

29th October 2015

South Tyneside NHS Foundation Trust

Ref: DC 08-14-41127 NC3

For the attention of: Michael Collins

Dear Mr Collins,

RE: South Tyneside Integrated Care Hub – BS 4142 Rooftop Plant Noise Assessment

Stroma Technology Ltd (Stroma) has been commissioned by South Tyneside NHS Foundation Trust to undertake atmosphere-side noise calculations for rooftop plant at the site of the new Integrated Care Hub at South Tyneside District Hospital. The assessment is required in order to achieve the BREEAM Noise Pollution Credit under Pol 05 and also to discharge the noise related Planning Condition 6.

Planning Condition 6 states:- *'Prior to the installation of plant and equipment a Noise Assessment, including all necessary and suitable noise mitigation measures, shall be submitted to the Local Planning Authority identifying all significant sources of noise associated with external cooling.'*

Rooftop plant noise data has been provided by the Project M&E Consultant, CAD21. It is understood that the rooftop plant (and associated sound pressure level) is as follows, as set out on CAD21 Drawing Ref 3058_00_02_DR_M-100 (appended to this report):

- | | | |
|--------------------------------------|----------|------------------------------------|
| • ASHP 01 - CAHV-P500YA-HPB(-BS) | 59 dB(A) | |
| • ASHP 02 - CAHV-P500YA-HPB(-BS) | 59 dB(A) | |
| • ASHP 03 - CAHV-P500YA-HPB(-BS) | 59 dB(A) | |
| • Split System 01 - PUAZ-ZRP35VKA | 46 dB(A) | |
| • Split System 02 - PUAZ-ZRP35VKA | 46 dB(A) | |
| • Split System 03 - MUZ-FH25VE-E2 | 49 dB(A) | |
| • Split System 04 - PUAZ-ZRP35VKA | 46 dB(A) | |
| • Split System 05 - PUAZ-ZRP35VKA | 46 dB(A) | |
| • Split System 06 - MUZ-FH25VE-E2 | 49 dB(A) | |
| • Split System 07 - MUZ-FH25VE-E2 | 49 dB(A) | |
| • Split System 08 - MUZ-FH25VE-E2 | 49 dB(A) | |
| • Split System 09 - PUAZ-ZRP100YKAR1 | 61 dB(A) | -based on data for PUAZ-ZRP100YKA2 |
| • Split System 10 - PUAZ-ZRP100YKAR1 | 61 dB(A) | -based on data for PUAZ-ZRP100YKA2 |
| • Supply Fan 03 - ESS3-E | 61 dB(A) | |
| • In-line Fan 05 - ACM125 | 38 dB(A) | |
| • In-line Fan 06 - ACM125 | 38 dB(A) | |

All quoted dB values are sound pressure levels at 1m and have been quoted on the basis of hemispherical radiation i.e. representative of a noise source sited on a rooftop. Due to corrections made in order to normalise the data in accordance with the former sentence, the 'dB value' as quoted in the supplied data may differ from that quoted above. It is assumed that all supplied data is representative of the actual installed and operating conditions e.g. operating duty, static pressure, mode etc. No account has been taken of any system acoustic losses, nor any regenerated noise associated with the fans. It is assumed, as with most modern plant equipment, that the noise source is broadband in nature without any attention catching characteristics.

4No. key noise-sensitive receptor (NSR) locations have been identified; these are marked on the location plan appended to this report and are described below:

- NSR-A 166 Harton Lane
- NSR-B South Shields Community School, McAnany Avenue
- NSR-C Hollingside Way
- NSR-D STICH Bedroom F.085 (example receptor location)

Attenuation due to distance corrections based on the inverse square law have been applied assuming a point source for each individual plant item. Screening corrections have also been applied, generally as follows, a 0dB correction for screening to first floor level NSRs, a 5dB correction for grazing incidence screening to ground floor level NSRs, and a 10dB correction for full screening to bedrooms associated with the development itself. Although this is a rather simplistic approach, it is considered reasonably robust. A noise incidence correction factor of 3 dB has also been applied to account for the orientation of the sound source to the receiver for development bedrooms only.

