NOISE BREAKOUT ASSESSMENT

EVERYMAN SCREEN ON THE CORNER,

MMA ENGINEERS

FEBRUARY 2016

NOISE BREAKOUT ASSESSMENT
EVERYMAN SCREEN ON THE CORNER

Our Ref: 2822_001R_1-0_JB

Client:	**MMA Engineers** 384 Caledonian Road Islington London N1 1DY
Report by:	**Anderson Acoustics Limited** Unit 1.2.1 The Leathermarket London SE1 3ER www.andersonacoustics.co.uk T: 0203 1767909
Date:	**11 February 2016**
Project No:	**2822**
Status:	**ISSUED**

Author	**Joe Baggaley** **Principal Consultant** MSc BSc (Hons)MIOA		**11 February 2016**
Reviewed	**Luca Dellatorre** **Principal Consultant** MEng MIOA		**11 February 2016**
Approved	**Joe Baggaley** **Principal Consultant** MSc BSc (Hons)MIOA		**11 February 2016**

REVISION HISTORY

Version	Comments	Changes made by	Approved by
1.0	First issued version	JB	LD

PAGELEFT INTENTIONALLY BLANK

CONTENTS

1	INTRODUCTION	6
2	SITE DETAILS	7
3	LOCAL AUTHORITY REQUIREMENTS	11
4	BASELINE NOISE LEVELS	12
5	CONTROL OF NOISE FROM CINEMA	14
6	CONTROL OF NOISE EMISSIONS FROM BUILDING SERVICES	15
7	SUMMARY	16

1 INTRODUCTION

Anderson Acoustics Ltd has been appointed by MMA Engineers to advise on acoustics and noise control for the proposed new cinema screen situated in Kings Cross London, Everyman Screen on the Corner.

The project involves the fit out of an existing retail space on the ground floor of the Plimsoll Building to provide one 28 seat cinema screen.

This report records our assessment of noise break-out from the cinema when in operation in accordance with local authority requirements.

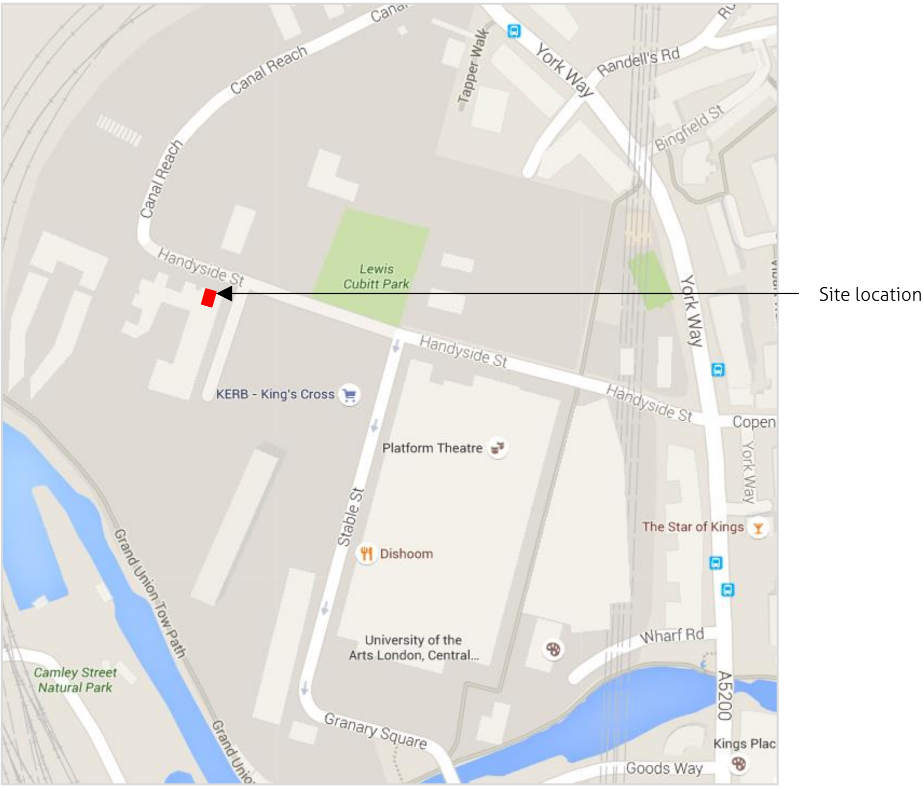
Several visits were made to the site between the 4th and 10th February to inspect the existing construction of the building and undertake acoustic measurements.

2 SITE DETAILS

2.1 Location

A wide location plan is shown in Figure 2.1 below.

Figure 2.1: Location plan (site depicted in red)



The site is situated at ground floor level of the Plimsoll Building on the corner of Handyside Street (north) and Wollstonecraft Street (east). Directly above on the 1st floor of the Plimsoll Building is a school for the hearing impaired and above that on the 2nd floor and floors above are residential flats.

The space also shares internal walls with ground floor areas of the Plimsoll Building to the south and west, however these areas are non-sensitive.

