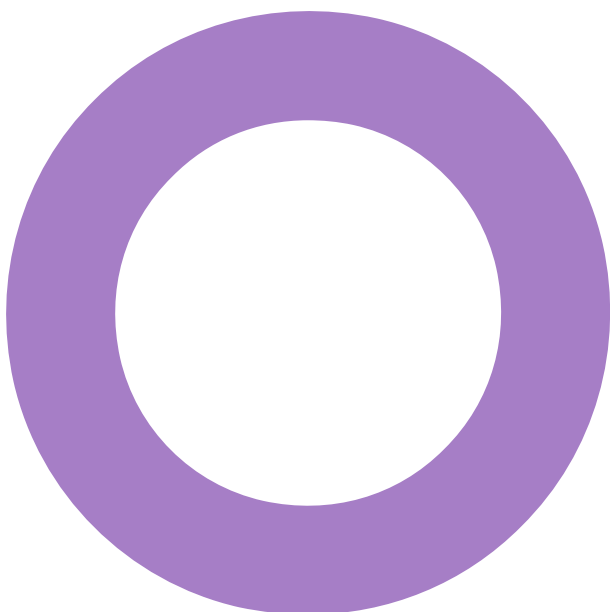


Premier Inn.
Lever Street, Manchester.
Trafalgar Leisure Ltd.

ACOUSTICS
SITE NOISE SURVEY

REVISION 1 – 05 AUGUST 2020



Audit sheet.

Rev.	Date	Description	Prepared	Verified
0	06/07/2020	Draft report	AM	
1	05/08/2020	Updated floor plans	AM	DM

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Document reference: Premier Inn, Manchester REP 10/12294-05-AM-20200706-R1

Contents.

Audit sheet.	2
Executive summary.	4
1. Introduction.	5
2. Site description.	6
3. Development proposals.	7
4. Design requirements.	8
4.1 National Planning Policy Framework – NPPF.	8
4.2 Premier Inn design criteria.	9
4.3 BS 4142:2014.	9
5. Measurements.	10
6. Results.	11
6.1 Logger measurement data.	11
6.2 Attended survey data.	12
7. Discussion.	13
7.1 Existing noise climate.	13
7.2 Premier Inn specification assessment.	13
7.3 Mechanical services plant.	13
8. Recommendations.	15
9. Conclusions.	16
Appendix 1 – Floor plans.	17
Appendix 2 – List of measurement equipment.	21
Appendix 3. – Measurement data.	22
Glossary of Terms.	

Executive summary.

Assessment has been made of the existing noise climate at a site off Lever Street, Manchester. It is proposed that the site be redeveloped to provide a new Premier Inn hotel.

Assessment has identified that the principal source of noise across the site is traffic flow on Lever Street and Piccadilly including bus movements.

It will be necessary to install acoustic rated vents and windows to guest rooms throughout the development in order to achieve the standard Premier Inn design criteria.

It will be necessary for plant installations to be designed and specified to achieve local planning requirements and also the requirements of the Premier Inn design specification. It is noted that the project specification is considered to be more onerous than planning requirements.

This report provides recommended performance criteria for glazing systems and vent units on the project.

1. Introduction.

Assessment has been made of the existing noise climate at a site located adjacent to the junction of Lever Street and Piccadilly on the eastern side of Manchester city centre. It is proposed that the site be developed to provide a new Premier Inn hotel.

This report details the results of all site measurements and reviews this data with respect to the performance requirements of the standard Premier Inn specification.

2. Site description.

The site is located on the eastern side of Manchester City centre and is adjacent to Lever Street and Piccadilly. The site includes an area of derelict land and an existing commercial building on three storeys.

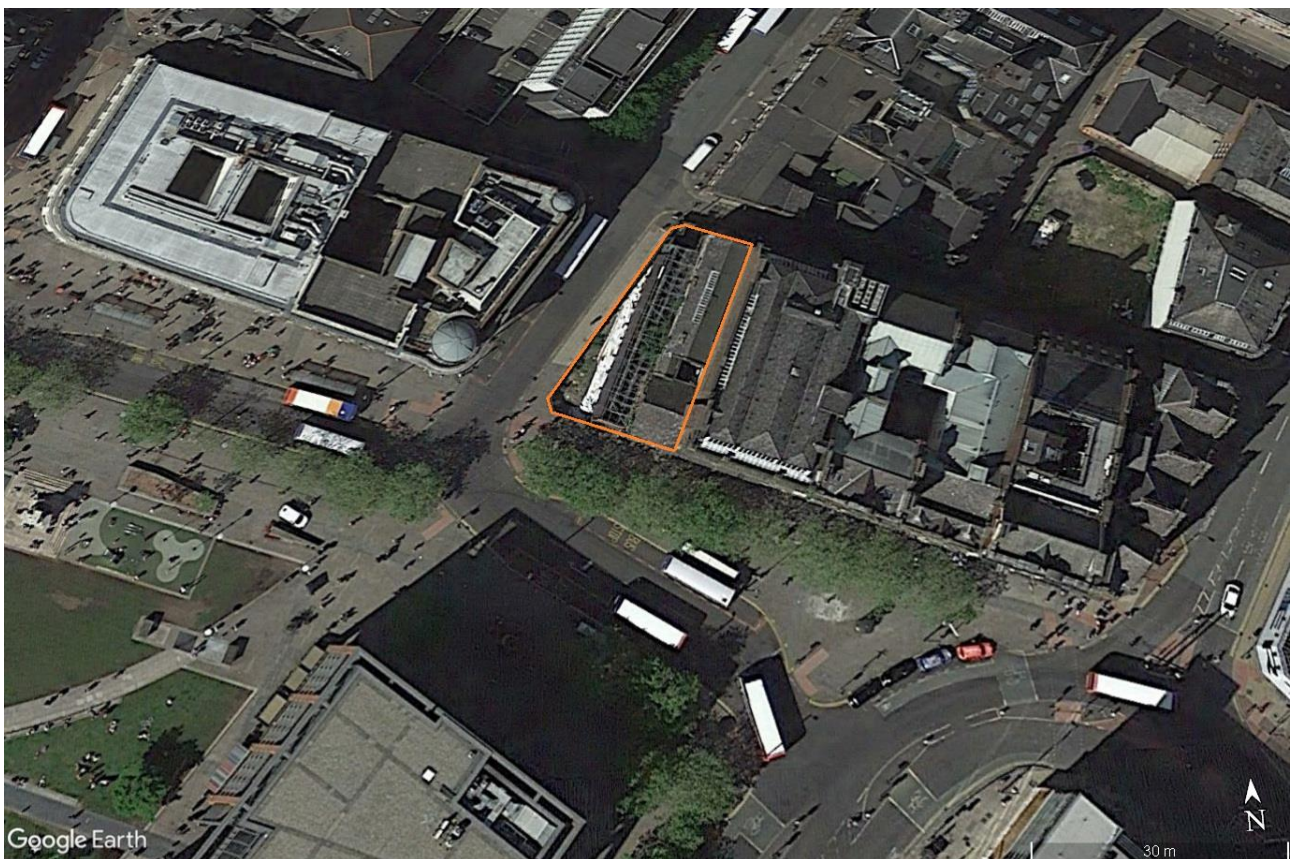
Lever Street forms the western site boundary and provides a link route between the City centre and Great Ancoats Street to the north. Traffic flows are not particularly high but there are a significant number of bus movements and designated stops immediately opposite the site. Across Lever Street to the west is a large office building on five storeys.

