



Report: Noise Impact Assessment
Ref: 50-047-R1-1
Date: 21st August 2019



NOISE IMPACT ASSESSMENT

13 St. John Street, Manchester
Manchester

Prepared for:



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Date Issued: 21st August 2019

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EXECUTIVE SUMMARY

BACKGROUND

Site Address	13 St. John Street, Manchester, M3 4DQ
National Grid Reference	E 383411 N 397912
Proposed Development	Proposed change of use from commercial to residential properties.
Report Objectives	The objectives of this report are to: Assess the potential impact of existing road traffic and surrounding commercial/public activity upon future residents. The report follows current and relevant British Standards in order to provide a robust assessment.

ASSESSMENT

Surveys Completed	Unattended ambient noise surveys were completed on both the north and south facing facades to monitor the existing sound climate of both St John Street and Camp Street. Both meters took measurements over a full weekday and weekend period. This allowed for the quantification of worst-case daytime and night-time noise levels at both facades.
Assessments	E3P has undertaken an assessment of noise to determine the external noise levels incident upon the north and south facing facades. Internal noise levels were then calculated and then compared to the criteria given in BS 8233:2014. Consideration has been given to living rooms and bedrooms within the dwelling.
Mitigation Requirements	This report has assessed the suitability of the proposed secondary glazing as well as the existing façade composition. This report has shown that the proposed secondary glazing will be sufficient in controlling external to internal break-in. However, an alternative ventilation system is required in order to maintain suitable internal noise levels whilst not compromising background ventilation and air flow within the habitable rooms.

CONCLUSIONS

This assessment has shown that no adverse impact is predicted day or night within the habitable rooms due to the existing sound climate.

As such, noise need not be a material consideration in the granting of planning permission as long as the recommendations of this report are followed and included within the design stage.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by BTP Architects to undertake a Noise Impact Assessment for a proposed change of use of an existing commercial property to residential on St John Street in Manchester, to be referred to hereafter as '*the Site*'.

This assessment looks to determine the potential impact of existing sound sources upon the proposed sensitive development.

1.2. PROPOSED DEVELOPMENT

BTP Architects intend to develop the existing commercial usage for residential use. It is understood that the property is Grade 2 listed so existing windows and internal coving details cannot be changed.

The main sources of noise impacting upon the Site is road traffic sound associated with both St John Street to the North and Camp Street to the south, which both run parallel to site. Furthermore, pedestrian activity is audible from around the local area.

This assessment has been undertaken in accordance with the following supplied drawings:

-  Site Layout Plan (Drawing Number SJ-BTP-00-LP-DR-A-3521_100) dated 12th July 2019

The Proposed Site Layout is shown in Figure 1 of Appendix II.

1.3. LIMITATIONS

Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative and reliable in order to inform an accurate assessment.

Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance.



2. ASSESSMENT METHODOLOGY

2.1. NATIONAL PLANNING POLICY FRAMEWORK

To prevent unacceptable risks from pollution, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be considered.

The national planning policy framework states that planning policies and decisions should aim to:

- ✳ Avoid noise from 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.
- ✳ Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.
- ✳ Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2. NATIONAL PLANNING PRACTICE GUIDANCE

Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Local planning authorities' plan-making and decision-making should take account of the acoustic environment and in doing so consider:

- ✳ Whether or not a significant adverse effect is occurring or is likely to occur.
- ✳ Whether or not an adverse effect is occurring or is likely to occur.
- ✳ Whether or not a good standard of amenity can be achieved.

In line with the explanatory note of the NPSE, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase, where applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.



The “observed effect levels” are as follows:

-  **Significant observed adverse effect level:** This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
-  **Lowest observed adverse effect level:** This is the level of noise exposure above which adverse effects on health and quality of life can be detected.
-  **No observed effect level:** This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 2.1 summarises the noise exposure hierarchy, based on the likely average response.