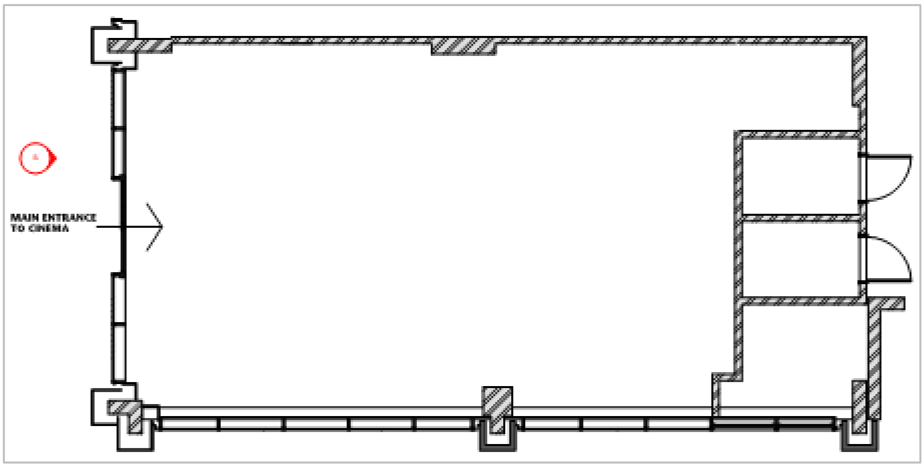
2.2 The Shell

Figure 2.2 below shows a plan of the existing retail space as a shell.

The superstructure is concrete with a concrete floor base and first floor concrete slab approximately 250 mm thick, supported on structural columns.

The perimeter walls are dense concrete block (assumed 100 mm thick) with large double glazed areas (understood to be 6/14/8.8 lam). There is a metal louvered area that runs around the perimeter of the space, above the glazed areas. The entrance door is a sliding double glazed unit.

Figure 2.2: Existing shell



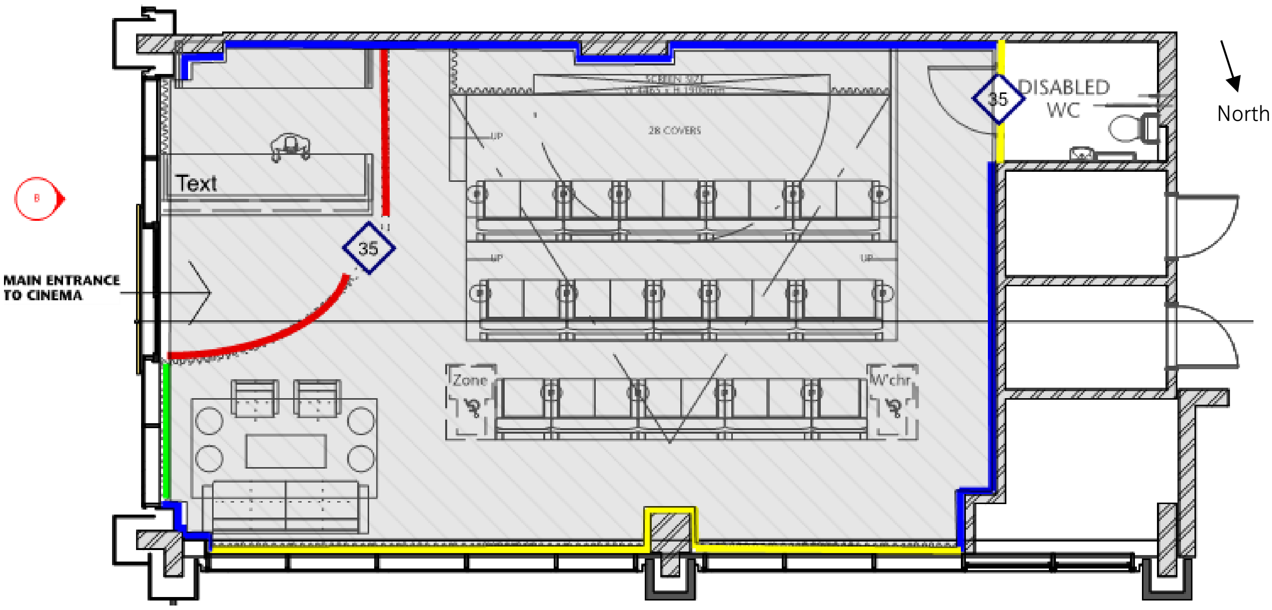
2.3 Proposed Design

2.3.1 General

Figure 2.3 is a plan showing the reconfigured space providing the cinema screen and front desk/bar area.

The proposed design will create a room in room scenario to control both airborne and structure borne noise breakout to the above sensitive spaces via the external façade and via internal floors and walls. The plan below incorporates a key showing the location of various acoustic design measures (these are discussed in more detail below).

Figure 2.3: Plan showing proposed design measures



2.3.2 Auditoria Walls

The internal perimeter block walls will be independently lined on the auditorium side with two layers of 12.5 mm dense acoustic plasterboard supported on 50 mm studs located at least 20 mm away from the perimeter walls (70mm cavity) with 50 mm mineral wool insulation (density 36 kg/m^3) in the cavity.