The adopted background noise level data is based on the noise survey undertaken by Stroma on the 28th and 29th of October 2014, between the hours of 18:15 and 13:57. Full details of the noise survey can be found in Stroma Report Reference KS 08-14-41127 NC2 Rev 01 DC. The lowest measured background noise levels (L_{A90} dB) have been adopted for the purposes of this assessment. The lowest measured noise level at Measurement Position 1 (40 dB) has been adopted for assessing NSR-A. The lowest measured daytime noise level at Measurement Position 2 (40 dB) was adopted for assessing NSR-B. The lowest measured night-time noise level at Measurement Position 2 (38 dB) was adopted for assessing NSR-C. No background noise level has been utilised for NSR-D, as a BS 4142 assessment is not considered applicable/appropriate in this instance, due to being on the site itself. Therefore, noise break-in calculations have been undertaken for NSR-D.

The noise levels at NSR-A due to rooftop plant are given in Table 1 below:

Table 1

Plant Area	Noise Level @ 1m	Distance	Distance Attn'	Screening	Assumed Screening Attn'	Predicted Noise Level
North	64	40	32	None	0	32
East	64	60	36	None	0	28
South	52	55	35	None	0	17
West	61	35	31	None	0	30
Predicted noise level at NSR-A due to all rooftop plant						35

The noise levels at NSR-B due to rooftop plant are given in Table 2 below:

Table 2

Plant Area	Noise Level @ 1m	Distance	Distance Attn'	Screening	Assumed Screening Attn'	Predicted Noise Level
North	64	120	42	Grazing	5	17
East	64	105	40	Grazing	5	19
South	52	135	43	Grazing	5	4
West	61	140	43	Grazing	5	13
Predicted noise level at NSR-B due to all rooftop plant						22

The noise levels at NSR-C due to rooftop plant are given in Table 3 below:

Table 3

Plant Area	Noise Level @ 1m	Distance	Distance Attn'	Screening	Assumed Screening Attn'	Predicted Noise Level
North	64	255	48	None	0	16
East	64	225	47	None	0	17
South	52	245	48	None	0	4
West	61	265	48	None	0	13
Predicted noise level at NSR-C due to all rooftop plant						21

The noise levels at NSR-D due to rooftop plant are given in Table 4 below:

Table 4

Plant Area	Noise Level @ 1m	Distance	Distance Attn'	Screening	Assumed Screening Attn'	Incidence Correction	Predicted Noise Level
North	64	40	32	Full	10	3	19
East	64	10	20	Full	10	3	31
South	52	25	28	Full	10	3	11
West	61	40	32	Full	10	3	16
Predicted noise level at NSR-D due to all rooftop plant							31

The noise levels at the noise-sensitive receptors, NSR-A, NSR-B and NSR-C due to rooftop plant noise are given in Table 5 below. The total predicted noise levels have also been compared with the lowest background noise level measured at the associated representative noise monitoring location.

Table 5

Receptor	Predicted Noise Level	Background Noise Level L _{A90}	Excess over background
NSR-A	35	40	-5
NSR-B	22	40	-18
NSR-C	21	38	-17

It can be seen from Table 5 above, that the predicted rooftop plant noise levels all fall significantly below the existing measured background noise levels. BS 4142-2014 states, '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.'

Based on the above, it can be concluded that any noise impact at off-site receptors due to rooftop plant will be of a 'low impact'. As the BS 4142 rating level falls at least 5 dB below background, it can be concluded that the BREEAM PoI 05 Credit is achievable.

The noise level at the noise-sensitive receptor, NSR-D due to rooftop plant noise is given in Table 6 below. The total predicted noise level has been used to establish an internal noise level within the room based on 10 dB(A) attenuation from an open window. This internal noise level due to plant noise break-in has then been compared with the HTM 08-01 internal ambient noise level criterion.

Table 6

Receptor	Predicted Noise Level	Open Window Attn'	Predicted Internal Plant Noise Level	Internal Ambient Noise Level Criterion	Excess over ambient
NSR-D	31	10	21	35	-14

It can be seen from Table 6 above, that the predicted rooftop plant noise break-in level falls significantly below the internal ambient noise level criterion. In considering road traffic noise break-in, it can be concluded that rooftop plant noise break-in to bedrooms will be inaudible.

Based on the above, it can be concluded that any noise impact at on-site receptors due to rooftop plant will be negligible.

I trust the above is self-explanatory; however, should you require any additional information or I can be of further assistance, please do not hesitate to contact me.

Yours sincerely

Dan Cramond MIOA
On behalf of Stroma Technology

APPENDIX A: Off-site Noise-sensitive Receptor Location Plan



APPENDIX B: On-site Noise-sensitive Receptor Location Plan

