
Axis Architecture Ltd

***Pfizer Biotech, New Lane, Havant –
Proposed New Blast Freezer***

Noise Impact Assessment Report

Report No: 154/Rep 1/Rev 0/Jun 2015



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FINAL REPORT

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SUMMARY

Pfizer Biotech is proposing to replace two older blast freezers with one system in a building to be located adjacent to the existing ones. The Pfizer site in Havant in Hampshire is sandwiched between residential areas to the east and west.

The Local Authority Planning Office highlighted some concern about the possible adverse impact on the nearest noise sensitive receptors due to noise arising from the new blast freezer; it has therefore requested a noise assessment.

Axis Architecture, the architect, approached Dr H S Sagoo – an experienced independent Noise and Vibration Consultant – to undertake the noise survey and prepare the requisite noise assessment.

Ambient noise levels were measured over a period commencing around 15:00 hrs on Friday, 12th June 2015 till approximately 15:00 hrs on Monday. Two sound level meters were installed approximately 2.0m above ground on secure tripods; one along the New Lane site boundary and the other on the railway site boundary. Measurements of the background noise level at these locations were considered to be representative of the levels at the nearest residential houses.

The noise emission of the blast freezer is stated as 66 dB at 10m distance when just loaded and 55 dB when the temperature has gone down. Each of the three freezers is rated at 55 dB at 10 m distance when running on full load and 45 dB off load. The proposed new blast freezer and three other freezers will be located close to the site of existing freezers. There are buildings on site in close vicinity that will screen these freezers from the noise sensitive receptors.

The lowest background noise level measured was 32.2 and 37.6 dB L_{A90} at the railway and New Lane site boundaries, respectively.

The BS4142 assessment based on worst case scenario indicates that the rating noise level is calculated to be 4 to 6 dB below the measured background noise level. Therefore, this is a clear 'indication of the specific sound source having a low impact', hence it is clear that the new freezers will not cause an adverse impact and hence no mitigation is necessary.

Moreover, this assessment is based on the highest source noise levels when under full load. The noise of the freezers has no strong tones and is not intermittent or impulsive, and in context where the ambient noise is intermittent and impulsive due to road traffic and trains, it is considered that noise due to the freezers will not be noticeable. Consequently, it is unlikely that noise of the freezers will cause an adverse comment. The planning department should therefore approve the development.

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1. INTRODUCTION

Pfizer Biotech is proposing to replace two older blast freezers with one system in a building to be located adjacent to the existing ones. The Pfizer site in Havant in Hampshire is sandwiched between residential areas to the east and west.

The Local Authority Planning Office highlighted some concern about the possible adverse impact on the nearest noise sensitive receptors due to noise arising from the new blast freezer; it has therefore requested a noise assessment.

Axis Architecture, the architect, approached Dr H S Sagoo – an experienced independent Noise and Vibration Consultant – to undertake the noise survey and prepare the requisite noise assessment.

The purpose of this report is to describe the site, the nearest residential areas, brief details of the proposal and outline the assessment methodology including the findings of the noise survey, assessment of the noise impact in accordance with the appropriate national guidance, and finally, recommend noise mitigation measures as necessary.

2. DESCRIPTION OF THE SITE

The Pfizer site is located just over 1 km northeast of Havant town centre and about 1.5 km north of the A27 between Portsmouth and Chichester, see Figure 1. The Portsmouth to Petersfield railway line forms the eastern site boundary and New Lane, which is a main access road to the industrial area, forms the western site boundary. The site is within the New Lane Industrial Estate and there are commercial units north and south of Pfizer.

The site is exposed to noise of road traffic on New Lane and trains on the Portsmouth to Petersfield service. The site is also exposed to noise from the adjacent commercial units including car park to the north. At the time of installation of the sound measuring equipment some fan noise was clearly audible at the railway site boundary location. This was due to extraction fan on a neighbouring industrial unit which was being cleared ready for a renovation or demolition.

The nearest noise sensitive receptors are houses east of the railway in Nutwick Road which are about 200 m from the new blast freezer and west of New Lane which are about 155 m distance.

3. DEVELOPMENT PROPOSAL

Pfizer Global Supply site in Havant is home to highly sophisticated production lines. These provide state-of-the-art packaging of vaccines and specialist injectable products, often in highly secure refrigerated conditions, which are then distributed around the world. The vaccines are usually required to be delivered at low temperatures destination in compliance with label requirements ready for patient and practitioner use.

Transport solutions range from a small container to transport cold chain medicines by four-wheel drive and destinations include, for example, remote mountainous locations in

Kenya. Delivering to destinations with a huge ambient temperature range require specialist methods and accurately controlled temperature containers using gel packs.

The freezer units are full of gel packs that are chilled to - 20 to - 25 degree C. These packs are then used in the containers for delivery. The freezer units operate continuously but are under full load when a new load of gel packs are placed inside and when the doors are opened for access.

At present there are two blast freezers in use which are understood to be fairly old, see Photo 1, and both of these are proposed to be replaced by three new freezers and a blast freezer housed in one building. This building will be placed close to the existing units with their chiller fans orientated away from the HPS car park. See Figure 2.

The site also has bank of chillers and fans which will remain are located close to the boundary with HPS car park, see Photo 2, and these operate on a continuous basis.

4. ASSESSMENT CRITERIA

Planning policy

The National Planning Policy Framework¹ sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their local authorities can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

One of the aims of the NPPF is stated in paragraph 123 on page 29; *'Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them'*.

British Standard 4142

British Standard 4142² gives guidance on measurement and assessment of industrial and commercial sound on nearby residents and to determine whether this is likely to give rise to complaints.

In essence, the noise level and the character of noise caused by the specific source, called the rating level, is measured and rated against the measured ambient background level during the period of operation. The greater this difference the greater is the magnitude of the impact, as given in the table below. This standard states the reference time interval is 1 h during the day, 07:00 to 23:00 hrs, and 15 minute during the night.

¹ Department for Communities and Local Government, 'National Planning Policy Framework, March 2012.

² British Standard 4142:2014 'Method for rating and assessing industrial and commercial sound'.

Difference in dB	Comment
+10 dB or more	Likely to be an indication that a significant adverse impact, depending on the context;
+5 dB	Could be an indication that a significant adverse impact, depending on the context;
The lower the rating level is relative to the measured background level	The less likely it is that there will be an adverse impact.

Table 1 BS 4142 Assessment Criteria

Acoustic Features

This standard allows a correction of up to 6 dB that can be added for source noises with a *“tone, whine, hiss, screech, hum, roar or other distinctive feature”*. In addition, a correction of up to 9 dB can be added for *“distinct impulses”* such as *“bangs, clicks, clatters or thumps”* and 3 dB for intermittency.

5. NOISE MEASUREMENTS

Background noise measurements

The locations for the background noise measurements was discussed and agreed with the local authority beforehand. Ambient noise levels were measured over a period commencing around 15:00 hrs on Friday, 12th June till approximately 15:00 hrs on Monday, 15th June 2015. Two sound level meters were installed approximately 2.0m above ground on secure tripods; one along the New Lane site boundary, about 8m from the edge of the road see Photo 3, and the other on the railway site boundary see Photo 4. Measurements of the background noise level at these locations were considered to be representative of the levels at the nearest residential houses. Short term noise measurements were undertaken close to the existing freezers and in the adjacent commercial area car park.

Measurements include the equivalent continuous noise level L_{Aeq} , the background noise level L_{A90} , the maximum level L_{Amax} and L_{A10} together with third octave frequency spectra. Explanation of acoustical terminology is given in Appendix 1.

The weather was dry with clear blue sky at the start of the noise survey with hardly any wind; 0.4 m/s with gusts up to 0.8 m/s. There may have been some rain on Friday evening. On Monday the weather was again dry with light south-easterly wind of 0.8 m/s with gusts of 2.9 m/s.

Noise sources

The noise emission of the blast freezer is stated as 66 dB at 10m distance when just loaded and 55 dB when the temperature has gone down. Each of the three freezers is rated at 55 dB at 10 m distance when running on full load and 45 dB off load. It is understood that the freezers could be loaded with gel packs during night-time.

6. INSTRUMENTATION

Noise measurements were taken using two 01dB Solo Type 1 integrating sound level meters (serial nos. 11649 and 10485) each fitted with a ½ inch microphone. These were set-up to record the frequency spectra of the ambient noise and were calibrated using a 01dB Calibrator (serial no. 130366) in accordance with the manufacturer's instructions before and after the measurements, and no drift in calibration level was observed.

The long term measurements were free-field and the microphone was mounted on a secure tri-pod 2.0 m above ground. The short term measurements were on a tri-pod 1.6 m above ground are all are free-field except the measurement 1m in front of the existing freezer unit which was between the unit and a wall of a building. All measurements were conducted in accordance with the guidelines given in BS7445³ and BS4142.

