

Acoustics
Air Quality
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Project

North Manchester General Hospital
External Plant Noise Measurements

Prepared for

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PI	06/09/2024	-	Heulwen Peters

Summary

SRL Technical Services Limited has been commissioned by IOarchitect to measure plant noise from the newly installed AHU at North Manchester General Hospital Endoscopy. Measurements were taken at the nearest noise sensitive receptors, both on-site and off-site, with reference to the methods in BS 4142:2014+A1:2019 and the applicable planning criteria.

We measured noise levels from the newly installed AHU at the Endoscopy department at North Manchester General Hospital whilst it was in typical and normal operation. Attended measurements were taken at the nearest accessible location to the nearby noise sensitive receptors and supplemented with distance corrected calculations from the plant noise level measurements at source.

Using the data measured on site, I calculate that the cumulative noise from the plant will be 26 dB $L_{A_{r, Tr}}$ at the nearest on-site noise sensitive receptor. Noise levels at the nearest off-site noise sensitive receptor will be 14 dB $L_{A_{r, Tr}}$. Noise levels at both receptors are below the target criterion of “5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location” and therefore the criteria has been met. Additionally, these noise levels are below the level at which BS4142 predicts noise will have an adverse impact.

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1.0 Introduction

IOarchitect currently have a planning application under review for a newly installed air handling unit (AHU) at the Endoscopy Department at North Manchester General Hospital in Crumpsall.

SRL Technical Services Limited has been commissioned by IOarchitect to measure plant noise from the Endoscopy Department at the nearest noise sensitive receptors, with reference to BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*. This assessment is done to address the conditions below:

- a) *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. 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.*
- b) *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.*

Figure 1 below shows the item of plant running at normal duty during our survey.

Figure 1 – Plant Measured (shown in blue)



2.0 Noise Guidance

BS 4142:2014+A1:2019 ‘*Methods for rating and assessing industrial and commercial sound*’ provides a method to assess whether “sound of an industrial and/or commercial nature” is likely to have an adverse impact at noise-sensitive receptors. BS 4142’s assessment methodology considers how loud the noise is and its character (e.g. whether it contains hisses, bangs, or clicks). The assessment is then based on how loud (and how annoying) the source noise is compared with the existing background noise at the receptor.

The following corrections can potentially be applied for the acoustic character:

Impulsivity – a correction of up to +9 dB can be applied depending on how impulsive the specific noise is:

- +3 dB if the impulsivity is just perceptible at the receptor
- +6 dB if the impulsivity is clearly perceptible at the receptor, and
- +9 dB if the impulsivity is highly perceptible at the receptor

Tonality – a correction of up to +6 dB can be applied depending on how tonal the specific noise is:

- +2 dB for a tone which is just perceptible at the receptor
- +4 dB for a tone which is clearly perceptible at the receptor, and
- +6 dB for a tone which is highly perceptible at the receptor

If the source is both tonal and impulsive it is usual to only apply the correction for the characteristic which is most dominant.

Intermittency – when the noise source has identifiable on/off conditions (e.g. an item of plant which switches on and off), and these on/off conditions are clearly distinguishable against the acoustic environment, a correction of up to +3 dB can be applied.

Other sound characteristics – where the noise source is not tonal or impulsive but has another characteristic that is clearly distinguishable against the acoustic environment, a correction of up to +3 dB can be applied.

The Rating Level is determined by applying acoustic corrections to the Specific Noise Level, and then the Rating Level is compared with the measured background level. The difference between the Rating Level and the typical background level can then be interpreted using the following guidance from BS 4142, depending on the context:

- If the Rating Level is +10 dB or more above the background level, this indicates a significant adverse impact.
- A difference of around +5 dB is likely to be an indication of an 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.

3.0 Noise Survey

We measured noise levels at the site between 02:00 and 03:00 on Tuesday 20th August 2024. This time was chosen to obtain measurements during what is to be considered the quietest part of the night-time period.

