1 Introduction

Areas of the retail arches on Water Lane and Hawley Quay of the Camden Lock Village (CLV) development approved under planning permission ref: 2018/1715/P and amended under NMA ref: 2019/2927/P will have a speaker system installed to provide the facility for health and safety announcements in emergencies.

We have assessed noise emission to neighbouring noise sensitive properties with consideration to Condition 54 of the original Planning Permission.

In addition, Condition 54 of the original Planning Permission for the site stipulated the following internal noise limits within habitable rooms in dwellings:

- Habitable rooms at night (23:00-07:00) ≤ 30 dB $L_{Aeq,8hrs}$
  ≤ 45 dB L_{AFmax}
- Habitable rooms during the day end evening (07:00-23:00) ≤ 35 dB $L_{Aeq,16hrs}$

The speaker system will be entirely controlled by the Landlord, managed through a centralised system in Camden Market. Announcements are not expected to be made during night-time hours.

The author of this assessment is Jason Clouston (BEng MSc MIOA), who is a Corporate Member of the Institute of Acoustics and has been practising acoustic consultancy for over 18 years.

2 Proposals

The speaker layout is shown in Figure 2-1 on the following page.

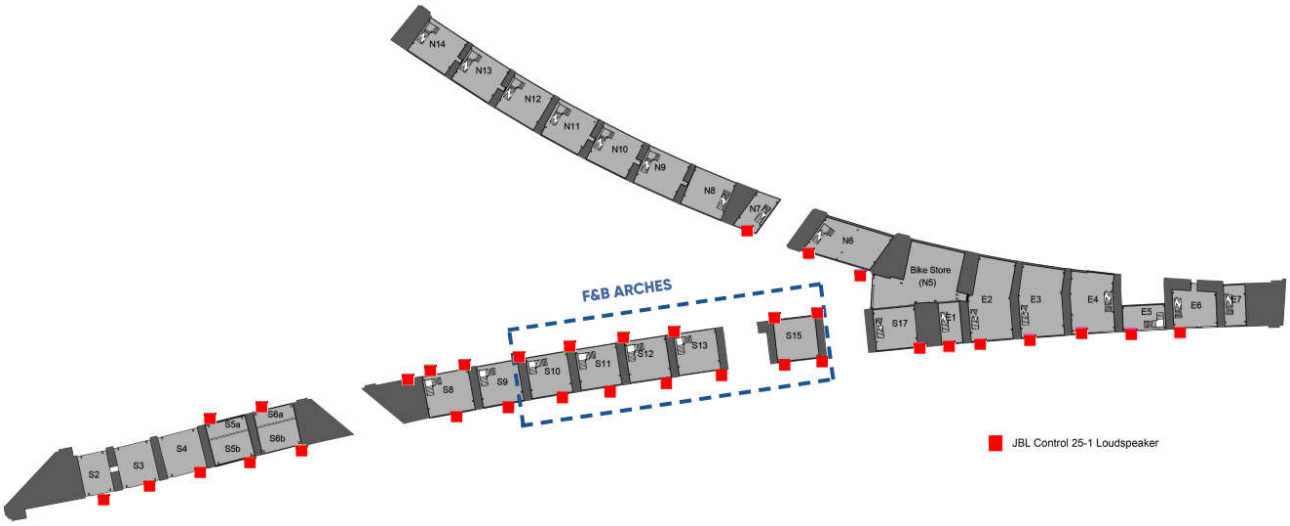

Figure 2-1: Proposed speaker positions

The speakers will be JBL's Control 25-1, which are compact full-range speakers measuring 243mm tall, 188mm wide and 145mm deep. Whilst they are full-range speakers, the sound power emitted at the lower frequencies is naturally of a reduced level owing to the compact nature. From the datasheet (within Appendix A), the low-frequency roll off starts at around 100Hz with a sharp decline in noise level to a level of about -10 dB at 63 Hz. A picture of the speaker is shown in Figure 2-2.

Figure 2-2: The proposed speaker, the JBL Control 25-1

Whilst the speakers are capable of producing relatively high noise levels, they will be hard limited so that they will not produce their maximum output.

