SANDY BROWN

Consultants in Acoustics, Noise & Vibration

20009-R01-A

30 January 2020

179a Tottenham Court Road, London

Noise survey and plant noise egress limits

London, Manchester, Edinburgh, Birmingham, Belfast, Stevenage

post@sandybrown.com
www.sandybrown.com

Sandy Brown Associates LLP
Registered in England & Wales No. OC 307504

Registered Office: 55 Charterhouse Street, London EC1M 6HA

Version	Date	Comments	Author	Reviewer
A	30 Jan 20		Mason Ford and Elma Ooro	Daniel Stringer and Jake Mroz

Summary

Sandy Brown has been commissioned by GLP Consulting Engineers Ltd to provide acoustic advice in relation to the proposed development at 179a Tottenham Court Road, Fitzrovia, London, W1T 7PA.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 17 January and 22 January 2020.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 55 dB during the daytime and $L_{A90,15min}$ 54 dB at night.

Based on the requirements of the London Borough of Camden and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 48 dB during the daytime, and $L_{Aeq,15min}$ 47 dB during the night.

These limits are cumulative and apply with all plant operating under normal conditions. If plant noise emissions contain tonal components, the limits will be 5 dB more stringent than those set out above.

An initial assessment of the proposed plant items associated with the development has been carried out. The proposed plant items are expected to comply with the relevant noise limits at the nearest noise-sensitive receiver positions.

Contents

1 Introduction

Sandy Brown has been commissioned by GLP Consulting Engineers Ltd to provide acoustic advice in relation to the proposed development at 179a Tottenham Court Road, Fitzrovia, London, W1T 7PA.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

This report presents the survey method and results, and a discussion of acceptable limits for noise emissions from building services plant.

2 Site description

2.1 The site and its surrounding

The site location (highlighted in red) in relation to its surroundings is shown in Figure 1.

The site is accessed from Queen's Yard to the north of the site which leads on from Tottenham Court Road. The site is bounded to the south by Shropshire Place which is accessed from Torrington Place.

Figure 1 Aerial view of site showing measurement location (courtesy of Google Earth Pro)

2.2 Adjacent premises

The Royal National ENT and Eastman Dental Hospital (highlighted green in Figure 1) is located to north-east of the site approximately 10 m from the site boundary. This building is also used by UCL with their main building being approximately 200 m north-east of the site boundary.

The nearest residential premises, Gordon Mansions and Brook House (highlighted in blue) are located approximately 25 m from the site boundary.

All other premises in the imitate vicinity are understood to be commercial, primarily offices and ground floor retail.

3 Building services noise egress criteria

3.1 Standard guidance

BS 4142:2014:+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at nearby noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

3.2 Local Authority criteria

Regarding industrial and commercial noise sources, the London Borough of Camden's Local Plan (2017) states the following:

> "*… 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.*"

4 Noise survey method

Unattended noise monitoring was undertaken at the site over 6 days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 15 minute periods between 11:10 on 17 January 2020 and 15:40 on 22 January 2020. The equipment was installed and collected by Matthew Higgins.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter ‘A’. A photograph showing the measurement location is provided in Figure 2.

The microphone was mounted on a tripod and fixed to railings at the rooftop parapet approximately 18 m above ground level. The noise monitoring equipment was at least 3.5 m from the other significant reflecting surface and is considered free-field.

This location was chosen to be reasonably representative of noise levels outside the adjacent hospital and residential buildings (described in Section 2.2), considered to be the nearest noise sensitive premises.

Weather conditions during the survey are described in Appendix A.

Figure 2 Photograph showing measurement Location 'A'

5 Noise survey results

5.1 Observations

The dominant noise sources observed at the site during the survey were road traffic from Tottenham Court Road.

Less significant noise sources included road traffic from Capper Street, plant items on a neighbouring roof and pedestrians traveling through Queen's Yard.

5.2 Noise measurement results

5.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Friday 17 January 2020	-	55
Saturday 18 January 2020	56	55
Sunday 19 January 2020	55	56
Monday 20 January 2020	58	58
Tuesday 21 January 2020	58	56
Average	57	56

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Daytime and night time statistical analysis of representative values for the site are given in Figure 3 and Figure 4.

From this analysis, the representative free field background sound levels measured during the survey were $L_{A90,15min}$ 55 dB during the daytime and $L_{A90,15min}$ 54 dB at night.

