allaway Acoustics
- Wakefield Acoustics
- Caice

6.2 Barriers

Currently the site is surrounded on some sides by solid fencing. To control the noise emissions from the remaining noisy units and bring the projected noise impact to within the Council criterion, additional barriers are recommended to be erected. This would be the most effective solution to noise emitted by these remaining units as some are not easily enclosed due to the complexity of their surroundings, but they are low in height (less than 2 metres) and therefore noise can be significantly attenuated by a sufficiently tall physical barrier.

The fences described below should be constructed of closed-boarded timber with no perforations, or of metal similar to the existing border fences at the northeast and southwest of the site, at least of 0.6 mm thickness steel.

Fences of at least 2.5 metre height are proposed in the below locations (highlighted in red), shown in Figure 6.1 and 6.2. The proposed fence at the southwest border of the site should abut with the building at that corner, such that there are no gaps at the junction with the building from which the sound may escape. Figure 6.1 is the northeast portion of the site. Figure 6.2 is the south portion of the site.

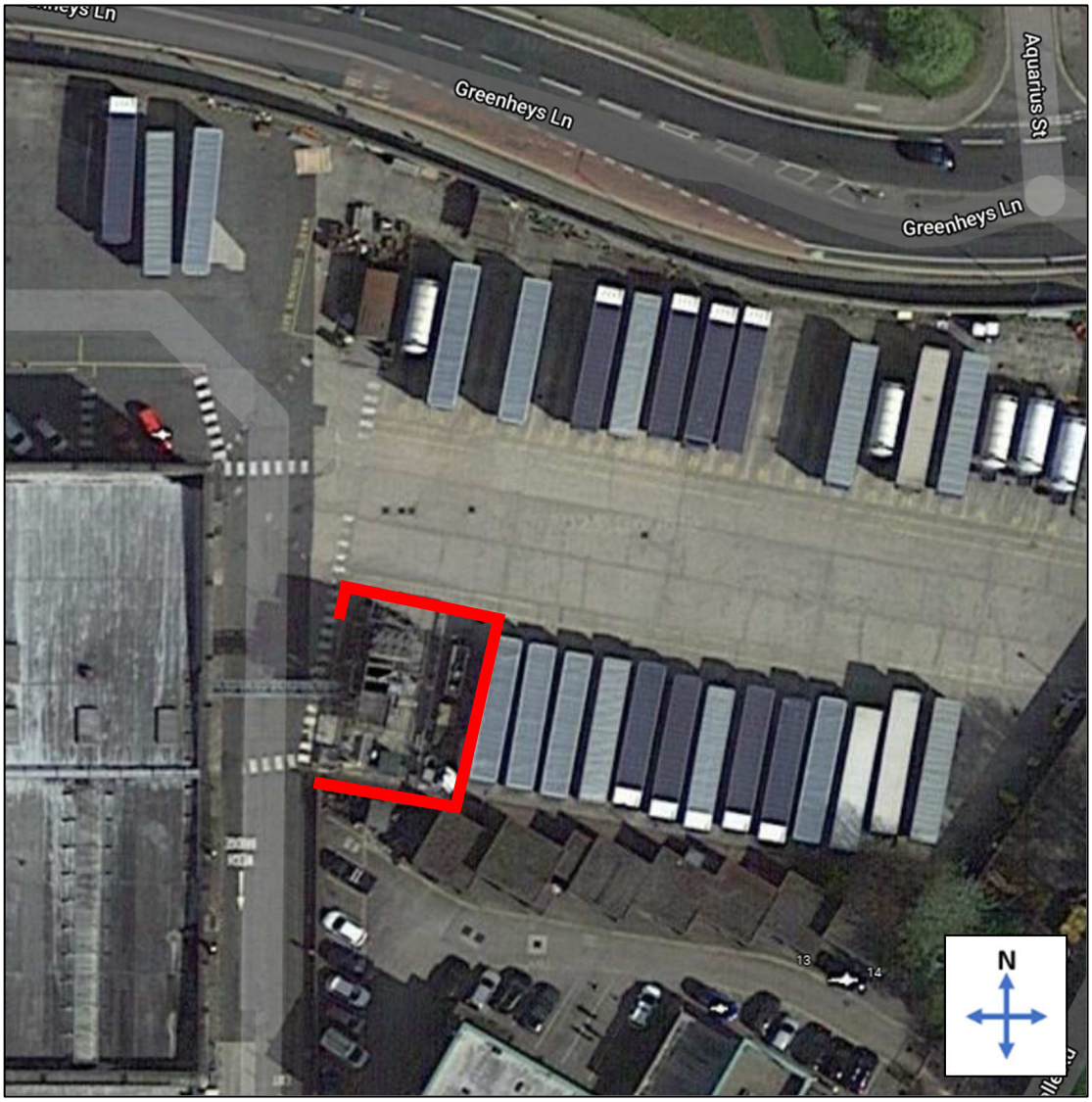

Figure 6.1 Fence around CT14 pump

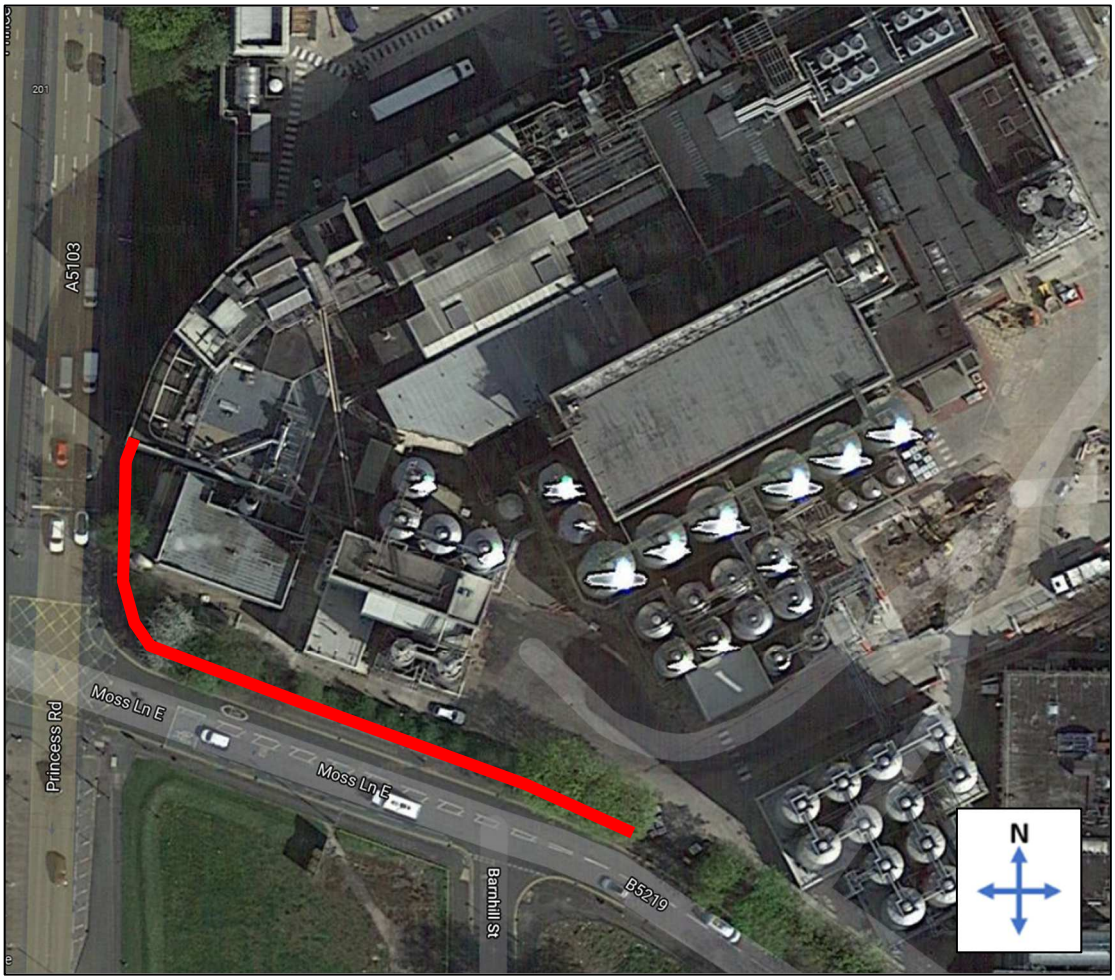

Figure 6.2 Fence at the south west border of the site

6.3 Anti-Vibration Mounting Strategy

In the case of all plant units installed in future, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Where practical, these should be fitted to current plant depending on their size. Appendix C outlines detailed advice in order to ensure that the system installer selects the appropriate anti-vibration mount for installations where appropriate.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

7.0 CONCLUSION

An environmental noise survey has been undertaken at Heineken Manchester, Denmark Road, Manchester, M15 6LD by KP Acoustics Ltd between 18:46 on 27/09/2021 and 14:41 on 28/09/2021. The results of the survey have enabled a representative background noise level to be set.

