GEIC: PLANNING CONDITION 21 AND 22

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Client	**University of Manchester**
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To	**LoR**
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1. Introduction

Planning Condition 21 and 22 for the Graphene Engineering Innovation Centre (GEIC) at the University of Manchester relates to noise emission limits from building and its services plant.

An assessment of the building envelope, and the services plant items has been made, and the noise rating levels calculated at the nearest noise sensitive receivers. This note explains the requirements of Planning Condition 21 and 22 and the calculation methodology. The results of the calculations are presented for submission to the City Council.

2. Planning Condition 21 and 22

Planning Condition 21 states:

"The premises shall be acoustically insulated and treated to limit the break out of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the city council as local planning authority. 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."

Planning Condition 22 states:

"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 noise level of 5dB (LAeq) below the existing background (LA90) at the nearest noise sensitive location. The scheme should be submitted to and approved in

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writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site."

3. Location of noise sensitive receivers and background noise levels

A baseline noise survey was conducted by Ramboll in January 2015. The nearest noise sensitive receivers (NSRs) were identified as Weston Hall on Sackville Street and residential properties on Mancroft Walk. These locations are approximately 100m and 110m from the GEIC building respectively, and are shown on a site plan in Figure 1.

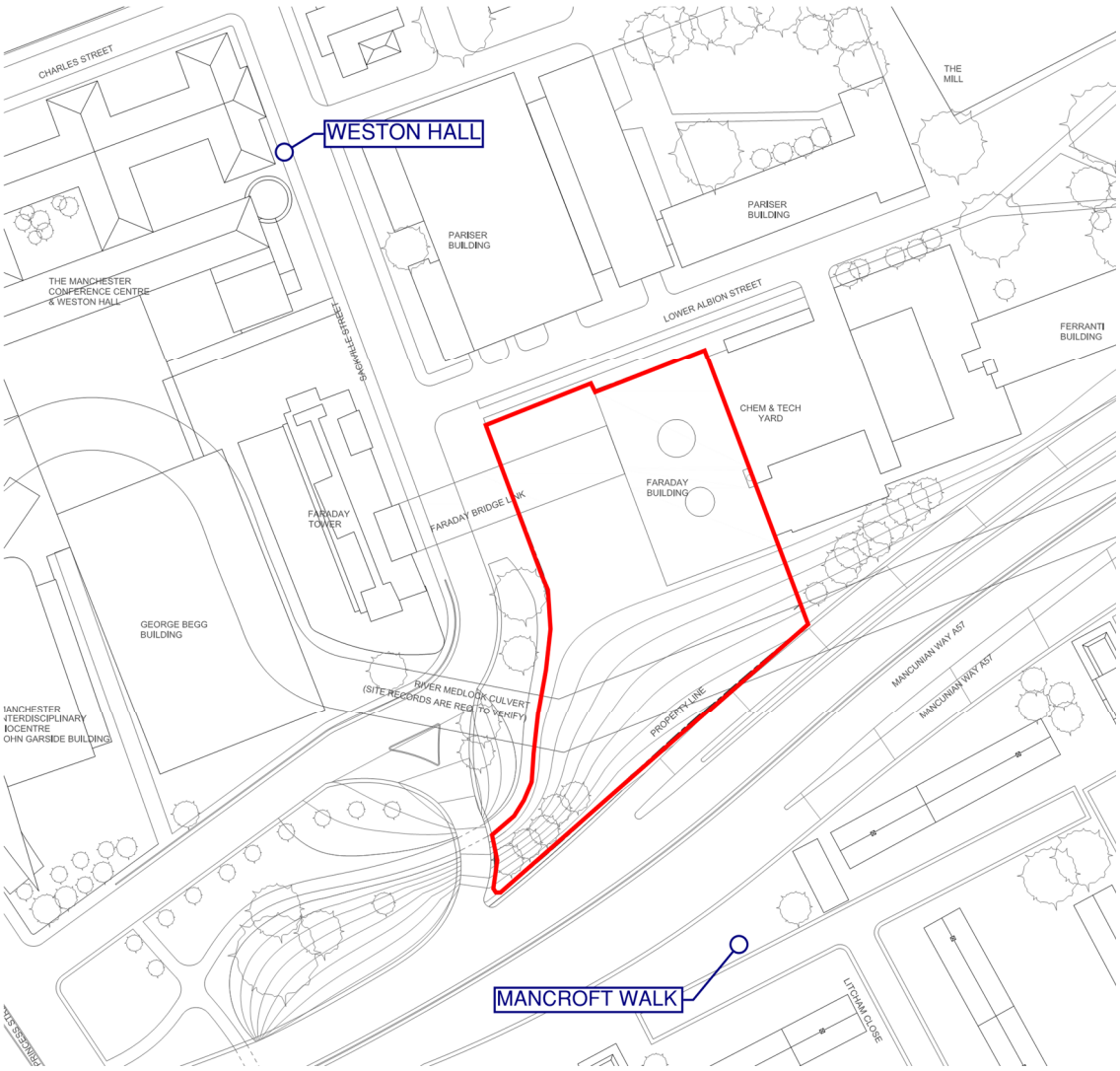

Figure 1: Site plan showing baseline noise survey measurement locations

The lowest measured background noise levels and corresponding maximum rating noise level requirements are presented for each NSR in the following table.

Location of NSR	Lowest measured L_{A90}, dB[1]	Max. rating noise level requirement, LA_{eq}, dB
Weston Hall, Sackville St	45	40
Mancroft Walk	47	42

Table 1: Plant noise emission limits

