



Azymuth Acoustics UK

Professional Acoustic Services

Noise Impact Assessment

Ref: Z54116

Independent School

Redby Street,
Manchester,
M11 2NP

On behalf of

Create it Studio Architects

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Manchester,
M12 6JH



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1.0 Introduction

Azymuth Acoustics UK (AAUK) has been contracted by Create it Studio Architects to provide a Noise Impact Assessment (NIA) to support the planning application for an independent school on Redby Street, Manchester, M11 2NP.



Figure 1 - Redby Street independent school proposed 3D drawing

This noise impact assessment is intended to provide information relating to potential noise levels affecting the site in order to support the detailed planning application for the development. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken in the vicinity of Redby Street, Manchester.
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development.
- Recommendations to meet the targets set out by the assessment criteria.

1.2 Site Layout

The site is intended to be an independent school with provisions for nursery care, primary education and secondary education consisting of 27 classrooms, 3 libraries, 4 science labs and 2 IT labs. There are nominally 14 car parking spaces associated with the scheme.

The location is shown in the figure below, and intends to build upon Redby Street, a now blocked minor road connecting Ashton Old Road and Whitworth Street.



Figure 2 - Proposed location and layout of site, taken from drawing A1417(02)AP001

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the environmental noise survey consisted of a SvanTek 959/977 type 1 precision sound level meter. The equipment was calibrated before and after the noise measurements. The sound level meter measured at A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

Daytime noise surveys took place between 13:21hrs and 15:12hrs on Tuesday 17th May 2022 and between 09:52hrs and 11:18hrs on Wednesday 18th May 2022.

The ambient noise measurements were undertaken using the sound level meter at the positions shown in figure 2:

- Position 1: Ashton Old Road
- Position 2: Whitworth Street
- Position 3: Redby Street



Figure 3 - Noise measurement locations, shown in reference to location plan.

Full results of the noise levels recorded during the course of the survey are included in Appendix B of this report.

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime level.

Location	L _{AFMax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
1) Ashton Old Road	86.4	71.3	73.6	67.3	58.8
2) Whitworth Street	74.0	62.6	57.5	51.7	48.4
3) Redby Street	68.8	56.6	59.1	54.6	49.7

Table 1 – Summary Results of surveys conducted for this project.

2.2 Noise climate

The noise climate within the area consisted of noise from Ashton Old Road, with small amounts of noise from vehicles and pedestrians on Whitworth Street.

Weather during the measurement periods was dry. Wind speeds were approximately 5mph.

2.3 Nearest residential receptor

AAUK has determined the nearest residential receptor to be above the restaurant on the opposite site of Ashton Old Road (shown below).



Figure 4 – Marked location plan showing assumed nearest residential location.

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics UK has reviewed various guidance documents and standards, these include:

- National Planning Policy Framework (NPPF 2021)
- World Health Organisation Guidelines on Community Noise
- British Standard 4142:2014
- BB93 Acoustic Design of Schools: Performance Standards
- Manchester City Council Planning & Noise Technical Guidance (2015)

3.1 National Planning Policy Framework (NPPF) 2021

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 185 of the National Planning Policy Framework (NPPF) states that planning policies and decisions should aim to:

- Avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions

The National Planning Policy Framework states that the planning system should 'prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'.

3.2 World Health Organisation Environmental Noise Guidelines (ENG) 2018

The main purpose of the 2018 WHO guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from the following sources: transportation (road traffic, railway and aircraft), wind turbines and leisure activities.

The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Exposure limits are average levels defined over a period of one year, measured outdoors in free field at the most exposed façade. It should be noted that the document does not provide guideline limit values for multiple noise sources in combination.

The 2018 guidelines supersede the Community Noise Guidelines from 1999. Nevertheless, the document recommends that all CNG indoor guideline values and any values not covered by the current guidelines should remain valid. As such, the following guidance would remain appropriate:

For protection against sleep disturbance inside dwellings, night time noise levels should not exceed 30dB LAeq for continuous noise and 45dB L_{Amax} for typical single sound events (which are exceeded 15 times or more per night – see ProPG Appendix A.12 for more details). To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise (interpreted as noise from all sources combined) should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas.

It should be noted that exposure levels defined in ENG and CNG are for guidance purposes as relates potential adverse health impacts and should not be interpreted as absolute limits or regulations.