Measured noise data of existing plant units has been used to obtain the Noise Levels at the assigned noise sensitive receivers in accordance with British Standard BS4142:2014 for compliance with Manchester City Council requirements.

The noise levels were compared with the representative background noise levels to assess the likelihood of impact considering the environmental noise context of the area as per the requirements of BS4142:2014.

It has been concluded that noise emissions from the existing plant units would not have an adverse impact on the nearest residential receivers provided that the noise control strategy presented in Section 6 is followed.

P1/2 - Quinney Crescent
Environmental Noise Time History
From 27 September 2021 To 28 September 2021

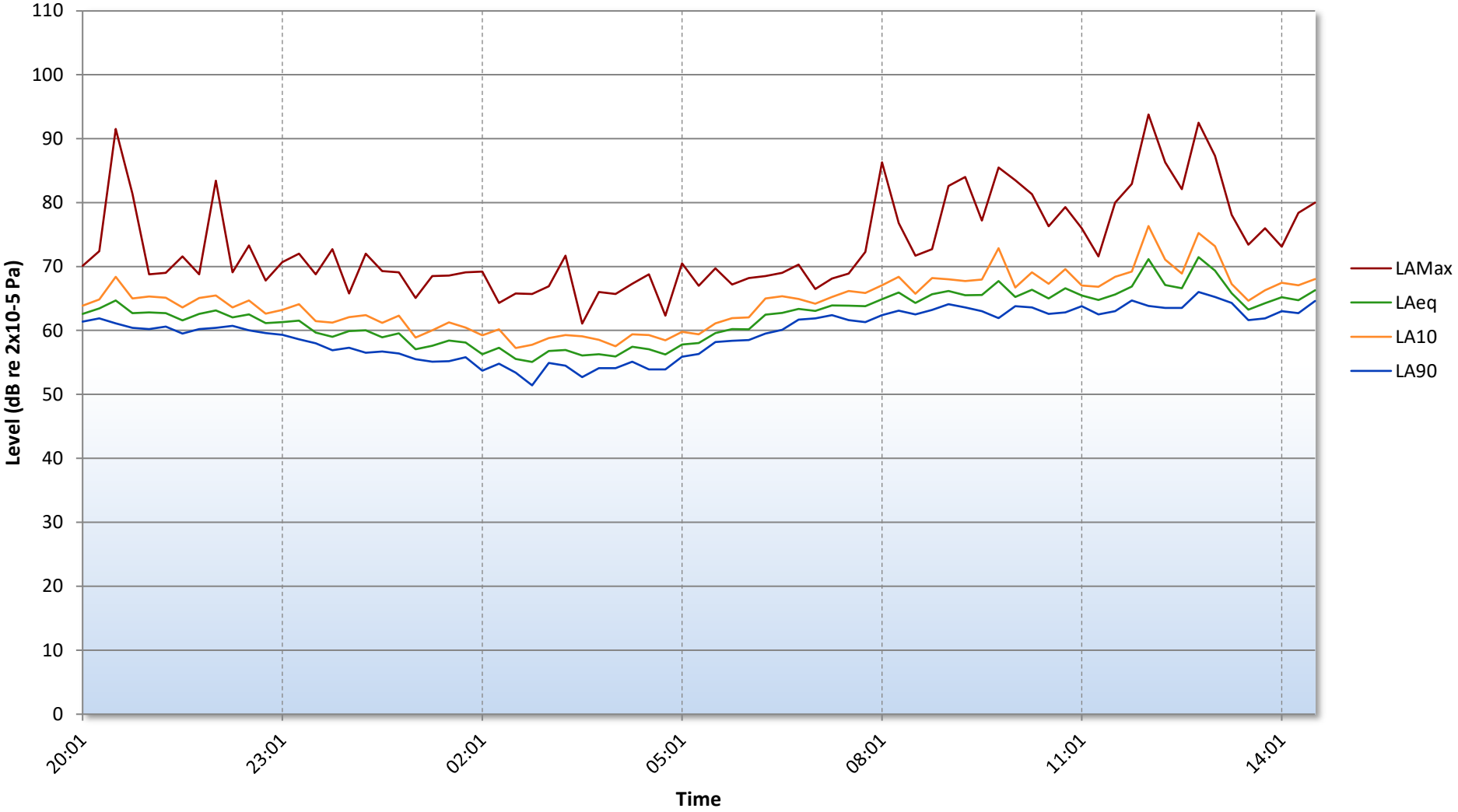

Figure 23102.TH1

P3 - Denmark Road/Pencroft Way Junction
Environmental Noise Time History
From Monday, September 27, 2021 To Tuesday, September 28, 2021

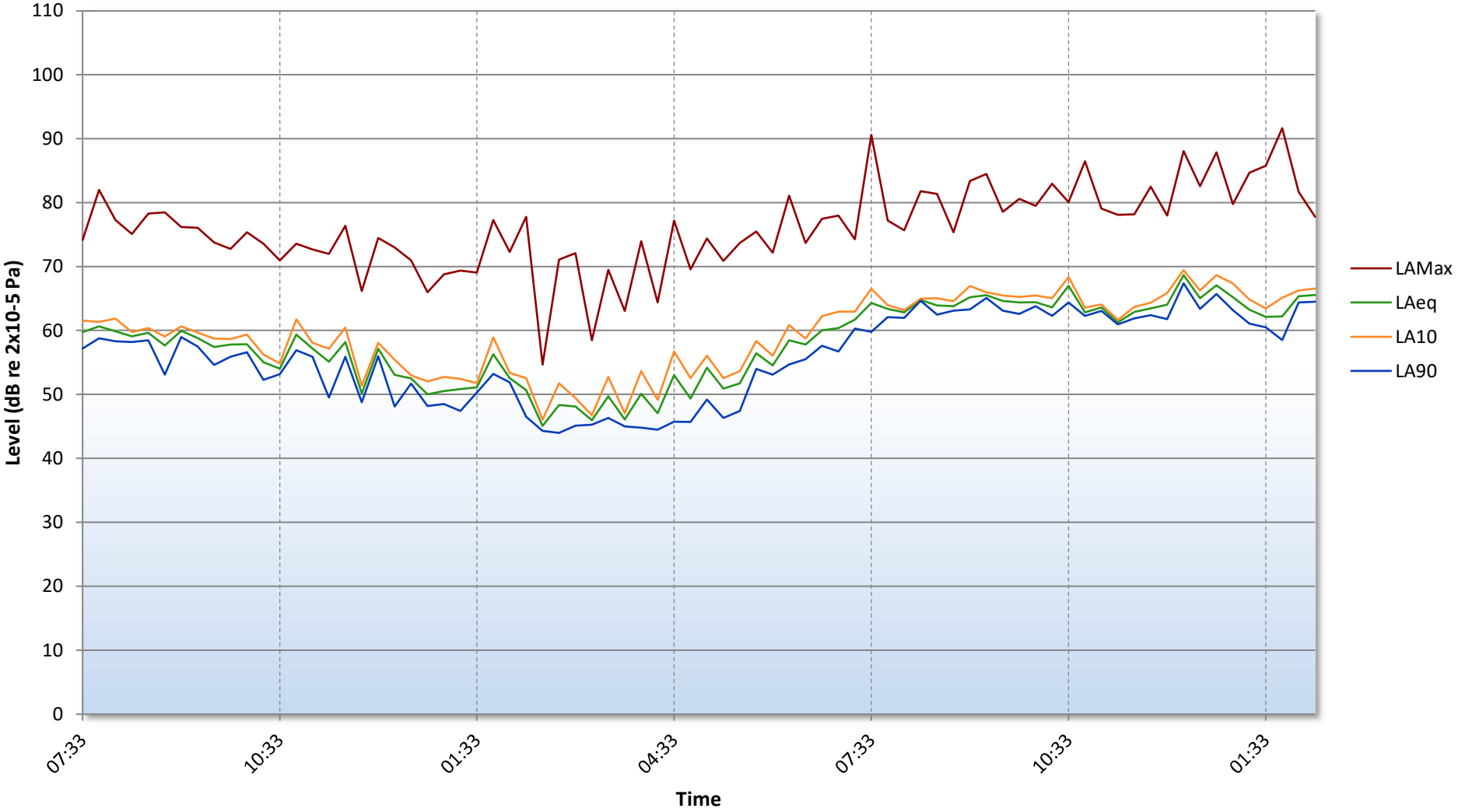

Figure 23102.TH2

P4 - Boundary Lane/Coupland Street Junction
Environmental Noise Time History
From 27 September 2021 To 28 September 2021

