



TO **Cedric Jackson**
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CC As per email distribution list

FROM **Alex Taylor**

DATE 02 December 2022
FILE REF P3001965(COR)U008
Rev A

SUBJECT **AMERESCO SCHEMES – NORTH CITY FAMILY & FITNESS CENTRE, MANCHESTER**
Plant noise commissioning measurements

We are writing to summarise the results of our external plant noise commissioning measurements undertaken at North City Family & Fitness Centre, Manchester. The measured plant noise levels have been used to calculate the plant noise levels at the location of the closest noise sensitive receptors (NSR) properties in order to review compliance with the local authority planning noise limits.

1. Noise criteria

LPA criteria relating to the proposed equipment states that the following requirements must be achieved:

“The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that: ‘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 rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location’.”

The nearest / most exposed NSR properties to the proposed plant equipment location at the site are identified to be the residential properties facing onto Upper Conran Street approximately 69 metres to the east / south-east of the equipment location.

An environmental noise survey has been undertaken by BDP Acoustics on 24/01/2022 at the nearest / most exposed NSR properties to the proposed plant equipment location on the site to determine the typical background level (L_{A90}). Full details and results of the noise survey can be found in the BDP Acoustics report reference ‘P3001965/(REP)U007’ dated April 2022.

2. Plant details

This noise assessment considers the following newly installed plant equipment:

- 3no. ground source heat pumps (GSHP) enclosed within a plant enclosure

The location of the newly installed plant equipment and the closest NSR properties is illustrated in Figure 1 below.

Figure 1: Location of installed plant highlighted in red and closest NSR properties highlighted in white



3. Measured plant noise levels

When on-site, at the NSR position the specific noise associated with the new equipment was not perceptible against the residual ambient noise climate.

In order to demonstrate compliance with the criteria a series of short-term (1min) nearfield plant noise measurements have been undertaken on 31/08/2022 by BDP Acoustics. The Amerseco representative on site confirmed that the plant was operating at typical operating duty during the measurements.

The nearfield plant noise measurements were taken at a distance of 1.0m from the acoustic weak-point associated with the GSHP enclosure (the louvred door) and 1.5m A.G.L. The location of the plant noise measurement position (MP1) is illustrated in Figure 2 below.

A Rion NA-28 sound level meter and Rion NC74 calibrator was used for the measurements. The sound level meter was site calibrated prior to and following the survey period with no significant drift in sensitivity observed. Full laboratory calibration information is appended to this report for reference.

Weather conditions during the survey were sunny and dry, with wind speeds below 5 m/s, temperature of 19°C, and cloud cover in the region of 30%-50%.

Figure 2: Location of nearfield plant noise measurement position MP1



The following table summarises the nearfield plant noise levels measured at position MP1.

Table 1: Summary of nearfield plant noise measurements at position MP1 on 31/08/2022

Start Time	Duration	L_{Aeq} dB	L_{A90} , dB
12:18	1 minute	59.8	55.5
12:20	1 minute	59.9	54.9
12:23	1 minute	59.9	54.8
12:26	1 minute	57.9	55.0
12:27	1 minute	60.7	56.8

4. Predicted noise levels at NSR properties

The nearfield measurement results have been used to determine the worst case noise levels expected at the NSR properties based on simple noise propagation calculations taking account of distance attenuation. The predicted worst case noise levels expected at the NSR properties are presented in Table 2 below.

For the purposes of this noise assessment, the nearfield measured L_{A90} noise levels have been used to inform the calculations in order to omit non-representative contributions during the survey measurements (i.e. traffic passbys from Walter Street and the adjacent car park).

In order to assess a worst case scenario, the assessment has included a correction of +5dB (i.e. $10 \times \log 3$) to allow for the potential contribution of all 3 GSHPs operating simultaneously, and has used the highest nearfield plant noise L_{A90} noise level (56.8 dB) measured during the survey for the source noise level.

