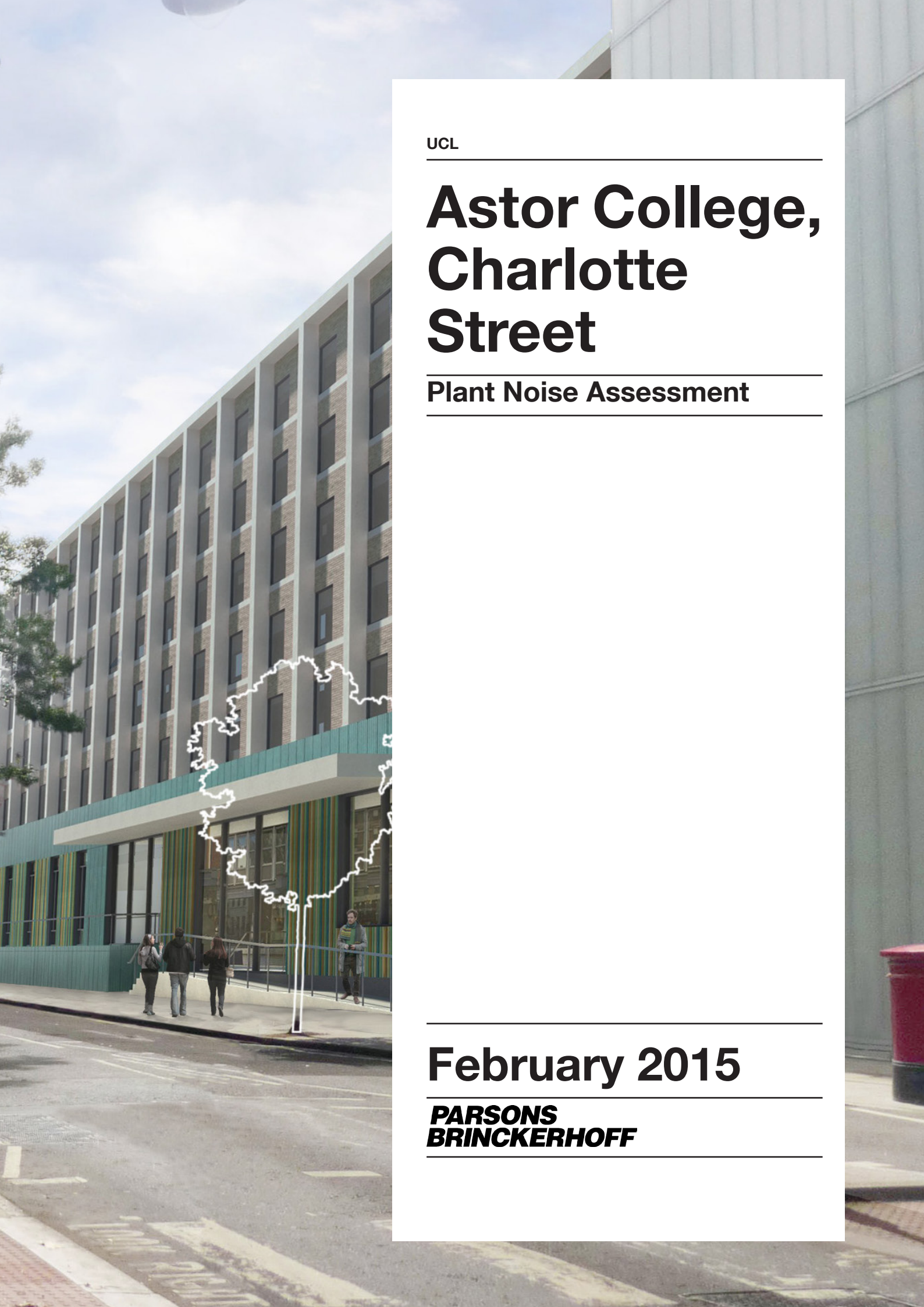

UCL

Astor College, Charlotte Street

Plant Noise Assessment

February 2015

PARSONS BRINCKERHOFF

Plant Noise Assessment - Astor College, London

V1.2

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1 INTRODUCTION

1.1 General

1.1.1 Parsons Brinckerhoff Ltd (PB) has been commissioned to undertake a noise assessment for the proposed installation of new plant equipment to service the University College London (UCL) building of Astor College, Charlotte Street, London, W1T 4QB.

