HOLTZ ACOUSTICS

Site at Former B&Q, Great Stone Road, Trafford

Inquiry Evidence
Noise - Summary

Prepared For: Accrue (Forum) 1 LLP

5th November 2021

Document Reference: HA2021046/A/REV1
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Executive Summary

- The following report and appendices serve to address the concerns from the Lancashire County Cricket Club (LCCC) regarding noise from concert and cricket matches at the Emirates Old Trafford (EOT).

- Noise has not been a reason for refusal of the application and Trafford Council have accepted a noise management plan as a suitable means of concert noise mitigation. However this report provides further assessments which demonstrate that the business activities of the LCCC will not be unduly burdened by the presence of the proposed building.

- LCCCs premise license allows for music noise levels (MNL) of up to 80 dB $L_{Aeq,15min}$ at existing residential receivers.

- If it can be demonstrated that this level is unlikely to be exceeded at the proposed facades it is a strong indication that enforcement action is unlikely to take place and complaints are unlikely to be upheld and therefore there will be no additional burden on LCCCs operating activities.

- A concert noise survey was undertaken in order to determine existing MNLs around the proposed site and aid in calibrating a computer noise model.

- The noise model showed that the 80 dB $L_{Aeq,15min}$ criterion was not exceeded at any point on any of the proposed facades.

- Many of the residential windows are screened from concert noise due to the 'courtyard' design. In addition, the noise model demonstrates that the presence of the proposed building will reduce noise levels at existing residential dwellings to the south of the site.

- Noise from cricket matches has been further assessed. A noise model based on the worst case stand noise levels given in LCCCs 'Review of Noise Issues' report was used to model a full capacity cricket ground.

- The calculated level at the worst affect proposed façade was used to undertake noise ingress calculations and determine whether the recommend internal noise levels in BS8233:2014 can be met.

- The calculations showed that the internal noise levels could be met comfortably with the use of an uprated double-glazed window and acoustically rated trickle vents for background ventilation.

- A review of external amenity noise was undertaken to account for the new cricket noise sources. There was no material change from the previous assessment.

- Recommended noise levels at residential balconies and two terraces were exceeded in the model, however in-line with the recommendations of ProPG guidance there are multiple alternative quite external amenity spaces included in the scheme that can act as substitutes.

- The report further demonstrates that noise should not be a material factor in the planning decision and that the business activities of LCCC will be protected.

- We recommend that the development is conditioned to ensure that internal noise levels arising from road, tram and cricket matches do not exceed the recommend levels in BS8233:2014 with the final glazing and ventilation specification.

HOLTZ ACOUSTICS

Site at Former B&Q, Great Stone Road, Trafford

Inquiry Evidence
Noise - Main Proof

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5th November 2021

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1.0 Concert Noise

1.1 A representation has been received from the Lancashire County Cricket Club (LCCC) that raises concerns that the appeal proposal will conflict with the LCCC's operations through noise.

1.2 Noise was not a reason for refusal and mitigation of concert and noise via a Noise Management Plan has been accepted by Trafford Council as a suitable mitigation measure. This report however serves to allay the concerns of the LCCC via additional evidence.

1.3 LCCC are concerned that the proposed development will unduly impact the operation of their business which includes noisy activities such as cricket matches and occasional concerts. This impact could be in the form of noise complaints from future residents being upheld and enforcement action or review of licensing conditions undertaken by Trafford Council.

1.4 The licensing conditions for LCCC as referenced in their 'Review of Noise Issues' document states that the permitted music noise level (MNL) at existing noise receptors is up to 80 dB $L_{Aeq,15min}$. We understand that there is also a 2230hrs curfew for music events and that they are licensed for up to 7 events per year.

1.5 If it can be demonstrated that the existing MNL does not exceed 80 dB $L_{Aeq,15min}$ at the new residential receptors then this is evidence that the LCCC's licensing conditions are unlikely to be breached. Without breaching licensing conditions, it is unlikely that enforcement actions or review of licensing will be undertaken.

2.0 Noise From Cricket Matches

2.1 LCCC are concerned that crowd and music noise from cricket matches may give rise to complaints from the new residents and unduly burden their business operation.

2.2 Noise levels will vary between matches and stands. A wide range of match types and their frequency were outlined in the 'Review of Noise Issues' report prepared for the LCCC. In order to give the most robust assessment of these noise levels the worst-case scenario detailed in this report will be used, that is, a music and crowd level of up to 85 dB L_{Aeq} in the stands.

2.3 This would be, for example, a high attendance match with music 'stings' for boundaries and wickets such as an international T20 which would run into the early evening.