TABLE 2.1 NOISE EXPOSURE HIERARCHY

PERCEPTION	EXAMPLES OF OUTCOMES	INCREASING EFFECT LEVEL	ACTION
Not Noticeable	No effect.	No observed effect	No specific measures required
Noticeable and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television, speaking more loudly, or having to close windows for some of the time because of the noise where there is no alternative ventilation. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed effect	Avoid
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening, loss of appetite, significant/medically definable harm (auditory and non-auditory).	Unacceptable adverse effect	Prevent



The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any situation. These factors include the following:

- ✿ The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day. The adverse effect can also be greater simply because there is less background noise at night.
- ✿ For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise can be important.
- ✿ The spectral content of the noise and the general character of the noise. The local topology and topography should also be considered along with the existing and, where appropriate, the planned character of the area.

More specific factors to consider when relevant:

- ✿ Where applicable, the cumulative impacts of more than one source should be considered along with the extent to which the source of noise is intermittent and of limited duration.
- ✿ Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases, a suitable alternative means of ventilation is likely to be necessary.
- ✿ If external amenity spaces are an intrinsic part of the overall design, then the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.3. BS 8233:2014 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

2.3.1. NOISE CRITERIA LIMITS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 2.2.

TABLE 2.2 BS 8233:2014 RECOMMENDED INTERNAL NOISE LEVELS

CRITERION	TYPICAL SITUATION	DESIGN CRITERION, $L_{Aeq,T}$ (dB)
Suitable Resting and Sleeping Conditions	Living Room	35
	Bedroom	30



BS 8233 goes on to recommend noise levels for gardens:

It is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted.

BS 8233 goes on to say:

In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

2.3.2. VENTILATION REQUIREMENTS

Where a partially open window cannot be relied upon to provide an adequate level of façade sound insulation performance, it is necessary to consider alternative ventilation for habitable rooms. Section 8.4.5.4 within BS 8233 states:

The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Alternatively, acoustic ventilation units (see 7.7.2 below) are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans.

Section 7.7.2 states:

NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.



3. SURVEY RESULTS

The measurement positions are detailed in Figure 1 of Appendix II.

3.1. UNATTENDED AMBIENT SOUND SURVEY – ST JOHN STREET

E3P has conducted a full weekday and weekend Background and Ambient Sound Survey in order to quantify the existing levels of background and ambient sound at the north façade of the property located on St John Street. The survey was carried out over the following time period:

📍 11:00 Thursday 15 August to 09:00 Monday 19th August 2019.

The following noise measurement position was chosen for the Background and Ambient Sound Survey:

📍 Noise Measurement Position 1 (NMP1): Located out of an existing first floor window on the north facing façade, within 1m of the façade. Dominant sources of noise included road traffic associated with St John Street and occasional pedestrian activity.

Table 3.1 details the daytime and night-time average noise levels for applicable periods as well as the 10th highest maximum noise level from each night-time period. Appendix III details the full hourly data. The levels used within the assessment are highlighted in bold.

TABLE 3.1 AVERAGE AND MAXIMUM MEASURED SOUND LEVELS – NORTH FAÇADE

DATE	TIME PERIOD	AVERAGE MEASURED SOUND PRESSURE LEVELS, FAÇADE, $L_{Aeq,T}$ (dB)	10th HIGHEST MAXIMUM NOISE LEVEL, FAÇADE, $L_{Amax,fast}$ (dB)
Thursday 15th/Friday 16th August 2019	Daytime	60.8	-
	Night-time	59.6	86.3
Saturday 17th August 2019	Daytime	60.4	-
	Night-time	63.2	86.6
Sunday 18th August 2019	Daytime	56.8	-
	Night-time	54.7	75.4



3.2. UNATTENDED AMBIENT SOUND SURVEY – CAMP STREET

E3P has conducted a full weekday and weekend Background and Ambient Sound Survey in order to quantify the existing levels of background and ambient sound at the south façade of the property located on Camp Street. The survey was carried out at the same time as NMP1.