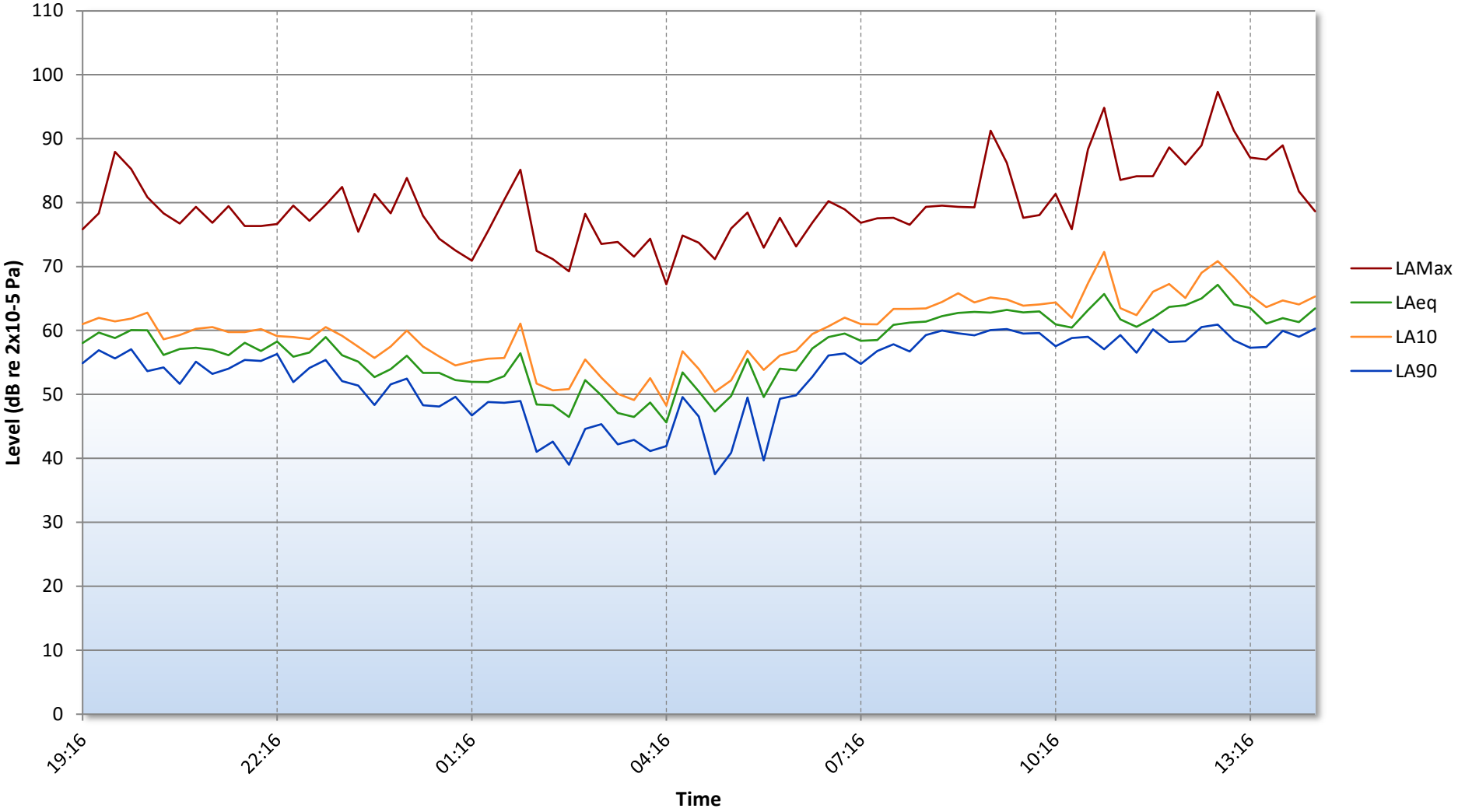

Figure 23102.TH3

P5 - Moss Lane East/Acomb Street Junction
Environmental Noise Time History
From Monday, September 27, 2021 To Tuesday, September 28, 2021

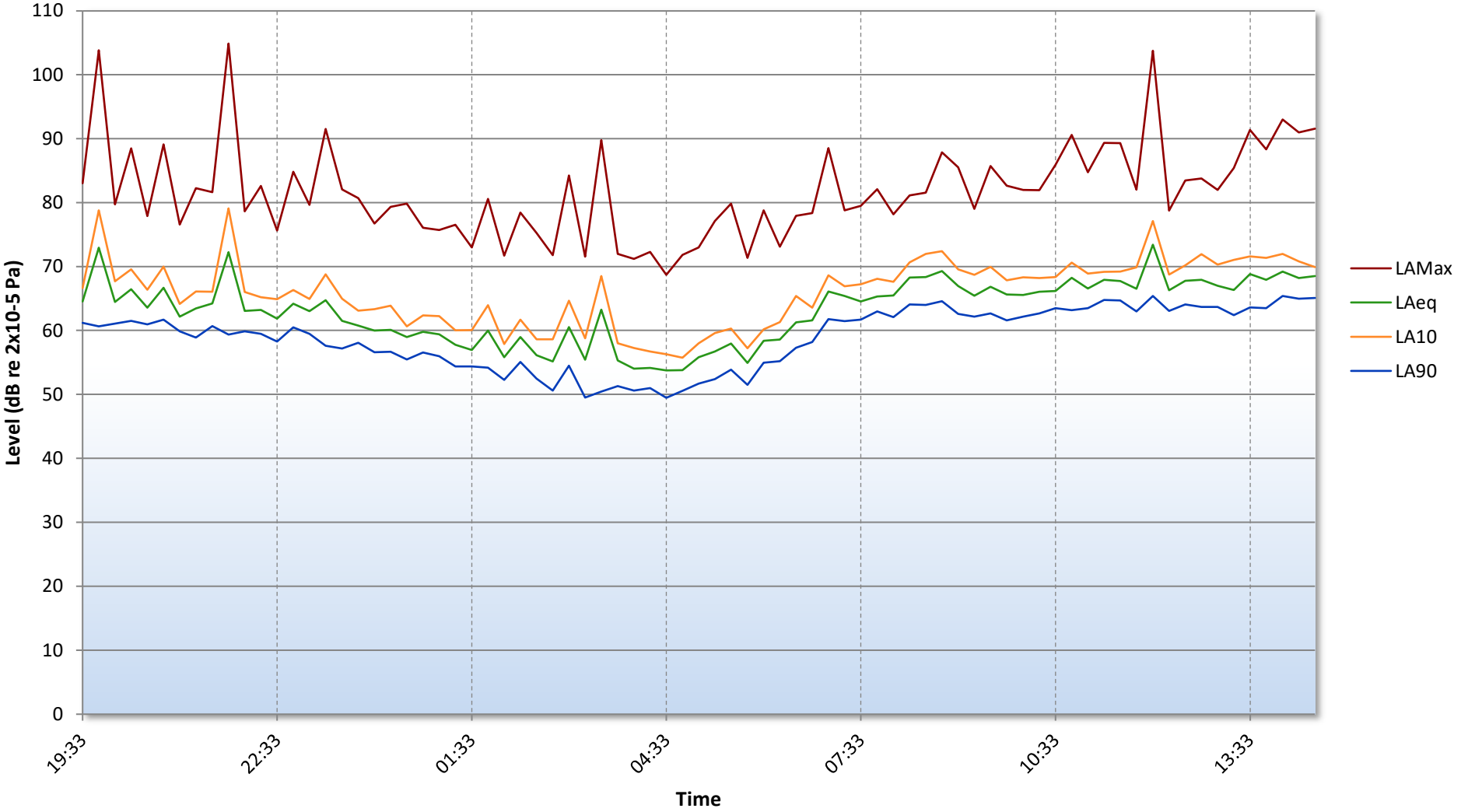

Figure 23102.TH4

P1/2 - Quinney Crescent
Representative Daytime Background Noise Level
From 27 September 2021 To 28 September 2021

