

DIECAST VENUE – NOISE LIMITER INSTALLATION TEST

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Contact	Joel Wilkinson
Project	Diecast Venue – Noise Limiter Installation Test
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INTRODUCTION

- 1.1.1 Three Spires Acoustics have been commissioned by Diecast Ltd to undertake acoustic commissioning testing following the installation of 2Nos Dateq SPL6 sound limiters, within Leno Ex Machina and the Beer Hall which form part of the Diecast venue. The testing has been required in order to satisfy the requirements of planning condition 4 related to planning consent reference 133523/FO/2022 issued by the local planning authority at Manchester City Council (MCC).
- 1.1.2 This is a supplementary report following an initial assessment and subsequent reconfiguration of the noise limiters following comments by MCC Environmental Health Department.

1.2 Planning Condition

- 1.2.1 Condition 4 is reproduced below.

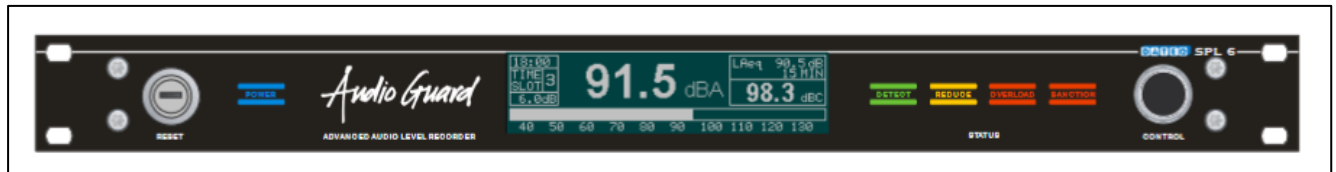
‘Prior to any commencement of the use/s hereby approved, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommended noise levels and acoustic insulation requirements, relating to information as set out in Sections 6.3 and 6.5, as well as Tables 7, 8 and 9 of the Planning Noise Assessment report prepared by Hoare Lea (Reference REP-1013578-5A-AP-20220203-PlanningNoiseAssessment-Rev03 dated 24/03/22) - Received by the Council 13/04/22, in order to achieve and adhere to the acceptable noise limits relating to both the breakout of noise (including entertainment noise) and plant equipment noise. The report shall also undertake a suitable amount of post completion testing to confirm that acceptable criteria has been met. Any instances of non-conformity with the recommendations in the approved report shall be detailed along with the measures required to ensure compliance with the agreed noise criteria.

Where entertainment noise is proposed the LAeq (entertainment noise) shall be controlled to 5dB below the LA90 (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63Hz and 125Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively.’

1.3 Sound Limiter

- 1.3.1 2Nos Dateq SPL6 sound limiters were installed by dbnaudile. The limiters have full spectral control and time functionality and therefore are able to comply with the requirements of condition 4. Screenshots of the [Dateq SPL6](#) settings are presented at Appendix A. Figure 1 below details a screenshot of the DateqSPL6.

Figure 1. Dateq SPL6 sound limiter



1.4 Internal amplified Music Sound Noise Limits

- 1.4.1 A previous noise impact assessment undertaken by Hoare Lea Consultants provided internal single octave band limiting levels which would ensure compliance with required external music noise levels based upon the noise breakout from the venue. These limits have been used to set the Dateq SPL6 system settings for validation testing. Internal levels from the Hoare Lea report are reproduced at Table 1 below.

Table 1. Maximum internal amplified sound levels (Hoare Lea Report ref MEM-1013589-5A-AP-20240313)

Leq,5min music noise limit, dB	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	L _{Aeq,5min}
Daytime (07:00 – 23:00)	84	81	84	88	88	79	80	85	92
Night (23:00 – 07:00)	81	78	80	84	84	72	75	84	88

