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PROJECT TECHNICAL MEMORANDUM

JOB TITLE : Hill Quays, Jordan Street

REF : HT: 2675/PTM1/R2

DATE : 1 June 2022

FROM : Jake Howarth

ISSUED TO : Cobe Consulting Ltd

RE: HILL QUAYS EXTENSION

It is proposed to erect a two-storey roof-top extension to Block A of the existing apartment building at Hill quays to create 11No additional dwellings and to allow the extension of the existing penthouse apartment (ref 124094/FO/2019).

The scheme was granted planning consent on 29 May 2020 subject to a number of conditions. One of which, condition 7, relates to noise and vibration and requires discharging before the work commence. For ease of reference the wording of condition 7 is provided below:

> *"7) Before the development hereby approved commences a scheme for acoustically insulating the proposed residential accommodation against noise from Medlock Street and Little Peter Street shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The scheme must take into account any affected retained building fabric in addition to the new building fabric. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.*
>
> *Noise survey data must include measurements taken during a rush-hour period and night time and to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:*
>
> - *Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events shall not exceed 45 dB $L_{Amax,F}$ by more than 15 times)*
> - *Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}*
> - *Gardens and terraces (daytime) 55 dB L_{Aeq}*

Due to the proximity of the development to the railway line it will be necessary for vibration criteria to apply which can be found in BS 6472: 2008 "Guide to evaluation of human exposure to vibration in buildings". Groundborne noise/re-radiated noise should also be factored into the assessment and design.

Additionally, where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.

Upon completion of the development and before the residential use becomes operational, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that above criteria is 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 noise criteria. This shall include monitoring in the completed flats to confirm the internal levels are being achieved (including the 63 and 125 Hz octave bands). This report shall be submitted to and approved in writing by the City Council as local planning authority before the use becomes operational along with a timescale that confirms when any necessary changes will be implemented."

The following sections address the pre-commencement section of condition 7 and provide design evidence with a view to discharging the condition.

1.0 Noise and Vibration Surveys

1.1 Noise Survey Summary

An environmental noise survey was carried out 2019 between approximately 12:45 hours on Thursday 6 June to 10:45 hours on Monday 10 June. Detailed information relating to the noise survey are provided in Hann Tucker Report 26875/NIA1 dated 14 June 2019, however, for ease of reference a summary of the measured environmental noise levels are presented below:

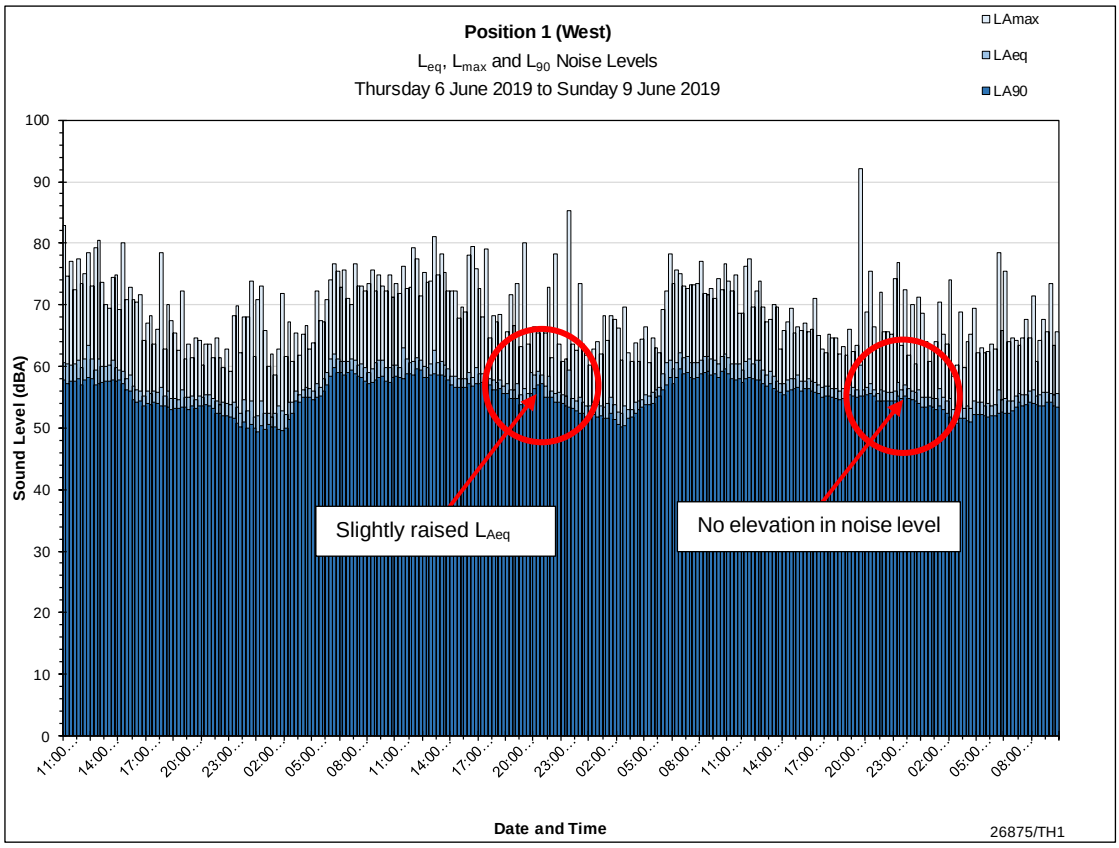
Façade	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16h}$	Lowest $L_{A90,15min}$	$L_{Aeq,8h}$	Lowest $L_{A90,15min}$	10th Highest $L_{Amax,15min}$*
West	60	52	55	49	73
East	61	52	58	47	71

The following table sets out the octave band sound pressure levels corresponding to the above.

Item	Octave Band Sound Pressure Level (dB) at each Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
West									
Daytime $L_{eq,16h}$	63	59	57	55	56	52	45	35	60
Night $L_{eq,8h}$	58	55	52	50	52	48	41	33	55
Night $L_{Fmax,8h}$	82	77	74	72	70	64	58	46	73
East									
Daytime $L_{eq,16h}$	64	59	57	55	57	53	46	37	61
Night $L_{eq,8h}$	59	54	53	51	55	51	43	36	58
Night $L_{Fmax,8h}$	66	61	61	59	67	66	49	40	71

The wording of condition 7 refers to entertainment noise. The site is approximately 125m from the Rebellion Nightclub and approximately 160m from the clubs on Deansgate Locks. The noise survey was carried out over a weekend where a concert took place at Rebellion Nightclub on the Friday (0161 Manchester Underground Metal Community Showcase) and Saturday (Detest EP Launch) evenings and the bars on Deansgate Locks were operating as usual.

The measured noise levels in both positions were interrogated to establish if there was an increase in night-time noise levels which could be attributed to entertainment noise from the nearby venues. The Time History Plot overleaf shows the measured noise levels between Thursday 6 June and Sunday 9 June and highlights the time periods in which elevated noise levels due to entertainment noise may have been present. Slightly elevated ambient noise levels were measured between 20:45 and 22:00 on Friday, however, there was no increase in noise level on Saturday.



Time History Plot – Position 1 – West

Based on the above the noise levels measured in the 63 Hz and 125 Hz octave bands between 20:45 and 22:00 on Friday 7 June are presented for the most exposed façade (ie the West) below. However, it should be noted that there was no significant increase in low frequency noise during the course of our survey, so it is likely that the below levels are purely from environmental sources.

Notwithstanding these, levels have been used to inform the absolute worst case entertainment noise ingress levels to the proposed apartments

Measurement Position	West Case $L_{Aeq,15min}$ (dB) at Octave Band Centre Frequency (Hz)	
	63	125
1 – West	60	56

1.2 Vibration Survey Summary

The wording of condition 7 also refers to the potential for vibration impacts affecting the site. Hann Tucker carried out a fully manned vibration survey between Tuesday 17 November 2020 between approximately 10:00 and 12:30 hours for an adjacent development (ref 128433/FO/2020). Please refer to Hann Tucker report 28295/TIV1 dated 24 November 2022 for more details.

