Popeyes

122 Kilburn High Road
Kilburn
NW6 4HY

Plant Noise Impact Assessment

On behalf of

chapman ventilation

Project Reference: 91161 | Revision: 02 | Date: 8th December 2022
Revised 5th January 2023

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Document Information

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	Name	Qualifications	Initials	Date
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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved
01	12 Dec 2022	Airflows updated and attenuation revised	NAC	JS
02	5 Jan 2023	References to Camden Planning Guidance Updated; Residential receptors identified	NAC	DMB

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Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to undertake a noise impact assessment for new plant serving the proposed Popeyes restaurant at 122 Kilburn High Road, London.

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 following London Borough of Camden's usual requirements.

1.4. To assist with the understanding of this report a glossary of acoustic terms can be found 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 proposed Popeyes restaurant is to occupy the basement and ground floor of 122 Kilburn High Road. The premises have previously been occupied by a dental surgery.

2.2. New plant will be installed to serve the restaurant. This will comprise a kitchen extract fan, a general supply fan, general extract and toilet extract fans. The kitchen extract fan will be located at the rear of the building on a flat roof, with the exhaust duct routed up the rear elevation to discharge at roof level. The other supply and extract fans will be located inside the building, with louvres on the rear elevation.

2.3. Two refrigeration condenser units, serving the freezer and chiller, will also be located on the flat roof at the rear of the premises.

2.4. Mitigation is to be installed in the form of attenuators and acoustic enclosures. In addition, any sections of external ductwork between the kitchen extract attenuator and the penetration through the roof from inside will be acoustically lagged.

2.5. The proposed plant operating hours are 07.00 to midnight, daily. All plant will operate during this period. Outside this period only the refrigeration condenser units may operate.

2.6. An existing VRF air conditioning (AC) condenser, within an acoustic housing at the rear of the building, will be retained. It is understood that the enclosure was designed to control noise from the AC unit such that it would not exceed 29dB at the nearest residential window[1].

2.7. **Appendix B** contains a table with the manufacturer's published sound pressure levels for the proposed plant. The plant layout is shown in **Appendix F**.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is a mix of commercial and residential properties. It is understood that Merlin House has been converted from office to residential use.

3.2. The nearest residential properties to the plant are on Quex Mews to the east (Receptor R1), approximately 10m from the closest plant item, at the rear of the Kilburn High Road wing of Merlin House (Receptors R2 and R3) and within a first-floor extension adjacent to Quex Mews (Receptor R4). Receptor R1 is screened from the intake and discharge louvres by the extension.

3.3. Windows on the Quex Road wing of Merlin House overlooking the plant area serve the communal corridor of the flats within that wing and are therefore not noise-sensitive.

3.4. An aerial view showing the site and surrounding area, the nearest noise sensitive properties and noise monitoring location used in this assessment is presented in **Appendix C**.

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.

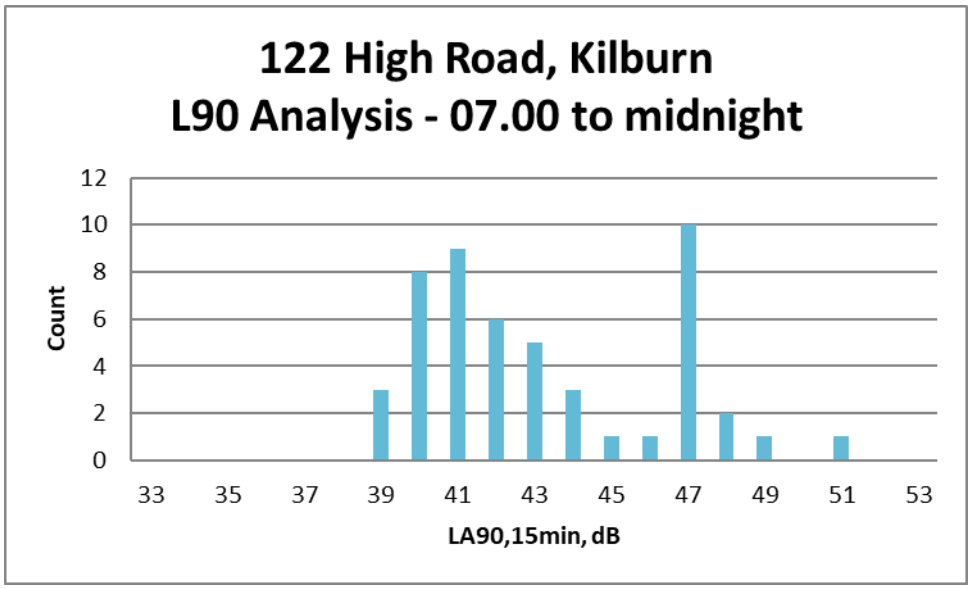
4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in **Appendix D**.