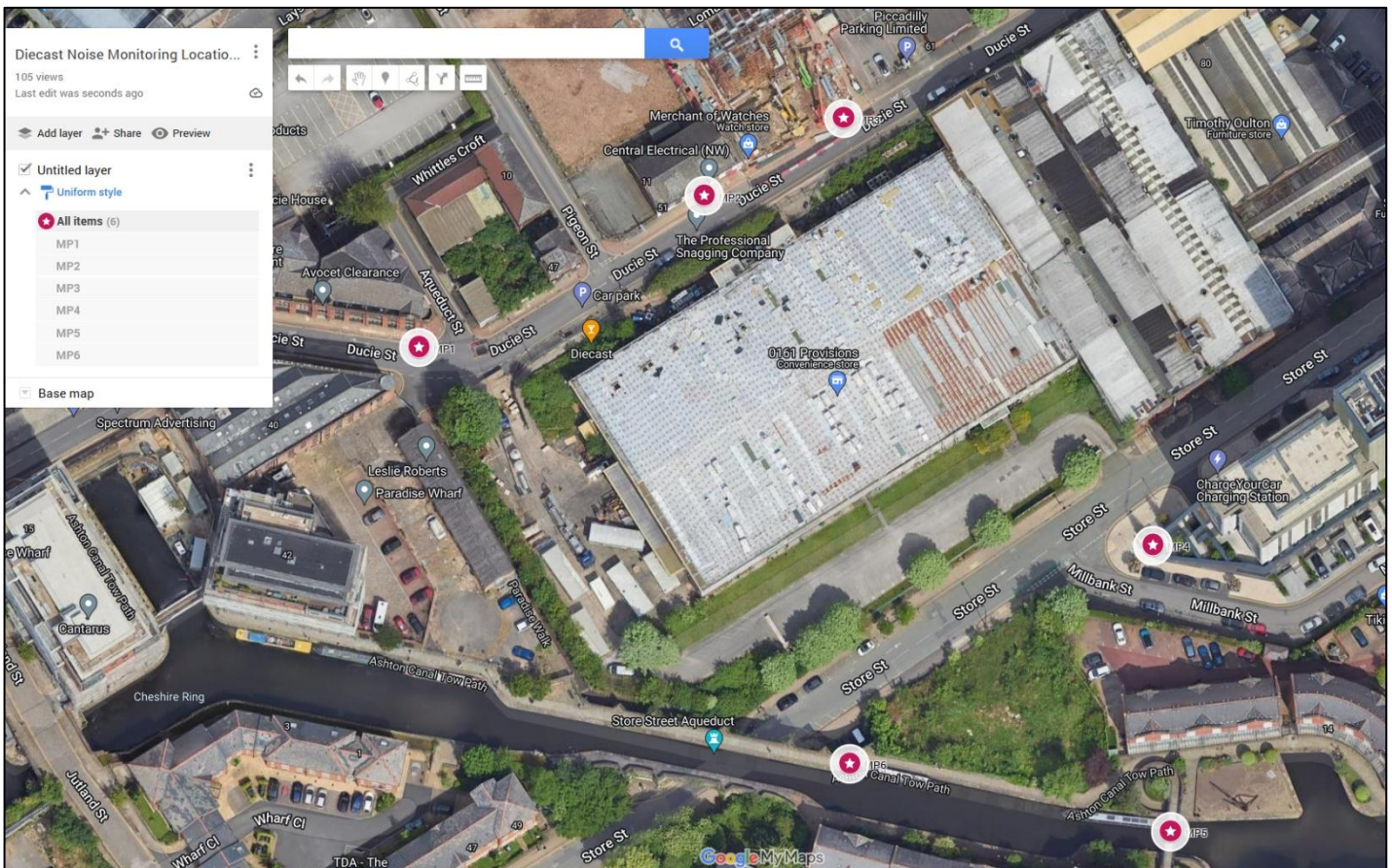
- 1.4.2 External guideline limits derived from the Hoare Lea noise survey and the application of the MCC Technical Noise and Planning criteria are also reproduced from the Hoare Lea report below.

Table 2. Amplified sound noise limits at nearby residential receptors

Amplified sound noise limits	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
<i>Noise limits to Store Street side (i.e. Oxygen, Piccadilly Village)</i>								
Daytime / evening (07:00 - 23:00), L _{eq} (dB)	52	42	37	37	37	30	18	10
Night (23:00 - 07:00), L _{eq} (dB)	47	37	32	31	30	22	10	9
<i>Noise limits to Ducie Street / courtyard side (i.e. Junction Works, Whittles Croft)</i>								
Daytime / evening (07:00 - 23:00), L _{eq} (dB)	50	40	35	34	33	26	13	10
Night (23:00 - 07:00), L _{eq} (dB)	47	37	31	30	29	19	8	9

1.4.3 Monitoring locations are identified in Figure 2 below. Locations MP5 and MP6 both have line of site to the roof of the Diecast venue, and these were prioritised during the evening and night-time external monitoring survey.

