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Temporary events, Trapp Farm

Noise impact assessment

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Version	Date	Comments	Author	Reviewer
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Summary

Sandy Brown has been commissioned by International Shows Ltd to provide acoustic advice in relation to the application for temporary events at Trapp farm, Thornton-Cleveleys, FY5 5NR.

Temporary events are proposed on the site, consisting of a drive-in cinema/concerts for around 150-200 cars, 6 days per week between 16:00 and 22:00 hrs, for 3 weeks. No external amplified music is proposed. Sound for the events will be radio broadcast to customers cars.

Based on objections raised to the application for temporary events, a noise impact assessment has been performed.

An environmental noise survey has been carried out at the site, with the purpose of determining existing external typical noise levels outside nearby noise sensitive premises.

Predicted noise egress levels have been assessed against guidance given in IOA/IEMA guidelines, the Code of Practice for Environmental Noise Control at Concerts, as well as comparison against WHO guidelines.

The results indicate that at the nearby Norcross Hall farm moderate noise impact is predicted. For all other nearby noise sensitive premises, 'negligible' noise impact is predicted.

A 30 m x 10 m exclusion zone could be introduced on the site close to Norcross Hall farm, to reduce the noise impact to minor. This may result in a reduction to maximum capacity. Alternative, acoustic screening or provision of headphones could be implemented to reduce the noise impact.

Contents

1 Introduction

Sandy Brown has been commissioned by International Shows Ltd to provide acoustic advice in relation to the application for temporary events at Trapp farm, Thornton-Cleveleys, FY5 5NR.

This report presents the results of an environmental noise survey carried out at the site, along with an assessment of noise egress associated with proposed temporary events.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1.

The site consists of existing fields. The temporary events development is proposed to the area highlighted in blue.

Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The nearest residential premises to the site is Norcross Hall farm, to the west. There is also a row of houses to the east of the site, along B5268.

Other nearby premises include a building to the north west of the site (assumed to be commercial) and Norcross Vets to the north of the site.

2.3 Proposals

Temporary events are proposed on the site, consisting of a drive-in cinema/concerts for around 150-200 cars, 6 days per week between 16:00 and 22:00 hrs, for 3 weeks. No external amplified music is proposed. Sound for the events will be radio broadcast to customers cars.

3 Assessment method

It is understood objections to the application for temporary events have been raised from Environmental Health due to noise pollution. The concerns raised relate to noise impact from the following sources at the nearby residential premises:

- Cars idling on the field
- Event sound breakout from within cars
- Cars arriving and leaving the events.

These concerns are assessed in this report using the following methodology:

- An environmental noise survey at the site to determine the existing noise climate
- Measurements of the typical sources of noise set out above
- Producing a 3D computational environmental noise model to predict the noise egress levels due to the noise sources set out above
- Carrying out a noise impact assessment based on existing baseline noise levels and the guidance given in IOA/IEMA guidelines and the Code of Practice for Environmental Noise Control at Concerts
- Comparing predicted noise levels with WHO guidance.

4 Criteria

4.1 Scale of noise effects

The Noise Policy Statement for England (NPSE) provides guidance on the scale of noise effects.

Assessment will be performed to identify whether the overall effect of noise exposure generated by the proposed temporary events development is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level. The definitions for the different effect levels are outlined below:

- Significant Observed Adverse Effect Level (SOAEL): The level of noise exposure above which significant adverse effects on health and quality of life occur
- Lowest Observed Adverse Effect Level (LOAEL): The level of noise exposure above which adverse effects on health and quality of life can be detected
- No Observed Effect Level (NOEL): The level of noise exposure below which no effect at all on health or quality of life can be detected.

Typically, effects (either before or after mitigation) that are major or moderate in scale shall be considered as 'significant effects' i.e. exceeds the LOAEL.