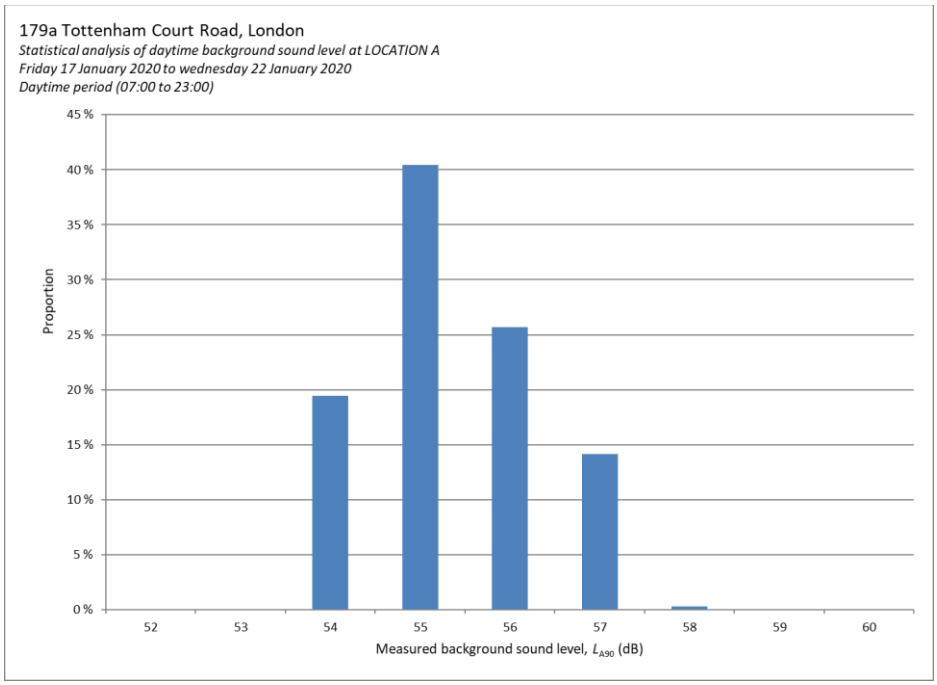

Figure 3 Histogram of background sound levels recorded during the daytime (07:00-23:00) at Location 'A'

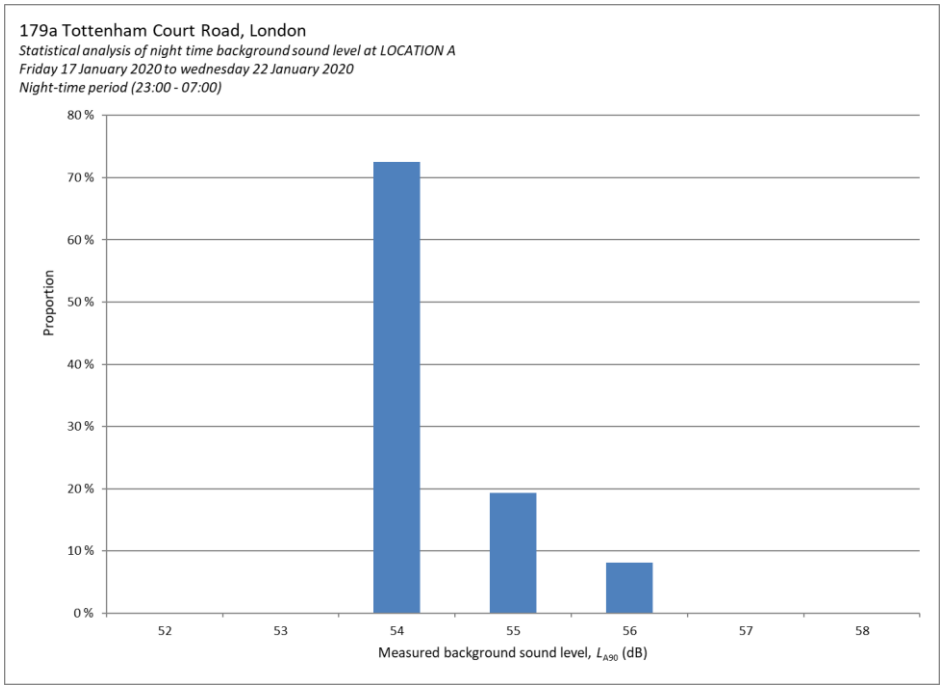

Figure 4 Histogram of background sound levels recorded during the night-time (23:00-07:00) at Location 'A'

5.3 Basic limits

Based on the requirements of the London Borough of Camden and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 2.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background noise levels by the addition of 3 dB. In this case these limits would apply at location 'A'.