To the south, the site adjoins Piccadilly which is part pedestrianised but provides a local link route from Portland Street to the east and Oldham Street to the west. Again, this section of road carries significant bus movements with a number of stops immediately to the south of the building. Beyond Piccadilly to the south are Piccadilly Gardens and a large office building on six storeys.

To the north the site is bounded by Back Piccadilly which provides access to adjacent commercial premises and visitor accommodation at Piccadilly Suites and Gardens Hotel. Traffic movements on this road are negligible.

To the east, the building adjoins a building on five storeys which includes a Wetherspoons public house at ground floor.

An aerial view of the site and surroundings is shown below.



3. Development proposals.

It is proposed that the existing building be retained and refurbished and extended across the western side of the site to form the new hotel building.

The hotel will be on twelve storeys plus basement level and provide 129no bedrooms. The ground floor and basement will be part occupied by retail unit which will extend across the Piccadilly and Lever Street frontages. The remaining basement and ground floor areas will house plant areas and storage facilities. The Reception, restaurant and back-of-house facilities will be located at 1st floor. The upper floors will be given over to guest bedrooms and associated storage areas.

The hotel refuse store and certain plant items will be located on the northern side of the building adjacent to Back Piccadilly. The main plant area will be located at 12th floor level.

The proposed basement, ground, 1st and 2nd floor plans are shown at Appendix 1 of this report.

4. Design requirements.

4.1 National Planning Policy Framework – NPPF.

The National Planning Policy Framework (NPPF): June 2019 sets out the Government's planning policies for England and how these are expected to be applied. The document seeks to encourage sustainable development subject to all relevant factors.

Section 11: 'Making effective use of land' advises that planning policy and decisions should promote effective use of land making as much use as is possible of brownfield sites.

Section 15: 'Conserving and enhancing the natural environment', paragraph 170, states the following:

'Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability'.*

Furthermore, paragraph 180 states that:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Paragraph 183, additionally, states *'The focus of planning policies and decisions should be on whether a proposed development is an acceptable use of land, rather than control of processes or emissions (where these are subject to separate pollution control regimes)'.*

Reference is made to the DEFRA Noise Policy Statement for England 2010 (NPSfE). This latter document is intended to apply to all forms of noise other than that which occurs in the workplace and includes environmental noise and neighbourhood noise in all forms.

NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have *'a single objective noise-based measure...that is applicable to all sources of noise in all situations'*. It further advises that the sound level at which an adverse effect occurs is *'likely to be different for different noise sources, for different receptors and at different times'*.

In the absence of specific guidance for assessment of environmental noise within NPPF and NPSfE it is considered appropriate to base assessment on current British Standards and appropriate local or national guidance.

It is noted that NPSfE also advises that the general principle that increases in ambient noise should be 'minimised', needs to be considered in context for each site and, in this regard, states:

'Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical...the application of the NPSfE should enable noise to be considered alongside other relevant issues and not be considered in isolation. In the past, the wider benefits of a particular...development or other activity may not have been given adequate weight when assessing the noise implications'.

4.2 Premier Inn design criteria.

Premier Inn has adopted standard design criteria for external noise break-in to bedrooms which are detailed in the Premier Inn Specification. Table 2.13.4 of the specification gives the requirements as follows:

Period	Noise Level
Daytime (0700 -2300 hrs)	$L_{Aeq,1hour}$ 35 dB
Night-time (2300 - 0700 hrs)	$L_{Aeq,1hour}$ 30 dB $L_{Amax,F}$ 42 dB*
(*)The maximum criterion applies to all vehicle and railway train pass-bys and all aircraft flyovers. It also applies to the noise from all street activities including those associated with patrons attending and leaving adjacent, neighbouring or connected entertainment venues; noise associated with commercial and industrial neighbouring premises including delivery activities and process equipment; seagulls and church bells. Genuinely infrequent and unpredictable sources such as car alarms occurring no more than twice a night are excluded.	

