CONABEARE ACOUSTICS

ACOUSTIC REPORT

Ref. No. CS 7055

New York University
4 to 6 Bedford Square
London

6th July 2011

Prepared By:

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John E Redknap MBA, MIOA, MCMI

Checked By:

.....

James E Slade

Client: **Callisia Limited**
443 Stroude Road
Virginia Water
Surrey
GU25 4BU

Conabeare Acoustics Limited
10 Chiltern Enterprise Centre, Station Road, Theale, Berkshire. RG7 4AA
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FORWARD

As part of the refurbishment of the premises new air conditioning equipment is to be located on the roof of the premises. An acoustic survey and report is therefore required to establish compliance or otherwise with the planning requirements of the local council for this area.

Conabeare Acoustics Limited has been commissioned to undertake an Environmental Sound Survey at the roof level of the premises. The results of the survey will establish the Background Sound Level to enable checks to be made on the mechanical services plant in order that they comply with planning requirements.

SUMMARY

The lowest measured Background Sound Levels $L_{A90.15MIN}$ were as follows:

$L_{A90.15MIN}$	49.4dB(A) between 07:00 hours to 19:00 hours (Day Time)
$L_{A90.15MIN}$	48.3dB(A) between 19:00 hours to 00:00 hours (Evening)
$L_{A90.15MIN}$	46.3dB(A) between 00:00 hours to 07:00 hours (Night Time)

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1. Author

John E Redknap MBA, MIOA, MCMI

The author has been practising in noise control engineering since 1985. He has gained a wide range of experience over this period and is employed as a Sales Engineer for **Conabeare Acoustics Ltd.**

2. Client

The survey and report has been undertaken on behalf of:

Callisia Limited
443 Stroude Road
Virginia Water
Surrey
GU25 4BU

3. Introduction

As part of the refurbishment of the premises new air conditioning equipment is to be located on the roof of the premises. An acoustic survey and report is therefore required to establish compliance or otherwise with the planning requirements of the local council for this area.

An Environmental Sound Survey has been carried out to establish the existing Background Sound Levels. The results of the Environmental Sound Survey are used as a datum so that acoustic calculations can be undertaken to determine the likely impact of the plant on the nearest sound sensitive locations.

4. Noise Principles

The Environmental Sound Survey has been carried out in accordance with the principles of BS7445-1 (2003) to establish the existing Background Sound Levels. The Background Sound Level measured is in terms of A-weighted sound pressure level L_{A90} with a time interval of 15 minutes.

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5. The Site

The property is located at 4 to 6 Bedford Square, an area of mixed commercial and residential properties. The new mechanical services plant is to be located on the roof, with two options as to its proposed location. The general ambient noise level is expected to consist primarily of local traffic noise traveling along Bedford Square.

6. Measurement Methodology

A SVAN 949 (Precision) Environmental Sound Level Analyser, fitted with an Electret Microphone, was set up on the roof of number 4 Bedford Square, with the microphone positioned as illustrated on the attached location plan.

The survey was carried out from 08:59 hours on Tuesday 14th September 2010, up until 09:29 hours on Wednesday 15th September 2010.

The Analyser was programmed to produce the following indices:

$L_{AEQ.15MIN}$, $L_{A90.15MIN}$, $L_{A10.15MIN}$

Attached for your reference is a Glossary of these terms.

The analyser was checked for calibration before the survey commenced and at the end of survey with a CEL 284/2 Class 1 calibrator with no measurable deviation.

The weather was generally dry and warm, with partly cloudy skies.

Having reviewed the results of our survey, it is our opinion that the weather experienced over the survey period has not had any detrimental effect on the lowest recorded readings and therefore on our recommendations**.**

7. Planning Noise Requirements

The Planning noise requirement of this area usually 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.

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8. Assessment

The objective of any specification limiting sound should be to ensure that sound emissions from the proposed plant should not materially add to the existing ambient noise climate when measured 1m from the nearest effected property window.

The level at which the target should be set is normally specified by the planning authority in their planning consent conditions.

In the absence of any such specification, we would recommend setting a limit on the proposed plant sound level as follows, with the proviso that any sound produced by this plant must be quite free of any audibly evident, tonality or similar characteristics.