[1] Letter from Arc Planning to London Borough of Camden, 19 May 2017, ref application 2016/6163/P.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15mins)}$	$L_{AFmax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	42-62	53-81	44-62	39-51
Trading hours (07.00 – midnight)	42-62	53-81	44-62	39-51
Night-time (23.00 – 07.00 hours)	39-48	48-68	41-50	35-45
Outside trading hours	39-48	48-66	41-50	35-45

Figure 1 Histogram of L_{A90} background sound pressure levels during operational hours



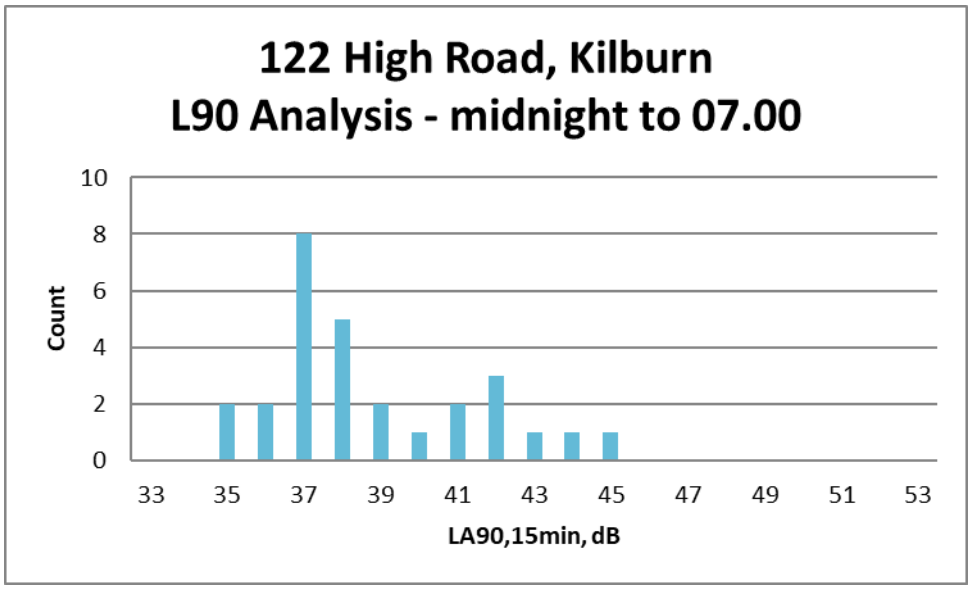
4.3. Further statistical analysis has been carried out on the data, and the mean, modal and median values are shown in Table 2 below.

Table 2 Statistical analysis of $L_{A90,15min}$ levels during operational hours

dB, L_{A90} daytime period	
mean	43
modal	47
median	42

4.4. From reviewing the above histogram, 40dB has been selected to be representative of the background sound level in this area, during proposed trading hours.

Figure 2 Histogram of L_{A90} background sound pressure levels outside of proposed operating hours



4.5. Further statistical analysis has been carried out on the data, and the mean, modal and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels outside proposed operating hours

dB, L_{A90} daytime period	
mean	39
modal	37
median	38

4.6. From reviewing the above histogram, 37dB has been selected to be representative of the background sound level in this area, outside proposed trading hours.

5.0 Plant noise design criteria

National Planning Policy Framework

5.1. A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF[2]) was published in March 2012, with revisions in July 2018 and February 2019 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2021 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 July 2021 edition.

5.2. Paragraph 174 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*

[2] National Planning Policy Framework, DCLG, March 2012

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."

5.3. The NPPF goes on to state in Paragraph 185:

"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 ...

5.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE[3]).

5.5. 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."*

5.6. 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 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"*.

