Our ref: NIA/7690/20/9018/v1/HbH Manchester

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Dear Sir

NOISE IMPACT ASSESSMENT FOR PROPOSED EXTERNAL PLANT
HAMPTON BY HILTON HOTEL, SHARP STREET, MANCHESTER

MANCHESTER CITY COUNCIL PLANNING PERMISSION REFERENCE 111921/FO/2016/N1

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Create Construction to carry out a noise impact assessment for external plant at the proposed Hampton by Hilton hotel at Sharp Street, Manchester (hereafter referred to as the subject site).

1.02 Planning Permission (Reference 111921/FO/2016/N1) for the development was granted by Manchester City Council in July 2016, subject to conditions. Condition 24 relates to the control of noise as follows:

> *24. Before first occupation of the development hereby approved, any externally mounted ancillary equipment, shall be acoustically insulated in accordance with a scheme 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 equipment. The development shall then be completed in accordance with the approved details.*
>
> *Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to policies SP1 and DM1 of the Core Strategy.*

1.03 The objectives of the noise impact assessment were therefore to:

- Establish the noise level associated with fixed external plant.
- Assess the potential impact of fixed external plant on the nearest noise-sensitive receptors with reference to pertinent guidance.

1.04 This report details the methodology and results of the assessment. It has been prepared to aid in the discharge of Condition 24 Planning Permission 111921/FO/2016/N1 granted by Manchester City Council.

1.05 This report has been prepared for Create Construction for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Create Construction and ENS as to the extent to which the findings may be appropriate for their use.

1.06 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1

2.00 SITE SETTING AND PROPOSED DEVELOPMENT

2.01 The proposed development is located on the outskirts of Manchester City Centre, and is bound by:

- Baptist Street to the north west.
- Ludgate Hill to the north east.
- Rochdale Road to the south east.
- Sharp Street to the south west.

2.02 The proposed development is a 10-storey hotel with 221 no. guest rooms across ground floor to eighth floor and ancillary spaces (reception, fitness room, meeting room, breakfast area, etc.) at ground floor.

2.03 The proposed development will include roof-mounted cooling and ventilation plant, and it is assumed that the plant may operate during the night time.

2.04 The nearest noise sensitive receptors (NSRs) are residential apartments on Baptist Street, Ludgate Hill and Dyche Street, and the Skyline Central residential apartment building on Rochdale Road.

2.05 A noise impact assessment (report ref: 16099-R03-B) carried out by Sandy Brown Associates LLP for the proposed development determined that the representative daytime and night time background sound levels in the vicinity of the subject site were **61 dB $L_{A90\ (15min)}$** and **43 dB $L_{A90\ (15min)}$** respectively.

3.00 NOISE IMPACT ASSESSMENT

3.01 With respect to commercial noise (in this case fixed plant), Manchester City Council's Planning & Noise Technical Guidance states that:

'The development should be 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'

3.02 The cumulative daytime and night time plant noise limits at the nearest noise sensitive receptors are therefore **56 dB $L_{Aeq\ (15\ min)}$** and **38 dB $L_{Aeq\ (15\ min)}$** respectively.

3.03 It is understood that the proposed development will include the following items of roof-mounted plant:

<u>Level 7 Roof</u>

- COND01 – Mitsubishi PURY-P450YNW-A (noise level 66 dB at 1 metre)
- COND02 – Mitsubishi PURY-P450YNW-A (noise level 66 dB at 1 metre)
- COND03 – Mitsubishi PURY-P450YNW-A (noise level 66 dB at 1 metre)
- COND04 – Mitsubishi PURY-P450YNW-A (noise level 66 dB at 1 metre)
- COND05 – Mitsubishi PURY-P450YNW-A (noise level 66 dB at 1 metre)
- COND06 – Mitsubishi PURY-P300YNW-A (noise level 61 dB at 1 metre)
    - Cumulative condenser noise level of 73 dB at 1 metre
- AHU02 – MAX37/B/SW/S (noise level 59 dB at 1 metre)

Level 9 Roof

- COND07 – Mitsubishi PURY-P250YNW-A (noise level 61 dB at 1 metre)
- COND08 – Mitsubishi PURY-P550YNW-A (noise level 66 dB at 1 metre)
- COND09 – Mitsubishi PURY-P400YNW-A (noise level 65 dB at 1 metre)
- COND10 – Mitsubishi PURY-P200YNW-A (noise level 59 dB at 1 metre)
- COND11 – Mitsubishi PURY-P200YNW-A (noise level 59 dB at 1 metre)
- COND12 – Mitsubishi PURY-P200YNW-A (noise level 59 dB at 1 metre)
- COND13 – Mitsubishi PURY-P200YNW-A (noise level 59 dB at 1 metre)
- COND14 – Mitsubishi PURY-P200YNW-A (noise level 59 dB at 1 metre)
- COND15 – Mitsubishi PURY-P250YNW-A (noise level 61 dB at 1 metre)
- COND16 – Mitsubishi PURY-P250YNW-A (noise level 61 dB at 1 metre)
- COND17 – Mitsubishi PUHZ-ZRP35VKA2 (noise level 46 dB at 1 metre)
- COND18 – Mitsubishi PUHZ-ZRP35VKA2 (noise level 46 dB at 1 metre)
    - Cumulative condenser noise level of 72 dB at 1 metre
- AHU01 – MAX37/B/SW/S (noise level 59 dB at 1 metre)