It is noted that these requirements correlate to the internal noise level criteria of British Standard BS 8233:2014 for hotel rooms. It is noted that the above values are to be achieved with closed windows and open vents (where provided).

Given that the retained building adjoins an existing building, it will be necessary to ensure that the separating wall provides adequate sound reduction. Table 2.15.1 of the specification requires partitions between bedrooms and adjacent tenancies to provide an in-situ sound reduction of D_{nTw} 65.

With regard to noise impact upon adjacent noise sensitive premises, Section 2.13.5 of the Specification states:

'Noise emission from all plant associated with the hotel shall be designed so as to be at least 5dB below the lowest measured background noise level at night with all plant operating simultaneously at full duty, when measured at the nearest noise sensitive property'.

It is considered that the separating wall performance requirement noted above for bedrooms adjacent other tenancies should also apply to the 1st floor kitchen and bar to limit sound transfer into the adjacent building.

4.3 BS 4142:2014.

BS4142:2014 'Methods for rating and assessing industrial and commercial sound' is the current British Standard providing guidance for assessment of noise impact from industrial and commercial sites. In general, the likelihood of adverse impact for a particular noise is dependent upon factors including the margin by which it exceeds the background noise level, the character of the noise and its occurrence. The Standard recommends the determination of the Rating Level of the specific source and advises a correction factor of between +3dB and +9dB if the sound has a tonal quality, is intermittent or impulsive or has any other distinct characteristics which would make it more noticeable.

The degree of impact is assessed by comparing the measured background level with the Rating Level. Where the Rating Level exceeds the background, the level of impact increases as shown below:

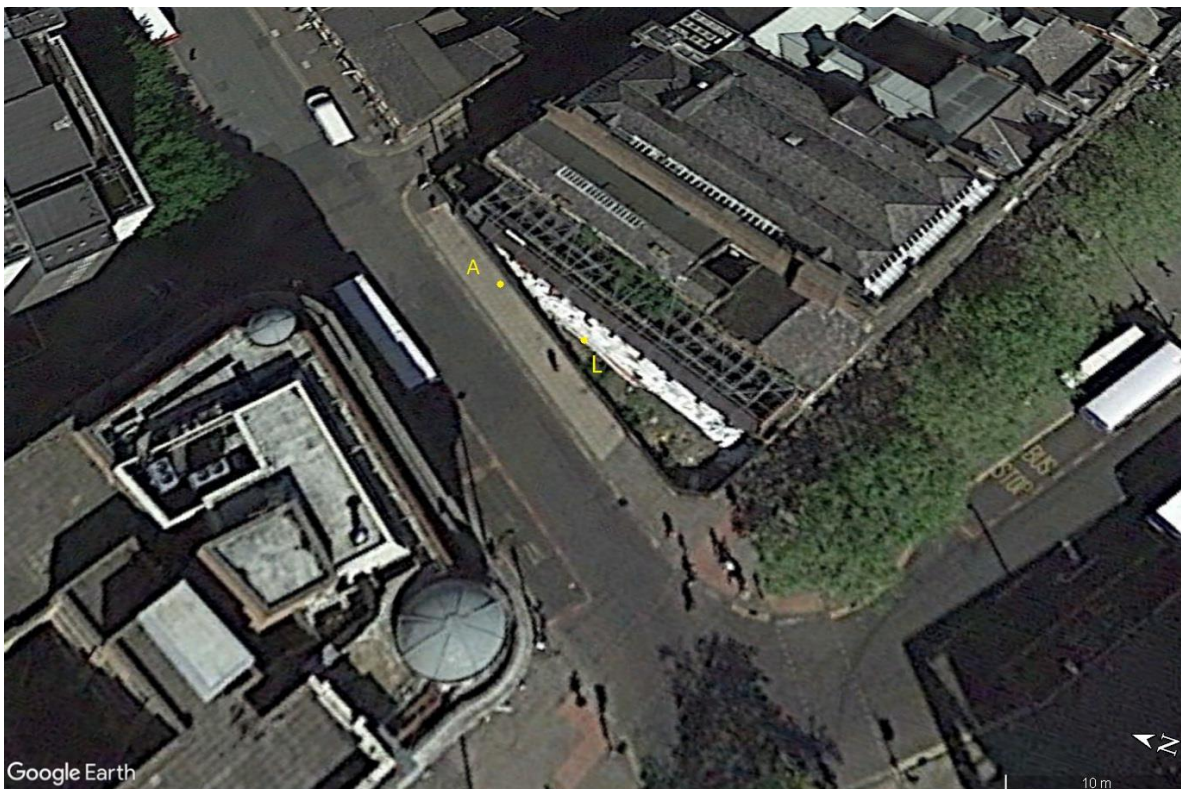
Comparison with background	Assessment
+0 dB or below measured background	Low impact
+ 5 dB	Adverse impact
+ 10 dB or more above measured background	Significant adverse impact

It should be noted that the assessment method applies to free-field external sound levels.

5. Measurements.

Site measurements were carried out over the period Friday 3rd July to Monday 6th July 2020 to determine the diurnal noise climate affecting the site. The survey period included the weekend opening of public houses following the Covid-19 restrictions.

The microphone was attached to existing scaffolding at the site at a point approximately 5m from the kerb of Lever Street and at a height of approximately 3m. This position enable the microphone to have a view of Lever Street over the site hoarding and, in particular, the bus parking bays on the opposite side of Lever Street. The measurement position is indicated at L on the image below:



Measurements were made in one minute samples to determine the indices L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} indices. In addition, levels were also determined for the octave band centre frequencies between 12.5Hz and 20kHz.

Additional observed measurements were made during the site visits at a position on the Lever Street pavement adjacent to the site to determine typical activity noise levels. This position is indicated at A in the image above.