1.1.2 This assessment aims to determine the suitability of the site for the proposed plant installation, the various aspects included in this study are:

- Survey and assessment of existing ambient noise levels.
- The impact assessment of the new plant noise at the nearest noise sensitive receptors.
- Identification of noise limits for the building services plant that is proposed to be installed.

1.1.3 This report presents the approach and findings of the assessment.

1.1.4 A glossary of acoustics terminology is provided in Appendix A.

1.2 Site Description

1.2.1 The site is located on Charlotte Street which is to the west of Tottenham Court Road and the main University complex. The surrounding area consists of commercial buildings with offices on Howland Street and Charlotte Street. The dominant noise source on site is from local road traffic from the surrounding roads.

1.2.2 The nearest residential premises have been identified as student accommodation within Astor college. The nearest noise sensitive window is located at the rear of the block at 7th floor level, approximately 12m from the proposed plant location.

1.2.3 It is understood that the current proposal is for the installation of three extract fans. Two extract fans are proposed to be installed on the 7th floor roof on a new extension to the rear of Astor College. An additional extract fan is proposed to be located at ground floor level to south of the rear façade of the existing building.

2 METHODOLOGY

2.1 Legislative Guidance

2.1.1 The legislative framework and guidelines that have been used during this assessment are listed below:

- BS 7445: 1991 '*Description and Measurement of Environmental Noise*' Parts 1 to 3, BSI
- BS 4142:1997 'Method of rating industrial noise affecting mixed residential and industrial areas'
- BS 8233:2014 'Guidance on Sound Insulation and noise reduction for buildings'
- Camden Development Policy DP28 – Noise and Vibration

2.2 BS7445

2.2.1 All noise monitoring was conducted in accordance with the guidance set out in BS 7445-2: 1991 '*Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use'*. This standard details information that should be recorded in addition to the actual measured levels such as meteorological data, and a description of the noise source itself.

2.3 Industrial Noise Affecting Residential Dwellings

2.3.1 The British Standard BS4142:1997[1] 'Method of rating industrial noise affecting mixed residential and industrial areas' is used for assessing the impact of noise from mechanical services plant. The standard provides guidance as to the likely community response to new fixed noise sources affecting sensitive residential receptors. The rating method detailed within this standard is widely accepted by local authorities as a means of assessing building plant noise. BS4142 requires separate analysis for day and night time periods. The Standard compares the 'rating level'[2] of the new noise with the existing 'background level'[3]. The greater this difference the greater the likelihood of complaints. The significance of the new noise based on this difference is given in **Table 1**.

Table 1: BS4142 Noise Rating Summary

Difference between Rating Level and Background Level	BS4142 Rating
-10 dB(A) or less	Positive indication that complaints are unlikely
+5 dB(A)	Marginal significance
+10 dB(A) or more	Indicates complaints are likely

2.4 Local Authority Criteria

2.4.1 Astor College, Charlotte Street lies within the London Borough of Camden. The plant noise requirements of Camden Council are set out in their Local Development

[1] A new version of BS4142 has been issued in 2014, but as Camden policy refers to the 1997 version, it is the older version that has been used in this assessment.
[2] The Rating Level is the noise level attributable to the new source(s), plus a 5 dB(A) penalty if the new source has tonal or intermittent characteristics
[3] The Background Level is taken as the L_{A90}; this is the ambient noise level, which is exceeded for 90% of the measurement period.

Framework. Criteria for new plant noise emissions at the worst case receptor are given below in **Table 2**.