Table 2 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Daytime (07:00-23:00)	48
Night-time (23:00-07:00)	47

[1] The limits set out in Table 2 do not include any attention catching features. A 5 dB penalty correction would apply to the limits if tonal components are present in plant noise emissions.

5.4 Plant noise assessment

An assessment of plant noise egress from the proposed rooftop plant has been carried out.

A Google Earth image showing the worst-affected windows of the nearest noise-sensitive premises relative to the location of the proposed rooftop plant is shown in Figure 5. The proposed rooftop plant location is marked 'X'.

The Royal National ENT and Eastman Dental Hospital (highlighted green in Figure 5) is located to north-east of the site approximately 30 m from the plant locations.

The nearest residential premises, Gordon Mansions and Brook House (highlighted in blue) are located approximately 39 m from the plant locations.

Figure 5 Aerial view of site showing the proposed rooftop plant location (courtesy of Google earth Pro)

5.4.1 Proposed plant items

There will be a total of 3 x Mitsubishi PURY-P400YNW-A and 3 x Mitsubishi PURY-P550YNW-A condenser units.

A screenshot of the proposed rooftop plant layout showing these unit locations is shown in Figure 6.

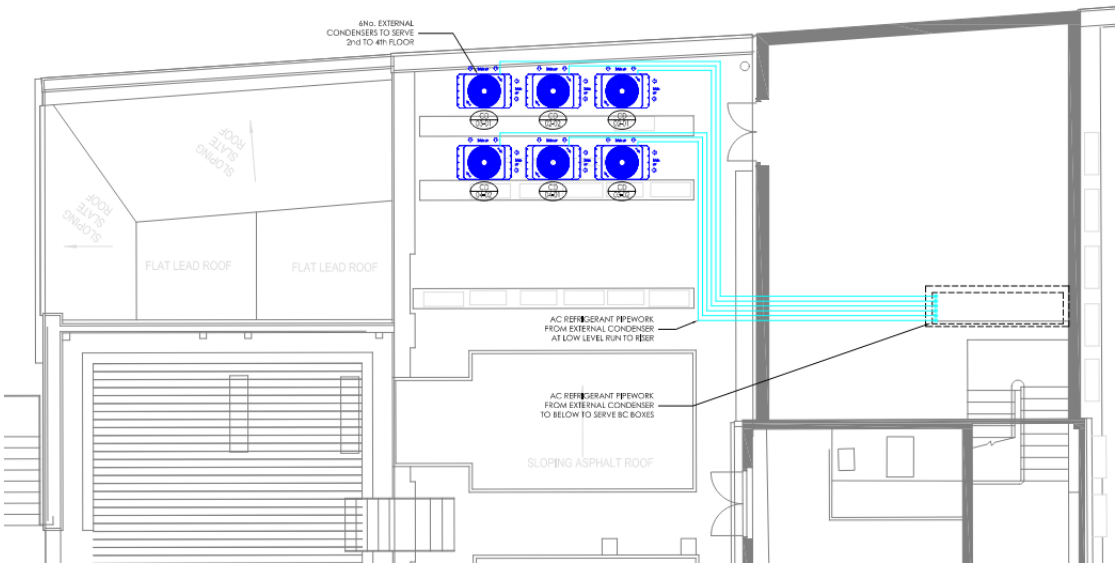

Figure 6 Screenshot of drawing showing proposed rooftop plant layout

Table 3 summarises the manufacturers plant sound power data for the proposed rooftop condenser units.

Table 3 Sound power levels of proposed rooftop condenser units (re 1 x 10^{-12} W)

Plant item	Octave-band centre frequency (Hz), Sound power level, L_w (dB)							
	63	125	250	500	1000	2000	4000	8000
PURY-P400YNW-A	81.0	69.5	69.5	68.0	62.0	59.0	64.0	48.5
PURY-P550YNW-A	77.5	68.0	71.0	69.0	63.0	60.5	56.0	54.0

5.4.2 Assessment summary

Based on the calculations that take into consideration attenuation with distance, directivity and facade reflections, the proposed plant items comply with the relevant basic noise limits set in Section 6.3 at the nearest noise-sensitive receiver positions.

