CONABEARE ACOUSTICS

ENVIRONMENTAL ACOUSTIC REPORT

NO CS7777/1

Trainline,
Levels 2 & 3,
120 Holborn,
London
EC1

Issue date: 31st March 2016

Prepared By:

Stuart Metcalfe

Stuart Metcalfe MIOA

CLIENT:

AMD Environmental Limited
Jupiter House,
Orbital One,
Green Street Green Road,
Dartford, Kent
DA1 1QG

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FORWARD

An environmental acoustic survey has been carried out to the rear courtyard of 120 Holborn, London EC1

The results of the survey will establish the Background Sound Level for new mechanical services plant in order that it complies with planning/design requirements.

SUMMARY

The lowest $L_{A90,15min}$ measured to the rear of the premises were;

$L_{A90,15min}$ 48dB(A) between 07:00 hours to 19:00 hours.

$L_{A90,15min}$ 46dB(A) between 19:00 hours to 23:00 hours.

$L_{A90,15min}$ 45dB(A) between 23:00 hours to 07:00 hours.

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1. **Author**

Stuart Metcalfe MIOA

The author of this report has been practicing in building services acoustics and noise control engineering for 25 years, is a Member of the Institute of Acoustics (MIOA) and is a Director at Conabeare Acoustics Ltd.

2. **Client**

The report and survey has been undertaken on behalf of:

AMD Environmental Limited
Jupiter House,
Orbital One,
Green Street Green Road,
Dartford, Kent
DA1 1QG

3. **Introduction**

The survey has been carried out to ensure that any future proposed plant does not have a detrimental effect on the local surroundings and in particular residential premises.

4. **Noise Principles**

The environmental survey has been carried out generally in accordance with the principles of BS7445–1 (2003) and BS4142 to establish the Background Sound Level

The Background Sound levels measured is in terms A-weighted sound pressure level L_{A90} with a time interval of 15 minutes.

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GLOSSARY.

L_{A90}	The sound pressure level in dB(A) which is exceeded for 90% of the time and is taken to be the effective lowest background sound level for the period by such methods of sound rating as that recommended in British Standard 4142. It will also be used as a basis for selecting limiting sound levels from new plant by Local Planning Authorities when setting Planning Consent Conditions.
L_{eq}	The "equivalent continuous sound level" for the measuring period, defined as the level in dB(A) which, if held constant over the measuring period, would produce the same amount of sound energy as does the actual varying ambient sound level. It is a measure of the amount of sound energy affecting the site from sources other than new plant or operations.
L_{A10}	The sound level exceeded for 10% of the time over the sample period. Originally used as a measure of subjective reaction to traffic noise in particular, it can also be taken as an indication of the practical maximum sound level that the building envelope will have to protect against.
dB(A)	Describes measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal conditions, and a change of 10dB(A) corresponds roughly to halving or doubling the loudness of a sound.

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5. **The Site**

The site is located within the rear courtyard of 120 Holborn, London EC1. The area is a mixture of Residential and Commercial premises. The survey was carried out within the proposed plant location.

The nearest residential façade would be at a distance of approximately 45 metres from the proposed plant location.

The nearest office façade would be at a distance of approximately 3 metres from the proposed plant location.

We would assess that the dominant sound source within the area would be the existing plant which is within an Acoustic Louvred Housing as well as transportation noise from the surrounding area.

6. **Measurement Methodology**

A CEL593 (precision) Environmental Sound Level Analyser, fitted with a CEL Electret Microphone was located to the side of the property in area following demolition of existing structures.

The Survey commenced at approximately 09:25 hours on Tuesday 29th March 2016 until approximately 08:00 hours on Wednesday 30th March 2016.

The Analyser was checked for calibration before readings commenced and at the end of the measurement period using a CEL 284/2 Class 1 calibrator. There was no measurable deviation on the Analyser.

The weather was mostly dry and cold throughout the measuring period with some short rain showers.