3.3 British Standard 4142:2014

British Standard 4142: 2014 “Methods for assessing and rating industrial sound” describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- Typically, the greater the difference between background sound and industrial/commercial noise, the greater the magnitude of the impact.
- 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.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- A difference of around + 10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

BS 4142 notes 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.”

3.4 Building Bulletin 93

Building Bulletin 93 (BB93) outlines minimum performance standards for the acoustics of school buildings and describes the normal means of demonstrating compliance with building regulations.

The table below specifies the upper limit for the indoor ambient noise level in terms of $L_{Aeq,30mins}$ during normal teaching hours as outlined in BB93. This level excludes contributions from:

- Teaching activities within the school premises
- Equipment used in the space
- Rain Noise (however suitable control of rain noise should be provided, with levels not exceeding the indoor ambient noise level targets by more than 25dB)
- External ambient /environmental noise breaking in via the building fabric (with a consideration of the ventilation strategy)

The below table includes all room types in the project, and the target indoor ambient noise level as stated in Table 1 of BB93. This report assumes there are no teaching spaces intended specifically for students with special hearing and communication needs.

Room Type	Upper limit for indoor ambient noise $L_{Aeq,30mins}$ (dB)
Classroom	35
Science Lab	40
IT Room	40
Library	40
Dining Hall	45
Sports Hall	40
Office	40
Medical	40

Table 2 – Upper limits for indoor ambient noise levels on a room by room basis.

3.5 Manchester City Council Planning & Noise Technical Guidance (2015)

For Industrial & Commercial developments, Manchester City Council (MCC) suggests an assessment based upon BS 4142 is performed. From this, rating level relative to the background sound level can be used to indicate the adverse impact of the development. The lower the rating level (L_{Aeq}) relative to the background sound level (L_{A90}), the lower the likelihood of an adverse impact. The objective with regards to plant noise is as follows:

3.6 Recommended Noise Assessment Criteria

As this assessment covers both the impact of noise upon the proposed development, and the impact of noise from the site upon the local area a variety of assessment criteria should be used. As such the recommended criteria is as follows:

- Indoor ambient noise levels to be below the limits described in Table 1 of BB93
- Plant equipment to achieve a BS4142 rating level of 5dB below the typical background level (L_{A90}) at the nearest receptor

4.0 External Sound Insulation

Proper external sound insulation will be necessary to provide compliance with the ambient noise targets outlined in BB93, as shown in section 3.6 above. This will consist of:

- External Walls
- Roof
- Glazing
- Ventilation

AAUK has used both the results from the noise survey undertaken and modelling to determine the minimum requirements necessary to achieve the target indoor ambient level in these classrooms.

4.1 Noise Modelling Across the Site

AAUK has created a noise model of the existing and proposed sites in SoundPlan 8.1 to determine the required external sound insulation required for the proposed development. This model was created using the data measured in the surveys as a reference to provide estimates of the noise level generated by the nearby roads. The estimated impact upon the local area is shown below, with the proposed development in the intended location.