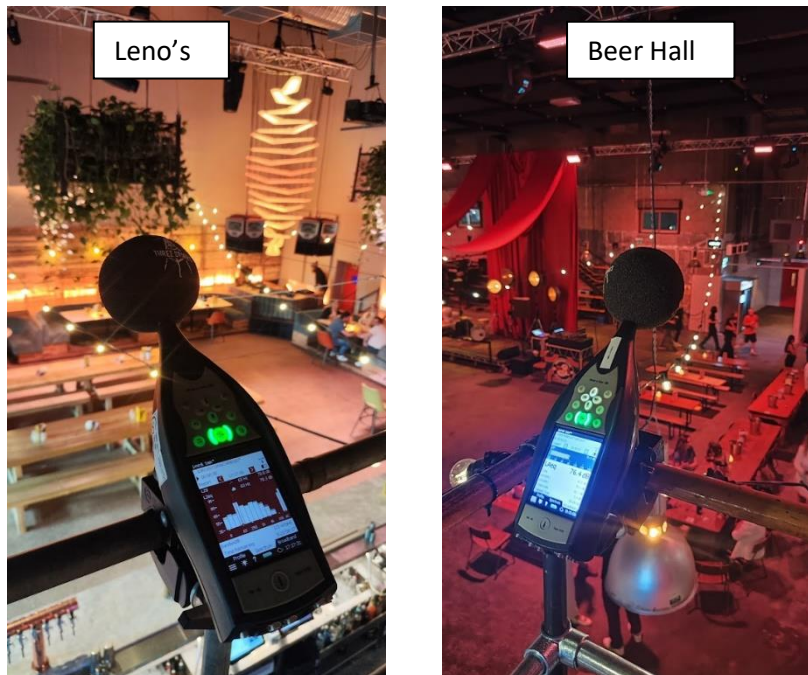
Figure 2. External measurement locations



1.5 Validation Survey

- 1.5.1 Validation testing was undertaken after the installation and commissioning the Dateq SPL6 sound limiters on Friday 13th September 2024.
- 1.5.2 The internal music sound level in each room was set by the dbnaudile audio engineer programming the Dateq SPL6 to the limits in Table 1 above. Screenshots of the software settings are presented at Appendix A. Access to the software is password protected and requires a licence which is issued to the venue.
- 1.5.3 The live limiter and recorder function (microphone) was applied with a calibration distance of 10m. The audio engineer set the single figure A Weighted level for pre and post 23.00 and the octave band levels, within the limiter software settings. Unfortunately, the octave band restrictions could not be configured to be timed assigned and therefore had to be limited to the post 23.00 situation which had the effect of restricting the overall A Weighted level below the single figure limit level. It is recommended that the manufacturer is contacted to advise further on this. However, generally music is only played at low level until approx 10.30-11pm after customers finish eating and therefore the post 23.00 restrictions will not significantly impinge on daytime operation.
- 1.5.4 A representative music track was continually played on a loop through inhouse PA's in both event spaces to ensure that the limiter was operational and limiting sound emissions to the requisite level.
- 1.5.5 External measurements were undertaken from 9pm until mid-night on Friday 13th September 2024 at each location and observations made of the aural perceptibility of any breakout sound. Generally, music noise breakout was inaudible or only just discernible above the background acoustic environment. Extraneous noise typically included customer noise from Diecast up until 10pm, after which time customers are brought inside the venue, local transportation noise, water feature noise from the canal and general city scape noise.
- 1.5.6 Monitoring was also undertaken internally during the survey period within the mezzanine area of both Leno's and the Beer Hall, see photographs below. Monitoring during the evening could not be undertaken close to the sound system for practical reasons, however the locations are representative of music noise within the event spaces but may be marginally lower than the assessment location which was calibrated at 10m from each sound system.

Figure 3. Internal Monitoring Locations



1.5.7 A summary of the internal LAeq,5min measurements is presented at Figure 4 below. External noise monitoring results are presented at Table 3 on page 5.

