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MEMO P23-327-M01v1

Project:	P23-327 – New rooftop equipment, Six by Nico, John Dalton Street, Manchester
Date:	13 August 2024
To:	Cathryn Saunders – C3 Cost Consultants
From:	Donald Quinn BSc FIOA, Managing Director
Subject:	**Plant/equipment verification noise measurements**

Following our visit to site earlier this week, this memo sets out the details and findings of our verification noise measurements of the new external plant and equipment.

The planning consent for the plant and equipment (Manchester City Council ref. 138274/FO/2023) includes the following condition regarding noise:

> 3) External plant/equipment/servicing
>
> 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 the operation of the scheme hereby approved, details of 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 nonconformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Hepworth Acoustics noise impact assessment report ref. P23-327-R01v1 dated September 2023 satisfied the requirements of Condition 3a, and the verification noise measurements described herein have been undertaken in connection with condition 3b.

The relevant noise limit as required by Manchester City Council was set out in our report P23-327-R01v1 as follows:

Table 1: Adopted noise limit

Location	Noise 'rating' level limit in L_{Ar} (dB)
Outside nearest/most exposed hotel guest room windows	48

Plant/Equipment Installation

The installed plant/equipment is shown in the sketch shown in the attached Figure 1. Because the Six by Nico equipment is spread widely across the whole width of the flat roof to the rear of the building (and in two separate sections divided by an approx. 1m high parapet wall as indicated in Figure 1), there is no one hotel guest room that is exposed to worst-case noise from all of the Six by Nico equipment. Indeed, because there are also numerous items of plant and equipment associated with other demises within the building (i.e. the hotel and gym), there is no single location on the roof where it was possible to measure noise from all items of Six by Nico plant/equipment in isolation. On this basis, it has been necessary to evaluate the noise levels from the condensers and kitchen ventilation fans separately (i.e. at separate positions) as indicated in Figure 1. As set out below, the condenser and ventilation fan noise levels were carried out on separate days due to an issue with the supply fan that was identified during our initial visit.

Site Visits & Noise Measurements

6 June 2024

An initial site visit and set of noise measurements was carried out during the morning of Thursday 6 June 2024. The weather conditions during the measurements were mild/warm, dry and calm. The noise measurements were taken with a NTi Audio XL2 'Class 1' sound analyser (serial no. A2A-20361-E0). The analyser was check-calibrated before and after the measurements with no variance observed. The sound analyser was hand-held at a microphone height of approximately 1.4m above flat roof level and 1m from the nearest/most exposed guest room. The measurements were taken as a series of short-term measurements including octave band analysis both with and without the Six by Nico plant/equipment operating. An operative from the mechanical consultants/contractors APL was on-hand to operate the equipment as required.