2.3.3 Auditoria Glazing North Facade

A new independent wall will be introduced behind the glazing, the wall will be constructed of two layers of 15mm dense acoustic plasterboard on the auditorium side of a 70 mm I stud with one layer of 15 mm acoustic plasterboard on the glazing side. 50 mm mineral wool insulation (min density 36 kg/m^3) will be placed in the cavity. The wall will be located at least 20 mm away from the concrete foot of the north facing façade (approximately 200 mm from existing glazing). The existing window reveal will be lined with a sound absorbent lining to improve the acoustic performance further.

An acoustic curtain with a weight of 380 g/m^2 will also be installed, fronting the partition on the auditorium side; the curtain will be installed approximately 100 mm from the partition.

2.3.4 Auditoria Glazing East Façade

A small section of the east façade will be secondary glazed. An additional pane of 8 mm acoustic laminate glass will be installed allowing for a cavity of at least 150 mm, the window reveal will be acoustically lined as described above.

The acoustic curtain as described above will also be installed behind this area on the room side.

2.3.5 Auditoria Entrance East Facade

The main entrance will be lobbied from the auditorium with a glazed partition and a well-sealed acoustic rated door-set. The partition will provide a laboratory tested acoustic performance of R_w 40 dB and the door-set R_w 35 dB. The door-set will be well sealed at the head, jambs and threshold.

2.3.6 Suspended ceiling

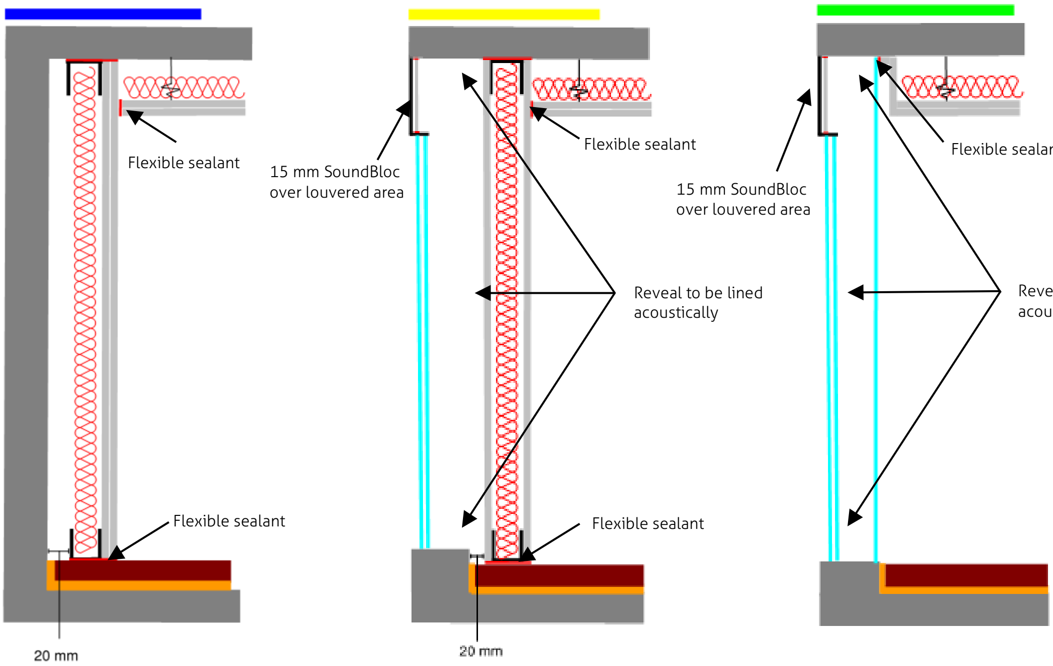
A suspended ceiling consisting of two layer of 15 mm dense acoustic plasterboard will be installed beneath the existing concrete soffit leaving a minimum cavity of 200 mm. The ceiling will be acoustically separated from the structure using proprietary resilient hangers, 100 mm mineral wool insulation (min density 36 kg/m^3) will be laid in the cavity.

2.3.7 Floating Floor

A raised floor will be installed above the existing base slab with a deck comprising 2 layers of 25 mm plywood (density 610 kg/m^3). The deck will be supported on an acoustically isolated frame incorporating discrete acoustic pads.

The above acoustic design measures are shown below in Figure 2.4. The sketches provide the key design principles being followed (not to scale).

Figure 2.4: Acoustic treatment to perimeter walls and facades



2.4 Proposed Use

The cinema screen will typically operate seven days a week between 8 am and 1 am. The sound system will be limited to the following sound pressure levels in the auditorium using an LSS-100P light and sound sensor, see Appendix for details.

Table 2.1: Noise levels in auditoria

Octave Band Hz	63	125	250	500	1000	2000	4000
SPL dB	97	100	100	100	100	100	100

2.5 Plant details

The development will be ventilated mechanically through a fully ducted heat recovery system located in the ceiling void above the bar area with intake and extract grilles terminating at high level on the east facing façade.

Space heating and cooling will also be provided as part of a fully ducted system with external items of plant situated in the basement car park.

2.6 Loudspeaker mounting

In order to avoid the transmission of vibration to the structure the loudspeakers will be resiliently mounted to the structure or mounted on independent walls.