Figure 4. Beer Hall & Leno's LAeq,5min Time Profile 13/09/2024 18:00-01:00

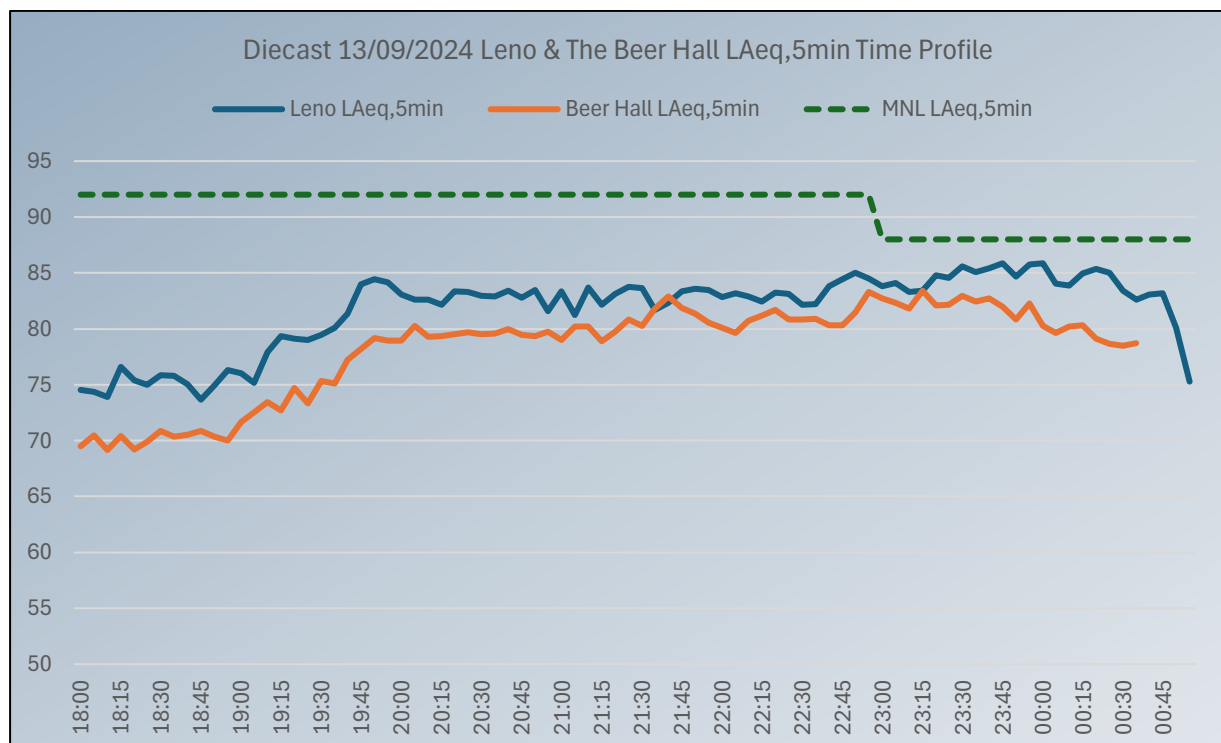


Table 3. External Monitoring Results

Location	Start Time	Elapsed Time	LAeq [dB]	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Observations
Beer Hall	13/09/2024 17:14	00:02:00	88	80	78	80	84	85	71	71	77	Music played on a loop throughout measurement period. Dateq SPL6 installed and activated
Leno	13/09/2024 18:05	00:02:00	87	80	78	78	84	83	72	69	78	
MP1 Junc Ducie & Aqueduct St	13/09/2024 21:10	00:05:02	55	62	58	53	52	50	48	41	31	Music noise inaudible. Customer noise and local traffic noise dominant acoustic feature. Some low level noise from generator on construction site also audible.
MP6 Bridge Overlooking Store St	13/09/2024 21:18	00:05:01	52	67	56	53	53	55	50	37	25	Very low level bass just audible, Customer noise and local traffic noise dominant acoustic feature.
MP5 Foot bridge over canal	13/09/2024 21:25	00:02:41	46	55	48	46	42	42	36	27	19	Music from site inaudible. Transportation noise, cars and trams dominant acoustic feature. Some low level noise from narrow boat and pedestrians on canal tow path and water running through sluice on canal also audible. Stopped measurement after 2.21mins to take phone call
MP5 Foot bridge over canal	13/09/2024 21:28	00:05:06	47	55	51	48	44	44	38	30	22	Music from site inaudible. Transportation noise, cars and trams dominant acoustic feature. Some low level noise from narrow boat and pedestrians on canal tow path and water running through sluice on canal also audible. Car horn sounded at the end of the measurement period.
MP4 Store Street	13/09/2024 21:46	00:05:24	55	62	56	55	51	52	47	41	34	Music inaudible. Local traffic stopping at temporary traffic lights with engines idling dominant noise source as well as distant transportation noise. One emergency siren and high level aircraft event during measurement period.
MP2 Ducie Street	13/09/2024 21:56	00:04:41	51	58	57	50	47	47	43	37	30	Music inaudible. Traffic on Ducie St dominant noise source. Customer noise and customer accessing the site also contributing to the measured level.