2.4 A detailed acoustic model has been produced that predicts noise levels at the proposed facades. These noise levels have been used to calculate noise ingress via a typical glazing and ventilation scheme.

2.5 British Standard BS8233:2014 'Sound Insulation and Noise Reduction for Buildings'[1] states that it is desirable that internal noise levels do not exceed the following guideline values shown below in Figure 1.

Figure 1. Guideline internal noise levels taken from BS8233:2014

Table 4 **Indoor ambient noise levels for dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

2.6 The value in focus when assessing the cricket noise will be 35 dB $L_{Aeq,16\ hour}$ in living areas and bedrooms as the matches do not run past 2300hrs.

2.7 It should be noted that the above value is the 'equivalent' level spread over 16 hours. As matches don't typically last for this duration the calculations shown in Section 3 over estimate the internal noise levels and therefore represent a worst-case scenario.

2.8 Details of the noise mapping system and configuration are included in Appendix A. A summary of the results of the modelling are included in the following section.

3.0 Concert Noise Model

3.1 Noise modelling/mapping software allows one to model the propagation of noise from numerous noise sources via complex terrain and building geometry.

3.2 The resultant noise levels at receiver facades are then calculated. 3D façade noise maps and grid maps provide a visual representation of the noise propagation.

3.3 A noise map was also included in LCCC's 'Review of Noise Issues' report but did not include detail on the parameters used to configure it.

3.4 A large level of uncertainty in noise mapping can be present when estimating the level from noise sources. It is unclear how source levels were determined in their model nor how the directivity of the PA system was configured.

3.5 The model presented in this report however used survey data taken from a recent concert at EOT to 'calibrate' the noise map and provide a more accurate noise source level. Full details of the noise model preparation are included in Appendix A.

3.6 The survey was undertaken during 'The Courteeners' concert on Saturday the 25th of September. Two survey positions we used as shown in Appendix B. The measurements were taken at 6m so

[1] Guidance on sound insulation and noise reduction for buildings, BSI, 2014

as to be out of the influence of the flat roof of the B&Q. The results are summarised in Table 1 below.

Table 1. Summary of survey results

Position Reference	Location Description	$L_{Aeq,T}$ (dB)	Measurement Notes
1	Near south east façade, partially screened by cricket school.	71 $L_{Aeq,33min}$	Average L_{Aeq} over entire survey period, a mixture of acoustic songs and bass heavy rock songs
2	Near site entrance, direct line of sight to stage and PA	74 $L_{Aeq,8min}$	Only 8 minutes of survey data available. But a suitable proxy for a 15 minute measurement. Taken towards the end of the concert during bass heavy rock songs.

3.7 A noise map of the existing site as it stood during the survey was constructed and the above receiver levels inputted at their respective positions (6m elevation) in the model. The sound system was then inputted into the model as estimated from concert photos. The sound level of the system was then set to match the measured levels at the receiver points.

3.8 This methodology takes away the uncertainties from estimating the output and propagation pattern of the sound system as it relies on survey data for calibration. This data was sourced relatively close to the proposed facades.

3.9 The proposed building geometry was then inputted into the model and the resultant levels at the facades calculated. A summary of the calculated levels is shown in Table 2 below and a 'heat map' of the façade shown in Appendix C.

Table 2. Summary of façade MNLs predicted by the noise map

Facade	Highest predicted level on facade	Floor at which this level predicted
North East	78 $L_{Aeq,15min}$	Level 2 Upwards
North West	78 $L_{Aeq,15min}$	Level 4 Upwards
South East	74 $L_{Aeq,15min}$	Level 5
South West	73 $L_{Aeq,15min}$	Level 8

3.10 At no point on any façade was the 80 $L_{Aeq,15min}$ limit exceeded. This is a strong indication that LCCCs licensing condition will not be breached and along with the proposed noise management plan will help safeguard the LCCC from future noise complaints impacting their business.

3.11 In addition, the noise map shows that the proposed building will reduce noise levels to existing residential dwellings to the south of the site. In the areas directly to the south of the proposed building a reduction of approximately 5-10dB is predicted. This is up to a halving of subjective MNL at the existing properties. The graphical noise maps in Appendix D and E demonstrate where the reductions may be achieved.

4.0 Cricket Noise Model and Calculations

4.1 For the cricket match noise map, a distributed sound system was modelled around the perimeter of the boundary as is typical at these types of events. The spectators in the stands were modelled as area sources covering the entire footprint of the stands. The source levels were then set to achieve 85 dB L_{Aeq} as referenced in the 'Review of Noise Issues' report.