Table 2: Local Authority Plant Noise Requirements

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) <L_{A90}
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) <L_{A90}
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) <L_{A90}
Noise at 1 metre external to a sensitive façade where L_{A90}>60dB	Day, evening and night	0000-2400	55dB L_{Aeq}

3 BASELINE NOISE CONDITIONS

3.1 General

The assessment of the existing baseline conditions has been undertaken in the form of an unattended site survey. The noise survey was conducted using a Class 1 Sound Level Meter. A field calibrator was used to calibrate and check the meter before and after the measurement period. The calibration certificates for the equipment used are provided in Appendix B. Specific details of the equipment used including serial numbers and calibration data are provided on these certificates. A Rion NA-28 sound level meter with environmental kit was used. The following statistical noise parameters were recorded: L_{Amin}, L_{Amax}, L_{A90}, L_{A10}, L_{Aeq}, over a 24 hour period.

3.2 Noise Measurements

A site plan is provided in Figure 1 which identifies the unattended noise survey location.

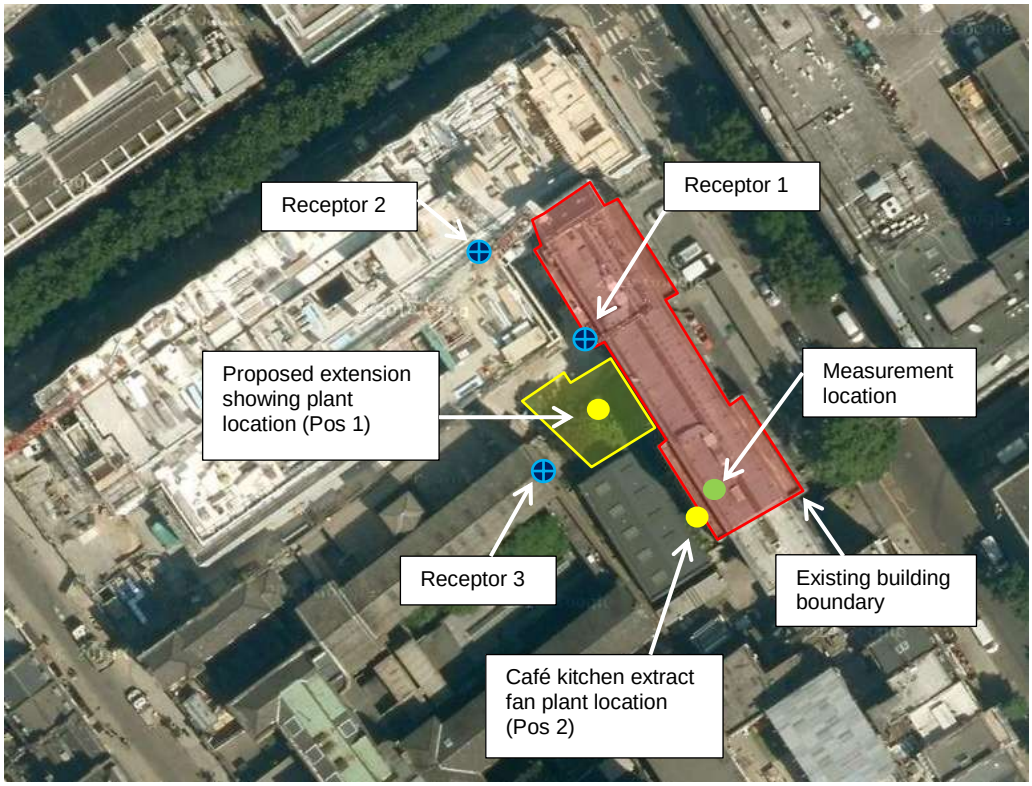
<u>24 Hour Unattended Survey</u>

3.2.1 An unattended noise survey was carried out between the 17th – 18th December 2014. A semi-permanent noise monitoring kit was deployed in a weather-proof case in a façade measurement position on the roof of Astor College, Charlotte Street. Concurrent 5 minute measurements were taken logging the following parameters: L_{Amin}, L_{Amax}, L_{A90}, L_{A10}, and L_{Aeq}. The noise monitor was set to record throughout the 24 hour period.