The following noise measurement position was chosen for the Background and Ambient Sound Survey:

- Noise Measurement Position 2 (NMP2): Located out of an existing first-floor window overlooking Camp Street and placed 1 m outside the window. Dominant sources of noise included road traffic associated with Camp Street and occasional pedestrian activity.

Table 3.2 details the daytime and night-time average noise levels for applicable periods as well as the 10th highest maximum noise level from each night-time period. Appendix III details the full hourly data. The levels used within the assessment are highlighted in bold.

TABLE 3.2 AVERAGE AND MAXIMUM MEASURED SOUND LEVELS – SOUTH FACADE

DATE	TIME PERIOD	AVERAGE MEASURED SOUND PRESSURE LEVELS, FACADE, $L_{Aeq,T}$ (dB)	10th HIGHEST MAXIMUM NOISE LEVEL, FAÇADE, $L_{Amax,fast}$ (dB)
Thursday 15th/Friday 16th August 2019	Daytime	53.4	-
	Night-time	46.0	64.4
Saturday 17th August 2019	Daytime	50.9	-
	Night-time	52.4	74.7
Sunday 18th August 2019	Daytime	50.5	-
	Night-time	47.9	67.9

TABLE 3.3 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
NMP1	Sound Level Meter	01dB Fusion	12039	21st June 2021
	Pre-amplifier	01dB Pre22	Internal	
	Microphone	01dB 40CE	330832	
	Calibrator	01dB Cal31	87281	8th March 2020
NMP2	Sound Level Meter	01dB Fusion	11403	17th April 2021
	Pre-amplifier	01dB Pre22	Internal	
	Microphone	GRAS 40CE	269481	
	Calibrator	01dB Cal21	34675321	8th October 2019

The sound level meters were both field calibrated on site using the above-mentioned calibrators prior to and after noise measurements were taken. No significant drift was witnessed as noted above. Calibration certificates are available upon request.



4. NOISE IMPACT ASSESSMENT

4.1.1. INTERNAL NOISE LEVEL ASSESSMENT

With regards internal noise levels, E3P understands that secondary glazing is proposed for the Site comprising of a single glazed pane with a 50 mm gap to the existing sash windows. Furthermore, the client has confirmed that this provides a sound reduction index of 39 dB R_w which is confirmed by E3P via a Certificate of Test undertaken by Selectaglaze for the above configuration. Furthermore, this glazing configuration provides a reduction, weighted for road traffic frequency content, of 32 dB $R_w + C_{tr}$. As such, these levels of reduction have been used in the following assessment. Furthermore, E3P have drawn on relevant guidance for the assumption of an open window reduction of 15 dB.

Table 4.1 details the measured noise levels, corrects for free-field and compares internal noise levels with the criteria given in BS 8233:2014.

TABLE 4.1 INTERNAL NOISE LEVEL ASSESSMENT

FAÇADE	TIME PERIOD	CORRECTED TO FREE-FIELD (dB)	GLAZING REDUCTION (dB)	INTERNAL NOISE LEVEL, WINDOWS CLOSED (dB)	DIFFERENCE WITH CRITERIA (dB)	INTERNAL NOISE LEVEL, WINDOWS OPEN (dB)	DIFFERENCE WITH CRITERIA (dB)
NORTH	Daytime	58	32	26	-9	43	+8
	Night-time	60	32	28	-2	45	+15
	Night - Maximum	84	39	45	0	69	+24
SOUTH	Daytime	50	32	18	-17	35	0
	Night-time	49	32	17	-13	34	+4
	Night - Maximum	72	39	33	-12	57	+12

Table 4.1 has confirmed that the proposed secondary glazing (existing sash windows with 50mm air space and 4mm secondary pane) will be sufficient in controlling internal noise levels for both the northern and southern facades.

