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Project:  
18 Greville Place, London NW6 5JH

Title:  
Plant Noise Impact Assessment

quietly moving forward





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## 1 INTRODUCTION

- 1.01 Environmental Equipment Corporation Limited has been commissioned by Noel Wright Architects to undertake a noise assessment of a single Clivet 14.1 condensing unit to serve the existing residential dwelling of No 18 Greville Place.
- 1.02 This noise assessment has been conducted in accordance with the policies and requirements of Westminster City Council (WCC) and is based on a noise survey carried out at the site over a typical weekday period.
- 1.03 This assessment includes:
- the setting of plant noise limits in accordance with the requirements of WCC and national planning policy, standards and guidance; and
  - the prediction of noise impacts at the worst affected noise sensitive receptors based on the proposed items of plant and their location.
- 1.04 This report is prepared solely for Noel Wright Architects. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party. Note that the contents contained herein are produced for the purposes of review by relevant Planning Authority departments and do not constitute a detailed design or specification document to be used for the purposes of construction. Subsequent development of noise mitigation schemes shall engage EEC Ltd and Noel Wright Architects so as to support the conclusions of this report.
- 1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

## 2 SITE

2.01 18 Greville Place is a three-storey townhouse style residential dwelling located in a predominantly residential area of Abbey Road, Westminster.

2.02 The property is bound by the following:

- North – Adjoined neighbouring residential dwelling of No 20 Greville Place;
- East – Industrial units off Clifton Hill with rear facades of residential dwellings beyond;
- South – Adjoined neighbouring residential dwelling of No 16 Greville Place; and
- West – Greville Place Roadway with further residential dwellings running parallel..

2.03 This application is for a single Clivet 14.1 condensing unit which is to be located in the rear garden of the property, as presented in Appendix B.

2.04 It is proposed that the unit will be housed in a high performance acoustic enclosure and will operate in 'Silent-Mode' through the night-time hours of 2300-0700.

2.05 The closest noise sensitive receptors to the proposed plant items are the following:

- The rear top-floor windows of No 16 Greville Place.

2.06 All other noise sensitive receptors are at a greater distance from the proposed location of the units, or are protected by more screening by the intervening structures, and as such will be subject to lower levels of noise.

## 3 GUIDANCE

3.01 Local and National Planning Policy for the Westminster City Council is presented in Appendix C of this document.

3.02 A summary of the pertinent points relating to this application are presented below:

- where the existing external noise levels are above WHO Guideline levels the maximum emission level ( $L_{Aeq15min}$ ) should not exceed 10dB below the minimum external background noise at the nearest noise sensitive properties; and
- where the existing external noise levels do not exceed the WHO Guideline levels the maximum emission level ( $L_{Aeq15min}$ ) should not exceed 5dB below the minimum external background noise at the nearest noise sensitive properties.
- where background noise levels are below 30dB  $L_{A90,15min}$  site specific standards that avoid noise disturbance to nearest noise sensitive receptors may be considered.

#### 4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekday period, between 1445 hours on Monday 15<sup>th</sup> January 2024 and concluded 1015 hours the following day, to establish the existing noise levels at the site. The survey methodology and results are set out below.

4.02 Noise measurements have been carried out at the following position, as shown in Appendix B and described as:

- Position 1: located at a height of approximately 1.5 metres above floor level of the rear garden terrace. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

4.03 This position is considered to be representative of the nearest windows to the proposed plant location.

#### 5 EQUIPMENT

5.01 The equipment used for the survey was as follows:-

- 01dB Fusion Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- GRAS 40CD Condenser Microphone, PRE22 S Pre-amp and Connecting Leads;
- Tripod.

5.02 The equipment holds current accreditation and serial numbers as follows:

Sound Level Meter 01dB Fusion	Serial No.	14014
	Calibration Date	2 <sup>nd</sup> May 2023
	Cal Certificate No.	U44157
½" Condenser Mic. GRAS 40CD	Serial No.	383172
	Calibration Date	2 <sup>nd</sup> May 2023
	Cal Certificate No.	44156
Calibrator CAL 31	Serial No.	94723
	Calibration Date	2 <sup>nd</sup> May 2023
	Cal. Certificate No.	U44155

N.B. Copies of calibration certificates are available upon request.