5.7. Paragraph 119 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"*.

London Borough of Camden

5.8. Section 6 of the Camden Planning Guidance Amenity, published January 2021, gives guidance on noise and vibration.

5.9. Clause 6.8 refers to noise thresholds within Appendix 3 of the Local Plan and to the principles of No observed effect level (NOEL), Lowest observable adverse effect level (LOAEL) and Significant

[3] Noise Policy Statement for England, DEFRA, March 2010

observed adverse effect level (SOAEL) and defines their meanings. Specifically, in the context of this report, LOAEL is defined as:

> *The level above which changes in behaviour (e.g. closing windows for periods of the day) and adverse effects on health (e.g. sleep disturbance) and quality of life can be detected.*

5.10. SOEAL is defined as:

> *The level above which adverse effects on health and quality of life occur. This could include psychological stress, regular sleep deprivation and loss of appetite.*

5.11. Clause 6.27 states that:

> *Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the council accompanying any acoustic report. "BS4142 Method for rating Industrial and Commercial Sound' contains guidance and standards which should also be considered within the acoustic report.*

5.12. Appendix 3 within the Camden Local Plan published 2017 states:

> *"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."*

5.13. Table C of the appendix – reproduced here as Table 4 - states the criteria at which development related noise levels will be acceptable:

Table 4 Table C: Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

5.14. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes "sound from fixed plant installations which comprise mechanical and electrical plant and equipment".

5.15. The procedure contained in BS 4142:2014 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.

5.16. 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.

5.17. 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."

5.18. 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."

5.19. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *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.*

5.20. The standard does state that "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."

5.21. 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."

5.22. 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."*

5.23. BS 4142:2014 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.

Summary of criteria

5.24. The local authority's usual requirement is that the plant noise level at the nearest noise-sensitive windows should be at least 10dB below the representative L_{A90} background sound level.

5.25. Noise from the new plant should therefore not exceed the limits shown in the table below:

Table 4 Proposed plant noise emissions level limits at nearest receptors

Period	Residential
	Plant rating level, dB $L_{Ar,Tr}$
All proposed plant operating (07.00 hrs to midnight)	30
All other times (cold store plant only)	27

6.0 Plant noise impact assessment

6.1. The cumulative plant noise levels at the nearest noise sensitive receptors have been predicted. The assessment has considered attenuation, directivity, any screening between source and receivers and distance attenuation. The predictions during the proposed operating period (07.00 hours to midnight) have been based on the proposed plant all operating at full capacity; outside of proposed operating hours only the two refrigeration condenser units may operate.

6.2. Predictions are inclusive of the following atmospheric-side attenuators as shown in Table 5 and acoustic enclosures to the refrigeration condensers and the kitchen extract fan providing 15dBA and 10dBA attenuation, respectively.

Table 5 Proposed atmosphere-side attenuators to ventilation systems

Attenuator	Insertion losses dB, at octave band centre frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
Kitchen Extract	11	25	45	40	40	36	31	27
General Supply	7	18	36	45	45	45	45	45
General Extract	11	25	45	45	45	45	45	45
WC Extract	7	17	34	45	45	45	45	41

6.3. It should be noted that all proposed plant is high-quality and no tonality or impulsive characteristics are anticipated provided the equipment is well maintained. Since the local authority's criterion is for plant noise to be at least 10dB below the existing background sound level, no other BS 4142 feature corrections are considered appropriate.

6.4. Table 7 summarises the results of the assessment at the most affected properties. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. The full set of calculations can be found in **Appendix E**.

Table 7 Assessment of predicted noise levels at the nearest noise sensitive receptors

Receptor	Period	Predicted rating level at receptor, dB $L_{Ar, Tr}$	Design criterion dB $L_{Ar,Tr}$	Difference, dBA
R1	07:00 – 00:00 hours	28	30	-2
	00:00 – 07:00 hours	22	27	-5
R2	07:00 – 00:00 hours	30	30	0
	00:00 – 07:00 hours	27	27	0
R3	07:00 – 00:00 hours	26	30	-4
	00:00 – 07:00 hours	21	27	-6
R4	07:00 – 00:00 hours	29	30	-1
	00:00 – 07:00 hours	15	27	-12

6.5. The noise level predictions demonstrate that cumulative noise emissions from the proposed plant will comply with the proposed limits at all nearby residential windows.

Context and uncertainties

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 position was representative of the noise climate outside the nearby noise sensitive receptors and not in a position where higher noise levels were present.

6.7. 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 windows. The impact on all other nearby windows will be lower due to screening and distance attenuation.
- It should be noted that the above assessment is based on all plant operating at maximum duty. Given that the plant will not operate at maximum design duty all of the time the above assessment is considered to be representative of the worst case.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to undertake a noise impact assessment for new plant serving the proposed Popeyes restaurant at 122 Kilburn High Road, London.