7. NOISE MEASUREMENT RESULTS

Complete results of the ambient noise survey at the agreed locations are given in Appendix 3 and the time histories of the measurements are given in Figure 3. As the freezers run continuously the greatest noise impact is likely to be during the night, hence the lowest 15-minute period value for each night is summarised below together with the time of occurrence.

As mentioned above there was an extractor fan operating at a neighbouring site. On closer inspection via spectral time history of the measurements shown in Figure 4, the fan appeared to have been operating all weekend except from 14:56 hrs on Saturday until 08:29 hrs on Sunday; this was convenient because this is the period when the lowest background is usually expected. As a result, the quietest period given below was during Saturday night.

Period start	Railway site boundary				New Lane boundary			
	Leq	Lmax	L90	L10	Leq	Lmax	L90	L10
Daytime – hourly averages								
Friday daytime 22:00	58.5	79.6	50.1	57.1	57.4	72.1	45.5	62.4
Saturday daytime 22:00	58.9	81.4	37.2	49.5	54.9	69.4	42.7	58.8
Sunday daytime 07:00	58.2	81.6	36.8	52.7				
22:00					52.8	68.9	39.7	52.7
Night-time – 15 minute averages								
Friday night 03:00	51.3	53.3	50.8	51.6	46.7	54.4	43.6	48.7
Saturday night 02:00	33.2	36.9	32.2	33.7				
03.15					43.1	53	38.6	46.8
Sunday night 02:30	42.5	45.2	42.1	42.6	38.6	41.1	37.6	39.4

All noise levels are in dB(A)

Table 2 Ambient noise – lowest daytime and night-time values

³ BS7445:2003, 'Description and measurement of environmental noise; a guide to quantities and procedures', BSI.

8. ASSESSMENT OF THE NOISE IMPACT

Calculated source noise levels

The worst case is when all units are running at full load; the sound level at 10 m will then be 66 dB and 60 dB L_{Aeq} from the blast freezer and three freezers, respectively. The sound level at each of the two residential areas is summarised in the table below.

Sources	Source noise level dB at 10 m	Noise at houses in Nutwick Rd at 200 m	Noise at houses in New Lane at 155 m
Blast freezer	66	40	42.2
Freezers 3no.	55 = 60 for three	34	36.2
Combined specific noise level		41.0	43.2

All noise levels are in dB(A)

Table 3 Calculated specific noise levels

Obstructions and screening

There are a lot of buildings on the Pfizer site and some of these will obstruct the transmission of sound towards the residential areas. The barrier correction depends upon the height of the obstruction and the spatial information of the source, obstruction and the receiver. This barrier effect has been calculated using the procedure in CRTN⁴ and given in the table below

	Noise at houses in Nutwick Rd at 200 m	Noise at houses in New Lane at 155 m
Combined noise level	41.0	43.2
Barrier effect of buildings	- 14.7	- 9.2
Residual specific noise level	26.3	34.0

All noise levels are in dB(A)

Table 4 Calculated barrier corrections and specific noise levels

Rating noise level

The sound of the freezers was heard at close quarters and it was considered to be broadband without any noticeable tones. As the freezers are running continuously there are no start ups or intermittency or impulses. As a result, no acoustic character corrections are appropriate, therefore the rating noise level is the specific noise level given above.

⁴ 'Calculation of Road Traffic Noise', Dept of Environment and Welsh Office, HMSO, 1988.

BS4142 noise assessment

Table 5 below summarises the rating noise levels and the measured background noise levels at the selected receiver locations.

Receptor	Specific noise level dB	Rating noise level dB	Background noise level dB L _{A90}	Exceedance dB
Receptor at New Lane 150 m	34.0	34.0	37.6	- 4
Receptor at Nutwick Rd 200 m	26.3	26.3	32.2	- 6

Noise levels are in dB

Table 5 BS4142 Assessment

The BS4142 assessment shows that the rating noise level is calculated to be about 4 to 6 dB below the lowest background noise level in the area. Given that this assessment is based on worst case scenario of higher source noise levels this is, therefore, a clear 'indication of the specific sound source having a low impact'. Hence it is clear that the proposed new blast freezer and the three other freezers will not cause an adverse impact and hence no mitigation is necessary.

9. MITIGATION MEASURES

The assessment of noise caused by the proposed new blast freezer and the three other freezers at the Pfizer site in New Lane has shown that these would have a low impact. As a result, no mitigation measures are necessary.

10. CONCLUSIONS

Ambient noise levels were measured over a period commencing around 15:00 hrs on Friday, 12th June 2015 till approximately 15:00 hrs on Monday. Two sound level meters were installed approximately 2.0m above ground on secure tripods; one along the New Lane site boundary and the other on the railway site boundary. Measurements of the background noise level at these locations were considered to be representative of the levels at the nearest residential houses.

The noise emission of the blast freezer is stated as 66 dB at 10m distance when just loaded and 55 dB when the temperature has gone down. Each of the three freezers is rated at 55 dB at 10 m distance when running on full load and 45 dB off load. The proposed new blast freezer and three other freezers will be located close to the site of existing freezers. There are buildings on site in close vicinity that will screen these freezers from the noise sensitive receptors.

The lowest background noise level measured was 32.2 and 37.6 dB L_{A90} at the railway and New Lane site boundaries, respectively.

The BS4142 assessment based on worst case scenario indicates that the rating noise level is calculated to be 4 to 6 dB below the measured background noise level. Therefore, this is a clear 'indication of the specific sound source having a low impact', hence it is clear that the new freezers will not cause an adverse impact and hence no mitigation is necessary.

Moreover, this assessment is based on the highest source noise levels when under full load. The noise of the freezers has no strong tones and is not intermittent or impulsive, and in context where the ambient noise is intermittent and impulsive due to road traffic and trains, it is considered that noise due to the freezers will not be noticeable. Consequently, it is unlikely that noise of the freezers will cause an adverse comment. The planning department should therefore approve the development.