4.2 The levels at the proposed façade were calculated and a summary of the results is shown below in Table 3.

Table 3. Summary of façade cricket noise levels predicted by the noise map

Facade	Highest predicted level on facade	Floor at which this level predicted
North East	66 L_{Aeq}	Level 7
North West	66 L_{Aeq}	Level 7
South East	61 L_{Aeq}	Level 4
South West	57 L_{Aeq}	Level 6

4.3 The highest level calculated was on the 7th floor with the main contribution coming from the temporary stand. The noise spectrum at this receiver position was used to calculated the internal noise levels in accordance with the methodology from BS8233:2014.

4.4 The calculation was based on a solid brickwork external wall, a standard (but higher specification) double glazing unit and acoustically rated trickle or façade vents for background ventilation. Full details of the calculation parameters and methods are included in the Appendix F.

4.5 The calculated internal noise level at this worst affected point on the façade with windows closed was 28 dB L_{Aeq}. This is comfortably under the internal noise level recommendations for living areas in the day (0700-2300hrs) of 35 dB $L_{Aeq.}$

4.6 The mitigation design should incorporate suitable background ventilation to allow windows to be shut during cricket matches whilst maintaining appropriate ventilation and thermal comfort.

4.7 The 'Review of Noise Issues' criticizes the lack of an overheating study. Such a study would normally be worked up during the detailed design phase where the specification of building elements is decided. The building will be designed to meet all required standards for ventilation and heating.

4.8 At this stage it has been shown that suitable internal noise levels from cricket noise can be readily achieved with standard design strategies.

4.9 We recommend that the development is conditioned to ensure that the internal noise levels from from road, tram and cricket matches meet the recommended levels in BS8233:2014 with the final detailed design.

5.0 External Amenity Areas

5.1 The impact from cricket noise on the external amenity areas was raised in the 'Review of Noise Issues' report. Noise impact on outdoor amenity spaces from road and tram sources has already been covered in the 'Acoustic Design Statement' submitted with the planning application.

5.2 This has now been reviewed to include for cricket noise and there are no material changes to the impact on outdoor spaces.

5.3 BS8233:2014 states that 'the acoustic environment of external amenity areas that are an intrinsic part of the overall design should be assessed and noise levels should ideally not be above 50-55 dB $L_{Aeq,T}$.

5.4 Balconies on the south west, north west and around half of the balconies on the north east façade exceed this criterion as well as two of the roof terraces nearest the cricket ground.

5.5 ProPG: Planning & Noise[2] states that these guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces.

5.6 For the private balconies, there is no practicable way to further lower the noise levels with the balcony design and we believe that LCCCs recommendation to turn them into winter gardens shifts them away from being considered 'outdoor amenity spaces'

5.7 Likewise the terraces already include balustrades or planters to provide additional screening. The terraces that exceed the BS8233 criteria are those nearest the cricket ground where cricket noise is the dominant noise source. BS8233:2014 generally concerns continuous noise sources such as road traffic. Relaxations should therefore be made for the infrequency of matches.

5.8 The areas detailed above have already been designed to achieve the lowest practicable noise levels.

5.9 ProPG states that if this is the case then the impact may be partially offset if the residents are provided with access to 'a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings'.

5.10 There are numerous public and private outdoor amenity areas proposed in the development which would fit this criterion.

5.11 The noise levels have been predicted in these areas and are shown on the graphical noise map in Appendix G. This includes contributions from the cricket match modelled in Section 4 and the road traffic noise along Great Stone Road.

5.12 This shows that there is ample quiet substitute outdoor amenity space included in the scheme that meets the BS8233:2014 noise criterion.

[2] Working Group, ProPG: Planning and Noise, May 2017

HOLTZ ACOUSTICS

Site at Former B&Q, Great Stone Road, Trafford

Inquiry Evidence
Noise - Appendices

Prepared For: Accrue (Forum) 1 LLP

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Appendix A – Details of Noise Mapping Methodology

- The noise model was configured to predict noise based on the methodology contained in ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

- Soundplan 4.2 noise mapping software was used. Mapping of the site and surrounding area was based on aerial photography, the elevation and layout of stands around EOT were taken from publicly available drawings included with previous planning applications.

- Buildings were set to be reflective and 2 orders of reflection were used in the calculation process.

- The majority of ground cover is hard in the area so ground absorption was set to G=0. The pitch and training nets ground surface was set to G=0.5 to account for some absorption from the grass.

- The PA system was estimated based on concert photographs from the concert surveyed. This includes two flown speaker arrays either side of the stage at 10m elevation, a central subwoofer at 2m elevation and three delay towers on the pitch at 10m elevation.

- The stage position as seen on the evening of the survey is shown in Appendix B. The speaker arrays point away from the proposed site which is located behind the stage to the south.