MP1 Junc Ducie & Aqueduct St	13/09/2024 22:02	00:23:39	59	64	58	55	56	54	51	44	34	Music noise inaudible. Pedestrians and customer noise accessing and egressing the site as well as traffic on Ducie Street dominant noise source. Low level generator noise also contributing to measured level. Extended measurement period.
MP6 Bridge Overlooking Store St	13/09/2024 22:34	00:05:17	54	63	54	50	49	51	46	35	25	Low level bass just audible. Local and distant traffic dominate noise source. Car backfiring at 22:36:50 and city scape noise contributing to measured level.
MP5 Foot bridge over canal	13/09/2024 22:41	00:10:22	48	57	50	47	44	45	39	31	20	Music inaudible local and distant traffic dominant noise source.
MP4 Store Street	13/09/2024 23:00	00:05:07	57	64	60	59	53	53	49	43	35	Music inaudible. Traffic stopped at temp traffic lights with engines idling and other local traffic dominant noise source.
MP1 Junc Ducie & Aqueduct St	13/09/2024 23:09	00:09:21	57	65	60	53	55	48	44	41	37	Music noise inaudible. Pedestrians and customer noise accessing and egressing the site as well as traffic on Ducie Street dominant noise source. Low level generator noise also contributing to measured level.
MP6 Bridge Overlooking Store St	13/09/2024 23:22	00:06:40	53	62	52	49	48	50	46	35	26	Music noise inaudible Local and distant traffic dominate noise source. Pedestrians walking along tow path talking also contributing to measured level.
MP5 Foot bridge over canal	13/09/2024 23:31	00:19:38	48	55	48	46	44	45	39	33	24	Music inaudible local and distant traffic dominant noise source. Canal boat owners talking also contributing to measured level.

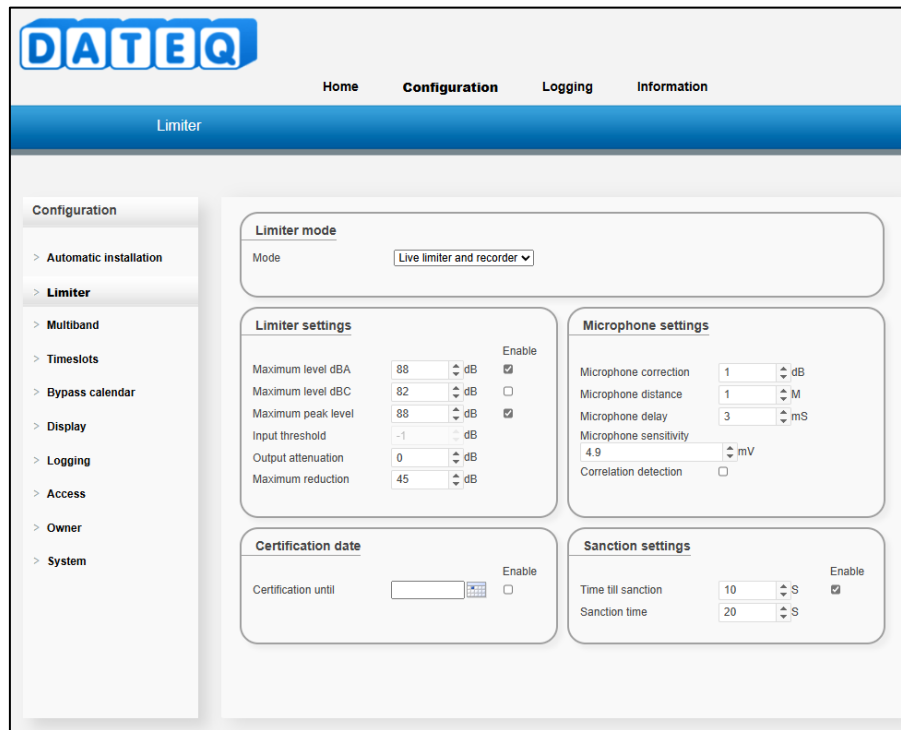
1.5.8 Measurement results confirm that music noise breakout was either inaudible or only just discernible at all measurement locations and specifically those with line of sight to the roof of the venue. This aligns with the previous initial daytime assessment and confirms that the noise limiter has reduced music noise breakout to achieve planning condition 4 requirements.