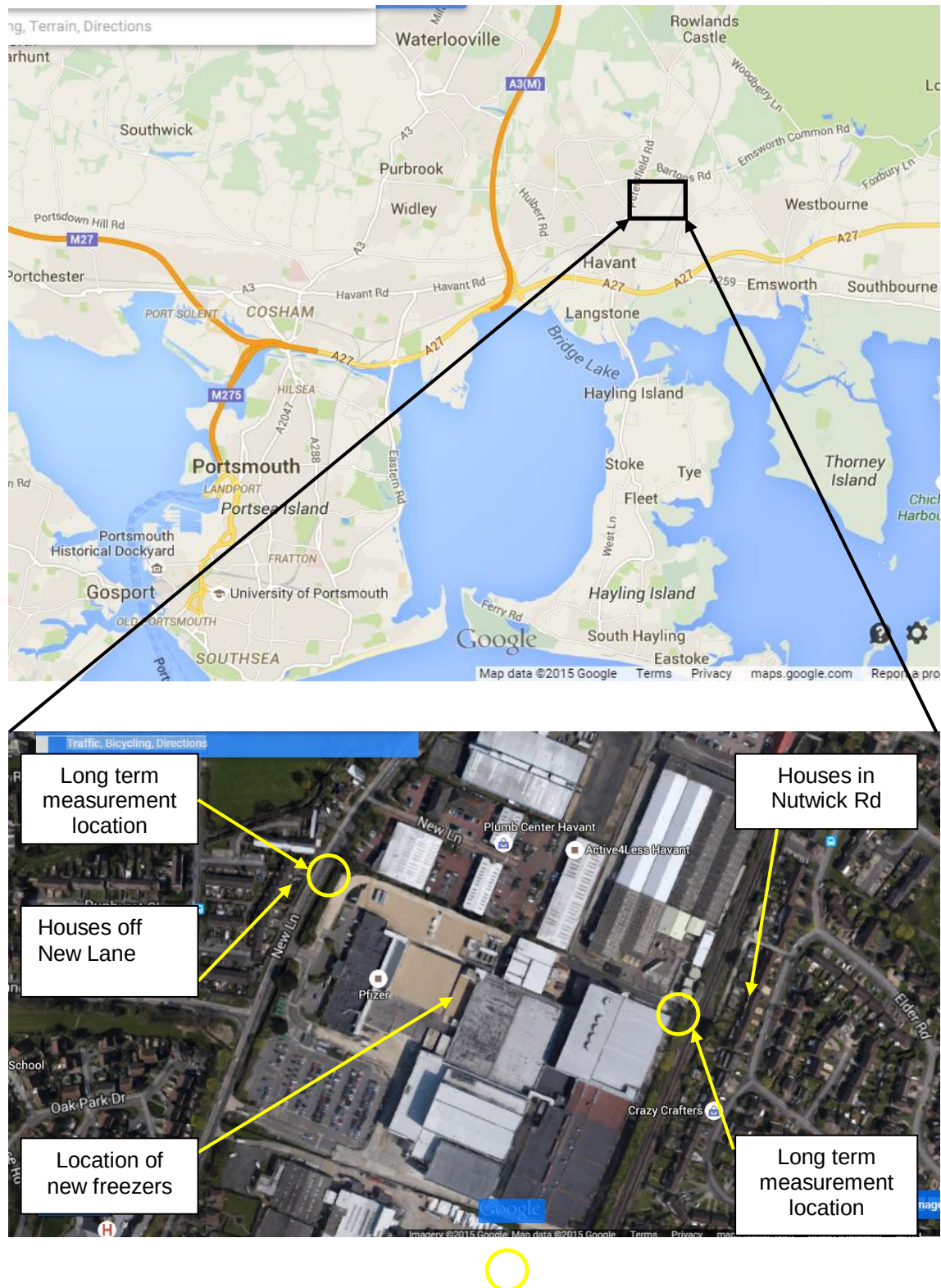


FIGURE 1 Map of Pfizer site in Havant showing measurement locations

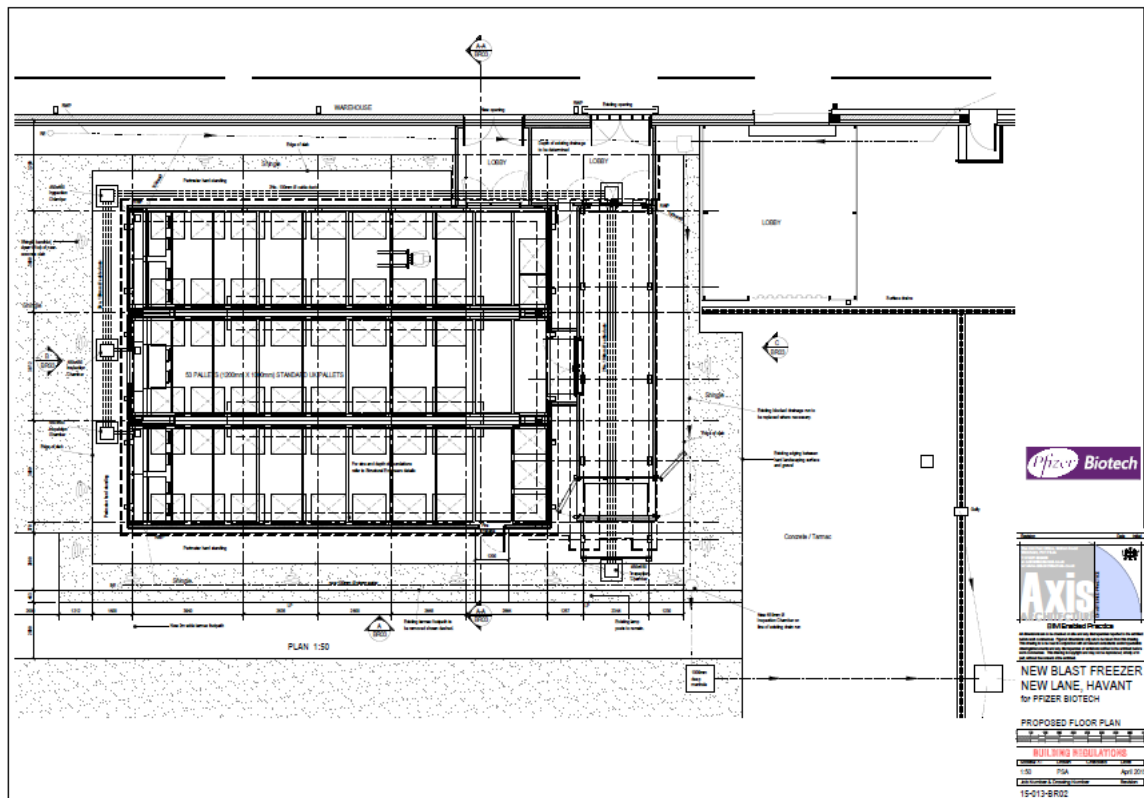
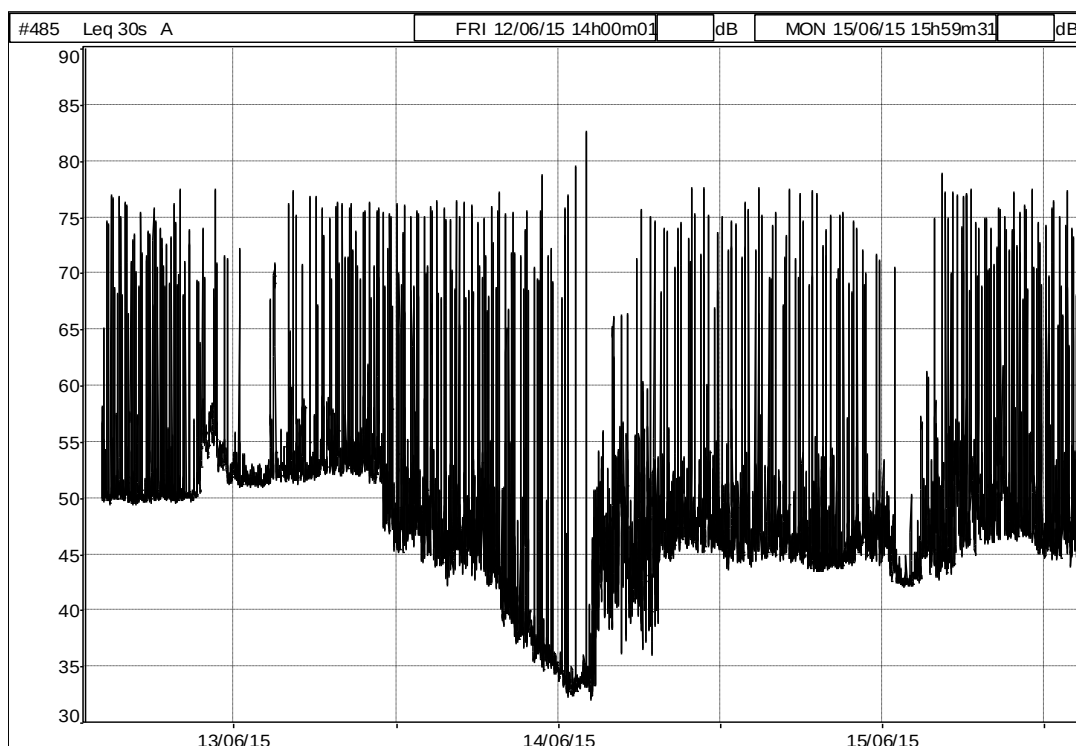
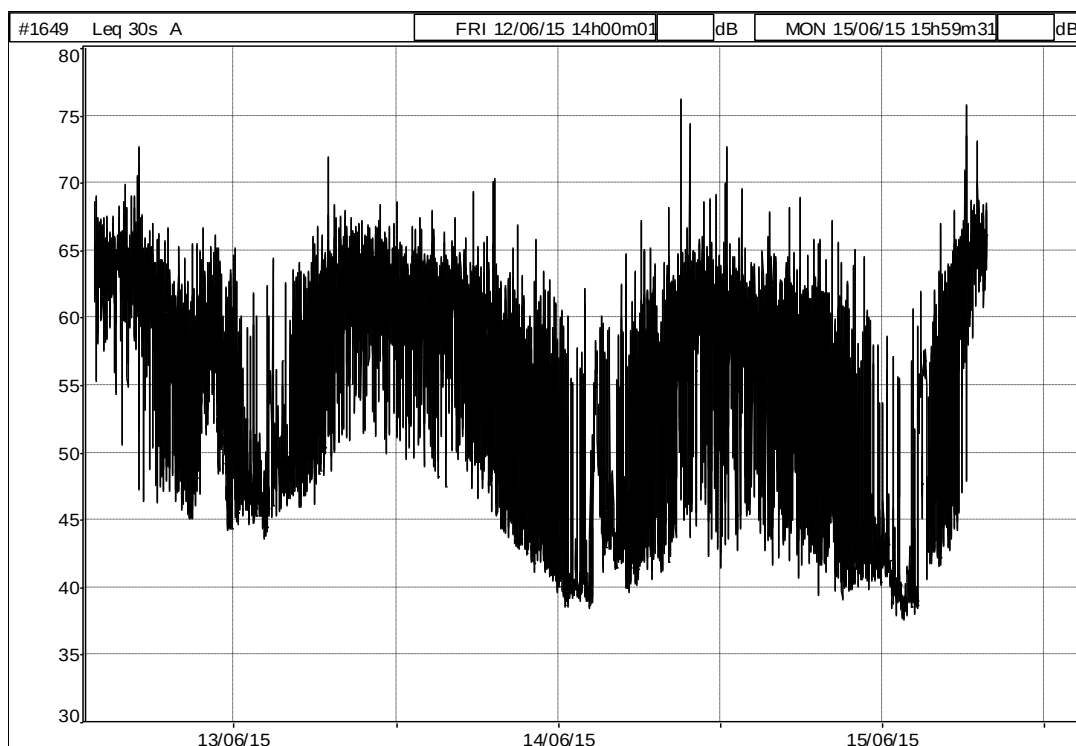