5.03 The equipment was calibrated both before and after the survey with no difference noted in the levels.

## 6 RESULTS

- 6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind for the duration of the survey.
- 6.02 Noise sources at the site include local and distant road traffic. There were no other significant sources of noise during the survey.
- 6.03 A list of the levels measured is included in Appendix D and represented graphically in Appendix E.
- 6.04 A summary of the time averaged ambient levels and lowest measured background levels over the measurement periods are shown in Table 6.1. The minimum  $L_{A90}$  is the lowest fifteen-minute measurement in the specified period.

Position	Period	Average $L_{Aeq,T}$ – dB	Minimum $L_{A90}$ – dB
1	Day time (0700-2300 hrs)	45	35
	Night-time (2300-0700 hrs)	45	34

Table 6.1: Free-Field Measured Ambient and Lowest Background Noise Levels

## 7 PLANT ASSESSMENT

- 7.01 This application is for the installation of a single Clivet 14.1 condensing unit to be located in the rear garden of the property.
- 7.02 Based on the standard requirements of WCC and the lowest measured background noise level in each time period, Table 7.1 sets out the recommended noise limits that the proposed items of plant should meet.
- 7.03 In accordance with the requirements of Westminster City Council, the proposed noise limits are based on being 5 dB below the measured background noise level.

Location	Period	Measured Existing $L_{A90,T}$	Proposed Noise Limit $L_{Ar}$
No 16 Greville Place Rear Top Floor Windows	Day	35 dB	30 dB
	Night	34 dB	29 dB

Table 7.1: Suggested Plant Noise Emission Limits Based on Lowest Measured  $L_{A90}$ , Free-field dB

- 7.04 Note that the limits suggested above are rating levels and as such any design should take into account the acoustic characteristics of the plant. In this instance the proposed unit displays none of the characteristics whereby the acoustic correction should be applied.
- 7.05 Assuming the proposed item meets the noise limits set out in Table 7.1 noise will be approaching the NOEL with respect to the NPPF.
- 7.06 The proposed unit has a stated manufacturer’s sound power level of 77 dB(A). Copies of the manufacturer’s plant data sheets are included in Appendix F.
- 7.07 It is proposed that the unit will be housed in a bespoke, high-performance acoustic enclosure. It is also proposed that the unit will operate in ‘Silent-Mode’ through the hours of 2300-0700 which provides a 2 dB reduction to the unit’s noise emissions.

- 7.08 Predicted noise levels have been calculated at the closest, most affected noise sensitive windows, top floor rear windows of No 16 Greville Place. The windows at lower levels of 16 Greville will benefit from greater levels of acoustic screening provided by the boundary fence than the top floor windows. .
- 7.09 Other residential receptors located further from the site will be subject to lower noise levels than those predicted at the above locations.
- 7.10 Tables 7.2-7.3 present the results of worst-case plant noise predictions at the worst-case locations.

Item	Noise Level		Notes
	DAY	NIGHT	
Clivet 14.1	77 dB(A)	75 dB(A)	Sound Power Level 3dB Night setback
Reflections	+ 3 dB		Additional reflections – Boundary walls
Barrier Effect	0 dB		Line of sight to proposed plant location
Conformal area Losses over 9 metres	- 30 dB		Distance to closest window
Noise Control	- 20 dB		Bespoke high-performance acoustic enclosure
Resultant Noise Level	30 dB(A)	28 dB(A)	No 16 Greville Place Top Floor Rear Windows

Table 7.2: No 16 Greville Place Plant Noise Calculation

Property	Period	Proposed Noise Limit $L_{Ar}$	Predicted $L_{Aeq,T}$	Exceedance of noise limit
No 16 Greville Place Top Floor Rear Windows	Daytime	30 dB	30 dB	0 dB
	Night-time	29 dB	28 dB	- 1 dB

Table 7.3: Assessment of Predicted Noise Levels Based on Proposed Noise Limit, Free-field dB(A)

- 7.11 It can be seen from the above tables that the noise limits are not exceeded during any period at the closest noise sensitive windows of No 16 Greville Place.
- 7.12 Assuming that the proposed plant and acoustic enclosure is included in the installation, predicted noise levels will meet the requirements of the Local Authority during all periods of operation and at the closest noise sensitive receptors.
- 7.13 With respect to the NPPF, achieving the noise limits would be classified as approaching the NOEL.