- The speakers were modelled as point sources with highly directional directivity patterns typical of line arrays which are designed to project sound onto the audience for maximum efficiency rather than waste energy projecting sound behind or above

- The subwoofer was modelled to have standard directivity for a single subwoofer rather than a dipole or subwoofer array which offer similar efficiency to the line arrays mentioned above.

- It should be noted that the exact configuration of speakers is not vital as the model was calibrated using survey data at height, near the proposed building.

- The spectra of the speakers were set to typical rock music spectra with higher energy in the low frequency bands.

- The output level from the speakers was adjusted until the calculated level at Survey Position 2 matched the survey data. Survey Position 1 also matched the survey levels suggesting an accurate model. This calibration method takes away the unreliability of estimating the speaker system output making for a much more accurate noise map.

- The proposed building was then added to the model based on the proposed plans and elevations and the façade noise levels calculated as a 1m grid across the most exposed façades.

- It is noted that some apartments have windows that are set back from the façade edge by balconies potentially leading to a build-up of noise due to the additional surfaces around the windows.

- These apartments also have glass balustrades and the balcony floors will provide additional screening to the lower half of the windows. It is not possible to calculate either of these contributions accurately so it is estimated that any noise increase from additional surfaces is offset by noise reductions from the screening.

- The highest calculated level was 78.3 dBA. Under the 80 dBA licensing criterion.

- For the cricket noise a distributed PA system was modelled around the boundary. Crowds were modelled as area sources based on library data for sports crowds and a typical crowd output spectra.

- The crowd were inputted as area sources that followed the geometry of the stands and entirely covered them at a height of 1m above the stands.

- The crowd source and speaker source outputs were then adjusted to achieve 85 dBA in the centre of the stands. This is based on the worst-case level given in the LCCC's report.

- Façade noise levels were calculated and the worst-case facade point was used to undertake an internal noise calculation to demonstrate that the noise can readily meet the recommended levels in BS8233:2014 using standard specifications.

- Noise to outdoor amenity areas was modelled using the road traffic noise level determined in the previous assessment as well as the cricket match noise levels detailed above.

- Individual points were calculated for the higher-level terraces and a grid noise map calculated for the low-level courtyards.

- In addition, a grid noise map was calculated for the concert noise with and without the proposed development to show the acoustic screening benefits of the proposed buildings on the residential dwellings to the south of the site. The grids were set at an elevation of 1m and a grid spacing of 5m.

Appendix B – Concert Noise Survey Details

- A survey of the concert noise was undertaken on the evening of Saturday the 25th of September.

- The concert measured was 'The Courteeners' which reportedly had sold out at a 50,000 capacity. The survey was started during the main set and concluded just before the set finished.

- The set was a mixture of acoustic and rock songs. The most important measurements were taken towards the end of the set where there was just bass heavy rock music. The set concluded at the 2230hrs curfew time.

- Monitoring was undertaken at two positions as show on the aerial view below.

- Measurements were taken with a microphone on a 6m vertical pole to reduce the screening effects from the flat roof of the existing site.

- It should be noted that the speaker systems were pointing away from the proposed site, it is understood that this configuration and stage position are the standard setup for concerts at EOT.

- Modern speaker systems are designed to point sound down and towards the audience, this makes them more efficient and easier to power as no energy is wasted propagating sound behind, where no one will hear it. The long 'strings' of speakers often seen at concerts are a special configuration called a 'line array' which direct sound forwards and down onto the audience.

- PA systems also include low frequency speakers (subwoofers), these typically radiate in all directions but in recent years subwoofer arrays are being introduced which also radiate more sound forwards rather than backwards. It is not known whether subwoofer arrays are used at EOT.

- Measurements were taken using a Class 1 sound level meter which was set to integrate over 1 minute periods and measure in single octave bands.

- The positions were chosen to be as close to the proposed façade as possible but there were access issues stopping the survey proceeding very close to the proposed façade.

- Position 1 included the effect of screening from the cricket school.

- Position 2 had a direct line of sight to the stage and PA system.

A summary of the results from the survey are shown in the tables overleaf.