FIGURE 2 The proposed layout of the new freezers

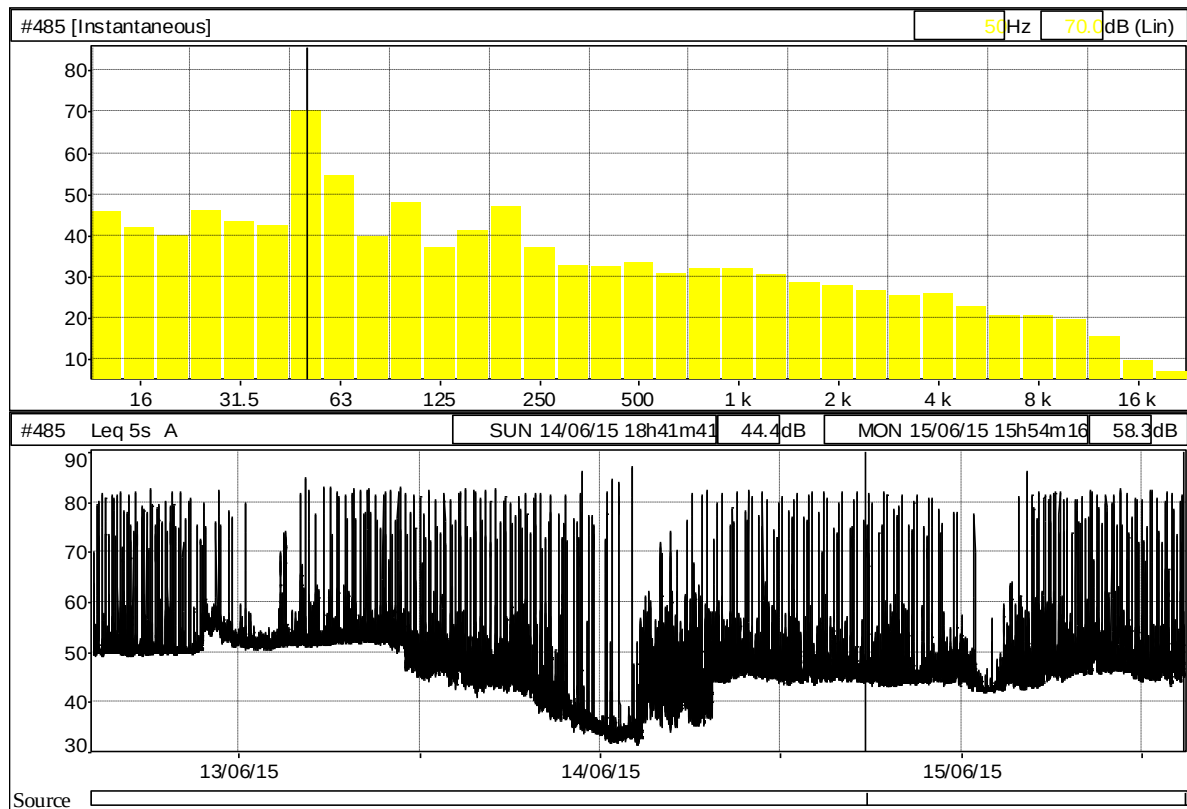


Railway site boundary

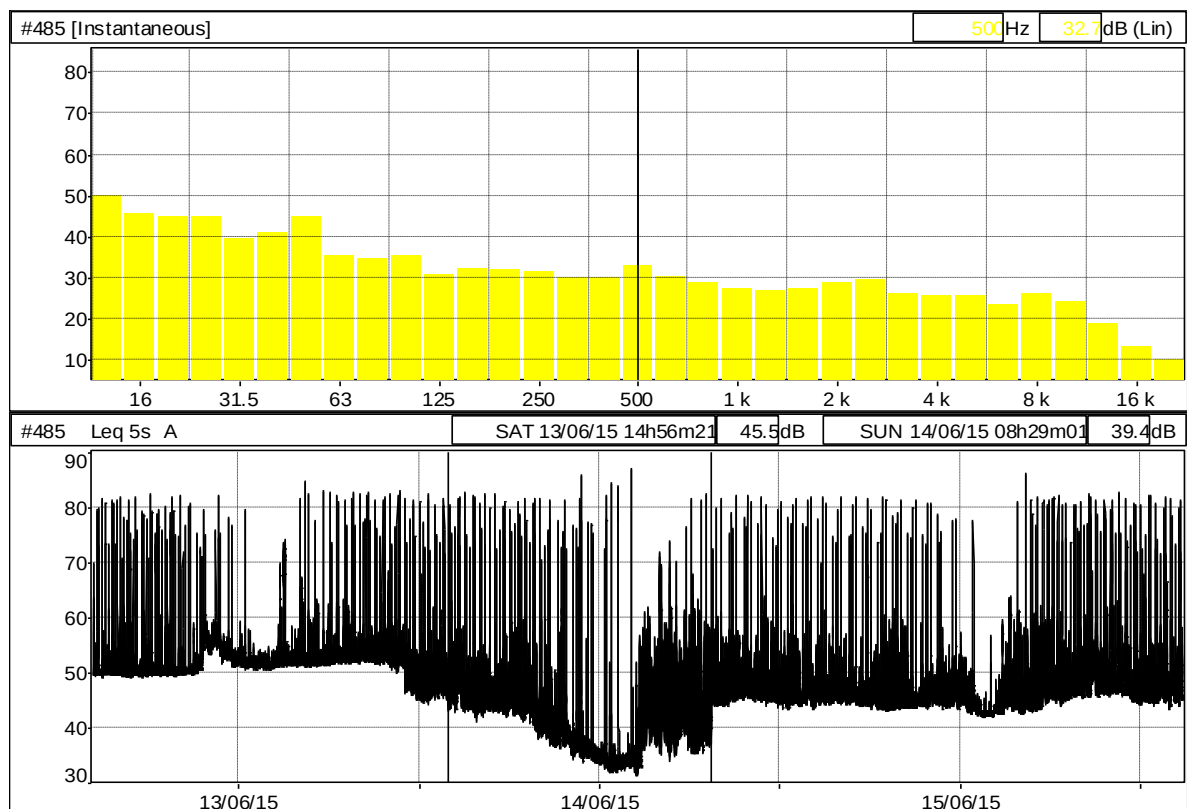


New Lane site boundary

FIGURE 3 Measurement time histories – background noise



Presence of a strong 50Hz tone indicating extractor fan operating



The period when the extractor fan was off – the sharp peaks are due to trains

FIGURE 4 Evidence of extractor fan on and off

Appendix 1 Acoustic Terminology

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Perception of sound. Sound is a rapid fluctuation in air pressure. The human ear can hear sensations of sound when the fluctuations occur between 20 times a second and 20,000 times a second. This is called the frequency of the sound and is measured in Hertz (Hz). The loudness of the sound depends on the amplitude of fluctuation in the air pressure. The ear has an approximately logarithmic response to the loudness of sound: for example, every doubling or halving in sound pressure gives an apparently equal step increase or decrease. In measuring environmental noise, sound pressure levels are therefore usually quoted in terms of a logarithmic unit known as a decibel (dB). Typically, the quietest sound that can be heard (the threshold of hearing) is 0 dB and the sound becomes painful at 120 dB. The sensitivity and frequency range of the ear varies somewhat from person to person and deteriorates with age and exposure to loud sounds

“A” Weighting. The human ear is not equally sensitive to sounds of different frequencies (i.e. pitch): it tends to be more sensitive in the frequency range of the human voice than at higher or lower frequencies. When measuring sound, compensation for these effects can be made by applying a frequency weighting, usually the so-called “A” weighting, although other weightings are sometimes used for special purposes. To signify that the “A” weighting has been applied, the symbol of dB(A) is often used. However, current practice tends to prefer the weighting letter to be included in the name of the measurement index, e.g. dB(A) L_{eq} and dB L_{Aeq} both refer to the “A” weighting equivalent continuous sound level in decibels.

L_{AeqT} is a unit that also takes into account fluctuations in sound pressure levels. This unit takes into account both steady and impulsive noises and is defined as the steady, continuous sound pressure level which contains the same energy as the actual, fluctuating sound pressure level. It is necessary to state the time period over which the sound is measured, e.g. $L_{Aeq,(12\text{-hour})}$, typical in the case of daytime working and 5-minute for night-time.

L_{A90} is the level of A-weighted sound exceeded for 90% of the measurement period. It is generally used as a measure of the background noise in environment noise standards.