## 8 CONCLUSIONS

- 8.01 Noel Wright Architects has appointed Environmental Equipment Corporation Limited to undertake a noise assessment for a single Clivet 14.1 condensing unit to serve the existing residential dwelling of No 18 Greville Place.
- 8.02 The assessment has been carried out in accordance with national planning guidance and the requirements of the Local Authority, and is based on an environmental noise survey conducted at the site over a mid-week period.
- 8.03 A noise assessment has been undertaken to evaluate the potential noise impact of the proposed condensing unit at the closest existing residential receptors.
- 8.04 Plant noise limits have been set based on the methodology contained in BS4142, the results of a background noise survey and the requirements of Westminster City Council, to control the noise from the proposed condensing unit. In accordance with the Local Authority, the noise limit has been set 5 dB below the lowest measured background noise level.
- 8.05 Predictions have shown that the noise criterion is met at all assessment locations during all periods of the condenser's proposed operation, assuming, the acoustic enclosure is included in the installation and the plant operates with a setback through the night-time hours.
- 8.06 Assessing the site in accordance with the principles of the National Planning Policy Framework has shown that predicted noise levels would be approaching the level at which no effects are observed to occur, the NOEL.
- 8.07 On the basis of this assessment it is considered that noise does not pose a material constraint to the operation of the condensing unit.



APPENDIX A  
GLOSSARY OF TECHNICAL TERMS

ACOUSTIC TERMINOLOGY

Absorption Classes	The sound absorption of a material is rated from Class A to Class E, where Class A materials provide the highest level of sound absorption.
Ambient Noise Levels	Noise levels measured in the absence of noise requiring control, frequently measured to determine the situation prior to the additional of a new noise source.
dB	Decibel. The logarithmic unit of sound level.
dB(A)	A-weighted decibel. The A-weighting approximates the response of the human ear.
$D_{nT,w}$	Weighted standardized level difference. A single number quantity of the sound level difference between two rooms. $D_{nT,w}$ is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling. Measured in accordance with BS EN ISO 16283-1 and weighted in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	The weighted element-normalized level difference. A single number rating of the sound reduction provided by a sound passing through an individual element. $D_{n,e,w}$ is typically used to define the sound insulation provided by ventilators. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4kHz, roughly equal to the range of frequencies on a piano.
Impact Sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
$L_{Aeq,t}$	The equivalent continuous sound level measured in dBA. This is commonly referred to as the average noise level. 't' is the interval time for the measurement. Typically 't' of 16hrs and 8hrs is used for day and night time ambient noise respectively or 't' is defined by the period of interest in BS4142 assessments.
$L_{A90,t}$	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L'_{nT,w}$	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard "tapper" machine. The lower the $L'_{nT,w}$ , the better the acoustic performance. Measured in accordance with BBS EN ISO 140-7 and rated in accordance with BS EN ISO 717-2.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave Band	Frequencies are often grouped together into octaves for analysis. Octave bands are labelled by their centre frequency which are: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.
Reverberation Time ( $T_{mf}$ )	Reverberation time is used for assessing the acoustic qualities of a space. It is defined as the time it takes for an impulse to decay by 60dB. $T_{mf}$ is the arithmetic average of the reverberation time in the mid frequency bands (500Hz, 1kHz and 2kHz).
$R_w$	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. $R_w$ is measured in a laboratory. $R_w$ is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Sound Absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. Sound absorption refers to the ability of a material to absorb sound, rated from 0, complete reflection, to 1, complete absorption.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to prevent the travel of sound.
Structure-borne transmission	Transmission of sound energy as vibrations via the structure of a building.

APPENDIX B  
SITE PLAN  
&  
MEASUREMENT LOCATION



APPENDIX C  
PLANNING POLICY  
AND GUIDANCE

## PLANNING POLICY AND GUIDANCE

Westminster's planning policy framework is set out in a range of documents including Westminster's "City Plan 2019 – 2040" (formally adopted 21 April 2021) and other Local Development Framework documents.