1.5.9 I can confirm that I witnessed the installation of the Dateq SPL6 Sound Limiters on Friday 13th September and tested their effectiveness which resulted in music level reductions when gain control was increased across the system.

- 1.5.10 I consider that the installation of the limiters and resultant measurement results and aural assessment achieve the requirements of Condition 4 of Planning Consent 133523/FO/2022 and the condition can be discharged.

Appendix A: Screenshots of the Dateq SPL6 Sound Limiters Set-up (provided by dbnAudile)

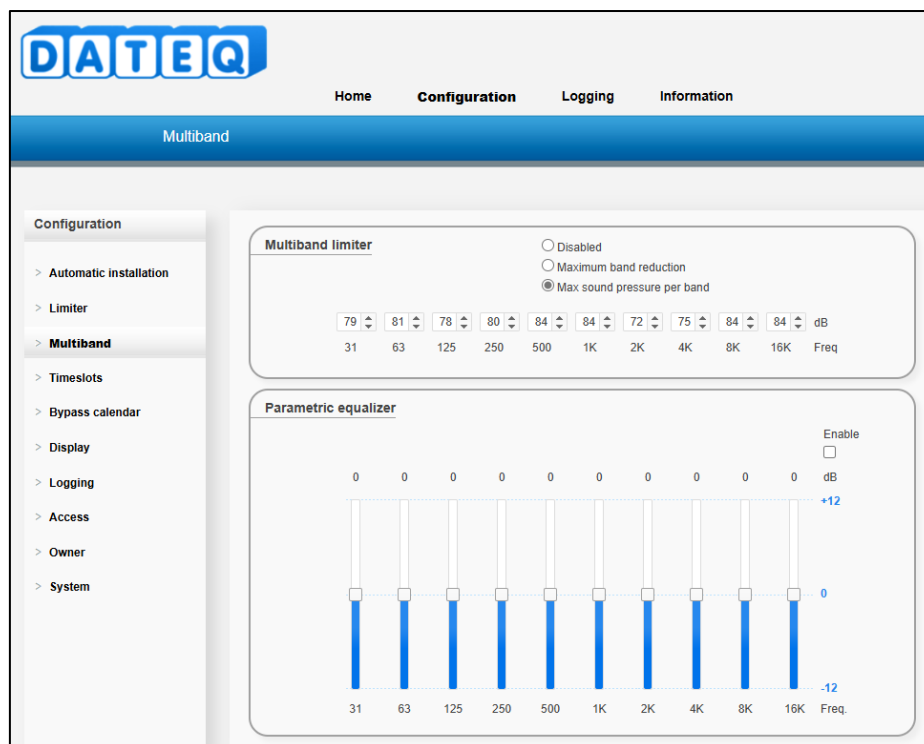
Figure 5. Single Figure A Weighted Limit Level



The screenshot shows the DATEQ web interface for the Limiter configuration. The left sidebar lists various configuration options, with 'Limiter' selected. The main content area is divided into several sections:

- Limiter mode:** Mode is set to 'Live limiter and recorder'.
- Limiter settings:** Includes fields for Maximum level dBA (88), Maximum level dBC (82), Maximum peak level (88), Input threshold (-1), Output attenuation (0), and Maximum reduction (45). There are checkboxes to enable these settings.
- Microphone settings:** Includes fields for Microphone correction (1 dB), Microphone distance (1 M), Microphone delay (3 mS), Microphone sensitivity (4.9 mV), and Correlation detection (unchecked).
- Certification date:** Includes a field for Certification until and an enable checkbox.
- Sanction settings:** Includes fields for Time till sanction (10 S) and Sanction time (20 S), with an enable checkbox.

