

Plant Noise Commissioning Tests – Planning Condition 4B

Office Development

76 Quay Street, Manchester, M3 4PR

REPORT REFERENCE NO. J005375-9327-CW-01

27th January 2026

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Document Control Sheet

Details of Assessment	
Client	Quay Street PD Ltd
Document Title	Plant Noise Commissioning Tests (Condition 4B) – 76 Quay Street
Report Reference	J005375-9327-CW-01

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Issue	Date	Author	Remark	Status
01	27/01/2026	Chris Wright	Initial Issue	Issued
02				

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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1.0 SUMMARY

PDA Ltd have been commissioned to undertake an assessment of plant noise emissions from the proposed office development at 76 Quay Street in Manchester City Centre.

A desktop assessment has previously been undertaken by PDA Acoustics to demonstrate compliance with the requirements of Planning Condition 4A (report reference: J005375-8709-CW-02 dated 16th September 2025). The previous report details the results of a noise modelling exercise which was based on manufacturers noise data for the proposed plant installations. The results of the assessment indicated that plant noise emissions from the development were likely to be at least 5 dB below the typical background noise level and therefore, complies with the requirements of Condition 4A.

This assessment has been undertaken to demonstrate compliance with the requirements of Planning Condition 4B which stipulates the following:

“Prior to the operation of the scheme a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.”

Measurements were undertaken to determine noise emissions from the following plant items which have been installed on site:

- 1 no. Samsung AM140AXVGGR Condenser Unit
- 1 no. Samsung AM160AXVGGR Condenser Unit
- 1 no. Elta SQT250-1ECL Extract Fan
- 1 no. Samsung AN100JSKLKN Heat Recovery Unit (HRU)

Based on the measurements taken in-situ we have undertaken calculations to determine the sound power level associated with the various plant installations. The calculated sound power levels have been compared against the manufacturers stated noise levels on which our previous desktop assessment was based.

The measured levels in-situ show good correlation with the predicted levels assumed in our desktop assessment and are approximately equal to or, lower than those previously assumed.

As such, the installed plant complies with the recommendations of the previous report and by extension, satisfies the requirements of Planning Condition 4B. On this basis we would consider that the Condition may be discharged.

2.0 SITE DESCRIPTION

The development is located at 76 Quay Street in Manchester City Centre and comprises office space across 4 floors.

In terms of noise generating plant installations associated with the development there is a plant compound at roof level which contains 2no. condenser units and a WC extract fan. In addition, there is a single Samsung AN100JSKLKN heat recovery unit (HRU) located internally within the basement office space, the HRU inlet and outlets are ducted to the atmosphere via the Gartside Street facade.

The site is bound by Young Street to the north and east, Gartside Street to the north and Quay Street to the south. The immediate surrounding area comprises a number of existing office and commercial uses typical of a city centre urban environment.

The site location and its surroundings can be seen in the Figure below:

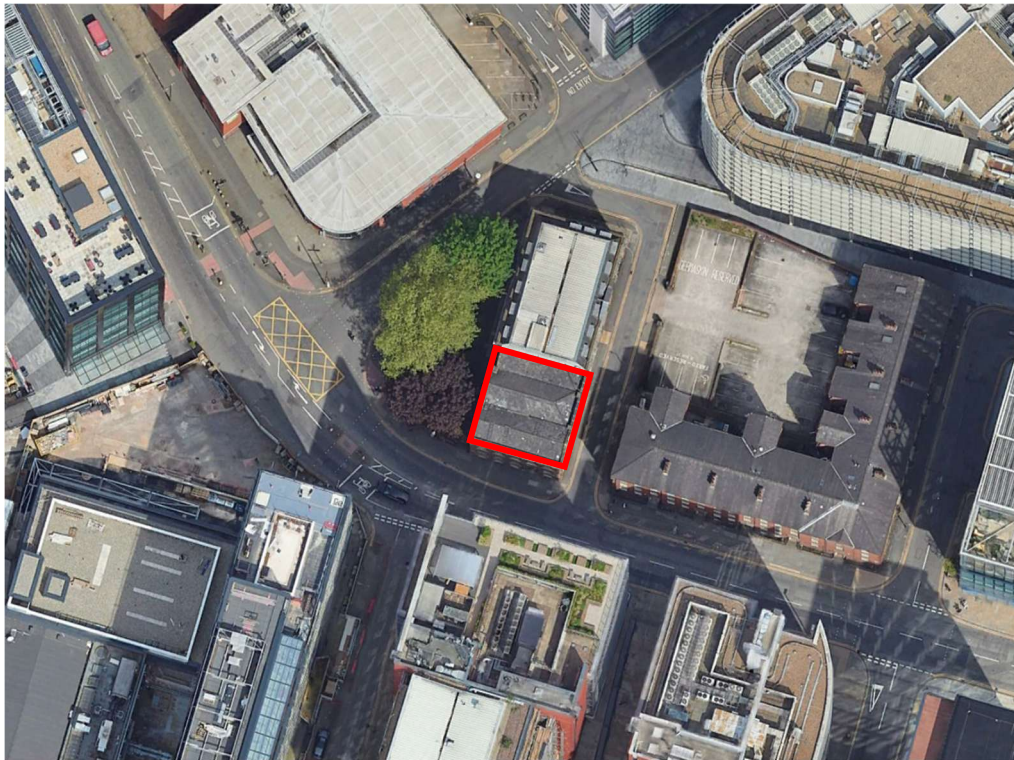


Figure 1: Site Location and Surroundings

3.0 ASSESSMENT CRITERIA

3.1 Planning Condition 4 (app: 133726/FO/2022)

It is understood that planning permission for the development has been approved subject to conditions. Condition 4 relates to plant noise emissions and stipulates the following:

Condition 4A

“Externally mounted ancillary plant, equipment and servicing including plant located behind any louvres shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.”

A desktop assessment has previously been undertaken by PDA Acoustics to demonstrate compliance with the requirements of Planning Condition 4A (report reference: J005375-8709-CW-02 dated 16th September 2025). A summary of the previous assessment is provided in Section 3.2 below.

Condition 4B

“Prior to the operation of the scheme a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.”

The following assessment has been undertaken to demonstrate compliance with the requirements of Condition 4B.

3.2 Summary of Previous Assessment (Condition 4A)

A noise impact assessment has previously been undertaken by PDA Acoustics to demonstrate compliance with the requirements of Planning Condition 4A (report reference: J005375-8709-CW-02 dated 16th September 2025). A noise modelling exercise was undertaken to predict the likely plant noise levels at the nearby noise sensitive receivers. Our assessment was based on manufacturers noise data for the various plant installations as summarised below:

- 1 no. Samsung AM140AXVGGR Condenser Unit – 81 dB L_{WA}
- 1 no. Samsung AM160AXVGGR Condenser Unit – 81 dB L_{WA}
- 1 no. Elta SQT200-1ECL Extract Fan – 75 dB L_{WA} (outlet) / 69 dB L_{WA} (casing)
- 1 no. Samsung AN100JSKLKN Heat Recovery Unit (including attenuator) - 55 dB L_{WA} (outlet) / 60 dB L_{WA} (inlet)

Based on the above, the noise levels at the nearby noise sensitive receivers was calculated to be between 37 and 49 dB. When compared against the representative background noise climate, plant noise emissions were predicted to be between 5 and 16 below background and therefore, complaint with the requirements of Condition 4A which indicates that plant noise emissions should be at least 5 dB below background.

On this basis, where the sound power levels measured in-situ are less than or equal to those above this would indicate that the limiting criteria of Condition 4A has been achieved.

4.0 NOISE MEASUREMENTS

4.1 Measurement Details and Equipment

In order to determine the plant noise emissions associated with the scheme a noise measurement survey was undertaken for the installed plant items in situ. Measurements of the roof top condenser units and WC extract were undertaken on Monday 12th January 2025 with further measurements undertaken on 4th February 2026 to determine noise emissions from the heat recovery unit (HRU) which is located in the basement and ducted to the atmosphere via the Gartside Street facade.

The survey was undertaken using an NTi XL2 sound level meter. In accordance with IEC 61672-1:2002 the meter has a class 1 frequency response and can operate as an integrating sound level meter with frequency analysis and statistical functions. The meter was field calibrated both before and after the survey period, during which time no significant deviation from the calibrated level was observed. Note that a valid calibration certificate is held for both the meters and the calibrators. All measurements were made by Mr C Wright BSc (Hons) MIOA and Mr Sam Iles BEng AMIOA both of PDA Ltd.

The layout of the roof top plant compound can be seen in the Figure below:



Figure 1 – Rooftop Plant Compound

It should be borne in mind that it is not possible to measure the plant noise directly at the receivers due to the fact that this level would be below the existing background noise levels due to other noise sources such as road traffic noise, railway noise etc. Therefore, sound pressure measurements were taken in close proximity to operational plant and subsequently used to calculate the sound power level of the various plant items. The measured noise levels and calculated sound power levels are as summarised in the following sections.

During our measurements we were informed that all the plant items assessed were operating at typical capacity.

4.2 Measured Noise Results

4.2.1 Roof Top Condenser Units

There are 2 no. condenser units (Samsung AM140AXVGGR and AM160AXVGGR) located on the plant deck at roof level. Nearfield measurements were undertaken at a distance of 1m from each accessible face of condenser units whilst they were operated in isolation.

