

The Co-operative
53-55 The Broadway
Joel Street
Northwood Hills
HA6 1NZ

Plant Noise
Impact Assessment Report

On behalf of



Project Reference: 88595 | Revision: 00 | Date: 17th June 2019

T: 01252 519881
W: noisesolutions.co.uk
E: hello@noisesolutions.co.uk

Noise Solutions Ltd, Unit 5, Oriel Court, Omega Park, Alton, GU34 2YT Reg no. 3483481



Document Information

Project Name : The Co-operative, 53-55 The Broadway, Joel Street
Project Reference : 88595
Report Title : Plant Noise Impact Assessment Report
Doc Reference : 88595/NIA
Date : 17th June 2019

	Name	Qualifications	Initials	Date
Prepared by:	Miriam Pratap	BSc(Hons), AMIOA	MP	17 th June 2019
Reviewed and approved by:	Nigel Chandler	BSc(Hons) MIOA	NAC	17 th June 2019
For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved

Noise Solutions Ltd (NSL) disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms of the Contract with the Client and generally in accordance with the appropriate ACE Agreement and taking account of the manpower, resources, investigations and testing devoted to it by agreement with the Client. This report is confidential to the Client and NSL (Noise Solutions Ltd) accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

© Noise Solutions Ltd (NSL) 2019

Reg no. 3483481 Trading office Unit 5, Oriel Court, Omega Park, Alton, Hampshire, GU34 2YT

Contents

1.0	Introduction	1
2.0	Details of development proposals	1
3.0	Nearest noise sensitive receptors	2
4.0	Existing noise climate	2
5.0	Plant noise design criteria	4
	London Borough of Hillingdon	4
	BS 4142:2014 'Methods for Rating and Measuring Industrial and Commercial Sound'	4
	National Planning Policy Framework	6
	Proposed criteria	7
6.0	Plant noise assessment	7
7.0	Summary	8

Appendices

Appendix A	Acoustic terminology
Appendix B	Photograph of site showing areas of interest
Appendix C	Plant information and manufacturer published sound pressure levels
Appendix D	Environmental sound survey
Appendix E	Noise level predictions

Executive Summary

Noise Solutions Limited has undertaken a noise impact assessment of new plant to be installed at the proposed Co-operative food store at 53-55 The Broadway, Joel Street.

The results of the assessment demonstrate that the cumulative plant noise emissions from the proposed external plant will comply with the proposed limits at the most affected noise sensitive receptors.

Noise from the proposed plant should be considered acceptable to the London Borough of Hillingdon.

1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by RPM Consult to undertake a noise impact assessment for new plant serving the proposed Co-operative store at 53-55 The Broadway, Joel Street in Northwood Hills.
- 1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.
- 1.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed using the typical requirements of the local authority.
- 1.4. A glossary of acoustic terminology is given in [Appendix A](#). An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. The Co-operative store is proposed to be located at 53-55 The Broadway, Joel Street in Northwood Hills. The store will occupy the lower ground floor and part of the ground floor of a three-storey building; the two floors above are occupied by a 24 hour fitness gym.
- 2.2. The new air conditioning (AC) and refrigeration plant is proposed to be located at the rear of the store on the lower ground floor along the east elevation. The plant compound is proposed to be enclosed on three sides (north, east and west) by a timber close-boarded fence giving an overall height, when combined with the brick wall, of 2.4m. The fence will be solid, with no holes and a mass of at least 7kg/m².
- 2.3. The proposal is for the installation of three air conditioning (AC) units, a gas cooler and a condensing unit. A refrigeration pack is also proposed; however, it will be located internally and, therefore its impact at the nearest noise sensitive receptors will be negligible.
- 2.4. The proposed refrigeration plant will potentially operate 24 hours a day, although it should be noted that these units operate as required to meet demand and generally at a reduced capacity at night. The AC units will operate only during store opening hours.
- 2.5. [Appendix C](#) contains a table with the manufacturer's published sound pressure levels for the proposed plant.

3.0 Nearest noise sensitive receptors

- 3.1. The area surrounding the site is a mix of commercial and residential in use. The nearest noise sensitive property to the plant area will be the residential property at 25 Ferndown (Receptor R1) to the east of the store, approximately 14m from the nearest item of plant.
- 3.2. [Appendix B](#) contains an aerial photograph showing the site and surrounding area.