However, with windows open, the internal noise levels exceed the criteria for all habitable rooms. As such, an alternative ventilation system is required that provides the necessary building regulation requirements for air flow and ventilation but does not compromise the façade of the building.



5. MITIGATION

5.1. HABITABLE ROOMS

The previous section determined that an alternative ventilation is required for all habitable rooms across the Site. Given that the building is Grade II listed, a suitable system specific for this will be required. The actual alternative ventilation system to be used is ultimately down to the developer and any requirements of the Local Planning Authority and Building Regulations.

The system will need to provide background ventilation and air flow as a minimum without the need for opening windows. However, windows should remain openable for purge ventilation and at the discretion of the future occupants.



6. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned by BTP Architects in order to undertake a Noise Impact Assessment for a proposed residential development on St John Street, Manchester.

Unattended background and ambient sound surveys have been undertaken at the northern and southern facades of the site to quantify the impact of the surrounding environment on the Site.

The assessment has found that the proposed secondary glazing to be installed is sufficient in controlling internal noise levels in order to achieve the relevant criteria. However, an alternative ventilation system is required in order to provide background ventilation and air flow without the need for opening windows. Windows are to remain openable for purge ventilation and at the discretion of the future occupants.

With mitigation measures in place, this assessment has shown that no adverse impact is predicted day or night at the receptors due to transportation and/or commercial/industrial sound.

As such, noise need not be a material consideration in the granting of planning permission as long as the recommendations of this report are followed and included within the design stage.

END OF REPORT



APPENDIX I

GLOSSARY OF ACOUSTIC

TERMINOLOGY

NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE A1 TYPICAL SOUND PRESSURE LEVELS

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20–30	Quiet bedroom at night
30–40	Living room during the day
40–50	Typical office
50–60	Inside a car
60–70	Typical high street
70–90	Inside a factory
100–110	Burglar alarm at 1 m away
110–130	Jet aircraft on take off
140	Threshold of pain



ACOUSTIC TERMINOLOGY

TABLE A2 TERMINOLOGY

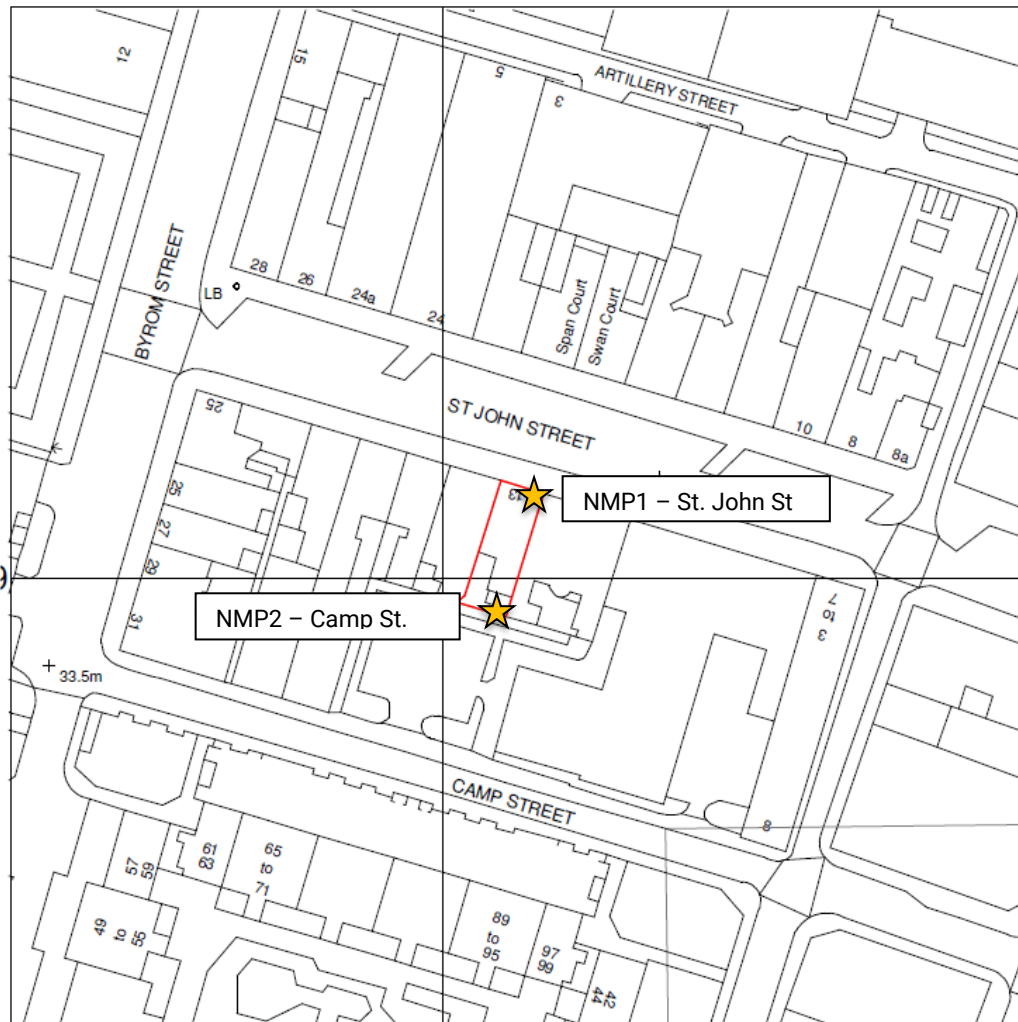
DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L_{Aeq, T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L _{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, 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.
L₁₀ and L₉₀	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L ₉₀ is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L ₁₀ index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.