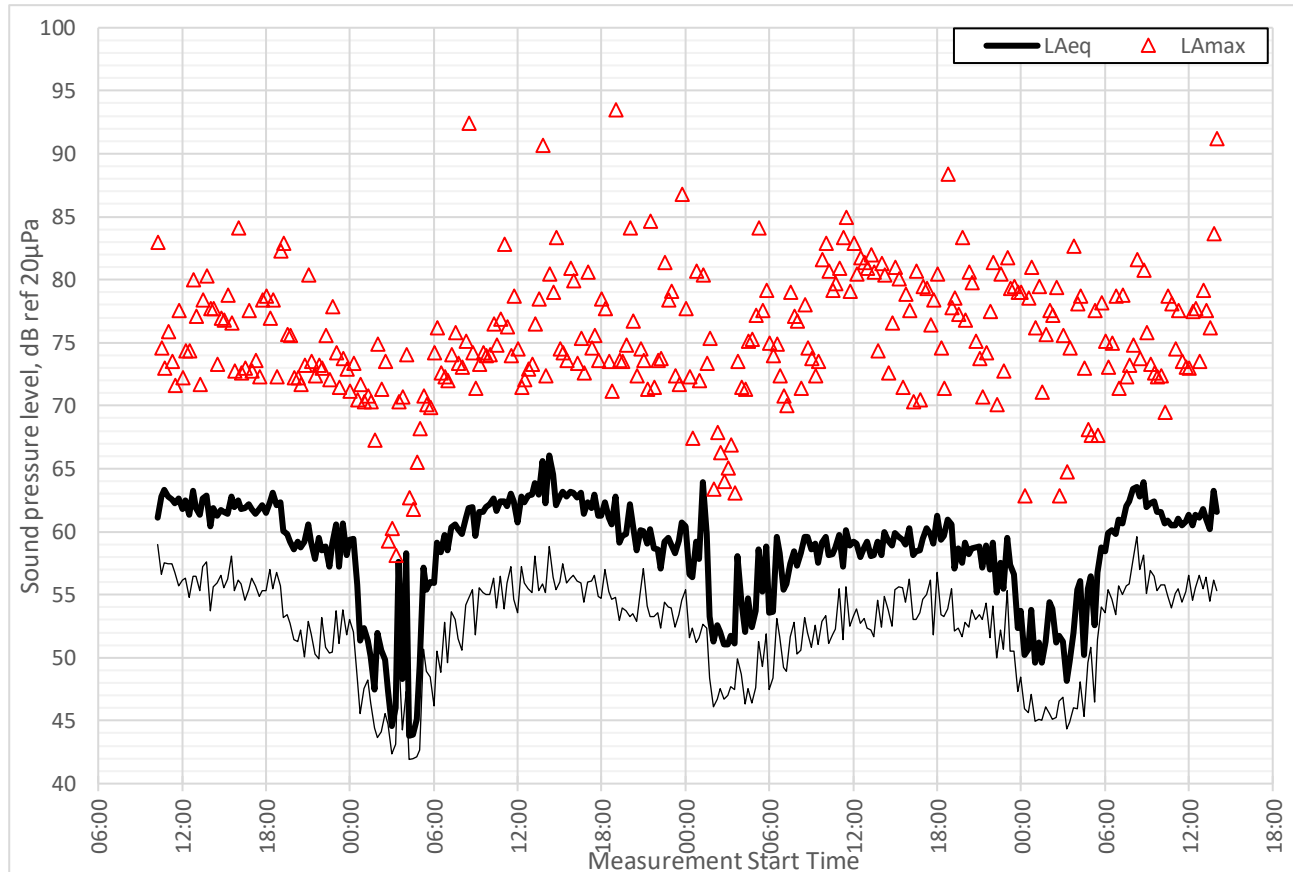
Weather conditions over the survey period were fine and dry with low wind speed. Conditions were considered to be acceptable for environmental noise monitoring.

All measurements were made with calibrated, precision grade sound level meters in accordance with BS EN 60651 and BS 7445:1993. Details of the equipment used are provided in Appendix 3 – List of Measurement Equipment. All equipment was calibration-checked before and after the survey; no significant drift was observed.

6. Results.

6.1 Logger position.

The variation in sound levels over the survey period are shown graphically below:



The measured levels over the survey period are summarised in the following table:

Position	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	L_{A10} (dB)	$L_{A90,T}$ (dB)
Friday	61.4	73 - 84	63.8	54.6
Friday night	55.8	71 - 76	53.6	47.4
Saturday	61.9	74 - 94	64.1	54.9
Saturday night	57.3	68 - 87	57.3	50.0
Sunday	58.8	78 - 88	60.6	53.0
Sunday night	55.4	78 - 83	54.8	48.3
Monday	61.7	76 - 84	64.4	55.9

Highest sound levels were attributable to bus pass-by and busses parked opposite the site.

The typical highest overall sound levels were L_{Aeq} 62dB daytime and L_{Aeq} 57dB night time whilst the typical highest night time maxima were in the range $L_{Amax,1min}$ 72-74dB but there were a few instances of levels in the range $L_{Amax,1min}$ 81-85dB.

It is noted that there was a marked increase in sound levels during the late evening periods on Saturday and Sunday and this is considered to be attributable to activity associated with re-opening of pubs on Saturday.

6.2 Attended measurement data.

Sound levels were measured during the middle of the day to determine typical pedestrian and vehicle activity noise levels. The typical sound levels over the sample period are summarised in the following table:

Period	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)	63	125	250	500	1k	2k	4k	8k
general	65-70	-	49	52	57	61	62	61	56	46
Bus mov ^t	-	85 - 86	57	61	72	80	80	84	77	59
Note: octave levels are shown as A-wtd values										

Highest sound levels were noted to be attributable to bus movements but there was additional noise from general vehicle movement and pedestrian activity.