3 LOCAL AUTHORITY REQUIREMENTS

Camden Statement of Licensing Policy 2011 states the following for Cinema noise breakout.

"*The conditions suggested in this section apply to any premises who wish to provide recorded music, live music dance performance, or provision of facilities for music and dancing as part of their licensable activities.*"

"*Before 2300 hours, the noise climate of the surrounding area shall be protected such that the A-weighted equivalent continuous noise level (L_{Aeq}) emanating from the application site, as measured one metre from any façade of any noise sensitive premises over any five minute period with entertainment taking place, shall not increase by more than 5dB as compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place; and the unweighted equivalent noise level (L_{eq}) in the 63Hz Octave band, measured using the "fast" time constant, inside any living room of any noise sensitive premises, with the windows open or closed, over any five minute period with entertainment taking place, should show no increase as compared to the same measure, from the same location(s), and over a comparable period, with no entertainment taking place.*"

"*After 2300 hours, the noise climate of the surrounding area shall be protected such that the A-weighted equivalent continuous noise level (L_{Aeq}) emanating from the application site, as measured one metre from any façade of any noise sensitive premises over any five minute period with entertainment taking place shall not increase by more than 3dB as compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place and the unweighted equivalent noise level (L_{eq}) in the 63Hz Octave band, measured using the "fast" time constant, inside any living room of any noise sensitive premises, with the windows open or closed, over any five minute period with entertainment taking place, should show no increase as compared to the same measure, from the same location(s), and over a comparable period, with no entertainment taking place.*"

In addition to this Camden set out the following requirement for controlling noise emissions from external plant and machinery:

Noise at 1 metre external to a sensitive façade shall be controlled to level that is 5 dB below the prevailing L_{A90} during the proposed hours of operation.

4 BASELINE NOISE LEVELS

4.1 General

To assess and suitably control noise emissions to surrounding noise sensitive properties a baseline noise survey has been carried out to establish the prevailing noise environment without the cinema in operation.

4.2 Internal Baseline

4.2.1 Methodology

To establish baseline noise levels inside the residential units during the night time period an unattended noise survey was carried out between Thursday 4th February and Friday 5th February 2016.

As access was restricted to the residential spaces a 01dB Duo precision sound level meter was placed inside the retail unit to record representative noise levels over consecutive five minute periods. The meter was fixed to a tripod at a height of approximately 1.5 metres above floor level.

The equipment was calibrated before and after using a 01dB Cal21 sound calibrator, no significant drift was observed.

To establish baseline noise levels inside the school classroom, attended measurements of 5 minute duration were made on Friday 5th February inside the adjacent classroom during typical school hours (13:00 to 13:20 hrs). Measurements were made using a Rion NL-52 precision sound level meter fixed to a tripod at a height of approximately 1.2 metres above floor level.

The equipment was calibrated before and after using a Rion NC-74 sound calibrator, no significant drift was observed.

4.2.2 Results

The internal baseline noise measurements are summarised in Table 4.1 below.

Table 4.1: Measured internal baseline noise levels

Description	63	125	250	500	1000	2000	4000	A
$L_{eq,5min}$ classroom[1]	51	47	45	40	37	33	27	41
$L_{eq,5min}$ bedroom[2]	45	49	44	30	25	19	16	39

Notes

[1] Noise levels in the classroom were dominated by mechanical services providing fresh air to the classroom.

[2] The lowest recorded $L_{eq,5min}$ during the proposed cinema operational hours has been presented and used for this assessment. The level was recorded at 00:20 hours.

4.3 External Baseline

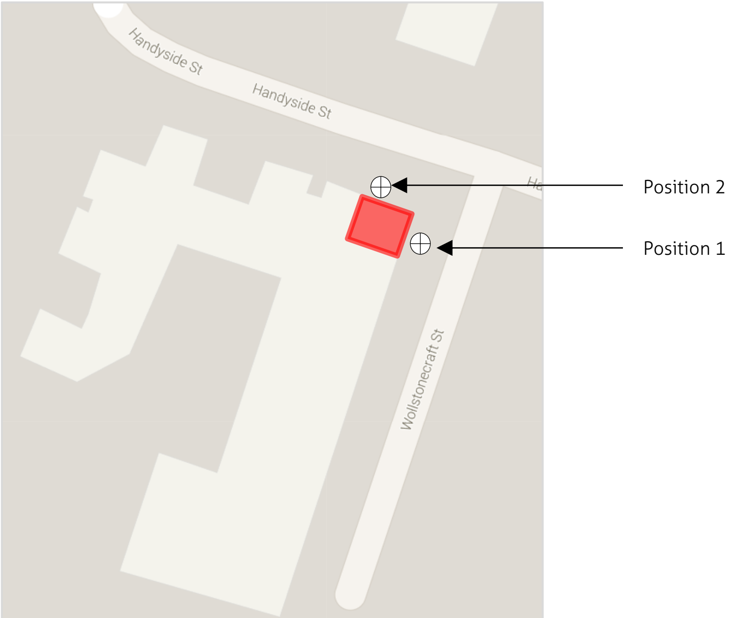
4.3.1 Methodology

To establish baseline external noise levels at 1 m from the sensitive facades an attended noise survey was carried out during night-time hours between 23:45 hours on Tuesday 9th February and 00:30 hours on Wednesday 10th February.