The weather in our opinion did not have a detrimental effect on the readings obtained.

7. **Planning noise requirements.**

The Planning noise requirement for the London Borough of Camden states, that any proposed plant should be at least 10dBA below the Background Sound level (L_{A90}) measured at 1 metre from the nearest effected residential property. Allowance should also be made for any tonal noise emanating from the proposed units.

London Borough of Camden Council's policies relating to noise from new mechanical services equipment are contained within the Council's Local Development Framework; Policy DP28.

In Summary, London Borough of Camden's noise conditions are:

Noise level from plant and machinery at which planning permission will not be granted:

Noise at 1m external to a sensitive façade	5dBA < LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1m external to a sensitive façade	10dBA < LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1m external to a sensitive façade	10dBA < LA90
Noise at 1m external to sensitive façade where LA90 > 60dB	55dB LAeq

Table 1: London Borough of Camden Council noise related planning conditions

Each of the above is applicable over a period of 60 minutes and measured at 1m external to noise-sensitive facades (typically nearest residential windows).

8. Assessment

The Environmental Sound Level Analyser was located at a height of 1.5 metres above the ground level to the rear of the property to pick up the existing ambient noise and the background noise.

The values of L_{A90} measured on site are therefore assumed to be representative of the background levels at the façade of other nearby properties.

The objective of any specification limiting new noises should therefore be to ensure that sound emission from the new building services plant and any other new sources in particular should not materially add to the existing ambient sound climate.

As to the level at which the target should be set, this is normally specified by the planning authority in their planning consent conditions. In the absence of any such specification, we would recommend setting the new plant sound limits as follows, with the proviso that any new sound producing plant must be quite free of any audibly evident tonal or similar characteristics.

The target limits should be achieved with all plant operating normally, any plant exhibiting characteristics which are tonal or intermittent in nature should be designed to criteria 5dB(A) more stringent. As the proposed plant is likely to be intermittent in nature we have set targets of 10dB(A) lower than the measured background.

The lowest measured Background Sound Levels $L_{A90\text{-}15min}$ were as follows:

$L_{A90\text{-}15min}$ 48dB(A) between 07:00 hours to 19:00 hours (Day Time)
$L_{A90\text{-}15min}$ 46dB(A) between 19:00 hours to 23:00 hours (Evening)
$L_{A90\text{-}15min}$ 45dB(A) between 23:00 hours to 07:00 hours (Night Time)

The combined sound level of all new plant when measured at 1 metre from the nearest residential sound sensitive window should therefore not exceed:

$L_{A90-15min}$ 38dB(A) between 07:00 hours to 19:00 hours (Day Time)
$L_{A90-15min}$ 36dB(A) between 19:00 hours to 23:00 hours (Evening)
$L_{A90-15min}$ 35dB(A) between 23:00 hours to 07:00 hours (Night Time)

We also need to consider the commercial windows and also the noise to the courtyard itself.

In general terms a level of 55dBA is usually accepted at 1 metre outside a commercial window and this would then be the most stringent requirement.

We have been informed that it is proposed to install the following condensing units within the courtyard plant space;

2nd Floor Open Plan Area	– 1 number Mitsubishi PURY-P350YLM-A1
Exhibition/Collaboration Space	– 1 number Mitsubishi PURY-P400YLM-A1
2nd Floor Patch Room	– 2 number Mitsubishi PUHZ-SHW112VHA
Comms. Rooms	– 3 number Denco DCRA 32-EC

We have detailed below our Calculation Sheets for the predicted noise to both the nearest Residential façade and the nearest Commercial façade.

We have therefore proposed within our calculations that the Condensing Units are contained within an Acoustic Louvre Housing as this will then provide the required acoustic reduction.

In our opinion all of the above would generally be acceptable to the local authority for this area, but all design targets should as a matter of course should be verified with the local Environmental Health or Planning Departments.