Appendix 2

Site Photographs



Photo 1 View of the chillers of the older existing freezers



Photo 2 A bank of chillers located close to HPS car park on north boundary



Photo 3 Long term monitor close to New Lane site boundary



Photo 4 Long term monitor at the railway site boundary



Photo 5 Short term measurement at the HPS car park close to Pfizer boundary

Appendix 3

Noise measurement results and calculations

Table A3.1	Results of the long term noise survey at railway site boundary
Table A3.2	Results of the long term noise survey at New Lane site boundary
Table A3.3	Results of long term measurements – night-time 15 minute averages for both locations
Table A3.4	Results of noise measurements close to the existing freezers and in the adjacent car park

All noise levels are in dB

Start	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
Time					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Saturday															
13/06/2015 00:00	56.3	78.2	51.4	54.3	54.9	52.9	78.1	61.8	51.3	51.9	50.6	48.3	44.1	41.6	32.6
13/06/2015 01:00	55.2	79.7	51	53.2	60.2	56.6	78.1	61.8	50.0	50.2	50.1	46.5	41.2	38.3	29.5
13/06/2015 02:00	51.7	54.8	50.9	52.3	56.0	51.6	78.3	61.9	47.6	43.2	41.6	39.2	35.7	32.8	23.8
13/06/2015 03:00	54.1	69.8	51	53.8	54.9	51.2	78.5	61.9	47.5	42.7	42.7	44.5	37.7	49.7	28.4
13/06/2015 04:00	61	74.1	51.5	65.5	56.2	52.9	78.5	61.9	47.5	42.8	42.7	59.1	48.5	41.4	28.0
13/06/2015 05:00	61.5	84.8	51.5	57.1	55.7	54.3	78.6	62.7	56.2	56.1	56.9	54.6	49.2	53.4	35.5
13/06/2015 06:00	58.6	82.9	51.5	56	56.0	53.1	78.5	62.1	52.1	54.4	53.8	51.3	47.4	42.8	34.8
13/06/2015 07:00	61.2	82.8	51.8	55.4	58.2	55.0	78.6	62.6	53.9	56.9	57.0	54.2	49.8	44.4	30.9
13/06/2015 08:00	61.5	82.7	52.1	56.5	61.7	58.5	78.5	62.2	54.5	57.3	57.5	54.3	50.6	44.5	31.4
13/06/2015 09:00	62	82.6	52.2	55.2	60.9	58.0	78.5	62.5	55.8	58.1	58.0	54.8	50.8	44.8	31.7
13/06/2015 10:00	61.5	81.8	51.9	56.2	63.7	58.9	78.4	62.2	55.1	56.8	57.3	54.4	51.3	46.3	31.9
13/06/2015 11:00	61.8	83	51.3	55.4	59.0	56.4	77.8	62.1	55.5	57.2	57.7	54.9	51.2	46.6	31.5
13/06/2015 12:00	61	81.6	46.5	53.3	58.3	55.6	70.1	56.9	55.0	57.3	57.2	53.7	50.1	45.5	30.9
13/06/2015 13:00	61.3	82.3	45.4	53.3	60.7	56.9	66.1	57.1	55.3	57.3	57.5	54.5	50.4	45.2	31.4
13/06/2015 14:00	60.5	81.7	46.2	52.4	57.9	56.0	66.5	54.7	54.2	55.7	56.5	54.1	50.0	43.8	30.2
13/06/2015 15:00	61.7	81.9	44.6	54.7	58.2	56.2	56.5	57.4	55.9	57.0	57.2	55.4	52.3	47.5	32.6
13/06/2015 16:00	60.9	82.6	43.5	50.7	54.3	53.2	54.2	55.1	54.6	57.1	57.1	54.4	49.9	44.6	31.2
13/06/2015 17:00	60.5	82.3	43.8	50	56.1	53.5	54.1	53.6	53.4	56.3	56.9	53.9	49.5	44.2	31.6
13/06/2015 18:00	61	82.5	43.4	51.3	58.2	55.0	53.7	54.4	53.8	57.3	57.4	54.3	49.7	44.3	32.4
13/06/2015 19:00	60.1	80.9	42.7	53.4	55.3	54.4	56.1	56.0	53.9	56.4	56.0	53.4	49.4	43.6	30.9
13/06/2015 20:00	61.2	81.5	39.8	49.8	54.1	53.8	53.4	54.6	53.8	57.5	57.3	54.8	50.0	44.7	33.2
13/06/2015 21:00	60.2	81.6	37.9	48.3	52.3	55.8	55.4	54.2	54.9	56.6	56.3	53.1	49.5	45.2	36.8
13/06/2015 22:00	58.9	81.4	37.2	49.5	51.4	54.4	55.7	52.8	53.8	55.3	54.6	51.9	48.4	42.5	30.2
13/06/2015 23:00	62.2	86	35.3	39.7	55.2	59.1	59.4	59.3	57.7	58.7	57.8	55.1	51.7	48.0	39.1

All noise levels are in dB

Start	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
Time					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Sunday															
14/06/2015 00:00	56.1	77.3	34.5	37.1	50.3	53.1	52.8	47.1	51.2	52.4	50.7	48.4	46.2	48.8	38.5
14/06/2015 01:00	60.2	84.5	32.7	35.7	53.6	53.2	54.2	51.7	54.7	56.1	55.2	53.1	50.7	51.7	44.8
14/06/2015 02:00	58.7	83.8	32.6	34.7	50.6	49.5	52.7	48.4	52.9	53.3	56.3	51.0	45.9	42.9	39.2
14/06/2015 03:00	61.9	87	32.9	45.3	49.1	49.0	52.6	51.2	57.1	56.9	57.3	56.4	49.7	47.1	43.1
14/06/2015 04:00	47.2	61.9	38.9	49.6	47.1	45.6	40.2	37.8	36.0	35.9	41.8	42.4	36.1	38.9	17.8
14/06/2015 05:00	55.3	74	38.7	56.1	47.5	45.8	42.1	41.5	37.9	48.5	41.6	50.7	48.4	48.7	19.2
14/06/2015 06:00	53.1	76.4	38.7	50	49.2	48.5	47.6	45.2	46.7	50.2	47.5	47.4	42.1	38.7	29.0
14/06/2015 07:00	58.2	81.6	36.8	52.7	50.3	49.2	49.3	49.2	49.4	54.3	54.2	51.3	48.2	44.9	29.3
14/06/2015 08:00	58.2	82.3	40.5	53.7	52.9	51.0	68.3	51.5	51.1	54.5	54.2	51.1	48.5	42.8	30.7
14/06/2015 09:00	58.7	81.5	44.4	51.9	56.5	53.5	71.4	51.7	52.8	55.1	54.6	51.9	48.0	41.8	28.7
14/06/2015 10:00	60.6	82.2	45.6	50.6	57.8	54.7	72.0	54.2	53.6	56.5	56.9	53.6	49.4	46.1	36.9
14/06/2015 11:00	60.1	81.9	45.3	50.3	57.8	54.2	70.8	53.4	53.1	55.8	56.4	53.2	49.6	44.8	34.1
14/06/2015 12:00	58.7	80.5	45.2	53.4	57.9	54.4	70.5	54.3	52.5	54.1	54.5	51.7	49.2	44.8	29.0
14/06/2015 13:00	59.4	80.9	44.3	50.4	57.9	54.3	70.5	54.2	54.2	55.6	55.5	52.2	48.0	42.0	28.8
14/06/2015 14:00	59.8	81.5	44.5	51.1	55.4	53.6	70.1	54.7	54.2	55.8	56.4	52.6	48.5	41.8	29.3
14/06/2015 15:00	60	82	44.3	50.5	55.8	54.5	70.0	53.6	53.8	55.9	56.2	53.4	48.9	43.3	31.9
14/06/2015 16:00	58.4	80.7	44.7	50	59.3	54.6	70.2	53.6	52.9	54.1	54.6	51.5	47.5	43.4	29.0
14/06/2015 17:00	59	81.8	44.8	49.2	58.6	54.2	70.2	52.9	53.2	54.8	55.2	52.3	47.9	42.0	29.3
14/06/2015 18:00	60.9	81.9	44.3	48.4	58.9	55.4	70.0	55.1	55.6	57.1	57.4	53.5	49.8	43.6	32.8
14/06/2015 19:00	59.5	81.8	43.7	49.5	53.7	52.0	69.5	51.7	53.1	55.4	55.8	52.6	48.3	43.3	33.3
14/06/2015 20:00	59.8	81.3	43.4	51.3	50.3	52.9	69.9	53.2	53.6	56.3	56.1	52.5	48.3	43.4	32.4
14/06/2015 21:00	59.1	81.2	43.7	47.7	50.9	51.3	70.5	52.4	53.3	55.2	55.7	52.1	47.5	42.4	29.9
14/06/2015 22:00	58.4	81.2	43.9	47.5	53.3	51.4	70.4	51.8	51.9	54.0	54.9	51.7	47.0	42.2	32.4