The frequency data indicates that the majority of noise at the site occurs in the frequency range 500Hz – 2kHz.

The data indicates that typical difference between temporal values for the logger and attended measurements was 5dB. On this basis, the corrected daytime and night time sound levels for the proposed façade line of the new building are as follows:

Daytime – L_{Aeq} 67dB

Night time – L_{Aeq} 62dB

7. Discussion.

7.1 Existing noise climate.

From observation during the site survey visits, it is evident that the dominant noise affecting the site is from bus movements on Lever Street and, to a lesser extent, Piccadilly. Additional noise is generated by general traffic movement and by pedestrian activity adjacent to the site and on Piccadilly.

There was a general increase in sound levels during the late evening on Saturday and Sunday and this is considered to be attributable to pedestrian activity and taxi movements associated with the re-opening of pubs following the Covid-19 shutdown.

The majority of noise associated with traffic and bus movements has a characteristic mid-frequency tonal peak at 500Hz – 2kHz as indicated by the attended measurement data.

7.2 Premier Inn specification assessment.

From the survey data it may be extrapolated that, in order to achieve the temporal requirements of the Premier Inn specification, the building fabric to Lever Street and Piccadilly would need to provide a minimum composite sound reduction of 32dB(A) for both daytime and night time. Based upon the frequency data, this reduction requirement applies primarily to mid-frequencies characteristic of traffic noise.

For rooms overlooking Back Piccadilly, traffic noise levels will reduce due to angle of view and distance from the road and sound reduction requirements can be expected to be up to 5dBdB lower than for Lever Street.

In the case of maximum levels, the Premier Inn specification stipulates a night time internal noise event limit level of L_{Amax} 42dB. The survey data indicates maximum levels at the measurement position up to L_{Amax} 86dB for Lever Street during bus movements. From this, it is considered that the minimum overall sound reduction requirement for night time events is 44dB for Lever Street and Piccadilly to ensure that the criterion is not exceeded. However, the observed measurement data for bus pass-by indicates that a reduction of 40-42dB is required at 500Hz-2kHz.

For the Back Piccadilly elevation, it is considered that a reduction of 40dB would be required for night time events after allowance for increased distance and reduced view of the road.

The sound reductions discussed above apply to closed windows and BS8233 advises that sound reduction across a partially open window will be limited to 15dB. Under these conditions the Premier Inn internal criteria would be exceeded on all elevations. Given this finding, it will be necessary for all bedrooms to be provided with alternative means of ventilation. Background ventilation in accordance with Building Regulations requirements can be achieved with proprietary acoustic rated window or wall mounted trickle vents. All such vents will require a sound reduction rating, when open, that is equivalent to the room window system.

It will be necessary to review the retained party wall construction on the eastern side of the development. This wall will need to have a minimum airborne sound reduction of R_w 70 to enable compliance with the specification for bedrooms and to limit sound transfer from the kitchen and bar into the adjacent building.

It is anticipated that the required performance will necessitate the provision of an independent dry-lining over an insulated cavity to the existing wall detail.

7.3 Mechanical services plant.

Details of plant types are not yet known and, consequently, it is not possible to carry out a BS 4142 assessment. However, noise limit criteria for plant installations can be determined from the site background sound levels and the guidance in BS 4142 in order to achieve an assessment of 'low impact' at the nearest noise sensitive premises.

The plant noise limit criteria are derived below and the typical lowest L_{A90} values measured during the survey have been used as the basis of the assessment.

Parameter	Day	Night
Minimum measured L_{A90} level (1-hour day, 15-min night)	51	42
Noise character correction (BS 4142 Annex 1)	-3	-3
Plant noise limit at any dwelling - L_{Aeq}	48	39

Notwithstanding the limit criteria derived above from BS 4142, it is noted that section 2.13.5 of the Premier Inn generic specification requires that cumulative plant noise levels at the nearest noise sensitive receptor do not exceed a level that is 5dB below the lowest night time background sound level. This requirement will necessitate a night time plant noise limit level of L_{Aeq} 37dB and 2dB lower than the limit values derived in the table above.

Section 2.13.4 of the generic specification also requires that external plant does not give rise to levels greater than NR 20 within any guest bedroom – this level approximates to 25dB(A).

Noise control measures may be required to achieve the limit levels and it will be necessary to review plant selections and locations during the construction phase.

8. Recommendations.

Based upon the results of the site measurements, it is recommended that all guest bedrooms overlooking Lever Street and Piccadilly should be fitted with windows providing a minimum sound reduction of 40dB in the frequency range 500Hz-2kHz. From available manufacturer's data this would, typically require a windows system with a minimum rating of R_w 42. For bedrooms overlooking Back Piccadilly, windows should have a minimum rating of R_w 38.

It is recommended that bedrooms throughout the building be provided with background ventilation in accordance with Building Regulations requirements and Premier Inn specification. Where vents are provided to the building façade, these should, when open, have a minimum manufacturer's rating, expressed as a D_{new} value, that is at least 5dB greater than the room window rating.

It is recommended that all external mechanical services plant be specified and selected to achieve a night time sound level no greater than L_{Aeq} 37dB when measured at any residential premises adjacent to the site.

It is recommended that the retained party wall to the building to the east be surveyed to determine the construction detail and identify any specific acoustic weaknesses. Where weakness are identified, these will need to be made good prior to provision of any internal finishes. All guest bedrooms, and the kitchen and bar areas at 1st floor should be provided with an appropriate independent dry-lining that will enable the completed construction to achieve a minimum in-situ airborne sound reduction of D_{nTw} 65.

9. Conclusions.

Survey work carried out at this site indicates that the overall noise climate is determined by traffic flows on Lever Street and Piccadilly and that highest noise levels are generated by bus movements. Bus movements will occur during the early morning and late evening periods which fall into night time.

