Report No:
Shaftesbury Theatre Noise Impact Assessment 20122017

Date:
20/12/2017

For:
Bennetts Architects

Report Title:

SHAFTESBURY THEATRE

NOISE IMPACT ASSESSMENT

By:
Gillieron Scott Acoustic Design
Studio 3
130 Brixton Hill
London SW2 1RS

t - 020 8671 2223
e - info@gsacoustics.org
w - www.gsacoustics.org

REVISION SCHEDULE

Document Revision	Date	Document Title	Details	Prepared by	Approved by
01	20/12/2017	Shaftesbury Theatre Noise Impact Assessment 20122017	FINAL ISSUE	Andrea Cicero  20/12/2017	Tim Scott  20/12/2017
00	13/11/2017	Shaftesbury Theatre Noise Impact Assessment 13112017	DRAFT FOR COMMENT	Andrea Cicero  13/11/2017	Tim Scott  13/11/2017

TABLE OF CONTENTS

Introduction

The Shaftesbury Theatre, set in the heart of the West End, London, is to be refurbished. Works include the installation of new mechanical equipment on the roof.

Gillieron Scott Acoustic Design (GSAD) have been commissioned to undertake a plant noise impact assessment in line with the Local Authority's adopted noise policy.

GSAD have undertaken a background noise survey from 1530 Friday 3rd November to 1615 Monday 6th November 2017 at a single fixed monitoring location that was positioned 6 m from the nearest residential window.

It is assumed operational hours of any newly proposed externally mounted plant items will be day-time (0700-2300 hours).

Calculations demonstrating plant noise levels reaching any residential dwelling comply with the London Borough of Camden's adopted noise policy will be undertaken once the full schedule of plant and locations are finalised.

The site location, plant area and nearest residential receptors are indicated in Appendices A, B and C.

1.0 Brief

- Undertake noise measurements at a fixed monitoring location over an extended period of time;
- Undertake weather measurements;
- Identify noise sensitive dwellings located in the vicinity of the site and assess the topography of the intervening ground;
- Analyse the site-acquired data and determine the appropriate criteria to adopt from the London Borough of Camden Council's noise policy.
- Using representative measured data from the survey and manufacturer's data for the proposed items of plant where possible, verify the impact of the development, to satisfy Local Authority's noise policy.
- Provide a technical report detailing findings of the noise survey.

2.0 Context

The Shaftesbury Theatre is located in proximity of Shaftesbury Avenue and High Holborn, in the London Borough of Camden. The buildings surrounding the theatre are largely residential, with commercial units at the street level.

The theatres existing plant area located on the rooftop. Part of the residential receptors at the same level of the theatre roof have line of sight to some of the units within this plant area.

The acoustic environment at the residential receptors located near the theatre comprises of various typical urban noise sources including road traffic noise, air traffic noise, sirens, building works near and far, noise from theatre performances and externally mounted services equipment.

3.0 Summary

A background noise survey was undertaken from 1530 Friday 3rd November to 1615 Monday 6th November 2017 at a single fixed monitoring location positioned adjacent to the worst case residential façade.

The hours of operation for new items of plant servicing the Shaftesbury Theatre will remain unchanged as 0700-2300 hours.

Using methodology outlined in BS4142:2014, a representative background sound level of 56 dB $L_{A90,15min}$ has been determined over the proposed operational hours.

Noise from mechanical ventilation with all plant operating shall be designed to satisfy the relevant statutory criteria at 1m from the façade of any noise sensitive properties in accordance with Camden Council's requirements and BS4142 'Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'. These noise criteria will be used in all attenuator calculations, once plant is selected.

The site location, measurement position and measured results are presented in the following Sections and Appendices.

4.0 Plant Noise Assessment Criteria

The London Borough of Camden Council's standard noise policy requires an assessment in line with British Standard BS4142: 2014 and DP28 to be undertaken. BS4142:2014 is the most suitable assessment methodology for assessing the potential impact of plant noise on any local residents.

BS4142:2014 provides methods for rating and assessing industrial and commercial sound. The standard is used to rate sound from fixed installations. The standard requires a "Specific Sound Level", in terms of L_{Aeq}, is determined either by measurement or calculation at a receptor location. This Specific Sound Level may then be corrected for the character of sound and is then termed the "Rating Level".

Once the Rating Level has been determined, the background sound level is subtracted from it and the greater the difference, the greater the likelihood of an 'adverse impact'. Where the rating level does

not exceed the background sound level, this is an indication of the specific sound source having a low impact. The standard advocates that each site and situation should take the context of the scenario into consideration and that "not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact".

The standard provides reference periods over which the assessment should take place which have been reproduced in the table below.

Table 1 – Reference Periods

Period	Hours	Assessment Period
Typical Daytime	0700 – 2300	1 hour assessment period
Typical Night-time	2300 – 0700	15 minute assessment period

5.0 Survey Details and Results

A background noise survey was undertaken from 1530 Friday 3rd November to 1615 Monday 6th November 2017 at a single fixed monitoring location that was located approximately 6 m from the nearest residential window.