Based on the in-situ measurement data we have calculated the total sound power radiating from the condenser units as follows:

$$L_w = L_p + 10 \times \log(2\pi r^2)$$

Where;

L_p = Average sound pressure level measured at a distance (r) from the source

L_w = Sound power level

$2\pi r^2$ = Assumes hemi-spherical propagation.

The results are summarised as follows:

Table 1. Summary of Roof Top Condenser Measurements

Description	Measured Noise Level (dB L_{pA})	Calculated Sound Power Level (dB L_{WA})
AM140AXVGGR	71	79
AM160AXVGGR	72	80

4.2.2 WC Extract Fan

The Elta SQT250-1ECL WC extract fan is located within the roof top plant compound, the unit comprises an externally mounted centrifugal fan with an exhaust termination ducted to the atmosphere.

In order to determine the sound power emissions from the extract fan, sound pressure measurements were taken at the termination and corrected to account for the radiating surface area of the duct as follows:

$$L_w = L_p + 10 \times \log(S)$$

Where;

L_p = Sound pressure level measured at the termination

L_w = Sound power level

S = Radiating surface area of termination (πr^2)

The results are summarised in the Table below:

Table 2. WC Extract Measurements and Calculated Sound Power Level

Description	Measured Noise Level (dB L _{pA})	Calculated Sound Power Level (dB L _{WA})
SQT250-1ECL	75	60

It should be noted that the previous assessment considered noise emissions from both the extract termination and fan casing breakout. However, it was not possible to measure casing breakout noise in isolation during the site visit. Due to space constraints within the plant compound, the extract termination is located in close proximity to the fan enclosure with noise from the termination noise dominating the noise climate. This indicates that fan casing breakout does not have a significant contribution to overall noise levels therefore, no further assessment has been undertaken.

4.2.3 Heat Recovery Unit

There is a single Samsung AN100JSKLKN heat recovery unit (HRU) located internally within the basement office area. The HRU inlet and outlets are ducted to atmosphere via the Gartside Street facade.

In order to determine the sound power emissions from the HRU duct terminations, near field sound pressure measurements were taken using a linear sweep over the entire surface area of the louvre / extract grill openings. In order to determine the sound power level of both the inlet and outlet ducts the measurements have been corrected to account for the radiating surface area of the termination as follows:

$$L_w = L_p + 10 \times \log(S)$$

Where;

L_p = Sound pressure level measured at the termination

L_w = Sound power level

S = Radiating surface area of termination

The results are summarised in the Table below:

Table 3. HRU Measurements and Calculated Sound Power Level

Description	Measured Noise Level (dB L _{pA})	Calculated Sound Power Level (dB L _{WA})
AN100JSKLKN Inlet	68	59
AN100JSKLKN Outlet	59	50

5.0 DISCUSSION OF RESULTS

The previous assessment submitted in support of the discharge of Planning Condition 4A was based on manufacturers noise data for the proposed plant installations. Using this data, noise propagation calculations were undertaken to predict sound levels at the nearest noise-sensitive receptors.

Predicted plant noise levels at these receptors were in the range of 37 to 49 dB. When compared with the representative background noise climate, plant noise emissions were assessed to be between 5 and 16 dB below background levels and were therefore compliant with the requirements of Condition 4A, which specifies that plant noise emissions should be at least 5 dB below background.

Accordingly, where the sound power levels measured in situ (as detailed in Section 4.2) are less than or equal to those assumed in the previous assessment, compliance with the limiting criteria of Condition 4A will be achieved.

To demonstrate compliance with the requirements of Condition 4B, the measured sound power levels have been compared with those assumed in the previous assessment. The results of this comparison are summarised in Table 3 below.

Table 3. Comparison of Assumed and Measured Sound Power Level

Description	Assumed Sound Power Level (dB L_{WA})	Measured Sound Power Level (dB L_{WA})	Difference (dB)
AM140AXVGGR (condenser)	81	79	-2
AM160AXVGGR (condenser)	81	80	-1
SQT250-1ECL (WC Extract)	75	60	-15
AN100JSKLKN (HRU inlet)	60	59	-1
AN100JSKLKN (HRU outlet)	55	50	-5

It can be seen from the results above that the measured sound power levels show good correlation with the predicted levels assumed in our desktop assessment and are approximately equal to, or with reference to the WC extract fan lower than those previously assumed.

It is noted that the measured sound power levels associated with the WC extract fan are approximately 15 dB lower than those assumed in the desktop assessment. It should be borne in mind however that the installed fan is a larger unit than previously assumed and therefore, it is likely that the required extraction rate is achieved while operating at a lower duty resulting in a reduced sound output.

The results of our assessment confirm that noise emissions from the installed plant items are consistent with those assumed in the previous assessment. As such, the installed plant complies with the recommendations of the previous report and by extension, satisfies the requirements of Planning Condition 4B. On this basis we would consider that the Condition may be discharged.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.