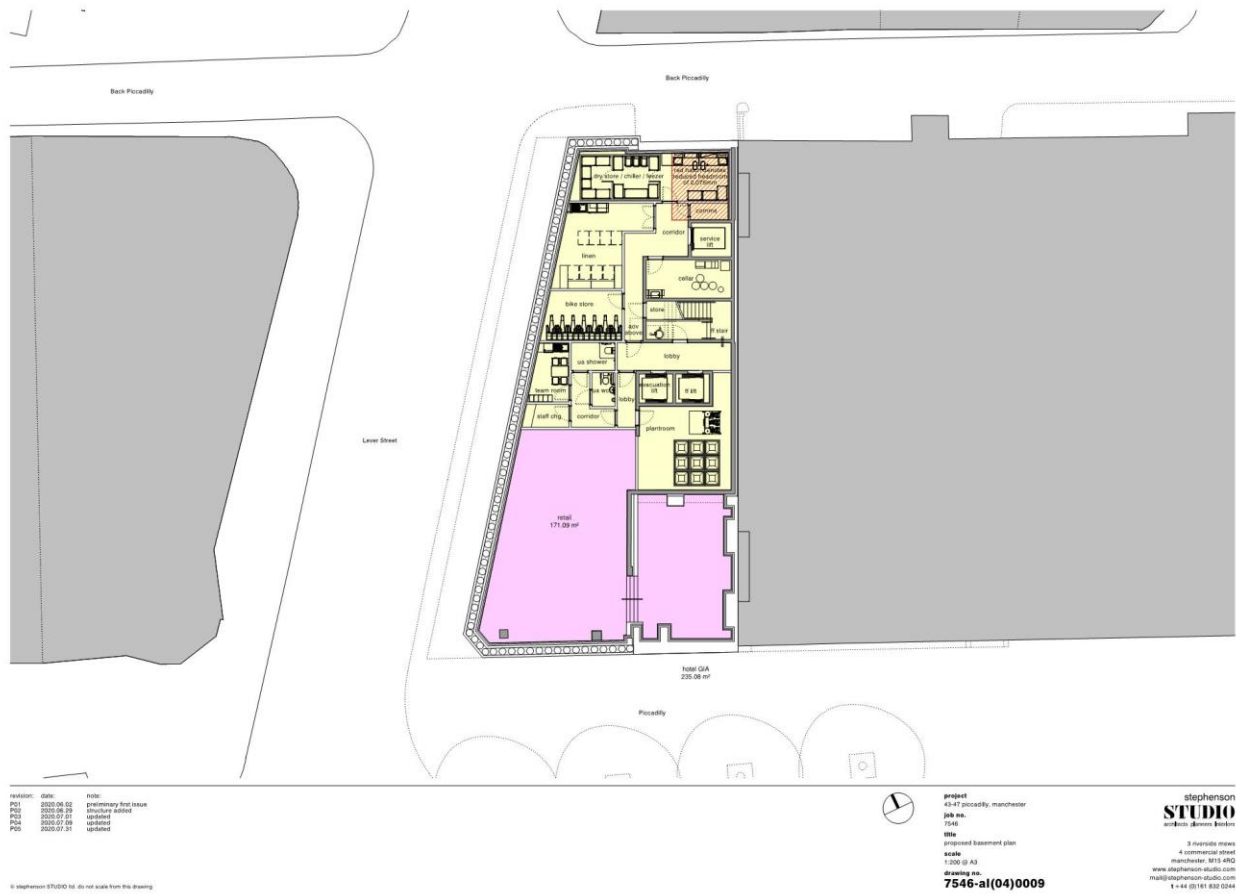
Internal noise criteria given in the Premier Inn specification will require the use of appropriate acoustic rated glazing and vents for all bedrooms throughout the proposed development. Minimum performance requirements for glazing systems and ventilation units are determined in this report.

