



CHARTER HOUSE, PARKWAY, WELWYN GARDEN CITY AL8 6JL

BS4142 NOISE ASSESSMENT

19 October 2016



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1.0 INTRODUCTION

Aran Acoustics has been appointed to carry out a noise impact assessment for the proposed installation of external condenser units at Charter House, Welwyn Garden City.

A noise survey and assessment has been requested by the Local Planning Authority to ensure that noise levels from the condenser units does not cause undue disturbance to nearby noise sensitive locations.

The purpose of this assessment is to determine the existing noise levels at the nearest noise sensitive location and establish the maximum permissible noise levels from proposed units.

Such to establish suitable plant noise levels an assessment has been carried out to BS 4142: 2014 '*Method for rating and assessing industrial and commercial sound*'. This assessment has been benchmarked against an environmental noise survey carried out on 19 October 2016.

This report therefore describes the noise survey and its results. Figure 4.1 contains a graphical representation of the noise measurements taken on site. Section 5.0 provides the maximum permissible noise levels for the proposed plant. Section 6.0 provides an assessment of plant noise levels.

2.0 SITE DESCRIPTION

Charter House is located along Parkway in Welwyn garden City. The building forms part of an existing block of mixed use development. Proposals are to install 4 no. air conditioning units within the courtyard area to the rear of the building.

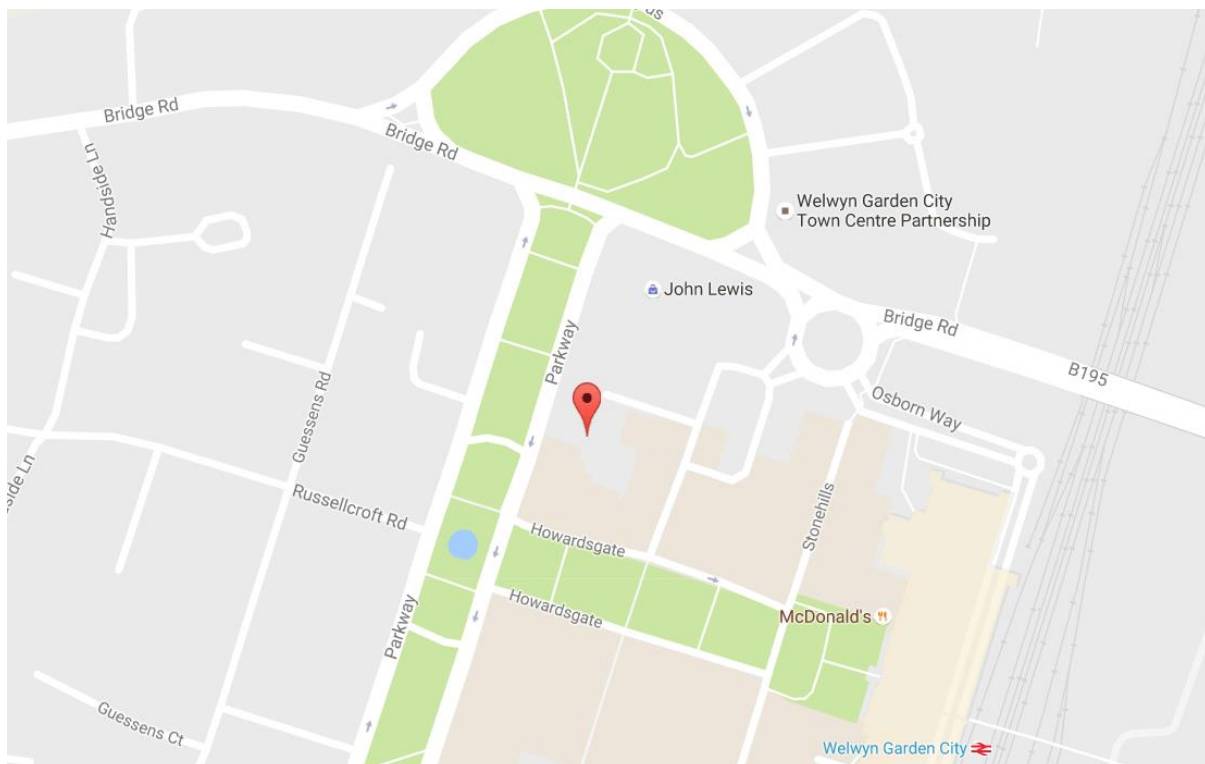
The building overlooks Parkway to the west and the adjoining building to the south is a Public House at ground floor level with residential units on the upper levels. The Pulic House contains a beer garden located to the rear of the premises.

