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REPORT No. 460857/1

26 CHRISTCHURCH HILL
LONDON
NW3 1LG

ENVIRONMENTAL NOISE SURVEY REPORT
&
PLANT NOISE ASSESSMENT

PREPARED: **4th OCTOBER 2016**

Presented By: **Fred Blyth MIOA**

CONTENTS

1.0 Introduction

1.1 Mendick Waring Ltd has commissioned Noico Ltd to conduct an environmental noise survey at 26 Christchurch Hill, London NW3 1LG.

1.2 The purpose of the survey is to obtain statistical noise data and to determine the background noise levels at the site. Based on the noise survey data, noise criteria are to be established for limiting noise emission from the mechanical plant installations serving the premises. The noise criteria are to be set in accordance with the requirements of the local planning authority (The London Borough of Camden).

1.3 In addition, Noico Ltd have been requested to carry out a plant noise assessment to establish that the proposed plant at high level will comply with the local authority requirement and propose suitable acoustic treatment should it not.

1.4 The development site comprises a fully detached house located at the junction of Christchurch Hill and Well Road. The local area is entirely residential with the nearest affected properties being to the north and east.

2.0 Instrumentation

2.1 A precision grade Norsonic 140 'Type 1' Integrating Sound Level Meter was used for the survey. This was equipped with an environmental microphone and extension cable. The instrument was powered by an external battery and stored in a weatherproof case.

2.2 The instrument was calibrated prior and subsequent to use with no calibration drift recorded.

3.0 Survey Details

3.1 Location: The environmental noise analyser microphone was located externally on a first floor balcony on the northern face of the property and as far from the existing plant as possible. This position was chosen as it was considered to be representative of the background noise environment which exists at the nearest noise affected properties. Note, from the observations made on site, the nearest noise affected properties are considered to be nos. 5 & 6 Well Road to the north at 6m & 8m approximately and respectively. The nearest property in Christchurch Hill is no. 22 to the east at approximately 20 metres. Note, the exact position of the nearest noise-affected properties is to be confirmed by the local planning authority, prior to final design of any necessary mechanical plant noise control measures.

3.2 Period: Monitoring was carried out continuously from approximately 12:15 hrs on the 6th September 2016 through to 13:40 hrs on the 7th September 2016. The instrument was set up to monitor noise levels continuously and store data in fifteen minute intervals.

3.3 Weather: The prevailing weather condition throughout the majority of the survey period was satisfactory for noise monitoring, being dry, mild and with little to a moderate breeze. Wind speed, although not recorded, was considered to be less than 5 m/s throughout the survey period.

3.4 Site Noise Characteristics: The ambient noise level was characterised by road traffic in the local area, and in particular along Christchurch Hill and Well Road. Additionally, noise from mechanical plant serving adjacent buildings may have been audible and, if so, could be contributing to the ambient noise level in the area. It is thought that no unusual events occurred during the survey period and the data are considered to be a true representation of ambient noise levels.

4.0 Survey Results

4.1 The results of the environmental survey are presented in graphical and numerical format in the attached appendices, showing the recorded values of L_{Aeq} and L_{A90}.

4.2 See Appendix 1 for a glossary of terms.

4.3 With reference to the measured data, the minimum background noise level measured during the survey period was:

Daytime (07:00 to 23:00hrs)	- 33.8 L_{A90}
Night time (23:00 to 07:00hrs)	- 29.4 L_{A90}

5.0 Environmental Noise Level Criteria

5.1 Criteria for mechanical services noise emission are normally based upon the prevailing level of background noise in the period of concern and may be set against this to a level as normally defined by the local planning authority.

5.2 The London Borough of Camden has advised that noise arising from fixed plant installations should be at least 5dB below the existing minimum background noise level (as expressed as an L_{A90}) at the nearest noise affected property. The local authority also confirmed that tonal contributions from plant should be kept to a minimum wherever possible.

5.3 To conform to the above criteria, and in accordance with the minimum background noise levels measured during the survey (summarised in 4.3 above), noise from the proposed plant installations should not exceed the following value.

Daytime plant operation (07:00 to 23:00hrs)	- 28.8 dB L_{Aeq}
24 hour plant operation	- 24.4dB L_{Aeq}

Note: These levels must be achieved cumulatively with all plant operating, and as measured at 1 metre from the window of the nearest affected property.

6.0 Plant Noise Assessment

6.1 We understand that a single new item of plant is to be located on the northerly facing side wall of the property. The new plant item is as follows:

One no. Daikin VRV Heat Pump unit model RXYSQ6P8V1 having a manufacturer's rated noise level of 53dB(A) at 1 metre when running in cooling mode.