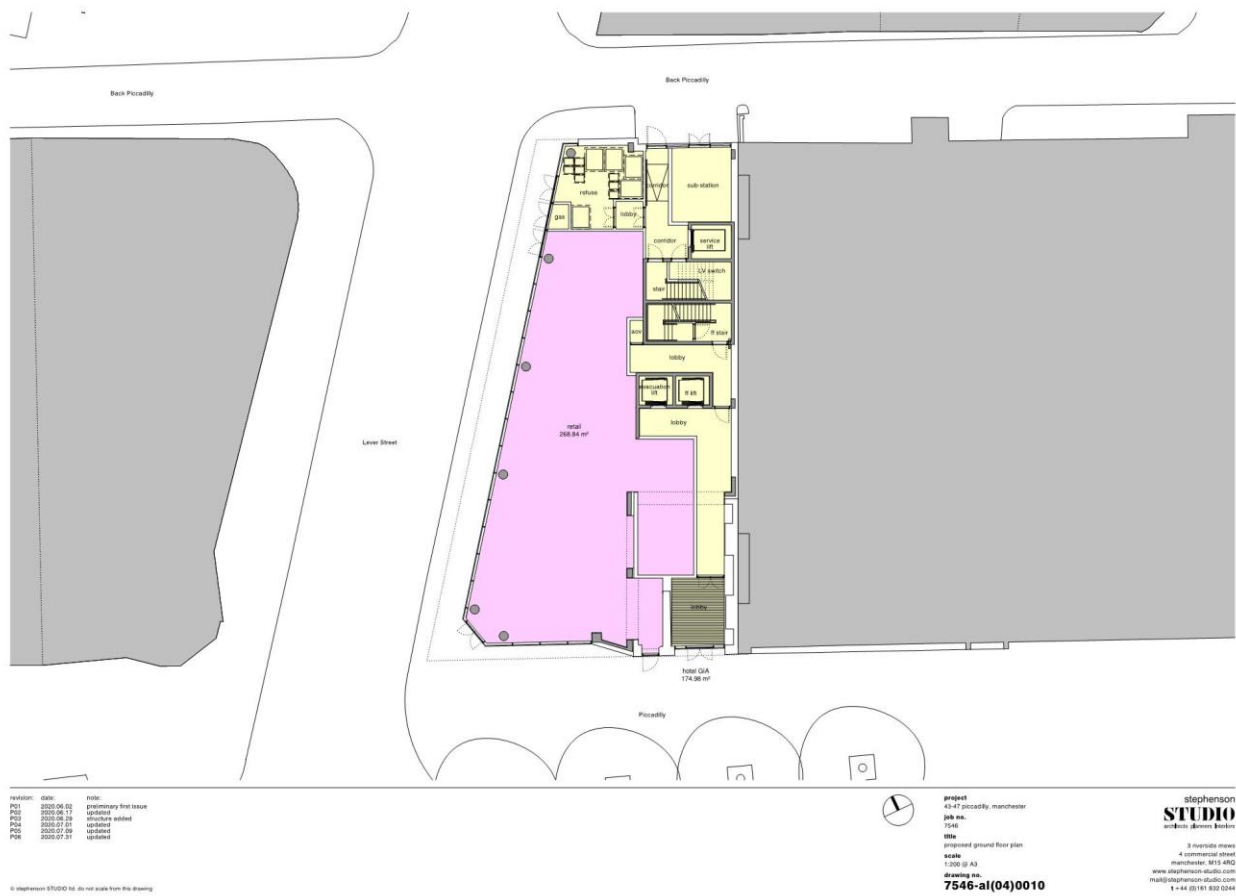
All guest bedrooms should be provided with means of background ventilation other than by use of open windows.

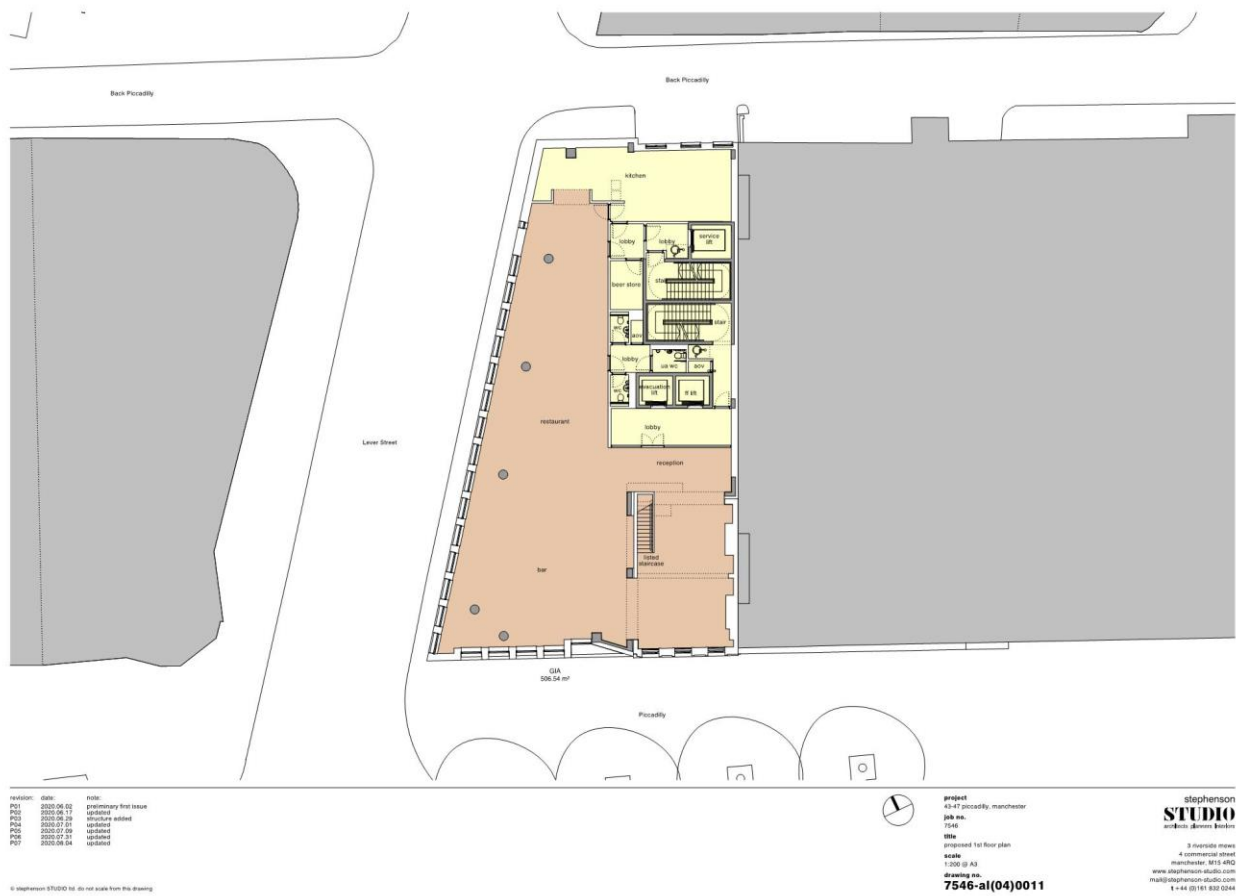
It will be necessary for all mechanical services plant associated with the proposed development to achieve the noise limit criteria derived in this report. All such systems should be reviewed during the design and construction stages to ensure that the limit criteria at the hotel façade and nearest dwellings are achieved.