Residential properties are generally considered as high sensitivity noise sensitive receptors (NSPs). The below criteria correspond to significance of observed effects at the nearby noise sensitive residential premises identified in Section 2.

4.1.1 IOA / IEMA 'Guidelines for Noise Impact Assessment'

Based on the IOA / IEMA 'Guidelines for Noise Impact Assessment', significance criteria for assessing the effects of increases in noise levels are presented in Table 1.

Table 1 Description of the magnitude of impact rating for assessing the effect of increases in ambient noise

Significance of effects	Increase in noise level (dBA)	Description
Negligible	<1.0	Noise increase is unlikely to be discernible.
Minor	1.0 - 2.9	A slight increase in noise levels may be perceived in affected buildings and outdoor recreational areas.
Moderate	3.0 - 4.9	Increase in noise levels is likely to be noticeable in affected buildings and outdoor recreational areas.
Major	>5.0	Increase in noise levels is likely to be clearly perceptible and could have a significant effect on the continued use of a building.

4.2 World Health Organisation (WHO) guidelines

The World Health Organisation document on the '*Community Noise Guideline Values'* recommends external noise levels for outdoor living areas/gardens/balconies of $L_{Aeq,16hour}$ 50 dB (threshold for moderate annoyance) with $L_{Aeq,16hour}$ 55 dB as an upper limit (threshold for serious annoyance). These apply for the daytime and evening.

It should be noted that these L_{Aeq} criteria values are based on 16 hour noise level average, however it is understood that events are only proposed between 16:00 and 22:00, i.e. 6 hours.

4.3 Code of Practise on Environmental Noise Control at Concerts

Based on Code of Practise on Environmental Noise Control at Concerts, Music Noise Levels (MNL) guidance is provided in Table 2.

This code is designed to assist in planning an amplified music event, so may not be fully applicable to the proposed temporary events venue. However, the guidance can be used as reference.

Table 2 Music Noise Levels guidance from Code of Practise on Environmental Noise Control at Concerts

Concert days per calendar year, per venue	Venue category	Guidelines
1 to 3	Urban stadia or arenas	The MNL should not exceed 75 dB(A) over a 15 minute period
1 to 3	Other urban and rural venues	The MNL should not exceed 65 dB(A) over a 15 minute period
4 to 12	All venues	The MNL should not exceed background noise level by more than 15 dB(A) over a 15 minute period

It is understood that events are proposed up to 6 days a week for 3 weeks, i.e. 18 days. This would not fall into any of the days per calendar year categories in Table 2.

The code states that:

> *For indoor venues used for up to about 30 events per calendar year an MNL not exceeding the background noise by more than 5 dBA over a fifteen minute period is recommended for events finishing no later 2300 hours.*

Although the proposed development is not specifically an indoor venue, the above requirement could be considered a guide for assessing operational noise egress.

5 Environmental noise survey

5.1 Method

Attended sample measurements were performed by Thomas Dent at the four positions indicated in Figure 1 on 1 June 2020. These were chosen to be close to the identified noise sensitive premises (NSPs) to the site, with the purpose of determining existing external typical noise levels outside the NSPs.

Measurements were made over 15 minute periods. In each case the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 1 m from any other

reflective surface. The weather and equipment information during the day of attended measurement is provided in Appendix A.

5.2 Measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 3. All measurements were free field.

Evening noise measurements were affected by construction noise, therefore the late afternoon measurements have been used as basis for our assessment.

Noise levels may be lower than usual, due to the current Covid-19 pandemic and drivers potentially avoiding the area due to additional traffic caused by the roadworks. Therefore, measured levels may be below the typical noise levels on the development site and are therefore likely to be worst-case.

It is understood that roadworks close to the site have been ongoing for approximately 10 months. However, it is understood that completion is due within the next few weeks.