The speakers will only be used for health and safety announcements, and will not be used for shopping ambience. The announcements will be made in only in emergencies, as and required.

3 High-level noise assessment

The nearest offsite noise sensitive buildings are about 50m away from the closest speaker location and will benefit from the effects of acoustic screening, owing to surrounding buildings and the railway. The nearest onsite new residential flats are about 6m away from the closest speaker location and will have a direct line-of-sight. The locations of the nearby noise sensitive receivers in relation to the restaurant buildings are presented in Figure 3-1.

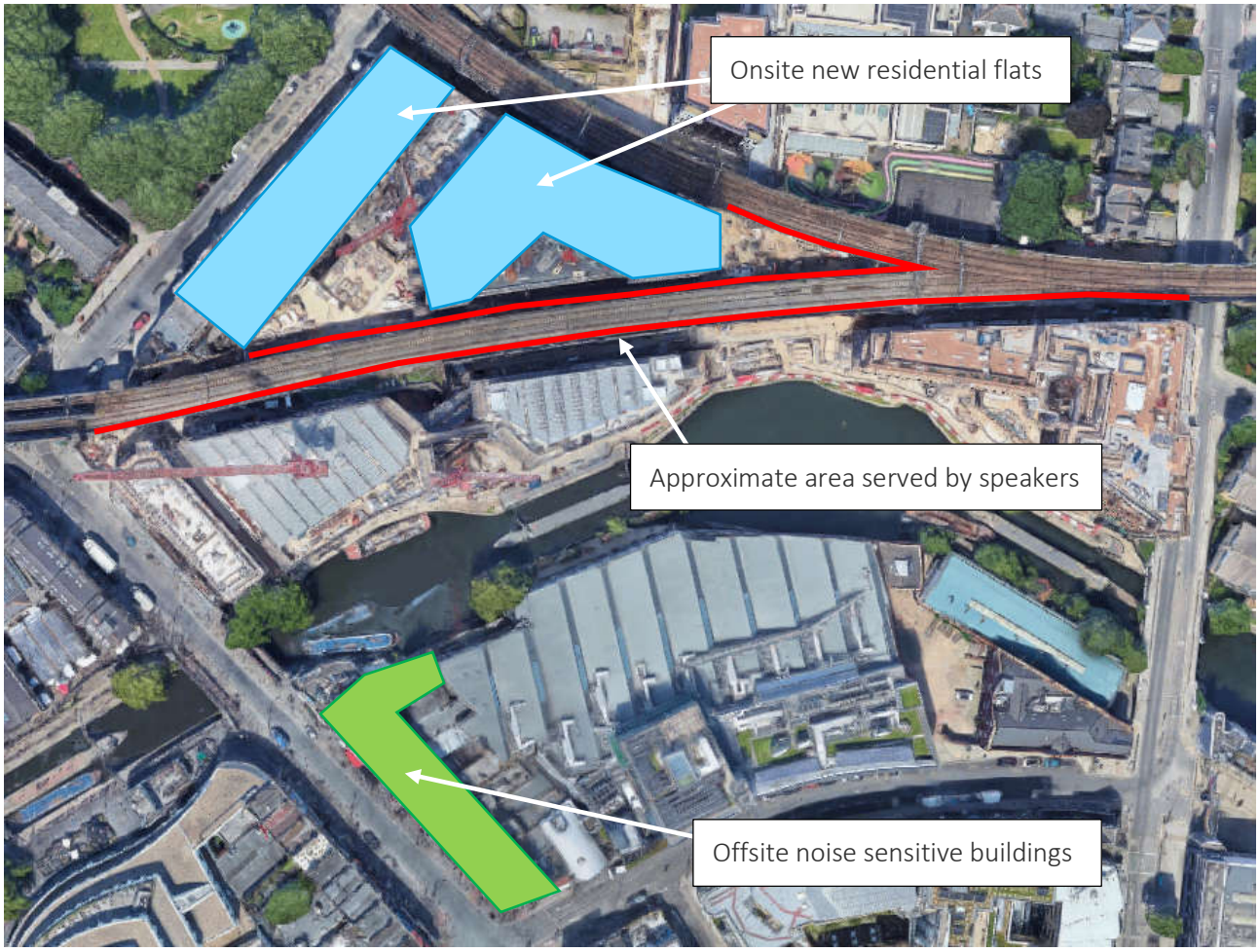

Figure 3-1: Nearby noise sensitive receivers in relation to the new speaker locations

Controlling noise to the onsite new residential flats is therefore expected to be the most onerous situation, such that satisfying the Council's noise limits there will also enable compliant noise levels at the offsite noise sensitive buildings.

