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PROJECT TECHNICAL MEMORANDUM

JOB TITLE	:	Viadux Phase 1
REF	:	HT: 25728/PTM7/R1
DATE	:	3 May 2023
FROM	:	George Grenfell
ISSUED TO	:	Domis

RE: VIADUX PHASE 1, MANCHESTER
PLANNING CONDITION 22A DISCHARGE NOTE

1.0 Introduction

Planning Condition 22a requests that evidence of the noise mitigation measures to ensure internal ambient noise levels in apartments satisfy agreed limits be submitted to the local planning authority. The condition is as below:

> *22)* Notwithstanding the noise assessment prepared by Fisher Acoustics stamped as received by the City Council, as Local Planning Authority, on the 31 March 2017 2017, (a) prior to the first occupation of the residential accommodation hereby approved, the accommodation shall be insulated in accordance with a scheme submitted for approval in writing by the City Council, as Local Planning Authority.

Whilst Planning Condition 22a refers to the report completed by Fisher Acoustics, subsequent baseline noise surveys have been undertaken by Hann Tucker Associates to better understand the prevailing noise climate at the site (unattended and attended). These surveys supersede the Noise Assessment referred to in the Planning Condition.

This Memo is specifically to discharge part a of condition 22 only, as we understand that part b will require a post construction survey.

2.0 MCC Requirements

Based on the wording of Condition 22a, the following criteria apply:

Area	Location	Daytime (07:00-23:00)	Night time (23:00-07:00)
Residential	Living Room	35 dB $L_{Aeq,16hr}$	-
	Bedroom	-	30 dB $L_{Aeq,16hr}$ 45 dB* L_{Amax}

* typical individual noise events.

Music noise levels in the 63Hz and 125Hz octave centre frequency bands should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively.

3.0 Noise Surveys

3.1 Survey Procedure

In total 2No noise survey have been carried out in the vicinity of the development. The first was carried out on between 20:00 and 00:00 on Saturday 09 April 2022 and the second was carried out between Thursday 14 April and Tuesday 19 April 2022.

The survey carried out on Saturday 09 April was carried out with a view to establishing the levels associated with the night-time economy in the vicinity of the site. Namely, the bars on Deansgate Locks, Road Traffic from adjacent roads and tram noise levels.

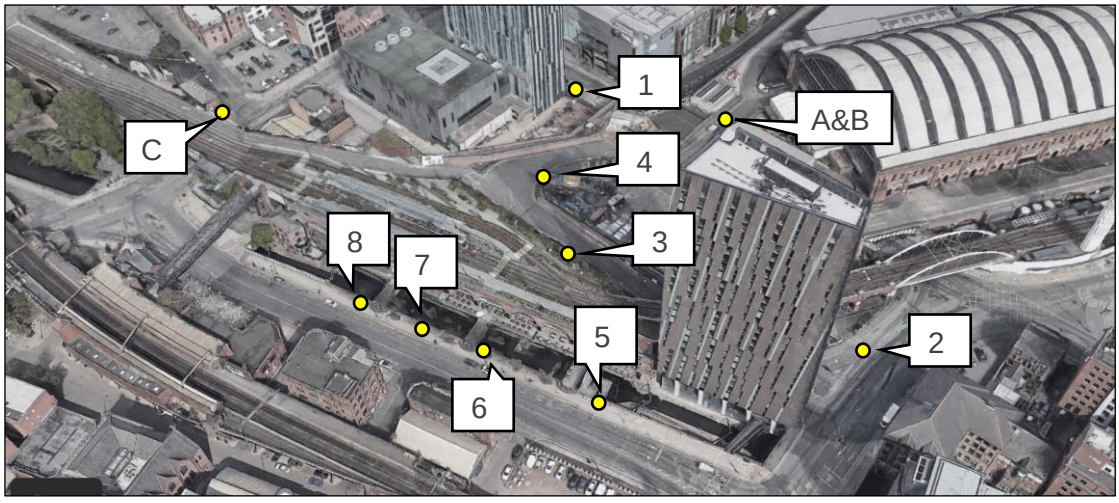
The survey carried out between Thursday 14 April and Tuesday 19 April was undertake with a view to establishing event noise levels from the Manchester Central Complex. Between 18:30 and 22:30 on both Friday 15 April and Saturday 16 April a large event took place (Peter Kay's Dance for Life) for which the whole of Manchester Central was used during a DJ set performance by Peter Kay.