Weather Conditions

3.2.2 Weather conditions during the surveys were conducive to successful monitoring. The weather over the monitoring period was mostly clear and dry with low wind speeds. The average temperature during the daytime was approximately 8ºC.

Figure 1 – Noise Survey Measurement Location



3.3 Noise Survey Results

3.3.1 It is current practice to quote all statistics to one decimal place, apart from L_{A90} data which are rounded to the nearest whole numbers.

3.3.2 **Table 3** presents a summary of the unattended 24 hour noise survey measurements.

Table 3: Summary of the Unattended Noise Survey Data

Measurement Location	Measurement Period	Average	Minimum
		$L_{Aeq,\ T}$ (dB)	$L_{A90\ T}$ (dB)
7th Floor Roof	Day (0700-1900)	58.4	51
	Evening (1900-2300)	52.5	50
	Night (2300-0700)	51.8	47
	24 hours (00:00-24:00)	56.1	47

3.3.3 The noise climate was characterised by local road traffic noise from Charlotte Street, distant road traffic from Tottenham Court Road and light construction noise taking place in the vicinity during the daytime.

3.3.4 The time history of the 24 hour noise survey is presented in Appendix C. The noise survey data is presented in a numerical form (in a table) in Appendix D.

4 ASSESSMENT OF PLANT NOISE

4.1 Installation of New Plant

4.1.1 The current proposal calls for the installation of new plant items which in turn will introduce new noise sources to the area. These have been detailed in Table 4 below:

Table 4 – Summary of Proposed New Plant Items

Plant/ Equipment	Quantity	Location	Operating Hours*
Extract fans (Pos 1)	2	7th Floor Roof – Rear extension	24 hrs
Café kitchen extract fan (Pos 2)	1	Ground Floor – Rear of building (south)	24 hrs

4.1.2 *It is understood that the operating hours are based on a worse case assumption.

4.1.3 The plant arrangement is shown in Appendix E.

4.1.4 The noise from the new plant should be appropriately controlled such that it does not contain any temporal or tonal qualities. This includes bangs, clicks, clatters and thumps, (temporal) or hums, hissing, screeches and whines (tonal).

4.1.5 Within the BS 4142 assessment guidelines a 5 point penalty should be applied to any item of plant equipment that is found to have tonal noise characteristics. Due to this, any manufacturers plant equipment that does contain tonal characteristics should be designed to achieve a sound pressure level of 5dB(A) below the limits given in this study.

4.1.6 **Table 5** below shows the *lowest* representative background noise level for the plant operating period. The lowest L_{A90} background level from the unattended survey has been assumed as a worst case scenario.

Table 5 – Summary of Noise levels for Plant Operational Period

Operational Period	Measurement Time	Ambient Noise Data	
		Lowest $L_{Aeq, 5mins}$	Lowest $L_{A90\ 5mins}$
24 hours	03:21 18/12/14	48.2	47

4.2 Determining Design Criteria

4.2.1 It can be seen from **Table 5** that the lowest background noise level measured over the 24 hour measurement period was 47 dB $L_{A90\ 5mins}$.

4.2.2 In accordance with local authority plant noise criteria the new noise sources introduced should be designed such that it is at least 5dB below the existing background noise level. Specifically, the equivalent continuous noise level (L_{Aeq}) should be at least 5dB below measured background L_{A90} at the residential receptor location.

4.2.3 It is assumed that the proposed equipment may run throughout the 24 hour period. It is therefore necessary to control noise emissions from the plant to 42 dB $L_{Aeq, T}$ at the nearest noise sensitive receptor.

