



111 Piccadilly

Noise Impact Assessment

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18088 111 Piccadilly R04

Client: Bruntwood

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Introduction

dBx Acoustics Ltd has been appointed by Bruntwood to carry out a noise impact assessment for the newly installed building services plant at 111 Piccadilly, Manchester. A noise survey was undertaken to determine the specific noise level of the units.

Previously, as part of the planning application, a noise impact assessment of the proposed units was undertaken. This report will refer to *18088 111 Piccadilly R01A* submitted on 5th October 2018. This report contains details of a noise survey that was carried out at a location representative of the nearest noise sensitive premises (the Premier Inn on Dale Street, to the rear of 111 Piccadilly).

This allows for the noise impact of the new units to be assessed in accordance with the requirements of Manchester City Council (MCC).

Assessment Criteria

The following assessment criteria are referred to within this report:

Manchester City Council – Planning & Noise Technical Guidance (December 2015)

This document sets out Manchester City Council's requirements with regard to current guidance and policy, with the aspiration that new developments achieve the highest standards without compromising the health and wellbeing of residents. The guidance refers to the NPPF and NPSE as described below.

“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a BS 4142 rating level (see below) of 5 dB L_{Aeq} below the typical background L_{A90} level at the nearest noise sensitive location. “

BS 4142:2014 – Methods for Rating and Assessing Industrial and Commercial Sound

BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating is determined and compared with the existing local Background Sound Level. The MCC guidance refers to a noise rating level for externally mounted ancillary plant.

The Rating Level ($dB_{L_{Ar,Tr}}$) is evaluated from the Specific Noise Level by including several, cumulative corrections to account for factors such as distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristics.

BS 4142:2014 seeks to determine a “representative” Background Sound Level, stating that “...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.

The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

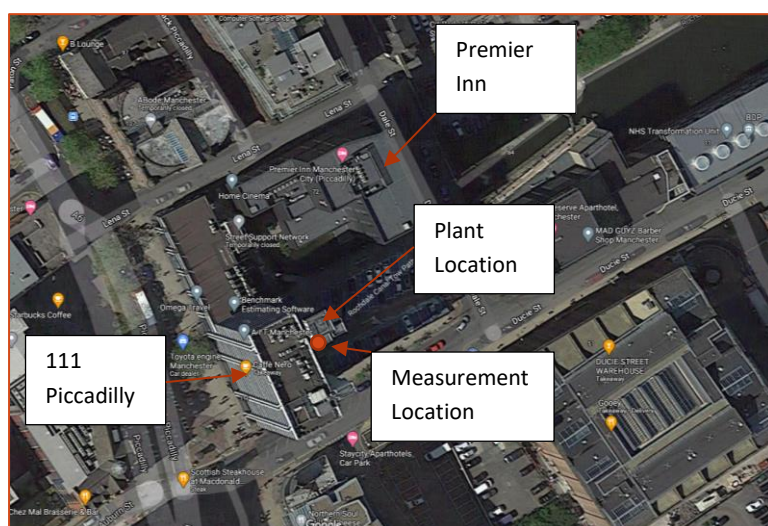
- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB is likely to be an indication of an adverse impact,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

Noise Survey

Site Description

To the West, the building overlooks Piccadilly, with hotels to the East and North-east. The nearest of these hotels is the Premier Inn located on Dale Street. The other buildings in the area are commercial in nature, consisting of bars/restaurants at ground floor and offices above. The site, measurement location and nearest noise sensitive receptor are shown in Figure 1, below.

Figure 1: Site Plan Showing Measurement Location



Noise Sources

The dominant noise source measured during the unattended survey was the building services plant, which operated continuously throughout the survey. Background noise levels were due to distant road traffic from the surrounding road network. The noise levels at the Premier Inn were due to the same sources.

Weather Conditions

Weather conditions during the measurement periods were generally cloudy and dry. Wind speeds were within suitable parameters for the measurement of environmental noise (i.e. generally under 5 ms^{-1}). All microphones were protected with a windshield for the duration of the survey.

Equipment

The equipment used during the environmental noise survey is detailed in Table 1, below.

Table 2: Equipment used in the environmental noise survey

Equipment	Manufacturer & Part No.	Serial Number
Sound Level Meter	Norsonic NOR140	1405619
Microphone	Norsonic NOR1225	168247
Pre-Amplifier	Norsonic NOR1209	15526
Calibrator	Norsonic NOR1251	33827

The sound level meters were calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

Noise Survey Results

The noise survey was undertaken between 13:15h on Friday 27th November to 12:00h on Monday 30th November 2020. The full measurements are shown in Appendix B, and a summary of the measured noise levels is shown in Table 2, below. The measurements were taken at a distance of 1m from the nearest operating building services units.

Table 2: Summary of day and night-time measured noise levels

Date	Period	Ambient Noise Level (dBL _{Aeq,T})	Lowest Measured Background Noise Level (dBL _{A90})	Highest Maximum Noise Level (dBL _{AFmax})
27/11/2020	Daytime (07:00-23:00)*	66	63	93
	Night-time (23:00-07:00)	67	61	87
28/11/2020	Daytime (07:00-23:00)	65	60	91
	Night-time (23:00-07:00)	64	63	88
29/11/2020	Daytime (07:00-23:00)	66	63	95
	Night-time (23:00-07:00)	65	62	83
30/11/2020	Daytime (07:00-23:00)*	70	64	93

*Only part of the period measured

Previously Measured Noise Levels

To determine the representative background noise levels at the nearest noise sensitive receptor (Premier Inn) prior to the new plant being installed, the background noise levels measured in the previous noise impact assessment have been used. The full survey data can be found in dBx Acoustics' report ref 18088 111 Piccadilly R01A dated 5th October 2018. In that report, it was stated that the noise levels detailed in Table 3, below, are representative of the noise levels at the Premier Inn.