Together with national planning policy and the Mayor of London's London Plan, these set out their strategy for managing growth and development in the City.

Policy 7 "Managing development for Westminster's people" and Policy 33 "Local environmental effects" of the City Plan sets out the council's policy on noise.

### Policy 7

"Development will be neighbourly by:

- A. Protecting and where appropriate enhancing amenity, by preventing unacceptable impacts in terms of daylight and sunlight, sense of enclosure, overshadowing, privacy and overlooking.
- B. Protecting and where appropriate enhancing local environmental quality.
- C. Protecting and positively responding to local character and the historic environment.
- D. Not overburdening the capacity of local infrastructure.
- E. Contributing to the greening of the city.
- F. Improving sustainable transport infrastructure and highway conditions.
- G. Making appropriate and effective waste management arrangements."

### Policy 33 (Section C)

#### "NOISE AND VIBRATION

C. Development should prevent adverse effects of noise and vibration and improve the noise environment in compliance with the council's Noise Thresholds, with particular attention to:

1. minimising noise impacts and preventing noise intrusion to residential developments and sensitive uses;
2. minimising noise from plant and machinery and internal activities;
3. minimising noise from servicing and deliveries; and
4. protecting the relative tranquillity in and around open spaces."

In the Glossary of terminology Noise Sensitive Receptors are described as:

"Comprises residential use, educational establishments, hospitals, hotels, hostels, concert halls, theatres, law courts, and broadcasting and recording studios".

In addition to the City Plan 2019 – 2040, Westminster council has published a Noise Technical Guidance Note (in public draft as of August 2021) which outlines the standard design targets, or "Noise Thresholds" required in order to achieve the above Policies.

Table 3 of this document (reproduced below) presents the Noise Thresholds for noise emissions from plant and machinery.

*Table 3: Noise criteria for plant machinery and internal/external activities*

Existing External Ambient Noise Level	Tonal or Intermittent Noise/ Noise Source	Sound Emission Level that should not be Exceeded at the nearest Noise Sensitive Receptor <sup>3</sup>
Exceed WHO Guideline levels.  L <sub>Aeq</sub> 55 dB over periods of daytime (07.00-23.00hrs) and L <sub>Aeq</sub> 45 dB at night-time (23.00-07.00hrs).	Does not contain tones or intermittent noise sufficient to attract attention.	10 dB below the minimum external background noise level
	Contains tones or be intermittent noise sufficient to attract attention.	15 dB below the minimum external background noise level.

<sup>2</sup> These criteria will be applied to development no matter the background/assessed

<sup>3</sup> Measured at the nearest noise sensitive receptors 1m from the most affected façade, relative to the existing external background noise level in this location and including assessment at the quietest time during which the plant operates or when there is internal activity at the development site. The background noise level should be expressed in terms of the lowest L<sub>A90,15min</sub> during day time or night time (depending on the hours of use being applied for).

	Noise emitted from emergency plant or an emergency life supporting generators. <sup>4</sup>	10 dB above the lowest background noise level within a 24-hour period.
Does not exceed WHO Guideline levels.  L <sub>Aeq</sub> 55 dB over periods of daytime (07.00-23.00hrs) and L <sub>Aeq</sub> 45 dB night-time (23.00-07.00hrs).	Does not contain tones or intermittent noise sufficient to attract attention.	5 dB below the minimum external background noise level.
	Contains tones or be intermittent noise sufficient to attract attention.	10 dB below the minimum external background noise level.
	Noise emitted from emergency plant or an emergency life supporting generators. <sup>5</sup>	10 dB above the lowest background noise level within a 24-hour period.
Below 30 dB L <sub>A90,15min</sub> at the nearest noise sensitive receptors Both daytime (07.00-23.00hrs) and night-time (23.00-07.00hrs).	Noise contains and/or does not contain tones or intermittent noise	Site specific standards that avoid noise disturbance to nearest noise sensitive receptors may be considered.

In addition to the above, further design criteria are outlined for the protection of Tranquil Open Spaces. The Technical Note states the following:

“The noise criteria in sections 2.3 and 2.4 [table 3 above] apply to the closest edge of the nearest tranquil open space, or for development within a tranquil open space the criteria apply 5 metres from the noise sources at the quietest time of day or night (when the plant operates or when there is internal or external activity at the development) ...

