12 Keats Grove

Environmental Noise Survey and Plant Noise Assessment Report

29262/PNA1 Rev2

23 December 2021

CK Properties

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

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Document Control

Rev	Date	Comment	Prepared by	Authorised by
-	19/10/2021	-	Kelvin Carray Assistant Consultant BSc	John Ridpath Director BSc(Hons), MIOA, MIEnvSc
1	29/10/2021		Kelvin Carray Assistant Consultant BSc	John Ridpath Director BSc(Hons), MIOA, MIEnvSc
2	23/12/2021	Revised plant location.		
			Kelvin Carray Assistant Consultant BSc	Kelvin Carray Assistant Consultant BSc

This report has been prepared by Hann Tucker Associates Limited (HTA) with all reasonable skill, care and diligence in accordance with generally accepted acoustic consultancy principles and the purposes and terms agreed between HTA and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by HTA unless expressly stated otherwise. This document contains confidential and commercially sensitive information and shall not be disclosed to third parties. Any third party relies upon this document at their own risk.

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Attachments

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1.0 Introduction

It is proposed to install items of building service plant in the front garden of 12 Keats Grove.

Hann Tucker Associates have therefore been commissioned to undertake a detailed 72 hour daytime and night-time fully automated environmental noise survey of the site to establish the currently prevailing noise climate and propose suitable plant noise emission criteria, based on the results of the survey and the requirements of the Local Authority.

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

This report presents the survey methodology and findings.

2.0 Objectives

To establish, by means of detailed 72 hour daytime and night-time fully automated environmental noise monitoring, the existing A-weighted (dBA) L_{90}, L_{eq} and L_{max} environmental noise levels at a selected accessible position, thought to be representative of the nearest affected property.

Based on the results of the noise survey, and with reference to the requirements of the Local Authority, to recommend suitable plant noise emission criteria.

To assess the proposed plant and comment on its acceptability.

3.0 Site Description

3.1 Location

The site falls within the jurisdiction of the London Borough of Camden. The location is shown on the following map.

Location Map © Google 2021

3.2 Description

The site overlooks Keats Grove to the south. The immediate surrounding area is residential. It is proposed to install the plant in the front garden. The nearest noise sensitive receptors are the front windows of the neighbours to the east and west.

3.3 Acoustic Terminology

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

The site extents are shown on following Site Plan.

Site Plan showing the site extents © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

4.0 Acoustic Standards and Guidelines

BS 4142:2014

When setting plant noise emission criteria reference is commonly made to BS 4142: 2014 "*Methods for rating and assessing industrial and commercial sound".*

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains "a tone, impulse or other characteristic" then various corrections can be added to the specific (source) noise level to obtain the "rating level".

BS 4142 states 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 estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

• *"Typically, the greater this difference, the greater the magnitude of the impact."*

• *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*

• *"A difference of around +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 sound level, the less likely it is that the specific sound source will have an adverse impact or a 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 impact, depending on the context."*

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to "No Observed Effect Level" as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of "low impact".

5.0 Survey Methodology

5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:00 hours on Friday 15th October to 12:15 hours on Monday 18th October 2021.

At the beginning and end of the survey period the wind conditions were moderate. The sky was clear with some patches of cloud. We understand that generally throughout the survey period the weather conditions were similar to this with some rainfall on the morning of Saturday 16th.