Table 3: Summary previously measured day and night-time noise levels

Date	Period (hh:mm)	Typical Ambient Noise Level (dBL _{Aeq,T})	Lowest Measured Background Noise Level (dBL _{A90,T})
13/09/2020	Day (07:00-23:00)*	59	55
	Night (23:00-07:00)	57	53
14/09/2020	Day (07:00-23:00)	60	56
	Night (23:00-07:00)	58	53
15/09/2020	Day (07:00-23:00)	60	54
	Night (23:00-07:00)	58	53
16/09/2020	Day (07:00-23:00)	59	54
	Night (23:00-07:00)	56	52
17/09/2020	Day (07:00-23:00)	59	54
	Night (23:00-07:00)*	55	52

*Only part of the period measured

Using the noise levels in Tables 2 and 3, an assessment of the noise impact of the building services units can be made.

Assessment

MCC Requirements

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a BS 4142 rating level (see below) of 5 dB below the typical background noise level at the nearest noise sensitive location.

Based on the noise survey data presented in Table 3, the plant should be operating to a rating level of no more than $49\text{dB}_{\text{L}_{\text{Ar,Tr}}}$ during the daytime and $48\text{dB}_{\text{L}_{\text{Ar,Tr}}}$ at night.

BS 4142:2014

The following BS 4142:2014 assessment has been carried out to examine the effect of the external condenser unit on the residential properties.

Typical daytime plant noise levels were $70\text{dB}_{\text{L}_{\text{Aeq,T}}}$, and typical night-time noise levels were around $68\text{dB}_{\text{L}_{\text{Aeq,T}}}$.

The Premier Inn is around 20m from the plant. On this basis, the distance correction is -26dB, resulting in daytime noise levels of $44\text{dB}_{\text{L}_{\text{Aeq,T}}}$ and night-time noise levels of $42\text{dB}_{\text{L}_{\text{Aeq,T}}}$. As there is a direct line of sight from the hotel to the plant, no screening correction has been made.

The plant runs continuously and shows no acoustically significant characteristics and so no Acoustic feature corrections have been made.

Using the above data, the daytime BS4142 assessment is presented in Table 4, below, and the night-time assessment is presented in Table 5, below.

Table 4: BS 4142 Assessment - Daytime

Results	Calculation	Relevant Clause	Commentary
Measured background sound level	54 dB $L_{A90, 1hr}$	8.3	The typical background sound level measured during the daytime period. Consistent throughout survey period.
Specific sound level	44 dB $L_{Aeq,T}$	7.3.3	A prediction made using the methodology outlined above, includes all sources, screening and distance corrections.
Assessment made during the daytime period, so reference period is 1 hour		7.2	-
Acoustic feature correction	0 dB	9.2	No acoustically distinct characteristics
Rating level	44 dB $L_{Ar,Tr}$	9.2	The predicted Rating Level during the daytime period.
Background sound level - daytime	54 dB $L_{A90, 1hr}$	8	The typical background sound level measured.
Excess of rating over background sound level	-10 dB	11	-
Assessment indicates low likelihood of adverse impact		11	Predicted Rating Level does not exceed the lowest measured background level. This is an indication of the development having a low impact.
Uncertainty of the assessment	Minor	10	Background sound level based on repeatable measurements. The predicted Rating Level is based on established prediction methodologies.

Table 5: BS 4142 Assessment – Night-time

Results	Calculation	Relevant Clause	Commentary
Measured background sound level	53 dB $L_{A90, 15min}$	8.3	The typical background sound level measured during the daytime period. Consistent throughout survey period.
Specific sound level	42 dB $L_{Aeq,T}$	7.3.3	A prediction made using the methodology outlined above, includes all sources, screening and distance corrections.
Assessment made during the daytime period, so reference period is 15 minutes		7.2	-
Acoustic feature correction	0 dB	9.2	No acoustically distinct characteristics
Rating level	42 dB $L_{Ar,Tr}$	9.2	The predicted Rating Level during the daytime period.
Background sound level - daytime	53 dB $L_{A90, 15min}$	8	The typical background sound level measured.
Excess of rating over background sound level	-11 dB	11	-
Assessment indicates low likelihood of adverse impact		11	Predicted Rating Level does not exceed the lowest measured background level. This is an indication of the development having a low impact.
Uncertainty of the assessment	Minor	10	Background sound level based on repeatable measurements. The predicted Rating Level is based on established prediction methodologies.

It can be seen from Tables 4 and 5 that the operating building services plant at 111 Piccadilly meets the requirements set by MCC.

Conclusion

A noise impact assessment has been undertaken for the operating building services units at 111 Piccadilly, Manchester.

An unattended noise survey was undertaken to determine the specific noise level of the operating plant units. To determine representative background noise levels at the nearest noise sensitive receptor, previously measured noise data was used.

A BS 4142 assessment was carried out for both the daytime and night-time periods and it was found that the plant is operating to within the criteria set out by MCC.

Appendix A: Glossary of Acoustic Terminology

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.

Appendix B: Noise Survey Results