The main courtyard area to the rear of the building is mainly used for car parking and provides access for deliveries to the rear of adjacent commercial premises.

It was noted that several existing air conditioning units along with other plant are located within the courtyard area servicing adjacent commercial premises as shown in the site photos contained within Appendix A.

A subjective noise assessment determined that the main noise sources in the area to impact nearby residential flats is vehicles entering and leaving the courtyard along with air conditioning units and other plant associated with adjacent commercial premises.

Figure 2.1 below shows a location map and aerial photo of the site and surrounding area.



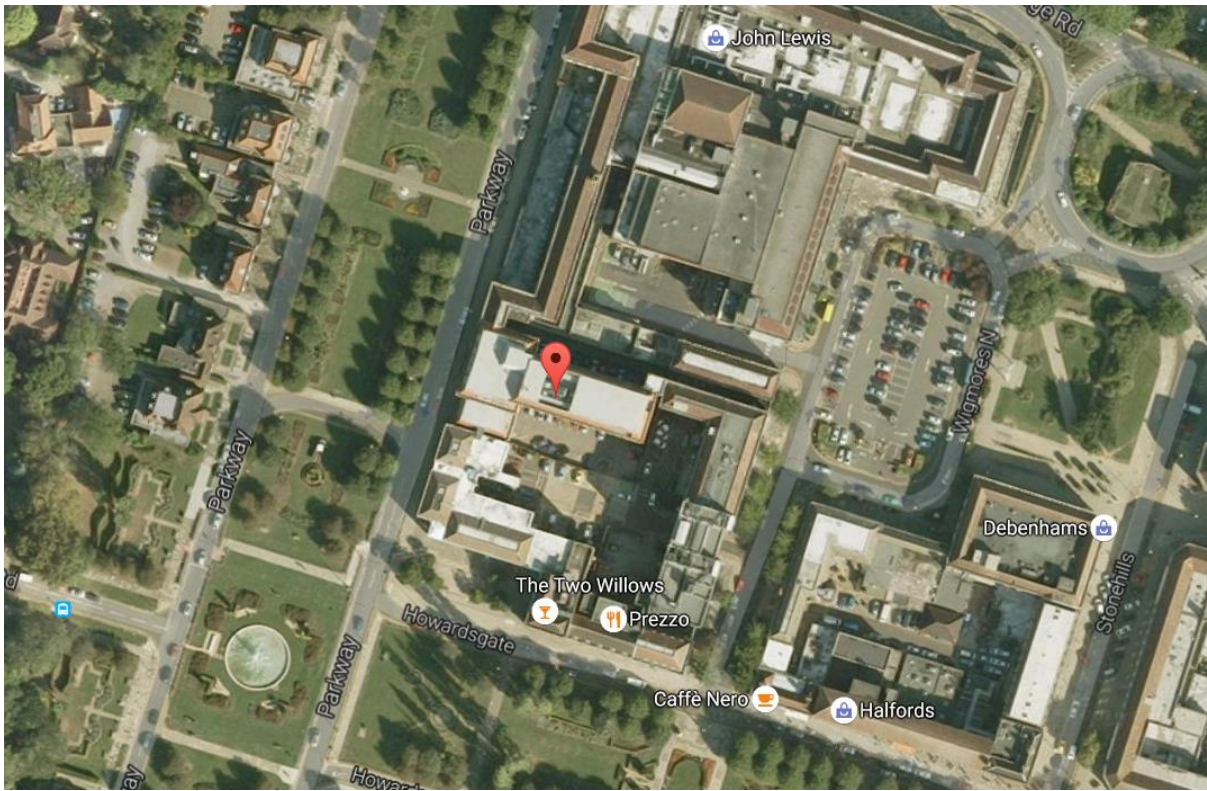


Figure 2.1 – Location map and aerial photo of the site

3.0 ENVIRONMENTAL NOISE SURVEY

A 24-hour environmental noise survey was carried out between Wednesday 19 and Thursday 20 October 2016. A single noise monitor was placed on site and located at first floor level within Charter House overlooking the rear courtyard. The microphone was situated next to the boundary wall of the adjacent residential flat. At this location the microphone was approximately 3 meters from the nearest residential window to the proposed location of the air condenser unit.