7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at locations representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area.

7.3. The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor locations and determined to be in compliance with London Borough of Camden's usual requirements. Therefore, noise from the plant proposals should not be a reason for refusal of planning permission.

7.4. Specified mitigation measures include;

- Atmospheric-side attenuators to all ventilation systems;
- Acoustic enclosures to refrigeration units providing an overall noise reduction of 15dBA;
- Acoustic enclosure to kitchen extract fan providing an overall noise reduction of 10dBA;
- Acoustic lagging to all sections of kitchen extract ductwork between the atmospheric-side attenuator and the penetration through the roof from inside.

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 s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), 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

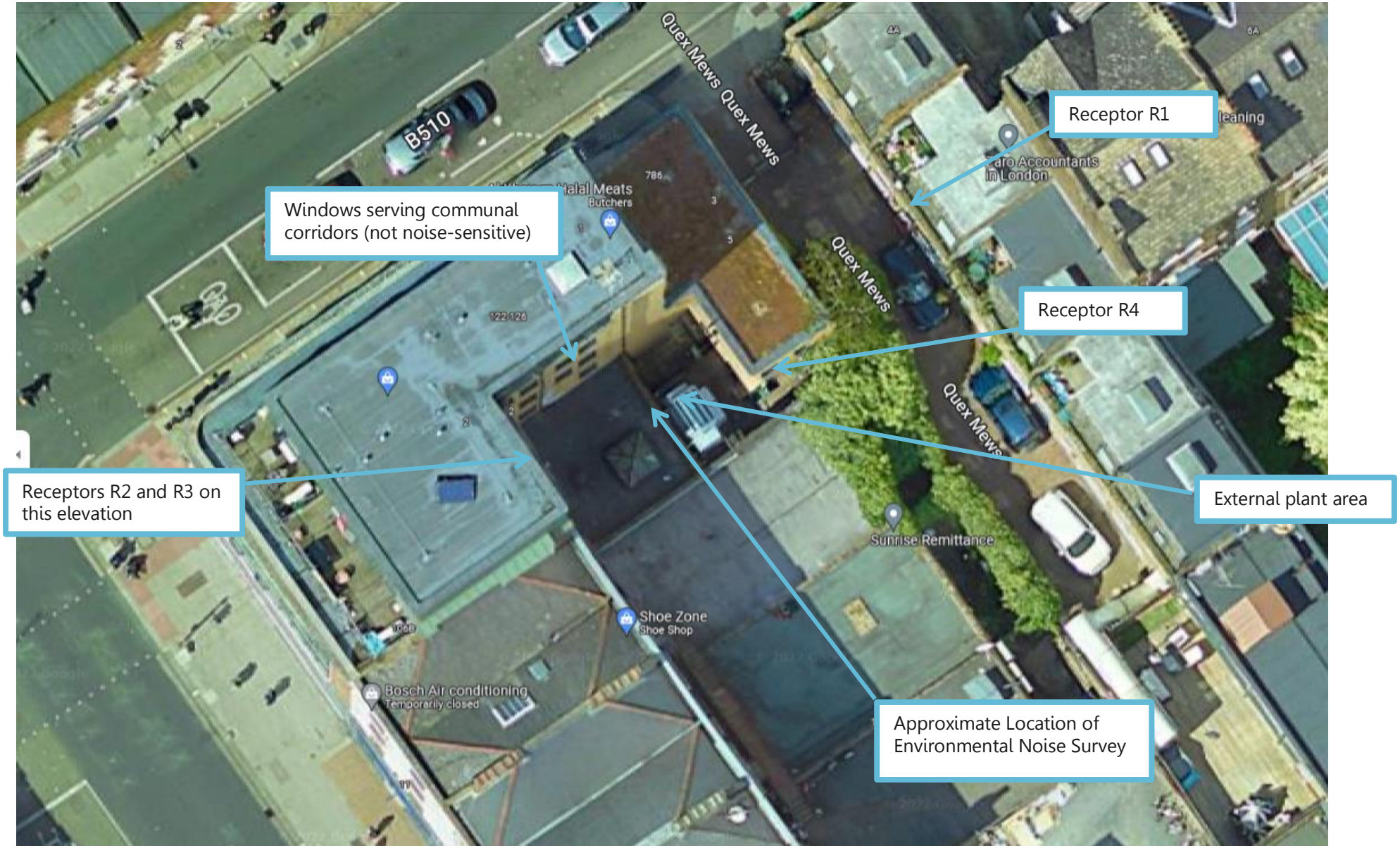
Appendix B Plant information and manufacturer published sound pressure levels