2No microphones were installed on the crane located adjacent to Manchester Central at differing heights.

3.2 Measurement Locations

The location of each measurement position is described below and indicated on the plan overleaf.

Pos.	Survey Date	Description
A	14/04/22 to 19/04/22	Located at 60m above local ground level with the microphone extending from the tower crane with a direct view over the roof of Manchester Central.
B	14/04/22 to 19/04/22	Located at 40m above local ground level with the microphone extending from the tower crane just below the apex of the arched façade of Manchester Central.
C	09/04/2022	Unattended measurement of road traffic noise along Deansgate, microphone secured out of office window at a height of approximately
1	09/04/2022	Attended measurements of road traffic noise along Great Bridgewater Street. Microphone was secured to a tripod at a height of approximately 1.5m
2	09/04/2022	Attended measurements of tram movements along the viaduct and road traffic noise along the A5103. Microphone was secured to a tripod at a height of approximately 1.5m
3	09/04/2022	Attended measurement of building services noise from an extract fan serving a nearby commercial property. Microphone was secured to a tripod at a distance of approximately 2m from the extract fan and 1.5m above the ground.
4	09/04/2022	Attended measurements of tram movements and entertainment noise propagating across the development site from the venues along Whitworth Street West. The microphone was secured to a tripod at a height of approximately 1.5m
5	09/04/2022	Attended measurements of entertainment noise from 'El Diablo', situated on Whitworth Street West. The microphone was secured to a tripod at a height of approximately 1.5m
6	09/04/2022	Attended measurements of entertainment noise from 'Lula Lo' and 'Revolution', situated on Whitworth Street West. The microphone was secured to a tripod at a height of approximately 1.5m
7	09/04/2022	Attended measurements of entertainment noise from 'Popworld' and 'Revolution', situated on Whitworth Street West. The microphone was secured to a tripod at a height of approximately 1.5m
8	09/04/2022	Attended measurements of entertainment noise from 'Popworld', situated on Whitworth Street West. The microphone was secured to a tripod at a height of approximately 1.5m



Measurement Locations

3.3 Results

3.3.1 Saturday 09 April

The following table summarises environmental noise levels recorded at the unattended measurement position from the survey carried out on Saturday 09 April.

Unattended Measurements of Environmental Noise				
Position	Time Period	Sound Pressure Level (dB)		
		$L_{Aeq,1hr}$	$L_{A90,15min}$	Typical $L_{AFMax,1min}$
C	23:00 – 00:00	71	62	78

The following table summarises the road traffic noise levels measured during the survey.

Attended Measurements of Environmental Noise				
Position	Time Period	Sound Pressure Level (dB)		
		$L_{Aeq,15min}$	$L_{A90,15\ min}$	Typical $L_{AFMax,1min}$
1	23:10-23:25	66	59	72
2	23:30 – 23:45	68	60	72

The following table summarises building services noise levels recorded at the attended measurement position.

Attended Measurements of Commercial Extract Fan		
Position	Sound Pressure Level (dB)	
	$L_{Aeq,1min}$	$L_{A90,\ 1min}$
3	81	80

The following table summarises entertainment noise levels recorded outside the bars during the survey. Both the L_{Aeq} and low frequency noise levels have been provided.

Attended Measurements of Entertainment Noise				
Position	Time Period	Sound Pressure Level (dB)		
		$L_{Aeq,T}$	$L_{Aeq,T\ 63Hz}$	$L_{Aeq,T\ 125Hz}$
4	23:55-00:00	59	71	64
5	23:45-00:00	71	83	75
6	00:00-00:05	71	85	74
7	00:05-00:10	71	85	75
8	00:10-00:15	76	82	74

3.3.2 Thursday 14 April and Tuesday 19 April

A summary of the noise levels measured over the duration of the survey are presented below in terms of overall daytime and night-time noise levels. There is very little difference in terms of the overall noise levels between 40m and 60m above ground level.