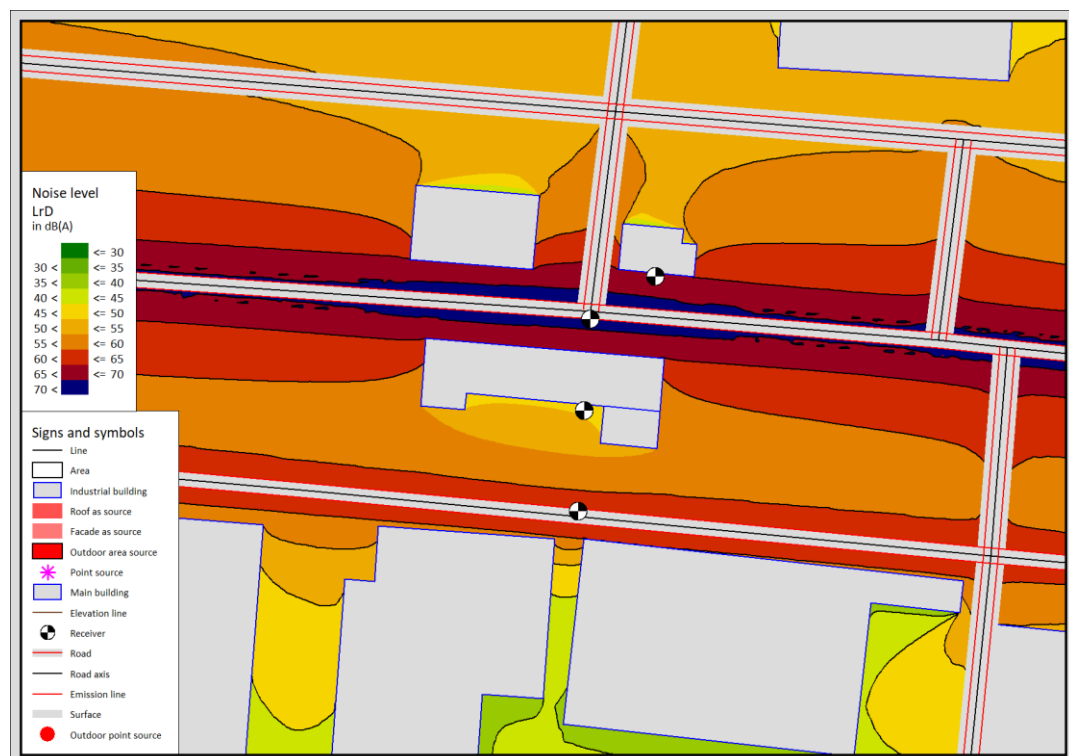


Figure 5 – Noise contour map showing the daytime sound levels at proposed development

Along with noise contours, SoundPlan 8.1 also enabled AAUK to generate a façade noise map of the proposed development. This was used to determine a worst-case noise level at each façade. A graphic of the façade noise map is shown below, along with a table containing the worst-case noise level at each façade.

Façade	Calculated worst-case noise level (dB)
S	56
E	66
N	70
W	66

Table 3 – Predicted worst-case levels for each façade of the proposed development.

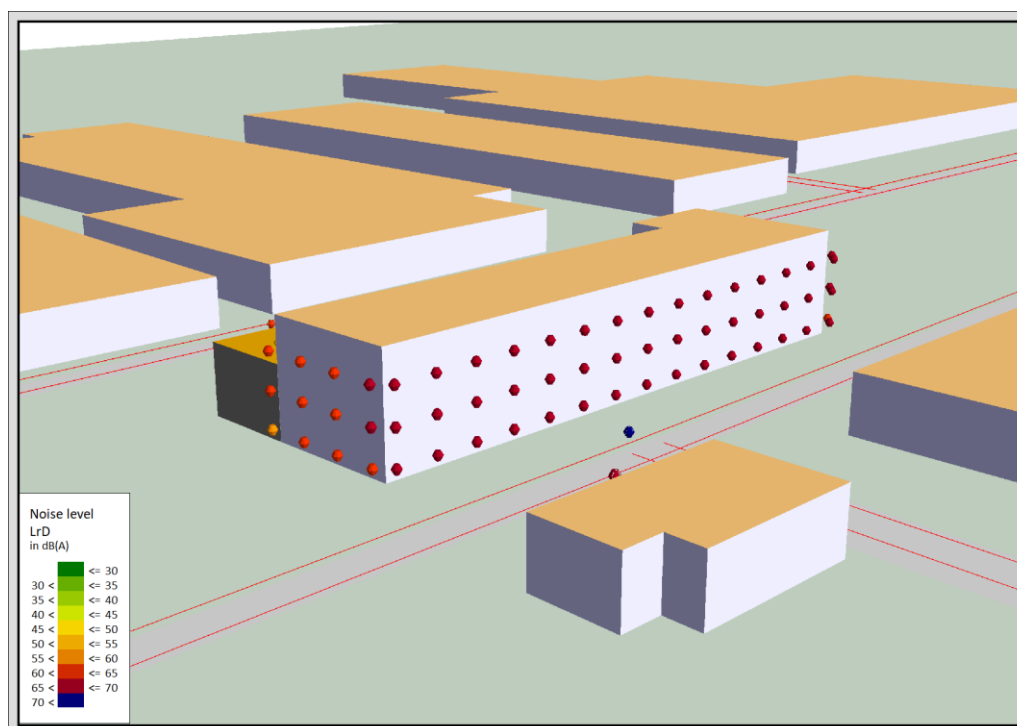


Figure 6 – Façade noise map showing the effects of Ashton Old Road upon the North and East façades

4.2 Sound Insulation of External Walls

The minimum recommended sound insulation for the external walls is R_w 50 dB . This minimum is likely to be significantly exceeded by a normal brickwork façade. Where alternative external wall types are proposed on habitable areas it will be appropriate to check that they comply with the R_w 52dB target.