Table 3 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
A	16:44	50	63	46	Occasional traffic on Norcross Ln. Frequent, quiet, distance traffic on A585 and roundabout NE of site.
A	20:28	48	61	43	Construction noise (generators, large vehicles, operational noise etc). Norcross Ln closed due to roadworks. Occasional, quiet, distant traffic from A585.
B	17:22	69	92	45	Occasional, high speed traffic on Norcross Ln. Max caused by loud car exhaust.
B	20:46	49	72	40	Norcross Ln closed due to roadworks. Birdsong and construction noise audible. Distant traffic audible.

C	17:03	56	68	53	Frequent traffic on A585 and roundabout NE of site. Occasional traffic on Norcross Ln. Quiet low frequency rumble, perhaps construction site generator.
C	21:07	58	81	54	Loud construction noise. Norcross Ln closed due to roadworks. Occasional (mostly inaudible) traffic along A585 and roundabout. Max caused by ambulance siren.
D	17:42	52	65	49	Frequent traffic on A585 and roundabout NE of site. Occasional traffic on Norcross Ln. Birdsong, wind through trees and dogs barking audible.
D	21:24	54	72	47	Loud construction noise. Norcross Ln closed due to roadworks. Occasional, quiet traffic along A585 and roundabout.

6 Assessment

6.1 Acoustic modelling

A computational model of the development has been produced for the purpose of predicting noise egress levels to the NSPs.

The geometry of the site and surrounding areas has been taken from Google maps.

Computer modelling has been performed using the acoustic modelling package CadnaA (version 2019). The software carries out calculations using a ray tracing technique, and considers the effects of topography, reflections, screening and distance attenuation for noise sources to predict noise levels in three dimensions. Calculation are carried out in accordance with ISO9613 Attenuation of sound during propagation outdoors.

A screenshot of the model is provided in Figure 2.

Figure 2 Image from 3D computational modelling

6.1.1 Modelling scenarios

Four modelling scenarios have been assessed:

- Scenario 1: 200 cars idling
- Scenario 2: 200 cars idling with car stereo audio (car windows closed)
- Scenario 3: 200 cars idling with car stereo audio (car windows open)
- Scenario 4: 40 cars moving, 160 cars idling.

These scenarios are considered worst case and aim to address the noise concerns identified.

Specific site layouts have not been provided, therefore cars are assumed to be evenly distributed across the field area.

6.1.2 Source noise levels

The sound source noise levels used for this assessment have been based on sample measurements performed of a typical hatchback with standard stereo system. These are summarised in Table 4.

Table 4 Sound source noise levels

Noise source	Sound pressure level at 1m, L_{Aeq} (dB)
Single car idling	57
Single car idling with typical (70 dBA) internal stereo music, car windows closed	58
Single car idling with typical (70 dBA) internal stereo music, car windows open	59
Single car passby accelerating from 5 mph to 10 mph	61

6.2 Results

6.2.1 Predicted noise maps

Predicted noise maps at a height of 1.5 metres for the four modelling scenarios are presented in Figure 3 to Figure 6.