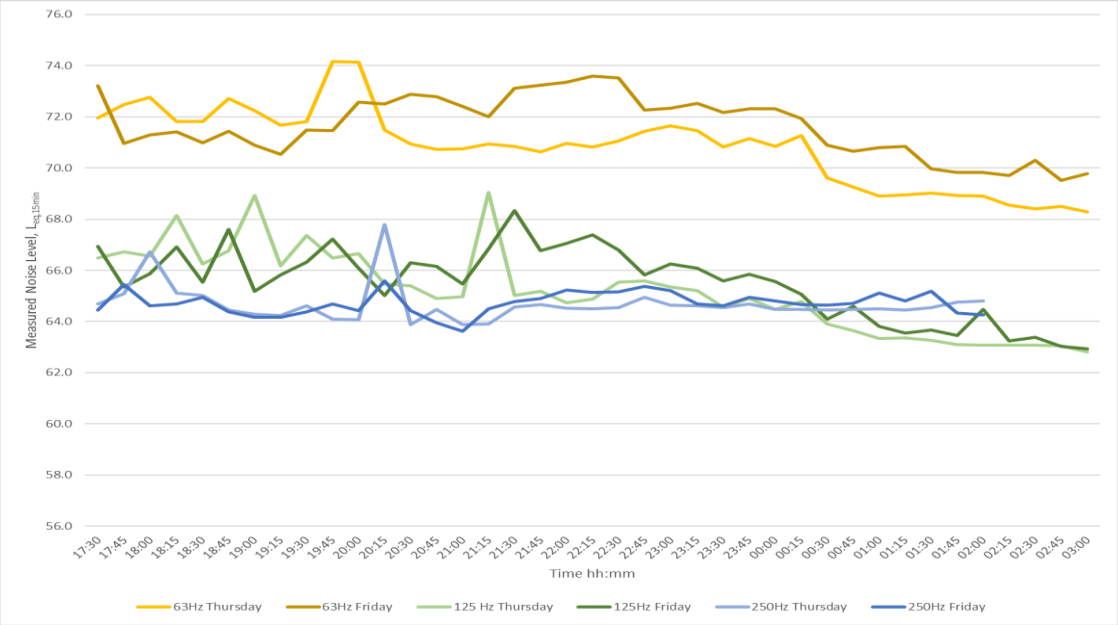
Position	Daytime (07:00 – 23:00 hrs)	Night-time (23:00 – 07:00 hrs)
	$L_{Aeq,16h}$	$L_{Aeq,8h}$
A	63 dB	60 dB
B	63 dB	61 dB

To investigate the impact of the event at Manchester Central the table below provides a sample of the measured octave band noise levels measured during the evening/night of Friday and Saturday.

Pos	Date	Time	Sound Pressure Level ($L_{eq,15min}$ dB) at each Octave Band Centre Frequency (Hz)						
			63	125	250	500	1000	2000	4000
A	15/04/2022	18:30	70	64	61	58	57	53	45
	15/04/2022	22:30	74	67	63	59	57	53	44
	16/04/2022	00:00	71	64	63	59	57	54	45
	16/04/2022	02:00	68	62	62	57	57	54	49
	16/04/2022	18:30	74	67	64	61	59	55	46
	16/04/2022	22:30	73	67	62	61	58	54	45
	17/04/2022	00:00	70	63	62	58	57	53	42
	17/04/2022	02:00	67	64	64	59	57	52	42
B	15/04/2022	18:30	71	66	64	58	57	52	45
	15/04/2022	22:30	74	67	65	59	57	53	45
	16/04/2022	00:00	72	66	65	59	57	54	46
	16/04/2022	02:00	70	64	65	57	56	53	47
	16/04/2022	18:30	74	67	68	60	59	54	46
	16/04/2022	22:30	73	67	65	61	58	54	46
	17/04/2022	00:00	71	65	64	59	57	52	43
	17/04/2022	02:00	70	66	65	60	58	52	43

In general, the octave band noise levels are broadly similar, however, there is a slight increase in low frequency noise during the event. For ease of reference and for direct comparison between a non-event evening and an evening where an event takes place, we have plotted the

low frequency (63Hz, 125Hz and 250 Hz) octave band noise levels measured in Position B between 17:30 and 03:00 on both Thursday (non-event) and Friday (event) on the plot below:



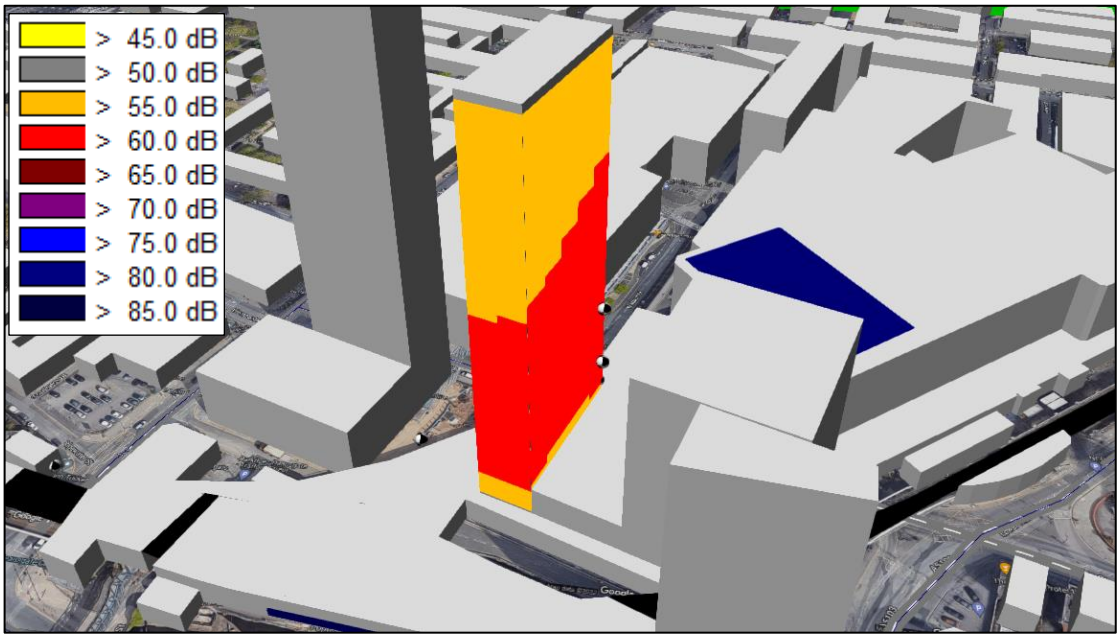
Based on the above, there is a slight increase in the 63Hz and 125Hz octave bands during the Friday which seem to correlate well with the event at Manchester Central. This indicates that low frequency noise levels during an event would impact the proposed development of not mitigated.

However, it is clear to see that noise levels in the 250Hz octave band remain largely unchanged during the same period. This seems to indicate that noise egress from Manchester Central is largely low frequency (ie 63Hz and 125Hz) and the mid to high frequency noise egress is likely below the noise levels in absence of any event.

4.0 Acoustic Modelling

A computer model of the site has been developed to establish the worst-case façade noise levels on each elevation. All sources in the model produce octave band sound levels and have been calibrated based on the noise levels measured in both our noise surveys.

The image provided below, shows the worst case noise levels on the south and east facades.



Night-time Noise Levels – Viadux Phase 1 (South and East Facades)

Based on the results of the noise survey, the night-time noise levels will likely drive the façade specifications. As such, the worst-case night-time external noise levels are considered to be the following:

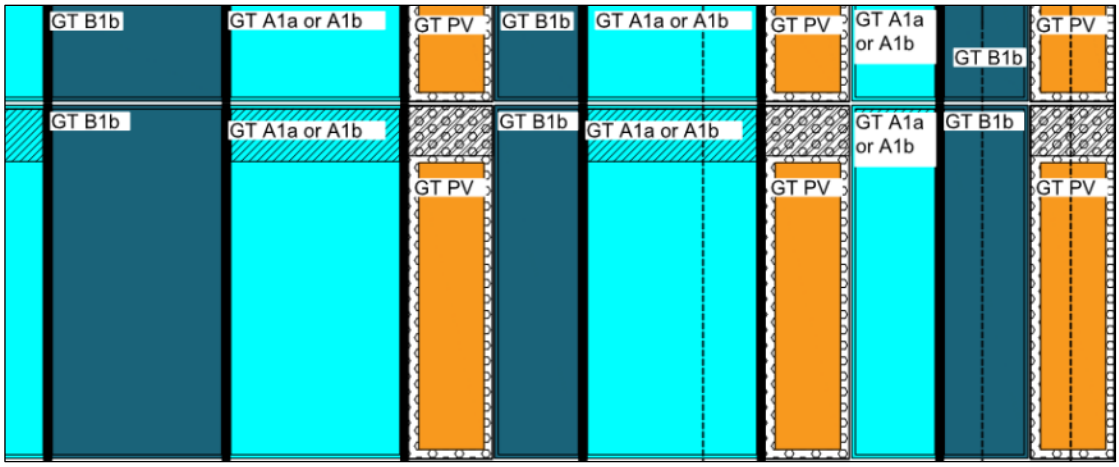
Façade	Worst Case Sound Pressure Level ($L_{eq,5min}$ dB) at each Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
North	75	68	62	59	59	57	50
East	75	68	62	59	59	57	50
South	72	65	59	56	56	54	47
West	72	65	59	56	56	54	47

Based on the results of the survey the maximum noise events experienced at the site are relatively close to the worst case L_{Aeq}. This is likely due to the trams stopping in the early hours of the morning and the area in the vicinity of the scheme being free from trams, traffic and people. For reference the worst case 10th Highest L_{fmax} noise levels are presented below.

Façade	Worst Case 10th Highest Sound Pressure Level ($L_{fmax,5min}$ dB) at each Octave Band Centre Frequency (Hz)						
	63	125	250	500	1000	2000	4000
Worst case	77	73	69	68	69	60	55

5.0 Proposed Façade

The external facades are the same configuration throughout the residential portion of the development. The screenshot below shows the shows the different glazing façade zones.



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The glazing configurations proposed are detailed below:

Manufacturer Specifications		
Type	**Location**	**Configuration** ***(glass / airspace / glass)***
GT-A1a	Floors 2 to 39 Vision South and West Elevations	13.5mm/20mm/10mm
GT-A1b	Floors 2 to 39 Vision North and East Elevations	13.5mm/20mm/10mm
GT-PV	Floors 2 to 39 Vision All Elevations	10.8mm/16mm/6mm/16mm/13.5mm
GT-B1b	Floors 2 to 39 Non-Vision All Elevations	10mm/24mm/10mm

The proposed façade has been laboratory tested and achieved the performance below:

Sound Insulation Laboratory Test Results (Glazing and Frame)							
Façade Construction Tested	**Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
Typical Glazing Configuration Including Frame (Apartment)	27	28	33	38	40	44	53

The tested façade construction can be seen in the image below from Salford University during the testing process:



Image from F1647-TDS-014_ACOUSTIC AIRBORNE TEST-RESULTS-16.06.2022 REPORT 05767_Stage 5 Construction_P01_0

6.0 Noise Break-in Assessment

Based on the typical apartment layouts and using the detailed calculation method set out in BS8233:2014, we have calculated the following worst case internal noise levels