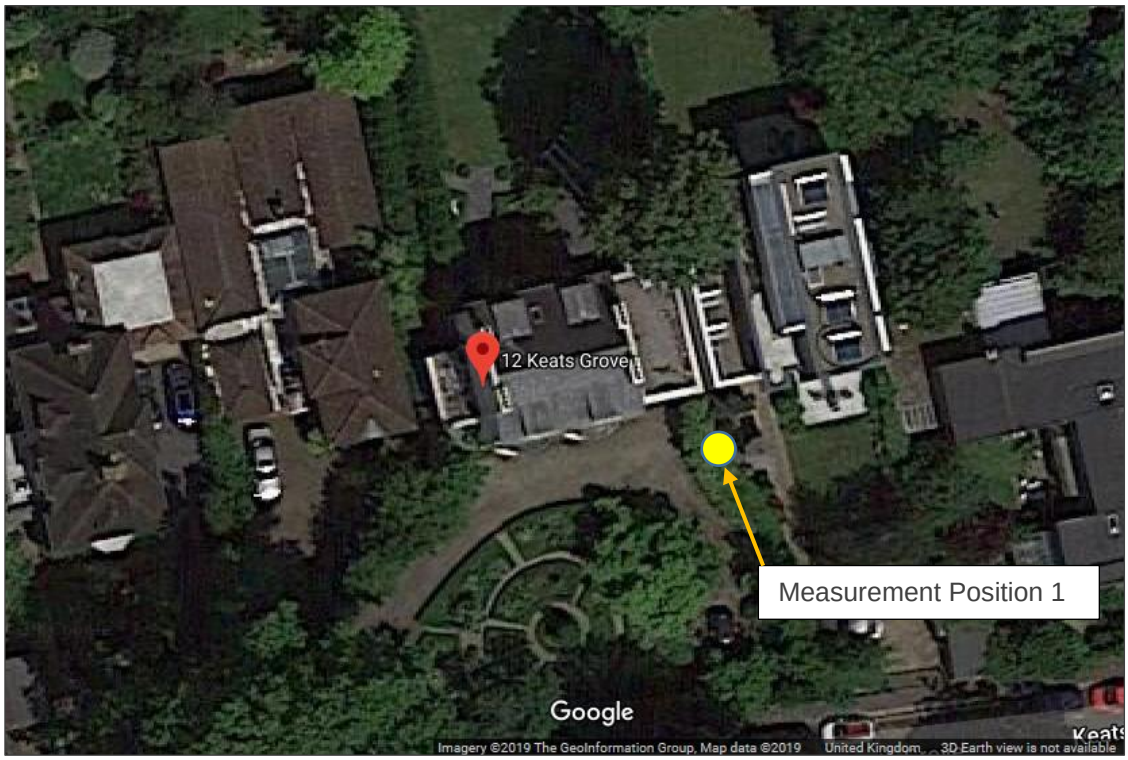
These conditions are considered suitable for obtaining representative measurement results.

5.2 Measurement Position

The noise level measurements were undertaken at a single position at the site. The measurement position is described in the table below.

Position No	Description
1	The sound level meter was located on the east boundary fence of the front garden. The microphone was attached to a pole approximately 3m above ground level, 30cm above the top of the fence, and away from any reflecting surfaces.

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 following plan.



Site Plan showing the measurement position © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

5.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	PCB	377B02	132146	Calibration on 02/07/2021
Preamp	Larson Davis	PRM902	4215	Calibration on 02/07/2021
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3838	Calibration on 02/07/2021
SLM Calibrator	Bruel & Kjaer	4230	494325	Calibration on 14/12/2020

The sound level meter, including the extension cable was calibrated prior to and on completion of the survey. 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 windshield.

6.0 Results

The results have been plotted on Time History Graph 29262/TH1 enclosed, presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} noise levels at the measurement position throughout the duration of the survey.

The lowest $L_{A90\ (15\ min)}$ measurements recorded during the survey are presented in the table below:

Lowest Measured $L_{A90(15min)}$ Background Noise Level (dB re 2 x 10^{-5} Pa)			
Position	**Daytime (07:00 – 23:00) Hours**	**Night-Time (23:00 – 07:00) Hours**	**24 Hours**
1	39 dBA	37 dBA	37 dBA

7.0 Discussion Of Noise Climate

During our time on site, the dominant noise sources were noted to be from construction at 12 Keats Grove itself, and traffic on surrounding roads.