4.3 Sound Insulation of the Roof

The minimum recommended sound insulation for roof constructions is R_w 45dB. This minimum would likely be exceeded by a suitably insulated concrete roof or composite flat roof with sufficient surface mass and mineral wool insulation layers. (NB for composite flat roof build-ups a minimum 200mm roof void and 100mm mineral wool insulation would be recommended over and above the rigid insulation required to provide the required levels of thermal insulation).



4.4 Sound Insulation of Glazing

The below table shows the minimum sound insulation required for windows on each façade, with higher requirements on the North and South façades.

Façade	Calculated worst-case noise level (dB)	Lowest internal noise target (dBA)	Minimum sound insulation required (dB)	Example glazing specification
S	56	35	R_w 29 / R_w + Ctr 25	4mm / (6-16mm) / 4mm double glazing (i.e. standard double glazing)
E	66	40	R_w 29 / R_w + Ctr 25	4mm / (6-16mm) / 4mm double glazing (i.e. standard double glazing)
N	70	35	R_w 40 / R_w + Ctr 34	Acoustic glazing 6 mm / 16 mm argon / 6.8 mm Pilkington Optiphon™
W	66	40	R_w 29 / R_w + Ctr 25	4mm / (6-16mm) / 4mm double glazing (i.e. standard double glazing)

Table 4 – Recommendations for glazing based upon internal noise targets for different spaces.

4.5 Acoustic Ventilation Strategy

AAUK recommends the following ventilation strategy for rooms having external windows onto the north, south, east and west façades.

Primary Façade of noise sensitive rooms	Calculated worst-case noise level (dB L_{Aeq})	Recommended Ventilation Strategy
S	56	Natural ventilation is generally acceptable
E	66	Hybird/Mixed-mode ventilation or mechanical ventilation
N	70	Hybird/Mixed-mode ventilation or mechanical ventilation
W	66	Hybird/Mixed-mode ventilation or mechanical ventilation

Table 5 - Recommendations for glazing based upon internal noise targets for different spaces

5.0 External Noise

5.1 External Plant noise limit

The daytime background noise level at the nearest receptor (the dwelling above the restaurant opposite) is 59dB L_{A90} . Based on the plant in the current proposed location (shown below), a plant noise limit of:

- 60dB SPL @ 1m from atmosphere connections or externally mounted / roof mounted plant (noise limit to apply to any individual item of plant).
- All plant should be reviewed against this target before installation to ensure that compliance is achieved.
- Compliance with this noise limit should ensure that a target of not greater than 54dBA is achieved at the nearest residential receptor.

NB if any items of plant are proposed to run beyond 2200hrs or earlier than 0700hrs then an additional review of the night-time noise climate and any associated noise limits may be required.

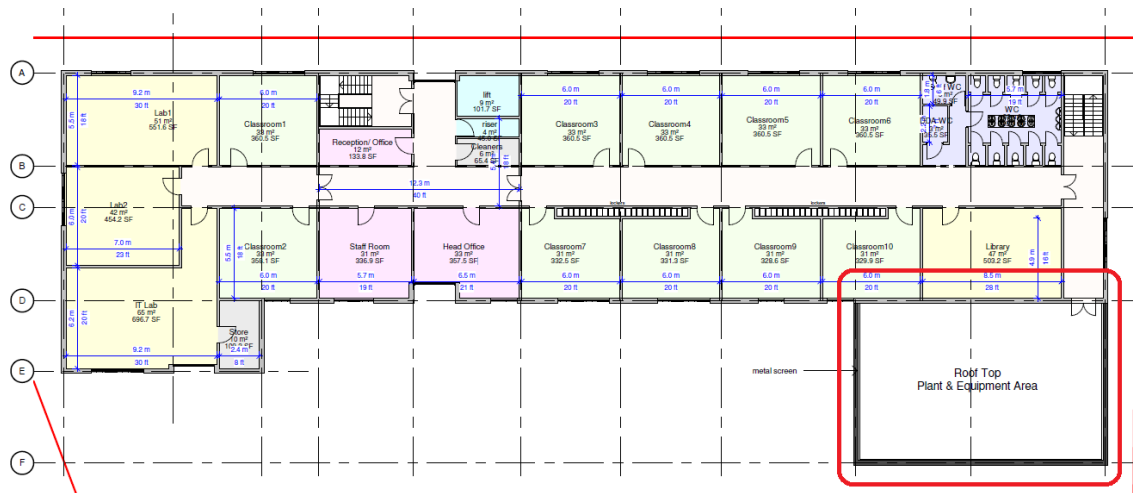


Figure 7 – Location of roof top plant, taken from 2nd floor plan.