Measurements of 5 minute duration were made using a Rion NL-52 precision sound level meter fixed to a tripod at a height of approximately 1.2 metres above floor level. The measurement positons are shown in Figure 4.1 below.

The equipment was calibrated before and after using a Rion NC-74 sound calibrator, no significant drift was observed. Weather conditions were dry and mild with occasional gusts of winds.

Figure 4.1: Measurement positions



4.3.2 Results

The external baseline noise measurements are summarised in Table 4.2 below.

Table 4.2: Measured external baseline noise levels

Time	Location	Parameter	63	125	250	500	1000	2000	4000	A
23:45	1	$L_{eq,5min}$	56	48	46	45	43	44	48	53
		$L_{90,5min}$	51	46	43	40	38	32	24	43
23:51	2	$L_{eq,5min}$	58	53	50	46	44	40	33	49
		$L_{90,5min}$	55	50	46	41	39	33	24	45
23:57	1	$L_{eq,5min}$ [1]	56	47	45	42	40	36	33	45
		$L_{90,5min}$ [2]	52	45	43	40	38	32	22	42
00:03	2	$L_{eq,5min}$	60	53	50	45	43	39	38	49
		$L_{90,5min}$	55	50	45	41	39	34	27	45
00:08	1	$L_{eq,5min}$	60	48	47	44	40	34	30	48
		$L_{90,5min}$ [3]	52	45	43	39	37	31	21	42
00:14	2	$L_{eq,5min}$	58	52	48	43	42	38	33	47
		$L_{90,5min}$	55	50	46	40	38	32	22	44

Notes
[1] Lowest recorded $L_{Aeq,5min}$ during the survey period. This has been used for the purpose of assessing noise breakout during cinema showings.
[2, 3] Lowest recorded $L_{A90,5min}$ of 42 dB(A) recorded during the survey period. This has been used for the purpose of assessing plant noise emissions.

5 CONTROL OF NOISE FROM CINEMA

5.1 General

An assessment of cinema noise breakout has been carried out to demonstrate compliance with the guidelines set out in the Camden Statement of Licensing Policy 2011.

Our predictions are based on current design proposals and the proposed source spectrum limit set out in Table 2.1 of this report,

The following sound transfer paths have been assessed, full spectral calculations can be seen in the Appendix –

- Noise transmission through the building via separating floors and flanking walls Table A1 of Appendix;
- Noise breakout through the external façade to 1 m from the nearest noise sensitive residential façade Tables A2 and A3 of Appendix;
- Combined noise level inside bedroom from transmission through the building and out via the external façade and in through open window Table A4 of Appendix.

5.2 Conclusion

The calculations show that with a room in room design (as set out in this report)and the source level controlled to the limit proposed, both broadband and low frequency sound transfer from the cinema auditorium will be adequately controlled and should comply with Camden Guidelines.

6 CONTROL OF NOISE EMISSIONS FROM BUILDING SERVICES

6.1 General

An assessment of external plant noise emissions has been carried out to demonstrate compliance with the London Borough of Camden's noise limits set out in Section 3 of this report.

The results of our attended survey showed that during the proposed hours of operation the minimum background $L_{A90,5min}$ level is 42 dB. Therefore to comply with the requirements of LBC the design limit for noise emissions to the atmosphere is 37 dB.

Our predictions have been based on information provided by MMA Engineers and manufacturer noise levels for the proposed items of external plant.

6.2 External Plant

Heating and cooling will be provided by external condenser units, 1no. model ref Mitsubishi PUMY-P200-YKMA and 1 no. Mitsubishi PUHZ-ZRP71-VHA located in the basement carpark. This location has no line of site to noise sensitive windows and also holds an existing bank of condensers that serve the building. Consequently the condensers associated with the development will have no impact on existing conditions outside surrounding noise sensitive receptors and have not been considered further with regard to noise emissions.

Fresh air will be provided by a Vent-Axia Sentinel Totus D-ERV Midi heat recovery unit located in the ceiling void above the bar area. The intake and discharge terminals will be located on the east façade at high level.

Manufacturer's sound power levels (L_w) for the unit are provided below in Table 6.1.

Table 6.1: Heat recovery unit sound power levels

Description	63	125	250	500	1000	2000	4000	A
Intake L_w dB	54	58	64	49	47	42	35	57
Discharge L_w dB	54	62	69	56	55	53	43	63

An attenuator will also be installed to the atmosphere side of the extract fan, the attenuator will be approximately 350 mm long and provide the following minimum insertion losses.

Table 6.2: Attenuator insertion losses

Description	63	125	250	500	1000	2000	4000
Extract attenuator insertion losses (dB)	1	2	5	9	13	10	7

Based on the above noise data a prediction of emissions has been carried out to the nearest sensitive window, which belongs to a residential property on the 2nd floor of the plimsoll building directly above the cinema, at a distance of approximately 6 metres.