Position 1

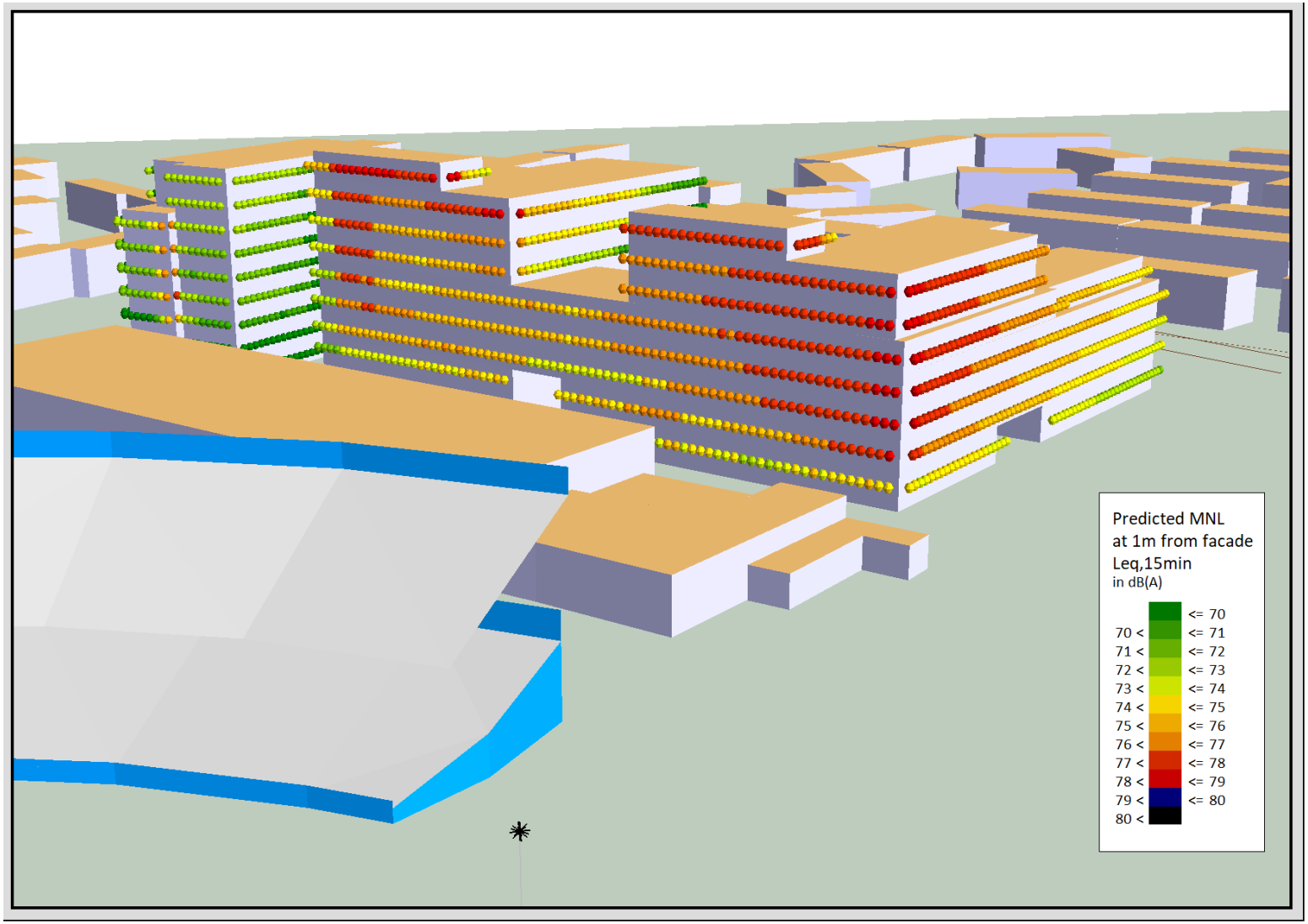
Time	$L_{Aeq,1min}$	L_{eq} (dB)							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
21:38:21	74	86	85	77	68	66	63	59	47
21:39:21	75	87	85	79	69	66	65	61	46
21:40:21	68	81	79	72	62	59	55	48	32
21:41:21	72	83	80	76	67	63	60	53	43
21:42:21	72	85	81	76	68	64	62	52	42
21:43:21	73	84	82	78	68	66	64	56	44
21:44:21	75	85	83	80	68	66	65	58	46
21:45:21	71	78	79	76	64	63	60	53	38
21:46:21	58	57	54	52	57	54	48	39	23
21:47:21	66	57	66	71	62	60	58	47	41
21:48:21	65	58	64	69	62	59	56	47	37
21:49:21	65	57	62	68	62	61	57	47	37
21:50:21	65	60	63	66	62	60	56	47	38
21:51:21	69	59	65	73	65	63	59	49	41
21:52:21	68	59	63	71	65	64	59	49	42
21:53:21	67	58	64	69	64	63	57	49	40
21:54:21	66	58	65	69	62	60	58	48	41
21:55:21	68	58	67	71	64	60	60	50	45
21:56:21	68	59	66	71	65	61	60	50	44
21:57:21	61	58	60	59	57	59	52	45	34
21:58:21	62	58	55	52	57	61	50	41	29
21:59:21	61	58	59	57	58	57	53	46	33
22:00:21	69	78	78	73	65	62	58	48	37
22:01:21	72	83	80	77	67	64	62	52	42
22:02:21	72	81	81	76	66	64	61	52	41
22:03:21	71	81	80	75	66	64	62	54	42
22:04:21	67	75	75	70	61	61	57	50	37
22:05:21	71	83	80	74	65	65	60	53	42
22:06:21	74	85	84	77	70	66	63	56	46
22:07:21	74	84	84	77	70	65	64	56	45
22:08:21	74	84	84	76	70	66	65	57	46
$L_{Aeq,31min}$	71								