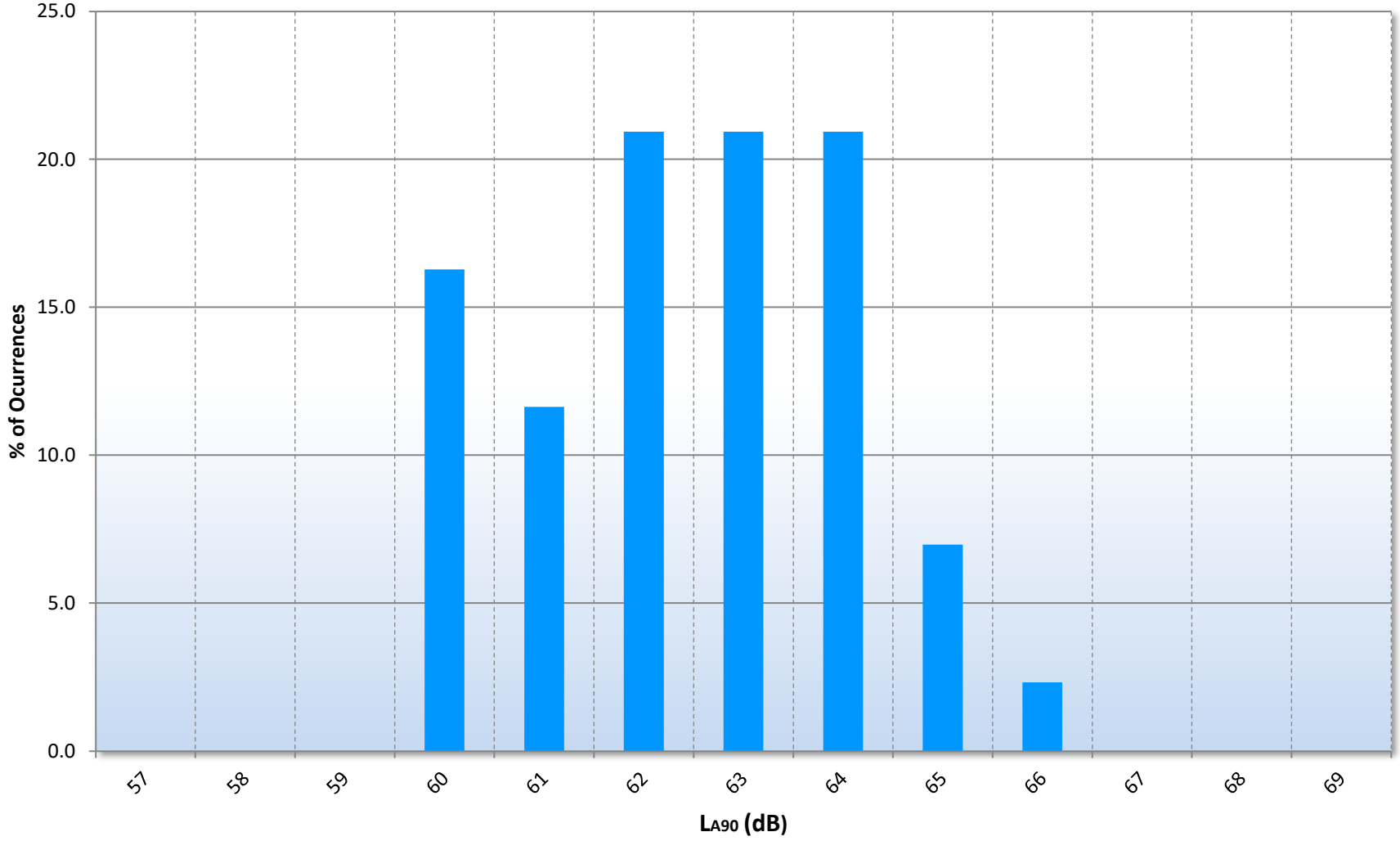

Figure 23102.L90

P3 - Denmark Road/Pencroft Way Junction
Representative Daytime Background Noise Level
From Monday, September 27, 2021 To Tuesday, September 28, 2021

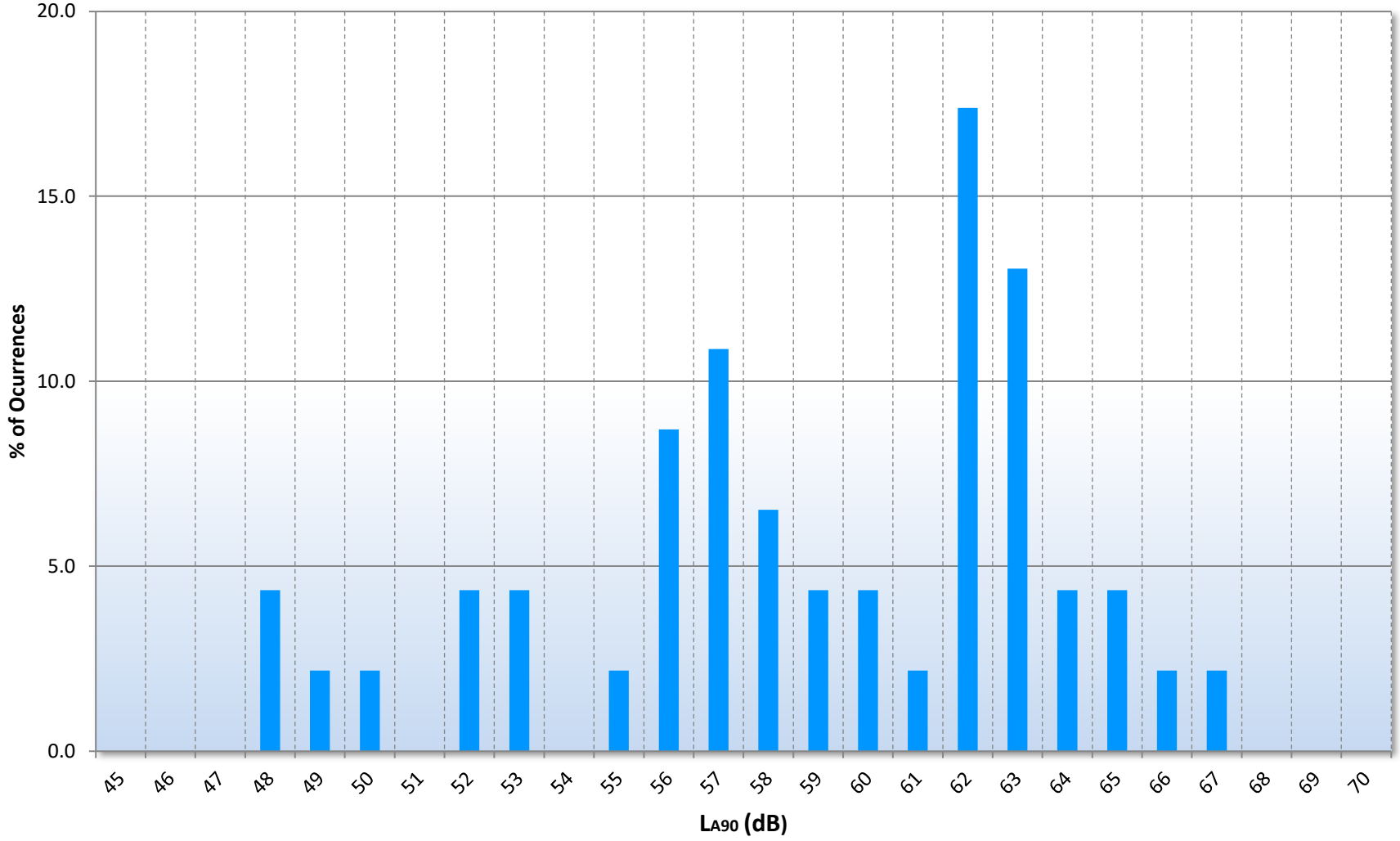

Figure 23102.L90

P4 - Boundary Lane/Coupland Street Junction
Representative Daytime Background Noise Level
From 27 September 2021 To 28 September 2021