Figure 6. Octave Band Limit Levels Settings



The screenshot shows the DATEQ web interface for the Multiband configuration. The left sidebar lists various configuration options, with 'Multiband' selected. The main content area is divided into two sections:

- Multiband limiter:** Includes radio buttons for 'Disabled', 'Maximum band reduction', and 'Max sound pressure per band' (selected). Below are frequency sliders for 31, 63, 125, 250, 500, 1K, 2K, 4K, 8K, and 16K Hz, with values ranging from 79 to 84 dB.
- Parametric equalizer:** Includes a frequency slider for 31, 63, 125, 250, 500, 1K, 2K, 4K, 8K, and 16K Hz, with values ranging from 0 to +12 dB. There is an enable checkbox.



Appendix B: Glossary of Terms

‘A’ weighting (dB(A)): A frequency dependent correction which weights sound to correlate with the sensitivity of the human ear to sounds of different frequencies.

Ambient Noise: A measure of the typical noise (excluding any unusual events) present at a site, or in a room. This is usually described in terms of $L_{Aeq,T}$.

Audible: Sound that can be heard or is perceptible by the human ear.

Background Noise: A measure of the underlying noise (excluding any unusual events) which is present at a site before a new noise source is introduced. This is usually described in terms of the LA_{90} level: the sound pressure level exceeded for 90% of the time.

Decibel (dB): A unit used for many acoustic quantities to indicate the level of sound with respect to a reference level.

External Amenity Space: An outdoor area near to a residential building which is designed and intended primarily for leisure and recreational use by the occupants of the dwelling. This will include gardens, patios, balconies, roof gardens and terraces.

Hertz: The tonal quality of a sound is described and measured in terms of the frequency content and is commonly expressed as octave or third octave bands, the latter being the division of the octave bands into three for finer analysis, across the frequency spectrum. The smaller the octave band or third octave band centre frequency number defined in terms of Hz, the lower the sound. For example 63 Hz is lower than 500 Hz and is perceived as a deeper sound. The attenuation due to air absorption and natural barriers increases with frequency i.e. low frequencies are always the most difficult to control

Inaudible: Sound that cannot be heard or is imperceptible to the human ear.

$LA_{90,T}$: Sound pressure level exceeded for 90% of the measurement period “T” or ‘background level’.

$LA_{eq,T}$: Equivalent continuous sound pressure level measured over the time period “T”

L_{Amax} : The maximum RMS A weighted sound pressure level

Music Noise Level (MNL): The L_{eq} of music noise measured at a particular location.

Noise: Unwanted sound.

Noise assessment: A basic evaluation of an acoustic environment by a suitably qualified person to assist in the determination of a planning application..

Noise impact: the noise level of the source under consideration, and/or any change in noise levels due to the scheme, and/or the relationship between the noise level of the source under consideration and a descriptor of the existing noise climate; at a receptor or group of receptors.



Noise effect: the consequence of the noise impact e.g. annoyance, sleep disturbance, speech interference, disruption of learning/teaching, health consequences, fauna displacement etc. Noise impact and noise effect are related to each other and the noise effect is related to the magnitude of the noise impact as well as other factors e.g. sensitivity of the receptor, duration of the noise, how frequently it occurs, the time of day or night it occurs, whether the noise is temporary, reversible or permanent etc.

Noise level (Lp): the logarithmic measure of the RMS sound pressure of a sound relative to a reference value that represents the threshold of hearing. It is measured in decibels (dB) e.g. $L_p = 20 \lg(p/p_0)$ dB re 20 μ Pa for air.

Noise sensitive premises / developments: Principally comprising residential premises, hospitals, schools and hotels. Other premises and sites may be deemed to be noise sensitive depending upon circumstances.

Typical sound pressure levels

