The Railway Children - Planning Application
Our Reference (D-TRC-KX-15-014)

Sound Management Plan

Client

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The Purpose of this Document

This document has been prepared on behalf of Theatre Tracks Limited for the extension to their existing planning application (number 2014/6593/P) for a temporary theatre venue, which provides a venue for a theatrical production of The Railway Children and potential other shows. The purpose of this document is to describe the management process for the management and control of sound systems for the venue located at Zone A, Goods Way, King's Cross Central, London N1C 4UR and to extend the current planning application by twenty four months to the end of January 2018.

The document will also describe the monitoring scheme proposed to measure the levels of sound at residential premises and explain how these processes will jointly ensure the minimum disruption and impact that the show will have on local residential properties.

Definitions of the terms used can be found at the end of this document.
This statement forms part of the application for planning permission for these facilities.

The Show

The Railway Children is a theatrical production (a play) rather than a musical or in the style of a pantomime. Whilst elements of music are used within the show, these are very much incidental to the performance of the play and account for less than 10 percent of the running time of the show. The Railway Children takes place in a temporary theatre venue, which is known as The King's Cross Theatre.

The Location

The King's Cross Theatre is located on an open area of land to the north of the King's Cross railway buildings, which will eventually be redeveloped as office accommodation. Currently the space is unused.

The area is a level, open space which is laid with a hard core surface. The site has been proposed following consultation with Argent LLP, the development and asset manager of the King's Cross Central scheme site.

It is accepted that there are considerations to be made for the use of the site, specifically regarding the location of the nearest residential neighbours. The following locations have been identified as those which contain residential accommodation.

Location	Direction	Distance	Background sound levels
York Central	East	125m	68dB
Block J	North East	210m	58dB

The Structure

The King's Cross Theatre auditorium is constructed from a large, clear span marquee venue, with no internal supporting roof beams, meaning that there are excellent sight lines from virtually all the seats. For an internal view of the floorplan please see drawing P-TRC-KX-15-004.

The stage is located in the centre of the structure, and cuts the space into two halves (east and west), with the stage (and the railway line) running through the centre. This unique theatre experience (with the stage at the centre) means that there is no 'front' stage area and that audio is produced to cover both sides of the structure equally. This means that the audio can be directed to focus on the areas where the audience sits. The benefit of this system is that there is a large number of small, but very directional speakers, rather than a large stack of speakers on the front of the stage, projecting to the back of an auditorium. This means that the sound design team can directly control the sound system to ensure that the majority of the sound is contained within the temporary structure and that sound 'bleed' is minimised.

In addition, the controllable and directional nature of the system means that it can be run at a much lower sound level than would otherwise be necessary.

The performance is contained within a large marquee structure that uses fabric which will give an approximate attenuation of 10db. In addition the side wallings of the structure are constructed from a solid ABS plastic and internally drapes will be used where required to dampen the sound that does spill outside of audience areas.

Sound in the Show

The show is a piece of theatre, rather than a musical or concert and, although there are some musical elements to the show these are very much to complement and support the 'play' rather than as a part of the show as would be the case in a musical type performance.

In addition to the musical elements there are occasional sound 'effects' which are used to support the characters and the storyline – these however are limited in both their use and length. All of the music and sound effects are pre-recorded and played back by the sound operator.

Noise Control Guidelines

Noise Guidance – Existing Residential

As with other licensed premises across London, and following consultation with the Local Authority, it has been decided that events at The King's Cross Theatre should follow the general guidance given in the Noise Council Code of Practice on Environmental Noise Control at Concerts. The Code gives guidance depending upon the number of concerts per year and for the most frequent category (30 times per year), it is recommended that music noise levels (LAeq 15 min) should not exceed the background LA90 by more than 5dB(A).

The performances at The King's Cross Theatre are programmed to finish no later than 2300, however there are times where the owners of the venue may extend these opening hours to 0100 for smaller shows with a greatly reduced soundscape (i.e. a comedian or similar). This has not been confirmed and very careful consideration will be undertaken prior to shows of this nature being confirmed.

This application seeks to extend the current planning approval (which expires at the end of January 2016) to allow performances to take place until the end of January 2018). It is proposed that the venue will operate on a daily basis (dependent on ticket sales) which could generate almost 312 show days per year (which is more than 30 times in the year). As it is located in a temporary structure, it is considered that a more stringent guideline should be adopted.