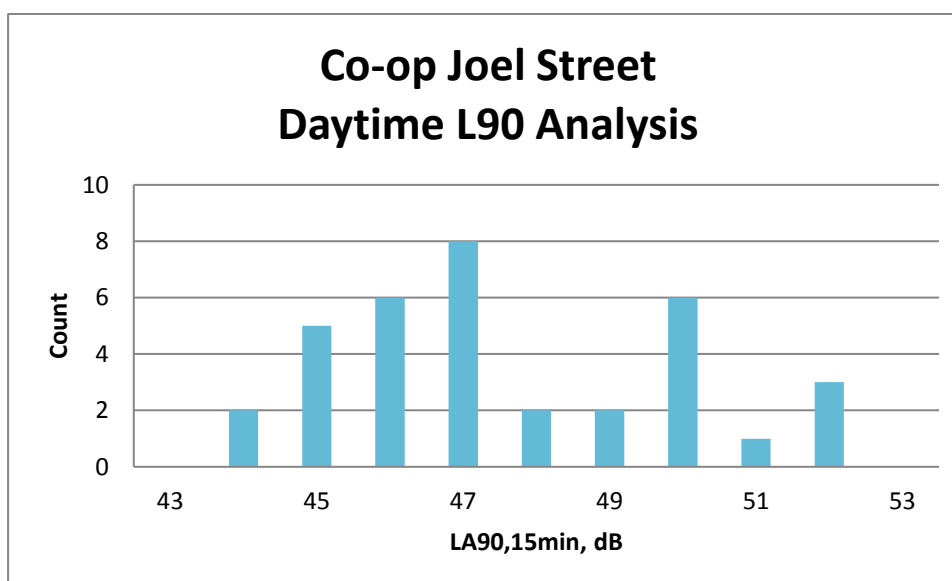
4.0 Existing noise climate

- 4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.
- 4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in [Appendix D](#).

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	L _{Aeq} (15mins)	L _{Amax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 – 23.00 hours)	51-70	69-91	53-70	44-52
Night-time (23.00 – 07.00 hours)	39-56	48-76	41-60	37-48

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



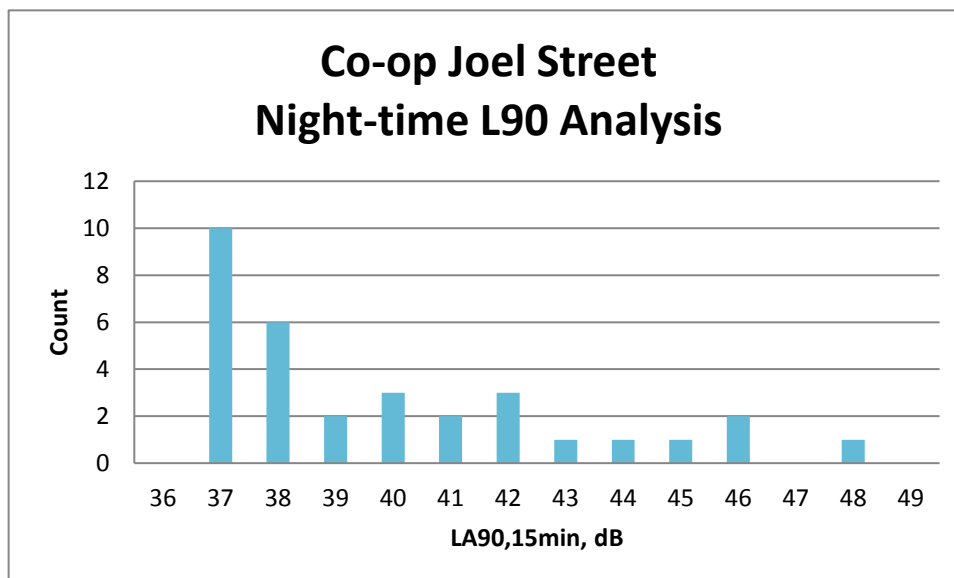
- 4.3. Additional statistical analysis has been undertaken. As shown in Table 2, the mean, median, and modal values have been calculated:

Table 2 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
Mean	47
Median	47
Mode	47

- 4.4. The mean, median and modal values all equal 47dB L_{A90} . From review of the graph in Figure 1, 46dB L_{A90} has been considered as representative of the typical background sound level during the daytime period.

