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CLIENT PROJECT REFERENCE:

Kemps Grill, 31 Joel Street, Northwood Hill, HA6 1NU

ENVIRONMENTAL NOISE SURVEY

PREPARED FOR:

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(On behalf of Kemps Grill, 31 Joel Street, Northwood Hill, HA6 1NU)

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Date: 08/09/2022

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1. Summary

A Noise Impact Assessment is carried out at the premises at 31 Joel Street, Northwood Hill, HA6 1NU on Monday 29th August 2022. Ron-berks Acoustics Ltd has been approached by Mrs Umut Gedik Kilic of Narch Design and Build (on behalf of 31 Joel Street, Northwood Hill, HA6 1NU) to undertake an environmental noise survey at the site in order to determine the impact of the sound sources upon noise sensitive receptors.

The results of the noise survey were considered reasonable given the location of the measurement position and the existing noise sources in the local neighbourhood. Noise calculations of the sound sources have been undertaken using available details and plans provided by the client and obtaining manufacturers' specifications wherever possible. The data and information form the basis of the assessment. A BS4142:2014+A1:2019 noise assessment has been carried out at the site.

In accordance with BS4142:2014+A1:2019 guidance, **the day rating level at nearest receptor** does not exceed the background sound level. It has been shown that the day rating noise levels at nearest receptor are 14.5 dB(A) below the background level at proposed first floor window of 31 Joel Street. ***Therefore, the operation of the sound sources indicates the specific sound sources having a low adverse impact.***

The night rating noise levels at nearest receptor are 10.5 dB(A) below the background level at first floor flat above the site. In accordance with BS4142:2014+A1:2019 guidance, the night rating noise level is ***an indication of the specific sound source having a low adverse impact.***

The summary of the difference between rating level and background noise level of all noise sensitive receptor is given in table below.

Noise sensitive receptor	Difference between Rating level and Background level	
	Day	Night
First floor flat of 31 Joel Street, Northwood Hill, HA6 1NU (above the site)	-14.5 dB(A)	-10.5 dB(A)

According to table above, the operation of the sound sources indicates the specific sound sources having a low adverse impact during daytime and night time.

Consequently, the measured noise level of the sound sources is expected to comply with BS4142:2014+A1:2019 guidance, and London Hillingdon Council's policy.

2. Introduction

Acoustic measurements were carried out at Kemps Grill, No: 31 Joel Street, Northwood Hill, HA6 1NU, on Monday 29th August 2022 (see Figure 1). Environmental Noise Survey was undertaken in accordance with BS4142:2014+A1:2019, on the request of London Hillingdon Council. The site is located on a busy road with high background noise level.



Figure 1: Front view of Kemps Grill, 31 Joel Street, Northwood Hill, HA6 1NU.

3. Site Description

31 Joel Street, Northwood Hill, HA6 1NU (shown by yellow line in Figure 2), the site, is seeking planning permission for the extractor fan, air conditioning and refrigeration compressor units installed at the back of the premises. The building has four floors including the roof. The premises is located in a mixed commercial and residential area.



Figure 2: Site location and surrounding land use, Google Earth map.

4. Environmental Noise Survey Methodology

Environmental noise survey was undertaken at one measurement location at the rear of the site between 14:50 and 23:32 to determine day and night noise levels in accordance with the methodology contained within BS4142:2014 +A1:2019 as shown in Figure 3. Noise survey at given time covers the most sensitive period of the time in which the noise units may be operational.



Figure 3: Measurement set-up, noise sensitive receptors, noise sources at the site and showing measurements position at the rear of the site.

4.1. Sound sources under investigation

The noise source considered here is extractor fan unit (Helios GigaBox, model: GBD560/4/4), two air conditioning units (Mitsubishi, model: SRC71ZR-W) and two refrigeration compressor units (Unit model: M016-TKP-NT6226.ES5). Air conditioning and refrigeration compressor units are floor mounted at the rear of the site while the extractor fan unit is wall mounted.