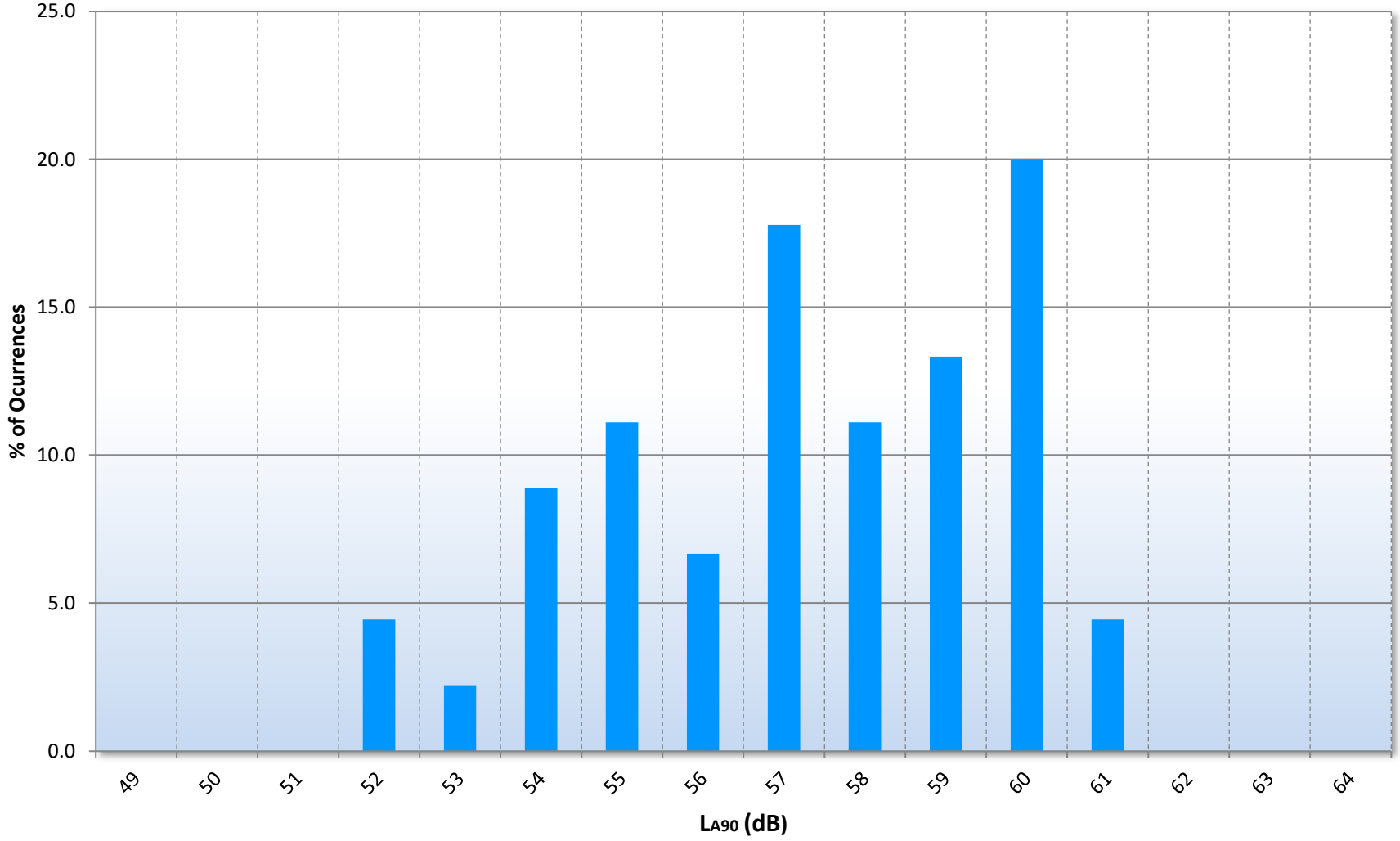

Figure 23102.L90

P5 - Moss Lane East/Acomb Street Junction
Representative Daytime Background Noise Level
From Monday, September 27, 2021 To Tuesday, September 28, 2021

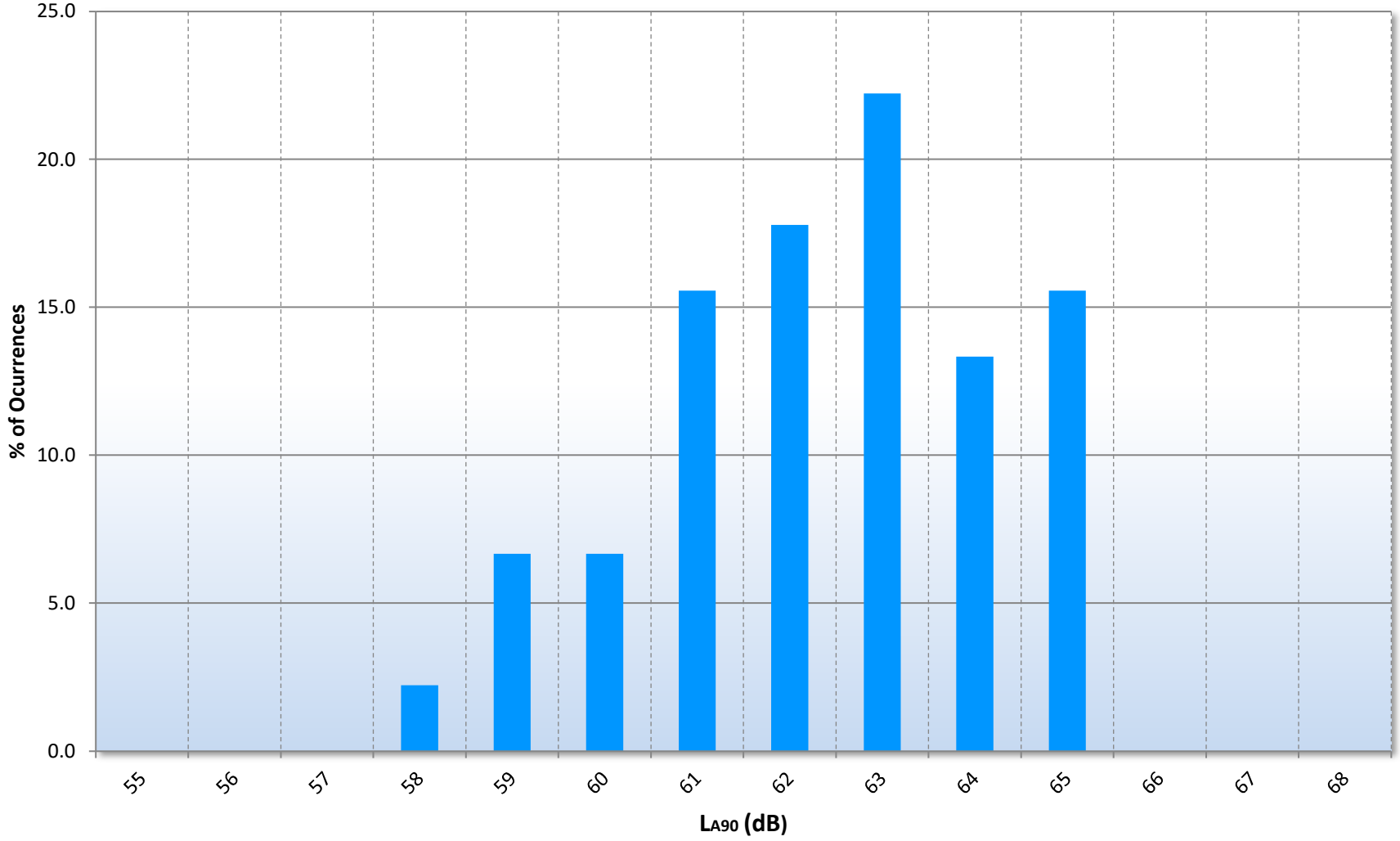

Figure 23102.L90

P1/2 - Quinney Crescent
Representative Night-time Background Noise Level
From 27 September 2021 To 28 September 2021