Position 2

Time	$L_{Aeq,1min}$	L_{eq} (dB)							
		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
22:12:11	75	90	82	80	68	69	66	61	43
22:13:11	73	91	82	79	65	63	60	53	40
22:14:11	74	93	83	80	66	65	61	55	43
22:15:11	75	94	82	81	66	66	65	58	44
22:16:11	74	93	81	80	66	66	63	57	45
22:17:11	60	60	56	55	58	56	52	45	35
22:19:24	77	93	81	76	69	69	72	69	64
22:20:54	73	93	82	79	65	63	59	51	38
$L_{Aeq,8min}$	74								

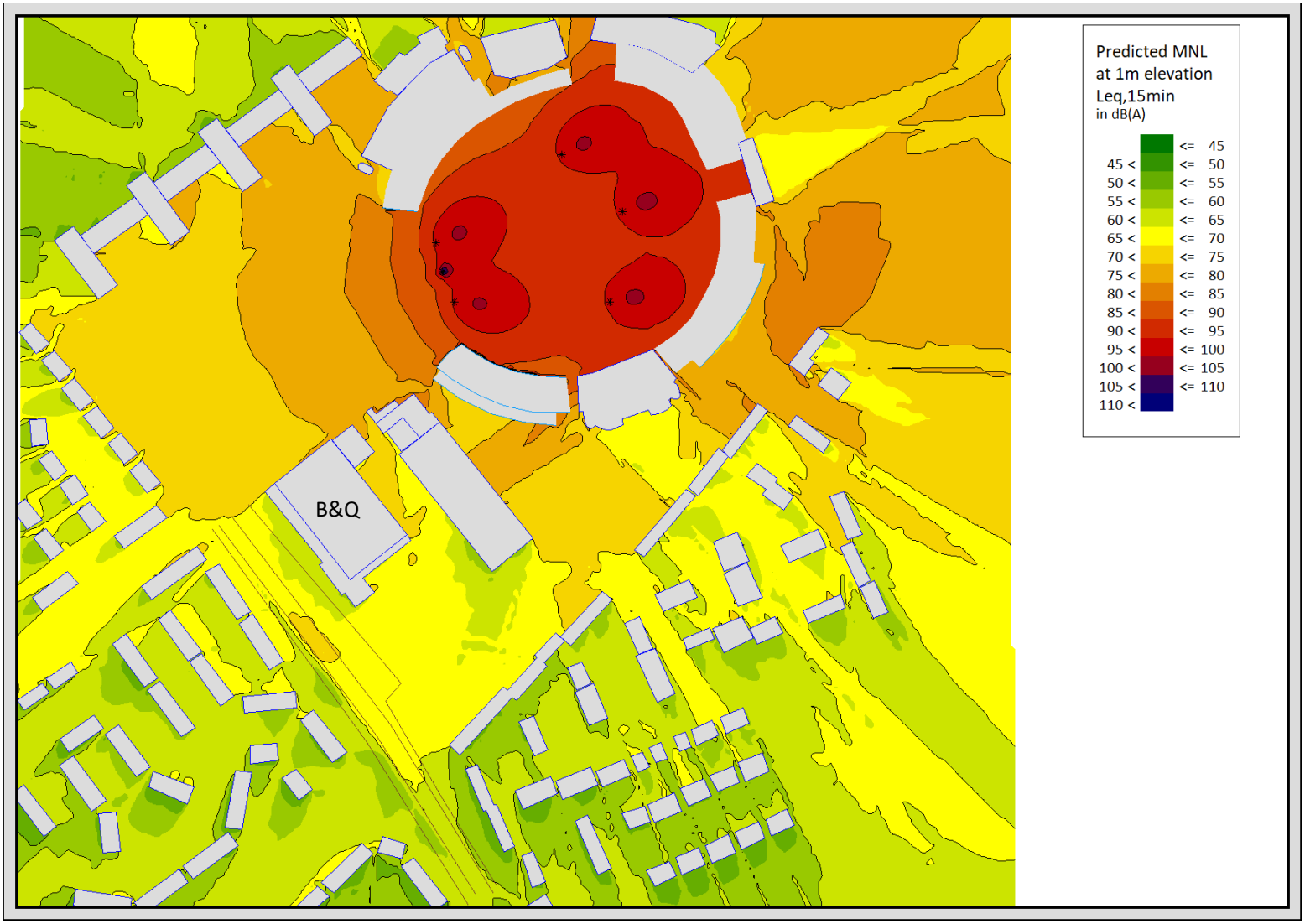
Appendix C – Façade Noise Map Showing Predicted MNLs at 1m from Facade