Detailed calculations can be seen in Table A5 of Appendix A.

Our predictions indicate a plant noise level of 34 dB at 1 m from the sensitive receptor, which complies with Camden's requirements.

The unit and associated ductwork should be mounted on anti-vibration pads, in line with normal good practice, to control the transmission of vibration through the building.

7 SUMMARY

This report records the outcome of a noise breakout assessment in connection with the proposed fit out of an existing retail space on the ground floor of the Plimsoll Building to provide one 28 seat cinema screen. Predictions have been carried out to assess the following key issues:

- Noise breakout during cinema showings
- Noise breakout from mechanical plant serving the cinema

The London Borough of Camden sets out specific planning guidelines for the control of noise breakout (see Section 3 of this report).

With this in mind the design of the cinema and associated mechanical services has been carefully considered to enable compliance.

The cinema auditorium will be acoustically isolated from the existing shell through the implementation of a room in room design and the sound system will be sufficiently limited using sound sensor technology.

The ventilation plant has been selected for quiet operation (including atmosphere side attenuation) and the space heating and cooling plant is to be located in an area that will have no impact on surrounding sensitive areas.

As proposed the design should enable compliance with all Camden's noise guidelines relevant to the development.

APPENDIX A

DETAILED CALCULATIONS

Anderson Acoustics

Table A1: Prediction of noise transmission via slab and flanking walls

Job No.	Made By	Date Created	Sheet No.									
2822	JB	10/02/16	1									
Job Name		Date last revised	Rev									
Everyman Kings Cross		11/02/16	1									Anderson Acoustics
Calculation Description				Octave Band Centre Frequency								
Room to Room noise transfer				32	63	125	250	500	1k	2k	4k	8k
			Lp1 (dBA)		Source room sound pressure level Lp1 (dB)							
Source Room	Auditorium		105.4		97	100	100	100	100	100	95	90
Partition details	First floor Slab	Area S (m2)	Rw (dB)		Sound Insulation Performance of slab calculated using Insul acoustic modelling software (based on 250 mm slab with acoustic ceiling)							
		70.0			55	63	73	81	88	93	97	97
Site reduction due to flanking		-3.0			52	60	70	78	85	90	94	94
Receiver Room	Classroom	Volume V (m3)			Reverberation Time RT (s)							
		200.0			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Absorption A (sabine)							
					64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4
			Lp2 (dBA)		Receiver room sound pressure level Lp2 (dB)							
Predicted level inside classroom			28.0		45	40	30	22	15	10	1	-4
Measured LAeq,5min inisde classroom			42.8		51	47	45	40	37	33	27	25
Combined sound pressure level			43.0		52	48	45	40	37	33	27	25
		Difference	0		1	1	0	0	0	0	0	0
			Lp1 (dBA)		Source room sound pressure level Lp1 (dB)							
Source Room	Classroom		28.0		45	40	30	22	15	10	1	0
Partition details	Second floor Slab	Area S (m2)	Rw (dB)		Sound Insulation Performance of slab calculated using Insul acoustic modelling software (based on standard 250 mm slab)							
		15.0			43	44	51	59	66	71	76	76
Site reduction due to flanking		-3.0			40	41	48	56	63	68	73	73
Receiver Room	Bedroom	Volume V (m3)			Reverberation Time RT (s)							
		40.0			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
					Absorption A (sabine)							
					12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
			Lp2 (dBA)		Receiver room sound pressure level Lp2 (dB)							
Predicted level inside bedroom			7.0		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Measured LAeq,5min inisde bedroom			38.2		45	49	44	30	25	19	16	13
Combined sound pressure level			38.2		45	49	44	30	25	19	16	13
		Difference	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Room to Room Airborne Noise transfer Version 0.01		Anderson Acoustics										

Table A2: Prediction of noise breakout via north façade

Job No.	Made By	Date Created	Sheet No.									
2822	JB	08/02/16	1									
Job Name		Date last revised	Rev									
Everyman Kings Cross North Façade		09/02/16	1									
Calculation Description				Octave Band Centre Frequency								
Inside to Outside noise transfer				A	63	125	250	500	1k	2k	4k	8k
					Source room sound pressure level Lp,in (dB)							
Source Room			Lp,in (dB)	105	97	100	100	100	100	100	95	90
					Sound Insulation Performance R or R' (dB)							
Facade Element	Glazed/lined facade		Rw (dB)	70	31	44	68	85	85	85	85	85
+10logS					Calculated using Insul acoustic modelling software							
width (m)	height (m)		Area S (m2)									
			28.0		14	14	14	14	14	14	14	14
+Directivity (dB)	3				3	3	3	3	3	3	3	3
		minimum r (m)	Distance r (m)									
-20*logr-14			8.0		32	32	32	32	32	32	32	32
Receiver sound pressure level Lp,out (dB)			Lp,out (dB)	28	51	41	17	0	0	0	0	0
Combined sound pressure level Lp,out (dB) façade				31	54	44	20	3	3	3	3	3
Baseline sound pressure level Leq				45	56	47	45	42	40	36	33	30
Combined				45	58	49	45	42	40	36	33	30
Difference				0	2	2	0	0	0	0	0	0
Inside to Outside Airborne Noise transfer Version 0.02		Anderson Acoustics										