The following targets will be adopted by the producers of the show:

- The noise from the shows should not be discernible inside residential properties.
- The external music LAeq should be 5dB below the existing LA90 background noise level.

These are very stringent criteria and often apply for events operating after 2300 hours. For after 2300 hours, it is recommended by the Local Authority that the music noise should not be discernible inside residential premises. This is in line with the recommendations of the Noise Council Code of Practice which recommends inaudibility inside residential properties after 2300 hours.

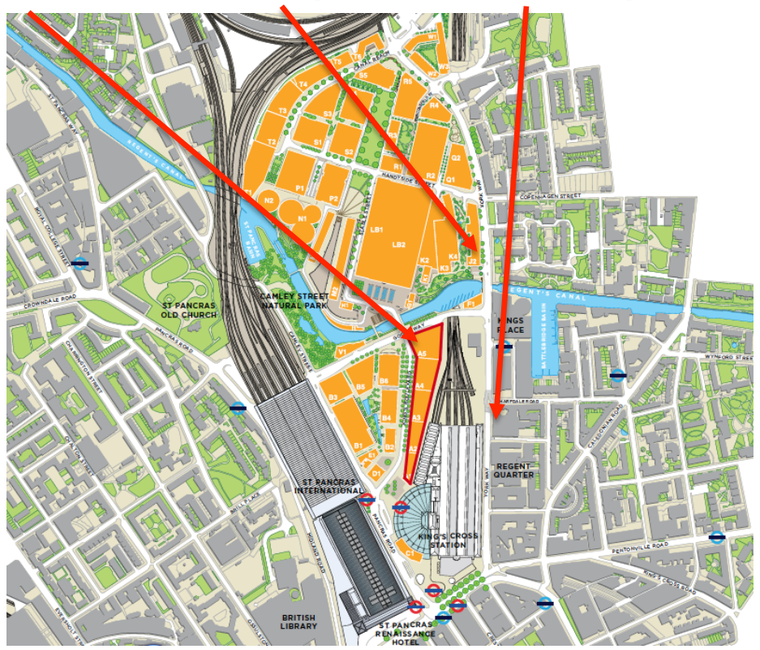
Noise Guidance – New Residential

For new residential properties, proposed close to The King's Cross Theatre, advice should be followed as given in BS8233:1999. A scheme of sound insulation should be presented with the planning application to ensure that the required internal noise levels can be achieved within the new development with regard to music and ancillary noise associated with the King's Cross Central scheme.

Sound Management

A baseline noise monitoring protocol was proposed by the show producers for The King's Cross Theatre. Residential properties, (as shown below) have been identified as the closest properties to the venue, and the most likely to be disturbed by noise levels generated by shows.

Proposed Site Residential Dwellings Residential Dwellings



Noise Management Mitigation

The Railway Children is not a performance with high sound levels.

Previous experience of other shows in similar tented structures show that reduction in sound from the performances can be achieved through the use of directional loudspeaker equipment, with the tent structure providing 10dB attenuation.

The event layout has been designed to ensure that the majority of the sound system is facing away from the nearest residences (to the north and east). Large existing buildings, as well as the natural ground layout mean that much if not all of the structure and sound system are incredibly shielded from all other locations. In addition sound screening will be incorporated around plant equipment if sound source issues are identified once the site is built and commissioned.

Theatre Tracks Limited will work in consultation with Camden Environmental Health Officers to ensure that the sound generated is not an issue for those living in the nearby locality.

Communications

Theatre Tracks Limited will write to the local residents in the local residential premises which are identified as being sensitive to the temporary venue to advise them of the proposed extension to the planning and licensing applications. The letter text will be in a pre-agreed format and provide information of the show timings, telephone numbers that residents can use to contact the site management team in the event that they have an issue or question as well as details of who enquiries can be passed to at Theatre Tracks Limited and Camden Council (see document D-TRC-KX-15-017).

Monitoring

Prior to the first performance of The Railway Children, sound propagation testing was completed to set the music noise limit within the tent to meet the environmental noise limits at the community locations. This was completed during the rehearsals period in the lead up to the opening night of the performance. Directional control of the line array sound system and fine tuning was also be carried out at this time in order to obtain the maximum sound level inside the tent whilst complying with external limits. This was completed with both Argent LLP and Camden Council.

Discussion will take place with the Environmental Health Department on the best form of action to be taken if complaints of noise arise from the venue. On request, the complaints log will be issued to the local authority. The log will include the time, nature and location of the complaint including the action that was taken.