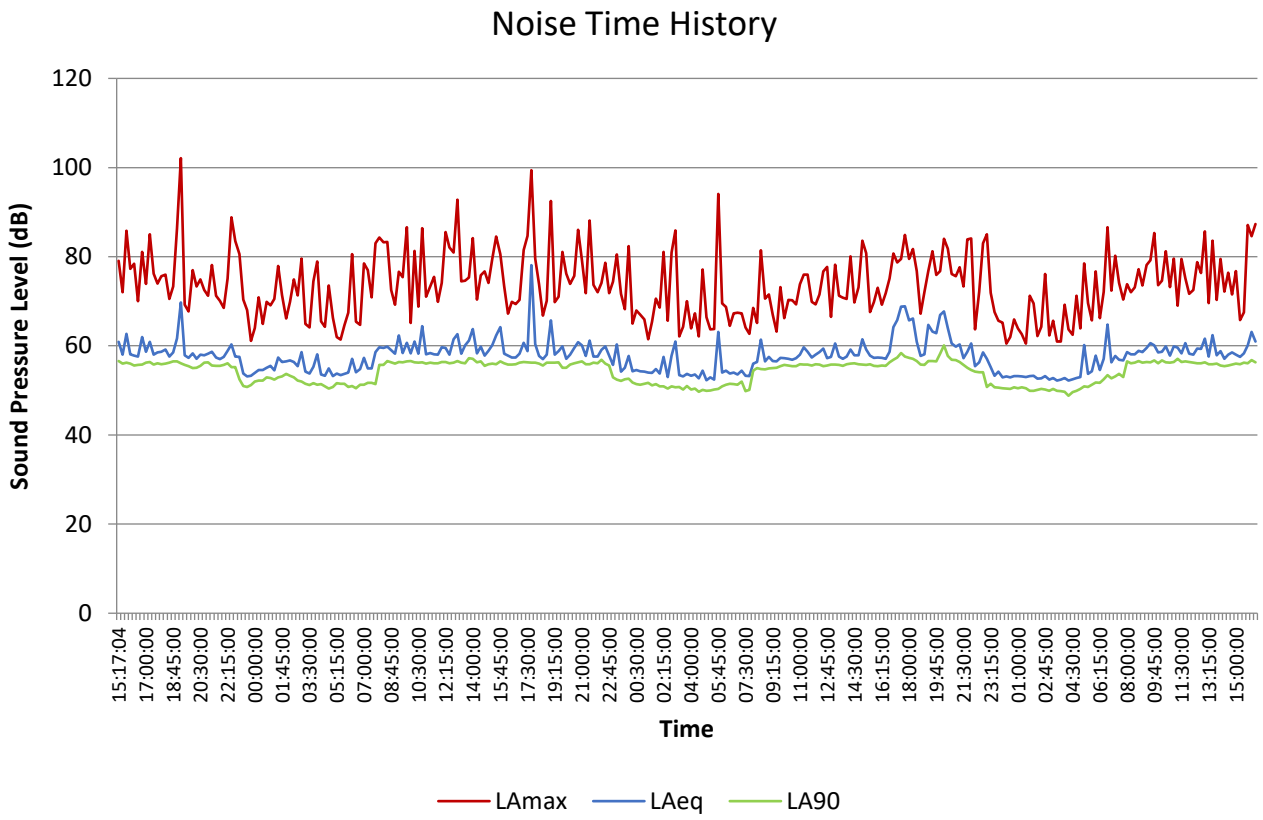
The levels were recorded as A-weighted and octave band L_{eq}, L_{max} and L_{90}. The clock on the sound level meter was synchronised to the correct time before deployment. The meter was then set to integrate sound levels over 15-minute periods in synchronisation mode. A list of the equipment is reported in Appendix G.

The measurement position was located between the theatre's rooftop plant area and the nearest noise sensitive residential dwelling. The microphone was positioned approximately 1m from the worst affected window of this receptor. The microphone position is shown in Appendices B and C.

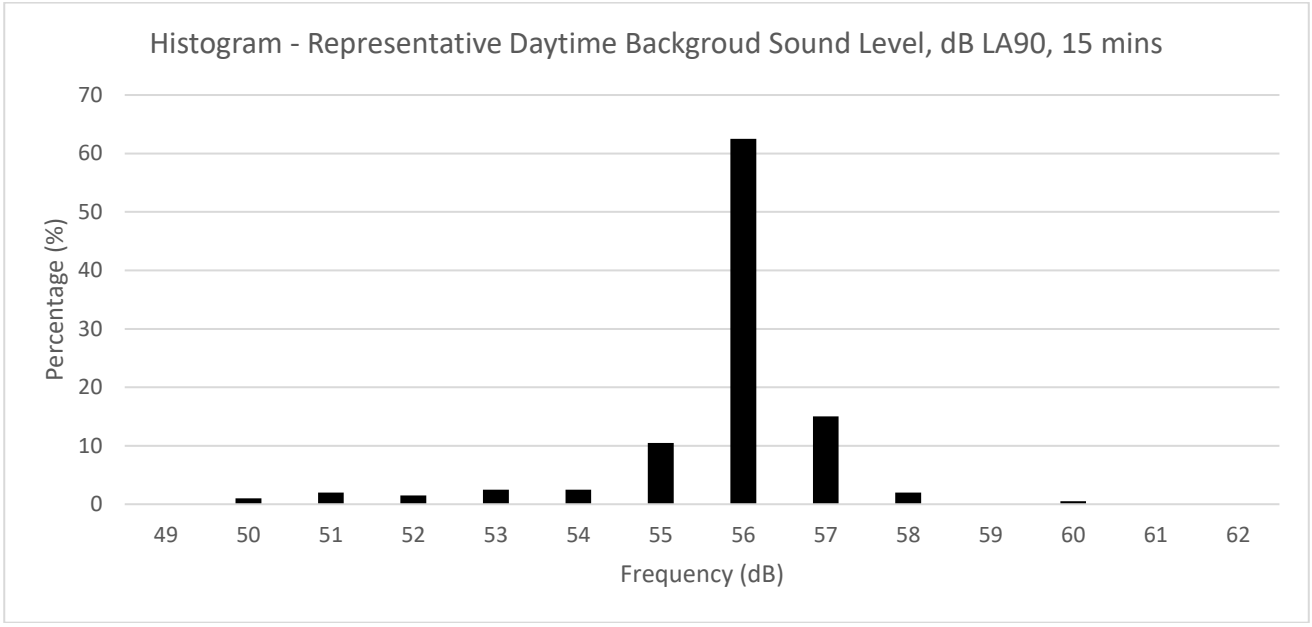
The equipment was calibrated at the beginning and end of the survey period and no drift in calibration was noted.

An automatic logging weather station was deployed as part of the assessment to ensure all data used in the detmination of the representative background sound level occurred during conditions that are considered conducive to acoustic measurement. Weather data is presented in Appendix E.

Full survey results to one decimal place are presented in the Appendix. A graphical representation of the results is presented below.



Logged background sound levels over proposed operational hours, 0700-2300, have been plotted in the histogram below to determine the representative daytime L_{A90}.



From the above histogram, a representative daytime background sound level of 56 dB $L_{A90,15min}$ has been determined. This background sound level will be used in the assessment of noise from plant items in the following section.