4.2. Measurement equipment

A description of the equipment used for the noise survey are given in the Table 1.

Table 1: Description of the Equipment used for measurements

Equipment	Description	Quantity	Serial No
Norsonic SLM	Type 1 sound level meter, NOR140	1	1403870
Norsonic	½ inch microphone	1	1225
Norsonic	Preamplifier	1	1209
Norsonic	Class 1 Calibrator (114 dB)	1	125525649

4.3. Parameters measured

BS4142:2014+A1:2019 gives a method for assessing the impact of specific sounds based upon the amount, in dB, that a specific sound level exceeds the background sound level, taking into account the context of the situation. The standard requires measurement of the **specific sound level**, in $L_{Aeq,T}$ over a period of 1 hour (daytime) and 15 minutes (night time), and the **background sound level**, L_{AF90} , when the specific sound is not in operation, the **residual sound level**, L_{Aeq} , when the specific sound is not in operation, and the background and residual sound should be measured at times which are **representative of and similar to** those at which the specific sound is in operation. Noise parameters were measured using a calibrated system over a period of the time that is representative of the worst-case condition. Ambient, residual,

background, and maximum noise levels were measured in 1/3 octave bands throughout the noise survey.

Weather conditions were noted to be 22 degrees Celsius with mostly cloudy skies at the beginning of the measurements with a light wind, which was less than 3 m/s, and 18 degrees Celsius at the end of the measurements with a partly cloudy sky and a wind, which was less than 4 m/s. These weather conditions were checked against and confirmed using the Meteorology Office mobile application available on smart phone technology.

The noise monitoring equipment was calibrated before and after the measurements. No significant drift was recorded during calibration as shown in Table 2.

Table 2: Calibration details

Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
Day	114.0	114.10	0.10	113.8	-0.2
Night	114.0	114	0.0	114.0	0.20

4.4. Measurements

To undertake a BS4142:2014+A1:2019 assessment it is necessary to measure the noise levels with and without the sound sources in operating. Noise measurements were taken to determine day and night noise levels with and without sound sources in operation. *Firstly*, residual noise levels at the rear of the site was measured. *Secondly*, ambient noise levels at the rear of the site were measured when noise sources were in operation. *Finally*, night residual and ambient noise levels were measured at the rear of the site.

The sound level meter was positioned at minimum 3.5 metre away from nearby walls/fences (3.5 metres from noise sources). The sound level meter was mounted onto a tripod at 1.35 metre above rear terrace of the site as shown in Figure 4.

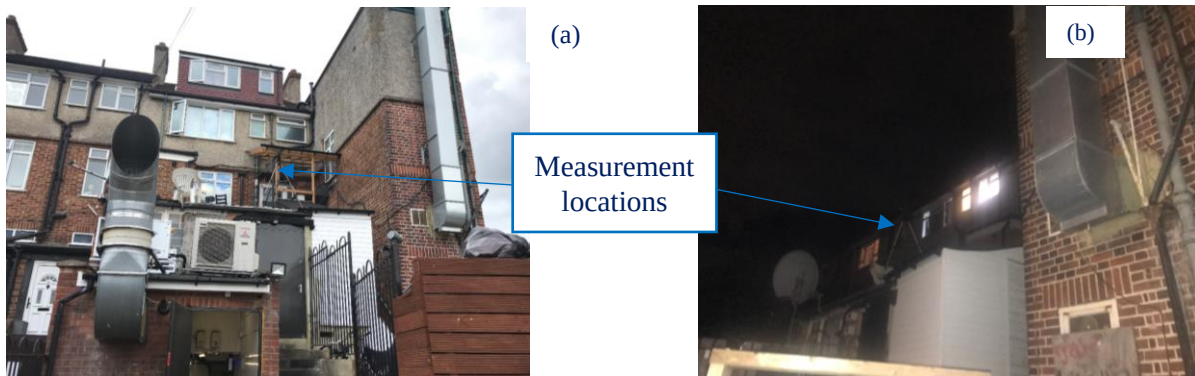


Figure 4: Measurement set-up: a) Day noise measurements at the rear of the site and b) Night noise measurements at the rear of the site.