Detailed plant noise calculations are included in Technical Appendix C.

6 Conclusion

The representative free field background sound levels from the noise survey were $L_{A90,15min}$ 55 dB during the day, and $L_{A90,15min}$ 54 dB during the night.

Based on the requirements of the London Borough of Camden, the relevant plant noise limits at 1 m from the windows of the worst affected existing noise sensitive premises are $L_{Aeq,15min}$ 48 dB during the day, and $L_{Aeq,15min}$ 47 dB during the night.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant noise emissions contain tonal components, the limits will be 5 dB more stringent than those set out above.

An initial assessment of the proposed plant items associated with the development has been carried out. The proposed plant items are expected to comply with the relevant basic noise limits set in Section 6.3 at the nearest noise-sensitive receiver locations.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00320633	Rion	25 May 20	TCRT18/1462
Microphone	UC-59/12576	Rion	25 May 20	TCRT18/1462
Pre-amp	NH-25/10641	Rion	25 May 20	TCRT18/1462
Calibrator	N7-74/34125430	Rion	15 May 20	TRCT18/1420

[1] Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meter used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 1°C at night and 11°C during the day, and the daily average wind speed varied between 1.3 m/s and 5.1 m/s.

Appendix B

Results of unattended measurements at Location 'A'

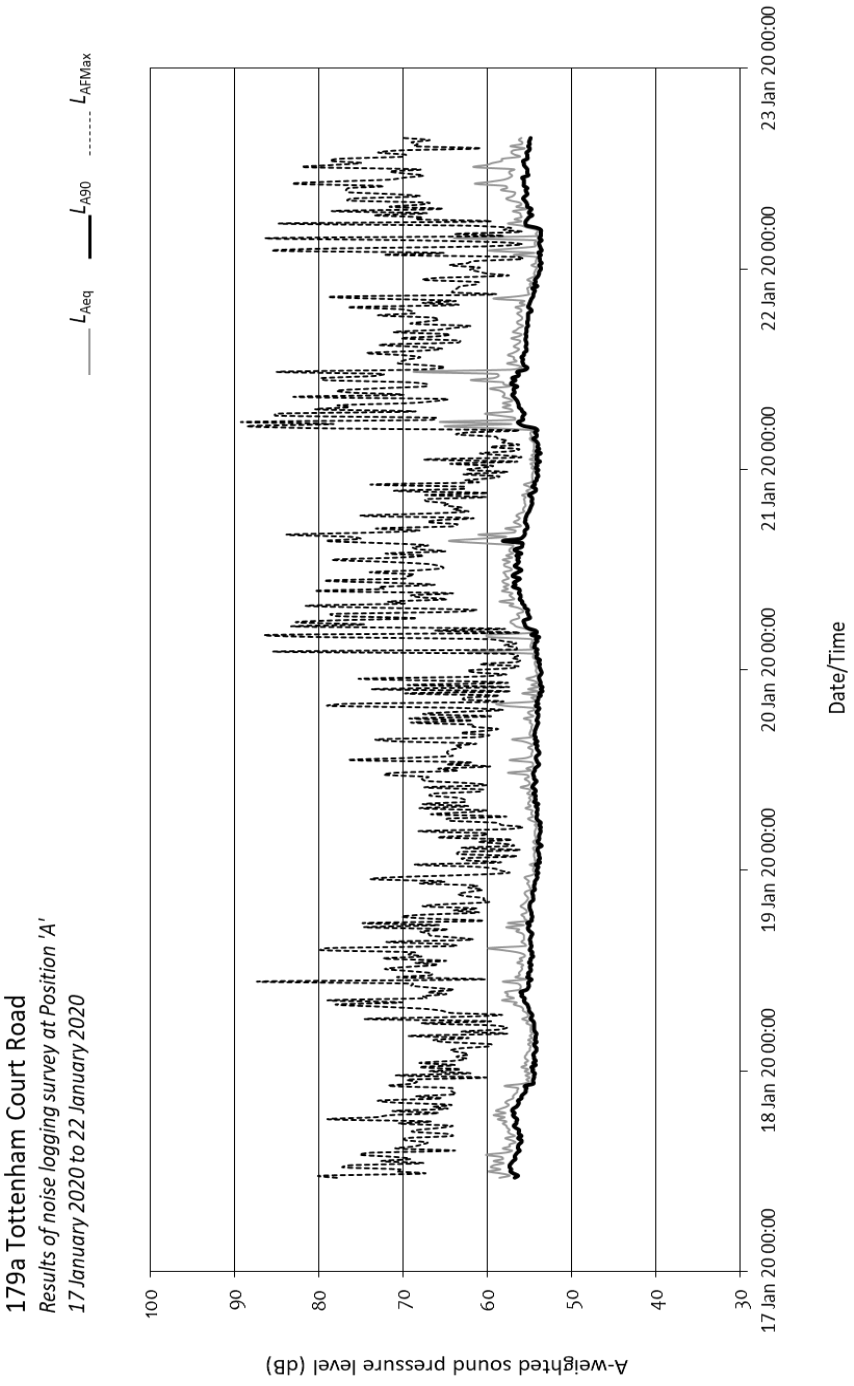

Figure B1 Time History at Location 'A', measuring at 15 minute intervals

Appendix C

Planning plant noise egress calculations

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

Project name	179a Tottenham Cour	**Project number**	20009
Calculation revision	A		
Engineer	EO	**Date created**	30/01/2020
Checked by	JM	**Date checked**	30/01/2020
Calculation description	Calculation of plant noise egress from proposed rooftop condenser units		

Comments	**Octave band centre frequency (Hz)**								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Plant item 1									
Sound power level	81	70	70	68	62	59	64	49	70
Adjustment to spectrum to be dBA	0	0	0	0	0	0	0	0	
Correction for 3 units	5	5	5	5	5	5	5	5	
Total sound power level	86	74	74	73	67	64	69	53	75
Losses									
Distance attenuation - Point source, r=30m Q=2	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	
Total losses	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	
Sound pressure level after losses	48	37	37	35	29	26	31	16	38