Report carried out for and on behalf of Conabeare Acoustics Limited by,

Stuart Metcalfe

Stuart Metcalfe MIOA

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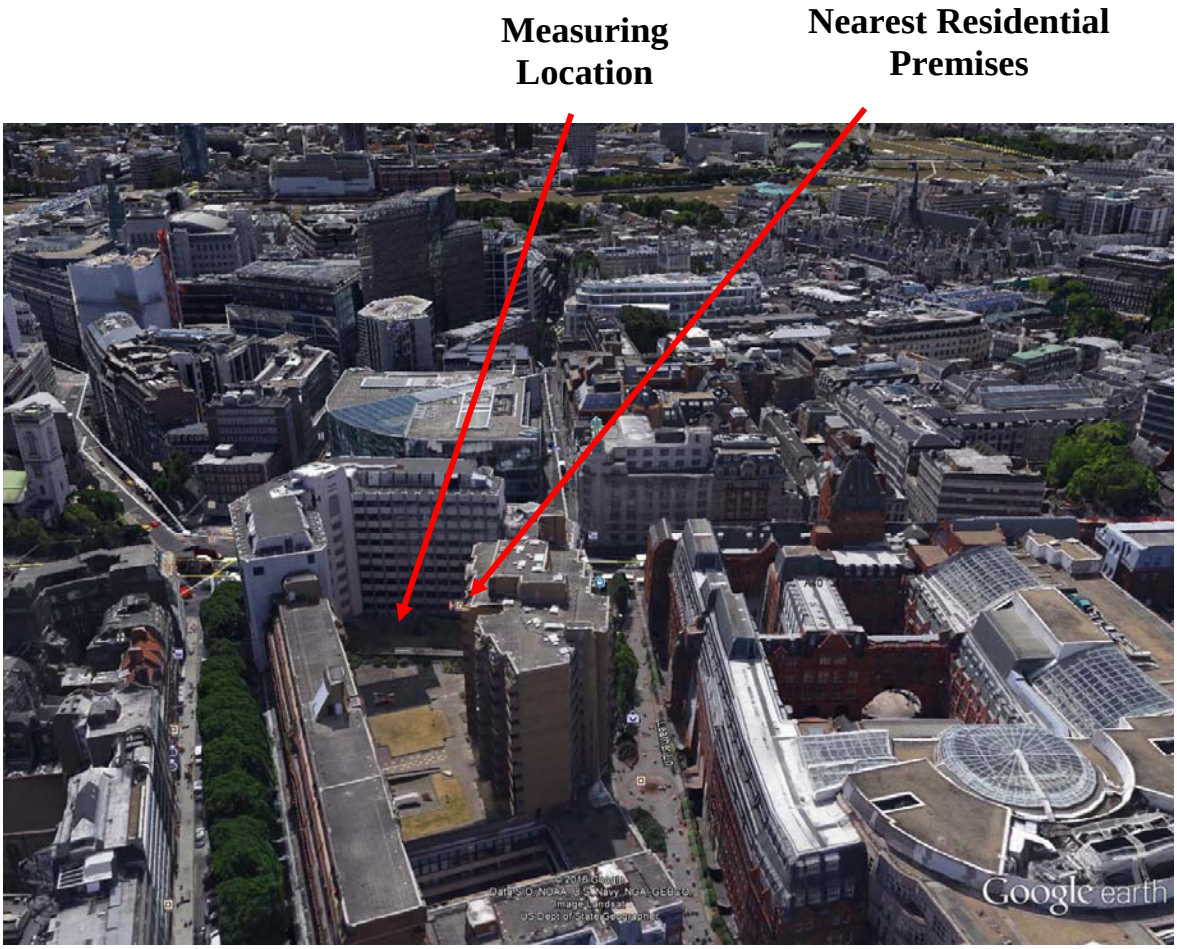
9. Measuring Location