4.3 Recommended Design Levels

4.3.1 The two extract fans (Pos 1) are proposed to be located on the 7th floor roof on a new extension to the south of Astor College, Charlotte Street. It is proposed for an acoustic screen to surround the extract fans. To achieve the design criteria noise limits at the receptors, the extract fans should be designed not to exceed a maximum combined sound power level of 76 dB(A) at the discharge louvres.

4.3.2 The café kitchen extract fan is proposed to be located on the ground floor to the south on the rear façade of the existing building. The fan will be ducted to a louvre which will terminate flush to the existing external wall. The proposed louvre will be positioned approximately 1m below the bedroom window of student accommodation (nearest noise sensitive receptor) located on the 1st floor. In order to meet local authority noise criteria (42 dB(A)) at 1m from this receptor, the extract fan should be designed to not exceed a maximum sound power level of 54 dB(A) at the louvre.

4.4 Assessment Results

4.4.1 The nearest residential premises to the proposed plant in Pos 1 have been identified as student accommodation within Astor college (Receptor 1). The nearest noise sensitive window is located at the rear of the block at 7th floor level, approximately 12m from the proposed plant location.

4.4.2 Two further receptor locations have been assessed; the Sainsbury Wellcome Centre (Receptor 2) located to the north of the site at a distance of approximately 30m from the proposed plant location, and Cleveland Street Workhouse (Receptor 3) located to the west of the site at a distance of approximately 15m from the proposed plant location.

4.4.3 Calculations have been carried out to predict the noise level 1 metre from the window of the sensitive properties identified above including distance and any screening effects.

4.4.4 The calculation method that has been used is in line with the formula contained within the following international standard: ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. The standard describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental sound at a distance from a variety of sources.

4.4.5 The calculations have been carried out using the noise modelling software CadnaA which implements the formula in ISO 9613: 1996.

4.4.6 At this stage, the fan extract system has not been finalised. The assessment has evaluated a maximum design level (See section 4.2.5) that will meet the Local Authority criteria at the worse affected receptor. This sound power level has

subsequently been input into the noise model to predict plant noise levels at the nearest surrounding receptors.

4.4.7 **Table 6** reports the results of the assessment at the nearest noise sensitive receptors from the proposed plant.

Table 6: Assessment Summary – Nearest Noise Sensitive Receptors (plant Pos 1)

Noise Sensitive Receptor Location	Receptor 1	Receptor 2	Receptor 3
Predicted Plant Noise Level, L_{Aeq} dB @ 1m from façade	41.7	34.8	32.1
Lowest Night Time Background Level, L_{A90} dB	47	47	47
Difference between Predicted Level and Background level	-5.3dB	-12.2dB	-14.9dB

4.4.8 Assuming a combined sound power level of 76dB(A), (which would be equivalent to a sound pressure level of 62 dB for each unit at 1m from them) the predicted level from the plant does not exceed 5 dB below the minimum external background noise at the nearest noise sensitive receptor, identified as Astor College student accommodation, and therefore meets the criteria that has been set.

4.4.9 According to guidance given in BS4142, the predicted noise levels at the closest receptor give a positive indication that complaints are unlikely.

4.4.10 It is assumed that no tonal correction will apply to the equipment, however if any of the installed plant is found to have tonal characteristics, an acoustic feature correction of +5dB should be applied.

5 CONCLUSIONS

5.1.1 An ambient noise survey has been completed at Astor College, London W1T. Noise limits for the proposed new plant has subsequently been set using local authority criteria and guidance given in relevant British Standards.

5.1.2 This report sets maximum sound power limits for the proposed extract fans in order to meet local authority noise criteria at the nearest identified residential receptors. Assuming the proposed limit, the predicted noise level from the extract fans does not exceed 5 dB below the minimum external background noise at the noise sensitive receptor.

5.1.3 According to BS4142, noise levels at the receptor show a positive indication that complaints are unlikely, subject to the satisfactory installation of the extract fans.