5. Noise survey results and observations

5.1 Results

A noise survey was carried out at the site. Detailed day and night noise level results are given below.

5.1.1 Day noise levels

Measured ambient ($L_{Aeq,1h}$), residual ($L_{Aeq,1h}$), and background ($L_{AF90,1h}$), levels are 54.8 dB, 54.1 dB and 48.1dB respectively. Highest L_{AMax} , was 83.3 dB that was observed at 15:50 during

measuring background noise levels. A comparison of L_{Aeq} , L_{AMax} , L_{A10} and L_{A90} results with and without sound sources in operation is given in Table 3.

Table 3: Sound Pressure Levels measured at the rear of the site.

Operator Attended Day Noise Levels					
Measurements of all noise at the assessment location					
Recorded Time	Noise sources	L_{Aeq}	L_{AFmax}	$L_{AF,10}$	$L_{AF,90}$
17:21	on	54.8	76.1	59.2	51.3
18:28	on	55.8	77.3	60.1	53.3
22:40	on	53.6	80.2	54.4	49.4
Average Levels		$L_{Aeq,1h}$ =54.8dB	$L_{AFmax,1h}$ =78.2dB	$L_{AF10,1h}$ =58.5dB	$L_{AF90,1h}$ =51.6 dB
Operator Attended Background Noise Levels					
15:50	Off	54.1	83.3	55.4	48.1
		$L_{Aeq,1h}$ =54.1dB	$L_{AFmax,1h}$ = 83.3dB	$L_{AF10,1h}$ = 55.4dB	$L_{AF90,1h}$ =48.1 dB

5.1.1.1 Objective method to determine noticeable characteristics

Section B.2.1.1 of BS4142:2014+A1:2019 states “Establish whether standing waves/interference patterns are present by considering the nature of the source and the influence of any nearby sound reflecting surfaces. This can be carried out subjectively by listening in several places around the measurement location, or by measuring any change in sound pressure levels with a sound level meter at different locations in the immediate locality when traversing the measurement location”.

Section 9.3 of BS 4142:2014+A1:2019 states that if the subjective method is not sufficient for assessing the audibility of tones in sound or the prominence of impulsive sounds, use the one-third octave method in 9.3.2.

Annex C of BS 4142:2014+A1:2019 states that the test for the presence of a prominent, discrete-frequency spectral component (tone) typically compares the $L_{Zeq,T}$ sound pressure level averaged over the time when the tone is present in a one-third-octave band with the time-average linear sound pressure levels in the adjacent one-third-octave bands. For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by some constant level difference.

The level differences between adjacent one-third-octave bands that identify a tone is:

- **15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);**
- **8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz); and**
- **5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz).**

Firstly, the character correction was determined by using subjective methods listening in several places around the sound sources and at measurement location in accordance with the methodology contained within section B.2.1.1 of BS 4142:2014+A1:2019. No acoustic features were observed from the sound sources that are installed at the rear of the site.

Secondly, objective method was used to assess the audibility of tones in sound in accordance with the methodology contained within section 9.3 and section Annex C of BS4142:2014+A1:2019.

- The level differences between adjacent low-frequency one-third-octave bands (25 Hz to 125 Hz) is within 15 dB limit.

- The level differences between adjacent middle-frequency one-third-octave bands (160 Hz to 400 Hz) does not exceed the 8 dB limit.
- The level differences between adjacent high-frequency one-third-octave bands (500 Hz to 10 000 Hz) does not exceed the 5 dB limit as it is shown in Table 4.

Hence, there was no tonality found in the sound units' noise. The sound is not tonal according to Annex C in BS4142:2014 + A1:2019.