5.2 Traffic noise from the development

The volumes of traffic that would be generated by the small number of proposed parking spaces on the site is not going to be a significant source of noise and on this basis has been scoped out of the assessment.

6.0 Summary

AAUK has conducted a noise survey at the site of the proposed development, and recommends the following to ensure the prevention of issues arising from break-in and break-out noise:

- Normal external wall and roof constructions
- Glazing specification as per table 4 (R_w 40 dB / $R_w + C_{tr}$ 34 dB for the north facing elevation which experiences the highest noise levels)
- Ventilation strategy does not rely upon openable windows except on the south elevation where the noise levels are somewhat lower
- External plant environmental noise limit of 60dBA @ 1m (from any individual item of external plant or atmosphere connection)



Appendix A – Glossary of Acoustic Terms

Decibel (dB)

This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)

This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level

The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}

This is the equivalent steady sound level in dB (A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})

This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)

Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

$SRI = L_1 - L_2 + 10 \log (S/A)$, where:

L_1 = Noise level in the source room

L_2 = Noise levels in the receiving room

S = Surface area of test specimen

A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)

This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.



Appendix B – Noise Survey Data

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
17 th May 2022							
13:21:00	2	00:05:00	70.9	55.7	57.7	51.2	48.4
13:26:00	2	00:05:00	93.6	73.6	65.5	53.5	48.9
13:31:00	2	00:05:00	75.7	56	58.2	51.1	46.5
13:36:00	2	00:05:00	67.4	52.4	53.7	49.7	46.5
13:41:00	2	00:05:00	66.5	51.7	52.8	50.3	48.4
13:46:00	2	00:05:00	72.5	54	54.7	51.5	48.8
13:58:00	1	00:05:00	82.5	70.4	74	67.2	57
14:03:00	1	00:05:00	89.9	71.1	73.7	67.2	59.1
14:08:00	1	00:05:00	102.9	75.6	72.6	67.2	61.1
14:13:00	1	00:05:00	86	70.8	73.6	67.3	61
14:18:00	1	00:05:00	83.3	70.5	73.4	67.4	60.9
14:23:00	1	00:05:00	84	71	74.1	67.7	58.2
14:28:00	1	00:05:00	82	69.7	73.3	67.4	58.6
14:33:00	1	00:05:00	85.3	70.8	74.2	68	59.4
14:38:00	1	00:05:00	82.4	69.7	73	67.3	59.6
14:43:00	1	00:05:00	84.1	71.1	74.4	68.4	57.7
14:48:00	1	00:05:00	88.5	71.1	74.2	65.6	56
14:53:00	1	00:05:00	85.6	70.1	73	66.9	57.3
15:07:00	2	00:05:00	69.9	54.7	56.8	51.5	49.4
15:12:00	2	00:05:00	77.6	57.7	57.1	50.3	45.8
18 th May 2022							
09:52:00	2	00:05:00	79.2	62.9	65.3	53.6	50.4
09:57:00	2	00:05:00	77.6	56.5	56.7	53.2	49.7
10:02:00	2	00:05:00	73.9	57.1	57.7	52.5	48.7
10:07:00	2	00:05:00	76.8	57.3	56.3	51.2	48.2
10:12:00	2	00:05:00	76.7	56.7	56.6	51.9	49.3
10:17:00	2	00:05:00	72.7	56.2	57.7	51.7	48
10:22:00	2	00:05:00	59.7	51.2	53.2	50.7	48.5
10:27:00	2	00:05:00	70.4	54.3	54.9	51.9	49.6
10:32:00	2	00:05:00	77.3	60.3	62.6	52.9	47.6
10:38:00	3	00:05:00	65.8	55.4	58.5	53.7	49.1
10:43:00	3	00:05:00	72	55.6	58.1	53.5	48.5
10:48:00	3	00:05:00	77.6	57.9	59.7	55.2	48.9
10:53:00	3	00:05:00	66.6	57	60.7	54.7	49.3
10:58:00	3	00:05:00	65.5	55.5	58.2	54.5	50.2
11:03:00	3	00:05:00	65.8	56.3	58.9	55.5	51.2
11:08:00	3	00:05:00	64	55.7	58.7	54.6	50.7
11:13:00	3	00:05:00	74	58.2	59.7	54.3	49.8
11:18:00	3	00:05:00	67.8	56.4	59.4	55	49.6

Table B 1 – Full tabulated results of daytime noise survey

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