8.0 Plant Noise Emission Criteria

The site comes under the jurisdiction of Camden Borough Council, which outlines its requirements as below in *Camden Local Plan 2017: Appendix 3*

"…a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion.

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 window (façade)*	*Day*	*'Rating level' 10dB below background*	*'Rating level' 9dB below and 5dB above background*	*'Rating level' greater than 5dB above background*
*Dwellings **		*Night*	*'Rating level' 10dB below background and no events exceeding 57dBL_{Amax}*	*'Rating level' 9dB below and 5dB above background or noise events between 57dB and 88dBL_{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 are given for dwellings, however, levels are use specific and different levels will apply dependant on the use of premises"

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 windows.

Plant Noise Rating Emission Criteria (dB re 2x10-5 Pa)			
Position	**Daytime (07:00 – 23:00) Hours**	**Night-Time (23:00 – 07:00) Hours**	**24 Hours**
1	29 dBA	27 dBA	27 dBA

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

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 London Borough of Camden Borough Council.

9.0 Plant Noise Impact Assessment

It is proposed to install the following items of building services plant.

Plant Description	Location	Qty	Plant Make	Model Number
Air Source Heat Pump	Front Garden	1	Mitsubishi	PUZ-VM112
Air Source Heat Pump	Front Garden	3	Daikin	RXYSCQ6TV1

9.1 Plant Noise Data

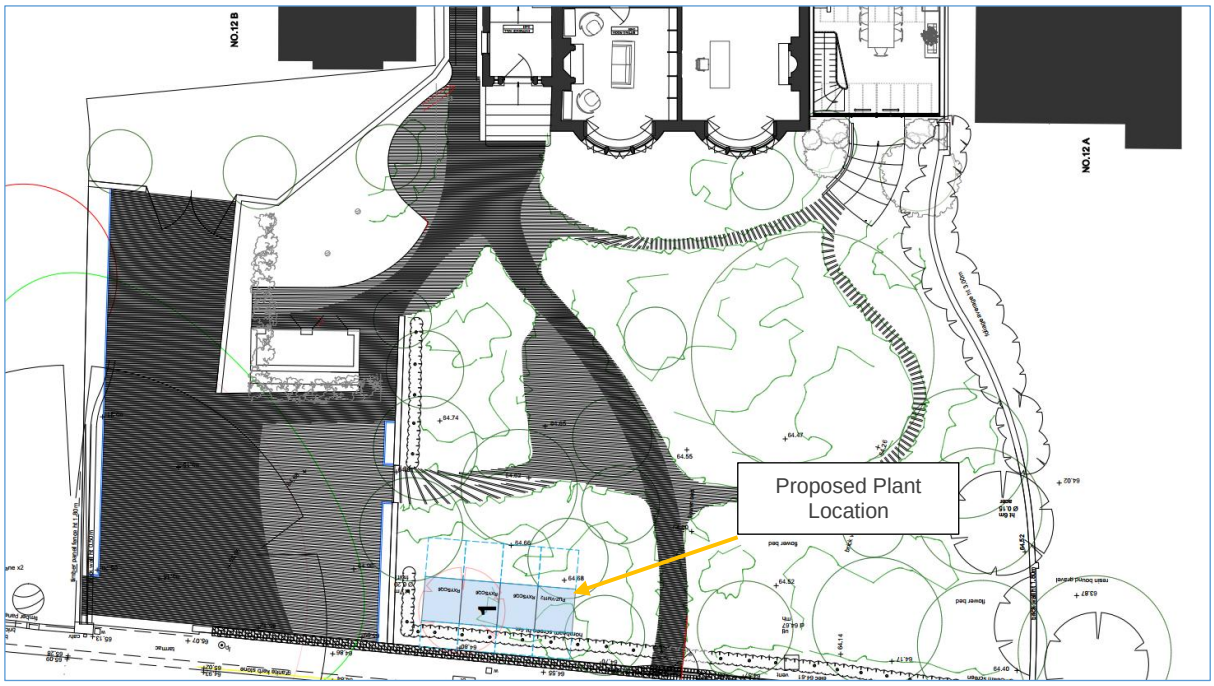
We understand the manufacturer's noise data for the equipment is as follows::