The lowest measured Background Sound Levels $L_{A90.15MIN}$ were as follows:

$L_{A90.15MIN}$ 49.4dB(A) between 07:00 hours to 19:00 hours (Day Time)
$L_{A90.15MIN}$ 48.3dB(A) between 19:00 hours to 00:00 hours (Evening)
$L_{A90.15MIN}$ 46.3dB(A) between 00:00 hours to 07:00 hours (Night Time)

The current design policy of council planners is that noise produced by mechanical plant should be at least 10dB(A) below the background sound level at the nearest sound sensitive window. The combined sound level of all new plant when measured at the closest residential window should therefore not exceed:

$L_{A90.15MIN}$ 39dB(A) between 07:00 hours to 19:00 hours (Day Time)
$L_{A90.15MIN}$ 38dB(A) between 19:00 hours to 00:00 hours (Evening)
$L_{A90.15MIN}$ 36dB(A) between 00:00 hours to 07:00 hours (Night Time)

The above 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 than those levels shown above. Allowances should also be made for the additional effect of multiple noise sources. From the frequency analysis the plant does not exhibit any distinct tonal characteristics and so the additional 5dB(A) penalty is not required.

For the purposes of this report we have assumed the proposed plant may have the opportunity to operate 24hours a day. We would therefore recommend that the proposed equipment is designed to achieve a level of 36dB(A) at the nearest residential window.

NB. If the plant only operates 07:00 to 19:00hours then the target changes to 39dB(A)

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From the information provided to us, and following our survey, we have established the nearest sound sensitive locations as follows:

On the roof of number 6 Bedford Square is the proposed location of the plant. The nearest sound sensitive residential windows to the proposed plant location would be those on the top floor of number 7 Bedford Square – a roof light adjacent to the boundary wall. This roof light is estimated to be at a distance of 15m away from the plant and this location is referenced as Assessment Location A.

For Assessment Location A, we have illustrated on the following calculation sheet that at 1 metre from the façade the Specific Sound Level would be 36dB(A). This figure is matches the proposed 24hour design target of 36dB(A) and should therefore meet the planning requirements of the local authority.

As previously mentioned, if the plant only operates 07:00 to 19:00hours then the design target would be 39dB(A). Should this be the case then the Specific Sound Level of 36dB(A) would clearly be 3dB(A) below this design target.

In our opinion 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.

9. Sound Level Measurements

The statistical readings obtained during the survey are attached to this report and are presented in both graphical and tabular form.

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10. Glossary of Terms

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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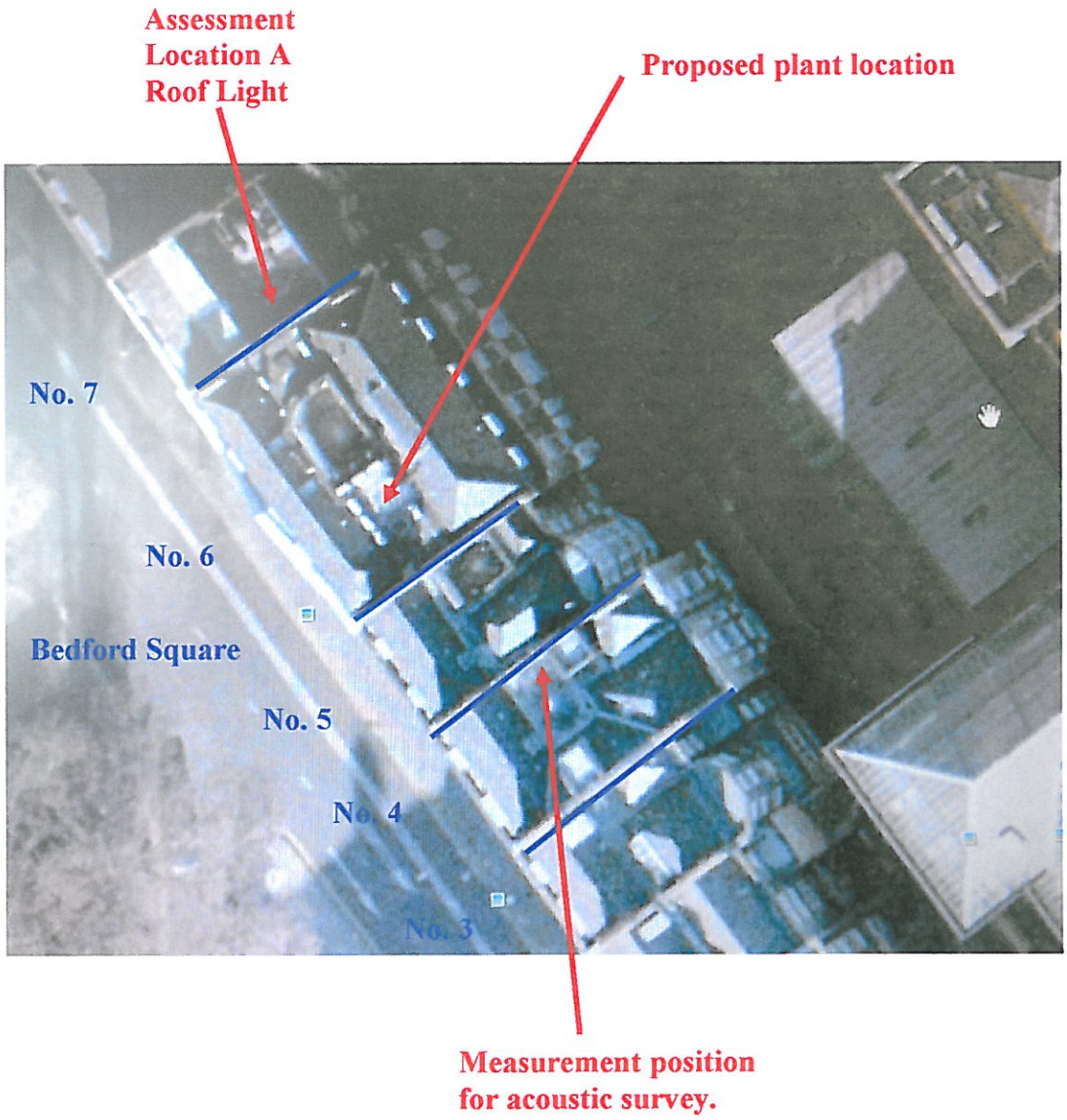
11. Location Plan