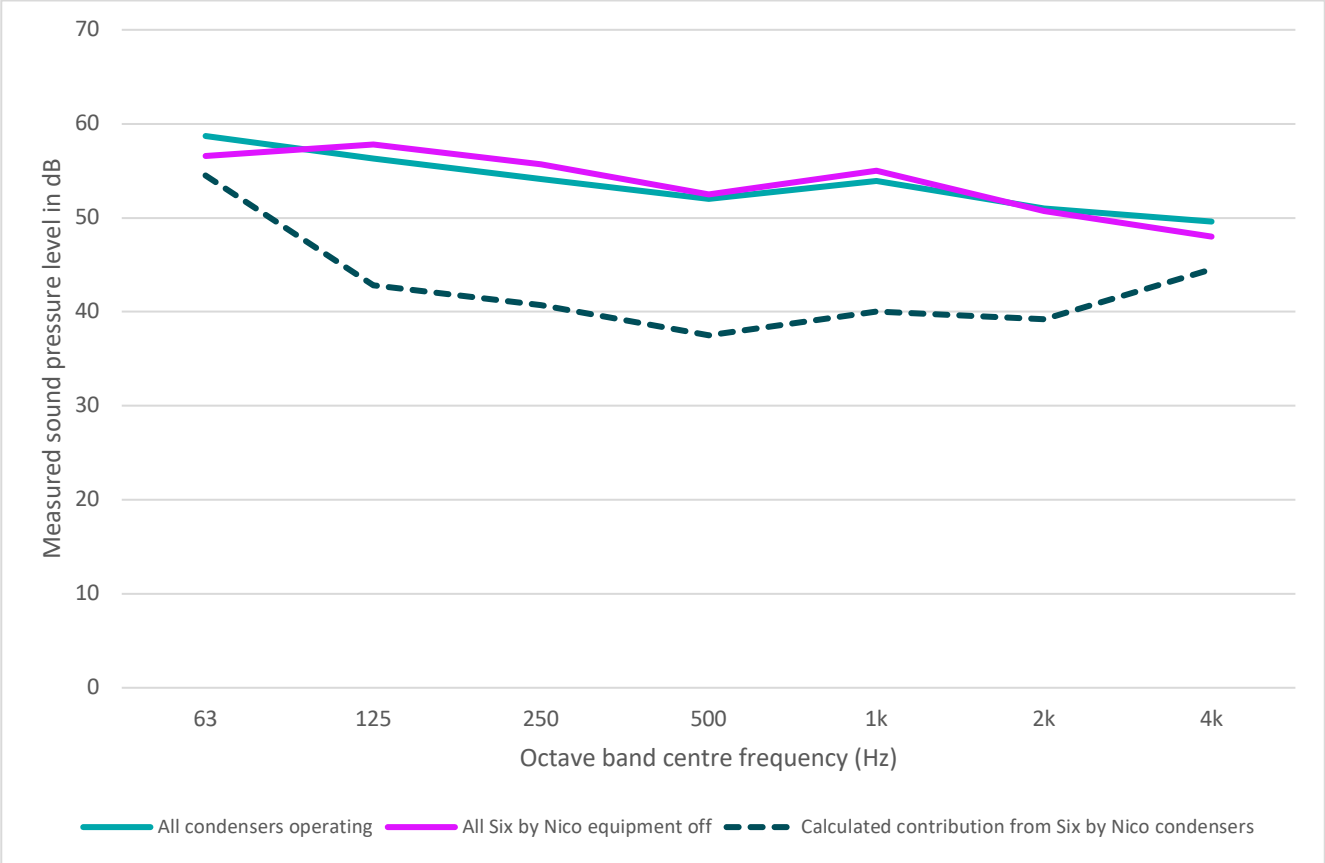
Sets of noise measurements with and without the condensers operating were carried out at Location A as indicated in Figure 1 with a view of the front of the main condenser units. This location was chosen as the hotel guest room closest/most exposed to Six by Nico condenser noise whilst, being least affected by noise from other installed equipment (i.e. unconnected to Six by Nico). Even so, at this location there was steady noise from the ventilation ducts associated with other demises as shown in Figure 1 (the condensers associated with other demises also shown in Figure 1 were not operating). As a result, the Six by Nico condensers were only audible at a low level. No Six by Nico fan noise was audible at Location A.

Chart 1, overleaf, indicates the measured noise levels at Location A. As can be seen in Chart 1, the noise levels were very similar with and without all condensers operating. This indicates, in line with observations on site, that Six by Nico condenser noise was not significant compared to noise from other equipment at the measurement location.

By logarithmic subtraction of the measured octave band noise levels with and without the condensers operating, we have been able to determine the contribution from the Six by Nico condensers only. Where the residual noise (i.e. the noise level measured with the condensers switched off) was marginally higher than with

the condensers operating, we have assumed that the contribution from the condensers was at least 15dB below the measured residual value.

Chart 1: Measured/calculated condenser noise levels at Location A



The calculated contribution from the Six by Nico condensers (i.e. the specific noise) is equivalent to 48 dB L_{Aeq}. Whilst the condensers will operate on/off upon demand, due to the low level of noise from the equipment in the context of the residual noise levels, there will be no significant perceptible on/off intermittency. Furthermore, no tonal noise was observed/measured. Hence, the condenser noise rating level is equal to the specific level. On this basis, the condenser noise just meets the planning noise criteria.

During the initial site visit on 6 June 2024, it was noted that the incorrect supply fan model had been installed and this was significantly noisier than the one that our original noise assessment was based upon. Initial measurements indicated that the supply fan noise was above the planning noise limit. As such, arrangements were made for the fan to be replaced.

12 August 2024

Following completion of the supply fan replacements works earlier that day, a further visit to the site was made during the early afternoon of Monday 12 August 2024 to carry out measurements of ventilation fan noise. The weather conditions during the measurements were warm/hot, dry and generally calm. The noise measurements were again taken with a NTi Audio XL2 'Class 1' sound analyser (serial no. A2A-20361-E0), with the sound analyser hand-held at a microphone height of approximately 1.4m above flat roof level and 1m from

the nearest/most exposed guest room windows. The analyser was check-calibrated before and after the measurements with no variance observed.