Plant Description	Sound Pressure Level @ 1m (dB re 2 x 10^{-5})
PUZ-VM112	45 dBA
RXYSCQ6TV1	53 dBA

9.2 Location of Plant

It is proposed to install the plant in the front garden. The nearest noise sensitive receptors are the residential windows of the neighbours to the east and west of the main building, approximately 20 metres and 25 metres away.

Our acoustic analyses are based on the following drawing provided by Helen Thomas, CK Properties.



Reference	Title	Date
1168 12 KG 8120	Site Plan with Proposed Air Source Heat Pumps	10/10/2021

The plant locations and noise sensitive receptors are shown on the following site plan.

Site Plan showing the proposed plant locations and noise sensitive receptors © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

9.3 Mitigation Measures

In order to control plant noise emissions in line with the proposed criterion, we recommend installing the units in an acoustic enclosure capable of providing no less no less than 12 dBA reduction (see Specification for Small Acoustic Enclosures in Appendix B).

9.4 Plant Noise Impact Assessment

We understand that the proposed units may be operational during daytime and night-time hours. The following tables present our calculations relating to the proposed plant installation.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3dB feature correction as advised in BS 4142:2014 has been applied for the possible present of *"… characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment …."*.

Calculations for Noise Sensitive Window 1	**Sound Pressure Level (dB re 2 x 10^{-5})**
RXYSCQ6TV1	53 dBA @ 1m
Correction for 3no.	+ 5
20m Distance Correction	- 26
Proposed Enclosure	- 12
Acoustic feature correction	+3
Sound Pressure Level at Nearest Residential Window 1	23 dBA
PUZ-VM112	45 dBA @ 1m
20m Distance Correction	- 26
Proposed Enclosure	- 12
Acoustic feature correction	+3
Sound Pressure Level at Nearest Residential Window 1	10 dBA
Cumulative Sound Pressure Level at Residential Window 1	23 dBA
Façade Reflection	+ 3dBA
Resultant Sound Pressure Level at Residential Window 1	**26 dBA**

Calculations for Noise Sensitive Window 2	Sound Pressure Level (dB re 2 x 10^{-5})
RXYSCQ6TV1	53 dBA @ 1m
Correction for 3no.	+ 5
25m Distance Correction	- 28
Proposed Enclosure	- 12
Acoustic feature correction	+3
Sound Pressure Level at Nearest Residential Window 2	21 dBA
PUZ-VM112	45 dBA @ 1m
24m Distance Correction	- 28
Proposed Enclosure	- 12
Acoustic feature correction	+3
Sound Pressure Level at Nearest Residential Window 2	8 dBA
Cumulative Sound Pressure Level at Residential Window 2	21 dBA
Façade Reflection	+ 3dBA
Resultant Sound Pressure Level at Residential Window 2	**24 dBA**

Our calculations indicate that the proposed plant, in conjunction with the proposed mitigation measures should be capable of achieving the requirements of the Local Authority outlined in Section 8.0.

10.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's planning condition.

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

The assessment indicates that the proposed plant, in conjunction with the proposed attenuation, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential windows.

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

Specification for Small Acoustic Enclosures

The condenser 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 from the enclosure in any horizontal or vertical direction under any load conditions in situ.

Plant Description	A-weighted Limiting Sound Pressure Level @ 1m (dB re 2 x 10^{-5} Pa)
PUZ-VM112	33 dBA
RXYSCQ6TV1	41 dBA

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 shall 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.

