

MPF/PR0630/L07

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Dear James

CROWN STREET, PHASE 2, BUILDING C4, MANCHESTER

I write to confirm the results of the internal noise measurements conducted within apartments of Building C4, Crown Street, Manchester. The measurements have been conducted to determine the internal noise levels due to external noise sources and to compare the measurement results to the requirements of the planning condition relating to external noise ingress.

INTRUSIVE NOISE CRITERIA - PLANNING CONDITION 19

Planning condition 19 of the planning approval for Crown Street, Phase 2, reference 129668/FO/2018, dated 3 August 2020, amended by 128226/NMC/2020 dated 22 October 2020 states:

- a. Prior to the commencement of development within Phase A, as defined by Condition 3, a scheme for acoustically insulating the proposed residential accommodation against noise from the Mancunian Way and Chester Road, surrounding road networks, and any other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises, shall be submitted to and approved in writing by the City Council as local planning authority.
- b. The approved noise insulation scheme shall be completed and a post-completion verification report (including validation that the work undertaken throughout the development conforms to the recommendations and requirements of the acoustic report approved under part a. above and including the results of post-completion testing to confirm that the internal noise criterion have been met) shall be submitted to and approved in writing by the City Council as local planning authority before any of the dwelling units within Phase A are first occupied. Any instances of non-conformity with the approved acoustic report shall be detailed within the post-completion report along with any measures required to ensure compliance with internal noise criteria. Those measures shall be implemented in full before any of the dwelling units within Phase A are first occupied.

The pre-commencement element of condition 19 was discharged on 9 November 2020 (application number CDN/20/0606).

The discharge notice states:

- 'Condition 19a (Acoustics)

Part (a) of Condition 19 (as amended under planning reference 128226/NMC/2020) is discharged on the basis that the development is carried out in accordance with the following information: Facade Sound Insulation report reference: Z3-FAC-A180-RP-XX-001 by Fisher Acoustics dated September 2020.

Fisher Acoustics Facade Sound Insulation report reference: Z3-FAC-A180-RP-XX-001 itself references Technical Note T01A-PR0634-MPF, dated 15 May 2020 issued by Fisher Acoustics Ltd, which presents a case for a relaxation of 5dB in the daytime internal noise criterion referred to by planning approval 129668/FO/2018.

The applicable internal noise criteria for apartments given the relaxation in the daytime internal noise criterion are reproduced in Table 1.

Room Type	Time of day	
	07:00 to 23:00	23:00 to 07:00
Living room	40 dB LAeq, 16 hours	-
Bedroom	35 dB LAeq, 16 hours	30 dB LAeq, 8 hours Individual noise events should not normally exceed 45 dB (LAmax) more than 15 fifteen times a night

Table 1: Intrusive noise criteria

MEASUREMENT METHODOLOGY

The measurement methodology, as agreed with Manchester City Council, to demonstrate compliance with the criteria identified in Table 1 above is as follows:

- 1) 10% of apartments are to be tested in the daytime only
- 2) Night-time measurements will be interpolated from the daytime noise levels, based on daytime and night-time external noise measurements.
- 3) Install sound level meters in a living room and bedroom of one apartment between the hours of approx. 4.30pm and 7pm (i.e. at a time when construction noise at Crown Street has ceased but road traffic levels can be assumed to be at a typical maximum).
- 4) Measure the noise level in the rooms for approximately 5 minutes without MVHR running (as the planning condition relates to external noise only). If the average (LAeq) noise level in the room has not settled after 5 minutes, continue the measurement until a consistent (LAeq) noise level has been established (up to approx. 10 minutes if required).
- 5) Measure the reverberation time in the rooms to allow the measured noise levels to be corrected to allow for the reduction in internal noise level that will occur upon furnishing of the rooms.
- 6) Analyse the data to determine the daytime noise level in the rooms. With reference to the results of external noise survey measurements, estimate the night-time internal noise levels within bedrooms based on the change in external noise levels between the daytime and night time.
- 7) Repeat the above measurements and analysis for the living room and a bedroom within a further 40 apartments.
- 8) The location of the apartments under test will be selected by Fisher Acoustics on the basis of apartments that are most exposed to the surrounding road traffic noise sources and with reference to any change in the glazing specification to apartments.

The measurements were conducted by Fisher Acoustics Ltd between the following times:

- 1600 hours and 1940 hours on Tuesday 9 May 2023
- 1540 hours and 1940 hours on Wednesday 10 May 2023
- 1540 hours and 1940 hours on Thursday 11 May 2023
- 1525 hours and 1855 hours on Tuesday 16 May 2023
- 1605 hours and 1740 hours on Friday 19 May 2023
- 1550 hours and 1940 hours on Tuesday 23 May 2023
- 1640 hours and 1915 hours on Wednesday 31 May 2023
- 1700 hours and 1845 hours on Wednesday 21 June 2023

There was no notable construction activity within the building during the internal measurements. Any occasional external noise from the adjacent construction site did not affect the measurements of internal noise.