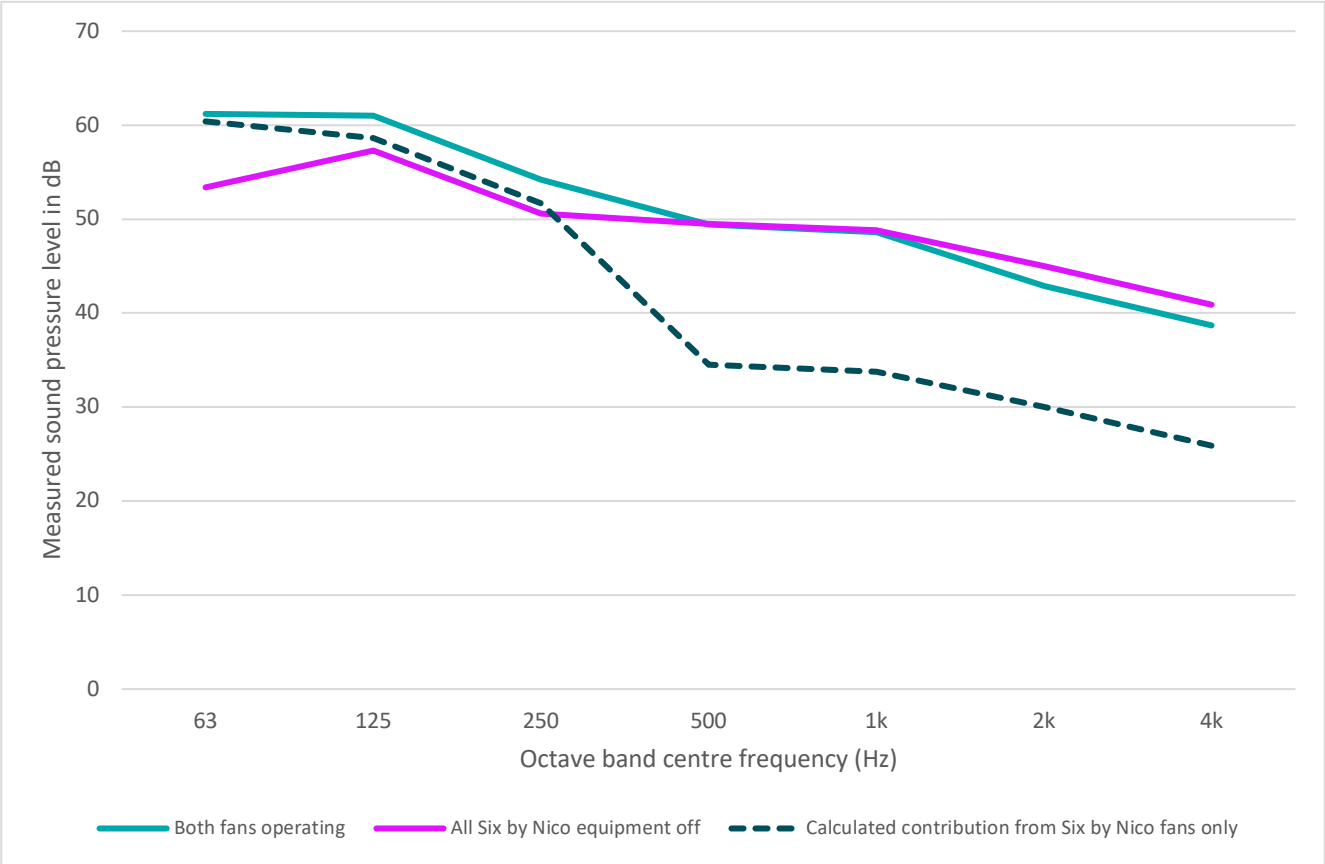
As before, the measurements were taken as a series of short-term measurements including octave band analysis both with and without the Six by Nico equipment (i.e. the ventilation fans) operating. Again, an operative from the mechanical consultants/contractors APL was on-hand to operate the equipment on/off as required. APL confirmed that the fan controls inside the premises were simple on/off switches, with the fan speed/duty controlled at roof level – no Six by Nico staff has access to the fan speed controllers.

Initial observations and noise measurements indicated that there was elevated noise from the new supply fan casing. This was found to be due to the fan 'idling' (i.e. operating under its optimal duty) at speed setting 6. Increasing the speed to 8 was found to reduce the overall noise considerably. APL advised that operating the fan at speed setting 8 would be acceptable and hence all noise measurements described below were carried out with the supply fan operating at speed 8. The kitchen extract fan was operating at the usual duty and no adjustments were made.

Measurements were taken at Location B, as indicated in Figure 1, at 1m from the rear elevation of the hotel guest rooms midway between the two fans and at the point where the supply fan ductwork enters the building via the flat roof. As before, the equipment noise was found to be generally no higher than the residual noise levels. As such, by logarithmic subtraction of the measured octave band noise levels with and without the fans operating, we have determined the contribution from the Six by Nico fans only.