Table 4: Sound Levels measured for fifteen minutes at the rear of the site with the sound sources in operation.

Frequency (Hz)	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz
$L_{Aeq,15m}$	62.5	58.9	57.6	64.6	57.9	55.1	55.3	53.2	55.3	55.8	49.8	47	45.7	45.1
Frequency (Hz)	630 Hz	800 Hz	1.0 kHz	1.25 kHz	1.6 kHz	2.0 kHz	2.5 kHz	3.15 kHz	4.0 kHz	5.0 kHz	6.3 kHz	8 kHz	10 kHz	
$L_{Aeq,15m}$	43.9	44.1	44.3	43	42	39.7	38.7	38.1	39.8	40	39.6	38.7	36.8	

The impulsivity of the sound from the sound sources was investigated by checking the onset rate using Annex E of BS4142:2014+A1:2019. The onset rate is less than 10 dB/s. **Therefore, the sound is not impulsive, according to BS4142:2014+A1:2019 Annex E.**

When the sound source was switched on and off, the specific sound was identifiable at 1 meter from the sound source. The intermittency was distinctive against the residual acoustic environment at 1 m from the source. It would be prudent in this instance to allow a **3dB penalty**.

5.1.2 Night levels

Night noise level were measured at the rear of the site between 23:00 and 23:32. Measured ambient ($L_{Aeq,15minutes}$), residual ($L_{Aeq,15minutes}$), and background ($L_{AF90,15minutes}$), levels are 52.2 dB, 50.6 dB and 44.5 dB respectively. Highest L_{AMax} , was 71.5 dB that observed at 23:16 during measuring background noise levels. A comparison of L_{Aeq} , L_{AMax} , and L_{A90} results with and without noise sources in operation is given in Table 5.

Table 5: Background noise levels

Time	Noise sources	L_{Aeq}	L_{AFmax}	$L_{AF,10}$	$L_{AF,90}$
23:15	off	50.6	71.5	52.4	44.5
23:32	on	52.2	68.7	55.2	46.9

5.2 Observations

Attended noise level measurements were carried out at the site. Observations and detailed notes were made of the significant noise sources, which contribute to each of the measured levels.

Road Traffic Noise: Road traffic noise from Joel Street and Briarwood Drive was audible at the monitoring locations and it was dominant noise source.

People noise: noise from people walking by the side was audible at measurement locations, but not subjectively loud during the measurement period attended.

Site Sound sources (AC, Refrigeration compressor and Extractor Fan Noise): Noise from sound sources was audible at measurement locations, at 1 m from metal fences/walls (3.5 metre from the noise sources).

Neighbourhood Sound sources (AC, Refrigeration compressors and Extractor Fan Noise): Noise from mechanical sources of neighbour shops was audible at measurement locations.

Motorcycles noise: Motorcyclists (delivery drivers) were parked on Briarwood Drive near the site and their noise was audible to measurement location.

Airplane Noise: Airplane noise was audible at measurement location but it was not dominate noise source.

5.3 Uncertainty

The levels of uncertainty in the data and calculations are low given the robust measurements undertaken in noise monitoring and the confidence in the data statistical analysis.

6 Noise Impact Assessment

6.1 BS4142:2014+A1:2019

BS4142:2014+A1:2019 provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. The key aspects of the BS4142:2014+A1:2019 are summarised below. The standard presents a method of assessing potential noise impact by comparing the noise level due to industrial sources (the Rating Level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the Background Sound Level). The Specific Noise Level - the noise level produced by the source in question at the assessment location - is determined and a correction applied for certain undesirable acoustic features such as tonality, impulsivity or intermittency. The corrected *Specific Noise Level* is referred to as the *Rating Level*.

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.

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB 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.