Measurements were taken at the nearest on-site noise sensitive receptor as shown below in Figure 2. Additionally, we also took measurements at the nearest off-site noise sensitive receptor as shown below in Figure 3. Measurements were taken on-site and off-site to represent the nearest noise sensitive receptor within the hospital grounds and the off-site residential dwellings.

Figure 2 – On-site NSR

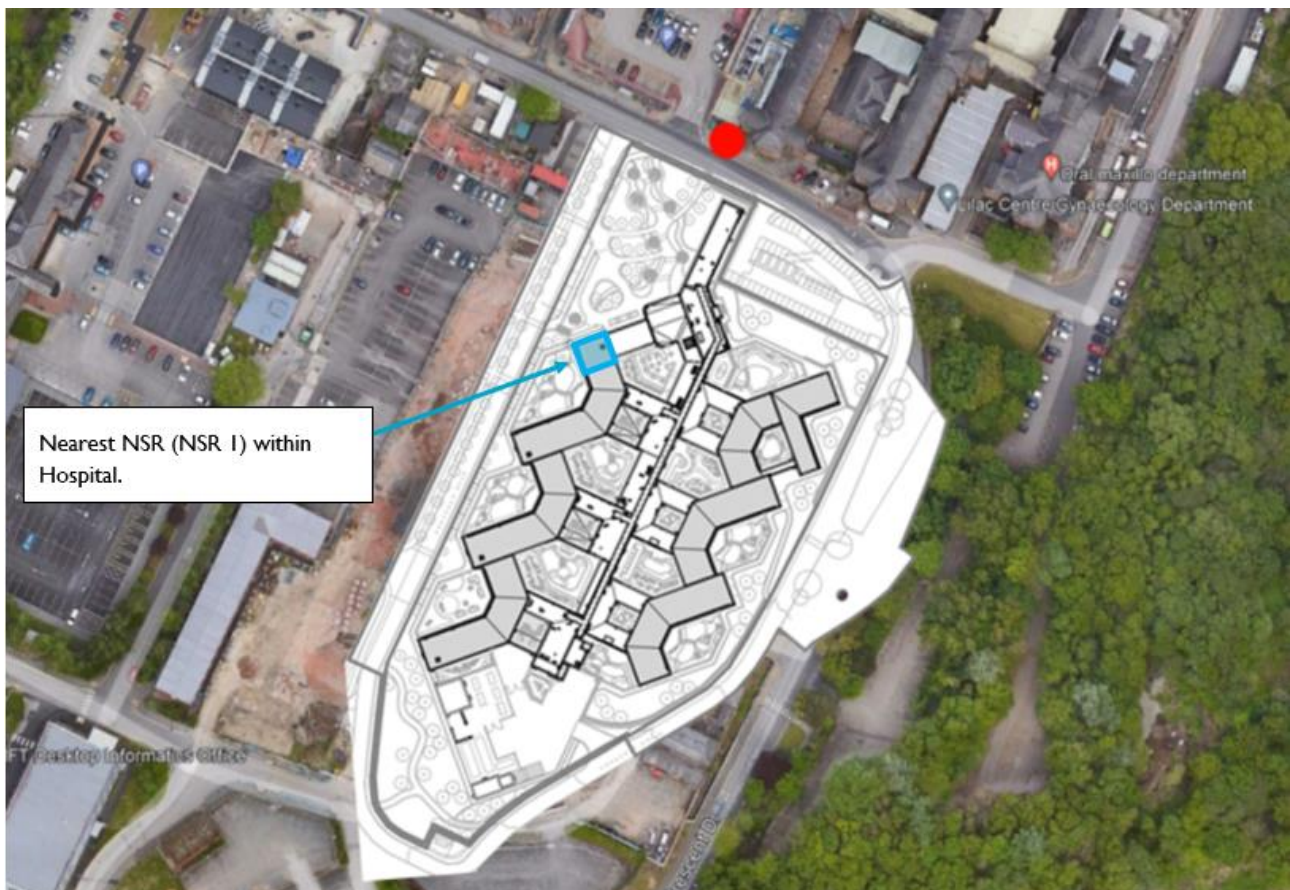
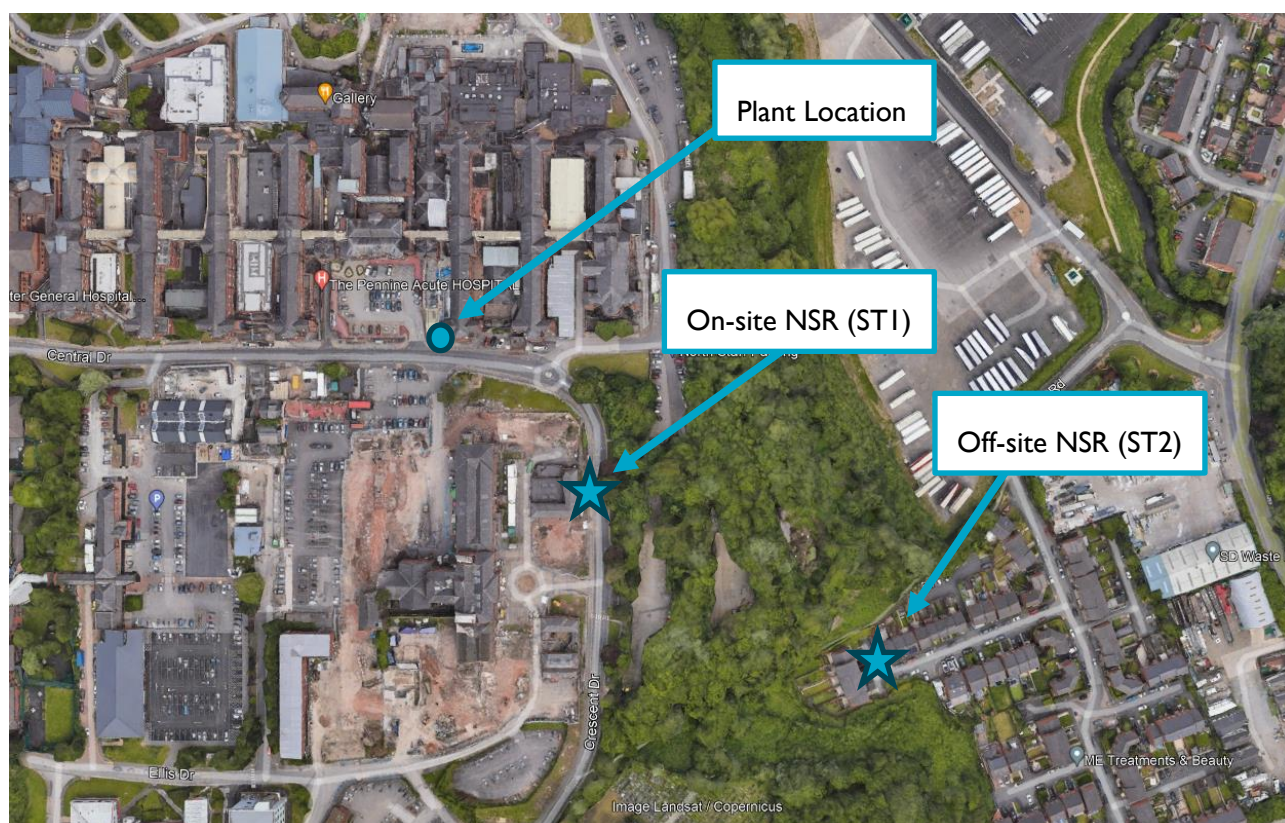


Figure 3 - Off-site NSR



Figure 4 below shows the measurement positions relative to the nearby noise sensitive receptors. These locations were chosen as the closest and accessible locations. The microphone was set at a height of 1.2m above ground level and in free field conditions.