Plant Reference	Unit/Model	Description	Sound power level (dB) at octave band centre frequencies (Hz)								dBA (dB)
			63	125	250	500	1k	2k	4k	8k	
EF1 Kitchen Extract	Systemair MUB/T 062 560D4	Outlet L_w	77	91	84	81	79	75	72	66	
		Casing L_w	55	73	55	48	47	45	38	29	
AHU1 General Supply	Systemair MUB 062 560D4 Multibox	Inlet L_w	75	84	81	79	77	73	72	66	
EF2	Systemair / Prio 355	Outlet L_w	77	88	81	75	71	65	58	49	
EF3	Systemair / K200 L Sileo	Outlet L_w	81	76	71	66	61	59	52	46	
Air Conditioning Condenser	As currently installed within acoustic housing – sound pressure level at nearest residential window										29
Freezer Condenser	JEHR-0210-B2-L-1, sound pressure level at 10m										38
Chiller Condenser	JEHR-0113-B1-M-1 V3, sound pressure level at 10m										30

Proposed attenuation

Fan Ref	Width (mm)	Height (mm)	Length (mm)	Air Vol (m^3/s)	Pressure Loss (Pa)	Insertion Loss (dB) at octave band centre frequency (Hz)							
						63	125	250	500	1k	2k	4k	8k
EF1 Kitchen Extract	700	700	2400	1.35	44	11	25	45	40	40	36	31	27
AHU1 Supply	800	800	2100	2.00	40	7	18	36	45	45	45	45	45
EF2 General Extract	500	500	2400	0.50	22	11	25	45	45	45	45	45	45
EF3 WC Extract	250	250	2100	0.10	8	7	17	34	45	45	45	45	41

Appendix C Aerial photograph of site showing areas of interest



Appendix D Environmental sound survey

Details of sound surveys

D.1 Measurements of the existing background sound levels were undertaken between 15.45 hours on Tuesday 15 November and 11.15 hours on Wednesday 16 November 2022.

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 15-minute sample periods for the duration of the noise survey.

Measurement position

D.3 The representative measurement position was located on the flat roof at the rear of the premises, close to the windows nearest to the proposed plant locations (indicated on the site plan in **Appendix C**).

D.4 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.5 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.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 971A / 124660	27/07/2022	Factory conformation certificate
Condenser microphone	ACO Pacific 7152 / 82792		
Preamplifier	Svantek SV18A / 126257		
Calibrator	Rion NC-74 / 35094453	06/09/2022	1503192-1