The amount of attenuation owing to distance propagation between the closest speaker and nearest new residential flat has been estimated as 16 dB. This is based on the assumption that noise will radiate from each speaker following an approximation of point-source propagation. An allowance should also be made to account for multiple speakers affecting a single dwelling, which would usually follow the mathematical rule of 10*log(N) where N is the number of individual point sources. An allowance of +5 dB is considered appropriate to account for the effects of multiple speakers affecting a single dwelling.

Assuming residents have windows open would result in a level difference between inside and just outside their window of up to c. 15 dB[1] (based on industry recognised data for openable windows).

A feasibility check of the level of noise from each speaker has therefore been carried out, based on the day / evening limits as stipulated within Condition 54 of the original Planning Permission.

- Target limit within all habitable rooms 35 dB $L_{Aeq,16hrs}$
- Limit converted to just outside an opened window 50 dB $L_{Aeq,16hrs}$
- Limit adjusted to account for multiple speakers 45 dB $L_{Aeq,16hrs}$
- Limit adjusted for distance propagation 61 dB $L_{Aeq,16hrs}$
    - This is the equivalent noise limit (L_{Aeq}) at a distance of 1m from each speaker

For reference[2], the level of normal speech, at a distance of 1m is about the same as the limit above, 60 dB L_{pA}. This means that in order to satisfy the limits stipulated within the original Planning Permission would require individual speakers limited to emit no more than the level of noise emitted by a person talking normally.

The speaker system is not to be used for shopping ambience (thus, will not be playing music) and will only be used for emergency announcements. It may therefore be necessary to ensure the intelligibility of announcements during periods by increasing the level the announcements are played at. Based on noise survey data of the site, daytime levels within the site are typically around 63 dB L_{Aeq}.

It is usual practice, when considering the intelligibility of announcements, for the Signal to Noise Ratio to be increased as much as practicable, to maximise the intelligibility of the announcements. Based on the noise survey data, we would propose that announcements are permitted at a level of at least 5 dB above the prevailing daytime ambient noise level; therefore, individual speakers would be limited to no more than 68 dB L_{pA} at a distance of 1m from each speaker. This would inevitably result in higher levels within dwellings, but it must be considered that this is expected to occur infrequently, only for very shirt durations, and only during daytime hours.

Should any adjustments need to be made once the speakers are installed, then this will be entirely possible owing to the centralised management of the proposed system, via a limiter.

4 Conclusions

The speaker system is only to be used for emergency announcements, and will not play background music or other ambience for the purposes of shopper enjoyment.

It has been found that the noise limits stipulated within Condition 54 of the original Planning Permission can be met by limiting the speakers to emit levels of noise similar to that of a person speaking normally. As the speakers are for emergency announcements, it is proposed to permit these to be broadcast at levels a little bit higher than this, so that they are intelligible by those that need to understand them.

A hardware noise limiter will be installed, accessible and controllable by the Landlord.

[1] Ref: World Health Organisation's Environmental Noise Guidelines for the European Region 2018
[2] ANSI 3.5-1997 Methods for Calculation of The Speech Intelligibility Index

Appendix A – Loudspeaker datasheet

The manufacturer's datasheet for the proposed loudspeaker is presented on the following pages.