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CONABEARE ACOUSTICS LTD CALCULATION SHEET - One

CLIENT: **Callisia**		PROJECT: **6 Bedford Square, London**								
		DATE: **6th July 2011**								
Roof Top Plant Location		Conabeare Acoustics ref: **CS7055**								
Assumed to be 24hour operation		Octave Band Centre Frequency (Hz)								
Description		**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**	**dB(A)**
LOCATION 'A' ASSESSMENT										
Daikin REYQ16P8	Lp @ 1m	**67**	**64**	**63**	**60**	**59**	**54**	**46**	**43**	**63**
Three additional identical units		6	6	6	6	6	6	6	6	
Combined Total		**73**	**70**	**69**	**66**	**65**	**60**	**52**	**49**	**69**
Surface Reflections	One	3	3	3	3	3	3	3	3	
Screening via building	delta = 0.44	-9	-10	-12	-14	-17	-19	-20	-20	
Additional Distance 1to15m to nearest window		-24	-24	-24	-24	-24	-24	-24	-24	
Façade Correction		3	3	3	3	3	3	3	3	
Lp @1m from receivers façade without acoustic treatment		**46**	**42**	**39**	**34**	**30**	**23**	**14**	**11**	**36**
Acoustic treatment	None	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	
Resultant Lp @1m from receivers façade with acoustic treatment		**46**	**42**	**39**	**34**	**30**	**23**	**14**	**11**	**36**

Design Target = 36

Notes

Calculations are to the nearest top floor residential windows of the adjacent property (no. 7)
No allowance has been made for any noise/vibration transfer through floor/structure
Vibration isolation will be required for the new plant

Header information for the file[1] @CAL5558

Device type ..... SVAN 949
Serial No. 8572
Internal software version ... 5.13
File system version 5.12

Original file name ..... @CAL5558
Measurement hour ..... 08:59'10
Measurement day 14/09/10
Device function ..... OCTAVE 1/1

Title text:

Input ..... Microphone
Mic. polarization ..... 0 V
Mic. field correction ..... FREE
Mic. outdoor filter ..... ON
Compensation filter ..... OFF
Measurement range ..... 105 dB
Leq integration ..... Linear
Trig. mode ..... OFF
Start delay ..... 1 s
Integration time def. ..... 15 m
Repetition cycle ..... Infinity
Number of spectra 1
Octave 1/1 lines ..... 15+3
Octave 1/1 filter ..... Lin
Octave 1/1 in buffer ..... OFF
Number of histograms ..... 3+18
Calibration type ..... Measuremer
Calibration time ..... 08:56'13
Calibration date 14/09/10
Rotation measurement ..... OFF

Profile: #1

Weighting filter ..... A
Detector type ..... Fast
Buffer contents definition .. None
Calibration factor ..... 3.3 dB

Main_results:

File	Date	Start	Filter	Detect	Time	units	Leq (A)	L1 dB(A)	L10 dB(A)	L90 dB(A)
@CAL5558	14/09/10	08:59'10	A	Fast	00:15'00	dB	56.8	63.1	58.6	53.5
@CAL5559	14/09/10	09:14'10	A	Fast	00:15'00	dB	57.9	64.2	60.3	54.2
@CAL5560	14/09/10	09:29'10	A	Fast	00:15'00	dB	56.3	61.0	57.9	53.6
@CAL5561	14/09/10	09:44'10	A	Fast	00:15'00	dB	56.8	62.1	59.1	53.4
@CAL5562	14/09/10	09:59'10	A	Fast	00:15'00	dB	57.2	69.7	56.5	51.3
@CAL5563	14/09/10	10:14'10	A	Fast	00:15'00	dB	52.7	59.4	54.3	50.1
@CAL5564	14/09/10	10:29'10	A	Fast	00:15'00	dB	52.9	57.6	54.3	50.2
@CAL5565	14/09/10	10:44'10	A	Fast	00:15'00	dB	54.5	59.1	55.8	51.5
@CAL5566	14/09/10	10:59'10	A	Fast	00:15'00	dB	55.9	64.2	56.9	52.1
@CAL5567	14/09/10	11:14'10	A	Fast	00:15'00	dB	57.0	65.6	57.9	53.3
@CAL5568	14/09/10	11:29'10	A	Fast	00:15'00	dB	56.6	64.3	57.8	53.0
@CAL5569	14/09/10	11:44'10	A	Fast	00:15'00	dB	60.5	74.0	56.0	51.9
@CAL5570	14/09/10	11:59'10	A	Fast	00:15'00	dB	54.3	59.8	56.2	51.3
@CAL5571	14/09/10	12:14'10	A	Fast	00:15'00	dB	55.0	61.1	56.4	52.1
@CAL5572	14/09/10	12:29'10	A	Fast	00:15'00	dB	57.7	68.4	58.7	52.6
@CAL5573	14/09/10	12:44'10	A	Fast	00:15'00	dB	55.4	59.8	57.2	52.5
@CAL5574	14/09/10	12:59'10	A	Fast	00:15'00	dB	54.6	61.8	55.9	51.9
@CAL5575	14/09/10	13:14'10	A	Fast	00:15'00	dB	53.7	57.3	55.0	51.6
@CAL5576	14/09/10	13:29'10	A	Fast	00:15'00	dB	55.1	63.1	56.5	51.8
@CAL5577	14/09/10	13:44'10	A	Fast	00:15'00	dB	56.4	66.8	57.7	51.8
@CAL5578	14/09/10	13:59'10	A	Fast	00:15'00	dB	54.2	60.0	55.6	51.7
@CAL5579	14/09/10	14:14'10	A	Fast	00:15'00	dB	57.6	70.7	55.5	51.0
@CAL5580	14/09/10	14:29'10	A	Fast	00:15'00	dB	60.3	71.4	59.7	51.9
@CAL5581	14/09/10	14:44'10	A	Fast	00:15'00	dB	62.0	71.7	68.1	52.3
@CAL5582	14/09/10	14:59'10	A	Fast	00:15'00	dB	55.6	66.0	56.7	51.9
@CAL5583	14/09/10	15:14'10	A	Fast	00:15'00	dB	57.4	70.6	56.8	52.0
@CAL5584	14/09/10	15:29'10	A	Fast	00:15'00	dB	60.7	72.9	57.6	52.1
@CAL5585	14/09/10	15:44'10	A	Fast	00:15'00	dB	59.6	72.7	56.2	51.8