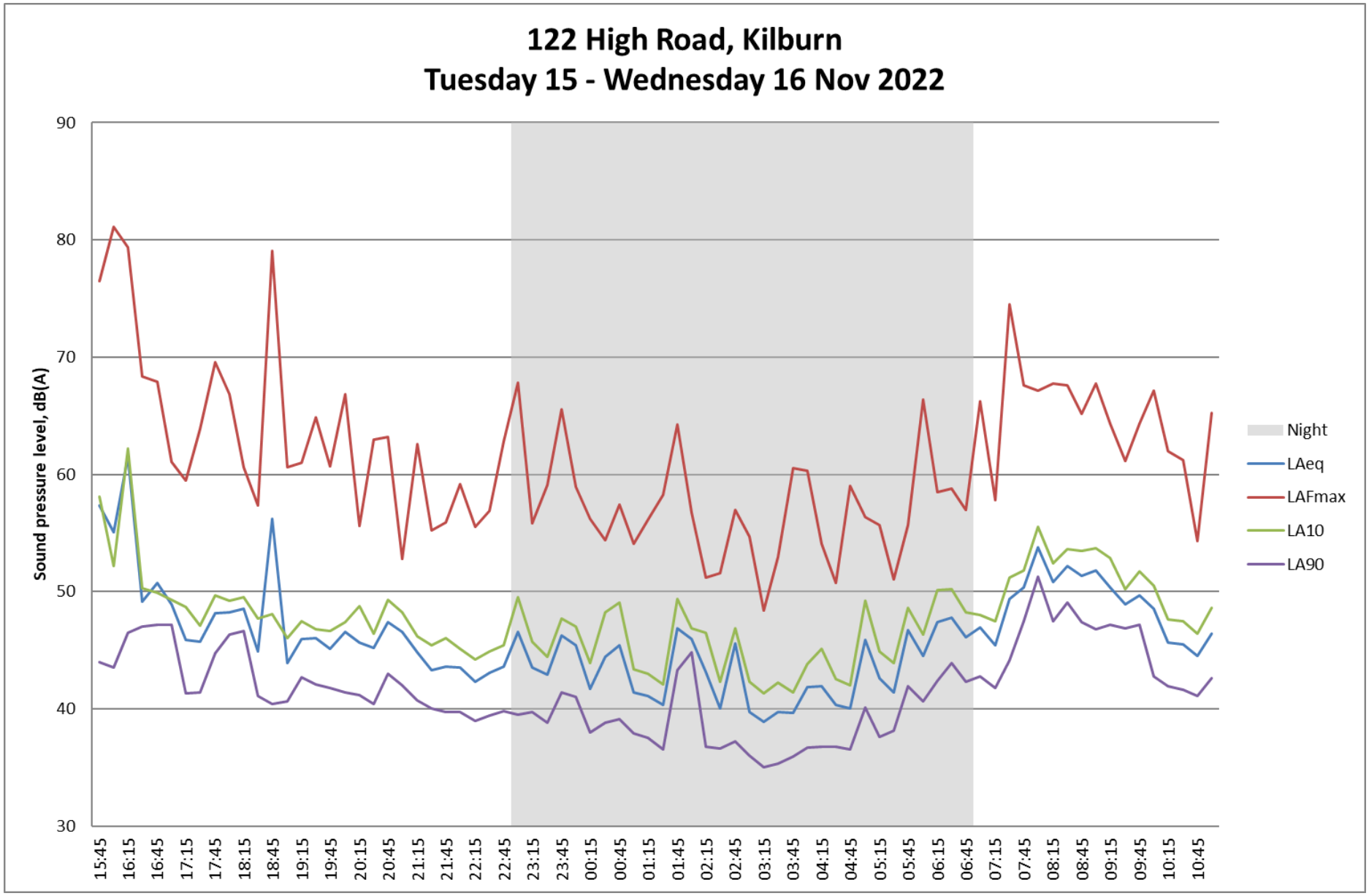
Weather Conditions

D.6 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.

<table>
<tr><th colspan="5">Weather Conditions</th></tr>
<tr><th>Measurement Location</th><th>Time/Date</th><th>Description</th><th>Beginning of Survey</th><th>End of Survey</th></tr>
<tr><td>As indicated on Appendix C</td><td>15.45 15 Nov - 11.15 16 Nov 2022</td><td>Temperature (°C)</td><td>14</td><td>11</td></tr>
<tr><td colspan="2" rowspan="8">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</td><td>Precipitation:</td><td>No</td><td>No</td></tr>
<tr><td>Cloud cover (oktas - see guide)</td><td>3</td><td>1</td></tr>
<tr><td>Presence of fog/snow/ice</td><td>No</td><td>No</td></tr>
<tr><td>Presence of damp roads/wet ground</td><td>Wet</td><td>Wet</td></tr>
<tr><td>Wind Speed (m/s)</td><td><1</td><td>2</td></tr>
<tr><td>Wind Direction</td><td>-</td><td>N</td></tr>
<tr><td>Conditions that may cause temperature inversion (i.e. calm nights with no cloud)</td><td>No</td><td>No</td></tr>
</table>

Results

D.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by local traffic, with aircraft intermittently audible. Existing plant in the area was not operating during the survey period. The results of the survey are presented in a time history graph overleaf.