BS4142:2014+A1:2019 criteria are given below;

Difference between the rating level and the background level	Assessment (All dependant on the context)
Around 10 dBA or more	<i>Indicates a significant adverse impact</i>
Around 5 dBA	<i>Indicates an adverse impact</i>
Below 5 dBA	<i>Lower the adverse impact</i>
Below 0 dBA	<i>Low adverse impact likely</i>

6.2 Assessment

6.2.1 Day noise impact

Specific noise level is the logarithmic difference between ambient noise, 54.8 dB(A), and residual noise levels, 54.1 dB(A).

$$\text{Specific noise level} = 10 \cdot \log(10^{54.8/10} - 10^{54.1/10}) = 46.6 \text{ dB(A)}$$

Specific noise level is 46.6 dB(A). No tonality and impulsivity were observed at the rear of the site, but 3 dB penalty was allowed for intermittency. The rating level $L_{Aeq\ Tr,1h}$ is equal to the specific noise level plus 3 dB for intermittency.

$$L_{Aeq\ Tr,1h} = 46.6 + 3 = 49.6\ \text{dB(A)}$$

Day rating level $L_{Aeq\ Tr,1h} = 49.6\ \text{dB(A)}$

6.2.2 Night noise impact

Measured ambient ($L_{Aeq,15\text{minutes}}$), residual ($L_{Aeq,15\text{minutes}}$), and background ($L_{AF90,15\text{minutes}}$), levels are 52.2 dB, 50.6 dB and 44.5 dB respectively. Specific noise level is the logarithmic difference between ambient noise, 52.2 dB(A), and residual noise levels, 50.6 dB(A).

$$\text{Specific noise level} = 10 \cdot \log(10^{52.2/10} - 10^{50.6/10}) = 47\ \text{dB(A)}$$

3 dB penalty was allowed for intermittency. The rating level $L_{Aeq\ Tr,1h}$ is equal to the specific noise level plus 3 dB for intermittency.

$$L_{Aeq\ Tr,1h} = 47 + 3 = 50\ \text{dB(A)}$$

Night rating level $L_{Aeq\ Tr,1h} = 50\ \text{dB(A)}$

6.3 Distance attenuation

The nearest noise sensitive receptors to noise sources were noted to be the first floor flats (29-31 Joel Street) above the site. First floor flat windows are at 7 metres distance from the noise source. The noise levels at window of the nearest noise sensitive receptors can be predicted using outdoor sound propagation equation;

$$L_{Aeq,Tr} - L_{Receptor} = 20 \log \left(\frac{r_2}{r_1} \right)$$

Distance attenuation at 7 metres (*first floor window*) from noise sources is 6 dB(A) using a 3.5 metres measurement distance from the noise source.

6.4 Barrier attenuation

Screening of the air conditioning unit to prevent line of sight to the source would reduce noise levels at the receivers. The back wall of the shop significantly cuts the line of sight at first floor flats.

Theory of outdoor sound propagation suggest that if the line-of-sight is significantly cut by a barrier/wall then a 10 dB(A) reduction can be expected.

If the line-of-sight is just cut by a barrier/wall then a 5 dB(A) reduction might be expected.

As it can be seen from Figure 3, the line of sight of nearest noise sensitive receptor is significantly cut the by the wall and rear-terrace of the site.

6.5BS 4142 Assessment for nearest noise sensitive receptors

6.5.1 Nearest receptor, first floor flat (31 Joel Street)

Daytime noise assessment:

The installed sound sources with a noise output of 46.6 dB(A)@ 3.5 metres and applying the factors discussed above would predict a noise rating level of 33.6 dB(A) at noise sensitive receptor. The **background noise level** $L_{AF90,1h}$ is 48.1 dB(A). The noise level at the receptor is 14.5 dB(A) below background noise level as calculated in table below.