Main_results:										
File	Date	Start	Filter	Detect	Time	units	Leq (A)	L1 dB(A)	L10 dB(A)	L90 dB(A)
@CAL5586	14/09/10	15:59'10	A	Fast	00:15'00	dB	60.4	72.7	56.2	52.4
@CAL5587	14/09/10	16:14'10	A	Fast	00:15'00	dB	56.0	64.5	57.4	51.8
@CAL5588	14/09/10	16:29'10	A	Fast	00:15'00	dB	53.2	57.7	54.6	51.3
@CAL5589	14/09/10	16:44'10	A	Fast	00:15'00	dB	53.3	57.1	54.9	51.2
@CAL5590	14/09/10	16:59'10	A	Fast	00:15'00	dB	53.4	56.9	54.8	51.4
@CAL5591	14/09/10	17:14'10	A	Fast	00:15'00	dB	53.0	57.5	54.7	51.0
@CAL5592	14/09/10	17:29'10	A	Fast	00:15'00	dB	53.0	56.8	54.7	50.8
@CAL5593	14/09/10	17:44'10	A	Fast	00:15'00	dB	53.0	56.9	54.6	50.8
@CAL5594	14/09/10	17:59'10	A	Fast	00:15'00	dB	53.0	57.0	54.7	50.8
@CAL5595	14/09/10	18:14'10	A	Fast	00:15'00	dB	53.2	58.1	55.1	50.8
@CAL5596	14/09/10	18:29'10	A	Fast	00:15'00	dB	52.3	55.7	53.9	50.3
@CAL5597	14/09/10	18:44'10	A	Fast	00:15'00	dB	52.6	55.7	54.0	50.5
@CAL5598	14/09/10	18:59'10	A	Fast	00:15'00	dB	52.7	56.7	53.9	50.3
@CAL5599	14/09/10	19:14'10	A	Fast	00:15'00	dB	52.4	55.7	54.2	50.2
@CAL5600	14/09/10	19:29'10	A	Fast	00:15'00	dB	55.7	60.9	57.7	52.6
@CAL5601	14/09/10	19:44'10	A	Fast	00:15'00	dB	52.6	55.9	54.5	50.0
@CAL5602	14/09/10	19:59'10	A	Fast	00:15'00	dB	54.5	62.0	55.8	50.6
@CAL5603	14/09/10	20:14'10	A	Fast	00:15'00	dB	52.8	56.9	55.0	50.2
@CAL5604	14/09/10	20:29'10	A	Fast	00:15'00	dB	52.6	58.8	54.4	50.1
@CAL5605	14/09/10	20:44'10	A	Fast	00:15'00	dB	52.1	56.8	54.1	49.7
@CAL5606	14/09/10	20:59'10	A	Fast	00:15'00	dB	51.7	55.2	53.5	49.4
@CAL5607	14/09/10	21:14'10	A	Fast	00:15'00	dB	52.4	61.3	53.6	49.2
@CAL5608	14/09/10	21:29'10	A	Fast	00:15'00	dB	52.6	58.8	54.1	49.5
@CAL5609	14/09/10	21:44'10	A	Fast	00:15'00	dB	52.0	57.1	53.8	49.5
@CAL5610	14/09/10	21:59'10	A	Fast	00:15'00	dB	51.8	56.9	53.5	49.4
@CAL5611	14/09/10	22:14'10	A	Fast	00:15'00	dB	51.6	55.8	53.6	49.2
@CAL5612	14/09/10	22:29'10	A	Fast	00:15'00	dB	51.4	55.9	53.3	49.1
@CAL5613	14/09/10	22:44'10	A	Fast	00:15'00	dB	55.2	67.4	54.5	49.2
@CAL5614	14/09/10	22:59'08	A	Fast	00:15'00	dB	51.6	55.6	53.4	49.3
@CAL5615	14/09/10	23:14'10	A	Fast	00:15'00	dB	51.8	56.8	54.0	49.1
@CAL5616	14/09/10	23:29'10	A	Fast	00:15'00	dB	51.0	54.9	52.9	48.9
@CAL5617	14/09/10	23:44'10	A	Fast	00:15'00	dB	51.1	54.8	52.9	49.1
@CAL5618	14/09/10	23:59'10	A	Fast	00:15'00	dB	50.6	54.5	52.4	48.3
@CAL5619	15/09/10	00:14'10	A	Fast	00:15'00	dB	49.9	53.8	51.7	47.7
@CAL5620	15/09/10	00:29'08	A	Fast	00:15'00	dB	49.7	53.8	51.6	47.5