Table A3: Prediction of noise breakout via east façade

Job No. 2822	Made By JB	Date Created 08/02/16	Sheet No. 1									Anderson Acoustics
Job Name Everyman Kings Cross East Façade		Date last revised	Rev 1									
Calculation Description				Octave Band Centre Frequency								
Inside to Outside noise transfer				A	63	125	250	500	1k	2k	4k	8k
					Source room sound pressure level Lp,in (dB)							
Source Room			Lp,in (dB)	105	97	100	100	100	100	100	95	90
					Sound Insulation Performance R or R' (dB)							
Facade Element	Secondary glazing		Rw (dB)	56	29	40	47	52	56	59	67	67
+10logS					Above calculated using Insul acoustic modelling software							
width (m)	height (m)		Area S (m2)									
			6.0		8	8	8	8	8	8	8	8
+Directivity (dB)	3				3	3	3	3	3	3	3	3
		minimum r (m)	Distance r (m)									
-20*logr-14			8.0		32	32	32	32	32	32	32	32
Receiver sound pressure level Lp,out (dB)			Lp,out (dB)	30	46.7	38.7	31.7	26.7	22.7	19.7	6.7	1.7
Facade Element	Lobbied entrance area		Rw (dB)	58	37	45	50	54	59	62	71	71
+10logS					Above calculated using Insul acoustic modelling software							
width (m)	height (m)		Area S (m2)									
			12.0		8	8	8	8	8	8	8	8
+Directivity	3				3	3	3	3	3	3	3	3
		minimum r (m)	Distance r (m)									
-20*logr-14			8.0		32	32	32	32	32	32	32	32
Receiver sound pressure level Lp,out (dB)			Lp,out (dB)	27	38.7	33.7	28.7	24.7	19.7	16.7	2.7	0.0
Combined sound pressure level Lp,out (dB) free-field				32	47	40	33	29	24	21	8	4
Combined sound pressure level Lp,out (dB) façade				35	50	43	36	32	27	24	11	7
Baseline sound pressure level Leq				45	56	47	45	42	40	36	33	30
Combined				46	57	48	46	42	40	36	33	30
Difference				0	1	1	1	0	0	0	0	0
Inside to Outside Airborne Noise transfer Version 0.02		Anderson Acoustics										

Table A4: Prediction of overall noise transfer

Description	63	125	250	500	1000	2000	4000	A
Contribution of sound transfer out through façade and in via open window								
Predicted noise level 1 m from window	54	44	20	3	3	3	0	31
Attenuation from open window	-15	-15	-15	-15	-15	-15	-15	
Predicted noise level inside bedroom	39	29	5	0	02	0	0	16
Contribution via building								
Predicted noise level inside bedroom	6	0	0	0	0	0	0	6
Overall level								
Combined level of noise transfer	39	29	6	3	3	3	0	17
Measured baseline in bedroom $L_{Aeq,5min}$	45	49	44	30	25	19	16	39
Combined noise level	46	49	44	30	25	19	16	38
Increase	0.8	0	0	0	0	0	0	0

Table A5: Prediction of plant noise emissions

Description	63	125	250	500	1000	2000	4000	A
Vent-axia Midi Intake (50% fan speed) (dB L_w)	59	64	57	46	45	40	35	57
End reflection loss (diam 250 mm)	-15	-11	-6	-2	-0	0	-0	/
Directivity correction (90°)	3	3	3	2	-2	-15	-15	
Distance (20*log(r)-8) ~ 6 metres	-24	-24	-24	-24	-24	-24	-24	
Façade correction	3	3	3	3	3	3	3	
Lp at 1 m from window	26	35	33	25	22	4	0	28
Vent-axia Midi Intake (50% fan speed) (dB L_w)	62	71	65	62	56	53	46	63
Attenuator insertion loss	-1	-2	-5	-9	-13	-10	-7	
End reflection loss (diam 250 mm)	-15	-11	-6	-2	-0	0	-0	/
Directivity correction (90°)	3	3	3	2	-2	-15	-15	
Distance (20*log(r)-8) ~ 6 metres	-24	-24	-24	-24	-24	-24	-24	
Façade correction	3	3	3	3	3	3	3	
Lp at 1 m from window	28	40	36	32	20	7	3	32
Combined noise level at 1 m from window								34
Design Limit								37
Difference								-3

APPENDIX B
NOISE SENSOR DETAILS

LSS-100P
Light & Sound Sensor

US Patent
Number 8,836,910

USL, Inc. proudly supports the protection of endangered species and animals under threat.

Digital cinema technology is far more complex than 35mm film. Cinema owners need a simple automated solution to ensure presentation quality of every show. The LSS-100P is designed to do exactly this.