All noise levels are in dB

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Monday															
15/06/2015 00:00	54.9	77.9	44.3	49.6	59.7	54.4	68.5	53.0	50.8	52.5	50.5	46.6	42.9	39.1	27.7
15/06/2015 01:00	51.6	77.6	43.4	49.6	60.4	54.5	68.1	53.0	48.5	47.8	47.3	44.0	40.1	35.9	25.0
15/06/2015 02:00	42.9	47.7	42.2	43.7	49.7	47.7	68.0	51.7	45.7	34.5	33.6	31.6	27.5	22.2	13.5
15/06/2015 03:00	45.5	59.6	42.3	45.2	49.8	47.9	68.1	51.4	45.9	34.7	36.0	40.5	30.6	29.1	13.7
15/06/2015 04:00	55.6	81	43.8	51.3	49.7	49.1	68.0	52.3	48.2	51.0	50.6	49.0	44.7	47.3	31.7
15/06/2015 05:00	61.4	86.2	43.1	50.2	51.8	52.8	67.5	57.9	57.0	57.5	57.2	53.8	50.1	53.1	35.7
15/06/2015 06:00	61.8	81.9	43.9	55.9	53.2	53.7	67.4	56.9	54.9	57.4	57.9	54.7	52.1	48.5	35.3
15/06/2015 07:00	63.5	82.1	45.3	54.7	54.9	54.7	67.6	57.4	55.9	59.3	59.8	56.6	53.6	48.6	35.0
15/06/2015 08:00	60.7	80.8	45.8	53.4	54.0	57.6	68.4	56.1	55.1	56.8	56.6	53.8	50.8	45.0	32.7
15/06/2015 09:00	61.9	82.4	46.1	55.3	53.8	55.1	69.3	56.7	55.2	58.3	58.1	54.4	51.9	44.2	30.7
15/06/2015 10:00	61.9	81.4	46.4	53.7	57.9	58.1	71.0	56.6	55.9	58.3	58.0	54.8	51.0	45.1	31.6
15/06/2015 11:00	62.1	82.7	46.5	53.2	58.7	57.1	71.8	58.2	55.3	57.6	58.6	55.4	51.1	45.7	33.5
15/06/2015 12:00	61.2	81.5	45.2	54.5	57.4	58.1	70.3	56.1	55.5	56.8	57.3	54.7	50.8	43.8	32.0
15/06/2015 13:00	60.9	82.2	44.8	51.1	55.6	54.7	69.1	58.0	55.1	56.5	57.2	54.2	49.7	44.5	31.6
15/06/2015 14:00	61.2	82	44.9	54.6	57.3	55.6	69.4	59.0	55.5	56.9	57.6	54.1	50.0	44.7	31.8
15/06/2015 15:00	60.9	81.5	44.9	52.9	53.8	54.2	69.6	57.0	54.9	56.9	57.1	54.1	50.1	43.7	31.2

All noise levels are in dB

Table A3.1 Results of the long term ambient noise survey at railway site boundary – hourly averages

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Friday															
12/06/2015 14:00	64	71.8	51.7	67.7	61.2	64.1	66.3	61.1	59.0	58.3	60.8	57.4	47.7	39.5	30.0
12/06/2015 15:00	64	73.4	52.8	67	62.3	64.5	66.4	61.8	59.2	57.8	61.1	57.2	46.4	35.0	21.5
12/06/2015 16:00	64.4	75.5	52.6	67.5	62.5	64.3	66.5	62.6	60.0	58.1	61.5	57.4	48.6	35.0	23.4
12/06/2015 17:00	64	76.9	50	67	59.4	63.2	65.1	61.0	59.2	57.8	61.2	57.0	46.0	36.5	25.5
12/06/2015 18:00	63.3	80	49.3	66.4	57.2	61.5	65.3	61.6	59.4	57.2	60.4	56.0	46.0	33.5	20.5
12/06/2015 19:00	60.9	71.6	47.1	65.5	61.5	61.6	62.6	57.8	55.1	54.3	58.3	53.8	42.9	33.7	21.9
12/06/2015 20:00	58.8	69.5	47.3	63.7	53.9	59.4	60.3	55.1	52.9	52.0	56.1	52.2	40.6	29.4	17.4
12/06/2015 21:00	57.4	72.1	45.5	62.4	51.8	57.8	58.8	54.7	51.6	50.6	54.9	50.3	38.3	28.4	16.6
12/06/2015 22:00	58.3	72.7	47.1	62.3	52.3	58.0	58.5	54.0	51.9	50.8	54.0	52.5	47.9	44.6	35.4
12/06/2015 23:00	59.3	70.8	50.9	62.3	54.4	57.7	57.0	51.4	50.3	50.8	54.1	54.1	50.2	47.3	38.0

All noise levels are in dB

Start	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
Time					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Saturday															
13/06/2015 00:00	56	69.9	44.5	57.6	50.8	56.8	57.6	51.8	49.3	48.5	51.8	50.4	44.7	40.7	31.0
13/06/2015 01:00	53.3	72.2	45.4	52.5	57.0	58.3	56.7	52.7	48.3	47.5	49.2	47.2	41.1	36.8	26.8
13/06/2015 02:00	50.1	66.7	44.8	49.7	55.7	57.1	54.7	48.0	45.1	44.5	46.3	43.7	37.1	34.3	24.3
13/06/2015 03:00	51	71.5	44.4	53.4	57.4	59.6	57.8	48.8	46.2	44.7	45.3	46.5	38.1	33.6	23.5
13/06/2015 04:00	50.4	67.2	46.1	51.7	56.2	57.4	54.4	47.5	44.7	44.0	45.1	45.5	39.3	35.3	25.2
13/06/2015 05:00	55.9	69.5	46.7	59	61.3	61.9	61.6	52.6	50.2	49.7	52.9	49.0	41.5	36.8	25.6
13/06/2015 06:00	57.3	73.4	46.7	60.5	58.7	59.7	60.3	54.2	52.3	51.0	54.4	50.5	41.7	36.9	26.6
13/06/2015 07:00	60	72.1	48.1	65.4	59.1	60.7	61.8	58.9	54.6	53.3	57.2	53.1	42.8	36.9	26.5
13/06/2015 08:00	62.1	79.5	50.3	66.6	60.4	60.9	62.3	60.3	57.4	55.9	59.1	55.2	45.2	39.8	29.8
13/06/2015 09:00	62.8	72.4	51.2	67.1	59.6	61.3	63.0	57.7	57.0	56.2	60.2	56.0	44.7	37.8	27.6
13/06/2015 10:00	62.9	72.4	51.4	66.9	60.7	62.3	63.5	59.5	57.8	56.7	60.1	55.9	45.4	39.5	29.6
13/06/2015 11:00	63.1	73.1	51.5	67.2	61.3	61.8	64.0	58.7	58.3	56.9	60.6	55.8	45.4	39.4	29.6
13/06/2015 12:00	62.9	71.4	51.1	66.8	61.2	61.7	64.4	59.5	58.1	56.9	60.4	55.3	44.7	38.7	29.1
13/06/2015 13:00	61.6	72.4	49.9	66	59.8	60.5	63.3	60.0	57.3	55.9	58.9	53.9	44.1	38.3	28.6
13/06/2015 14:00	61.5	71.6	50.3	65.9	62.6	61.0	62.1	58.2	56.7	55.4	59.0	53.9	44.6	39.1	29.8
13/06/2015 15:00	61.3	72.8	49.6	65.5	60.4	61.2	63.4	61.8	58.3	55.7	58.5	53.4	43.7	37.7	28.0
13/06/2015 16:00	60.8	71.3	49.2	65.1	58.7	60.7	62.0	58.4	56.2	54.8	58.2	53.4	42.8	35.9	26.0
13/06/2015 17:00	60.9	73.6	49.6	65.3	59.0	60.0	61.5	56.2	56.4	54.9	58.3	53.4	43.3	37.2	27.2
13/06/2015 18:00	60.1	76.4	48.5	64.5	58.9	59.8	60.9	61.2	55.6	53.7	57.2	52.6	42.7	37.0	27.3
13/06/2015 19:00	59.3	70.9	47.7	64.4	57.4	58.8	59.7	54.7	53.6	52.5	56.6	52.0	46.3	37.3	27.2
13/06/2015 20:00	58.3	77.7	45	62.5	54.2	58.7	61.4	59.8	55.0	55.3	54.9	50.1	39.8	35.0	22.7
13/06/2015 21:00	57.3	73.3	43.8	62.4	51.6	58.4	59.2	53.2	52.1	51.4	54.5	50.3	39.7	30.3	15.6
13/06/2015 22:00	54.9	69.4	42.7	58.8	49.0	56.5	55.8	51.5	49.4	48.4	52.3	47.8	35.9	23.5	14.8
13/06/2015 23:00	54.4	72	41.9	54.8	49.3	56.9	56.4	51.7	48.4	47.5	51.6	47.9	37.0	27.0	15.3