It will be necessary for remedial works to be carried out to the retained party wall to ensure compliance with the requirements of the specification.

Appendix 1 – Floor plans.









Appendix 2 – List of measurement equipment.

Measurements

Svan 949 Sound Level Meter	S/N 6748
Svan Pre-amplifier SV12	S/N 5915
Svan Microphone SV22	S/N 49317
B&K 2260 Handheld Sound Level Meter	S/N 01260202

Additional Equipment

Svantek Type SV30A Calibrator	S/N 10823
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The above equipment fulfils IEC 61672 Class 1 and is traceable to calibration under BS7580: Part 1:1997.

The equipment was calibration-checked before and after measurement – no adverse deviation was observed.

Appendix 3. Measured Sound Pressure Levels.

Date	Day	From	To	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
03/07/2020	Friday	11:00	11:59	62.6	77.6	65.5	56.8
		12:00	12:59	62.3	80.0	65.0	55.9
		13:00	13:59	62.2	80.3	65.1	56.7
		14:00	14:59	61.4	77.7	64.1	55.5
		15:00	15:59	62.0	78.8	64.7	56.3
		16:00	16:59	62.1	84.1	65.4	55.5
		17:00	17:59	61.8	78.4	65.1	55.5
		18:00	18:59	62.3	78.7	65.0	56.1
		19:00	19:59	60.5	82.9	62.8	53.8
		20:00	20:59	58.9	73.2	61.2	51.2
		21:00	21:59	59.4	80.4	60.7	51.2
		22:00	22:59	58.5	77.9	60.5	51.2
		23:00	23:59	59.4	74.2	60.9	52.6
04/07/2020	Saturday	00:00	00:59	57.5	73.4	56.0	49.7
		01:00	01:59	50.7	70.8	51.6	46.7
		02:00	02:59	50.2	74.9	49.7	44.5
		03:00	03:59	52.5	70.7	49.0	45.1
		04:00	04:59	52.8	74.1	47.7	43.4
		05:00	05:59	55.3	70.8	54.9	47.7
		06:00	06:59	58.5	76.2	59.3	49.6
		07:00	07:59	60.0	75.8	61.7	51.9
		08:00	08:59	61.2	92.4	63.4	53.7
		09:00	09:59	61.3	74.2	63.6	54.4
		10:00	10:59	62.2	76.9	65.4	55.4
		11:00	11:59	62.5	82.8	65.5	55.4
		12:00	12:59	62.3	74.5	65.4	55.6
		13:00	13:59	64.0	90.7	66.5	56.1
		14:00	14:59	64.1	83.4	66.4	56.4
		15:00	15:59	63.0	80.9	66.1	56.4
		16:00	16:59	62.6	79.9	66.0	55.7
		17:00	17:59	62.1	80.6	65.0	55.9
		18:00	18:59	61.4	78.5	63.9	55.4
		19:00	19:59	60.6	93.5	62.2	53.8
		20:00	20:59	60.5	84.1	62.3	53.7
		21:00	21:59	59.5	84.7	61.7	54.4
		22:00	22:59	58.7	81.4	60.4	53.6
		23:00	23:59	59.4	86.8	61.7	53.6
05/07/2020	Sunday	00:00	00:59	58.5	80.7	59.9	52.6

		01:00	01:59	60.2	80.4	59.0	51.2
		02:00	02:59	51.8	67.9	53.9	46.7
		03:00	03:59	54.2	73.5	54.0	48.0
		04:00	04:59	53.6	75.3	54.6	47.2
		05:00	05:59	57.1	84.1	57.5	50.0
		06:00	06:59	57.1	75.0	57.4	50.2
		07:00	07:59	57.0	79.0	58.6	50.6
		08:00	08:59	58.8	78.0	60.7	51.5
		09:00	09:59	58.6	81.6	61.1	51.8
		10:00	10:59	58.7	82.9	61.0	52.1
		11:00	11:59	59.1	85.0	61.2	53.7
		12:00	12:59	58.8	82.9	60.8	53.3
		13:00	13:59	58.7	82.0	60.9	52.7
		14:00	14:59	59.1	81.3	60.8	53.4
		15:00	15:59	59.5	81.0	61.3	55.3
		16:00	16:59	58.9	80.7	60.8	54.0
		17:00	17:59	59.7	79.5	61.7	54.4
		18:00	18:59	60.4	88.4	62.3	54.3
		19:00	19:59	58.7	83.4	60.4	52.9
		20:00	20:59	58.7	80.6	60.6	53.0
		21:00	21:59	58.0	77.5	59.4	53.1
		22:00	22:59	57.1	81.4	58.7	51.7
		23:00	23:59	57.2	81.8	57.6	50.9
06/07/2020	Monday	00:00	00:59	52.4	81.0	52.8	46.8
		01:00	01:59	50.5	79.5	51.7	45.3
		02:00	02:59	53.0	79.4	52.3	45.6
		03:00	03:59	50.5	82.7	51.4	45.5
		04:00	04:59	54.8	78.7	53.2	47.2
		05:00	05:59	56.6	78.2	57.4	50.7
		06:00	06:59	59.6	78.7	61.7	54.3
		07:00	07:59	61.6	78.8	64.5	55.6
		08:00	08:59	63.4	81.6	66.3	58.1
		09:00	09:59	62.1	75.8	65.0	55.9
		10:00	10:59	60.9	78.7	64.1	55.1
		11:00	11:59	60.7	77.6	63.1	55.0
		12:00	12:59	61.1	77.7	63.7	55.8
		13:00	13:59	61.7	83.7	63.8	55.6

Glossary of terms.

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm is taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB(A).

$L_{Aeq,T}$

The A-Weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

$L_{A90,T}$

The A-Weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

L_{Amax}

The highest A-Weighted noise level recorded during a noise event.



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