...It is acknowledged that some developments will enhance the soundscape; in this case the specified standards above will not need to be met. These developments may include children’s play areas, sonic installations and local amenities.”

## National Planning Policy Framework and the Noise Policy Statement for England

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27<sup>th</sup> March 2012 (as amended on 20<sup>th</sup> December 2023) and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

Paragraph 180 in Section 15 of the NPPF, entitled Conserving and enhancing the natural environment, states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability..."

Paragraph 191 in Section 15 also states that:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason..."

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

“NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.”

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:



avoid significant adverse impacts on health and quality of life;  
mitigate and minimise adverse impacts on health and quality of life; and  
where possible, contribute to the improvement of health and quality of life.”

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

2.25 This aim (the third aim), seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

## British Standard 4142

To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' has been used to assess the likelihood any adverse impacts based on the resultant noise level from the new plant item, including any corrections for the character of the noise against the existing background noise level.

BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.
- A difference of +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background noise level, the less likely it is that the specific sound source will have an adverse impact or significant 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 sound impact, depending on the context.

This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of  $L_{Aeq}$ .
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

BS 4142 goes onto state that:

'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.'

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

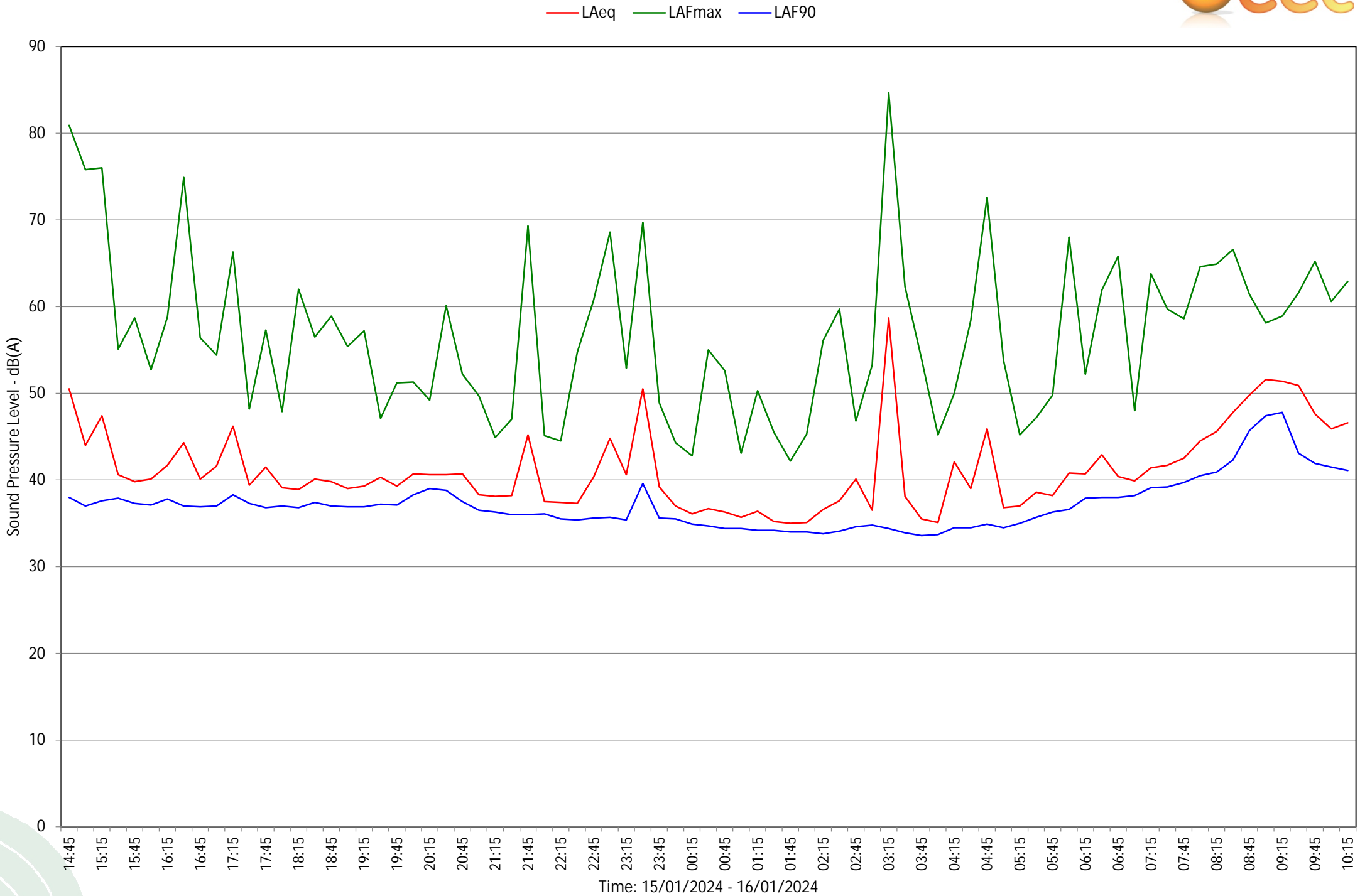
APPENDIX D  
SURVEY RESULTS  
(TABULAR)