4. Planning Condition 21 Assessment

4.1 Internal Ambient noise levels

The building envelope has been designed to safeguard the users from high external noise levels around the site, dominated by traffic noise on Mancunian Way.

The dominant element of the envelope that typically dictates the acoustic performance is the glazing, which in this case covers large areas of the building. The glazing is specified with an acoustic performance of R_w 41 dB. Other areas of the building façade are built from multi-layered build ups of plasterboard, thermal and acoustic insulation and composite cladding panels. This is typically expected to provide a sound insulation level in excess of R_w 50 dB.

Based on this performance noise from the users (typically in the range of 50-55 dBA) 1m from the external façade would be in the range of 20-25 dBA.
Noise from any internal plant or equipment (based on a maximum design level of no higher than 80dBA internally) would be in the range of 30-45dBA 1 m from the external façade of the building.

4.2 Results

Allowing for simple hemispherical spreading attenuation over a nominal distance of 80m (the closest distance between the building envelope and the noise sensitive receptor) would result in noise levels from users well below 0dBA, and noise from any internal plant or equipment in the range of 0-10 dBA.

Noise Source	Source Lp,dBA (1m from GEIC building facade)	Distance attenuation, dB	Façade correction	Predicted noise level from item, dBA
Users	20-25	-38	+3	<0
Plant and equipment	30-45	-38	+3	0-10
Total				**<10**

[1] These measurements were recorded at approximately 3am on Wednesday 7th January 2015.

The total is therefore at or below 10dBA which is well below the pre-existing background noise conditions at the identified receptors and thus planning condition 21 is considered to be met.

Any plant or equipment directly positioned externally or discharging externally is dealt with under planning condition 22, in the next section.

5. Planning Condition 22 Assessment.

5.1 Plant Items

Noise data and the location of relevant plant items have been provided for review by Deerns. A list of the plant items taken into consideration is provided in Table 2. All items will either be located on the rootop plant area, or ducted directly to atmosphere from an internal plant room.