Road traffic volumes were found to be high on both the Mancunian Way and Chester Road for the duration of the internal noise measurements.

The measurements were undertaken with the opening purge doors in apartments closed. All of the tested rooms were unfurnished.

The measurements were conducted in general accordance with 'ANC Guidelines -Noise Measurements in Buildings, Part 2: Noise from External Sources (e.g. traffic noise) within Buildings'.

The measurements were conducted in apartments on various levels of the building. The majority of apartments under test were on the closest elevation to the A57(M) (Mancunian Way) and had a direct view of road traffic of the A57(M) (Mancunian Way), Chester Road, or both.

MEASURED INTERNAL NOISE LEVELS DUE TO EXTERNAL NOISE SOURCES

As the rooms were unfurnished at the time of the measurements, the reverberation times of the rooms were greater than would be the case in the rooms when furnished. Therefore, the measured noise levels have been corrected to allow for the expected reduction in reverberation time following the furnishing of the rooms.

The measured reverberation times have been corrected to 0.5 seconds for living rooms and 0.45 seconds for bedrooms. A correction must also be applied to the measured 5-minute daytime internal noise levels in order to determine the expected 16-hour daytime internal noise levels within bedrooms. In order to determine the correction, reference has been made to external noise survey data gathered at the same time as the internal noise measurements and to the results of a full 16-hour daytime external noise survey.

Table 2 shows the measured, RT-corrected average ($L_{Aeq,16h}$) daytime noise levels in living rooms and bedrooms.

The measured daytime noise levels were determined by road traffic on the Mancunian Way (A57(M)) and to a lesser degree by road traffic on the roundabout at the junction of Chester Road with the Mancunian Way.

Apartment Number	Corrected Average Daytime Noise Level, dB ($L_{Aeq,16h}$)	
	Living Room/Kitchen (Limit = 40 dB $L_{Aeq,16h}$)	Bedroom (Limit = 35 dB $L_{Aeq,16h}$)
C4-02-01	33.4	30.7 (Bed 1)
C4-02-02	28.8	27.1 (1-bed apartment)
C4-03-01	36.7	36.2 (Bed 2)
C4-03-02	38.5	36.2 (Bed 2)
C4-03-04	27.6	29.6 (Bed 1)
C4-04-01	39.0	35.3 (Bed 2)
C4-04-02	39.2	36.0 (Bed 2)
C4-04-08	30.9	31.3 (Bed 2)
C4-05-01	38.9	34.8 (Bed 2)
C4-05-02	37.8	36.9 (Bed 2)
C4-05-03	33.6	31.1 (Bed 2)
C4-06-01	38.1	36.2 (Bed 2)
C4-06-02	39.6	37.1 (Bed 2)
C4-06-07	32.4	31.6 (1-bed apartment)
C4-07-01	38.6	34.2 (Bed 2)
C4-07-02	38.2	36.6 (Bed 2)
C4-07-09	33.9	31.3 (1-bed apartment)
C4-08-01	38.5	36.2 (Bed 2)
C4-08-02	37.6	35.9 (Bed 2)
C4-08-03	33.1	30.8 (Bed 1)
C4-09-01	36.2	34.9 (Bed 2)
C4-09-02	36.7	36.1 (Bed 2)
C4-10-01	36.6	31.9 (Bed 1)
C4-10-02	36.8	35.0 (Bed 2)
C4-11-01	36.9	34.7 (Bed 2)
C4-11-02	36.1	34.3 (Bed 2)
C4-12-01	36.3	34.4 (Bed 2)
C4-12-02	36.3	35.5 (Bed 2)
C4-13-02	35.4	33.8 (Bed 1)
C4-14-01	39.7	35.3 (Bed 2)
C4-15-06	34.7	33.2 (Bed 2)
C4-16-01	36.6	33.6 (Bed 2)

Apartment Number	Corrected Average Daytime Noise Level, dB (LAeq,16h)	
	Living Room/Kitchen (Limit = 40 dB LAeq,16h)	Bedroom (Limit = 35 dB LAeq,16h)
C4-17-02	34.3	36.0 (Bed 2)
C4-18-08	30.4	29.2 (Bed 1)
C4-19-01	34.8	28.7 (Bed 1)
C4-20-02	34.1	31.4 (Bed 2)
C4-22-02	34.0	31.7 (Bed 2)
C4-24-02	33.1	32.3 (Bed 2)
C4-26-01	34.2	29.1 (Bed 1)
C4-28-01	32.8	30.0 (Bed 2)
C4-30-02	31.8	29.8 (Bed 2)

Table 2: Measured, RT-corrected average (LAeq,5mins) daytime noise levels in apartment rooms

It can be seen that compliance with the daytime internal noise criterion for living rooms has been achieved in all of the rooms under test.