At no point is the 80 dBA licensing criterion exceeded.



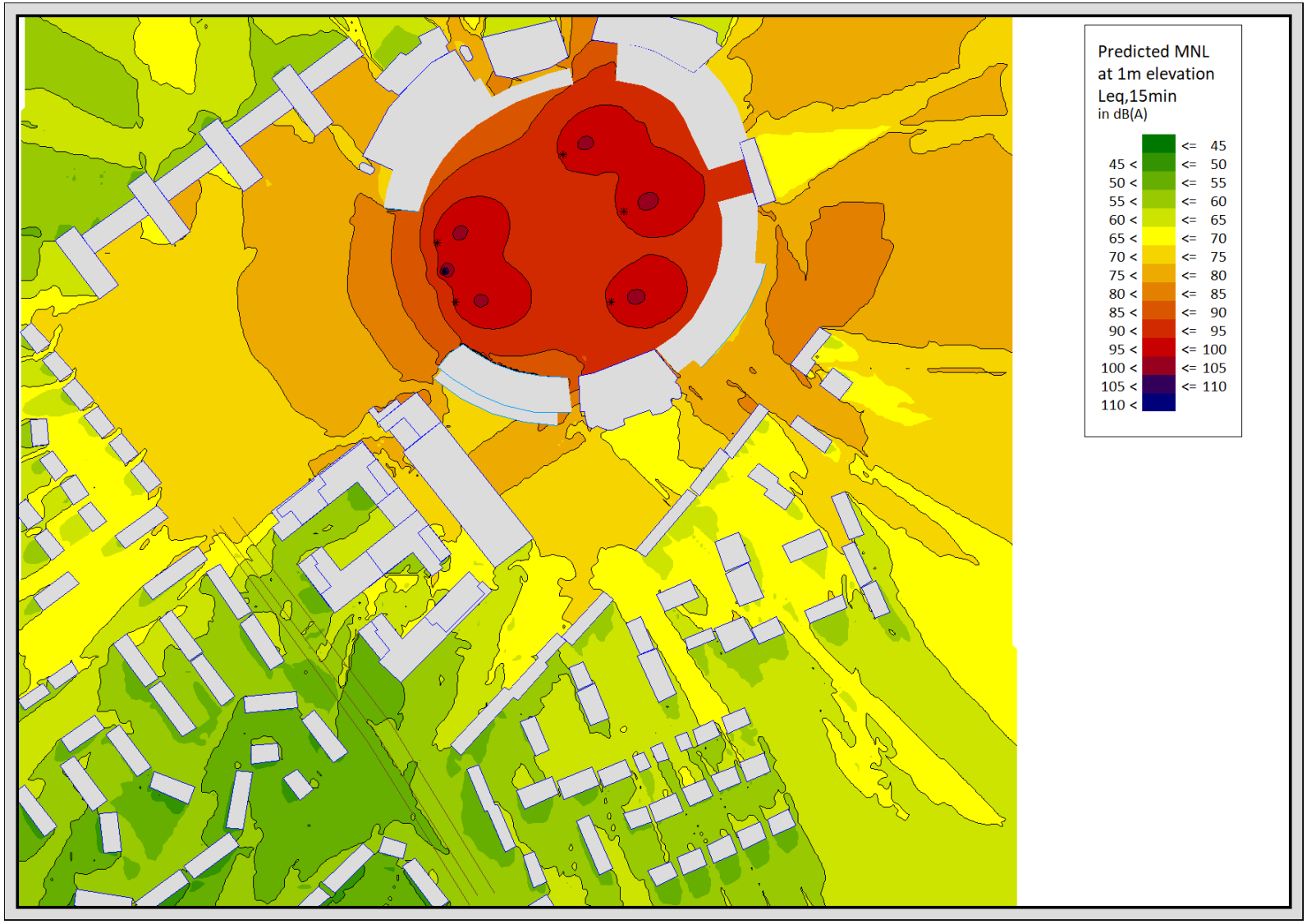
Appendix D – MNL Grid Map - Existing

Shows predicted noise levels at existing receptors.