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



- 4.5. From review of the graph in Appendix C, 37dB L_{A90} has been considered as representative of the existing background sound pressure level during the night-time period.
- 4.6. The following values, therefore, are considered as representative of the existing background sound pressure levels at nearby noise sensitive premises:
- 46dB L_{A90} during the daytime period; and
 - 37dB L_{A90} during the night-time period

5.0 Plant noise design criteria

London Borough of Hillingdon

- 5.1. The London Borough of Hillingdon were contacted in the past for a previous project with NSL and indicated that the usual noise related condition they would apply to sites such as this would be:

"The rating level of the noise emitted from plant and/or machinery at the development shall be at least 5dB below the existing background noise level. The noise levels shall be determined at the nearest residential property. The measurements and assessment shall be made in accordance with British Standard 4142 'Method for rating industrial noise affecting mixed residential and industrial areas'."

BS 4142:2014 'Methods for Rating and Measuring Industrial and Commercial Sound'

- 5.2. British Standard (BS) 4142:2014 describes a method for rating and assessing sound of an industrial 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, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 5.3. The industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes, upon which sound is incident.
- 5.4. The procedure contained in BS 4142 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15-minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.
- 5.5. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective

methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

- 5.6. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*
- 5.7. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*
- 5.8. The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15-minute intervals. The standard states that: *"A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."*
- 5.9. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- a) Typically, the greater this difference, the greater the magnitude of the impact.*
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
 - d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*
- 5.10. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*
- 5.11. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

- 5.12. BS 4142 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

National Planning Policy Framework

- 5.13. A new edition of NPPF was published in February 2019 and came into effect immediately. The original National Planning Policy Framework (NPPF¹) was published in March 2012, with a revision in July 2018 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2019 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the February 2019 edition.
- 5.14. Paragraph 170 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*
- 5.15. The NPPF goes on to state in Paragraph 180:
- "planning policies and decisions should ...*
- (a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;*
- (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...*
- 5.16. The NPPF document does not refer to any other documents or British Standards regarding noise other than the NPSE.
- 5.17. Paragraph 2 of the NPPF states that "planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."
- 5.18. Paragraph 12 of the NPPF states that "The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually

¹ National Planning Policy Framework, DCLG, March 2012

be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed.”

- 5.19. Paragraph 117 states that “Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or ‘brownfield’ land.

Proposed criteria

- 5.20. It is considered appropriate that the cumulative plant noise rating level of proposed plant should be controlled to a level that does not exceed 5dB below the representative L_{A90} background sound level at the nearest residential property. This would result in, at worst, a ‘low impact’ according to BS 4142:2014 (depending on the context) and therefore avoid any adverse impact.
- 5.21. The cumulative noise level for the proposed plant at the nearest residential windows should not therefore exceed the limits shown in the table below:

Table 3 Proposed plant noise emissions level limits at noise sensitive residential receptors

Period	Cumulative plant rating noise level, dB(A)
Daytime (07.00 – 23.00 hours)	41
Night-time (23.00 – 07.00 hours)	32

6.0 Plant noise assessment

- 6.1. The cumulative plant noise level at the most affected noise sensitive receptors has been predicted. The assessment has taken into consideration distance attenuation, directivity corrections and screening provided by the timber acoustic fence.
- 6.2. The predictions during the daytime period have been based on the proposed AC and refrigeration plant operating at full capacity. During the night-time period only the refrigeration plant is to be operating.
- 6.3. Table 4, below, summarises the results of the assessment at 1 metre from the nearest noise-sensitive windows. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in [Appendix E](#).

Table 4 Assessment of predicted noise levels at nearby receptors

Receptor	Period	Predicted plant noise level at receptor, L_{Aeq} (dB)	Proposed design criterion (dB)	Difference (dB)
R1	Daytime (07.00 – 23.00 hours)	35	41	-6
	Night-time (23:00 – 07:00 hours)	32	32	0

- 6.4. The above assessment demonstrates that noise from the proposed plant will comply with the criteria in Table 3 inclusive of the replacement acoustic timber fence.
- 6.5. As BS 4142:2014 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:
- The assessment is undertaken at the nearest residential window. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.
 - The assessment has been made with all plant operating at maximum capacity, as this is not always the case, the assessment is an absolute worst-case scenario.
- 6.6. Where possible uncertainty in the above assessments has been minimised by taking the following steps:
- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
 - Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
 - Care was taken to ensure that the measurement positions were representative of the noise climate outside the nearby residential dwellings and not in positions where higher noise levels were present.