6.0 Plant Noise Assessment

The full schedule of proposed plant items and their associated manufacturer noise levels have not been finalised, therefore, a detailed plant noise impact assessment that shows the method by which the council's criteria will be met will be carried out once the full schedule of plant is known.

The proposed externally mounted air condenser unit(s) serving the Theatre will operate between 0700-2300 hours and a representative daytime background sound level of 56 dB $L_{A90,\ 15min}$ will be used to assess noise from proposed externally mounted units once the full schedule of plant and their locations are finalised.

All inlets/outlets and breakout noise from plant will be attenuated to meet Camden Council's planning conditions.

7.0 Statement of Competence

The assessment has been undertaken by the author of this report: Andrea Cicero, MSc, AMIOA, an acoustic consultant with Gillieron Scott Acoustic Design with experience since completing his Master's Degree in Acoustics at the University of Salford. The author of this report has undertaken numerous assessments according to the most recent 2014 revision of the Standard.

The assessment has been checked by: Tim Scott BSc (Hons.), MIOA a senior acoustic consultant with Gillieron Scott Acoustic Design with 15+ years' experience since completing a degree in Audio Technology at the University of Salford in the late 1990's. The author of this report has undertaken numerous assessments according to the 1997 revision of the British Standard and the most recent 2014 revision of the Standard.

8.0 Conclusion

The Shaftesbury Theatre is undergoing refurbishment works which include the introduction of new mechanical units. GSAD has undertaken a background noise survey at the site and the survey results are presented within this report.

A representative background sound level of 56 dB $L_{A90,15min}$ has been determined over the proposed operational hours of the plant items, 0700-2300.

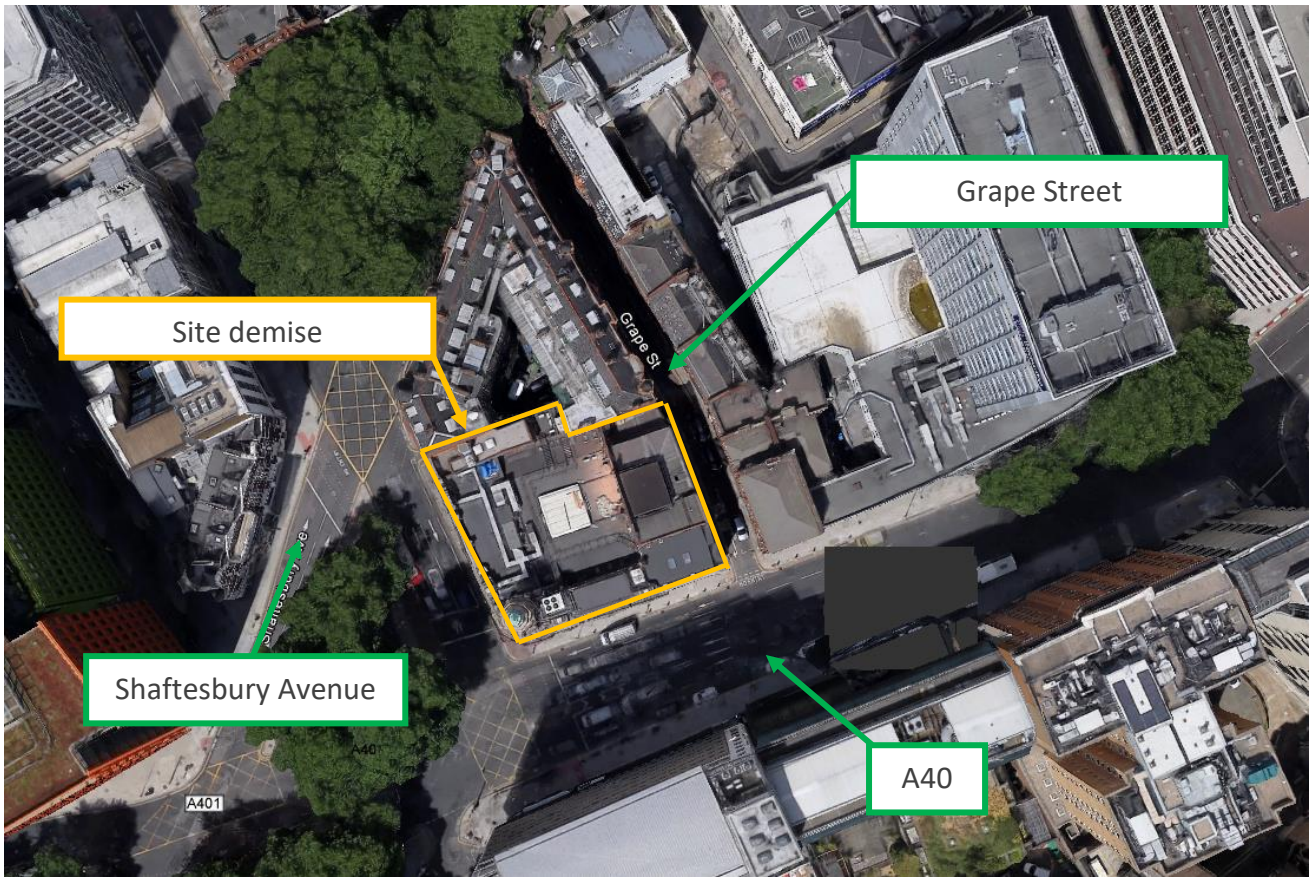
When specifying new items of plant the following will be assessed in detail once final plant selections have been made and locations are known.