Item	Location	Reference
Chiller (2 no.)	Rooftop plant zone	Airedale TurboChill 'V' TCF22R10S-22
Type A AHU (3 no.)	Level 2 plant room-louvred facade	AHS 15308-01-I
Office AHU (2 no.)	Level 2 plant room-louvred facade	AHS 15308-03-D
Type B AHU (2 no.)	Level 2 plant room-louvred facade	AHS 15308-02-0
Boilers (2 no.)	Plant room with flue to external	Ultramax R3602SB
Toilet extract fan	Ducted to rooftop plant zone	Nuaire AVT9-X
Hot water generators (2 no.)	Plant room	MAXXflo CWH120/300 CWH90/300
Cooling/heat pump unit (2 no.)	Roof plant zone	'Based on Mitsubishi equipment'

Table 2: Summary of plant items

The locations of the rooftop plant zone and the louvred façade to the Level 2 plant room are shown on a site plan in Figure 2.

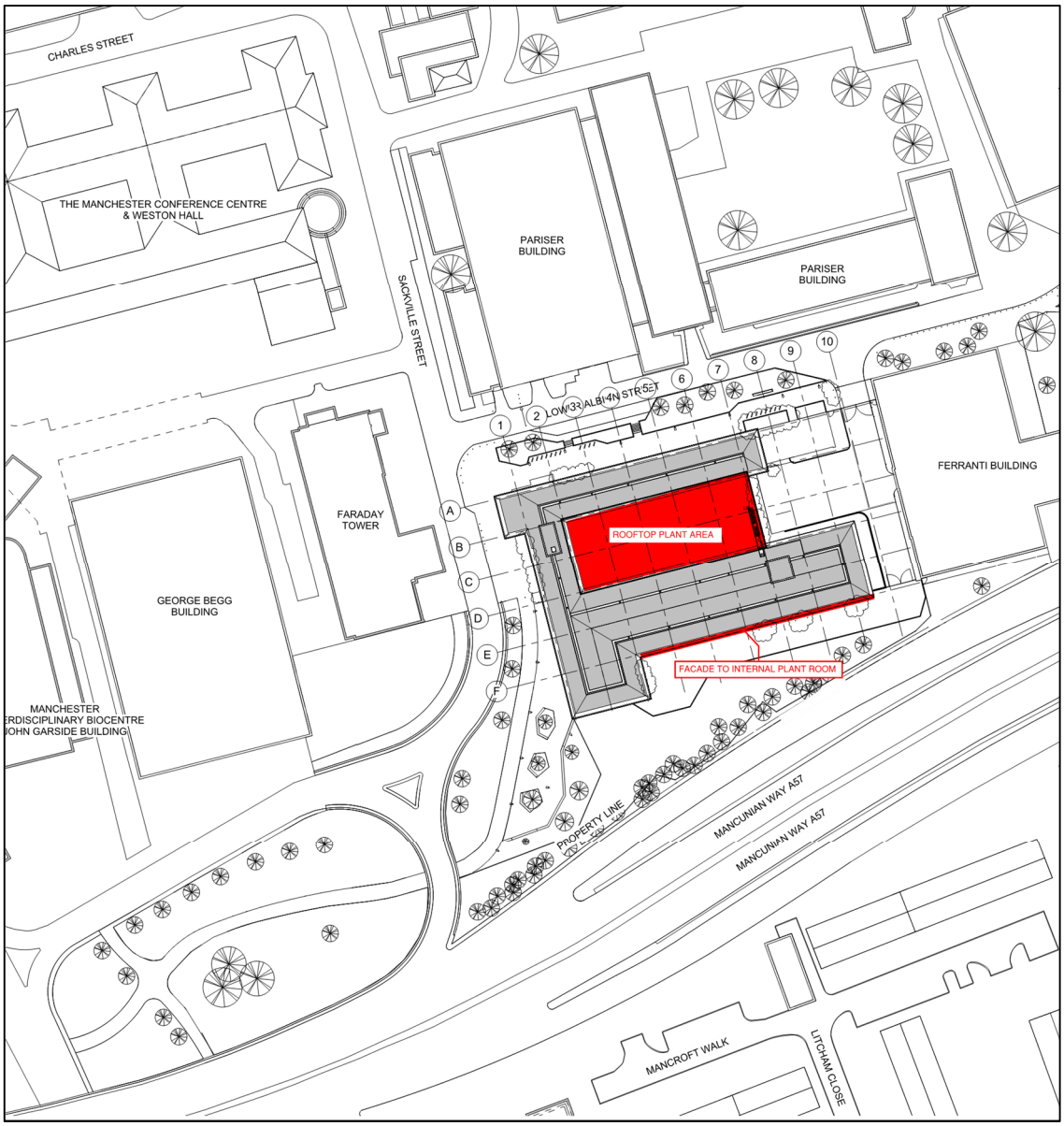

Figure 2: Site plan showing locations of plant areas

5.2 Calculation Summary

The following assumptions were made in the calculations:

- Attenuators as per Deerns specification
- Hemispherical spreading
- Suitable adjustments made for:
  - Screening due to barrier(s) and louvres where appropriate
  - Adjustments for directivity where appropriate
  - Allowance for additional plant (i.e. where there are several of the same item)
  - Façade correction for NSRs

Examples of the calculations for a plant item at each NSR are shown in Table 3 and Table 4. The predicted noise levels from each item of plant at both NSRs were then combined to provide a total figure at each location.

Plant item	Source $L_{w,}$dBA (including attenuator package if fitted and any duct losses)	Distance attenuation, including hemispherical loss L_w -L_p	Screening and directivity attenuation	Façade correction	Predicted noise level from item, dBA
Chillers (2)	96	-48	-13	+3	38
AHU Type A outlet (3)	71	-48	-15	+3	11
AHU Type A inlet (3)	66	-48	-15	+3	6
Office AHU outlet (2)	73	-48	-15	+3	13
Office AHU inlet (2)	67	-48	-15	+3	7
AHU Type B outlet (2)	62	-48	-10	+3	7