122 High Road, Kilburn
Tuesday 15 - Wednesday 16 Nov 2022
Sound pressure level, dB(A)
90
80
70
60
50
40
30
15:45
16:15
16:45
17:15
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Night
LAeq
LAFmax
LA10
LA90

Appendix E Noise level predictions

Summary of predictions

Plant	Resultant at receptor (dBA)			
	R1	R2	R3	R4
Kitchen Extract Fan exhaust	17	13	19	5
Supply Fan intake	18	6	-1	22
General Extract exhaust	15	3	1	13
WC Extract exhaust	13	4	2	13
Kitchen Extract Fan casing	20	23	17	17
Existing Condenser (in acoustic housing)	25	26	22	28
Freezer condenser	21	26	20	14
Chiller condenser	13	18	12	7
Intended Plant Operating Hours: Combined	**28**	**30**	**26**	**29**
All other times (freezer and chiller only)	**22**	**27**	**21**	**15**

AC Unit

Receptor R1

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
CU1	29	6	10	-4	0	0	Included	25

Receptor R2

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
CU1	29	6	8	-3	0	0	Included	26

Receptor R3

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
CU1	29	6	14	-7	0	0	Included	22

Receptor R4

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
CU1	29	6	4	+4	0	-5	Included	28

Cold store condensing units

Receptor R1

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
Freezer	38	10	12	-2	0	0	-15	21
Chiller	30	10	12	-2	0	0	-15	13

Receptor R2

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
Freezer	38	10	7	+3	0	0	-15	26
Chiller	30	10	7	+3	0	0	-15	18

Receptor R3

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
Freezer	38	10	14	-3	0	0	-15	20
Chiller	30	10	14	-3	0	0	-15	12

Receptor R4

Unit	Distance				Directivity	Screening	Attenuation	Result
	L_{pA}	at / m	m	dB				
Freezer	38	10	10	0	0	-9	-15	14
Chiller	30	10	9	+1	0	-9	-15	7

EF1 - Kitchen Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	**In-duct Lw**	77	91	84	81	79	75	72	66	**84**
System losses		-9	-5	-1	0	0	0	0	0	
Atmospheric side attenuator		-11	-25	-45	-40	-40	-36	-31	-27	
Sound power level leaving terminal		**57**	**61**	**38**	**41**	**39**	**39**	**41**	**39**	**49**
Receptor 1										
Directivity correction	450 x 450 (135,0)	-1	-1	-3	-6	-9	-8	-8	-8	
Distance correction	10 m	-28	-28	-28	-28	-28	-28	-28	-28	
Resultant at Receptor R1	**Lp**	**28**	**32**	**7**	**7**	**2**	**3**	**5**	**3**	**17**
Receptor 2										
Directivity correction	450 x 450 (135,0)	-1	-1	-3	-6	-9	-8	-8	-8	
Distance correction	15 m	-32	-32	-32	-32	-32	-32	-32	-32	
Resultant at Receptor R2	**Lp**	**24**	**28**	**3**	**3**	**-2**	**-1**	**1**	**-1**	**13**
Receptor 3										
Directivity correction	450 x 450 (90,0)	0	0	0	0	-4	-7	-7	-7	
Distance correction	9.7 m	-28	-28	-28	-28	-28	-28	-28	-28	
Resultant at Receptor R3	**Lp**	**29**	**33**	**10**	**13**	**7**	**4**	**6**	**4**	**19**
Receptor R4										
Directivity correction	450 x 450 (135,0)	-1	-1	-3	-6	-9	-8	-8	-8	
Distance correction	13.5 m	-31	-31	-31	-31	-31	-31	-31	-31	
Screening Correction		**-7**	**-8**	**-9**	**-12**	**-14**	**-17**	**-20**	**-23**	
Resultant at Receptor R4	**Lp**	**18**	**21**	**-5**	**-8**	**-15**	**-17**	**-18**	**-23**	**5**

EF1 – Kitchen Extract Casing

		Octave band centre frequency (Hz)								
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
In-duct fan sound power level		55	73	55	48	47	45	38	29	**58**
Casing sound insulation correction		10	10	10	10	10	10	10	10	
Casing radiated sound power level		**45**	**63**	**45**	**38**	**37**	**35**	**28**	**19**	**48**
Receptor 1										
Distance correction	10 m	-28	-28	-28	-28	-28	-28	-28	-28	
Resultant at Receptor R1	**Lp**	**17**	**35**	**17**	**10**	**9**	**7**	**0**	**-9**	**20**
Receptor 2										
Distance correction	6.7 m	-25	-25	-25	-25	-25	-25	-25	-25	
Resultant at Receptor R2	**Lp**	**20**	**38**	**20**	**13**	**12**	**10**	**3**	**-6**	**23**
Receptor 3										
Distance correction	13.5 m	-31	-31	-31	-31	-31	-31	-31	-31	
Resultant at Receptor R3	**Lp**	**14**	**32**	**14**	**7**	**6**	**4**	**-3**	**-12**	**17**
Receptor 4										
Distance correction	6.1 m	-24	-24	-24	-24	-24	-24	-24	-24	
Screening correction		-6	-7	-8	-9	-12	-14	-17	-20	
Resultant at Receptor R4	**Lp**	**15**	**32**	**13**	**5**	**1**	**-3**	**-13**	**-25**	**17**