However, the expected daytime noise level in a number of bedrooms does not comply with the currently daytime noise criterion.

In particular, a daytime noise level in excess of 35dB LAeq,16h is expected in fourteen bedrooms. Of these, thirteen rooms are expected to achieve internal noise levels that are within 2dB(A) of the criterion. The highest expected daytime noise level in a bedroom is 37.1 dB LAeq,16h. All rooms that exceed 35dB LAeq,16h are the smaller 2nd bedrooms of 2-bed apartments.

The expected daytime average noise level within all of the assessed bedrooms complies with the 'reasonable' daytime noise criterion of 40dB LAeq defined in BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'.

A correction must be applied to the measured daytime noise levels in order to determine the expected night time internal noise levels within bedrooms. In order to determine the correction, reference has been made to external noise survey data gathered at the same time as the internal noise measurements.

The external measurements show that the night time noise level (2300 hrs to 0700 hrs, dB LAeq,8hrs) is typically 2.1 dB lower than the daytime noise level (0700 hrs to 2300 hrs, dB LAeq,16hrs) due to traffic noise on the Mancunian Way.

Table 3 shows the interpolated night time average noise levels in bedrooms. (The second number in the apartment name is the floor level of the building, ie, apartment C4-07-01 is on Level 7. The third number in the apartment name identifies the location of the apartment on the floor plan. Apartments C4-xx-01 and C4-xx-02 are located on the elevation that directly faces the Mancunian Way).

Apartment Number	Estimated Average Night Time Noise Level, dB (L _{Aeq,8h}) (Limit = 30 dB L _{Aeq,8h})
C4-02-01	28.5 (Bed 1)
C4-02-02	25.1 (1-bed apartment)
C4-03-01	34.1 (Bed 2)
C4-03-02	34.1 (Bed 2)
C4-03-04	27.5 (Bed 1)
C4-04-01	33.2 (Bed 2)
C4-04-02	33.9 (Bed 2)
C4-04-08	29.1 (Bed 2)
C4-05-01	32.7 (Bed 2)
C4-05-02	34.8 (Bed 2)
C4-05-03	29.0 (Bed 2)
C4-06-01	34.0 (Bed 2)
C4-06-02	35.0 (Bed 2)
C4-06-07	29.4 (1-bed apartment)
C4-07-01	32.1 (Bed 2)
C4-07-02	34.5 (Bed 2)
C4-07-09	29.1 (1-bed apartment)
C4-08-01	34.1 (Bed 2)
C4-08-02	33.8 (Bed 2)
C4-08-03	28.7 (Bed 1)
C4-09-01	32.8 (Bed 2)
C4-09-02	33.9 (Bed 2)
C4-10-01	29.8 (Bed 1)
C4-10-02	32.9 (Bed 2)
C4-11-01	32.6 (Bed 2)
C4-11-02	32.2 (Bed 2)
C4-12-01	32.3 (Bed 2)
C4-12-02	33.3 (Bed 2)
C4-13-02	31.6 (Bed 1)
C4-14-01	32.2 (Bed 2)
C4-15-06	30.6 (Bed 2)
C4-16-01	31.5 (Bed 2)
C4-17-02	31.9 (Bed 2)
C4-18-08	27.1 (Bed 1)
C4-19-01	26.6 (Bed 1)
C4-20-02	29.2 (Bed 2)
C4-22-02	29.6 (Bed 2)
C4-24-02	30.2 (Bed 2)
C4-26-01	27.0 (Bed 1)
C4-28-01	27.8 (Bed 2)
C4-30-02	27.7 (Bed 2)

Table 3: Measured, RT-corrected average (L_{Aeq,8h}) noise levels in bedrooms

It can be seen that a number of bedrooms do not achieve compliance with the night time average internal noise criterion identified in Table 1. In particular, a noise level in excess of 30dB L_{Aeq,8h} is expected in twenty five rooms. Of these, twelve rooms are expected to achieve internal noise levels that are between 3dB(A) and 5dB(A) of the criterion. All rooms that exceed 30dB L_{Aeq,8h} are the smaller 2nd bedrooms of 2-bed apartments.

The expected night time average noise level within all of the assessed bedrooms complies with the 'reasonable' night time noise criterion of 35dB LAeq defined in BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'.

Table 4 shows the maximum (LAmax) noise levels in bedrooms measured during the daytime noise measurement.