AHU Type B inlet (2)	54	-48	-10	+3	-1
Toilet extract	61	-48	-13	+3	3
Hot Water Generators (2)	66	-48	-13	+3	8
Cooling/heat pump unit (2)	72	-48	-13	+3	14
Total					**38**

Table 3: Calculations of plant noise emission to NSR Weston Hall

Plant item	Source $L_{p,}$dBA (including attenuator)	Distance attenuation (hemispherical loss)	Screening and directivity attenuation	Façade correction	Predicted noise level from item, dBA
Chillers (2)	96	-49	-15	+3	35
AHU Type A outlet (3)	71	-46	+5	+3	33
AHU Type A inlet (3)	66	-46	+5	+3	28
Office AHU outlet (2)	73	-46	+5	+3	35
Office AHU inlet (2)	67	-46	+5	+3	29
AHU Type B outlet (2)	62	-46	+5	+3	24
AHU Type B inlet (2)	54	-46	+5	+3	16
Toilet extract	61	-49	-15	+3	0
Hot Water Generators (2)	66	-49	-15	-3	5
Cooling/heat pump unit (2)	72	-49	-30	-3	11
Total					**40**

Table 4: Calculations of plant noise emission to NSR Mancroft Walk

5.3 Results

The results of the calculations are compared with the noise emission criteria at each NSR in the table below.

Location of NSR	Max. rating noise level requirement, L_{Aeq}, dB	Calculated rating noise level, L_{Aeq}, dB	Meets Criterion
Weston Hall, Sackville St	40	38	Yes
Mancroft Walk	42	40	Yes

Table 5: Comparison of results with criteria

6. Conclusions

The noise emission from the building from users and internally located plant and equipment has been assessed and compared to the background noise levels. At the identified receptor locations noise from these sources is expected to be significantly below the background noise levels and therefore planning condition 21 can be discharged.

The calculated noise rating levels for external plant at the nearest noise sensitive receivers has been assessed and compared to the planning condition criterion.
At each identified receptor location the calculated noise emission is lower than the planning condition criterion, therefore it is recommended that Planning Condition 22 can be discharged.