Table 2: Summary of source measurements and simple noise propagation corrections to derive external plant noise levels at 1 m from façade of the closest NSR

<i>Position</i>	<i>L_{A90} dB</i>	<i>Measurement distance (m)</i>	<i>Source – NSR distance (m)</i>	<i>Distance attenuation (dB)</i>	<i>Corr for 3 no. sources (dB)</i>	<i>Noise level at NSR (dB)</i>
MP1	57	1.0	68.5	-37	+5	25

Table 3 summarises the predicted external plant noise levels at the NSR along with the proposed external plant noise limits for comparison. Due to the low predicted plant noise level at the NSR relative to the residual noise climate, character corrections have not been added to the predicted rating level, i.e. specific plant noise is not expected to be readily distinctive against the background noise climate at the NSR position.

Table 2: Predicted free field external plant noise levels at 1 m from façade of the closest NSR

<i>Noise Sensitive Receptor</i>	<i>Lowest measured background noise (dB L_{A90,5min})</i>	<i>Proposed noise limit at NSR (dB L_{A,r,T,r})</i>	<i>Predicted noise level at NSR (dB L_{A,r,T,r})</i>
Residential facades on Upper Conran Street	39	34	25

5. Summary

Nearfield noise measurements of the newly installed external plant equipment have been undertaken by BDP Acoustics and have been used to predict the worst case external plant noise levels at the closest NSR properties. The predicted external plant noise levels at the closest NSR properties indicate that the newly installed plant complies with the LPA plant noise criteria.

Please do not hesitate to contact us should you have any queries.

Yours sincerely
for BDP Acoustics

Alex Taylor
Senior Acoustic Consultant
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6. Calibration certificates

Certificate of Calibration

Issued by University of Salford (Acoustic Calibration Laboratory)

University of
Salford
MANCHESTER

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APPROVED SIGNATORIES

Claire Lomax [] Sean Furlong []
Gary Phillips [x] Danny McCaul []



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Certificate Number: 05663/1

Date of Issue: 9 March 2022

CALIBRATION OF A SOUND CALIBRATOR

FOR: BDP
11 Ducie Street
PO Box 85
Piccadilly Basin
Manchester
M 60 3JA

FOR THE ATTENTION OF: Lewis Herd

DESCRIPTION: Calibrator with housing for one-inch microphones
and adaptor type NC-74-002 for half-inch
microphones.

MANUFACTURER: Rion

TYPE: NC74

SERIAL NUMBER: 50941318

DATE RECEIVED: 23/02/2022

DATE OF CALIBRATION: 24/02/2022

LOCATION OF CALIBRATION: Acoustic Calibration Laboratory,
Newton G31, University of Salford.

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial):	CL	Name:	Claire Lomax
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Results in this certificate relate only to instruments tested.

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

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Certificate Number: 05663/1

Date of Issue: 9 March 2022

MEASUREMENTS

The sound pressure level generated by the calibrator was measured using a calibrated, B&K 4192 WS2P condenser microphone. The calibration was carried out with the calibrator in the half-inch configuration.

Five determinations of the sound pressure level, frequency and total distortion were made.

The manufacturer states that automatic compensation is applied for the effects of changes in atmospheric pressure.

The measured sound pressure level has been corrected for the effects of the load volume of the B&K 4192 reference microphone so that the stated output level is correct for use with a Rion UC-53A microphone. Consult the manufacturer's instruction manual for any corrections, due to slight differences in microphone load volumes, to the stated level which may be required when using this sound calibrator with other microphone models.

RESULTS

Coupler configuration: Half-inch

Calibration output level correct for microphone type: Rion UC-53A

Output level (dB re 20 μ Pa): 94.09 dB $\pm$ 0.09 dB

Frequency (Hz): 1002.26 Hz $\pm$ 0.12 Hz

Total Distortion (%): 1.55 % $\pm$ 0.22 %

Average environmental conditions at the time of measurement were:

Pressure: 100.150 kPa $\pm$ 0.015 kPa

Temperature: 22.9 °C $\pm$ 0.4 °C

Relative humidity: 38.7 % $\pm$ 2.1 %

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

All measurement results are retained at the acoustic calibration laboratory for at least four years.

