

CSG

acoustics

# FREETRADE EXCHANGE, MANCHESTER

ADT WORKPLACE

PLANT NOISE CONDITION 9 DISCHARGE  
CSGA-C2122-T1

12<sup>th</sup> July 2023

PREFACE

|             |                                |
|-------------|--------------------------------|
| Project     | Freetrade Exchange, Manchester |
| Reference   | CSGA-2122-T1                   |
| Report Type | Plant Noise – Condition 9      |
| Recipient   | ADT Workplace                  |
| Date        | 12/07/2023                     |
| Issue       | FINAL                          |
| Revision    | 0                              |
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Table P1: Revision Details

| Revision Number | Date | Details |
|-----------------|------|---------|
| -               | -    | -       |
| -               | -    | -       |
| -               | -    | -       |

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1 INTRODUCTION

CSG Acoustics Ltd have been appointed by ADT Workplace to undertake an external plant noise assessment. This assessment provides supporting evidence with regards to the discharge of Condition 9 of the Decision Notice (133119/FO/2022) for the Freetrade Exchange, Manchester M2 5GB.

A number of external plant items have been installed at the site and as such, sound emissions from the plant items must accord with Condition 9 and the criteria presented in the approved planning report produced by Hann Tucker Associates (29443/PNA1).

Condition 9 requires that a post-completion test is carried out to confirm that acceptable criteria have been met.

The assessment includes:

- Results of two noise surveys conducted at the site, one during the daytime and one during the evening; and a
- Comparison of the measured and predicted noise levels with the requirements set-out in the approved planning report.

This report is technical in nature therefore, to assist the reader, explanations of the relevant terminology are presented in Appendix A.

2 CONDITION 9

Condition 9 of the Planning Decision Notice states the following;

*Prior to occupation to any part of the development, a verification report will be required to validate that the proposed external plant equipment conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that acceptable 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.*

*Reason – To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site, in accordance with saved policy DC26.1 of the Manchester Unitary Development Plan and policies DM1, SP1 of the Manchester Core Strategy.*

3 PLANNING NOISE LIMITS

The environmental noise report titled Freetrade Exchange Manchester (29443/PNA1) dated 3<sup>rd</sup> February 2022 is understood to be the *approved consultant's report* referenced in the Condition.

Section 12 of the report presents the following criteria for the proposed items of plant;

Table 3.1: Planning Condition Plant Noise Limits

| Description            | Cumulative Plant Rating Level, L <sub>Ar,Tr</sub> (dBA) |
|------------------------|---------------------------------------------------------|
| Day time (0700–2300)   | 48dBA                                                   |
| Night-time (2300–0700) | 46dBA                                                   |

It should be noted that the night-time limit does not apply in this instance as the operation of the units are stated to be 8am–5pm. There is an allowance for some items of plant to switch on earlier to ensure that the correct internal temperature is reached by 8am, however, it has been stated that this would be 7:30am at the earliest.

4 INSTALLED PLANT ITEMS AND OPERATIONAL PERIODS

The following is a list of the externally located plant items that are subject to the planning approval and this assessment.

As noted above, all plant items are time-clocked to operate from 8am – 5pm. However, it is possible that some items of plant will switch on 30 minutes earlier to reach the required temperature before 8am.