Time	L <sub>Aeq</sub>	L <sub>AMax</sub>	L <sub>A90</sub>
14:45	51	81	38
15:00	44	76	37
15:15	47	76	38
15:30	41	55	38
15:45	40	59	37
16:00	40	53	37
16:15	42	59	38
16:30	44	75	37
16:45	40	56	37
17:00	42	54	37
17:15	46	66	38
17:30	39	48	37
17:45	42	57	37
18:00	39	48	37
18:15	39	62	37
18:30	40	57	37
18:45	40	59	37
19:00	39	55	37
19:15	39	57	37
19:30	40	47	37
19:45	39	51	37
20:00	41	51	38
20:15	41	49	39
20:30	41	60	39
20:45	41	52	38
21:00	38	50	37
21:15	38	45	36
21:30	38	47	36
21:45	45	69	36
22:00	38	45	36
22:15	37	45	36
22:30	37	55	35
22:45	40	61	36
23:00	45	69	36
23:15	41	53	35
23:30	51	70	40
23:45	39	49	36
00:00	37	44	36
00:15	36	43	35
00:30	37	55	35
00:45	36	53	34
01:00	36	43	34
01:15	36	50	34
01:30	35	46	34
01:45	35	42	34
02:00	35	45	34
02:15	37	56	34
02:30	38	60	34

Time	L <sub>Aeq</sub>	L <sub>AMax</sub>	L <sub>A90</sub>
02:45	40	47	35
03:00	37	53	35
03:15	59	85	34
03:30	38	62	34
03:45	36	54	34
04:00	35	45	34
04:15	42	50	35
04:30	39	58	35
04:45	46	73	35
05:00	37	54	35
05:15	37	45	35
05:30	39	47	36
05:45	38	50	36
06:00	41	68	37
06:15	41	52	38
06:30	43	62	38
06:45	40	66	38
07:00	40	48	38
07:15	41	64	39
07:30	42	60	39
07:45	43	59	40
08:00	45	65	41
08:15	46	65	41
08:30	48	67	42
08:45	50	61	46
09:00	52	58	47
09:15	51	59	48
09:30	51	62	43
09:45	48	65	42
10:00	46	61	42
10:15	47	63	41

APPENDIX E  
SURVEY RESULTS  
(GRAPHICAL)

# Noise Level Time History at 18 Greville Place



APPENDIX F  
PUBLISHED PLANT NOISE DATA

SIZES				2.1	3.1	4.1	5.1	6.1	7.1	8.1	6.1T	7.1T	8.1T	9.1	10.1	12.1	14.1
Sound power	standard	-	dB(A)	55	58	59	60	65	65	68	65	65	68	70	72	74	77
	silent	1	dB(A)	54	56	56	57	61	61	63	61	61	63	66	64	71	75
	supersilent	2	dB(A)	53	55	54	55	59	59	59	59	59	59	63	62	70	73
Sound pressure @1m	standard	-	dB(A)	41	44	45	46	50	50	53	50	50	53	55	56	58	61
	silent	1	dB(A)	40	42	42	42	46	46	48	46	46	48	51	48	55	59
	supersilent	2	dB(A)	39	41	40	40	44	44	44	44	44	44	48	46	54	57