6.2 The approximate distance from the new proposed plant to the affected windows of the nearest residential properties, the rear facade of both 5 & 6 Well Road, is approximately 6 metres

6.3 Being a residential property, we have assumed that the plant can run over the full 24 hour period.

6.4 A review of the plant noise level indicates that the unit has a smooth declining curve across the frequency spectrum and that no acoustic feature correction need be added.

6.5 The following table shows our BS 4142 calculation for the condenser emission to the nearest affected window in the properties as detailed in 6.2 above:

Rating Noise Level at nearest window in properties opposite

Description	dB(A)
Unit RXYSQ6P8V1: S.P.L. @ 1m	53
Distance attenuation ($20\log_{10}5/1$)	14
Wall Reflections	+3
Specific Noise Level (dB)	42
Correction for tonality or temporal character (dB)	0
Rating Noise Level (dB)	42
Criterion (24 hr operation) – clause 5.3 above	24
Excess (24hr operation)	**+18**

6.6 It can be seen that the proposed plant will exceed the criterion at the nearest affected windows of the neighbouring properties and acoustic treatment will be required around the unit to meet the recommendations of the local authority.

6.7 To achieve the reduction in noise it will be necessary to enclose the unit in a suitable purpose designed enclosure constructed from a minimum of 50mm acoustic panels having the following minimum transmission loss:

Minimum acoustic panel performance

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Acoustic panel performance (dB)	19	20	25	31	40	42	45	41

6.8 To ventilate the condenser once inside the enclosure it will be necessary to install purpose designed rectangular attenuators on the inlet and discharge openings. These attenuators should have the following minimum insertion loss (I.L.):

Minimum attenuator insertion losses

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Inlet & Discharge Attenuator I.L. (dB)	7	12	20	25	25	22	18	13

6.9 The enclosure and attenuators must be designed to take into account the limited resistance capabilities of the unit to be enclosed. When correctly enclosed with the arrangement as detailed above, the criterion required by the local authority will be achieved.

7.0 Conclusion

7.1 A background noise level survey has been carried out at 26 Christchurch Hill, London NW3 1LG.

7.2 Based upon the survey results and discussions with the local planning authority, criteria applicable to noise from the mechanical services plant have been established.

7.3 A plant noise assessment has been undertaken for the proposed mechanical equipment to be located on the side wall of the above property and it has been established that acoustic treatment will be required in order to meet the requirements of the local authority. Recommendations for such acoustic treatment have been put forward and with these fitted the criterion would be achieved.

Appendix 1 - Glossary of Terms

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (Lp) the reference quantity is $2x10^{-5}$ N/m^2. The sound pressure level existing when microphone measured pressure is $2x10^{-5}$ N/m^2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (Lp).
Frequency	Is related to sound pitch; frequency equals the ratio between velocity of sound and wavelength.
A weighting	Arithmetic corrections applied to values of Lp according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of Lp actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of Lp actually measured.
$L_{n,T}$	Lp which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.
Background Noise Level	The value of $L_{A90,T}$, ref. BS4142:1997.
Traffic Noise Level	The value of $L_{A10,T}$.
Specific Noise Level	The value of $L_{Aeq,T}$ at the assessment position produced by the specific noise source, ref. BS4142:1997.
Rating Level	The specific noise level, corrected to account for any characteristic features of the noise, by adding a 5 dBA penalty for any tonal, impulsive or irregular qualities, ref. BS4142:1997.
Specific Noise Source	The noise source under consideration when assessing the likelihood of complaint.
Assessment Position	Unless otherwise noted, is a point at 1 m from the façade of the nearest affected sensitive property.