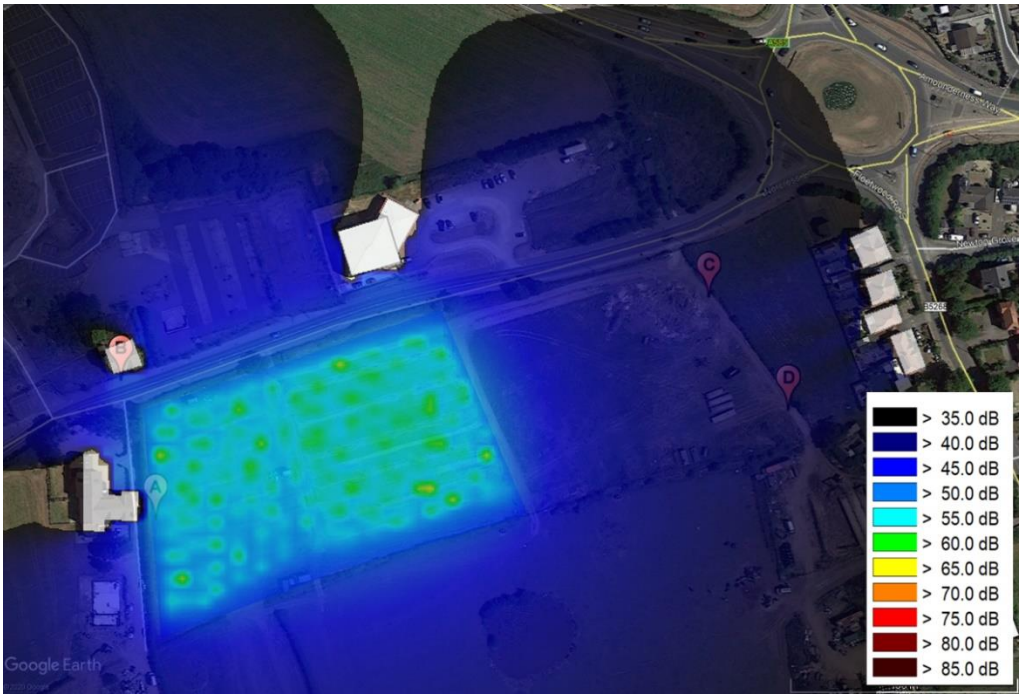

Figure 3 Noise map from model showing $L_{Aeq,15min}$ (dB) for 200 cars idling

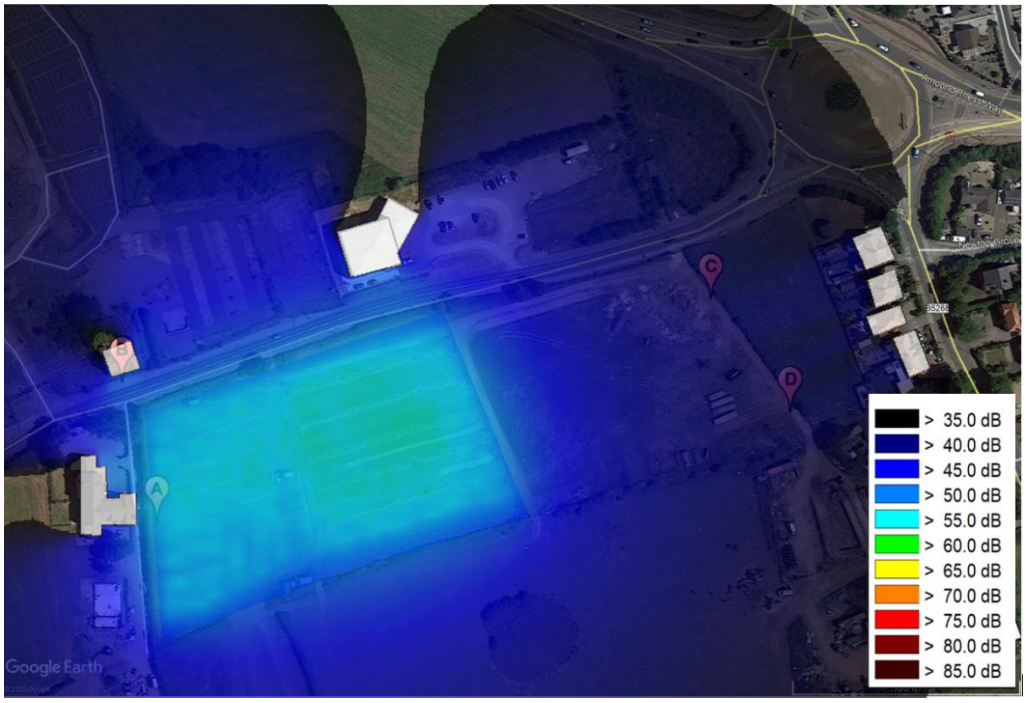

Figure 4 Noise map from model showing $L_{Aeq,15min}$ (dB) for 200 cars idling with stereo (windows closed)