- The distance between the proposed plant and the nearest noise sensitive windows
- Operational hours of the plant
- Number of plant items
- Location of plant
- Proposed plant noise levels
- Calculations for the predicted noise level at the window of the nearest sensitive property
- Predictions showing that noise levels outside the nearest noise sensitive windows will satisfy the relevant criteria

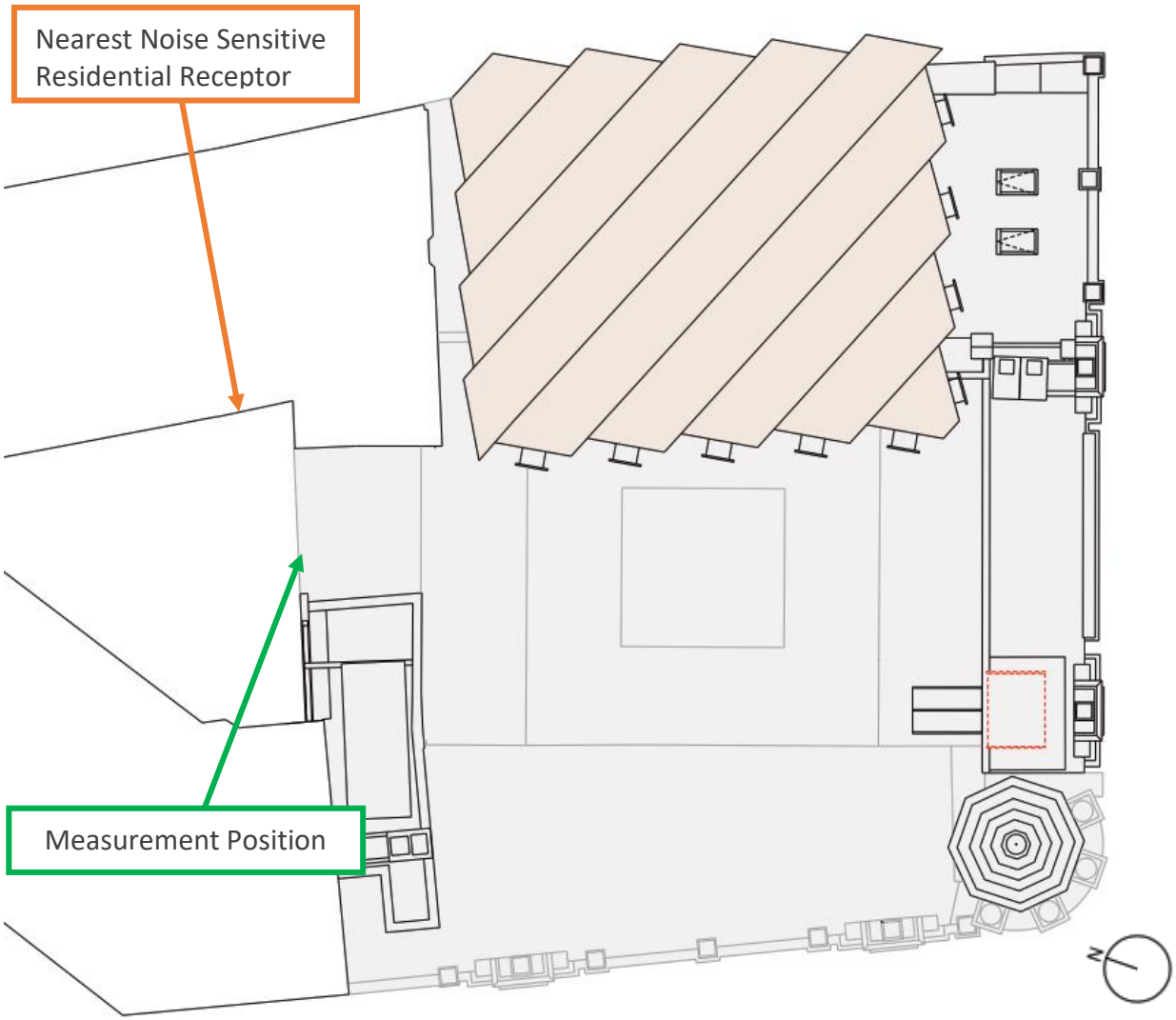
- Details of proposed mitigation measures including calculations and product datasheets where applicable.

APPENDICES

APPENDIX A: Site Demise



APPENDIX B: Measurement Position, Receptor Location & Rooftop Plant Area



APPENDIX C: Measurement Position Photograph

APPENDIX D: Survey Results

Date	Time	L_{Aeq}	L_{AFmax}	L_{AF90}
03/11/2017	15:17:04	60.9	79.1	56.6
03/11/2017	15:30:00	58.0	72.0	56.0
03/11/2017	15:45:00	62.7	85.8	56.2
03/11/2017	16:00:00	58.1	77.3	56.0
03/11/2017	16:15:00	57.8	78.4	55.6
03/11/2017	16:30:00	57.6	70.0	55.7
03/11/2017	16:45:00	62.0	81.1	55.8
03/11/2017	17:00:00	58.7	73.9	56.2
03/11/2017	17:15:00	60.9	85.0	56.4
03/11/2017	17:30:00	58.0	76.2	55.8
03/11/2017	17:45:00	58.5	74.0	56.1
03/11/2017	18:00:00	58.7	75.6	55.9
03/11/2017	18:15:00	59.2	76.0	56.0
03/11/2017	18:30:00	57.6	70.5	56.2
03/11/2017	18:45:00	58.5	73.3	56.5
03/11/2017	19:00:00	61.7	86.4	56.5
03/11/2017	19:15:00	69.7	102.1	56.1
03/11/2017	19:30:00	57.9	69.2	55.7
03/11/2017	19:45:00	57.3	67.7	55.4
03/11/2017	20:00:00	58.3	77.0	55.0
03/11/2017	20:15:00	57.1	73.3	55.1
03/11/2017	20:30:00	58.0	74.9	55.5
03/11/2017	20:45:00	57.9	72.5	56.2
03/11/2017	21:00:00	58.2	71.2	56.3
03/11/2017	21:15:00	58.7	78.1	55.6
03/11/2017	21:30:00	57.4	71.2	55.5
03/11/2017	21:45:00	57.0	70.1	55.5
03/11/2017	22:00:00	57.5	68.5	55.7
03/11/2017	22:15:00	58.9	75.1	56.1
03/11/2017	22:30:00	60.3	88.8	55.2
03/11/2017	22:45:00	57.6	83.5	55.2
03/11/2017	23:00:00	57.5	80.6	52.5
03/11/2017	23:15:00	53.8	70.4	51.0
03/11/2017	23:30:00	53.1	68.0	50.8
03/11/2017	23:45:00	53.3	61.1	51.2
04/11/2017	00:00:00	53.9	64.0	52.0
04/11/2017	00:15:00	54.6	70.9	52.2
04/11/2017	00:30:00	54.6	64.9	52.2
04/11/2017	00:45:00	55.1	69.9	52.9
04/11/2017	01:00:00	55.5	69.1	52.8
04/11/2017	01:15:00	54.5	70.5	52.4
04/11/2017	01:30:00	57.4	77.9	52.9
04/11/2017	01:45:00	56.4	71.4	53.1
04/11/2017	02:00:00	56.5	66.1	53.7
04/11/2017	02:15:00	56.7	69.9	53.3
04/11/2017	02:30:00	56.4	74.9	52.9
04/11/2017	02:45:00	55.4	71.3	52.2
04/11/2017	03:00:00	58.6	79.6	52.0
04/11/2017	03:15:00	54.2	64.9	51.5
04/11/2017	03:30:00	53.8	64.1	51.2
04/11/2017	03:45:00	55.3	74.5	51.6
04/11/2017	04:00:00	58.1	78.9	51.3
04/11/2017	04:15:00	53.6	65.5	51.4
04/11/2017	04:30:00	53.3	64.3	50.9
04/11/2017	04:45:00	54.9	73.5	50.4
04/11/2017	05:00:00	53.2	66.3	50.8
04/11/2017	05:15:00	53.8	62.0	51.6
04/11/2017	05:30:00	53.4	61.4	51.5
04/11/2017	05:45:00	53.7	64.6	51.5
04/11/2017	06:00:00	54.0	67.4	50.8
04/11/2017	06:15:00	57.1	80.6	51.0
04/11/2017	06:30:00	54.1	65.4	50.5
04/11/2017	06:45:00	54.8	64.7	51.3