**Rooftop –**

- 13 x Daikin VRF units
- 1 no AHU
- 1 no Cosmogas Heat Pump

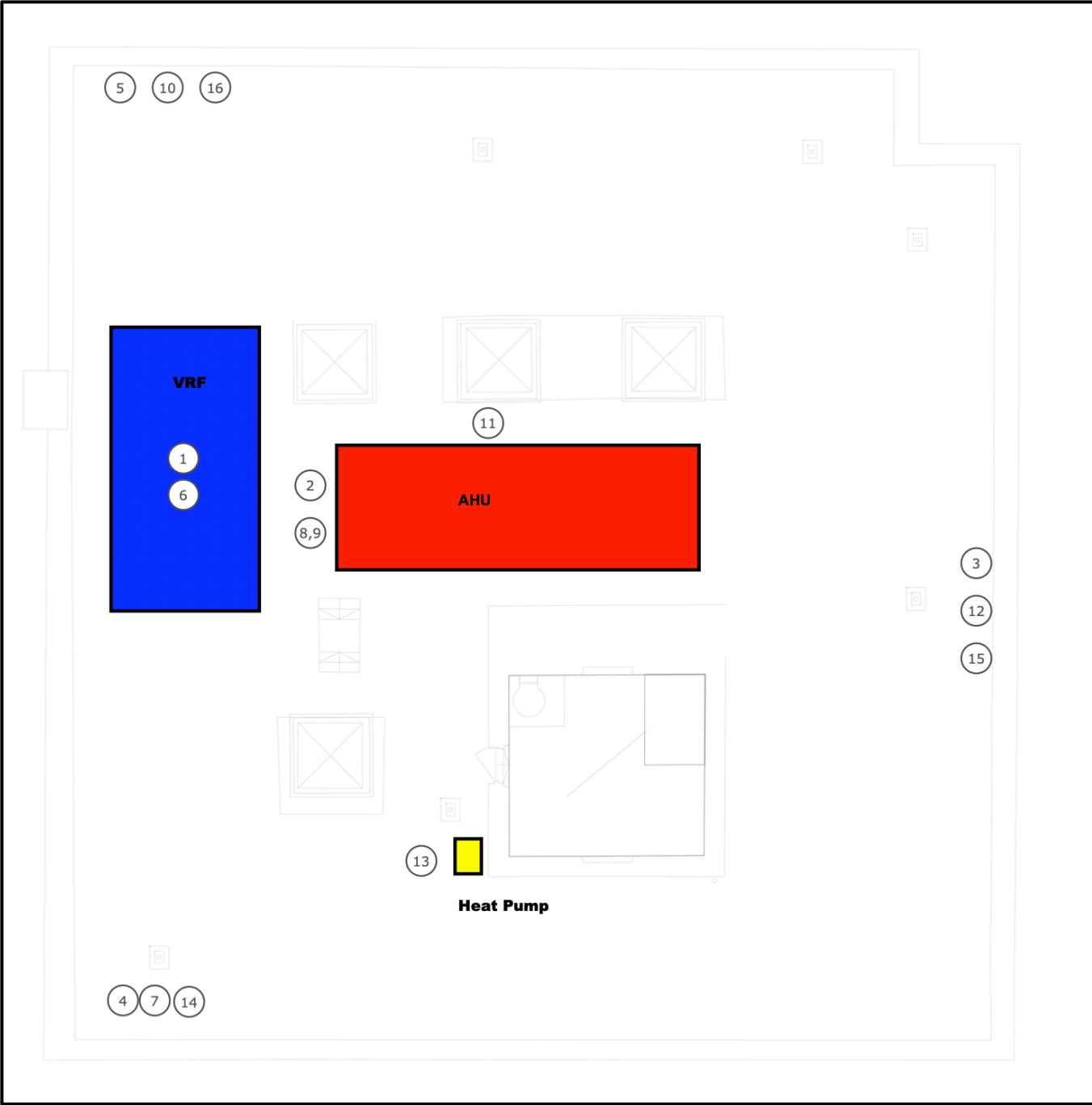
5 NOISE SURVEY

Two sets of environmental noise measurements have been carried out at the site to establish noise levels. The first survey was undertaken on the morning of Tuesday 4<sup>th</sup> July 2023 and the second survey was undertaken on the evening of Monday 10<sup>th</sup> July 2023.

Spot measurements were undertaken at various locations on the roof and at ground floor level to establish source noise levels and background noise levels.

Figure 5.1 presents the measurement locations across the site;

Figure 5.1 Measurement Locations



The equipment used for the survey was as follows:

Table 5.1: Equipment

| Equipment    | Model          | Serial No. | Certificate No. | Calibration Due Date |
|--------------|----------------|------------|-----------------|----------------------|
| Class 1 SLM  | 01dB SOLO      | 60672      | 05631/2         | 22/04/2024           |
| Microphone   | 01dB - MCE212  | 80836      |                 |                      |
| Preamplifier | 01dB - PRE21S  | 13541      |                 |                      |
| Calibrator   | Cirrus CR:511E | 33927      | 05872/1         | 10/08/2023           |

5.1 RESULTS

The noise survey was fully attended, with observations taken by the surveyor during the full period.