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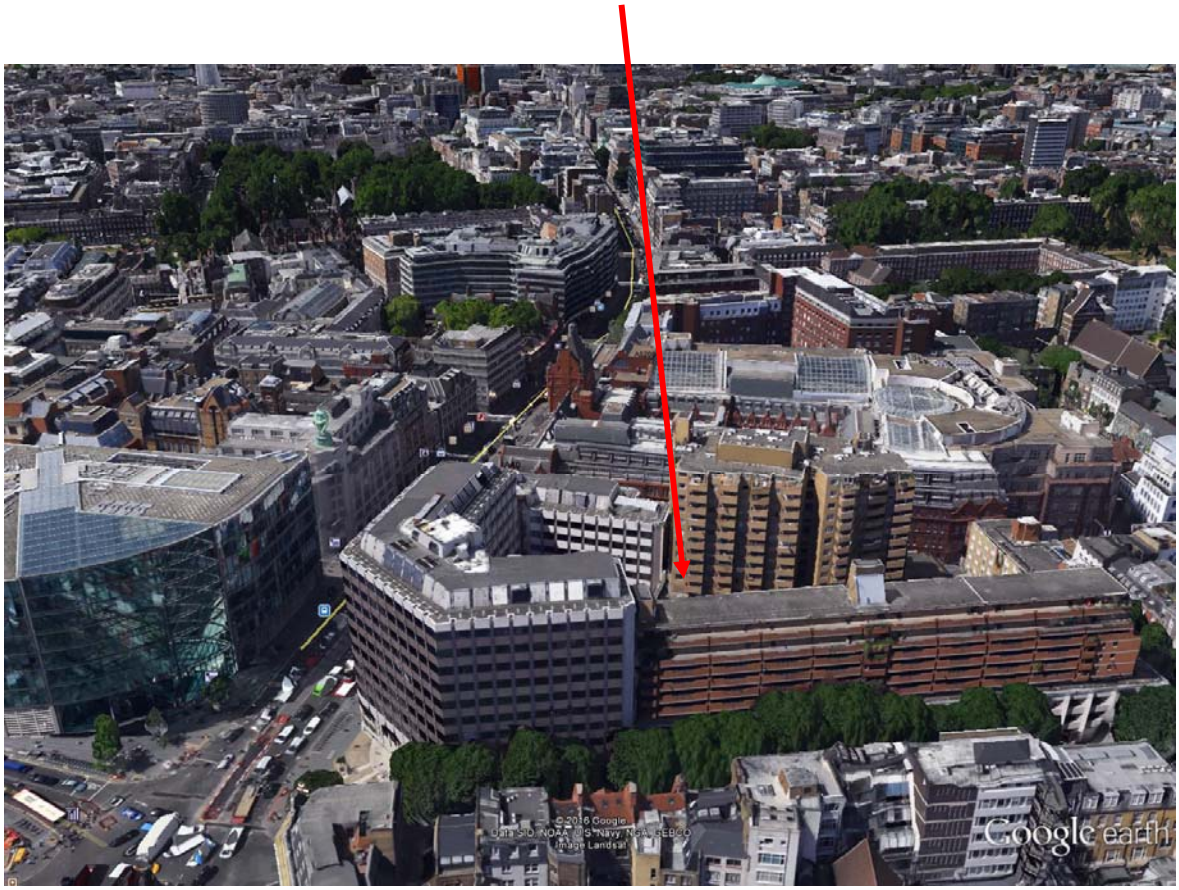
Nearest residential premises.