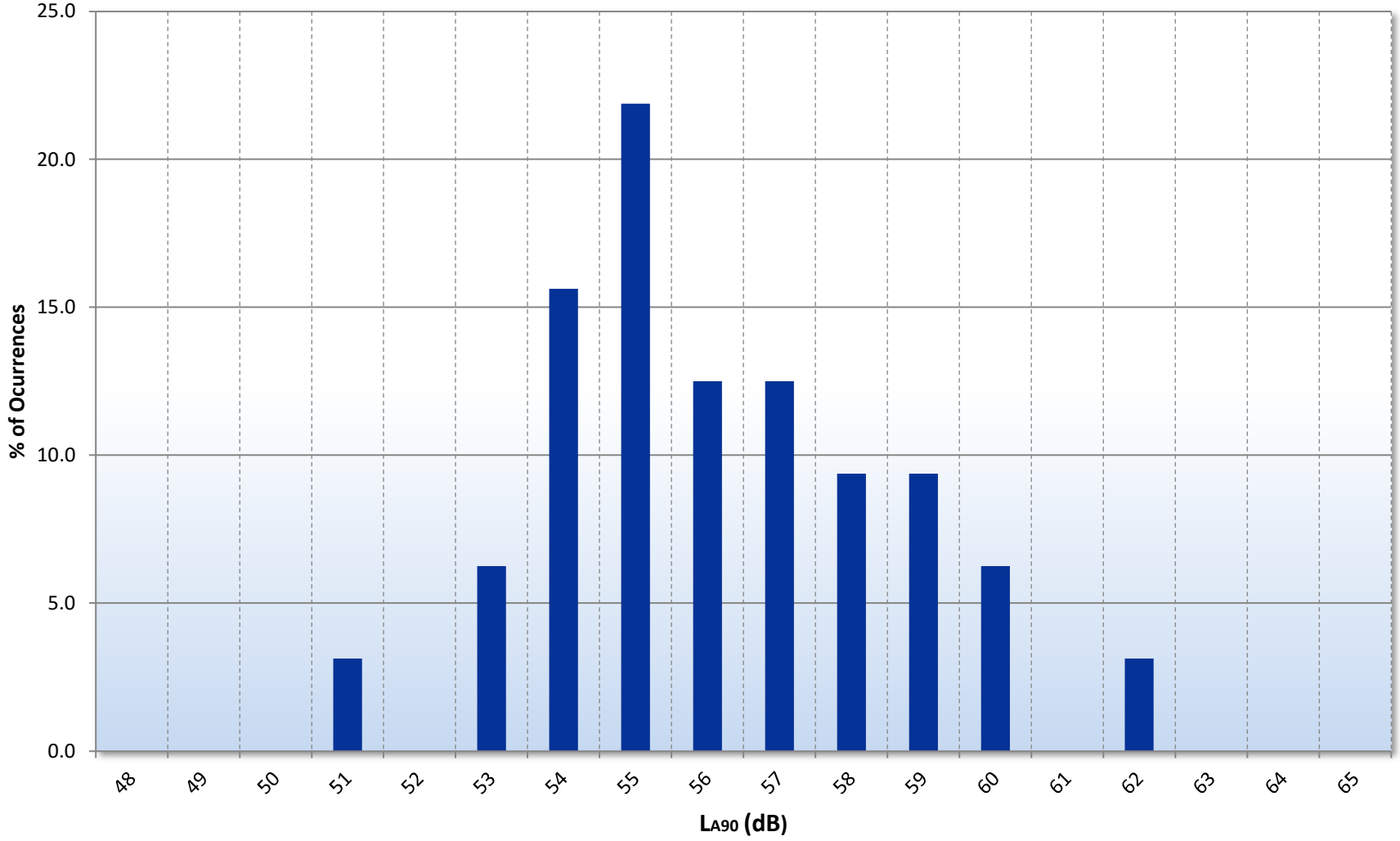

Figure 23102.L90

P3 - Denmark Road/Pencroft Way Junction
Representative Night-time Background Noise Level
From Monday, September 27, 2021 To Tuesday, September 28, 2021

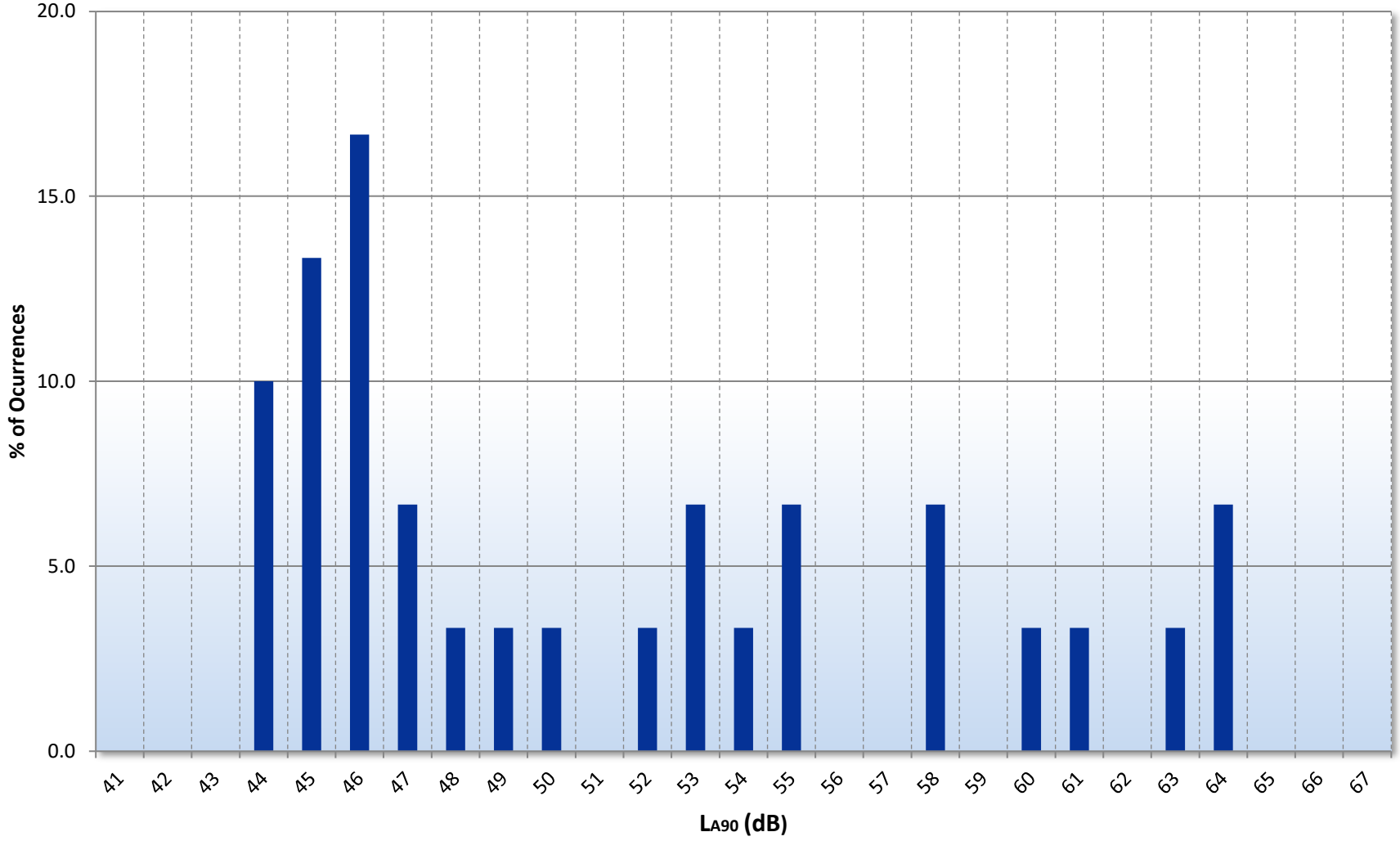

Figure 23102.L90

P4 - Boundary Lane/Coupland Street Junction
Representative Night-time Background Noise Level
From 27 September 2021 To 28 September 2021

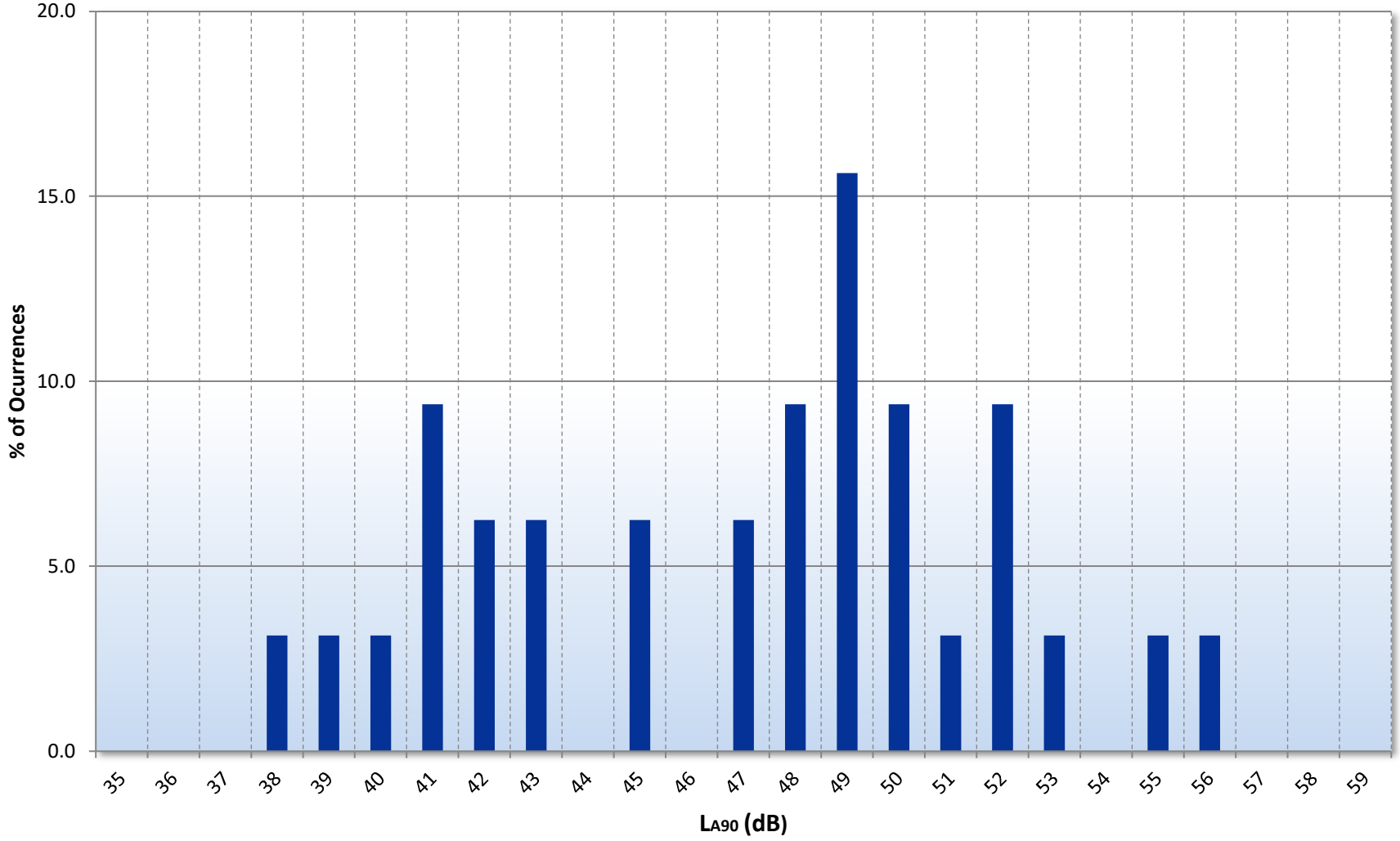

Figure 23102.L90

P5 - Moss Lane East/Acomb Street Junction
Representative Night-time Background Noise Level
From Monday, September 27, 2021 To Tuesday, September 28, 2021