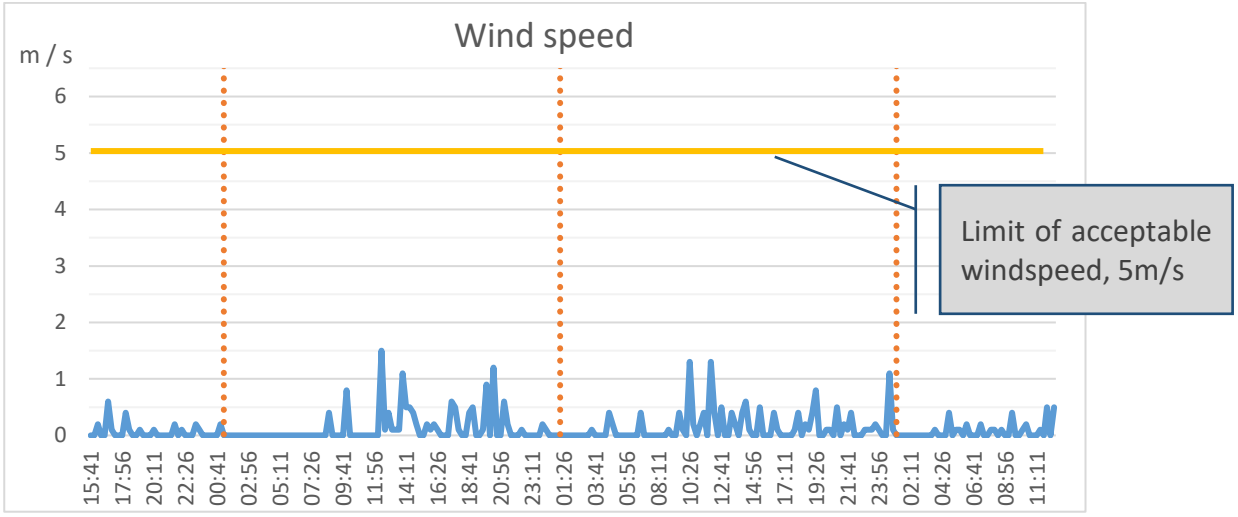
Date	Time	L_{Aeq}	L_{AFmax}	L_{AF90}
04/11/2017	07:00:00	57.3	78.5	51.3
04/11/2017	07:15:00	54.9	77.0	51.7
04/11/2017	07:30:00	54.9	70.9	51.7
04/11/2017	07:45:00	58.6	83.0	51.4
04/11/2017	08:00:00	59.7	84.3	55.7
04/11/2017	08:15:00	59.5	83.2	55.7
04/11/2017	08:30:00	59.8	83.3	56.6
04/11/2017	08:45:00	59.0	72.5	56.3
04/11/2017	09:00:00	58.2	69.2	56.0
04/11/2017	09:15:00	62.3	76.6	56.4
04/11/2017	09:30:00	58.4	75.4	56.3
04/11/2017	09:45:00	60.7	86.6	56.5
04/11/2017	10:00:00	58.3	65.1	56.6
04/11/2017	10:15:00	61.0	81.3	56.3
04/11/2017	10:30:00	58.2	68.8	56.2
04/11/2017	10:45:00	64.4	86.4	56.3
04/11/2017	11:00:00	58.1	71.0	56.0
04/11/2017	11:15:00	58.4	73.3	56.2
04/11/2017	11:30:00	58.1	75.5	56.1
04/11/2017	11:45:00	58.0	69.9	56.1
04/11/2017	12:00:00	59.7	74.1	56.4
04/11/2017	12:15:00	59.5	85.5	56.4
04/11/2017	12:30:00	58.0	82.1	56.1
04/11/2017	12:45:00	61.5	80.9	56.2
04/11/2017	13:00:00	62.6	92.8	56.6
04/11/2017	13:15:00	58.2	74.5	56.2
04/11/2017	13:30:00	60.1	74.6	56.1
04/11/2017	13:45:00	61.2	75.3	57.2
04/11/2017	14:00:00	63.8	84.2	57.1
04/11/2017	14:15:00	58.3	70.4	56.3
04/11/2017	14:30:00	59.8	75.8	56.5
04/11/2017	14:45:00	57.8	76.7	55.5
04/11/2017	15:00:00	58.9	74.1	55.9
04/11/2017	15:15:00	60.2	79.6	56.0
04/11/2017	15:30:00	62.3	84.5	55.9
04/11/2017	15:45:00	64.2	80.6	56.5
04/11/2017	16:00:00	58.2	73.4	56.1
04/11/2017	16:15:00	57.8	67.2	55.8
04/11/2017	16:30:00	57.4	69.9	55.8
04/11/2017	16:45:00	57.4	69.4	55.9
04/11/2017	17:00:00	58.2	70.3	56.2
04/11/2017	17:15:00	60.7	81.5	56.4
04/11/2017	17:30:00	58.8	84.7	56.3
04/11/2017	17:45:00	78.1	99.4	56.2
04/11/2017	18:00:00	60.4	79.6	56.2
04/11/2017	18:15:00	57.7	73.8	56.0
04/11/2017	18:30:00	57.0	66.8	55.6
04/11/2017	18:45:00	58.0	70.1	56.2
04/11/2017	19:00:00	65.7	92.5	56.2
04/11/2017	19:15:00	58.0	69.8	56.2
04/11/2017	19:30:00	58.8	71.0	56.3
04/11/2017	19:45:00	59.9	81.1	55.1
04/11/2017	20:00:00	57.1	76.2	55.1
04/11/2017	20:15:00	58.0	73.9	55.8
04/11/2017	20:30:00	59.5	75.7	56.1
04/11/2017	20:45:00	60.8	86.0	56.3
04/11/2017	21:00:00	60.1	79.2	56.5
04/11/2017	21:15:00	57.7	71.8	55.9
04/11/2017	21:30:00	61.2	88.1	55.9
04/11/2017	21:45:00	57.6	73.7	56.2
04/11/2017	22:00:00	57.6	72.0	56.1
04/11/2017	22:15:00	59.1	74.1	56.9
04/11/2017	22:30:00	59.9	78.6	56.0
04/11/2017	22:45:00	57.8	71.8	55.6
04/11/2017	23:00:00	55.7	74.4	52.9
04/11/2017	23:15:00	60.3	80.5	52.4