Noise levels measured at this location are considered representative of the existing environmental noise levels to impact the adjacent residential flat.

Figure 3.1 below provides a site photo of the microphone position.



Figure 3.1 - Site photos indicating measurement position

3.1 Measurement Equipment

The following measurement equipment was used, which complies with the performance specifications for a Class 1 device in accordance with BS EN 61672-1, BS EN 61260 and BS EN 60942.

Name	Serial Number	Last Calibrated	Calibration Due
Norsonic Precision Sound Analyser Type 140	1403701	Oct 2016	Oct 2018
Norsonic Type 1209 Pre-amplifier	13278	Oct 2016	Oct 2018
Norsonic Type 1225 Microphone	106867	Oct 2016	Oct 2018
CEL Sound Calibrator Type 284	10023283	Oct 2015	Oct 2016

Table 3.1 – Measurement equipment used on site

The meter was calibrated before and after testing - no deviations were found. The meter was set to measure consecutive 'A' weighted 15-minute samples. This time period is in line with BS 4142 requirements.

3.2 Weather Conditions

The weather was mainly fine and dry for the duration of the survey. Wind speed remained below 5 m/s. The temperature varied between approximately 11 and 16 °C. The weather conditions were seen as suitable for the measurement of environmental noise in accordance with BS 7445-1:2003 '*Description and measurement of environmental noise*'.

4.0 SURVEY RESULTS

The noise levels measured during the 24-hour survey period are shown in Figure 4.1 below. The full set of acoustic data measured on site is available upon request.