Appendix 2 - Environmental Noise Monitoring Data

Date	LAeq	LA90
(2016/09/06 12:14:57.00)	49	42.5
(2016/09/06 12:30:02.00)	47.7	40.6
(2016/09/06 12:45:08.00)	54.9	40.2
(2016/09/06 13:00:13.00)	46	40.7
(2016/09/06 13:15:18.00)	51.6	41.1
(2016/09/06 13:30:23.00)	44.8	39.5
(2016/09/06 13:45:28.00)	46.2	40
(2016/09/06 14:00:33.00)	44.7	38.2
(2016/09/06 14:15:38.00)	45.4	38.7
(2016/09/06 14:30:43.00)	45.7	38.4
(2016/09/06 14:45:49.00)	45.6	38.9
(2016/09/06 15:00:54.00)	45.2	39.6
(2016/09/06 15:15:59.00)	45	39
(2016/09/06 15:31:04.00)	46.4	38.8
(2016/09/06 15:46:10.00)	43.9	37.7
(2016/09/06 16:01:15.00)	51.5	37.8
(2016/09/06 16:16:20.00)	47.1	38.3
(2016/09/06 16:31:25.00)	50.4	38.8
(2016/09/06 16:46:31.00)	44.8	37.8
(2016/09/06 17:01:36.00)	46.5	37.5
(2016/09/06 17:16:42.00)	45	38.3
(2016/09/06 17:31:47.00)	45.5	38.4
(2016/09/06 17:46:53.00)	45	38
(2016/09/06 18:01:58.00)	43.7	37.3
(2016/09/06 18:17:03.00)	51.7	39.3
(2016/09/06 18:32:09.00)	46.1	38.3
(2016/09/06 18:47:14.00)	49.1	38.2
(2016/09/06 19:02:19.00)	50.3	38.2
(2016/09/06 19:17:25.00)	46	38.3
(2016/09/06 19:32:30.00)	45.7	38.5
(2016/09/06 19:47:36.00)	43.1	37.1
(2016/09/06 20:02:41.00)	43	37
(2016/09/06 20:17:47.00)	45.8	38.1
(2016/09/06 20:32:52.00)	41.7	35.1
(2016/09/06 20:47:58.00)	40.5	34.5
(2016/09/06 21:03:03.00)	46.1	35.4
(2016/09/06 21:18:09.00)	44.7	36.6
(2016/09/06 21:33:14.00)	40.2	34.7
(2016/09/06 21:48:19.00)	44.3	34.6
(2016/09/06 22:03:25.00)	42.2	35.5
(2016/09/06 22:18:31.00)	46	35.1
(2016/09/06 22:33:36.00)	39.9	33.8
(2016/09/06 22:48:41.00)	44.2	34
(2016/09/06 23:03:47.00)	45.1	32.3

Date	LAeq	LA90
(2016/09/06 23:18:52.00)	38.3	33.4
(2016/09/06 23:33:58.00)	39.4	32.3
(2016/09/06 23:49:03.00)	39.1	33.2
(2016/09/07 00:04:10.00)	43.8	33.1
(2016/09/07 00:19:15.00)	38.3	33.2
(2016/09/07 00:34:21.00)	38.9	33.1
(2016/09/07 00:49:26.00)	39.9	33
(2016/09/07 01:04:31.00)	38.9	32.9
(2016/09/07 01:19:36.00)	37.1	32.2
(2016/09/07 01:34:42.00)	36.8	31.9
(2016/09/07 01:49:47.00)	38.7	32.5
(2016/09/07 02:04:52.00)	36.7	32.5
(2016/09/07 02:19:57.00)	37.1	33.2
(2016/09/07 02:35:02.00)	37.2	33.1
(2016/09/07 02:50:08.00)	38.8	32.3
(2016/09/07 03:05:13.00)	38.2	31.7
(2016/09/07 03:20:18.00)	37.1	30.4
(2016/09/07 03:35:23.00)	33.9	31.9
(2016/09/07 03:50:28.00)	40.6	33.2
(2016/09/07 04:05:33.00)	47.3	30.8
(2016/09/07 04:20:38.00)	39	31.1
(2016/09/07 04:35:44.00)	39.2	30.6
(2016/09/07 04:50:49.00)	36.4	31.7
(2016/09/07 05:05:54.00)	40	31
(2016/09/07 05:20:59.00)	39	29.4
(2016/09/07 05:36:05.00)	41.8	33.5
(2016/09/07 05:51:10.00)	47.6	31.5
(2016/09/07 06:06:16.00)	44.2	32.3
(2016/09/07 06:21:21.00)	42.4	33.6
(2016/09/07 06:36:27.00)	52.9	34.8
(2016/09/07 06:51:32.00)	51.1	34
(2016/09/07 07:06:37.00)	46.1	34.6
(2016/09/07 07:21:43.00)	49.2	36.3
(2016/09/07 07:36:48.00)	45.3	36
(2016/09/07 07:51:54.00)	45.3	35.2
(2016/09/07 08:06:59.00)	43.1	37
(2016/09/07 08:22:04.00)	43.7	36.3
(2016/09/07 08:37:10.00)	45.8	39.4
(2016/09/07 08:52:15.00)	63.2	39.7
(2016/09/07 09:07:21.00)	61.6	41.3
(2016/09/07 09:22:26.00)	52.9	39.5
(2016/09/07 09:37:32.00)	50.1	39.6
(2016/09/07 09:52:37.00)	57.5	40.8
(2016/09/07 10:07:42.00)	59.7	42
(2016/09/07 10:22:48.00)	47.3	40.5