SPECSHEET

Control® 25-1

Professional Series – Compact Indoor/Outdoor Background/Foreground Speaker

JBL PROFESSIONAL HARMAN

Key Features:

- Components:
  - 5-¼" woofer with woven fiberglass cone
  - 3/4" PEI diaphragm tweeter with fluid cooling
- Contemporary, high-design appearance
- Built-in InvisiBall® mounting hardware*, plus available U-bracket
- Weather resistant enclosure and transducers
- Wide 100° x 100° coverage
- 100 Watt power handling (200 Watt program) in direct 8Ω setting, plus built-in 30 Watt 70V/100V multi-tap transformer
- High fidelity sound character with broad frequency response of 60 Hz – 20 kHz

Description:

The Control 25-1 is a two-way 5" speaker with rich sonic character, wide coverage, consistent dispersion, versatile mounting, and a contemporary high-design look that fits into a wide range of decors. This makes Control 25-1 an excellent choice for a wide variety of applications, including retail stores, restaurants, health clubs, theme parks, educational facilities, hospitality, music cafes, leisure venues, and anywhere where a top quality high-output indoor/ outdoor foreground/background music (and/or paging) speaker is required.

The unique InvisiBall mounting hardware is included with each system, making short work of permanent installation. The InvisiBall mounting method provides a high degree of both vertical and horizontal rotation, and because InvisiBall adjustments are made through a hidden access behind the logo badge, the grille never needs to be removed, and there exists a high degree of theft deterrence as well. Integrated M6 mounting points for an optional U-bracket adds to the installation versatility.

The LF driver's woven fiberglass cone provides durability and weather capable performance. The light weight high temperature fiberglass voice coil former and high temperature voice coil wire ensure high sensitivity and high power handling, while also providing stable performance under long-term high-power working conditions. The pure butyl rubber surround delivers clean sound and robust operation. JBL's WeatherEdge™ is a seamless, rubberized extension of the woofer surround that provides added protection to critical transducer elements. Cone geometry is optimized for smooth frequency response and consistent off-axis performance, while an FEA-optimized motor construction and linear suspension spider helps to lower harmonic distortion.

The HF driver's low viscosity ferro-magnetic fluid increases voice coil cooling for higher long-term power handling. The softened PEI diaphragm delivers a smooth and pure high frequency sound quality. The light weight Kapton™ voice coil former increases durability while providing better high frequency response extension. All these factors also contribute toward making the driver especially rugged for outdoors and other stressful applications.

In addition to the driver designs contributing toward a high degree of weather resistance, the cabinet provides excellent endurance against sun, salt and moisture. Grilles are heavily zinc-plated and finished in a tough, high-grade powder coating for rust resistance. The optional MTC-25WMG WeatherMax™ grilles are available for especially difficult environments and to break up driving rain. Connection is made via weather-capable screw-down terminals. The optional MTC-PC2 and MTC-PC3 panel covers are available to protect the terminal compartment, providing a water-tight sealed gland-nut entrance (when used with round-jacketed cable within the specified diameter range).

The frequency response is extremely smooth, resulting in a very natural sound character, and the response extends down to 60 Hz, providing strong bass capability. The system is capable of handling 100 Watts continuous pink noise (200 Watts program) at its 8 ohm setting and is also equipped with a built-in 30 Watt 70V/100V multi-tap transformer for operation on distributed speaker lines. The combination of high sensitivity and power handling provides high Max SPL of 110 dB.

The Control 25-1 readily accepts a variety of paints and finishes to match any décor. Available in black or white (-WH).

SPECSHEET

Control® 25-1

Professional Series – Compact Indoor/Outdoor Background/Foreground Speaker

JBL PROFESSIONAL by HARMAN

Specifications:

System	
Frequency Range (-10 dB)[1]	60 Hz – 20 kHz
Frequency Response (+/-3 dB)	85 Hz – 17 kHz
Power Rating[2]	200 W Continuous Program (2 hrs) 100 W (400W peak) Continuous Pink Noise (2 hrs) 75 W (300W peak) Continuous Pink Noise (100 hrs)
Maximum Input Voltage	25.3 V RMS (2 hrs), 50.6 V peak
Maximum SPL[3]	110 dB average Continuous Pink Noise (116 dB peak)
Sensitivity[4]	90 dB, 1W/1m (averaged 100 Hz – 10 kHz)
Coverage Angle[5]	100° x 100°
Directivity Factor (Q)	6.04 (averaged 1 kHz – 16 kHz)
Directivity Index (DI)	7.6 dB (averaged 1 kHz – 16 kHz)
Nominal Impedance	8 ohms (THRU setting)
Crossover Type	2nd order low-pass, 3rd order high-pass
Circuitry	
Transformer Taps	70V: 30W, 15W, 7.5W, 3.7W 100V: 30W, 15W, 7.5W Insertion Loss <0.94 dB at any tap setting Thru Setting: 8Ω nominal
Recommended Protective High-Pass[6]	60 Hz high-pass (24 dB/oct) (for 8Ω operation and for all 70V/100V tap settings)
Transducers	
Low Frequency	135 mm (5.25 in), woven-fiberglass cone with pure butyl rubber surround with Weather-Edge frame protection, high-temp fiberglass voice coil former, high-temp voice coil wire, optimized cone geometry, linear suspension spider, and FEA optimized motor structure.
High Frequency	19 mm (0.75 in) PEI diaphragm, low-viscosity ferro-magnetic fluid, and lightweight Kapton™ voice coil former.
Physical	
Enclosure Material	High Impact Polystyrene (HIPS), painted with highly-UV resistant paint on white (-WH) version for maximum UV fade resistance.
Grille	Highly zinc-plated, finished in durable TGIC polyester powder coating. MTC-25WMG-1 (&-WH) available with Weather-Max™ multi-layer foam and tight-weave mesh vapor barrier backing.
Installation	InvisiBall wall-mounting system included. Two 6 mm attachment points (on top and bottom) for optional MTC-25UB-1 (&-WH) U-bracket. Secondary safety attachment loop point on back panel.
Environmental	IP-44 per IEC529 (IP-55 when installed with the optional MTC-25WMG-1 WeatherMax™ grille and either MTC-PC2 or MTC-PC3 panel cover.) Exceeds MilSpec 810 for humidity, salt-spray, temperature & UV. Passes MilStd-202F for salt spray and ASTM G85 for acid-air plus salt spray. Optional MTC-25WMG-1 WeatherMax™ grille for breaking up driving rain and for especially difficult environments.
Termination	Screw-down terminal strip, zinc-plated copper based, nickel-plated metal screws and washers. Accepts up to 9 mm outside 4 mm inside open lugs (#6, #8, or #10 lug), plus bare wire (up to 12 AWG / 2.5 mm2). Optional MTC-PC2 and MTC-PC3 protective panel covers available to provide sealed entrance for additional weather protection.
Agency Rating	ROHS-compliant; Transformer UL Recognized per UL1876
Colors	Black (RAL9004) or white (-WH, RAL9016)
Dimensions (H x W x D)[7]	243 x 188 x 145 mm (9.6 x 7.4 x 5.7 in); 203 mm (8.0 in) deep total when mounted on InvisiBall wall-mount bracket.
Net Weight (each)	3.4 kg (7.5 lb)
Shipping Weight (pair)	8.16 kg (18 lb)
Included Accessories	InvisiBall™ wall-mounting system), 6 mm x 100 mm hex key
Optional Accessories	» MTC-25UB-1 – Yolk-type U-bracket (&-WH) » MTC-25WMG-1 – WeatherMax grille with backing (&-WH) » MTC-28/25CM – Ceiling-Mount InvisiBall adapter (&-WH)

[1] In half-space (on-wall, 2pi)

[2] At 8Ω setting. Continuous Pink Noise rating is IEC-shaped pink noise with a 6 dB crest factor. Continuous Program Power is defined as 3 dB above the Continuous Pink Noise Rating and is a conservative expression of the system's ability to handle normal speech and music program material.

[3] Calculated from sensitivity and power handling, exclusive of power compression, at THRU setting

[4] Half-space (on-wall), averaged 100 Hz – 10 kHz, 2.83V

[5] Coverage angle (-6 dB), average between 1 kHz and 12 kHz

[6] For protection against driving below resonant frequency and to keep transformer out of saturation

[7] In vertical orientation