-----END OF CERTIFICATE-----

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

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APPROVED SIGNATORIES

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University of
Salford
MANCHESTER

Certificate Number: 05141/1

Date of Issue: 5th March 2021

PERIODIC TEST OF A SOUND LEVEL METER to IEC 61672-3:2006

FOR:	BDP 11 Ducie Street PO Box 85 Piccadilly Basin, Manchester M60 3JA
FOR THE ATTENTION OF:	Dan Forbes
DATE RECEIVED:	16 th February 2021
PERIODIC TEST DATE:	3 rd March 2021
LOCATION OF CALIBRATION:	Acoustic Calibration Laboratory, Newton G31, University of Salford
TEST PROCEDURE:	CTP12 (Laboratory Manual)

Sound Level Meter Details-

Manufacturer	Rion
Model	NA-28
Serial number	00170250
Class	1
Software version	2.3

Associated Items:-

Type	Manufacturer	Model	Serial Number
Microphone	Rion	UC-59	01054
Preamplifier	Rion	NH-23	80932

Test Engineer (initial): GP Name: Gary Phillips

Results in this certificate relate only to instruments tested.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

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Certificate Number: 05141/1

Date of Issue: 5th March 2021

Procedures from IEC 61672-3: 2006 and TPS 49 Edition 2 June 2009 were used to perform the periodic tests. Manufacturer's instruction manual was marked as follows: Instruction Manual NA-28 and Technical Notes NA-28.

Adjustment data used to adjust the sound levels indicated in response to the application of a multi-frequency sound calibrator to sound levels equivalent to those that would be indicated in response to plane, progressive sound waves were provided by the manufacturer's agent.

The sound level meter calibration check frequency is 1000 Hz, the reference sound pressure level is 94 dB, and the reference level range is the 120 dB range.

The environmental conditions in the laboratory at the start of the test were:

Static pressure 102.333 kPa $\pm$ 0.014 kPa; air temperature 24.4 °C $\pm$ 0.3 °C; relative humidity 33.0 % $\pm$ 2.6 %.

The initial response of the instrument to application of the suitable laboratory sound calibrator was 93.7 dB (A). The instrument was then adjusted to indicate 94.1 dB (A). This indication was obtained from the calibration certificate of the calibrator and information in the manufacturer's instruction manual specified in this certificate, when the instrument is configured as follows: Wind Screen Correction: Off, Diffuse Field Correction: Off. The instrument was calibrated without a windscreen. Consult manufacturer's instructions if using a windscreen.

With the microphone installed the level of self-generated noise on the most-sensitive level range was:

A: 15.4 dB*† on the 80 dB range

* Under-range indicated on instrument display

† Indicates that the measured level exceeds the highest anticipated level of self-generated noise stated in the manufacturer's instruction manual.

With the microphone replaced by an electrical input device with a similar capacitance to that of the supplied microphone, the levels of self-generated noise on the most-sensitive level range were:

A: 10.8 dB*† on the 80 dB range

C: 15.4 dB*† on the 80 dB range

Z: 22.4 dB*† on the 80 dB range

* Under-range indicated on instrument display

† Indicates that the measured level exceeds the highest anticipated level of self-generated noise stated in the manufacturer's instruction manual.

The environmental conditions in the laboratory at the end of the test were:

Static pressure 102.152 kPa $\pm$ 0.014 kPa; air temperature 24.7 °C $\pm$ 0.3 °C; relative humidity 42.6 % $\pm$ 2.6 %.

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Certificate Number: 05141/1

Date of Issue: 5th March 2021

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data obtained from the manufacturer of the sound level meter was published in the instruction manual or made available by the manufacturer. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not meet the requirements of IEC 61672-1:2002.

Instruments used in the verification procedure were traceable to *National Standards*. The multi-frequency calibrator method was employed in the acoustical tests of a frequency weighting.

All measurement results are retained at the acoustic calibration laboratory for at least four years.

-----END OF CERTIFICATE-----