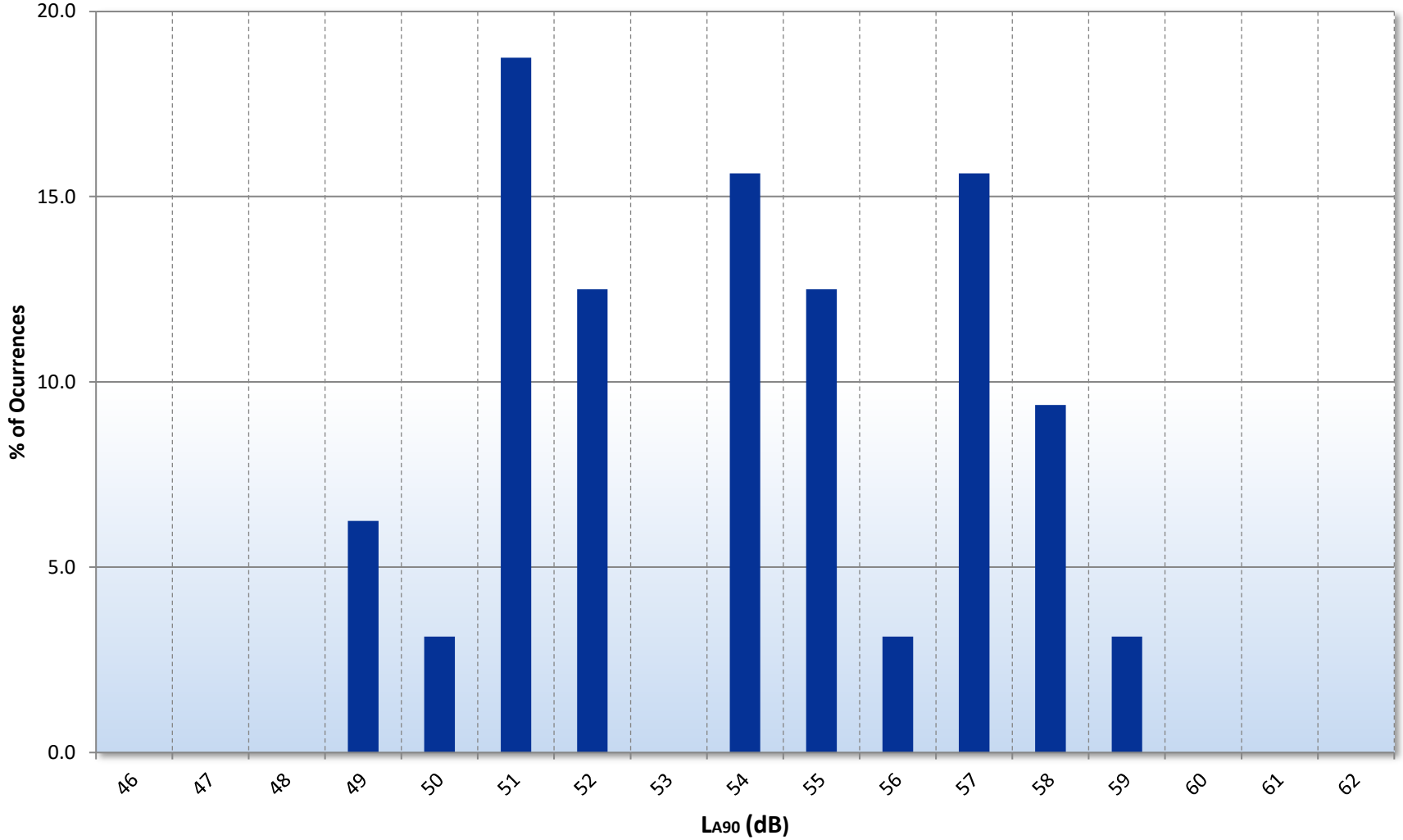

Figure 23102.L90

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

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SITE PLAN
NOT TO SCALE

NOISE SOURCES

#	SOURCE	APPROX ELEVATION (RELATIVE TO GRADE LEVEL TAKEN AS 33m ABOVE ORDNANCE DATUM)	DIRECTION
1	12-off Jaeggi Fans	18.5m	N E S W Up
2	1-off CT5 Fan	15.2m	N E S W
3	2-off CT10 Fan	17.0m	S
4	2-off CT11 Fans	17.0m	W
5	1-off CT12 Fan	15.2m	E W
6	1-off CT13 Fan	15.2m	E
7	1-off CT14 Fan	4.5m	N E S W
8	2-off CT14 Pumps	0m	E W
9	5-off canning pasteuriser hall roof extract fans (replaced in 2018 but 2-off seized and 1-off isolated due to excessive noise)	10m	Up
10	6-off canning cell 1 CO2 extract fans	11.5	Up
11	6-off canning cell 2 AHU fans	11.5	S
12	4-off canning cell 0 and cell 1 personnel doors (closed or open)	0m	3-off E/1-off N
13	1-off canning secondary packaging materials intake canopy rapid closing door (closed or open)	0m	S
14	1-off kegging AHU fan	12m	W
15	1-off T12 intake fan	4m	N
16	1-off upper engine room NH3 intake fan low and high speed (only used on high with a hot work permit in place and never at night)	19.0m	N
17	1-off upper engine room NH3 extract fan low and high speed (only used on high with a hot work permit in place and never at night)	18.0m	N
18	1-off lower engine room NH3 intake fan low and high speed (only used on high with a hot work permit in place and never at night)	18.0m	N
19	3-off lower engine room NH3 extract fans low and high speed (only used on high with a hot work permit in place and never at night)	4.5m	E & W
20	2-off WWTP biogas boosters	0	N E S
21	IC Reactor Pumps 1 & 2 (WWTP)	1.5m	N E S W
22	Flare Stack in WWTP	4.0m	N S E W Up
23	1-off CHP	3m	Up
24	1-off main boiler house intake fan (only used with a hot work permit in place and never at night)	4m	S
25	6-off boiler intake fans when on purge	1.5m	S
26	1-off gas metering cubical in front of main boiler house	0	N E S W
27	2-off DPR1 CO2 extract fans (CAPEX stage 0 is in the system) highest level of noise on the site!	8m	N
28	1-off grain transfer conveyor	16.0m	W
29	3-off silo block fans	15.5, 16.5 & 25.5m	E
30	6-off brewhouse extract fans	12m	SE
31	4-off brewhouse roof extract fans	13.5m	Up
32	4-off mash filter AHU fans	22.5m	2-off Up/2-off N
33	Many FV blocks and yeast culture plant CO2 extract fans but these should only operate under alarm conditions (in practice these do	1.5m	N E S W
34	2-off wet room fans	1.5m	1-off Up/1-off SE
35	1-off admin kitchen extract fan	3m	Up
36	1-off Fosters yeast room vent fan	19.5m	Up
37	Feedwater pump set adjacent to Semi Deaerator	0m	W
38	CV Area AHU Fan	15.5	W
39	Protect Room Extract Fan	4.5m	Up

REV	DATE	DRN	CHK	DESCRIPTION
A	26/08/21	SPB		FIRST ISSUE

HEINEKEN

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LOCATION: MANCHESTER BREWERY	DRAWN BY: SPB	DATE: 26/08/21	TITLE: NOISE EMISSION POINTS	DRAWING No.: 90-020	REV: A
PROJECT: ENVIRONMENTAL	CHECK BY	DATE		STATUS: INFORMATION	SCALE @ A3: NTS

PATH: s:\engineering_man\drawings\maintenance drawings\93 noise\90-020_rev a.dwg

APPENDIX C

ANTI-VIBRATION MOUNTING SPECIFICATION REFERENCE DOCUMENT

1.0 General

1.1 All mountings shall provide the static deflection, under the equipment weight, shown in the schedules. Mounting selection should allow for any eccentric load distribution or torque reaction, so that the design deflection is achieved on all mountings under the equipment, under operating conditions.

1.2 It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail. Particular attention should be paid to mountings which will be exposed to atmospheric conditions to prevent corrosion.