- Monitors screen light levels and chromaticity
- Monitors levels of all audio channels
- Monitors IR performance of ADA equipment
- Email alerts automatically sent to technicians*
- Database software available to monitor numerous cinema auditoriums
- Simple installation with Power over Ethernet (POE) capability
- Patented Technology

* Requires external database server

181 Bonetti Drive
San Luis Obispo, CA 93401-7397 USA
(Ph) +1 805.549.0161 (Fax) +1 805.549.0163
uslinc@uslinc.com www.uslinc.com

USL, inc.
Precision Sound • Light • Color

LSS-100P

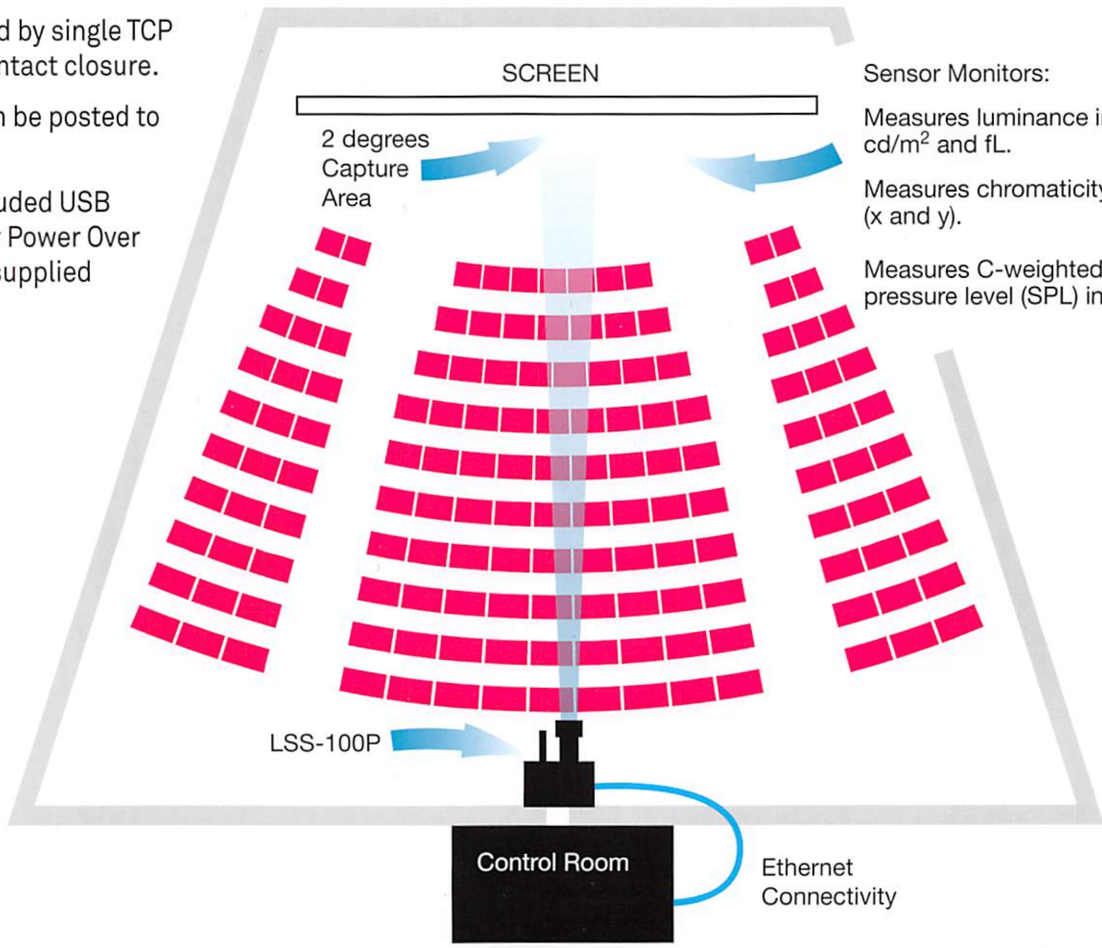
Light & Sound Sensor

SPECIFICATIONS

- Measures sound pressure level (dB(C), luminance (cd/m^2 and fL), and chromaticity (x,y).
- Measurement repeatability: 1dB (SPL), 2% (luminance), .003 (chromaticity).
- Separate luminance detector with photopic spectral response for accurate measurements with a variety of light sources.
- IR sensor measures illumination of screen by HI/VI-N/CC emitter.
- Web browser view of live and logged data.
- User defined scripts synchronize measurements with test content playback.
- Scripts include user defined description of measurement and minimum and maximum limits.
- Scripts triggered by single TCP command or contact closure.
- Logged data can be posted to server as XML.
- Power with included USB power supply or Power Over Ethernet (user supplied power injector).

UPCOMING FEATURES

- CP850 test mode. Script command places Dolby CP850 in or out of test mode to test all speakers in an Atmos auditorium.
- Audio/Video sync. Determines offset between flash on screen and pop in sound to ensure audio and video are synchronized for live events.
- Speaker distortion measurement. Measures total harmonic distortion of a tone to detect speaker rattle and similar failures.
- Sound exposure level. Measures sound exposure level to help ensure compliance with local regulations.
- Projection Lamp Flicker measures amount of flicker in projector and identifies faulty bulbs.



10-03-14-Vs9

LSS-100P is not a video camera and does not record the movie, it is strictly used as test equipment for movie theatres.