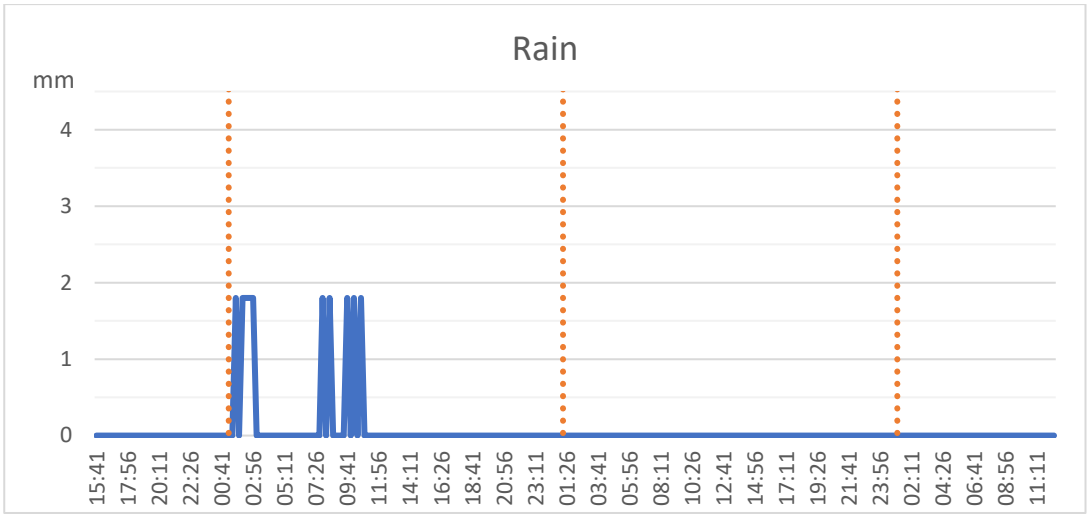
Date	Time	L_{Aeq}	L_{AFmax}	L_{AF90}
04/11/2017	23:30:00	54.2	71.7	52.1
04/11/2017	23:45:00	55.1	68.2	52.5
05/11/2017	00:00:00	57.7	82.4	52.6
05/11/2017	00:15:00	54.3	65.0	51.8
05/11/2017	00:30:00	54.6	67.9	51.4
05/11/2017	00:45:00	54.3	67.0	51.3
05/11/2017	01:00:00	54.2	65.9	51.5
05/11/2017	01:15:00	54.0	61.5	51.7
05/11/2017	01:30:00	53.9	65.4	51.1
05/11/2017	01:45:00	54.8	70.6	51.4
05/11/2017	02:00:00	53.8	68.6	50.9
05/11/2017	02:15:00	57.5	81.1	50.9
05/11/2017	02:30:00	53.0	65.6	50.4
05/11/2017	02:45:00	57.8	80.9	50.9
05/11/2017	03:00:00	61.0	85.9	50.7
05/11/2017	03:15:00	53.4	62.1	50.8
05/11/2017	03:30:00	53.1	64.3	50.2
05/11/2017	03:45:00	53.7	70.0	51.0
05/11/2017	04:00:00	53.3	63.9	50.2
05/11/2017	04:15:00	53.6	67.3	50.4
05/11/2017	04:30:00	52.7	62.1	49.7
05/11/2017	04:45:00	54.4	77.1	50.1
05/11/2017	05:00:00	52.3	66.4	49.9
05/11/2017	05:15:00	52.9	63.7	50.0
05/11/2017	05:30:00	52.4	63.8	50.2
05/11/2017	05:45:00	63.1	94.1	50.3
05/11/2017	06:00:00	54.0	69.5	50.9
05/11/2017	06:15:00	54.4	68.7	51.3
05/11/2017	06:30:00	53.8	64.5	51.5
05/11/2017	06:45:00	54.0	67.3	51.4
05/11/2017	07:00:00	53.6	67.4	51.3
05/11/2017	07:15:00	54.4	67.3	52.0
05/11/2017	07:30:00	53.3	64.1	49.8
05/11/2017	07:45:00	53.2	62.7	50.1
05/11/2017	08:00:00	56.0	68.5	54.4
05/11/2017	08:15:00	56.4	65.1	55.0
05/11/2017	08:30:00	61.4	81.4	54.8
05/11/2017	08:45:00	56.5	70.6	54.7
05/11/2017	09:00:00	57.5	71.5	54.9
05/11/2017	09:15:00	56.6	67.0	55.0
05/11/2017	09:30:00	56.5	63.2	55.1
05/11/2017	09:45:00	57.3	73.2	55.4
05/11/2017	10:00:00	57.2	66.2	55.7
05/11/2017	10:15:00	57.1	70.3	55.6
05/11/2017	10:30:00	56.9	70.2	55.4
05/11/2017	10:45:00	57.2	69.3	55.4
05/11/2017	11:00:00	58.0	73.8	55.9
05/11/2017	11:15:00	59.7	76.0	55.8
05/11/2017	11:30:00	58.7	76.0	55.8
05/11/2017	11:45:00	57.4	69.9	55.6
05/11/2017	12:00:00	58.0	69.3	55.9
05/11/2017	12:15:00	58.6	71.5	55.8
05/11/2017	12:30:00	59.4	76.7	55.4
05/11/2017	12:45:00	57.2	77.7	55.6
05/11/2017	13:00:00	57.5	66.5	55.8
05/11/2017	13:15:00	60.5	78.2	55.8
05/11/2017	13:30:00	57.6	71.2	55.7
05/11/2017	13:45:00	57.1	70.8	55.5
05/11/2017	14:00:00	57.6	70.5	55.9
05/11/2017	14:15:00	59.2	80.1	56.0
05/11/2017	14:30:00	57.9	69.7	56.1
05/11/2017	14:45:00	57.9	73.1	55.9
05/11/2017	15:00:00	61.5	83.6	55.8
05/11/2017	15:15:00	59.2	80.8	55.7
05/11/2017	15:30:00	57.8	67.6	55.9
05/11/2017	15:45:00	57.3	69.8	55.5