Vibration measurements were undertaken at 1No position at the corner of Little Peter Street and Constance Street to establish the prevailing vibration levels during train movements. Measurements were recorded on concrete hard-stands.

Measurements were undertaken in general accordance with “Measurement and Assessment of Groundborne Noise and Vibration”, by The Association of Noise Consultants.

Based on the typical maximum recorded vibration levels the predicted vibration levels within the proposed residences on the first suspended residential floor level have been calculated. Using estimated train movement frequency (taken from train timetables), our calculations indicate the following estimated vibration dose values (e.V.D.V) in the worst affected apartment. The BS 6472 limits for “low probability of adverse comment” is also presented for ease of reference.

Location	Period	Calculated e.V.D.V ($m/s^{1.75}$)	Target V.D.V ($m/s^{1.75}$)
Nearest Habitable Room Closest to the train line	Daytime (07:00 – 23:00)	0.02	< 0.4
	Night-Time (23:00 – 07:00)	0.01	< 0.2

Based on the above, the levels of vibration in the vicinity of the site are unlikely to result in an adverse impact on the new development. Therefore, there should be no need for any antivibration measures as part of the development.

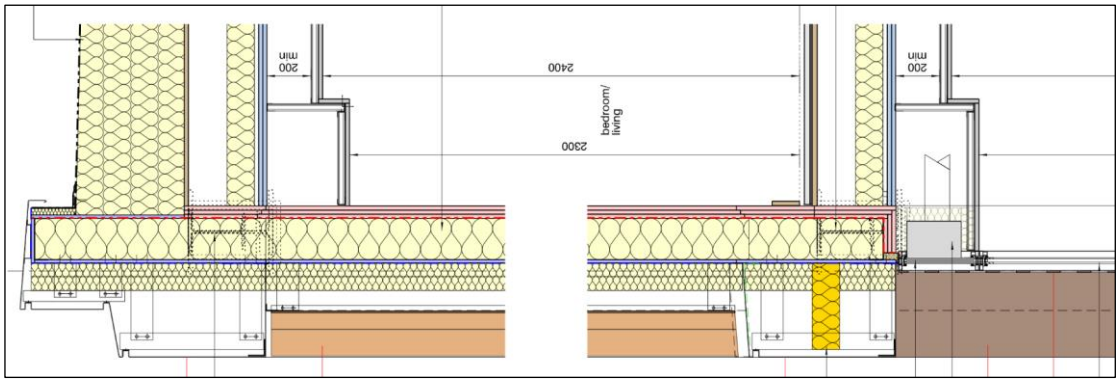
2.0 Proposed Constructions

2.1 External Wall

We understand that the proposed design intent for the façade (as indicated on SHR Studio drawing SK-0103) is to comprise the following:

- Bronze coloured rainscreen cladding comprising a pressed aluminium frame and glass infill panels
- Insulated, vented, cavity
- Min 10mm sheathing board
- Insulated SFS framing system (min 90mm)
- Minimum 2x15mm FireLine on the internal face.

An image of the proposed external wall section is provided below for reference.



Proposed Facade Sections (SHR Studio drawing SK-0103)

We would expect the external wall to achieve the following octave band sound reduction indices as a minimum:

Item	Sound Reduction Index, R, (dB) at each Octave Band Centre Frequency (Hz)								$R_w + C_{tr}$ (dB)
	63	125	250	500	1k	2k	4k	8k	
External Wall	20	33	42	45	50	50	55	60	44