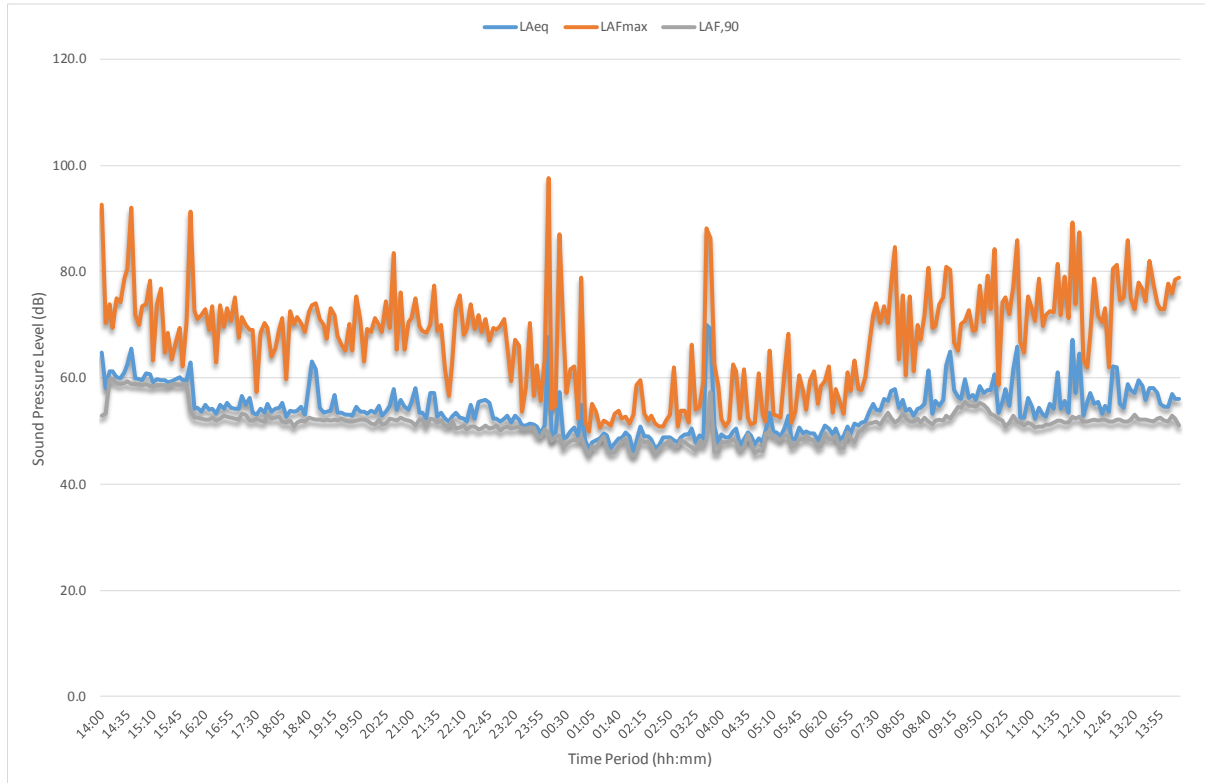


Figure 4.1 - Noise levels measured on site

The table below provides a summary of the noise levels measured on site at the fixed microphone position during the survey period including the representative background; L_{A90} .

Noise Descriptor	Daytime	Night time
	07:00 – 23:00 hours	23:00 – 07:00 hours
Average Noise Level, L_{Aeq}	57.5	55.4
Representative Background, L_{A90}	52.1	48
Maximum Noise Level, L_{Amax}	92.7	97.7

Table 4.1 - Summary of measured noise levels

5.0 BS4142 ASSESSMENT CRITERIA

BS 4142:2014 describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a specific noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. BS 4142 states that:

- 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.

This standard also allows for an appropriate correction for the acoustic features present in the noise using a number of methods. A correction should be applied if one or more of the following features (see the list below), are present within the noise sources in question.

- The noise is of a tonal nature, i.e. it contains a distinguishable, discreet, continuous note such as whine, hiss, screech, hum;
- The noise is impulsive, i.e. it contains distinct impulses such as bangs, clicks, clatters, or thumps;
- The noise contains other characteristics that are neither tonal nor impulsive but is irregular enough to attract attention.

5.1 Summary of Guidance Documentation

It can be concluded from BS4142 guidance document and that noise levels from plant and equipment associated with the development should not exceed -10 dB below the background noise level when measured at the nearest noise sensitive location. This target has been imposed upon similar developments and is seen as a suitable design target where complaints are deemed unlikely.

5.2 Target Plant Noise Levels

It is understood that the air condenser units will operate intermittently throughout the day and night time periods therefore Aran Acoustics propose that noise levels from plant should not exceed -10 dB below the background noise level when measured at the nearest noise sensitive location. This target has been imposed upon similar developments and is seen as a suitable design target where complaints are deemed unlikely.

It is considered that the external condenser units produce a broadband noise with no tonal features. The units are also inverter driven, meaning that the unit will gradually increase or decrease its operating capacity depending on the level of duty required. This gives a positive indication that the noise produced is not immediate or distinguishable therefore no correction need be applied to the results.

Based on the lowest measured background noise level during the proposed operating period and the suggested design targets including any tolerance or correction factors, the following table shows the maximum permissible noise level from the condenser unit when measured at the window of the nearest residential receptor.

Representative Background, L_{A90}	Tolerance Factor	Correction Factor	Max Noise Level at Residential
48 dBA	-10 dB	-0 dB	38 dBA

Table 5.1 - Plant Noise Level Target

Based upon the measurement results in Section 4.0 and noise level criteria provided within this section, it can be seen that noise levels from the proposed external condenser unit should not exceed 38 dBA when measured at the nearest noise sensitive receptor.

Note that noise levels have been rounded to the nearest whole number for assessment purposes in accordance with BS4142:2014.

6.0 PLANT NOISE LEVEL ASSESSMENT

The external condenser units are to be installed within an undercroft area below the existing offices in Charter House as indicated on the site plans in Appendix A. Based on this location, there is no direct line of sight between the units and the nearest residential window of the adjoining property due to retaining walls.

The 4 No. units are all inverter driven. The following table provides the manufacturers sound pressure level for each individual unit when measured at 1m and combined sound pressure level for all 4 units running simultaneously. Manufacturers technical data sheets are contained in Appendix B.