7.0 Summary

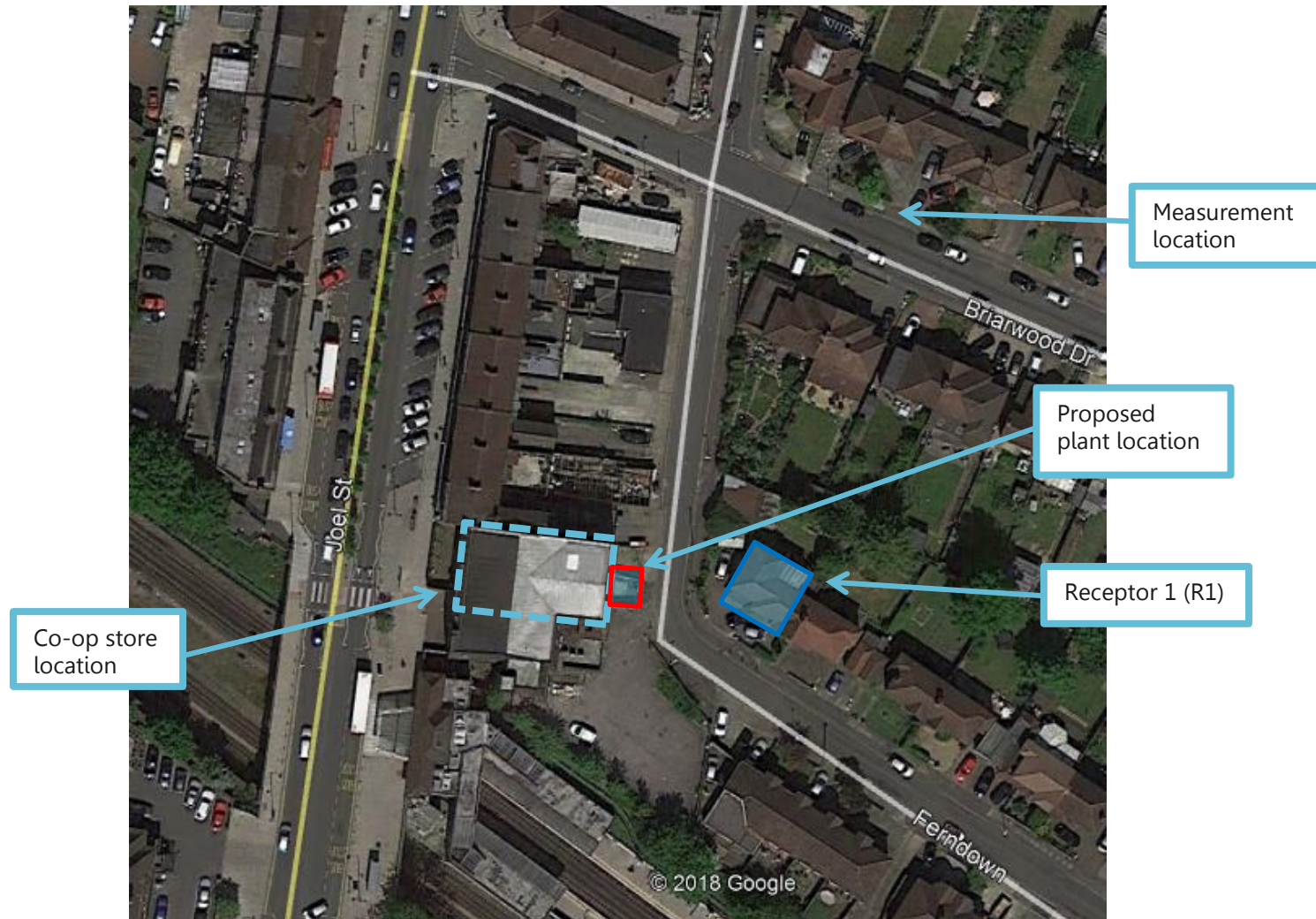
- 7.1. Noise Solutions Ltd (NSL) has been commissioned by RPM Consult to undertake a noise impact assessment for new plant serving the proposed Co-operative store at 53-55 The Broadway, Joel Street in Northwood Hills.