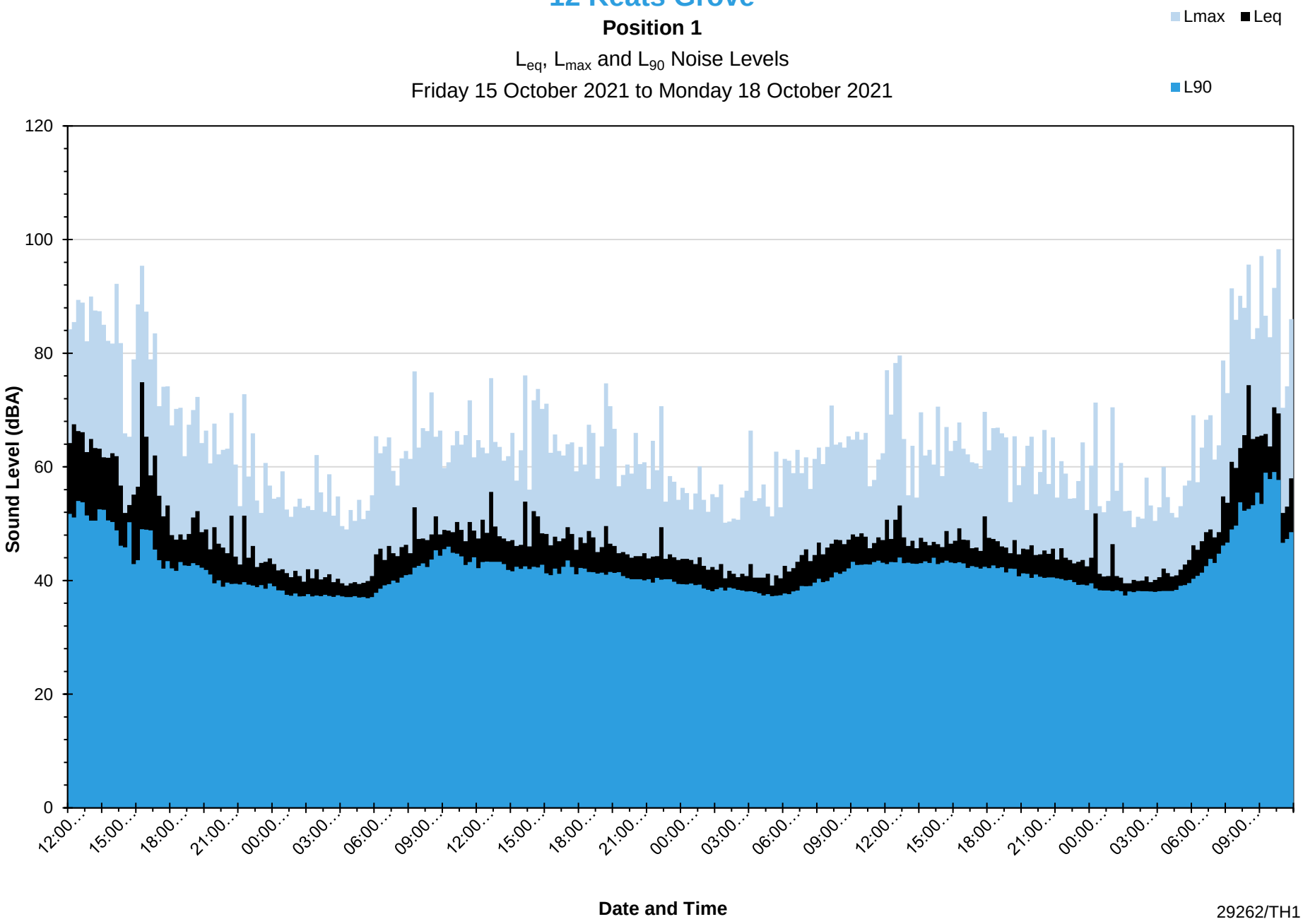
Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

12 Keats Grove

Position 1

L_{eq}, L_{max} and L_{90} Noise Levels

Friday 15 October 2021 to Monday 18 October 2021



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