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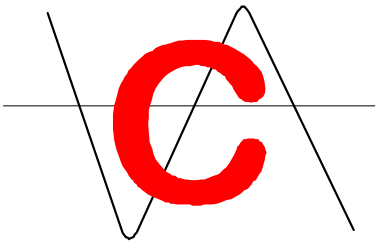
CS7777 - Trainline, Levels 2 & 3, 120 Holborn, London EC1

- Period result profile -

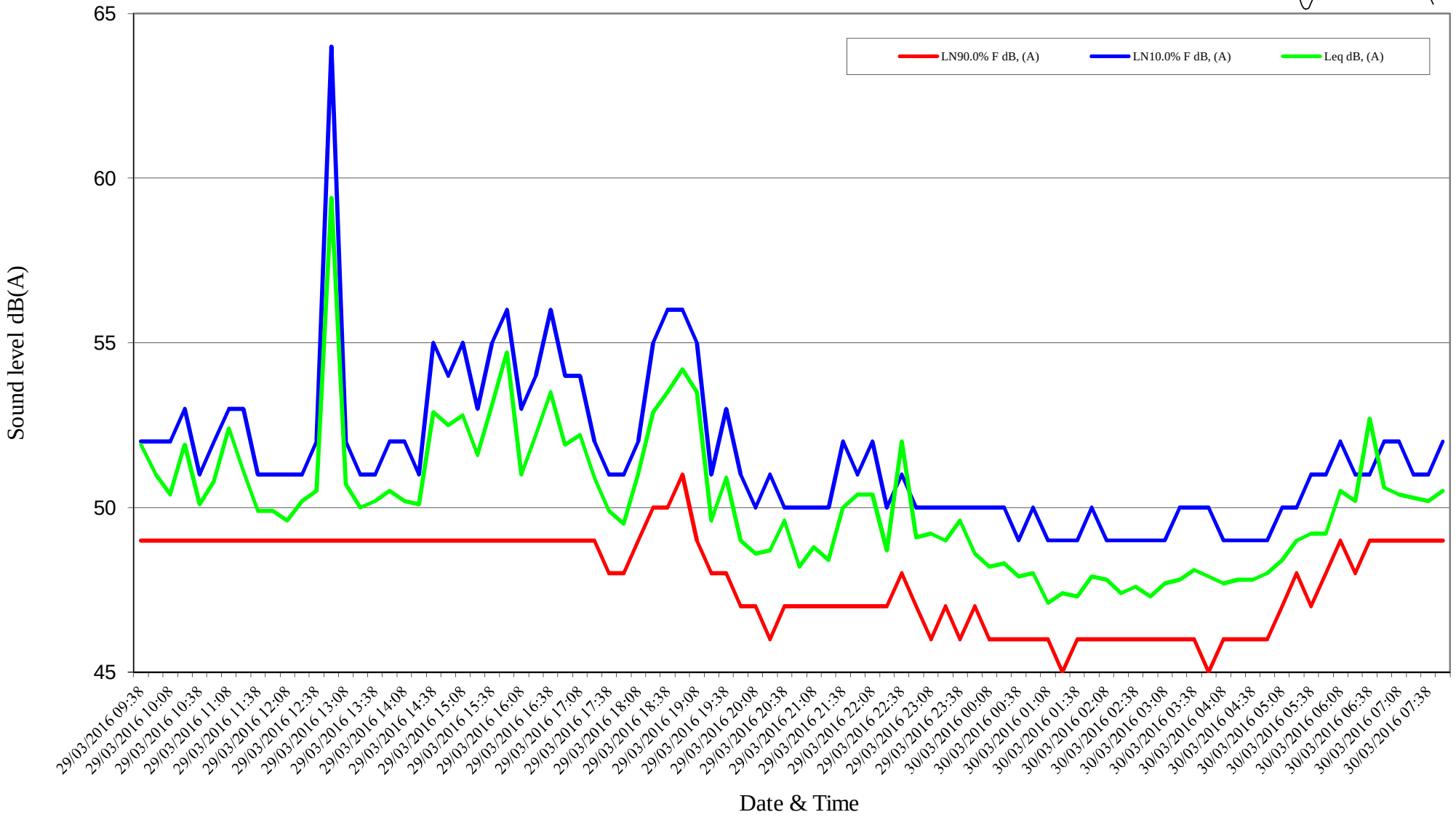


Overload occurred	No
Low battery occurred	No
Pause was used	No
Frequency weighting	A
Band	Broadband
Period time	15 min
Periods too short for LNs	No
First period listed	1 : 90