Description	Octave Band Centre Frequency, Hz, dB							dBA
	63 Hz	125 Hz	250 Hz	500 Hz	1.0 K Hz	2.0 K Hz	4.0 K Hz	
Sound Pressure Level – 1 Unit	67.6	60.4	58.7	51.2	47.8	41.8	33.1	54.6
Sound Pressure Level – 4 Units	73.6	66.4	64.7	57.2	53.8	47.8	39.1	60.6

Table 6.1 - Octave Band Data for typical Condenser Unit

Using the noise level data in Table 6.1, further calculations were carried out to determine the noise levels from the units at the nearest residential window.

Based on the proposed location of the condenser units the distance to the nearest residential window is estimated to be 15.5m with no direct line of sight due to the retaining wall. At distance, noise levels from the units of plant can be considered as a point source and sound will decay at a rate of 6dB per doubling of distance.

Due to no direct line of sight between the source and receiver, a barrier correction has also been included within our calculations.

Calculations show that the combined noise level from all condenser units running simultaneously including attenuation losses will be approximately **21 dBA** when measured at the nearest residential window. This is below the target plant noise level of **38 dBA** established in Section 5.0 above. This is considered a positive indication that complaints are unlikely therefore no further mitigation is proposed.

The plant noise calculation sheet is provided in Appendix C.

7.0 SUMMARY AND CONCLUSION

A noise survey was carried out at the proposed location of air condenser units at Charter House, Parkway, Welwyn Garden City on the 19 October 2016.

From this survey the minimum representative background noise level at the nearest sensitive property was found to be 48 dB L_{A90} during the proposed operational hours.

Using guidance in BS 4142, noise levels from the proposed external plant associated with the development should not exceed -10 dBA below the background noise level at the window of the nearest residential dwelling.

Based on manufacturer's noise level data for the proposed plant, calculations show that noise levels at the nearest noise sensitive façade would be approximately 21 dBA. This does not exceed the maximum permissible noise level target of 38 dBA therefore complaints are deemed unlikely.

APPENDIX B – TECHNICAL DATA SHEETS

Data sheet



Project: C1121 Rabone DC
Editor: Martin Bennett
Date : 25.06.2015

Unit

Unit type:	ASD 812 A		
Cooling capacity (total):	80.1 kW	Airflow:	16,980 m ³ /h
Cooling capacity (sensible):	80.1 kW	Air velocity:	2.1 m/s
Net total cooling capacity:	78.5 kW	Return air temperature:	28 °C
Net sensible cooling capacity:	78.5 kW	Return air humidity:	40 rel. %
Condensing temperature:	50 °C	Supply air temperature:	14 °C
EER:	4.05 kW/kW	Altitude above sea level:	0 m
Sound power level:	75.1 dB(A)	Height:	1,980 mm
LpA (2m freefield):	54.2 dB(A)	Width:	2,550 mm

1.2 Sound data

1.2.1 Data for 50 Hz

Distance 5000mm		63 [Hz]	125 [Hz]	250 [Hz]	500 [Hz]	1000 [Hz]	2000 [Hz]	4000 [Hz]	8000 [Hz]	Total
M1	Lw [dBA]	64,1	62,2	69,1	67,3	68,3	63	53,1	38,8	74,3
	LpA [dBA]	38,4	36,5	43,4	41,6	42,6	37,3	27,3	13,1	48,5
	Lp [dB]	64,6	52,6	52,0	44,8	42,6	36,1	26,3	14,2	65,1
M2	Lw [dBA]	63,4	64,1	69,1	66,8	68	63,8	54,3	45,5	74,3
	LpA [dBA]	37,7	38,4	43,3	41,1	42,3	38,1	28,6	19,8	48,5
	Lp [dB]	63,9	54,5	51,9	44,3	42,3	36,9	28,6	20,9	64,7
M3	Lw [dBA]	72,3	68,8	67,1	70,7	75,2	71,8	63,6	51	79,7
	LpA [dBA]	46,6	43,0	41,3	44,9	49,5	46,1	37,8	25,3	53,9
	Lp [dB]	72,8	59,1	49,9	48,1	49,5	44,9	36,8	26,4	73,0
M4	Lw [dBA]	67,9	67,5	68,9	70,5	71,6	66,8	56,8	43,3	77,0
	LpA [dBA]	41,9	41,5	42,9	44,6	45,6	40,8	30,8	17,4	51,1
	Lp [dB]	68,1	57,6	51,5	47,8	45,6	39,6	29,8	18,5	68,8
M5	Lw [dBA]	73,8	71,3	73,5	76,2	79	75,5	67,3	55,0	83,5
	LpA [dBA]	47,8	45,3	47,5	50,2	53,1	49,5	41,3	29,0	57,5
	Lp [dB]	74,0	61,4	56,1	53,4	53,1	48,3	40,3	30,1	74,4
* M6	Lw [dBA]	67,5	70,4	76,3	74,1	73,9	69,1	60,2	49,1	80,7
	LpA [dBA]	41,4	44,3	50,1	48,0	47,8	43,0	34,1	23,0	54,6
	Lp [dB]	67,6	60,4	58,7	51,2	47,8	41,8	33,1	24,1	68,9