It should be noted that, since event operations commenced at the venue in December 2014 there have been zero complaints relating to the operations of the venue.

Background sound tests were taken on the evening of October 9th 2014.

Location	Direction	Distance	Background sound levels LAeq 15minutes	Minimum sound level LAeq
York Central	East	125m	68dBA	54.3dBA
Block J	North East	210m	58dBA	49.6dBA

Calculations

Background level at nearest property

Having examined our own survey we have concluded that for the purposes of this calculation a prudent background sound level figure at the nearest property (York Central) can be seen to be 50 db. This is lower than both our average reading, and the minimum reading taken.

Level transmitted at Peter Pan in Kensington Gardens

Given the difficulty in assessing the then as yet, unbuilt venue, we have chosen to use data from previous events, which show that the show will run at no more than 90dbA inside the venue at the mix position. This kind of noise level in the auditorium would be appropriate and expected based on the audience makeup and on the basis of the same show, in the same configuration and same sound system as 2010.

Attenuating factors

The manufacturer states that a loss of 10db can be expected through the tent fabric

Sound is reduced over distance using this equation 20 x LOG (distance)

The nearest property is 125 metres from the tent so :-

20 x LOG (125 metres) = 41.93dB

This means that theoretically we will lose around 41.93 decibels over the 125m between the marquee and the nearest building

Estimated sound level received at the nearest property from The King's Cross Theatre

Sound received at the nearest property = Source – Attenuating factors

90db – (10db + 41.93) = 38.06dB

Difference between background noise and noise received from The King's Cross Theatre at the nearest property

38.06db - 50db = **-11.94dB**

This means that theoretically the sound from the show will be **lower** than that of background noise, given the distance that it has to travel and the relatively high background level (mainly from traffic noise around the area). It can be seen that the theoretical levels are below those required by BS8233:1999.

This is however, only theoretical. Once the theatre site has been built and the sound system installed, it will be possible for sound readings and monitoring to be undertaken. Team members from the Environmental Health Department will be invited to the sound testing of the venue to take readings and work with the production team to ensure compliance with the levels required.

Glossary of Terms

Definitions and Units

Noise is defined as unwanted sound. The range of audible sound is from 0dB to 140dB, which is taken to be the threshold of pain. The sound pressure detected by the human ear covers an extremely wide range. The decibel (dB) is used to condense this range into a manageable scale by taking the logarithm of the ratio of the sound pressure and a reference sound pressure.

The unit of frequency is Hz. 1 Hz is one pressure fluctuation in one second. The frequency response of the ear is usually taken to be about 16Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than at the lower and higher frequencies, and because of this, the low and high frequency component of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most used and which correlates best with the subjective response to noise is the dB(A) weighting. This electronic filter matches the variation in the frequency sensitivity of the meter to that of the human ear. This is an internationally accepted standard for noise measurements.

The ear can just distinguish a difference in loudness between two noise sources when there is a 3dB(A) difference between them. Also when two sound sources of the same noise level are combined the resultant level is 3dB(A) higher than the single source. When two sounds differ by 10dB(A) one is said to be twice as loud as the other.

Sound Level, dB(A) Environmental Condition

0 – 10	Threshold of hearing
10 - 20	Broadcasting Studio
20 – 30	Bedroom at night
30 – 40	Library
40 – 50	Living room urban area
50 – 60	Typical Business Offices
60 – 70	Conversation Speech
70 – 80	Average traffic on street corner
80 – 90	Inside bus
100 – 110	Alarm Clock (1m away)
110 – 120	Loud car horn (1m away)
120 – 130	Pneumatic drill (1m away)
130 - 140	Threshold of pain

The subjective response to a noise is dependent not only upon the sound pressure level and its frequency, but also its intermittency. Various statistical indices have been developed to try and correlate annoyances with the noise level and its fluctuations in a changing noise environment. The indices and parameters used in this report are defined below:

LAeq: Equivalent Continuous Sound Pressure Level The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under investigation. It is in effect the energy average level over the specified measurement period (T) and is the most widely used indicator for environmental noise.

LAN: the A-weighted sound level exceeded for N% of the measurement period. In BS7445 the LA90 is used to define the background noise level, i.e. the noise that would remain once all local noise sources were removed. The LA10 gives an indication of the upper limit of fluctuating noise and is used in the assessment of road traffic noise.

Contacts and Further Information

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