Period number	Flags	Date and Time	LN90.0% F	LN10.0% F	Leq
	OBPZ		dB, (A)	dB, (A)	dB, (A)
1	----	29/03/2016 09:38	49	52	51.9
2	----	29/03/2016 09:53	49	52	51
3	----	29/03/2016 10:08	49	52	50.4
4	----	29/03/2016 10:23	49	53	51.9
5	----	29/03/2016 10:38	49	51	50.1
6	----	29/03/2016 10:53	49	52	50.8
7	----	29/03/2016 11:08	49	53	52.4
8	----	29/03/2016 11:23	49	53	51.1
9	----	29/03/2016 11:38	49	51	49.9
10	----	29/03/2016 11:53	49	51	49.9
11	----	29/03/2016 12:08	49	51	49.6
12	----	29/03/2016 12:23	49	51	50.2
13	----	29/03/2016 12:38	49	52	50.5
14	----	29/03/2016 12:53	49	64	59.4
15	----	29/03/2016 13:08	49	52	50.7
16	----	29/03/2016 13:23	49	51	50
17	----	29/03/2016 13:38	49	51	50.2
18	----	29/03/2016 13:53	49	52	50.5
19	----	29/03/2016 14:08	49	52	50.2
20	----	29/03/2016 14:23	49	51	50.1
21	----	29/03/2016 14:38	49	55	52.9
22	----	29/03/2016 14:53	49	54	52.5
23	----	29/03/2016 15:08	49	55	52.8
24	----	29/03/2016 15:23	49	53	51.6
25	----	29/03/2016 15:38	49	55	53.1
26	----	29/03/2016 15:53	49	56	54.7
27	----	29/03/2016 16:08	49	53	51
28	----	29/03/2016 16:23	49	54	52.2
29	----	29/03/2016 16:38	49	56	53.5
30	----	29/03/2016 16:53	49	54	51.9
31	----	29/03/2016 17:08	49	54	52.2
32	----	29/03/2016 17:23	49	52	50.9
33	----	29/03/2016 17:38	48	51	49.9
34	----	29/03/2016 17:53	48	51	49.5
35	----	29/03/2016 18:08	49	52	51
36	----	29/03/2016 18:23	50	55	52.9
37	----	29/03/2016 18:38	50	56	53.5
38	----	29/03/2016 18:53	51	56	54.2
39	----	29/03/2016 19:08	49	55	53.5
40	----	29/03/2016 19:23	48	51	49.6
41	----	29/03/2016 19:38	48	53	50.9
42	----	29/03/2016 19:53	47	51	49
43	----	29/03/2016 20:08	47	50	48.6
44	----	29/03/2016 20:23	46	51	48.7
45	----	29/03/2016 20:38	47	50	49.6
46	----	29/03/2016 20:53	47	50	48.2