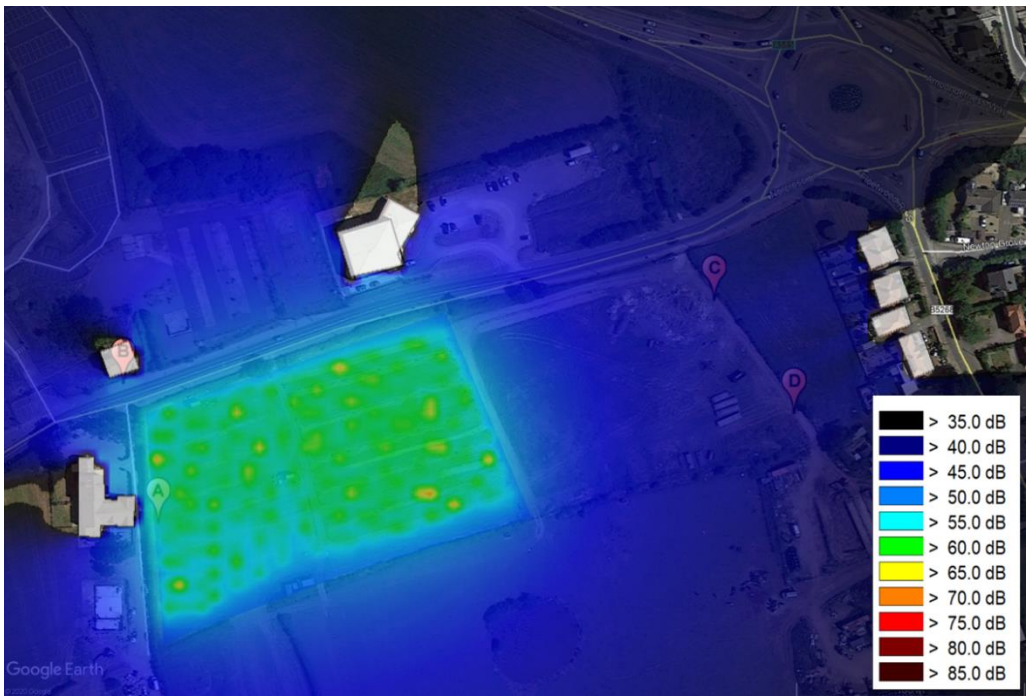

Figure 5 Noise map from model showing $L_{Aeq,15min}$ (dB) for 200 cars idling with stereo (windows open)