The weather for the duration of the survey was suitable for noise measurement, being dry throughout and with windspeeds in the acceptable range.

Tables 5.1 and 5.2 present the results of the daytime and evening noise survey and includes comments on the specific measurements.

Table 5.1: Daytime Noise Survey (4<sup>th</sup> July 2023)

| Meas.No. | Period (T) | L <sub>Aeq,T</sub> - dB | L <sub>A90,T</sub> - dB | Meas. Notes                                                                                                                                                                                                                                  |
|----------|------------|-------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | 1059–1101  | 58.4                    | 56.4                    | Between / Middle of VRV compound at a height of 1.5m above rooftop level. VRV dominates sound environment at measurement position. It is noted that not all VRV are operational, however all connected FCUs are running within the building. |
| 2        | 1101–1102  | 55.5                    | 54.5                    | 0.5 Metres from AHU intake and exhaust terminations. AHU appears to be off and is inaudible above VRV sound and general background sound on the rooftop.                                                                                     |
| 3        | 1102–1104  | 58.2                    | 56.7                    | Ambient and background sound measured at the eastern elevation – generally sound from roof plant, likely to be extract plant.                                                                                                                |
| 4        | 1106–1107  | 58.0                    | 55.1                    | Ambient and background sound measured at the southern elevation – generally sound from Peter Street.                                                                                                                                         |
| 5        | 1109–1110  | 64.2                    | 57.8                    | Ambient and background sound measured at the northern elevation – generally sound from the construction taking place on Bootle Street                                                                                                        |

Table 5.2: Evening Noise Survey (10<sup>th</sup> July 2023)

| Meas.No. | Period (T) | L <sub>Aeq,T</sub> - dB | L <sub>A90,T</sub> - dB | Meas. Notes                                                                                                                                                     |
|----------|------------|-------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6        | 2103-2104  | 67.2                    | 66.6                    | Between / Middle of VRV compound at a height of 1.5m above rooftop level. VRV dominates sound environment at measurement position. All VRV forced into running. |
| 7        | 2104-2105  | 59.3                    | 58.7                    | Edge of rooftop at the south-western corner with all rooftop plant on.                                                                                          |
| 8        | 2106-2107  | 73.0                    | 72.3                    | AHU Exhaust at 0.75m from the termination                                                                                                                       |
| 9        | 2107-2108  | 67.8                    | 67.1                    | AHU Intake at 0.5m from the termination                                                                                                                         |
| 10       | 2108-2110  | 60.1                    | 59.4                    | Edge of rooftop at the north-western corner with all rooftop plant on.                                                                                          |
| 11       | 2110-2111  | 60.0                    | 59.0                    | 0.5m from AHU side - Breakout noise                                                                                                                             |
| 12       | 2111-2112  | 57.8                    | 57.0                    | Edge of rooftop at the eastern elevation with all rooftop plant on.                                                                                             |
| 13       | 2117-2118  | 57.7                    | 57.7                    | 0.5m from Cosmos water condenser *practically inaudible                                                                                                         |
| 14       | 2128-2130  | 56.9                    | 55.6                    | Edge of rooftop at the south-western corner with all rooftop plant off.                                                                                         |
| 15       | 2130-2131  | 56.8                    | 56.0                    | Edge of rooftop at the eastern elevation with all rooftop plant off.                                                                                            |
| 16       | 2131-3133  | 57.7                    | 56.4                    | Edge of rooftop at the north-western corner with all rooftop plant off.                                                                                         |

6 PLANT NOISE ASSESSMENT

This report is to support the discharge of Condition 9 of the planning Decision Notice for the Freetrade Exchange site in Manchester.

6.1 ROOFTOP CALCULATIONS

The Hann Tucker planning report used worst-case prediction distances to allow for any changes in plant placement that may have occurred as the design progressed. Based on the placement of the rooftop AC units and the AHU, the distance to the identified location in the report is 70m from the rooftop plant.

The calculations below are based on the worst-case measured noise levels of the installed plant items.