1.3 All mountings shall be colour coded, or otherwise marked, to indicate their load capacity, to facilitate identification during installation.

Where use of resilient supports allows omission of pipe flexible connections for vibration/noise isolation, it shall be the Mechanical Service Consultant's or Contractor's responsibility to decide whether such devices are required to compensate for misalignment or thermal strain.

2.1 Type A Mounting (Caged Spring Type)

2.1.1 Each mounting shall consist of cast or fabricated telescopic top and bottom housings enclosing one or more helical steel springs as the principle isolation elements, and shall incorporate a built-in levelling device. The housing should be designed to permit visual inspection of the springs after installation, i.e. the spring must not be totally enclosed.

2.1.2 The springs shall have an outside diameter of not less than 75% of the operating height, and be selected to have at least 50% overload capacity before becoming coil-bound.

2.1.3 The bottom plate of each mounting shall have bonded to it a rubber/neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.1.4 Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

2.1.5 All nuts, bolts or other elements used for adjustment of a mounting shall incorporate locking mechanisms to prevent the isolator going out of adjustment as a result of vibration or accidental or unauthorised tampering.

2.2 Type B Mounting (Open Spring Type)

2.2.1 Each mounting shall consist of one or more helical steel springs as the principal isolation elements, and shall incorporate a built-in levelling device.

2.2.2 The springs shall be fixed or otherwise securely located to cast or fabricated top and bottom plates, shall have an outside diameter of not less than 75% of the operating height, and shall be selected to have at least 50% overload capacity before becoming coil-bound.

2.2.3 The bottom plate shall have bonded to it a rubber/ neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.3 Type C Mounting (Rubber/Neoprene Type)

Each mounting shall consist of a steel top plate and base plate completely embedded in oil resistant rubber/neoprene. Each mounting shall be capable of being fitted with a levelling device, and should have bolt holes in the base plate and a threaded metal insert in the top plate so that they can be bolted to the floor and equipment where required.

3.0 Plant Bases

3.1 Type A Bases (A.V. Rails)

An A.V. Rail shall comprise a steel beam with two or more height-saving brackets. The steel sections must be sufficiently rigid to prevent undue strain in the equipment and if necessary should be checked by the Structural Engineer.

3.2 Type B Bases (Steel Plant Bases)

Steel plant bases shall comprise an all-welded steel framework of sufficient rigidity to provide adequate support for the equipment, and fitted with isolator height saving brackets. The frame depth shall be approximately 1/10 of the longest dimension of the equipment with a minimum of 150 mm. This form of base may be used as a composite A.V. rail system.

3.3 Type C Bases (Concrete Inertia Base: for use with steel springs)

These shall consist of an all-welded steel pouring frame-work with height saving brackets, and a frame depth of approximately 1/12 of the longest dimension of the equipment, with a minimum of 100 mm. The bottom of the pouring frame should be blanked off, and concrete (2300 kg/m^3) poured in over steel reinforcing rods positioned 35 mm above the bottom. The inertia base should be sufficiently large to provide support for all parts of the equipment, including any components which over-hang the equipment base, such as suction and discharge elbows on centrifugal pumps.

Appendix D

Item Number	Description	Frequency Centre of 1/3 Octave Band, Hz																								
		50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2500 Hz	3150 Hz	4000 Hz	5000 Hz	6300 Hz	8000 Hz	10000 Hz	Overall (dBA)
1	12-off Jaeggi Fans	62	62	62	60	58	60	62	62	63	60	60	56	56	56	62	59	60	56	62	54	47	45	52	40	72
2	1-off CT5 Fan - Lower Part	72	65	68	67	65	64	62	65	64	64	63	62	63	62	61	61	61	60	61	62	61	62	65	60	74
2	1-off CT5 Fan - Upper Part	60	58	61	61	60	61	62	63	64	62	60	59	59	59	58	59	59	58	57	58	58	58	57	53	71
3 & 4	2-off CT10 Fan & 2-off CT11 Fan	71	71	70	69	68	67	68	68	68	69	68	68	69	68	67	67	67	64	65	66	64	64	62	59	84
5	1-off CT12 Fan	74	76	80	74	71	73	71	73	73	73	72	73	73	73	71	71	70	69	69	70	68	67	66	64	83
6	1-off CT13 Fan	82	73	76	83	84	88	91	92	92	90	89	89	89	87	84	82	81	80	78	78	77	77	78	78	97
7	1-off CT14 Fan	69	72	71	76	81	79	72	73	73	75	75	75	76	74	71	72	71	70	70	70	68	68	69	69	84
8	2-off CT14 Pumps	85	71	64	70	70	71	68	77	70	68	68	70	69	70	71	73	70	68	69	70	71	68	65	63	82
9	5-off Canning Extract Fans	69	66	65	64	64	70	63	64	73	64	72	69	71	69	64	66	65	66	65	65	63	60	57	55	78
10	6-off Canning Cell C02 Extract Fans	61	59	58	59	60	70	61	58	57	54	58	57	60	64	62	63	63	62	62	61	59	57	55	53	74
12	4-off Canning Cell 0 and Cell 1 Personnel Doors, Open	59	60	59	60	60	62	62	62	60	61	62	62	63	64	65	66	64	64	64	64	64	64	62	61	76
13	1-off Canning and Packaging Door, Open	65	63	61	61	60	61	63	62	60	59	61	60	59	60	62	60	58	59	59	59	58	56	55	50	71
16	1-off Upper Engine Room Intake Fan, High	73	73	74	74	74	79	83	83	86	90	94	93	93	91	88	87	86	84	81	79	76	75	72	69	100
17	1-off Upper Engine Room Extract Fan, Low	65	65	68	68	72	78	75	69	76	75	75	73	72	71	71	72	72	71	69	69	67	66	64	60	83
18	1-off Lower Engine Room Intake Fan 2, Low	64	60	61	65	64	68	77	77	73	68	69	68	68	68	68	68	66	64	63	62	60	59	58	56	79
18	1-off Lower Engine Room Intake Fan 1, Low	65	62	65	68	64	74	74	65	63	67	71	68	69	69	69	67	65	64	64	62	61	58	57	55	79
19	3-off Lower Engine Room Extract Fan 1, Low	72	68	72	69	69	68	72	69	73	70	71	72	69	68	66	65	63	61	60	59	57	56	55	54	77
19	3-off Lower Engine Room Extract Fan 1, High	66	60	67	76	68	68	75	70	72	73	79	82	79	75	71	67	66	62	61	60	57	55	53	52	86
19	3-off Lower Engine Room Extract Fan 2, High	68	70	68	71	73	75	79	77	86	93	88	91	88	88	87	86	84	84	82	81	79	78	76	74	98
19	3-off Lower Engine Room Extract Fan 3, High	69	72	70	71	74	76	81	79	87	92	90	93	93	91	87	87	86	85	83	82	80	79	78	76	100
20	2-off WWTP Biogas Boosters	73	72	71	62	58	63	71	61	67	75	67	72	68	66	71	69	72	71	74	76	78	74	70	71	85
21	IC Reactor Pumps 1 & 2 (WWTP)	66	70	87	77	79	74	71	70	77	81	78	80	75	76	73	73	71	69	67	67	64	62	60	58	85
22	Flare Stack in WWTP	90	87	91	93	89	80	83	79	73	72	66	65	63	63	61	60	59	58	63	57	55	54	52	50	80
23	1-off CHP	63	60	68	68	66	64	64	62	63	63	65	62	63	62	60	58	57	55	55	54	52	52	50	48	71
24	1-off Main Boiler House Intake Fan	73	74	76	77	82	82	86	87	86	86	87	86	86	83	81	79	77	75	73	71	69	66	65	65	92
25 & 26	6-off Boiler Intake Fans and 1-off Gas Metering Cubicle	73	79	79	80	81	76	74	76	67	72	69	69	68	64	65	68	66	69	66	68	66	61	60	60	80
27	2-off DPR1 C02 Extract Fans	76	79	75	75	75	79	80	78	81	87	90	87	87	87	88	87	86	84	83	82	80	78	76	74	97
33	FV Blocks Extract Fans	61	57	60	62	63	61	63	67	71	67	63	66	66	66	64	64	64	64	63	63	60	59	58	54	76
33	FV Blocks Extract Fans	62	59	61	62	63	60	66	74	84	75	74	79	80	78	76	75	76	76	74	72	69	70	66	64	88
35	Kitchen Extract Termination	73	70	69	64	59	69	75	81	70	67	71	79	67	68	67	64	64	62	59	58	57	56	53	51	80
37	Freedwater Pumps	74	71	67	65	67	71	65	69	67	66	70	66	65	65	66	66	67	69	67	73	74	68	69	65	81
100	Gas Pipes at West of Site	64	64	62	60	59	57	58	58	60	58	58	57	58	58	55	55	55	60	62	73	66	69	71	71	78