APPENDIX C – PLANT NOISE CALCULATION SHEET

Charter House - Condenser Units

Plant Noise Calculation

Barrier Attenuation

$$A_b = 10 \log_{10} (3 + G \delta / \lambda) \text{ dB}$$

Distance Attenuation

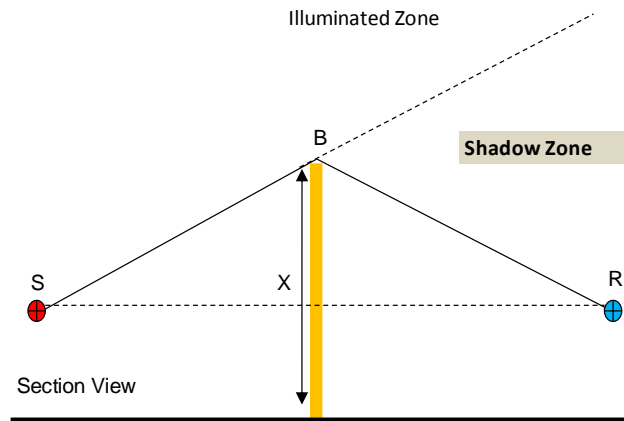
$$A_d = 20 \log_{10} (D + \delta) \text{ dB}$$

Geometry of Field

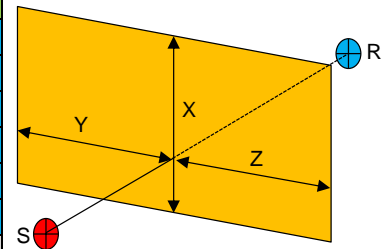
S: Source Noise

B: Barrier

R: Receiver



Dimensions	Path 1	Path 2	Path 2
Distance between Source and Receiver	15.5	0.0	0.0
Distance between Source and Barrier	12.2	0	0
Barrier Dimensions X, Y, Z	6	0	0
Source Dimension	0	0	0
Receiver Height	0	0	0
Radiation Factor (Q)	8	0	0
Path Difference δ	4.943	0.000	0.000
Use this Source	TRUE	FALSE	FALSE



Frequency (Hz)	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
Condenser Unit (Lp)	73.6	66	65	57	54	48	39	30	61
Barrier Attenuation	-16	-19	-22	-25	-28	-31	-34	-37	-
Distance Attenuation	-26	-26	-26	-26	-26	-26	-26	-26	-
Q Factor	9	9	9	9	9	9	9	9	-
Source 1 Level at Receiver (dB)	40.3	30.3	25.7	15.2	8.8	-0.2	-11.9	-23.9	21
Sound Power Spectrum 2 (Lw)	0.0	61	73	74	74	73	69	60	-
Barrier Attenuation	0	0	0	0	0	0	0	0	-
Distance Attenuation	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	-
Q Factor	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	-
Source 2 Level at Receiver (dB)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Sound Power Spectrum 3 (Lw)	0.0	61.4	66.4	61.4	59.4	56.4	51.4	49.4	-
Barrier Attenuation	0	0	0	0	0	0	0	0	-
Distance Attenuation	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	-
Q Factor	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	-
Source 3 Level at Receiver (dB)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
Noise Level at Receiver (dB)	40.3	30.3	25.7	15.2	8.8	-0.2	-11.9	-23.9	21.1

Minimum Mass of Barrier \geq #VALUE!