76 Fitzjohn's Avenue
NW3 5LS
London

Environmental Noise Survey and Plant Noise Assessment Report

23816/PNA1Rev1

05 December 2018

For:
Carnell Warren Associates
Duke House
1-2 Duke Street
Woking
Surrey
GU21 5BA

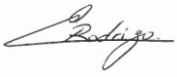
Hann Tucker Associates
Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595
Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041
(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk

Hann Tucker Associates

Environmental Noise Survey and Plant Noise Assessment Report 23816/PNA1Rev1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
0	31/10/2016	First issue	Rodrigo Espinosa-Garcia Senior Consultant MSc, BEng(Hons), AMIOA	John Gibbs Director MIOA, MSEE, CEnv
1	05/12/2018	Camden's plant noise emission criteria update to version June 2017		
			Rodrigo Espinosa-Garcia Principal Consultant MSc, BEng(Hons), AMIOA	John Gibbs Director MIOA, MSEE, CEnv

Hann Tucker Associates

Environmental Noise Survey and Plant Noise Assessment Report 23816/PNA1Rev1

Contents

Attachments

1.0 Introduction

New item of plant is proposed to be installed at 76 Fitzjohn's Avenue, London. Hann tucker Associates have therefore been commissioned to undertake an environmental noise survey to provide a basis for assessment of the environmental plant noise emissions for planning purposes.

This report presents the survey methodology and findings.

2.0 Objectives

To establish, by means of detailed 24 hour daytime and night-time fully manned automated environmental noise monitoring, the existing A-weighted (dBA) L_{90}, L_{eq} and L_{max} environmental noise levels at an accessible and secure position at the site, thought to be representative of the nearest affected property.

To present plant noise emission criteria and survey results in a report, based upon the requirements of the Local Authority.

To assess the noise emissions from the proposed plant based upon data with which we are provided, and comment upon the acceptability.

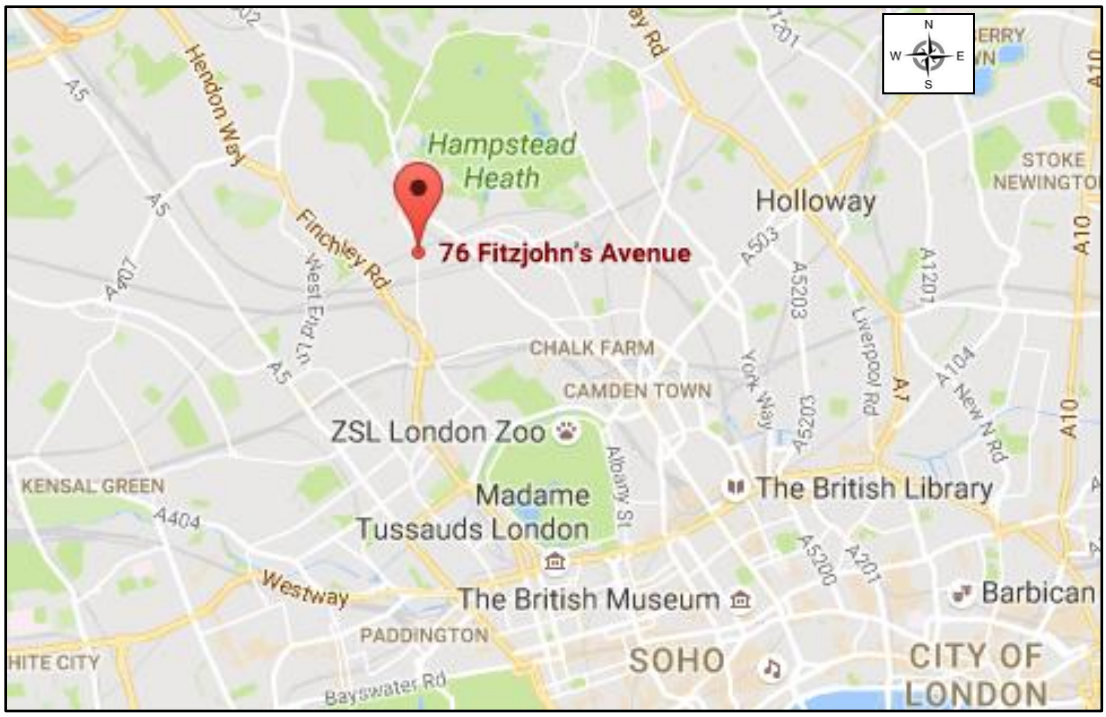
To advise on noise control measures if required to satisfy the requirements of the Local Authority.