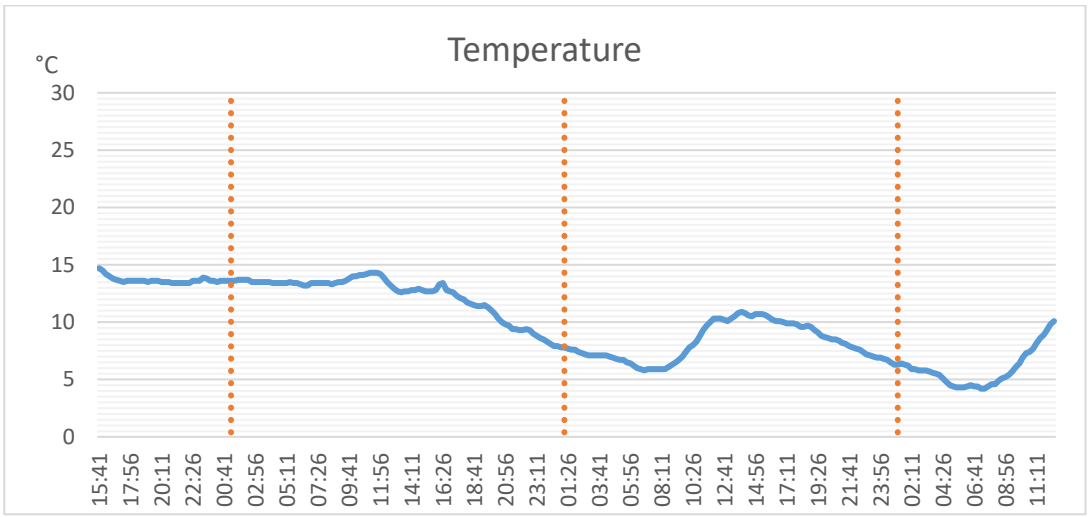
Date	Time	L_{Aeq}	L_{AFmax}	L_{AF90}
05/11/2017	16:00:00	57.4	73.0	55.4
05/11/2017	16:15:00	57.3	69.2	55.6
05/11/2017	16:30:00	57.1	71.8	55.5
05/11/2017	16:45:00	58.7	75.1	56.3
05/11/2017	17:00:00	64.2	80.7	56.9
05/11/2017	17:15:00	65.8	78.7	57.4
05/11/2017	17:30:00	68.8	79.5	58.4
05/11/2017	17:45:00	68.9	84.9	57.6
05/11/2017	18:00:00	65.7	79.5	57.3
05/11/2017	18:15:00	66.1	81.7	57.1
05/11/2017	18:30:00	60.9	76.8	56.6
05/11/2017	18:45:00	57.7	67.2	55.8
05/11/2017	19:00:00	58.1	72.1	55.7
05/11/2017	19:15:00	64.7	76.8	56.6
05/11/2017	19:30:00	63.2	81.2	56.6
05/11/2017	19:45:00	62.8	75.9	56.5
05/11/2017	20:00:00	66.9	76.8	58.2
05/11/2017	20:15:00	67.7	84.0	60.1
05/11/2017	20:30:00	64.0	81.8	57.7
05/11/2017	20:45:00	60.5	76.1	56.9
05/11/2017	21:00:00	59.8	75.6	56.8
05/11/2017	21:15:00	60.3	77.6	56.4
05/11/2017	21:30:00	57.2	73.3	55.7
05/11/2017	21:45:00	58.7	83.9	55.1
05/11/2017	22:00:00	60.5	84.1	54.6
05/11/2017	22:15:00	55.4	63.7	54.2
05/11/2017	22:30:00	56.3	72.1	54.1
05/11/2017	22:45:00	58.5	83.0	54.1
05/11/2017	23:00:00	57.1	85.0	50.8
05/11/2017	23:15:00	55.2	71.9	51.5
05/11/2017	23:30:00	53.3	67.6	50.7
05/11/2017	23:45:00	54.2	65.6	50.6
06/11/2017	00:00:00	52.9	65.2	50.5
06/11/2017	00:15:00	53.1	60.5	50.4
06/11/2017	00:30:00	52.9	62.0	50.3
06/11/2017	00:45:00	53.2	65.9	50.7
06/11/2017	01:00:00	53.2	63.9	50.5
06/11/2017	01:15:00	53.1	62.6	50.7
06/11/2017	01:30:00	53.0	60.5	50.5
06/11/2017	01:45:00	53.2	71.2	49.9
06/11/2017	02:00:00	53.3	69.5	49.9
06/11/2017	02:15:00	52.6	62.2	50.1
06/11/2017	02:30:00	52.7	64.3	50.3
06/11/2017	02:45:00	53.2	76.1	50.2
06/11/2017	03:00:00	52.4	62.3	49.9
06/11/2017	03:15:00	52.8	65.6	50.3
06/11/2017	03:30:00	52.2	61.0	49.9
06/11/2017	03:45:00	52.4	61.0	49.8
06/11/2017	04:00:00	52.8	69.2	49.7
06/11/2017	04:15:00	52.2	63.7	48.8
06/11/2017	04:30:00	52.5	62.5	49.6
06/11/2017	04:45:00	52.8	71.2	49.9
06/11/2017	05:00:00	53.0	63.9	50.3
06/11/2017	05:15:00	60.2	78.5	50.9
06/11/2017	05:30:00	53.7	69.6	50.8
06/11/2017	05:45:00	54.3	65.7	51.3
06/11/2017	06:00:00	57.8	76.7	51.8
06/11/2017	06:15:00	54.6	66.2	51.7
06/11/2017	06:30:00	57.1	72.1	52.5
06/11/2017	06:45:00	64.8	86.6	53.4
06/11/2017	07:00:00	56.3	72.4	52.7
06/11/2017	07:15:00	57.7	80.2	53.1
06/11/2017	07:30:00	56.9	74.1	53.7
06/11/2017	07:45:00	56.7	70.4	53.0
06/11/2017	08:00:00	58.6	73.8	56.5
06/11/2017	08:15:00	58.1	72.0	56.1