-
- 7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the plant area.
- 7.3. The predictions demonstrate that cumulative noise from the proposed plant meets the proposed noise criteria at all nearby receptors and at all times, inclusive of the replacement acoustic timber fence.
- 7.4. Therefore, noise from the proposals should not be a reason for refusal of planning permission.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Photograph of site showing areas of interest



Photograph 1 Courtesy of Google Earth



Appendix C Plant information and manufacturer published sound pressure levels

Plant item	Make/Model	Quantity	Period	Sound Pressure Level	
				dBA	Distance (m)
Air Conditioner	Mitsubishi Electric / PUZ-ZM125YKA	3	Daytime period (07:00 – 23:00 hours)	54	1
			Night-time period (23:00 – 07:00 hours)	-	-
Gas Cooler	Kelvion / GF-SA103F4H-063M043	1	Daytime period (07:00 – 23:00 hours)	24	10
			Night-time period (23:00 – 07:00 hours)	24	10
Condensing Unit	Cubo 2	1	Daytime period (07:00 – 23:00 hours)	41	10
			Night-time period (23:00 – 07:00 hours)	41	10

Note 1: The AC units will be switched off during the night-time period.

Appendix D Environmental sound survey

Details of environmental sound surveys

- D.1 Measurements of the existing background sound levels were undertaken from 17.30 hours on Tuesday 6th March to 10.00 hours on Wednesday 7th March 2018.
- D.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive fifteen-minute sample periods for the duration of the survey.

Measurement position

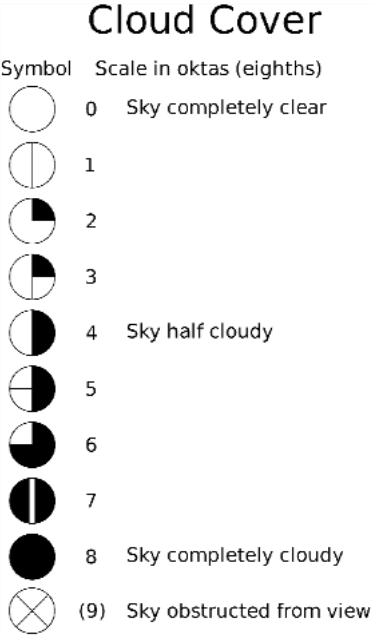
- D.3 The representative measurement position was located on a lamppost along Briarwood Drive (location indicated on the site plan in [Appendix B](#)). In accordance with BS 7445-2:1991 '*Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use*', the measurements were undertaken under free-field conditions.

Equipment

- D.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 949 / 8195	24/10/2016	1610560
Condenser microphone	MCE212/ 22267		
Preamplifier	Svantek SV12L / 7557		
Calibrator	Svantek SV 40A / 10843	06/10/2016	1610518