SF1 – Supply Fan

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	**In-duct Lw**	75	84	81	79	77	73	72	66	**82**
System losses		-7	-3	0	0	0	0	0	0	
Atmospheric side attenuator		-7	-18	-36	-45	-45	-45	-45	-45	
Sound power level leaving terminal		**61**	**63**	**45**	**34**	**32**	**28**	**27**	**21**	**48**
Receptor 1										
Directivity correction	1200 x 400 (0,0)	2	3	4	5	6	6	6	6	
Distance correction	10 m	-28	-28	-28	-28	-28	-28	-28	-28	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R1	**Lp**	**30**	**33**	**16**	**6**	**5**	**1**	**0**	**-6**	**18**
Receptor 2										
Directivity correction	1200 x 400 (135,0)	-2	-3	-7	-9	-9	-8	-8	-8	
Distance correction	10.6 m	-29	-29	-29	-29	-29	-29	-29	-29	
Screening Correction		-8	-10	-12	-15	-18	-21	-24	-27	
Resultant at Receptor R2	**Lp**	**22**	**21**	**-3**	**-19**	**-24**	**-30**	**-34**	**-43**	**6**
Receptor 3										
Directivity correction	1200 x 400 (135,0)	-2	-3	-7	-9	-9	-8	-8	-8	
Distance correction	17.3 m	-33	-33	-33	-33	-33	-33	-33	-33	
Screening Correction		-10	-13	-15	-18	-21	-24	-27	-30	
Resultant at Receptor R3	**Lp**	**16**	**14**	**-10**	**-26**	**-31**	**-37**	**-41**	**-50**	**-1**

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Receptor 4										
Directivity correction	1200 x 400 (0,45)	1	2	3	3	4	4	4	4	
Distance correction	4.3 m	-21	-21	-21	-21	-21	-21	-21	-21	
Screening Correction		-6	-7	-8	-9	-12	-14	-17	-20	
Resultant at Receptor R4	**Lp**	**35**	**37**	**19**	**7**	**3**	**-3**	**-7**	**-16**	**22**

EF2 – General Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	**In-duct Lw**	77	88	81	75	71	65	58	49	**78**
System losses		-7	-3	0	0	0	0	0	0	
Atmospheric side attenuator		-11	-25	-45	-45	-45	-45	-45	-45	
Sound power level leaving terminal		**59**	**60**	**36**	**30**	**26**	**20**	**13**	**4**	**44**
Receptor 1										
Directivity correction	1000 x 400 (0,0)	2	3	4	5	6	6	6	6	
Distance correction	10 m	-28	-28	-28	-28	-28	-28	-28	-28	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R1	**Lp**	**28**	**30**	**7**	**2**	**-1**	**-7**	**-14**	**-23**	**15**
Receptor 2										
Directivity correction	1000 x 400 (135,0)	-2	-3	-7	-9	-9	-8	-8	-8	
Distance correction	8.3 m	-26	-26	-26	-26	-26	-26	-26	-26	
Screening Correction		-10	-13	-15	-18	-21	-24	-27	-30	
Resultant at Receptor R2	**Lp**	**21**	**18**	**-12**	**-23**	**-30**	**-38**	**-48**	**-60**	**3**

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Receptor 3										
Directivity correction	1000 x 400 (135,0)	-2	-3	-7	-9	-9	-8	-8	-8	
Distance correction	15.8 m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening Correction		-7	-8	-9	-12	-14	-17	-20	-23	
Resultant at Receptor R3	**Lp**	**18**	**17**	**-12**	**-23**	**-29**	**-37**	**-47**	**-59**	**1**
Receptor 4										
Directivity correction	1000 x 400 (0,45)	1	2	3	3	4	4	4	4	
Distance correction	6.9 m	-25	-25	-25	-25	-25	-25	-25	-25	
Screening Correction		-7	-8	-9	-12	-14	-17	-20	-23	
Resultant at Receptor R4	**Lp**	**28**	**29**	**5**	**-4**	**-9**	**-18**	**-28**	**-40**	**13**

Appendix F Proposed plant layout