All noise levels are in dB

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Sunday															
14/06/2015 00:00	52.5	69.4	40.4	50.4	47.8	56.7	55.3	50.5	47.4	46.4	49.7	45.6	34.2	23.3	13.8
14/06/2015 01:00	49.5	67.9	39.1	43.7	47.2	56.4	54.1	47.1	44.9	43.5	46.9	42.2	29.9	21.5	15.5
14/06/2015 02:00	46.6	69.5	39.3	41.7	47.0	55.5	53.4	45.9	42.8	40.9	43.9	38.9	27.7	20.7	12.9
14/06/2015 03:00	51.6	68.5	38.9	56.5	46.4	55.5	53.2	44.6	42.8	39.3	41.9	49.0	39.7	33.7	22.8
14/06/2015 04:00	50.5	66.6	42.2	51.3	47.7	56.2	54.5	51.9	47.0	42.2	44.7	46.0	38.5	31.9	16.2
14/06/2015 05:00	48.9	67.7	41.5	47.3	46.9	56.6	54.3	47.3	44.4	42.4	45.1	41.9	38.3	34.0	14.9
14/06/2015 06:00	52.5	70.8	40.2	49.2	48.1	55.7	55.4	50.1	48.4	47.4	49.1	45.7	37.1	29.7	14.8
14/06/2015 07:00	56.6	72.1	41.4	61.2	48.8	56.9	55.8	53.6	52.6	50.6	53.6	49.8	39.9	32.4	19.9
14/06/2015 08:00	56.7	71.5	41.6	61.7	51.4	57.9	57.7	56.7	52.4	50.2	54.1	49.4	37.2	26.0	15.3
14/06/2015 09:00	59.7	75.4	42.9	64.9	54.1	58.8	59.5	60.4	55.4	53.3	56.8	52.9	41.3	29.8	18.3
14/06/2015 10:00	62.3	81.9	44.8	65.7	53.9	59.3	60.5	61.5	57.6	60.8	58.3	54.1	41.9	31.1	19.7
14/06/2015 11:00	61.6	75.4	46.3	65.9	54.7	59.9	61.9	57.2	57.7	55.2	58.9	54.6	43.5	33.0	19.0
14/06/2015 12:00	61.2	74.8	44.2	65.9	56.5	59.9	61.2	59.4	56.3	55.5	58.4	54.0	42.4	31.4	21.6
14/06/2015 13:00	61	77.6	43.3	65.3	54.2	59.1	61.5	61.7	57.8	55.4	57.9	53.4	44.4	33.2	19.1
14/06/2015 14:00	60.2	73.9	44	65.4	54.6	59.6	60.8	56.8	55.5	54.8	57.5	52.7	41.7	29.4	19.1
14/06/2015 15:00	59.6	69.6	44.9	64.3	54.1	59.8	60.3	55.7	54.7	53.3	57.1	52.2	40.9	29.1	16.7
14/06/2015 16:00	59.7	73.9	43.3	64.5	53.2	58.6	59.1	57.1	55.1	53.9	56.9	52.5	41.9	32.8	19.4
14/06/2015 17:00	58.5	70.8	43.6	63.9	53.0	58.0	58.5	54.1	53.4	52.0	55.9	51.4	40.0	29.6	17.6
14/06/2015 18:00	59.3	73.4	43.3	64.7	59.7	59.6	61.6	57.1	55.9	53.9	56.2	51.7	46.3	32.6	19.0
14/06/2015 19:00	57.8	73.5	42.4	63.4	50.8	57.2	58.6	56.9	54.8	51.0	54.9	50.9	39.7	28.9	16.3
14/06/2015 20:00	57.9	72	41.5	63.2	49.5	57.0	56.9	53.3	52.1	50.8	55.3	51.2	37.8	25.0	15.0
14/06/2015 21:00	55.9	73.9	40.8	59	47.5	56.4	56.2	51.5	50.3	48.9	52.9	49.7	39.1	31.8	19.2
14/06/2015 22:00	52.8	68.9	39.7	52.7	48.3	55.6	54.9	50.3	48.6	47.3	49.8	45.8	34.3	24.3	14.8

All noise levels are in dB

Start	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
Time					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Monday															
15/06/2015 00:00	47.9	65.7	40.4	45.2	46.7	54.7	51.8	47.3	44.2	41.4	44.7	41.2	32.6	27.5	17.0
15/06/2015 01:00	44.9	66	39.3	44	45.0	54.5	51.1	43.4	40.9	39.1	41.4	38.2	30.8	26.5	16.4
15/06/2015 02:00	42.4	63	38	40.8	43.4	55.0	50.1	42.9	39.7	37.6	39.2	34.7	24.2	19.6	12.4
15/06/2015 03:00	51	68.3	38.4	55.7	54.6	58.1	55.0	46.3	43.9	41.5	42.7	48.0	38.7	28.9	19.2
15/06/2015 04:00	53.3	69.7	41.9	57.5	49.7	56.4	53.3	45.4	43.6	42.6	46.4	49.7	42.7	37.3	24.4
15/06/2015 05:00	57.8	74.2	42.1	63.3	53.3	58.6	59.3	54.9	53.1	51.9	54.9	50.8	41.5	37.7	17.7
15/06/2015 06:00	61.5	72.9	44.2	66.1	57.7	61.4	63.0	60.6	56.8	55.5	58.6	54.6	43.3	32.9	17.8
15/06/2015 07:00	65.4	82.9	50.8	68.5	61.6	64.7	67.3	65.6	62.5	60.8	62.1	58.0	47.7	39.0	22.7
15/06/2015 08:00	66	76.7	55.1	68.7	63.1	66.2	69.3	63.5	62.3	60.3	63.0	59.0	48.2	36.6	22.9

All noise levels are in dB

Table A3.2 Results of the long term ambient noise survey at New Lane site boundary – hourly averages

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Saturday night railway side															
13/06/2015 23:00	37.6	40.3	35.5	38.7	47.4	46.5	42.9	40.1	37.8	33.2	33.5	29.2	25.3	21.5	14.6
13/06/2015 23:15	59.1	76.7	35.5	40.5	51.3	53.8	53.6	50.7	54.1	56.8	54.5	51.6	48.3	41.7	27.4
13/06/2015 23:30	61.8	81.7	35.8	42.2	52.8	59.6	60.0	56.1	56.4	57.7	57.6	55.3	51.1	46.1	34.8
13/06/2015 23:45	66.4	86	35	45.7	59.7	63.0	63.5	64.5	62.2	62.8	62.0	59.1	56.0	52.9	44.6
14/06/2015 00:00	39.1	56.2	35.1	37.6	47.9	46.0	40.6	35.9	34.4	31.7	36.3	31.4	27.6	21.6	14.4
14/06/2015 00:15	56.8	77.3	34.9	36.9	50.7	52.8	51.9	49.1	52.8	54.6	52.6	48.4	45.3	39.1	25.5
14/06/2015 00:30	60.6	77.1	34.7	39.2	52.9	57.4	57.7	50.6	55.3	56.1	54.6	53.1	51.2	54.7	44.4
14/06/2015 00:45	35	36.4	34.1	35.7	47.1	45.6	40.2	36.4	34.6	30.1	29.5	28.7	24.1	20.0	12.9
14/06/2015 01:00	34.7	37.2	33.7	35.4	47.1	45.6	39.8	36.7	34.3	29.9	29.3	28.2	23.7	19.9	12.9
14/06/2015 01:15	61.7	82.1	33.2	36.9	50.0	51.6	52.3	53.3	53.2	56.9	58.1	55.4	51.5	45.4	32.1
14/06/2015 01:30	58.6	78	32.5	35.7	54.2	52.4	55.4	49.7	54.4	53.6	49.0	48.8	51.3	56.2	49.8
14/06/2015 01:45	63	84.5	32.3	35	56.9	56.7	57.1	54.6	58.5	59.6	57.7	56.0	52.9	51.1	44.1
14/06/2015 02:00	33.2	36.9	32.2	33.7	47.2	44.6	40.1	37.3	34.3	28.9	27.3	25.9	21.6	19.0	12.7
14/06/2015 02:15	64.7	83.8	32.7	34.8	54.9	54.0	58.6	54.2	58.9	59.3	62.3	57.0	51.9	48.9	45.3
14/06/2015 02:30	33.5	35.4	32.9	34	47.1	45.7	39.3	34.7	33.1	28.1	26.6	28.0	23.9	19.4	12.4
14/06/2015 02:45	34.4	38.9	33.4	35.2	46.9	45.5	39.8	36.6	34.8	29.4	27.9	28.6	23.7	19.2	12.2
14/06/2015 03:00	67.8	87	33.1	35.9	52.2	53.4	58.4	57.0	63.0	62.9	63.3	62.4	55.7	52.9	49.1
14/06/2015 03:15	34.6	47.4	32.5	35.1	47.0	44.9	39.2	35.7	34.3	29.4	29.2	28.4	23.6	20.8	12.3
14/06/2015 03:30	42.1	55.9	32.5	43.4	47.0	45.3	39.7	37.1	34.4	30.3	39.9	34.3	28.7	21.5	12.6
14/06/2015 03:45	45.6	58.2	34.9	49.1	47.9	45.7	41.9	40.2	43.3	32.3	41.1	38.0	32.6	40.7	19.4
14/06/2015 04:00	47	61	39.9	49.3	46.9	45.0	40.2	36.7	34.0	28.9	42.3	43.0	35.5	28.9	13.1
14/06/2015 04:15	49.4	61.9	39.5	51.4	47.1	45.8	39.3	34.6	32.8	30.3	45.1	44.6	37.7	39.7	19.9
14/06/2015 04:30	46.3	56.5	40.6	48.9	47.3	45.9	41.3	40.8	39.6	37.7	36.0	41.8	35.4	41.2	18.4