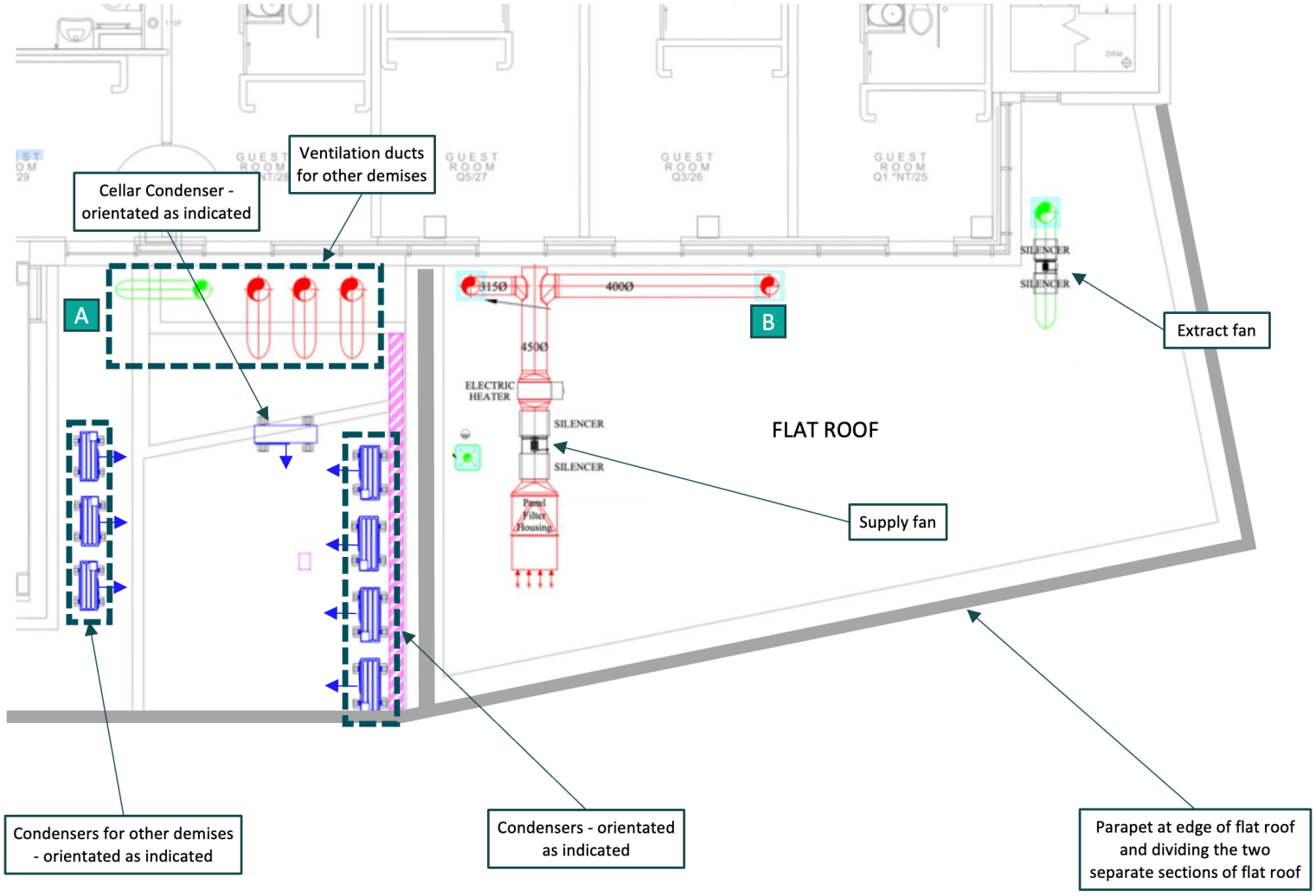
As before, where the residual noise (i.e. the noise level measured with the fans switched off) was marginally higher than with the condensers operating, we have assumed that the contribution from the fans was at least 15dB below the measured residual value. The measured/calculated noise levels are shown in Chart 2:

Chart 2: Measured/calculated fan noise levels at Location B



The calculated contribution from the Six by Nico fans (i.e. the specific noise) is equivalent to 47 dB L_{Aeq}. When operating, the fans produce steady, broadband noise. For this reason, and due to the low level of noise from the equipment in the context of the residual noise levels, the noise rating level from the fans is equal to the specific level. On this basis, the ventilation fan noise is below (i.e. within) the planning noise criteria.

We therefore conclude that, subject to the supply fan being maintained at speed setting 8, noise from the Six by Nico plant/equipment has been controlled to within the relevant noise limit as required by planning condition 3.



Key:

Not to scale

X - Noise measurement position

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Title: Figure 1: As-built equipment installation and noise measurement positions

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