In accordance with BS4142:2014+A1:2019 guidance and criteria, ***the rating level does not exceed the background sound level. This is an indication of the specific sound source having a low adverse impact (low adverse impact likely).***

BS4142 Assessment- Daytime first floor flat of 31 Joel Street	dB(A)
Specific Sound Level	46.6
Characteristic penalty	3
Distance attenuation at 7m	-6
Line-of-site cut significantly (barrier attenuation)	-10
Rating Level at receptor point	33.6
Daytime background level, L_{A90}	48.1
Difference between rating level and background level	-14.5

Night-time noise assessment:

The installed sound sources with a noise output of 47 dB(A)@ 3.5 metres and applying the factors discussed above would predict a noise rating level of 34 dB(A) at the sensitive receptor. The background noise level $L_{AF90,1h}$ is 44.5 dB(A). The noise level at the receptor is 10.5 dB(A) below background noise level as calculated in table below.

In accordance with BS4142:2014+A1:2019 guidance and criteria, ***the rating level does not exceed the background sound level. This is an indication of the specific sound source having a low adverse impact (low adverse impact likely).***

BS4142 Assessment- Night first floor flat of 31 Joel Street	dB(A)
Specific Sound Level	47
Characteristic penalty	3
Distance attenuation at 73m	-6
Line-of-site cut significantly (barrier attenuation)	-10
Rating Level at receptor point	34
Daytime background level, L_{A90}	44.5
Difference between rating level and background level	-10.5

7. Vibration

In addition to the control of airborne noise transfer, it is important to consider the transfer of noise as vibration to adjacent properties as well as any sensitive areas of the same building. Sound sources at the site was installed with proper connections to back wall of the site. No vibration from the mechanical units was observed. There was not any structural borne noise from the mechanical units.

8. Conclusion

Ron-Berks Acoustics Ltd has undertaken an environmental noise survey at No. 31 Joel Street, Northwood Hill, HA6 1NU, on Monday 29th August 2022 in order to determine prevailing day and night noise levels that are representative of the nearest noise sensitive neighbouring

residential receivers. A BS4142:2014+A1:2019 noise assessment has been carried out at the site. All worst-case situations have been considered for the assessment.

In accordance with BS4142:2014+A1:2019 guidance, **the day rating level at nearest receptor** does not exceed the background sound level. It has been shown that the day rating noise levels at nearest receptor is 14.5 dB(A) below the background level at proposed first floor window of 31 Joel Street. ***Therefore, the operation of the sound sources indicates the specific sound sources having a low adverse impact.***

The night rating noise levels at nearest receptors are 10.5 dB(A) below the background level at first floor flat above the site. In accordance with BS4142:2014+A1:2019 guidance, the night rating noise level is ***an indication of the specific sound source having a low adverse impact.***

The summary of the difference between rating level and background noise level of all noise sensitive receptor is given in table below.

Noise sensitive receptor	Difference between rating level and background level	
	Day	Night
First floor flats of 31 Joel Street, Northwood Hill, HA6 1NU (above the site)	-14.5 dB(A)	-10.5 dB(A)

According to table above, the operation of the sound sources indicates the specific sound sources having a low adverse impact during daytime and night time.

Consequently, the measured noise level of the sound sources is expected to comply with BS4142:2014+A1:2019 guidance, and London Hillingdon Council's policy.

9. References

- 1 BS4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound".

10. Appendix A: Acoustic Terminology

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Ambient noise level	The totally encompassing sound in a given $L_{Aeq,T}$ situation at a given time, usually composed of sound from many sources near and far.
Background noise level	The A-weighted sound pressure level of the $L_{A90,T}$ residual noise at the assessment position exceeded for 90% of a given time interval T, measured using the fast response and reported to the nearest whole dB.
Rating level $L_{Ar,T}$	The specific noise level plus any adjustment for the characteristic features of the noise.
Residual noise level	The ambient noise level at the assessment $L_{Aeq,T}$ position in the absence of the noise source under investigation.
Specific noise level	The equivalent continuous A-weighted noise $L_{Aeq,T}$ level produced by the source over a given reference time interval.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{n,T}$	The noise level exceeded for n% of the time over a given period T. e.g., L90, the noise level exceeded for 90% of the time (background noise) level.
L_{Max}	The maximum noise level measured.