2.2 Glazing

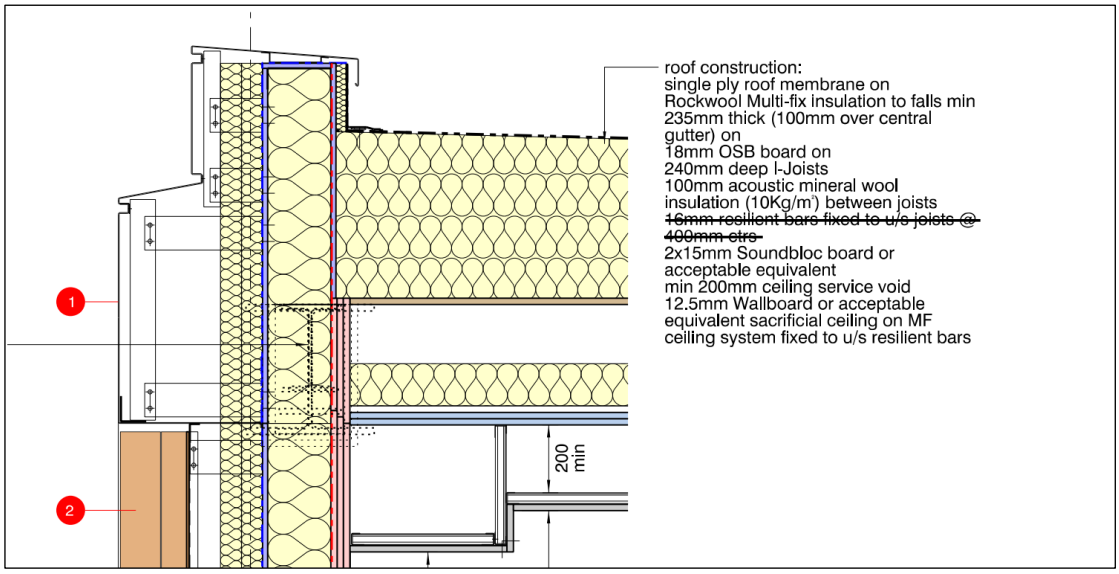
At this stage the exact glazing configuration is unknown, however, our initial assessment of the scheme (See Hann Tucker Report 26875/NIA1 dated 14 June 2019) indicated that standard thermal double glazing would likely be suitable to control environmental noise ingress.

As such, for the purposes of this assessment we have assumed that the glazing provided would be at least a 6-12-6 configuration providing the following performance. However, this will need to be confirmed by the contractor.

Item	Sound Reduction Index, R, (dB) at each Octave Band Centre Frequency (Hz)								$R_w + C_{tr}$ (dB)
	63	125	250	500	1k	2k	4k	8k	
Glazing	20	20	18	28	38	34	38	38	26

2.3 Proposed Roof Construction

The proposed detail design intent for the roof construction over the penthouse apartments as indicated in the image below:



Proposed Lightweight Roof Construction

We have calculated the acoustic performance of the above construction and the octave band performances are indicated in the table below which would outperform the minimum sound insulation performance for the site:

Item	Sound Reduction Index, R, (dB) at each Octave Band Centre Frequency (Hz)								$R_w + C_{tr}$ (dB)
	63	125	250	500	1000	2000	4000	8000	
Roof	20	35	48	56	58	58	60	60	47

3.0 Noise Ingress Assessment

3.1 Overview

As the scheme has a lightweight roof, the worst-case scenario in terms of noise ingress would likely be for the top floor (level 10) apartments. As such, the noise ingress assessments for both environmental noise and entertainment noise consider the following level 10 spaces.



Level 10 Rooms Considered for Noise Break-in

3.2 Environmental Noise

Based on the measured environmental noise levels set out in 1.1 and the proposed external wall, glazing and roof performances set out in Section 2.0, we have calculated the following worst case internal noise levels.

Facade	Room	Calculated Internal Noise Level (dB)		
		$L_{Aeq,16h}$	$L_{Aeq,8h}$	$L_{AFmax,5min}$
West	Living Room	27	23	N/A
	Bedroom	28	23	45
East	Living Room	28	24	N/A
	Bedroom	28	24	33

Based on the above, the levels of environmental noise break-in would likely be in-line with the MCC criteria.