Date	LAeq	LA90
(2016/09/07 10:37:53.00)	56.5	39.2
(2016/09/07 10:52:59.00)	59	40.4
(2016/09/07 11:08:04.00)	56.5	39.3
(2016/09/07 11:23:10.00)	46.9	39.1
(2016/09/07 11:38:15.00)	58	40.3
(2016/09/07 11:53:20.00)	53.2	39.8
(2016/09/07 12:08:26.00)	47.5	39.7
(2016/09/07 12:23:31.00)	46.6	36.8
(2016/09/07 12:38:37.00)	50.7	38.8
(2016/09/07 12:53:42.00)	49.7	40.7
(2016/09/07 13:08:48.00)	48.1	41.2
(2016/09/07 13:23:53.00)	45.9	39.6
(2016/09/07 13:38:59.00)	47.8	39.2

Figure 1

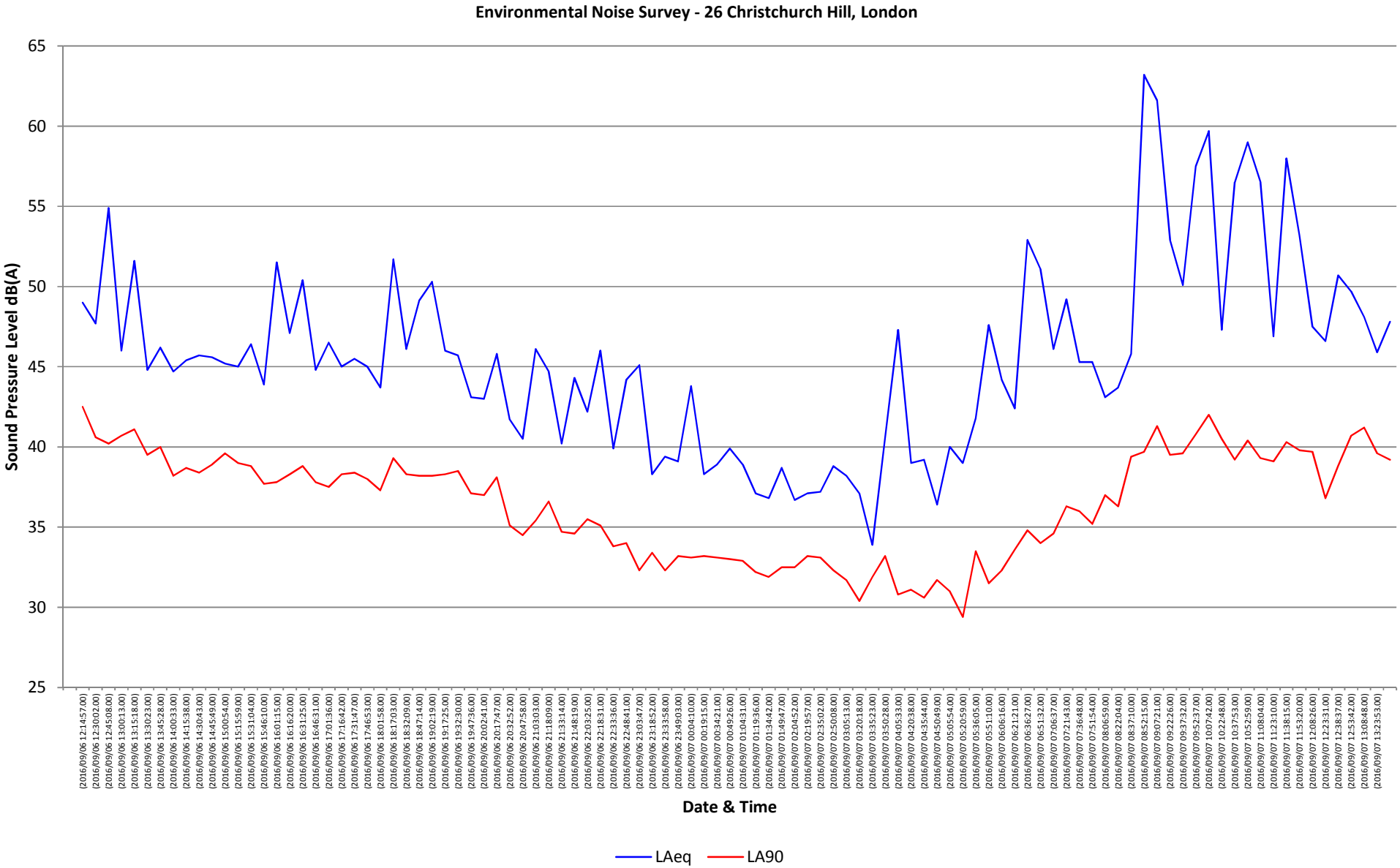
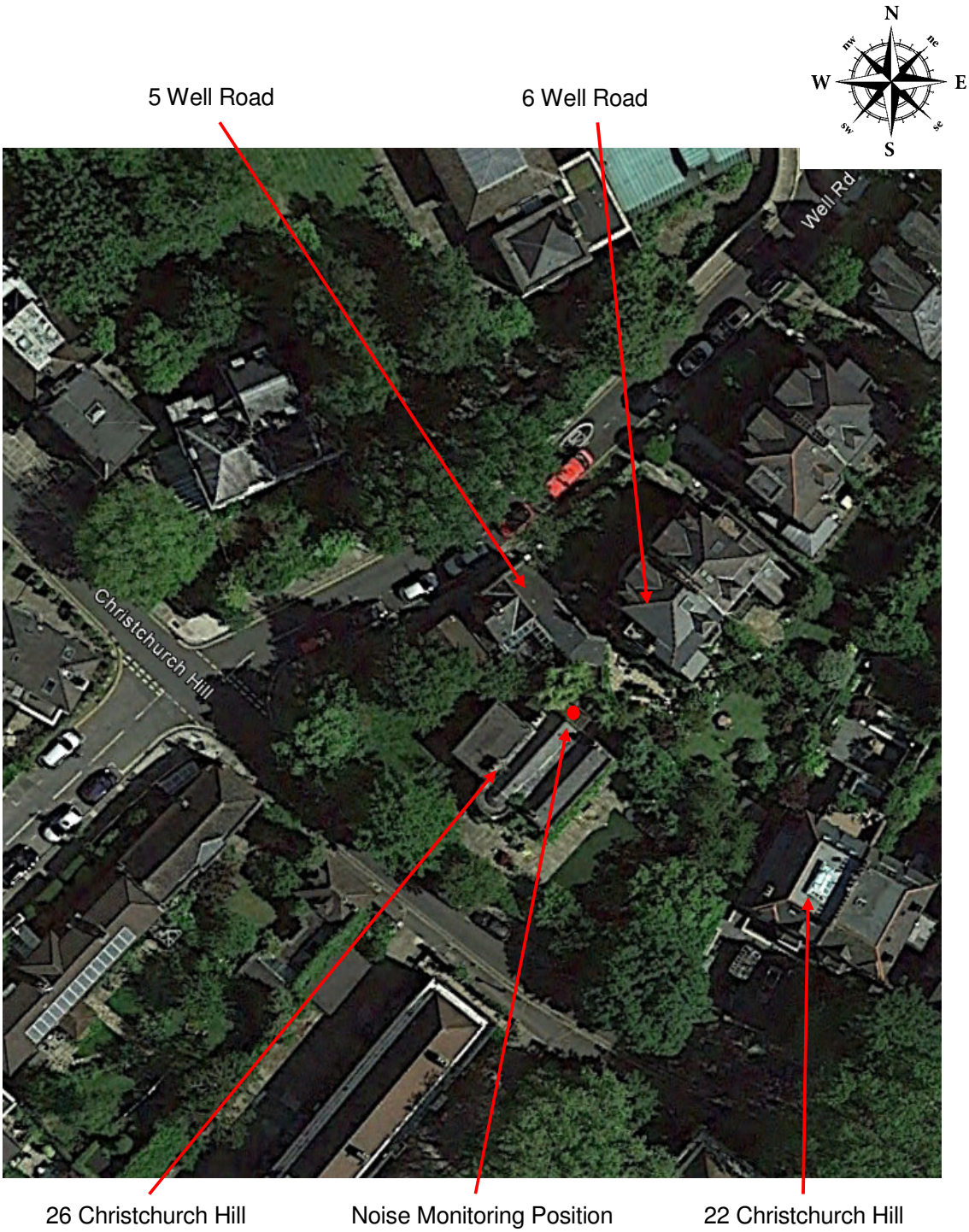

Environmental Noise Survey - 26 Christchurch Hill, London
Sound Pressure Level dB(A)
65
60
55
50
45
40
35
30
25
Date & Time
LAeq
LA90

Figure 2



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