@CAL5621	15/09/10	00:44'08	A	Fast	00:15'00	dB	49.6	54.0	51.5	47.3
@CAL5622	15/09/10	00:59'08	A	Fast	00:15'00	dB	49.6	54.2	51.5	47.4
@CAL5623	15/09/10	01:14'08	A	Fast	00:15'00	dB	49.3	54.2	50.9	47.2
@CAL5624	15/09/10	01:29'08	A	Fast	00:15'00	dB	49.1	53.5	50.8	47.1
@CAL5625	15/09/10	01:44'10	A	Fast	00:15'00	dB	49.1	53.5	50.9	47.1
@CAL5626	15/09/10	01:59'08	A	Fast	00:15'00	dB	48.9	52.9	50.8	47.0
@CAL5627	15/09/10	02:14'08	A	Fast	00:15'00	dB	48.8	52.6	50.8	46.8
@CAL5628	15/09/10	02:29'08	A	Fast	00:15'00	dB	49.6	55.2	51.6	47.2
@CAL5629	15/09/10	02:44'08	A	Fast	00:15'00	dB	48.8	53.7	50.6	46.8
@CAL5630	15/09/10	02:59'08	A	Fast	00:15'00	dB	48.5	52.1	50.5	46.5
@CAL5631	15/09/10	03:14'08	A	Fast	00:15'00	dB	48.4	52.3	50.2	46.4
@CAL5632	15/09/10	03:29'08	A	Fast	00:15'00	dB	48.4	53.1	50.2	46.3
@CAL5633	15/09/10	03:44'08	A	Fast	00:15'00	dB	49.2	55.5	51.2	46.8
@CAL5634	15/09/10	03:59'08	A	Fast	00:15'00	dB	48.6	54.2	50.5	46.5
@CAL5635	15/09/10	04:14'08	A	Fast	00:15'00	dB	49.3	54.3	51.1	47.1
@CAL5636	15/09/10	04:29'08	A	Fast	00:15'00	dB	49.4	54.2	51.6	47.1
@CAL5637	15/09/10	04:44'08	A	Fast	00:15'00	dB	49.4	53.4	51.4	47.2
@CAL5638	15/09/10	04:59'08	A	Fast	00:15'00	dB	49.6	54.3	51.4	47.4
@CAL5639	15/09/10	05:14'08	A	Fast	00:15'00	dB	49.4	54.1	51.2	47.2
@CAL5640	15/09/10	05:29'08	A	Fast	00:15'00	dB	50.0	55.7	51.7	47.8
@CAL5641	15/09/10	05:44'08	A	Fast	00:15'00	dB	49.6	53.9	51.7	47.5
@CAL5642	15/09/10	05:59'08	A	Fast	00:15'00	dB	51.8	61.1	52.9	48.2
@CAL5643	15/09/10	06:14'08	A	Fast	00:15'00	dB	50.7	54.4	52.6	48.6
@CAL5644	15/09/10	06:29'08	A	Fast	00:15'00	dB	51.3	55.4	53.3	49.0
@CAL5645	15/09/10	06:44'08	A	Fast	00:15'00	dB	51.3	55.2	53.4	49.0
@CAL5646	15/09/10	06:59'08	A	Fast	00:15'00	dB	51.5	56.2	53.6	49.0
@CAL5647	15/09/10	07:14'08	A	Fast	00:15'00	dB	52.3	57.4	54.4	49.4
@CAL5648	15/09/10	07:29'08	A	Fast	00:15'00	dB	54.6	58.6	54.5	50.3
@CAL5649	15/09/10	07:44'08	A	Fast	00:15'00	dB	53.6	63.8	54.8	49.5
@CAL5650	15/09/10	07:59'08	A	Fast	00:15'00	dB	52.9	58.0	54.7	50.2
@CAL5651	15/09/10	08:14'08	A	Fast	00:15'00	dB	54.1	57.8	55.6	52.0
@CAL5652	15/09/10	08:29'08	A	Fast	00:15'00	dB	53.9	58.2	55.5	51.7
@CAL5653	15/09/10	08:44'08	A	Fast	00:15'00	dB	55.1	61.9	57.1	52.1
@CAL5654	15/09/10	08:59'08	A	Fast	00:15'00	dB	56.0	65.4	56.9	52.8
@CAL5655	15/09/10	09:14'08	A	Fast	00:15'00	dB	54.7	60.0	56.0	51.9
@CAL5656	15/09/10	09:29'08	A	Fast	00:05'38	dB	57.3	62.6	56.9	52.2