Period number	Flags	Date and Time	LN90.0% F	LN10.0% F	Leq
	OBPZ		dB, (A)	dB, (A)	dB, (A)
47	----	29/03/2016 21:08	47	50	48.8
48	----	29/03/2016 21:23	47	50	48.4
49	----	29/03/2016 21:38	47	52	50
50	----	29/03/2016 21:53	47	51	50.4
51	----	29/03/2016 22:08	47	52	50.4
52	----	29/03/2016 22:23	47	50	48.7
53	----	29/03/2016 22:38	48	51	52
54	----	29/03/2016 22:53	47	50	49.1
55	----	29/03/2016 23:08	46	50	49.2
56	----	29/03/2016 23:23	47	50	49
57	----	29/03/2016 23:38	46	50	49.6
58	----	29/03/2016 23:53	47	50	48.6
59	----	30/03/2016 00:08	46	50	48.2
60	----	30/03/2016 00:23	46	50	48.3
61	----	30/03/2016 00:38	46	49	47.9
62	----	30/03/2016 00:53	46	50	48
63	----	30/03/2016 01:08	46	49	47.1
64	----	30/03/2016 01:23	45	49	47.4
65	----	30/03/2016 01:38	46	49	47.3
66	----	30/03/2016 01:53	46	50	47.9
67	----	30/03/2016 02:08	46	49	47.8
68	----	30/03/2016 02:23	46	49	47.4
69	----	30/03/2016 02:38	46	49	47.6
70	----	30/03/2016 02:53	46	49	47.3
71	----	30/03/2016 03:08	46	49	47.7
72	----	30/03/2016 03:23	46	50	47.8
73	----	30/03/2016 03:38	46	50	48.1
74	----	30/03/2016 03:53	45	50	47.9
75	----	30/03/2016 04:08	46	49	47.7
76	----	30/03/2016 04:23	46	49	47.8
77	----	30/03/2016 04:38	46	49	47.8
78	----	30/03/2016 04:53	46	49	48
79	----	30/03/2016 05:08	47	50	48.4
80	----	30/03/2016 05:23	48	50	49
81	----	30/03/2016 05:38	47	51	49.2
82	----	30/03/2016 05:53	48	51	49.2
83	----	30/03/2016 06:08	49	52	50.5
84	----	30/03/2016 06:23	48	51	50.2
85	----	30/03/2016 06:38	49	51	52.7
86	----	30/03/2016 06:53	49	52	50.6
87	----	30/03/2016 07:08	49	52	50.4
88	----	30/03/2016 07:23	49	51	50.3
89	----	30/03/2016 07:38	49	51	50.2
90	----	30/03/2016 07:53	49	52	50.5

CS7777 - Trainline, Levels 2 & 3, 120 Holborn, London EC1



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Project: CS7777 - Trainline, 120 Holborn, London
Client : AMD Environmental Limited
Revision: Original
Date : 31st March 2016

Calculation to Nearest Residential Façade - Calculation 01

Item	System			63	125	250	500	1k	2k	4k	8k	dBA
	2nd Floor Open Plan Area											
	Unit Lp - Mitsubishi PURY-P350YLM-A1 at 1 metre			74	69	65	62	56	48	43	38	**63**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Distance Loss	45	m	-34	-34	-34	-34	-34	-34	-34	-34	
	Façade Effect			3	3	3	3	3	3	3	3	
1	**Lp at Listener**			**46**	**41**	**37**	**34**	**28**	**20**	**15**	**10**	**35**
	Exhibition/Collaboration Space											
	Unit Lp - Mitsubishi PURY-P400YLM-A1 at 1 metre			74	69	65	62	56	48	43	38	**63**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Distance Loss	45	m	-34	-34	-34	-34	-34	-34	-34	-34	
	Façade Effect			3	3	3	3	3	3	3	3	
2	**Lp at Listener**			**46**	**41**	**37**	**34**	**28**	**20**	**15**	**10**	**35**
	2nd Floor Patch Room											
	Unit Lp - Mitsubishi PUHZ-SHW112VHA at 1 metre			57	57	52	49	48	43	38	33	**52**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Units	1		3	3	3	3	3	3	3	3	
	Additional Distance Loss	45	m	-34	-34	-34	-34	-34	-34	-34	-34	
	Façade Effect			3	3	3	3	3	3	3	3	
3	**Lp at Listener**			**32**	**32**	**27**	**24**	**23**	**18**	**13**	**8**	**27**
	Comms. Room											
	Unit Lw - Denco DCRA 32-EC			68	73	69	66	69	67	59	53	**73**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Units	2		5	5	5	5	5	5	5	5	
	Distance Loss	45	m	-45	-45	-45	-45	-45	-45	-45	-45	
	Façade Effect			3	3	3	3	3	3	3	3	
4	**Lp at Listener**			**34**	**39**	**35**	**32**	**35**	**33**	**25**	**19**	**39**
	Combined Level - Item 1 to 4			**49**	**45**	**41**	**38**	**37**	**34**	**26**	**20**	**42**