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	51	40	40	38	32	29	34	19	41
Plant item 2									
Sound power level	78	68	71	69	63	61	56	54	70
Correction for 3 units	5	5	5	5	5	5	5	5	
Total sound power level	82	73	76	74	68	65	61	59	75
Losses									
Distance attenuation - Point source, r=30m Q=2	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	
Total losses	*38*	*38*	*38*	*38*	*38*	*38*	*38*	*38*	
Sound pressure level after losses	45	35	38	36	30	28	23	21	37
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	48	38	41	39	33	31	26	24	40
Cumulative level									
Total facade sound pressure level at receptor	53	42	44	42	36	33	35	25	**43**
Criteria									
Criteria									47
Difference									-4

Figure C2 Facade sound pressure level at worst-affected window of ENT hospital 30m away

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

Project name	179a Tottenham Cour	**Project number**	20009
Calculation revision	A		
Engineer	EO	**Date created**	30/01/2020
Checked by	JM	**Date checked**	30/01/2020
Calculation description	Calculation of plant noise egress from proposed rooftop condenser units		

Comments	**Octave band centre frequency (Hz)**								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Plant item 1									
Sound power level	81	70	70	68	62	59	64	49	70
Adjustment to spectrum to be dBA	0	0	0	0	0	0	0	0	
Correction for 3 units	5	5	5	5	5	5	5	5	
Total sound power level	86	74	74	73	67	64	69	53	75
Losses									
Distance attenuation - Point source, r=39m Q=2	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	
Total losses	*40*	*40*	*40*	*40*	*40*	*40*	*40*	*40*	
Sound pressure level after losses	46	34	34	33	27	24	29	13	35
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	49	37	37	36	30	27	32	16	38
Plant item 2									
Sound power level	78	68	71	69	63	61	56	54	70
Correction for 3 units	5	5	5	5	5	5	5	5	
Total sound power level	82	73	76	74	68	65	61	59	75
Losses									
Distance attenuation - Point source, r=39m Q=2	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	
Total losses	*40*	*40*	*40*	*40*	*40*	*40*	*40*	*40*	
Sound pressure level after losses	42	33	36	34	28	25	21	19	35
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	45	36	39	37	31	28	24	22	38
Cumulative level									
Total facade sound pressure level at receptor	51	40	41	40	34	31	33	23	**41**
Criteria									
Criteria									47
Difference									-6

Figure C2 Facade sound pressure level at worst-affected window of Residential dwellings 39m away