To present our results in a Report to support the planning application as far as reasonably possible.

3.0 Site Description

3.1 Location

The site is located at 76 Fitzjohn's Avenue, London, NW3 5LS and falls within the London Borough of Camden's jurisdiction. See Location Map below.



Location Map (Map data - © 2016 Google)

3.2 Description

The site is located at 76 Fitzjohn's Avenue, London. It is a detached residential premise that comprises ground plus two storeys. The site is bounded by Fitzjohn's Avenue to the west, and to the north, south and east there are residential dwellings of similar height. See Site Plan below.

Site Plan (Imagery © 2016 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2016 Google.)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 Methodology

The survey was undertaken by Rodrigo Garcia, MSc, BEng(Hons), AMIOA.

5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 11:00 hours on 24 October 2016 until 11:00 hours on 25 October 2016.

Owing to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were calm and the sky was generally patchy cloud. We understand that generally throughout the survey period the weather conditions were consistent with this. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

5.2 Measurement Position

The noise level measurements were undertaken at a single position at ground level at the front garden of 76 Fitzjohn's Avenue. The Microphone was attached to a pole connected to the hoarding separating 76 and 74 Fitzjohn's Avenue, approximately three metres above ground level.

The position was selected in order to assess the lowest noise levels at the development site for subsequent use in setting plant noise emission criteria and is shown on the plan below.

Plan Showing Unmanned Measurement Position (Imagery © 2016 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2015 Google.)

5.3 Instrumentation

The instrumentation used during the survey is presented in the Table below:

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Precision Sound Level Meter	Larson Davis	824	3157	HT calibration on 18/07/2016
Type 1 Calibrator	Brüel and Kjær	4189	2470594	HT calibration on 18/07/2016

The sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant change was found to have occurred (no more than 0.1dB).

The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable.

The microphone was fitted with a manufacturer windshield.

6.0 Results

The results have been plotted on Time History Graph 23816/TH1 enclosed, presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

The following table presents the lowest measured L_{A90} background noise levels during the survey:

Lowest Measured L_{A90} Background Noise Level (dB re 2 x 10^{-5} Pa)	
Daytime (07:00 – 23:00) Hours	**Night-Time (23:00 – 07:00) Hours**
42dBA	33dBA

7.0 Discussion Of Noise Climate

Owing to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise source was noted to be light road traffic noise from Fitzjohn's Avenue. In addition at the beginning of the survey some light construction works were being carried out at the front garden of 76 Fitzjohn's Avenue.

8.0 Plant Noise Emission Criteria

The site lies within London Borough of Camden's jurisdiction. Their advice regarding criteria for atmospheric noise emissions from building service plant is contained within their Local Plan, version June 2017 as follows:

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

On 26 June 2016 London Borough of Camden sent us an email confirming the following windows should be considered noise sensitive, *"housing, schools, hospitals, offices, workshops"*.

On the basis of the above and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window with all plant operating simultaneously.

Plant Noise Emission Criteria (dB re $2x10^{-5}$ Pa)	
Daytime (07:00 – 23:00 hours)	**Night-time (23:00 – 07:00 hours)**
32dBA	23dBA

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

It should be noted that the above are subject to the final approval of the Local Authority.

9.0 Plant Noise Assessment

We understand that the following item of plant is to be installed at 76 Fitzjohn's Avenue:

Plant Description	Location	Qty	Plant Make	Model Number
Condenser	Front garden of 76 Fitzjohn's Avenue	1	Daikin	RXYSQ12TY1

9.1 Plant Noise Emissions

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Condenser	60	58	56	58	50	46	37	33	57

*Manufacturer's single figure noise data fitted to a typical octave band spectrum.