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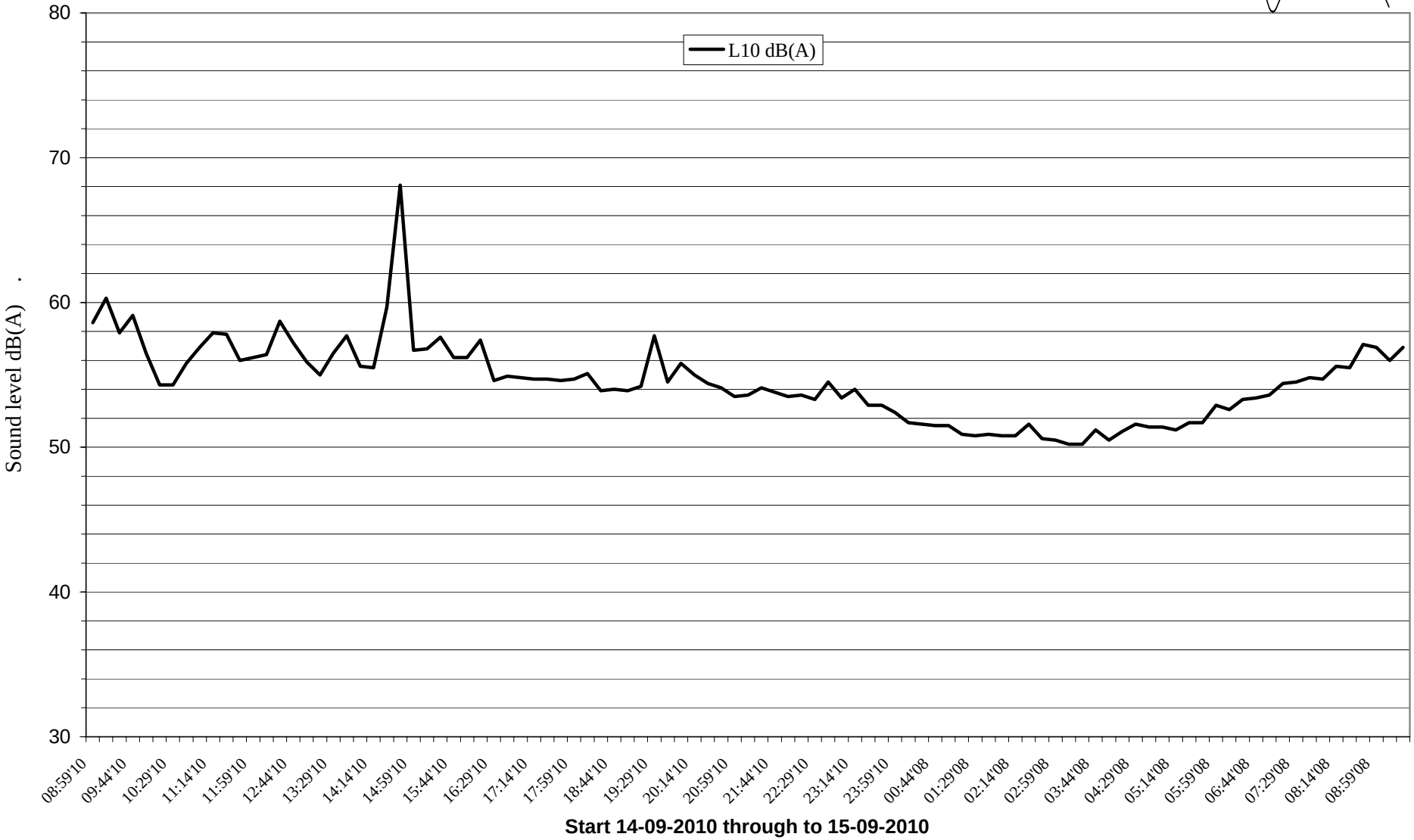