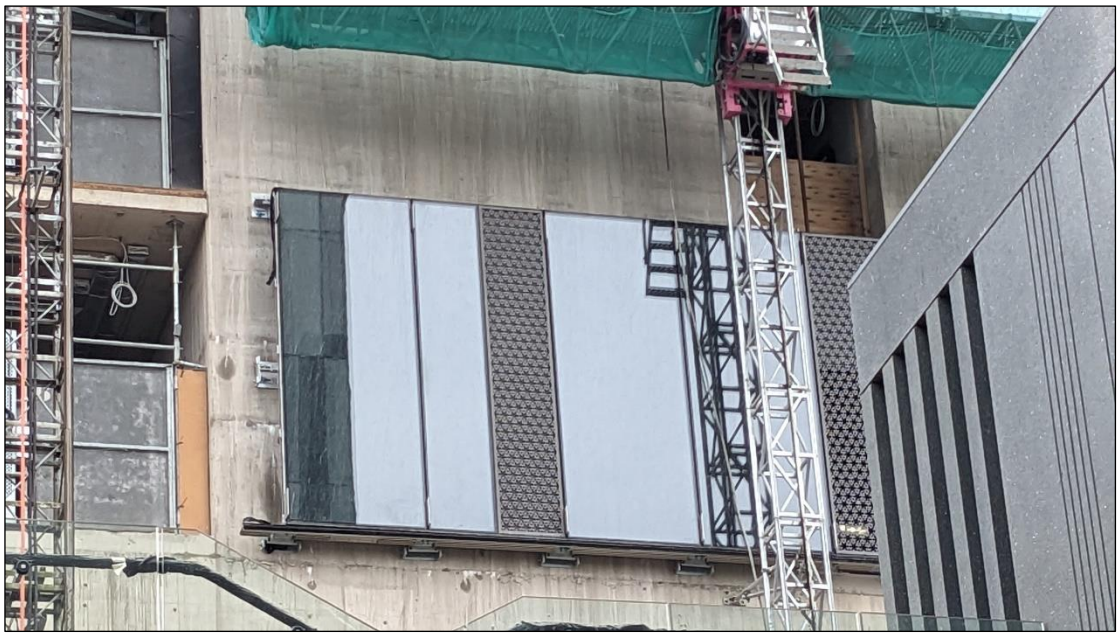
Façade	Sound Pressure Level ($L_{eq,15min}$ dB) at each Octave Band Centre Frequency (Hz)							A Weighted (dB)
	63	125	250	500	1000	2000	4000	
North	47	40	30	22	20	14	-2	28
East	47	40	30	22	20	14	-2	28
South	45	37	27	19	17	11	-5	26
West	45	37	27	19	17	11	-5	26

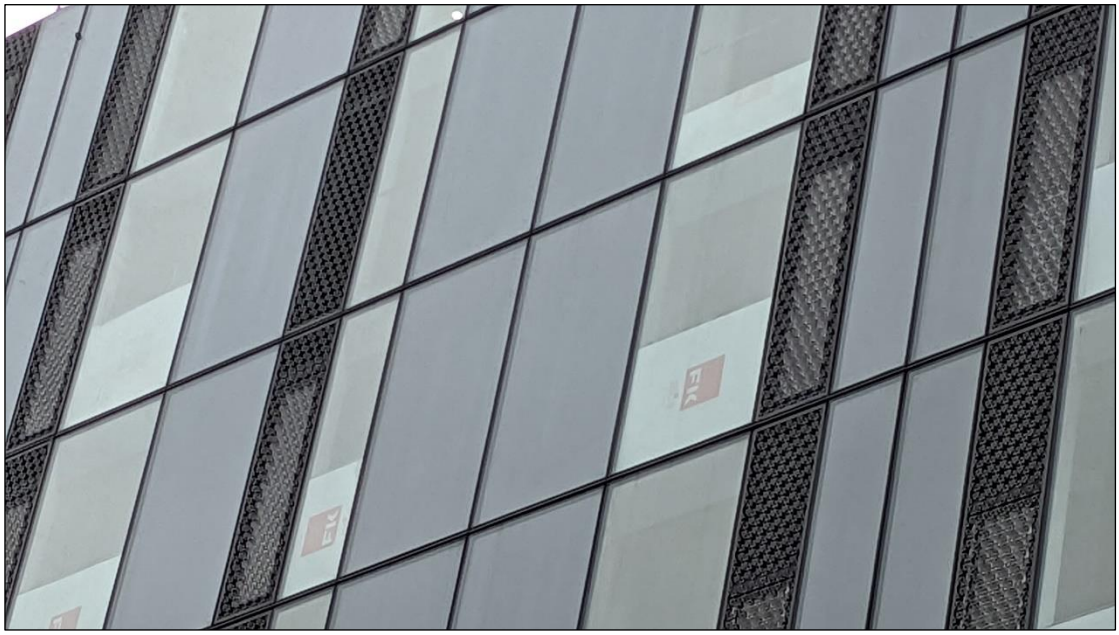
In addition to the above, the 10th highest maximum noise level during the night is expected to be no more than 40 dB $L_{AFmax,5min}$.

As such, the proposed external façade should control the levels of both environmental and entertainment noise break-in such that Condition 22a can be achieved.

7.0 Site Photos

Below are a selection of photographs showing the glazing as installed on site, which show that the glazing has been installed is in line with the glazing tested in the lab reports:





Yours sincerely

George Grenfell

for HANN TUCKER ASSOCIATES