Apartment Number	Measured Maximum Daytime Noise Level, dB (LAmax)
	(Limit = 45 dB LAmax)
C4-02-01	36.5 (Bed 1)
C4-02-02	40.8 (1-bed apartment)
C4-03-01	43.7 (Bed 2)
C4-03-02	40.7 (Bed 2)
C4-03-04	36.4 (Bed 1)
C4-04-01	42.8 (Bed 2)
C4-04-02	39.2 (Bed 2)
C4-04-08	39.4 (Bed 2)
C4-05-01	45.0 (Bed 2)
C4-05-02	41.5 (Bed 2)
C4-05-03	37.0 (Bed 2)
C4-06-01	37.7 (Bed 2)
C4-06-02	41.4 (Bed 2)
C4-06-07	38.0 (1-bed apartment)
C4-07-01	44.7 (Bed 2)
C4-07-02	41.2 (Bed 2)
C4-07-09	35.2 (1-bed apartment)
C4-08-01	42.4 (Bed 2)
C4-08-02	42.6 (Bed 2)
C4-08-03	44.2 (Bed 1)
C4-09-01	41.5 (Bed 2)
C4-09-02	44.4 (Bed 2)
C4-10-01	36.9 (Bed 1)
C4-10-02	40.1 (Bed 2)
C4-11-01	44.0 (Bed 2)
C4-11-02	39.8 (Bed 2)
C4-12-01	37.6 (Bed 2)
C4-12-02	43.8 (Bed 2)
C4-13-02	43.3 (Bed 1)
C4-14-01	38.4 (Bed 2)
C4-15-06	38.4 (Bed 2)
C4-16-01	42.4 (Bed 2)
C4-17-02	44.8 (Bed 2)
C4-18-08	43.3 (Bed 1)
C4-19-01	37.0 (Bed 1)
C4-20-02	36.0 (Bed 2)
C4-22-02	34.5 (Bed 2)
C4-24-02	40.5 (Bed 2)
C4-26-01	32.5 (Bed 1)
C4-28-01	36.8 (Bed 2)
C4-30-02	33.9 (Bed 2)

Table 4: Measured, RT-corrected average (LAmax,5mins) noise levels in bedrooms

During the daytime measurements within bedrooms there were no excesses over the night time internal noise criterion of 45dB LA_{max}. As road traffic during the measurements was considered typical of normal traffic volumes and vehicle types, it is expected that compliance with the night time maximum internal noise criterion would be achieved in the tested bedrooms due to typical external noise events.

CONCLUSION

With reference to the measurement results and subsequent analysis, compliance with the daytime average internal noise criterion of 40dB LA_{eq,16h} has been achieved in the tested living room rooms.

A daytime noise level in excess of 35dB LA_{eq,16h} is expected in fourteen bedrooms. Of these, thirteen rooms are expected to achieve internal noise levels that are within 2dB(A) of the criterion. The highest expected daytime noise level in a bedroom is 37.1 dB LA_{eq,16h}. All rooms that exceed 35dB LA_{eq,16h} are the smaller 2nd bedrooms of 2-bed apartments that directly face the Mancunian Way.

The expected daytime average noise level within all of the assessed bedrooms complies with the 'reasonable' daytime noise criterion of 40dB LA_{eq} defined in BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'.

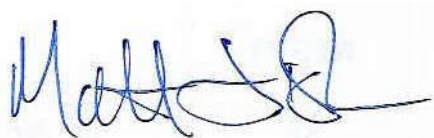
Compliance with the night time average internal noise criterion of 30dB LA_{eq,8hrs} is not expected in twenty five bedrooms. Of these, thirteen rooms are expected to achieve internal noise levels that are within 3dB(A) of the criterion and twelve rooms are expected to achieve internal noise levels that are between 3dB(A) and 5dB(A) of the criterion. All rooms that exceed 30dB LA_{eq,8h} are the smaller 2nd bedrooms of 2-bed apartments that directly face the Mancunian Way.

The expected night time average noise level within all of the assessed bedrooms complies with the 'reasonable' night time noise criterion of 35dB LA_{eq} defined in BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings'.

During the daytime measurements within bedrooms, there were no excesses over the night time internal noise criterion of 45dB LA_{max}. It is therefore expected that compliance with the night time maximum internal noise criterion would be achieved in the tested bedrooms due to typical external night time noise events.

Given compliance with the 'reasonable' noise criteria for living rooms and bedrooms, it is considered that acceptable internal noise levels within apartment rooms due to external noise sources have been achieved such that residential amenity will be maintained in all apartments.

Yours sincerely



MATT FISHER BEng(Hons) CEng MIOA
For and on behalf of Fisher Acoustics Limited