Start 14-09-2010 through to 15-09-2010

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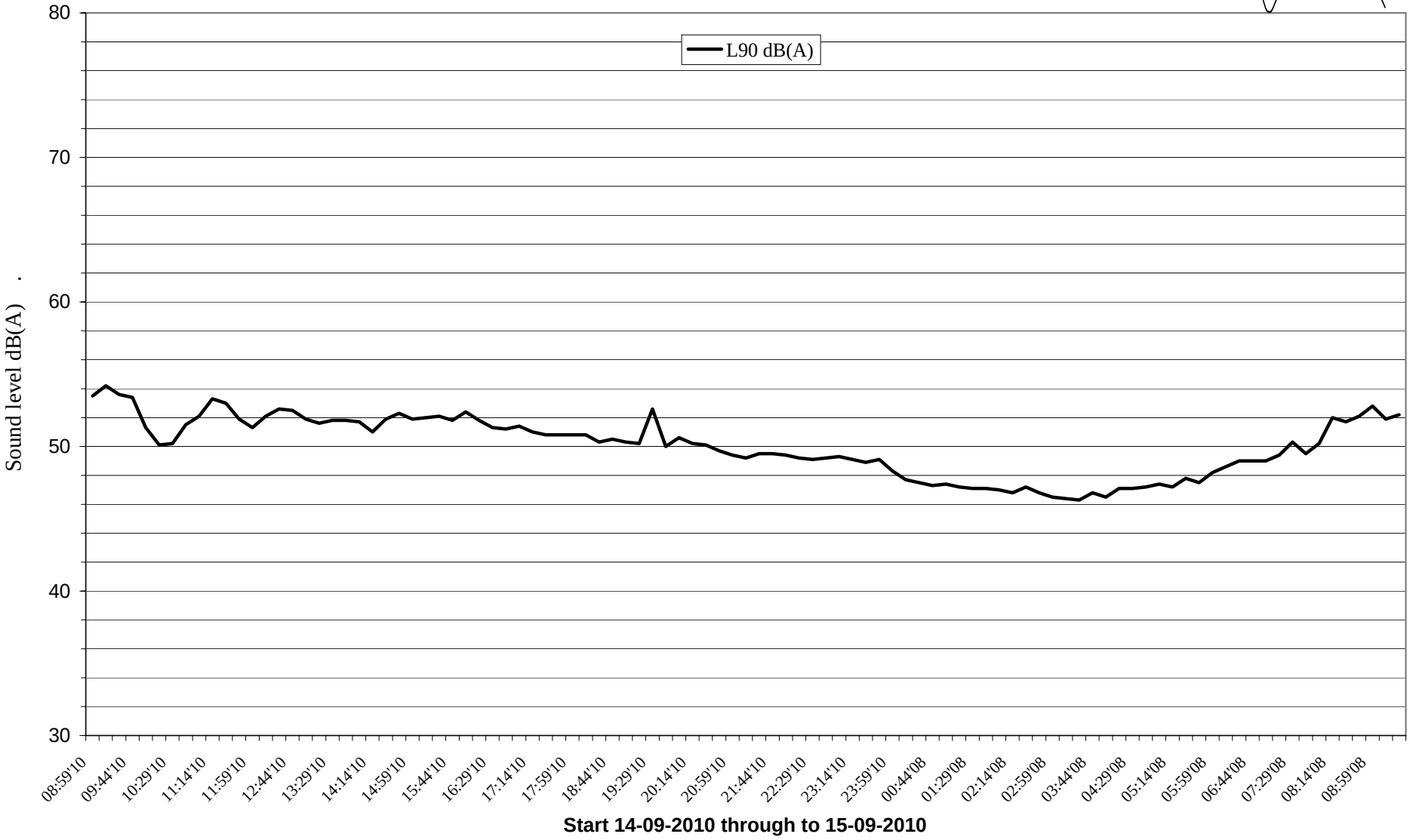
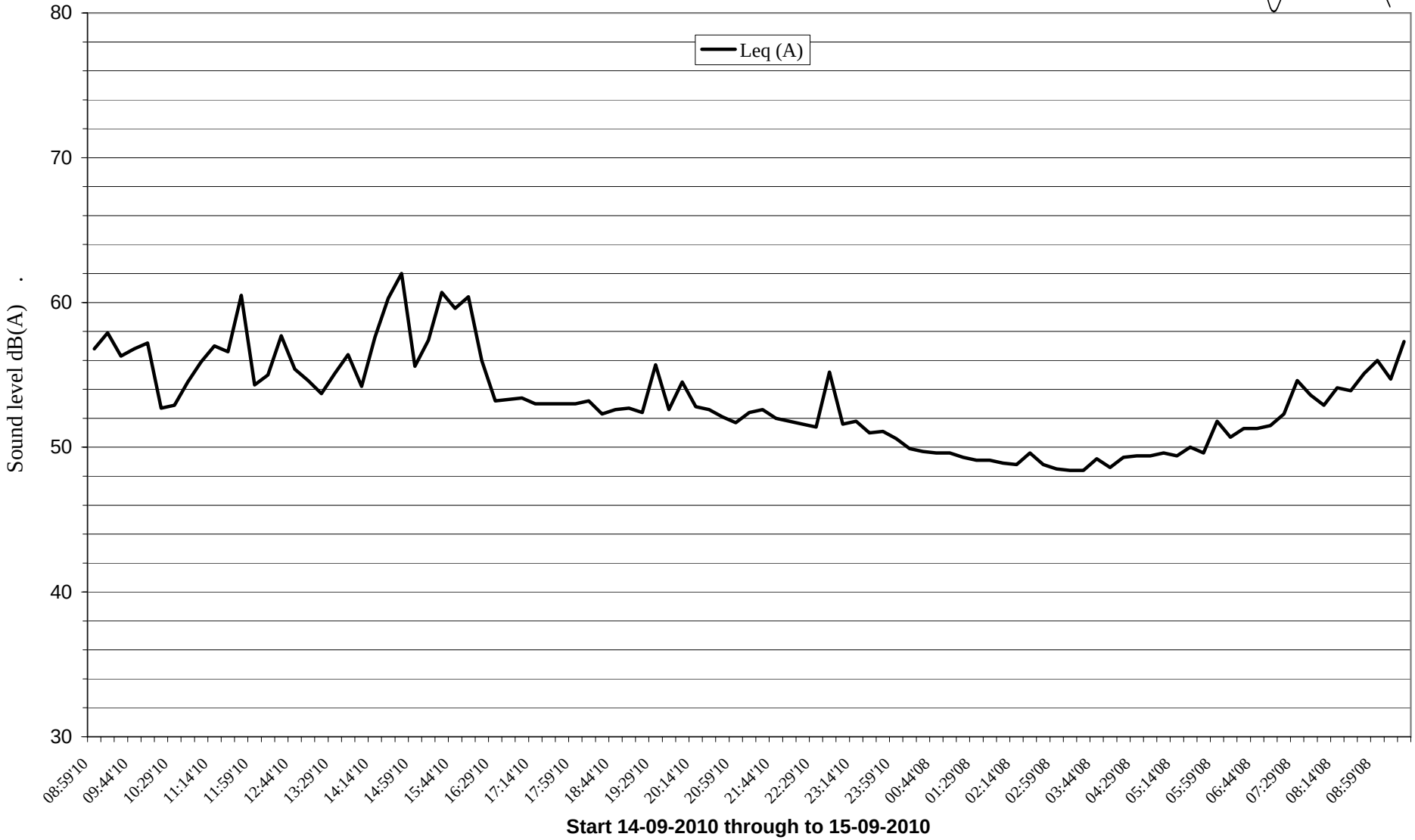
New York University, 4,5, & 6 Bedford Square, London.



Start 14-09-2010 through to 15-09-2010

Callisia Ltd

New York University, 4,5, & 6 Bedford Square, London.



Start 14-09-2010 through to 15-09-2010