3.04 In order to predict the resultant sound pressure levels at the nearest noise sensitive receptors due to the operation of the plant, the following relationship may be employed:

$SPL_{NSR} = SPL_{REF} – DA – SA$ where

SPL_{NSR} is the resultant sound pressure level at the nearest noise sensitive receptors (dB(A))
SPL_{REF} is the sound pressure level at 1 metre (dB(A))
DA is the distance attenuation of noise
SA is the screening attenuation of noise

3.05 For distance attenuation of noise, point source propagation characteristics (with a 6 decibel reduction per doubling of distance) have been assumed (i.e. $DA = 20 \log(r_2/r_1)$, where r_1 is the distance to reference measurement position and r_2 is the distance to the nearest NSR. Screening attenuation afforded by roof parapets at the development is calculated using the Maekawa barrier calculation in conjunction with octave noise data of the plant units.

3.06 The following tables summarise the worst-case resultant sound pressure levels of the plant, based on the specific noise levels above, the shortest separation distances to the NSRs, and any screening attenuation.

Table 3.1 – Resultant Plant Sound Pressure Levels at Baptist Street

Plant Location	Separation Distance (m)	Cumulative Sound Pressure Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Resultant level at Receptors (dB(A))
Level 7 Condensers	32	73 @ 1 m	-30	-18	25
Level 9 Condensers	20	72 @ 1 m	-26	-20	26
Level 7 AHU 01	25	58 @ 1 m	-28	-18	12
Level 9 AHU 02	30	59 @ 1 m	-30	-25	4
Cumulative resultant noise level at receptors on Baptist Street					**28**

Table 3.2 – Resultant Plant Sound Pressure Levels at Dyche Street

Plant Location	Separation Distance (m)	Cumulative Sound Pressure Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Resultant level at Receptors (dB(A))
Level 7 Condensers	50	73 @ 1 m	-34	-21	18
Level 9 Condensers	35	72 @ 1 m	-31	-21	20
Level 7 AHU 01	45	58 @ 1 m	-33	-19	6
Level 9 AHU 02	40	59 @ 1 m	-32	-15	12
Cumulative resultant noise level at receptors on Dyche Street					**22**

Table 3.3 – Resultant Plant Sound Pressure Levels at Ludgate Hill

Plant Location	Separation Distance (m)	Cumulative Sound Pressure Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Resultant level at Receptors (dB(A))
Level 7 Condensers	50	73 @ 1 m	-34	-19	20
Level 9 Condensers	40	72 @ 1 m	-32	-14	26
Level 7 AHU 01	40	58 @ 1 m	-32	-16	10
Level 9 AHU 02	55	59 @ 1 m	-35	-11	13
Cumulative resultant noise level at receptors on Ludgate Hill					**27**

Table 3.4 – Resultant Plant Sound Pressure Levels at Skyline Central

Plant Location	Separation Distance (m)	Cumulative Sound Pressure Level (dB)	Distance Attenuation (dB)	Screening Attenuation (dB)	Resultant level at Receptors (dB(A))
Level 7 Condensers	50	73 @ 1 m	-34	-9	30
Level 9 Condensers	55	72 @ 1 m	-35	-7	30
Level 7 AHU 01	55	58 @ 1 m	-35	-14	10
Level 9 AHU 02	40	59 @ 1 m	-32	-7	20
Cumulative resultant noise level at receptors at Skyline Central					**33**

3.07 The resultant plant sound levels at the nearest receptors are at least **28 decibels** below daytime background noise levels and at least **10 decibels** below night time background noise.

3.08 Inaudibility is a subjective matter but it is commonly accepted that it is approached when the source noise level is at least 10 dB below the background noise level. Since the plant noise level is expected to be at least 10 dB below the background noise levels at the nearest dwellings, it follows that noise associated with the proposed plant will be inaudible, even during the night time.

3.09 On the basis of the above, the noise impact of external fixed plant at the development is considered to be negligible and Condition 24 of Planning Permission 111921/FO/2016/N1 may therefore be discharged.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely

T. Crabb

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cc File

Appendix 1
Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_0)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Weighted Airborne Sound Insulation ($D_{nT,w}$)

Single number quantity which characterises the airborne sound insulation between rooms.