Appendix E – MNL Grid Map - Proposed

Shows reduced noise levels at some existing receptors due to screening from proposed building mass.



Appendix F – Calculation of Cricket Noise Ingress at Worst Affect Dwelling

The calculation methodology from BS8233:2104 Appendix G.2.2 was used. Resultant internal Nosie levels were calculated as 28 dB which leaves a safety factor of 7dB which more than allows for the reduction between laboratory values and on-site installations. Although in my experience façade where the glazing is the dominant factor this reduction is typically 2-3dB.

The trickle vent used in the calculation is a Greenwood 2500EA.AC1 acoustically rated trickle ventilator.

The glazing used is a 6/12/10 double glazed unit however many other configurations could achieve this target performance.

The wall is based on 150mm thick dense concrete blocks.

It should be noted that this calculation is for the worst affect dwelling from cricket noise the majority of dwelling will be subject to much lower cricket noise levels due to screening form the building mass.

Data used in the calculation of the noise level inside a room

Terms that are frequency dependent										
Term	**Description**	**Single Figure Rating**	**Octave Band Centre Frequency (Hz)**							**A-weighted**
			63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
$L_{eq,ff}$			49	61	61	63	63	55	47	39	66
$D_{n,e}$	Trickle Vent	42	30	40	40	34	45	48	43	45	
R_{wi}	Double glazing	36	26	26	27	34	40	38	46	46	
R_{ew}	Brick wall	46	30	31	36	43	49	55	59	60	
R_{rr}	Ceiling	0	0	0	0	0	0	0	0	0	
A			32	32	32	32	32	32	32	32	

Terms that are not frequency dependent		
Term	**Derivation**	**Value**
S_f	Façade area (including window)	14.00 m2
S_r	Roof area (exposed side)	0.00 m2
S_{wi}	Window area	3.70 m2
S_{ew}	Sf-Swi	10.30 m2
S_{rr}	Area of ceiling	0.00 m2
S	Sf + Srr	14.00 m2
A_0	Given in BS EN 20140-10	10.00 m2

V	100	**T60**	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

$$L_{eq,2} \approx L_{eq,ff} + 10log_{10}\left(\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}\right) + 10log_{10}\left(\frac{S}{A}\right) + 3 \quad (1)$$

$$L_{Aeq,2} = 10log_{10}\left(10^{\frac{L_{Aeq,125}}{10}} + 10^{\frac{L_{Aeq,250}}{10}} + .. +\right) \quad (2)$$

The calculation

Term from equation (1)	Reference letter of result	Octave band centre frequency (Hz)								
		63	125	250	500	1000	2000	4000	8000	
$L_{eq,ff}$	A	49	61	61	63	63	55	47	39	
$D_{n,e}$		30	40	40	34	45	48	43	45	
$\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}}$	B	0.00071	0.00007	0.00007	0.00028	0.00002	0.00001	0.00004	0.00002	
R_{wi}		26	26	27	34	40	38	46	46	
$\frac{S_{wi}}{S_f} 10^{\frac{-R_{wi}}{10}}$	C	0.00066	0.00066	0.00053	0.00011	0.00003	0.00004	0.00001	0.00001	
R_{ew}		30	31	36	43	49	55	59	60	
$\frac{S_{ew}}{S_f} 10^{\frac{-R_{ew}}{10}}$	D	0.00074	0.00058	0.00018	0.00004	0.00001	0.00000	0.00000	0.00000	
R_{rr}		0	0	0	0	0	0	0	0	
$\frac{S_{rr}}{S_f} 10^{\frac{-R_{rr}}{10}}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
10log10 (B+C+D+E)	F	-27	-29	-31	-34	-42	-43	-44	-45	
A (furnished)		32	32	32	32	32	32	32	32	
$10\log\left(\frac{S}{A}\right)$	G	-4	-4	-4	-4	-4	-4	-4	-4	
$L_{eq,2}$	A+F+G+3	21	32	29	29	20	12	3	-7	
A-weighting dB		-26	-16	-9	-3	0	1	1	-1	
$L_{eq,2}$ + A-weighting	$L_{Aeq,125}$ etc	-5	16	20	26	20	13	4	-8	28

$L_{Aeq,2}$ is obtained by combining these values using equation (2)

Appendix G – Outdoor Amenity Grid Map

At 1m elevation, Contributions from cricket match noise and road traffic noise. High level terrace point noise levels shown in dBA. Terrace calculations taken at centre of terrace at seated height of 1.2m. Allowances made for 0.5m balustrade/planter around perimeter of terraces.