3.3 Entertainment Noise

Based on the measured environmental noise levels set out in 1.1 and the proposed external wall, glazing and roof performances set out in Section 2.0, we have calculated the following worst case internal noise levels.

Facade	Room	Calculated Internal Noise Level (dB)	
		L_{63Hz}	L_{125Hz}
West	Living Room	46	32
	Bedroom	44	33

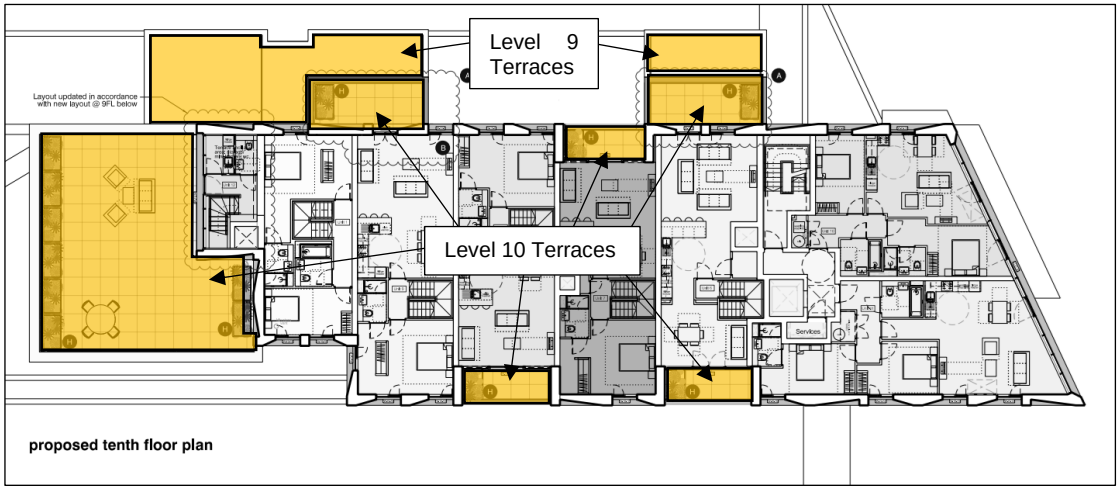
Based on the above, the levels of potential entertainment noise break-in should be in-line with Condition 7 wording.

4.0 External Terraces

On this scheme, we understand outdoor living spaces will be apartment roof terraces. With regards to balconies, BS 8233 states:-

“Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

The locations of the proposed terraces on Level 9 and Level 10 are shown below in yellow:



Based on the noise levels measured on site the noise level at 1m away from the building edge could be $L_{Aeq,16h}$ 60 dB. However, these noise levels were measured with the microphone extending over the building edge. As such the measurement position was not screened from the principal noise sources in the area.

All terraces have 1.1m high barriers around the perimeter and are either recessed into the building façade or are large areas in which most of the terrace would be screened from the principal environmental noise sources in the area.

Based on the above, calculations indicate that where line of sight between the balcony and the noise sources is broken, a noise level reduction of around 5 dBA would be achieved, thus reducing the noise level to around $L_{Aeq,16h}$ 55 dB in large portions of the terraces.

5.0 MVHR Noise

We understand that a Vent-Axia Kinetic CWH/CSH is proposed to ventilate the new apartments. The units shall be set to operate at 30 l/s to provide background ventilation in-line with the requirements of Part F of the Building Regulations. The octave band sound power levels for the units operating at this duty are presented below:

Side	Sound Power Level (dB) at Each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Supply	58	55	58	52	52	48	39	36
Extract	48	46	39	41	42	34	26	31
Breakout	45	42	48	41	38	35	30	31

Based on the above noise levels and a CWC Consulting Ventilation Layout 1778-DR-ZZ-5701 P03 both the supply and extract side of the MVHR units are likely to require attenuation. As such, we advise that acoustic flexible ducting or a suitable attenuator is used on the supply and return air spigots (ie the room side spigots) that achieves the following specification.

Side	Static Insertion Loss, IL, (dB) at Each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Supply & Extract	3	7	9	20	20	19	18	17