Date	Time	L_{Aeq}	L_{AFmax}	L_{AF90}
06/11/2017	08:30:00	58.1	73.1	56.2
06/11/2017	08:45:00	58.9	77.2	56.6
06/11/2017	09:00:00	58.6	73.5	56.2
06/11/2017	09:15:00	59.5	78.1	56.4
06/11/2017	09:30:00	60.6	79.2	56.3
06/11/2017	09:45:00	60.1	85.3	56.7
06/11/2017	10:00:00	58.5	73.6	56.1
06/11/2017	10:15:00	58.7	74.6	56.7
06/11/2017	10:30:00	59.9	81.2	56.3
06/11/2017	10:45:00	57.8	73.2	56.2
06/11/2017	11:00:00	59.9	79.6	56.4
06/11/2017	11:15:00	59.6	69.0	57.1
06/11/2017	11:30:00	58.3	79.5	56.4
06/11/2017	11:45:00	60.6	75.2	56.5
06/11/2017	12:00:00	58.2	71.7	56.4
06/11/2017	12:15:00	58.0	72.5	56.2
06/11/2017	12:30:00	59.4	78.8	56.1
06/11/2017	12:45:00	59.3	76.3	56.1
06/11/2017	13:00:00	61.6	85.7	56.3
06/11/2017	13:15:00	57.6	69.6	55.9
06/11/2017	13:30:00	62.4	83.6	55.9
06/11/2017	13:45:00	57.9	70.3	56.0
06/11/2017	14:00:00	58.8	79.5	55.6
06/11/2017	14:15:00	57.1	72.2	55.4
06/11/2017	14:30:00	58.0	76.4	55.6
06/11/2017	14:45:00	58.5	71.5	55.8
06/11/2017	15:00:00	58.0	76.8	56.0
06/11/2017	15:15:00	57.5	65.8	55.9
06/11/2017	15:30:00	58.3	67.5	56.2
06/11/2017	15:45:00	60.1	87.1	56.1
06/11/2017	16:00:00	63.1	84.6	56.8
06/11/2017	16:15:00	61.0	87.3	56.3

APPENDIX E: Weather Data







APPENDIX F: Camden Development Policy 28 – Noise and Vibration

Table E, Page 133, *"Camden Development Policies 2010-2015"*

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL_{Aeq}

APPENDIX G: Equipment

- NTi XL2 Real Time Analyser
- Norsonic 1251 Calibrator
- NTi Outdoor Microphone kit
- Tripods
- Weather Station Davis Vantage Vue

Calibration certificates are available on request.

APPENDIX H: Glossary of Acoustic Terms

DECIBEL (dB) - A unit of sound pressure measurement
Sound Pressure Level in dB (*L*p) = 20 log (Measured sound pressure/Reference sound pressure = 20 µPa)

dB(A) - The A -weighted sound pressure level, the weighting network reduces low frequency sound in a similar way to the human ear.

REVERBERATION TIME (RT or *T*) – decay of sound in rooms
The time taken for a sound, once terminated, to fall through 60dB i.e. to one millionth of its original sound intensity. *T*30 – RT for first 30dB of decay. RT_{500} - Mid frequency RT.
HERTZ (Hz) - a unit of frequency measurement. The normal range of hearing is from 20Hz to about 15kHz.

ABSORPTION COEFFICIENT – degree to which a material absorbs sound.
The ratio of absorbed to incident sound energy (perfect absorber = 1)

SOUND REDUCTION INDEX *R* – quantity which describes a material's ability to reduce the sound pressure level across it (e.g. a wall or floor)

$R = L1 - L2 + 10\log (S/A)$

*L*1 - Average sound pressure level in source room (averaged from 100 Hz – 3150 Hz)
*L*2 - Average sound pressure level in receiving room (averaged from 100 Hz – 3150 Hz)
S – Wall Area (m^2)
A – Total absorption in receiving room (m^2 units)

*R*w – weighted sound reduction index

AVERAGE ROOM TO ROOM LEVEL DIFFERENCE – *D*, dB = *L*1 – *L*2, averaged 1/3 octave bands from 100Hz – 3150kHz.

*D*w – weighted value of D (usually 2 - 3dB higher)

*D*nT, w – *D*w corrected for reverberation time of receiving room

NOISE RATING CURVES (NR CURVES) – set of curves used to describe optimum background noise levels for different tasks.

*L*10/90 LEVEL (dB) - The level in dB of a time varying sound pressured level (e.g. traffic) exceeded for 10%/90% of the time of measurement.
*L*90 is usually called the BACKGROUND NOISE LEVEL.

*L*eq AVERAGE SOUND PRESSURE LEVEL – level dB of a time varying sound pressure level with equal amounts of energy above and below it, for the time of measurement.

TONAL NOISE – noise of a single frequency (or a narrow band of frequencies that can be perceived as a tone), audible above the broad band noise background. Noise which is at least 5dB above the average of the 1/3 octave band sound pressure levels immediately on either side of it.