9.2 Location of Plant

The condenser is to be located on the ground of the front garden of 76 Fitzjohn's Avenue. The closest noise sensitive window is located approximately eleven metres away at 78 Fitzjohn's Avenue.

9.3 Plant Noise Impact Assessment

The following table presents our calculations relating to the proposed plant installation.

	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Manufacturer's single figure noise data fitted to a typical octave band spectrum	60	58	56	58	50	46	37	33	57
Distance Loss (11 metres)	-12.9	-12.9	-12.9	-12.9	-12.9	-12.9	-12.9	-12.9	-
Façade correction	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level at Window	50	48	46	48	40	36	27	23	47

We understand that the proposed unit will be operational during daytime and night-time hours. Our calculations indicate that the proposed plant exceeds criteria outlined in Section 8.0 and will therefore require attenuation in order to meet the requirements of the Local Authority.

9.4 Mitigation Measures

In order to bring the proposed installation into compliance with the proposed criterion, we would recommend installing the plant in an acoustic enclosure offering at least 24dBA attenuation. Please see our attached our Specification for Small Acoustic Enclosures and suitable suppliers (appendix B and C, respectively).

10.0 Conclusions

A detailed 24 hour daytime and night-time fully automated environmental noise survey has been undertaken in order to establish the currently environmental noise climate at the front garden of the site.

Plant noise emission criteria has been recommended based on the results of the noise survey and in conjunction with the Local Authority.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window.

The assessment indicates that the proposed plant will require attenuation in order to meet the requirements of the Local Authority at the nearest noise sensitive window.

Appendix A

The acoustic terms used in this report are defined as follows:

dB — Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

$L_{90,T}$ — L_{90} is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

$L_{eq,T}$ — $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} — L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B

76 FITZJOHN'S AVENUE

SPECIFICATION FOR

SMALL ACOUSTIC ENCLOSURES

The condensing unit shall be supplied complete with acoustic treatment which shall achieve adequate levels of attenuation to ensure that the following limiting sound pressure levels are not exceeded at 1m (free field over a reflecting plane) from the enclosure in any horizontal or vertical direction under any load conditions.

Duty/Time	A-weighted Limiting Sound Pressure Level @ 1m (dB re 2 x 10^{-5} Pa)
24 hours	33

Furthermore they shall not exhibit any significant tonal content.

Exceedances in excess of the measurement tolerance for a Type 1 sound level meter shall constitute a failure.

The enclosed outer panels shall be constructed from galvanized sheet steel having a minimum thickness of 1.6mm and fixed at 300mm (max) centres. The enclosure inner panels shall be constructed from punch-perforated (round-hole) galvanised sheet steel facing, having a minimum thickness of 0.7mm fixed at 300mm (max) centres. Flattened-expanded ("Expamet") sheet shall not be used, unless all edges of the sheet are mechanically fixed to the panel casing and galvanised steel cover strips are used to prevent rivet heads pulling through the perforated sheet (trapping the Expamet between two solid steel layers).

The inert, rot and vermin proof, non-hygroscopic and non-combustible mineral wool or glass fibre acoustic medium shall be packed to a density of not less than 48kg/$m^{3.}$ This shall be faced with a glass fibre cloth, or other approved infill protection membrane. Panels shall be constructed and assembled so that no egress of the acoustic medium will occur under the operating conditions.

Doors, access panels, windows and ventilation ducts or electrical cable penetrations hall be treated so as to maintain the specified acoustic insulation of the assembled enclosure.

Demountable sections shall be designed to allow easy disassembly and reassembly by unskilled personnel without affecting the acoustic performance.

The supplier shall ensure that the assembled enclosure is designed and constructed to withstand site operating conditions such as wind and snow loads, roof mounted plant, etc., as appropriate, and if outside, to be suitably weatherproofed.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.

Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

Appendix C

SUITABLE SUPPLIERS

OF

ACOUSTIC ENCLOSURES FOR SMALL AIR CONDITIONING UNITS

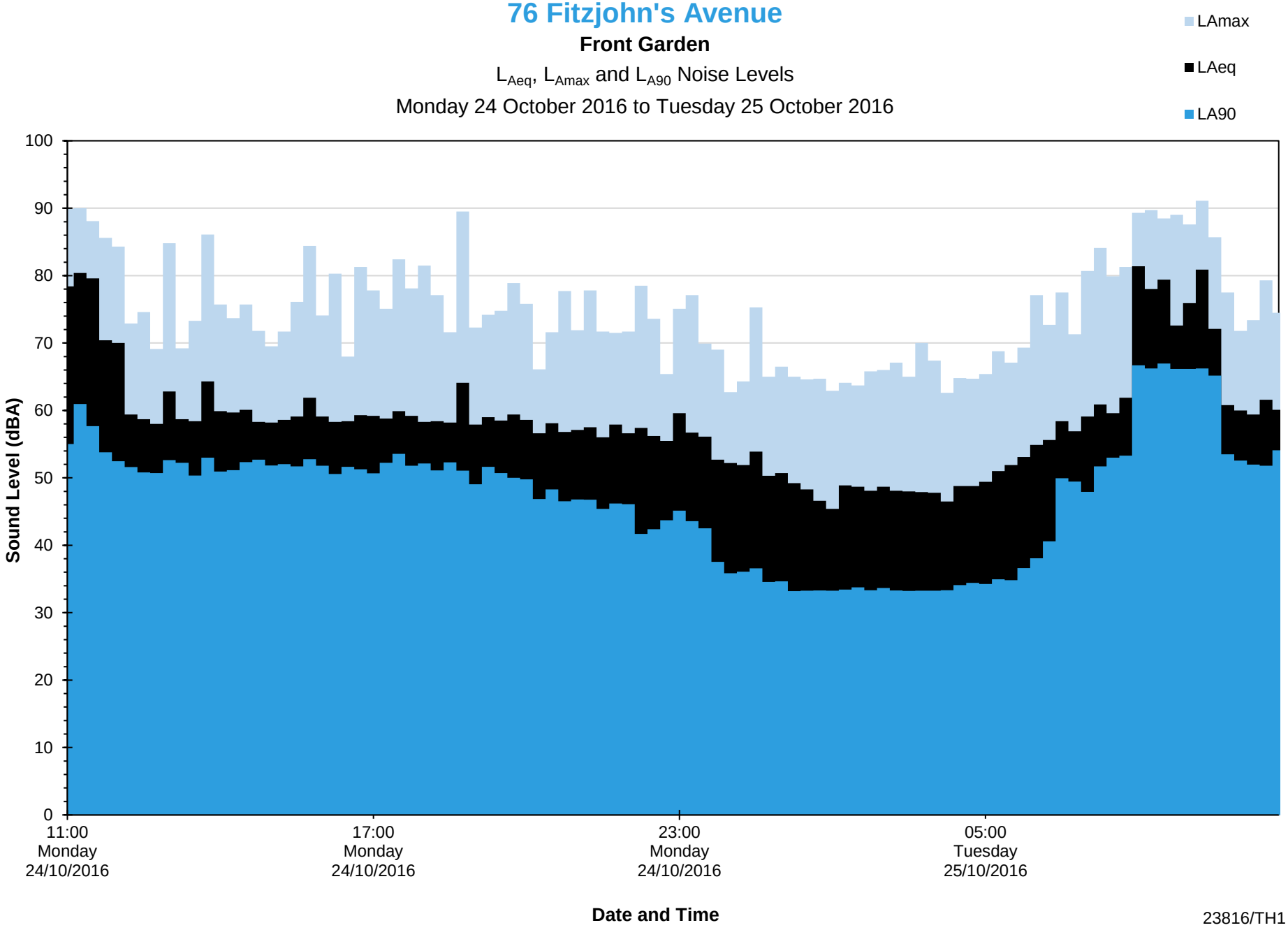
Name & Address	Telephone Number	Contact
Environ Technologies Ltd Regus House 1010 Cambourne Business Park Cambourne CB3 6DP	0870 383 3344	Steve Cox
Acoustic Engineering Services Ltd 78 High Road Byfleet Surrey KT14 7QW	01932 352733	Barry Austin Mark Stagg

76 Fitzjohn's Avenue

Front Garden

L_{Aeq}, L_{Amax} and L_{A90} Noise Levels

Monday 24 October 2016 to Tuesday 25 October 2016



23816/TH1