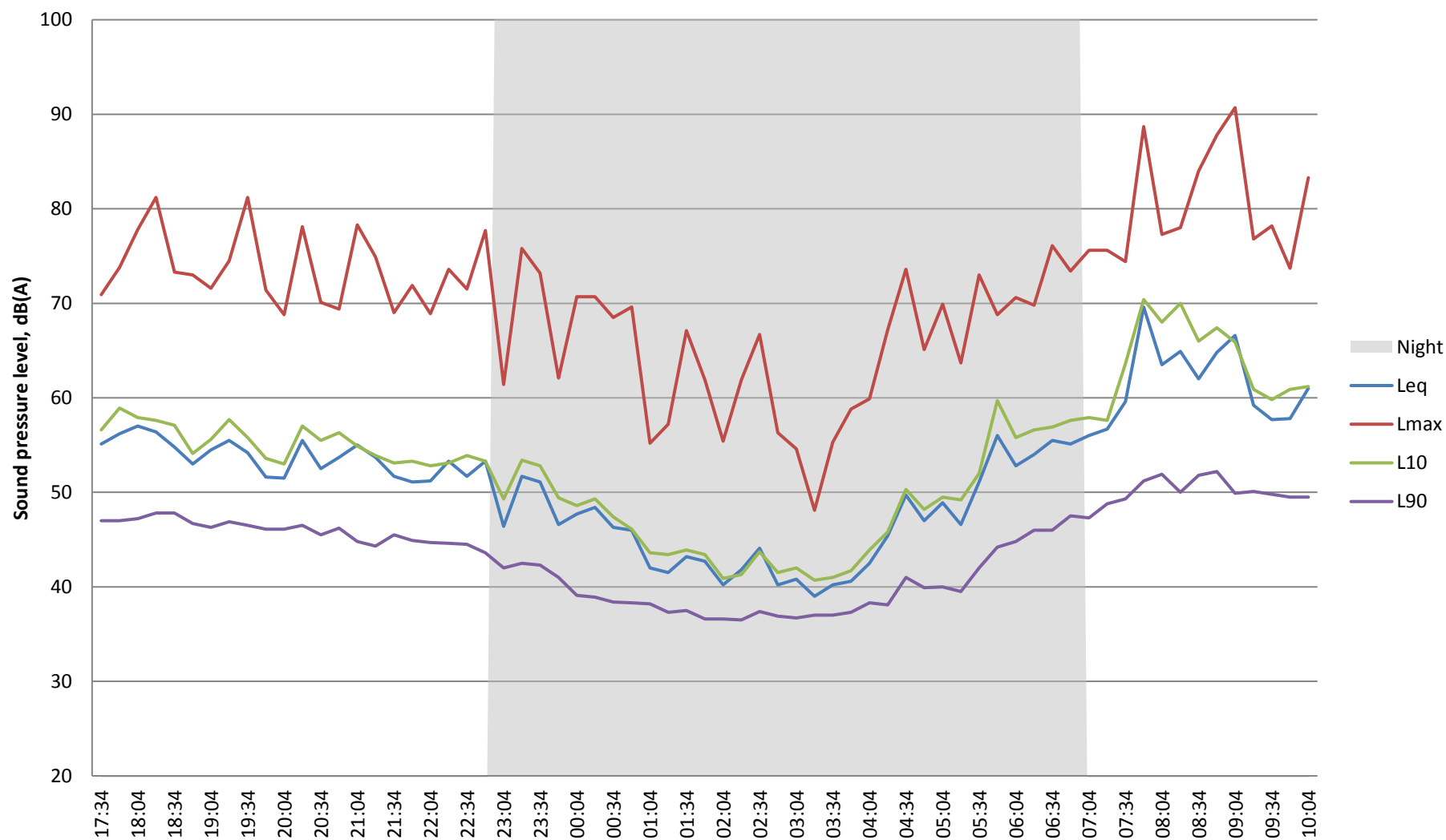
- D.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Time/Date	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	17.30 06/03/2018 – 10.00 07/03/2018	Temperature (°C)	8	6
Cloud Cover  Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		Precipitation:	No	No
		Cloud cover (oktas – see guide)	4	6
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	<1	1
		Wind Direction	N/A	West
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- D.6 The results of the survey are considered to be representative of the background sound pressure levels at the façades of the most affected noise sensitive receptors to the plant area during the quietest times at which the plant will operate. The noise climate at the measurement position was dominated by local road traffic. The results of the survey are presented in a time history graph overleaf.

Co-op Joel Street Tuesday 06 - Wednesday 07 Mar 2018



Appendix E Noise level predictions

Receptor R1, Day-time period

Plant item	Manufacturer noise data		Distance correction		Directivity correction (dB)	BS4142 feature correction (dB)	Screening correction (dB)	Resultant at receptor, L_{Aeq} (dB)
	Noise level, L_{Aeq} (dB)	Distance (m)	Distance (m)	Correction (dB)				
AC1	54	1	12	-22	+3	+3	-15 ¹	23
AC2	54	1	17	-25	+3	+3	-8 ¹	27
AC3	54	1	18	-25	+3	+3	-7 ¹	28
Gas Cooler	24	10	15	-4	+3	+3	-8 ¹	18
Condensing Unit	41	10	16	-4	+3	+3	-11 ¹	32
							Cumulative (dB)	35

Receptor R1, Night-time period

Plant item	Manufacturer noise data		Distance correction		Directivity correction (dB)	BS4142 feature correction (dB)	Screening correction (dB)	Resultant at receptor, L_{Aeq} (dB)
	Noise level, L_{Aeq} (dB)	Distance (m)	Distance (m)	Correction (dB)				
Gas Cooler	24	10	15	-4	+3	+3	-8 ¹	18
Condensing Unit	41	10	16	-4	+3	+3	-11 ¹	32
							Cumulative (dB)	32

Note 1: Screening provided by the acoustic timber fence on the north, east and south elevation of the plant compound