Figure 4 – Measurement Locations



4.0 Results

4.1 Attended Measurements

Table 1 below shows the L_{A90} values measured at positions ST1 and ST2. Please note that as we couldn't turn the plant off, measurements were taken at a representative location to capture the typical noise environment whilst excluding noise from the newly installed plant.

Table 1 – Summary of Attended Measurements (L_{A90})

Measurement Position	Typical Background Level (L_{A90})
On-site NSR (ST1)	43
Off-site NSR (ST2)	33

Table 2 - BS 4142 Assessment – On-site NSR (L_{Aeq})

Description	Receptor 1
Specific noise level L_{Aeq} at noise sensitive receptor	26
Acoustic feature correction * there are no audible tonal, intermittent or impulsive qualities to the noise at the receptor location	0
Rating level, $L_{Ar,Tr}$	26
Typical background noise level dB L_{A90}	43
Difference, dB	-17

My assessment shows that the newly installed AHU generates a noise level of 26 dB L_{Aeq} at the on-site nearest noise sensitive receptor. This is below the target criterion of “5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location” and therefore the criterion has been met. Additionally, this is below the level at which BS4142 predicts noise will have an adverse impact.

Table 3 - BS 4142 Assessment – Off-site NSR (L_{Aeq})

Description	Receptor 1
Specific noise level L_{Aeq} at noise sensitive receptor	14
Acoustic feature correction * <i>there are no audible tonal, intermittent or impulsive qualities to the noise at the receptor location</i>	0
Rating level, $L_{Ar,Tr}$	14
Typical background noise level dB L_{A90}	33
Difference, dB	-19

Our surveyor noted that the plant was not audible at either receptor.

My assessment shows that the newly installed AHU will generate a noise level of 14 dB L_{Aeq} at the off-site nearest noise sensitive receptor. This is below the target criterion of “5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location” and therefore the criterion has been met. Additionally, this is below the level at which BS4142 predicts noise will have an adverse impact.

Appendix A - Survey Details

A1. Location of Survey

North Manchester General Hospital

A2. Date & Time of Survey

02:00 – 03:00 Tuesday 20th August 2024

A3. Personnel Present During Survey

Sam Finch (SRL)

A4. Weather Conditions during Survey

14°C, 6mph winds, no precipitation

A5. Instrumentation

Bruel & Kjaer - Noise Meter HE2

Description	SRL No.	Make	Type	S/N
Sound Level Meter (HE2)	615	Brüel & Kjær	2250	2579806
Pre-amp	616	Brüel & Kjær	ZC0032	22126
Microphone	617	Brüel & Kjær	4189	2584598
Calibrator	618	Brüel & Kjær	4231	2583398

A6. Calibration Procedure

Before and after the survey the measurement apparatus was check calibrated to an accuracy of ± 0.3 dB using the type 4231 Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.8 dB re 2×10^{-5} Pa at a frequency of 1 kHz.

Appendix B - Information Used

Table 4 – Attended Survey Data

Project Name	Start Time	Elapsed Time	Position	L _{Aeq}	L _{AF90.0}
Project 001	20/08/2024 02:06	00:00:30	2m from plant	53	49
Project 002	20/08/2024 02:07	00:00:30	4m from plant	51	49
Project 003	20/08/2024 02:13	00:05:00	On-site Background	52	47
Project 004	20/08/2024 02:18	00:05:00	On-site Background	50	40
Project 005	20/08/2024 02:29	00:05:00	Off-site NSR	36	33
Project 007	20/08/2024 02:41	00:05:00	Off-site NSR	41	32
Project 006	20/08/2024 02:35	00:05:00	Off-site background	38	33
Project 008	20/08/2024 02:46	00:05:00	Off-site background	35	32

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