All noise levels are in dB

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Saturday night railway side															
14/06/2015 04:45	44.6	56.1	37.6	48.3	47.2	45.6	39.6	36.4	34.1	38.8	38.3	37.4	35.5	39.0	17.1
14/06/2015 05:00	58.4	72	37.7	61.5	47.2	45.3	39.1	34.4	33.9	50.5	46.1	56.3	46.3	41.0	17.9
14/06/2015 05:15	48.9	59.1	40.1	52	47.2	45.5	40.2	36.7	34.5	46.3	37.4	44.9	39.6	35.5	16.7
14/06/2015 05:30	56.6	74	38.8	56.7	48.3	46.4	44.3	45.9	41.5	43.2	38.8	40.7	52.8	54.0	23.0
14/06/2015 05:45	50.8	62	38.1	54.9	47.5	45.9	42.7	40.0	37.3	50.3	36.8	34.6	45.3	44.0	14.4
14/06/2015 06:00	53.7	70.2	36.6	52.8	47.9	45.0	42.8	40.2	38.8	35.8	43.6	51.3	43.9	39.8	20.0
14/06/2015 06:15	43.7	56	39.1	45.9	47.9	46.2	43.8	43.1	42.3	40.1	37.1	35.4	36.9	29.7	15.3
14/06/2015 06:30	48.4	61.4	40.1	49.5	47.8	46.6	43.4	41.0	40.2	50.3	37.1	35.4	37.0	32.6	16.5
14/06/2015 06:45	56.9	76.4	39	50	51.7	52.2	52.2	49.5	51.9	54.7	52.8	48.7	44.7	42.3	34.7
Saturday night New Lane side															
13/06/2015 23:00	49.4	64.5	41.7	45.6	47.8	56.9	54.7	47.4	44.9	43.5	46.7	42.1	30.2	22.6	13.8
13/06/2015 23:15	56.1	72	41.8	59.4	49.5	56.9	56.3	54.4	49.3	48.5	52.8	50.3	41.0	30.8	17.0
13/06/2015 23:30	55.3	68.8	42.3	58.4	50.0	57.0	57.7	51.6	49.7	48.7	52.9	48.2	35.5	25.4	15.0
13/06/2015 23:45	54.3	67.4	42.3	56	49.4	57.0	56.2	50.4	48.3	47.7	51.7	47.5	34.8	24.3	14.6
14/06/2015 00:00	53.9	69.4	40.9	56.6	47.9	56.9	54.9	52.7	48.1	46.9	50.8	47.8	37.0	25.2	15.0
14/06/2015 00:15	53	69.4	40.8	51.2	48.0	56.8	55.1	49.9	48.0	46.8	50.5	45.7	32.7	22.5	13.5
14/06/2015 00:30	52	67.6	40.3	49.2	47.4	56.4	54.1	49.0	47.0	46.2	49.4	44.8	32.3	22.0	13.1
14/06/2015 00:45	50.4	65.1	39.9	45.7	47.7	56.6	56.6	49.1	46.4	45.6	47.4	42.9	32.4	22.9	13.4
14/06/2015 01:00	49.6	65.5	40	44.6	47.4	56.8	54.5	47.4	44.5	43.9	47.1	42.1	30.0	22.0	13.5
14/06/2015 01:15	50.6	67.9	39.3	44	47.1	56.4	53.9	47.7	46.3	43.8	47.8	43.8	31.9	22.3	15.3
14/06/2015 01:30	49.5	65	38.7	41.5	47.4	56.6	54.9	47.0	44.5	43.5	47.2	41.6	28.9	21.1	18.3
14/06/2015 01:45	47.9	66.9	39	41	46.9	55.9	52.9	46.3	43.4	42.8	45.1	40.4	27.8	20.4	12.8

All noise levels are in dB

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
Saturday night New Lane side															
14/06/2015 02:00	43.4	61.6	39.4	40.9	46.6	54.3	53.0	45.5	41.8	39.5	40.0	35.0	23.9	19.5	12.6
14/06/2015 02:15	45	63.5	39.5	42.1	46.6	54.2	52.9	45.3	42.5	39.9	42.2	36.8	24.7	20.1	12.9
14/06/2015 02:30	44.9	62.6	39.1	40.9	47.2	56.0	53.8	45.0	40.5	40.0	41.9	37.3	27.0	20.8	13.0
14/06/2015 02:45	49.8	69.5	39.7	42.3	47.7	56.6	53.8	47.2	45.1	43.1	47.5	42.5	31.1	21.9	13.2
14/06/2015 03:00	48.6	68.5	38.8	41.9	46.4	55.9	53.4	45.4	44.6	42.0	45.7	41.7	29.6	20.9	13.0
14/06/2015 03:15	43.1	53	38.6	46.8	45.9	55.2	52.8	43.2	38.5	36.1	36.2	39.4	28.6	20.3	17.1
14/06/2015 03:30	50.7	58.3	39.1	54.9	46.3	56.0	53.1	43.4	39.7	36.6	38.3	48.5	38.5	26.8	18.9
14/06/2015 03:45	55.7	64.3	48.2	58.3	46.9	55.1	53.3	45.8	45.1	39.7	41.2	53.5	44.6	39.4	27.9
14/06/2015 04:00	51.4	66.4	44.9	51.6	46.0	56.1	55.4	56.9	51.0	43.3	44.1	47.2	36.7	25.9	14.3
14/06/2015 04:15	52	65.5	41.4	56.9	46.8	56.0	54.7	46.2	43.0	42.2	45.8	48.6	38.3	29.4	19.8
14/06/2015 04:30	48.9	66	42.2	47.4	49.8	56.7	54.5	47.4	45.2	42.0	44.3	43.4	37.7	31.4	13.1
14/06/2015 04:45	48.5	66.6	42.4	47.2	46.9	55.9	53.4	46.0	43.0	41.1	44.5	40.4	40.4	35.6	13.5
14/06/2015 05:00	44.9	51.9	41.5	48	46.2	56.0	53.0	44.9	38.4	38.3	36.5	34.5	40.5	36.7	14.2
14/06/2015 05:15	44.9	61.7	41.2	44.3	46.7	56.3	53.3	45.3	41.4	39.6	40.5	36.3	36.8	28.0	13.2
14/06/2015 05:30	52.7	67.7	42	49.7	47.9	57.8	56.0	50.4	48.3	45.7	49.3	46.3	38.0	34.0	16.4
14/06/2015 05:45	48.3	66.1	41.6	46.6	46.9	56.3	54.5	46.1	43.3	42.2	44.8	41.1	36.4	33.6	15.1
14/06/2015 06:00	53.9	70.8	39.8	52.4	49.5	55.4	55.4	51.7	50.8	50.5	49.6	46.9	38.7	32.3	15.1
14/06/2015 06:15	50.8	65.9	40.1	48.9	47.0	54.2	53.5	49.5	47.8	45.0	47.6	43.5	37.4	30.9	14.6
14/06/2015 06:30	53.8	68.9	40.6	51	49.0	56.4	56.9	49.0	47.3	47.0	50.9	47.5	37.0	26.8	14.4
14/06/2015 06:45	50.3	66.1	40.4	46.7	46.3	56.4	55.0	49.9	46.4	44.5	47.0	43.4	34.5	24.6	14.9

All noise levels are in dB

Table A3.3 Results of long term measurements – night-time 15 minute averages for both locations

Start Time	L _{Aeq}	L _{Amax}	L _{A90}	L _{A10}	Octave Band Frequency Hz										
					16	31.5	63	125	250	500	1k	2k	4k	8k	16k
1m from freezers includes reflection	72.1	73.2	70.9	72.8	66.8	81.4	77.8	76.3	75.5	70.1	66.6	62.0	53.9	47.7	38.5
5m from freezers	61.5	63.6	59.7	63.2	62.3	75.3	69.9	66.1	62.0	60.1	56.4	51.6	45.4	38.3	28.5
In HPS car park	56.9	63.2	55.4	57.8	57.5	62.5	61.6	55.9	53.9	51.7	53.5	49.9	43.3	36.9	25.8

All noise levels are in dB

Table A3.4 Results of noise measurements close to the existing freezers and in the adjacent car park