APPENDIX II

FIGURES

Figure 1 – Noise Measurement Positions



APPENDIX III

MEASURED SOUND PRESSURE LEVELS

TABLE A.1 HOURLY MEASURED AMBIENT SOUND LEVELS – ST JOHNS STREET

PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/15/2019 12:00:00 PM	60.9
8/15/2019 1:00:00 PM	57.6
8/15/2019 2:00:00 PM	61.0
8/15/2019 3:00:00 PM	60.8
8/15/2019 4:00:00 PM	60.3
8/15/2019 5:00:00 PM	58.6
8/15/2019 6:00:00 PM	56.8
8/15/2019 7:00:00 PM	56.1
8/15/2019 8:00:00 PM	54.0
8/15/2019 9:00:00 PM	54.3
8/15/2019 10:00:00 PM	55.5
8/15/2019 11:00:00 PM	54.6
8/16/2019 12:00:00 AM	52.3
8/16/2019 1:00:00 AM	51.4
8/16/2019 2:00:00 AM	51.1
8/16/2019 3:00:00 AM	58.7
8/16/2019 4:00:00 AM	52.7
8/16/2019 5:00:00 AM	52.8
8/16/2019 6:00:00 AM	67.4
8/16/2019 7:00:00 AM	66.8
8/16/2019 8:00:00 AM	65.2
8/16/2019 9:00:00 AM	61.0
8/16/2019 10:00:00 AM	60.4
8/16/2019 11:00:00 AM	59.4
8/16/2019 12:00:00 PM	59.5
8/16/2019 1:00:00 PM	59.4
8/16/2019 2:00:00 PM	61.4
8/16/2019 3:00:00 PM	61.4
8/16/2019 4:00:00 PM	59.1
8/16/2019 5:00:00 PM	59.7
8/16/2019 6:00:00 PM	57.6



PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/16/2019 7:00:00 PM	57.8
8/16/2019 8:00:00 PM	57.0
8/16/2019 9:00:00 PM	57.8
8/16/2019 10:00:00 PM	56.7
8/16/2019 11:00:00 PM	57.7
8/17/2019 12:00:00 AM	56.4
8/17/2019 1:00:00 AM	56.1
8/17/2019 2:00:00 AM	56.5
8/17/2019 3:00:00 AM	55.8
8/17/2019 4:00:00 AM	54.3
8/17/2019 5:00:00 AM	53.7
8/17/2019 6:00:00 AM	55.5
8/17/2019 7:00:00 AM	54.1
8/17/2019 8:00:00 AM	55.6
8/17/2019 9:00:00 AM	56.4
8/17/2019 10:00:00 AM	55.5
8/17/2019 11:00:00 AM	55.4
8/17/2019 12:00:00 PM	67.5
8/17/2019 1:00:00 PM	66.7
8/17/2019 2:00:00 PM	56.6
8/17/2019 3:00:00 PM	57.0
8/17/2019 4:00:00 PM	57.0
8/17/2019 5:00:00 PM	60.0
8/17/2019 6:00:00 PM	56.9
8/17/2019 7:00:00 PM	56.2
8/17/2019 8:00:00 PM	60.5
8/17/2019 9:00:00 PM	55.9
8/17/2019 10:00:00 PM	57.0
8/17/2019 11:00:00 PM	58.0
8/18/2019 12:00:00 AM	60.5
8/18/2019 1:00:00 AM	62.8



PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/18/2019 2:00:00 AM	67.7
8/18/2019 3:00:00 AM	61.8
8/18/2019 4:00:00 AM	61.4
8/18/2019 5:00:00 AM	66.0
8/18/2019 6:00:00 AM	54.2
8/18/2019 7:00:00 AM	52.2
8/18/2019 8:00:00 AM	54.9
8/18/2019 9:00:00 AM	63.4
8/18/2019 10:00:00 AM	55.0
8/18/2019 11:00:00 AM	55.5
8/18/2019 12:00:00 PM	56.9
8/18/2019 1:00:00 PM	55.5
8/18/2019 2:00:00 PM	57.2
8/18/2019 3:00:00 PM	54.9
8/18/2019 4:00:00 PM	55.4
8/18/2019 5:00:00 PM	57.0
8/18/2019 6:00:00 PM	55.9
8/18/2019 7:00:00 PM	57.0
8/18/2019 8:00:00 PM	54.7
8/18/2019 9:00:00 PM	53.9
8/18/2019 10:00:00 PM	54.9
8/18/2019 11:00:00 PM	51.8
8/19/2019 12:00:00 AM	54.6
8/19/2019 1:00:00 AM	54.0
8/19/2019 2:00:00 AM	50.6
8/19/2019 3:00:00 AM	52.8
8/19/2019 4:00:00 AM	51.3
8/19/2019 5:00:00 AM	57.6
8/19/2019 6:00:00 AM	58.2
8/19/2019 7:00:00 AM	59.1
8/19/2019 8:00:00 AM	62.8



PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/19/2019 9:00:00 AM	61.4

TABLE A.2 HOURLY MEASURED AMBIENT SOUND LEVELS – CAMP STREET

PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/15/2019 11:00:00 AM	54.3
8/15/2019 12:00:00 PM	53.4
8/15/2019 1:00:00 PM	52.9
8/15/2019 2:00:00 PM	53.1
8/15/2019 3:00:00 PM	52.2
8/15/2019 4:00:00 PM	53.1
8/15/2019 5:00:00 PM	53.3
8/15/2019 6:00:00 PM	52.1
8/15/2019 7:00:00 PM	49.5
8/15/2019 8:00:00 PM	48.6
8/15/2019 9:00:00 PM	47.6
8/15/2019 10:00:00 PM	49.8
8/15/2019 11:00:00 PM	46.7
8/16/2019 12:00:00 AM	46.0
8/16/2019 1:00:00 AM	45.2
8/16/2019 2:00:00 AM	43.4
8/16/2019 3:00:00 AM	43.7
8/16/2019 4:00:00 AM	45.8
8/16/2019 5:00:00 AM	44.9
8/16/2019 6:00:00 AM	49.3
8/16/2019 7:00:00 AM	52.6
8/16/2019 8:00:00 AM	55.8
8/16/2019 9:00:00 AM	57.6
8/16/2019 10:00:00 AM	56.1
8/16/2019 11:00:00 AM	52.8
8/16/2019 12:00:00 PM	54.6
8/16/2019 1:00:00 PM	55.1



PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/16/2019 2:00:00 PM	56.7
8/16/2019 3:00:00 PM	56.2
8/16/2019 4:00:00 PM	53.4
8/16/2019 5:00:00 PM	59.5
8/16/2019 6:00:00 PM	54.1
8/16/2019 7:00:00 PM	53.0
8/16/2019 8:00:00 PM	51.5
8/16/2019 9:00:00 PM	50.7
8/16/2019 10:00:00 PM	50.7
8/16/2019 11:00:00 PM	52.2
8/17/2019 12:00:00 AM	49.3
8/17/2019 1:00:00 AM	48.3
8/17/2019 2:00:00 AM	48.6
8/17/2019 3:00:00 AM	47.5
8/17/2019 4:00:00 AM	45.1
8/17/2019 5:00:00 AM	45.9
8/17/2019 6:00:00 AM	46.8
8/17/2019 7:00:00 AM	47.8
8/17/2019 8:00:00 AM	48.6
8/17/2019 9:00:00 AM	50.0
8/17/2019 10:00:00 AM	49.1
8/17/2019 11:00:00 AM	49.2
8/17/2019 12:00:00 PM	51.0
8/17/2019 1:00:00 PM	50.3
8/17/2019 2:00:00 PM	51.4
8/17/2019 3:00:00 PM	53.1
8/17/2019 4:00:00 PM	52.0
8/17/2019 5:00:00 PM	52.5
8/17/2019 6:00:00 PM	50.9
8/17/2019 7:00:00 PM	51.0
8/17/2019 8:00:00 PM	50.8



PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/17/2019 9:00:00 PM	51.3
8/17/2019 10:00:00 PM	51.3
8/17/2019 11:00:00 PM	55.2
8/18/2019 12:00:00 AM	54.3
8/18/2019 1:00:00 AM	54.9
8/18/2019 2:00:00 AM	51.0
8/18/2019 3:00:00 AM	50.4
8/18/2019 4:00:00 AM	49.6
8/18/2019 5:00:00 AM	50.4
8/18/2019 6:00:00 AM	46.7
8/18/2019 7:00:00 AM	47.5
8/18/2019 8:00:00 AM	47.0
8/18/2019 9:00:00 AM	50.4
8/18/2019 10:00:00 AM	48.0
8/18/2019 11:00:00 AM	49.4
8/18/2019 12:00:00 PM	52.5
8/18/2019 1:00:00 PM	50.1
8/18/2019 2:00:00 PM	52.7
8/18/2019 3:00:00 PM	50.7
8/18/2019 4:00:00 PM	51.3
8/18/2019 5:00:00 PM	52.2
8/18/2019 6:00:00 PM	51.5
8/18/2019 7:00:00 PM	51.6
8/18/2019 8:00:00 PM	50.1
8/18/2019 9:00:00 PM	48.4
8/18/2019 10:00:00 PM	49.8
8/18/2019 11:00:00 PM	46.1
8/19/2019 12:00:00 AM	46.1
8/19/2019 1:00:00 AM	49.1
8/19/2019 2:00:00 AM	41.3
8/19/2019 3:00:00 AM	52.0



13 St. John Street, Manchester

Noise Impact Assessment

August 2019

PERIOD START	MEASURED BACKGROUND SOUND LEVEL, $L_{Aeq,1HR}$ (dB)
8/19/2019 4:00:00 AM	47.6
8/19/2019 5:00:00 AM	43.7
8/19/2019 6:00:00 AM	49.2
8/19/2019 7:00:00 AM	51.6
8/19/2019 8:00:00 AM	51.7