Target Level 38dBA

	63	125	250	500	1k	2k	4k	8k	dBA
Mitigating Measures									
Type WSD300 Acoustic Louvre Sound Reduction Index	-5	-5	-7	-12	-16	-19	-15	-15	
Resultant Noise Level At 1 metre from Noise Sensitive Façade	**44**	**40**	**34**	**26**	**21**	**15**	**11**	**5**	**30**

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Project: CS7777 - Trainline, 120 Holborn, London
Client : AMD Environmental Limited
Revision: Original
Date : 31st March 2016

Calculation to Nearest Commercial Façade - Calculation 02

Item	System			63	125	250	500	1k	2k	4k	8k	dBA
	2nd Floor Open Plan Area											
	Unit Lp - Mitsubishi PURY-P350YLM-A1 at 1 metre			74	69	65	62	56	48	43	38	**63**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Distance Loss	2	m	-7	-7	-7	-7	-7	-7	-7	-7	
	Façade Effect			3	3	3	3	3	3	3	3	
	Line of Sight Screen			-2	-2	-2	-2	-2	-2	-2	-2	
1	**Lp at Listener**			**71**	**66**	**62**	**59**	**53**	**45**	**40**	**35**	**60**
	Exhibition/Collaboration Space			**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
	Unit Lp - Mitsubishi PURY-P400YLM-A1 at 1 metre			74	69	65	62	56	48	43	38	**63**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Distance Loss	2	m	-7	-7	-7	-7	-7	-7	-7	-7	
	Façade Effect			3	3	3	3	3	3	3	3	
	Line of Sight Screen			-2	-2	-2	-2	-2	-2	-2	-2	
2	**Lp at Listener**			**71**	**66**	**62**	**59**	**53**	**45**	**40**	**35**	**60**
	2nd Floor Patch Room			**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
	Unit Lp - Mitsubishi PUHZ-SHW112VHA at 1 metre			57	57	52	49	48	43	38	33	**52**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Units	1		3	3	3	3	3	3	3	3	
	Additional Distance Loss	2	m	-7	-7	-7	-7	-7	-7	-7	-7	
	Façade Effect			3	3	3	3	3	3	3	3	
	Line of Sight Screen			-2	-2	-2	-2	-2	-2	-2	-2	
3	**Lp at Listener**			**57**	**57**	**52**	**49**	**48**	**43**	**38**	**33**	**52**
	Comms. Room			**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
	Unit Lw - Denco DCRA 32-EC			68	73	69	66	69	67	59	53	**73**
	Additional Surfaces	1		3	3	3	3	3	3	3	3	
	Additional Units	2		5	5	5	5	5	5	5	5	
	Distance Loss	2	m	-18	-18	-18	-18	-18	-18	-18	-18	
	Façade Effect			3	3	3	3	3	3	3	3	
	Line of Sight Screen			-2	-2	-2	-2	-2	-2	-2	-2	
4	**Lp at Listener**			**59**	**64**	**60**	**57**	**60**	**58**	**50**	**44**	**64**
	Combined Level - Item 1 to 4			**74**	**70**	**66**	**63**	**62**	**59**	**51**	**45**	**67**

Target Level 55dBA

	Mitigating Measures	63	125	250	500	1k	2k	4k	8k	dBA
	Type WSD300 Acoustic Louvre Sound Reduction Index	-5	-5	-7	-12	-16	-19	-15	-15	
	Resultant Noise Level At 1 metre from Noise Sensitive Façade	**69**	**65**	**59**	**51**	**46**	**40**	**36**	**30**	**55**