Table 6.1: Predicted Rooftop Noise Levels at the Receiver Location

| Plant Item             | Noise Level (dBA) | Distance Measured (m) | Noise Level Correction to 70m | Noise Level at Receiver |
|------------------------|-------------------|-----------------------|-------------------------------|-------------------------|
| VRV Units              | 67                | 0.5                   | -43                           | 24dBA                   |
| AHU Exhaust            | 73                | 0.75                  | -39                           | 34dBA                   |
| AHU Intake             | 68                | 0.5                   | -43                           | 25dBA                   |
| AHU Breakout           | 60                | 0.5                   | -43                           | 17dBA                   |
| Cosmos                 | 58                | 0.5                   | -43                           | 15dBA                   |
| Total Cumulative Level |                   |                       |                               | 35dBA                   |

6.2 COMPLIANCE WITH CONDITION 9

Table 6.3 compares the predicted plant noise level with the requirements of Condition 9 of the Decision Notice;

Table 6.2: Condition 9 Compliance Statement

| Location                       | Period    | Predicted Noise Level | Noise Limit | Compliance Statement |
|--------------------------------|-----------|-----------------------|-------------|----------------------|
| Rooftop Plant – Radisson Hotel | 0700-2300 | 35dBA                 | 48dBA       | Comply               |

Based on the above, noise levels are predicted to meet the requirements of Condition 9 of the Decision Notice.

## 7 CONCLUSION

CSG Acoustics Ltd have been appointed by ADT Workplace to provide technical information to demonstrate compliance with Condition 9 of the Decision Notice for the Freetrade Exchange site in Manchester, M2 5GB.

As part of the refurbishment of the site, a number of external plant items have been installed on the roof. Hann Tucker Associates provided a planning report, which was approved by Manchester City Council and referenced in Condition 9 of the Decision Notice.

Noise measurements have been undertaken at the site during both the daytime and evening to ascertain the operational noise levels of the installed plant items.

Based on the measured worst-case noise levels of the plant items in operation, the assessment demonstrates that the requirements of the planning report are met.

In light of the above the external plant items installed have been assessed to accord with the requirements of Condition 9 of the Decision Notice.



## APPENDICES

## APPENDIX A: GLOSSARY OF TERMS

**Decibel (dB)** – The unit used to describe sound. A logarithmic scale is used to describe sound pressure levels and sound power levels. The logarithms used are to base 10; hence, an increase of 10dB in sound pressure level corresponds to a doubling in perceived loudness of the sound.

**Sound Power Level (SWL)** – This is a product of the source alone and is independent of its surroundings. It is a measure of the amount of sound power output measured in decibels.

**Sound Pressure Level (SPL)** – This is a function of the source and its surroundings and is a measure of the sound pressure at a point in space. The sound pressure measured or reported can be influenced by room/mounting conditions and the distance that the measurement is taken.

**Octave Bands** – The human ear is sensitive to sound over a range of approximately 20 Hz to 20 KHz and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands and the sound pressure level is measured in each band. 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.

**"A" Weighting** – A number of frequency weightings have been developed to imitate the ear's varying sensitivity to sound of different frequencies. The most commonly used weighting is the "A" weighting. The "A" weighted SPL can be measured directly or derived from octave or one-third octave band SPLs. The result is a single figure index which gives some idea of the subjective loudness of the sound, but which contains no information as to its frequency content.

**Intermittency and Time-Weighting** – The degree of annoyance caused by a noise also depends on its duration and intermittency of a noise. Intermittent, impulsive or repetitive noises tend to be more annoying than continuous noises. Various time-weightings have been derived to measure sounds of differing intermittences and these can be measured directly on modern equipment. The most common time-weightings in use are as follows:–

**$L_{90}$**  This is the sound pressure level exceeded for 90% of the measurement period. It is widely used to measure background noise levels.

**$L_{eq}$**  The equivalent continuous noise level is often used to measure intermittent noise. It is defined as the notional steady noise level that would contain the same acoustic energy as the varying noise. Because the averaging process used is logarithmic, the  $L_{eq}$  level tends to be dominated by the higher noise levels measured.