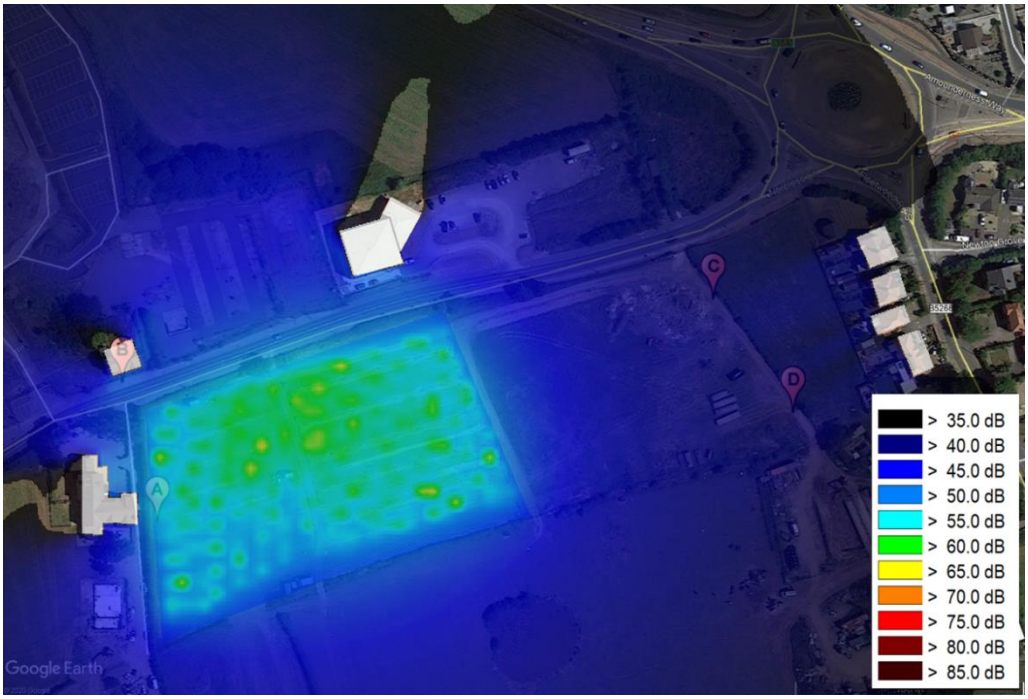

Figure 6 Noise map from model showing $L_{Aeq,15min}$ (dB) for 40 cars moving, 160 cars idling

6.2.2 Predicted noise levels

Predicted operational noise levels at the NSPs are presented for the four modelling scenarios in Table 5. Also provided is the predicted resultant overall noise levels and the difference compared to the measured levels.

Table 5 Predicted operational noise levels compared to measured existing daytime levels

	Daytime sound pressure level, $L_{Aeq,15min}$ (dB)			
Receptor	Measured existing	Predicted operational noise	Overall	Increase
Norcross Hall farm building				
Scenario 1	52.5[1]	51.5	55.0	2.5
Scenario 2	52.5[1]	52.7	55.6	3.1
Scenario 3	52.5[1]	54.0	56.3	3.8
Scenario 4	52.5[1]	52.1	55.3	2.8

Receptor	Daytime sound pressure level, $L_{Aeq,15min}$ (dB)			
	Measured existing	Predicted operational noise	Overall	Increase
Building to NW of site on Norcross Ln				
Scenario 1	72.2[1]	47.6	72.2	0.0
Scenario 2	72.2[1]	48.8	72.2	0.0
Scenario 3	72.2[1]	50.1	72.2	0.0
Scenario 4	72.2[1]	49.0	72.2	0.0
Garden of northmost house along B5268, near roundabout				
Scenario 1	56.3	38.7	56.4	0.1
Scenario 2	56.3	40.0	56.4	0.1
Scenario 3	56.3	41.1	56.5	0.2
Scenario 4	56.3	39.6	56.4	0.1
Garden of southmost house along B5268, away from roundabout				
Scenario 1	52.0	38.3	52.1	0.1
Scenario 2	52.0	39.6	52.2	0.2
Scenario 3	52.0	40.7	52.3	0.3
Scenario 4	52.0	39.3	52.2	0.2

[1] 3 dB correction has been applied to measured free field noise levels to obtain existing facade noise levels.

Predicted music noise levels from car stereo systems at the NSPs are presented in Table 6. These are compared against the measured background noise levels.

Table 6 Predicted music noise levels compared to measured existing background daytime levels

Receptor	Measured background sound pressure level, $L_{A90,15min}$ (dB)	Predicted stereo noise egress, $L_{Aeq,15min}$ (dB)	Difference (dB)
Norcross hall farm building			
Car windows closed	44.9	40.7	-4.2
Car windows open	44.9	44.8	-0.1

Receptor	Measured background sound pressure level, $L_{A90,15min}$ (dB)	Predicted stereo noise egress, $L_{Aeq,15min}$ (dB)	Difference (dB)
Building to NW of site on Norcross Ln			
Car windows closed	43.7	37.3	-6.4
Car windows open	43.7	40.9	-2.8
Northmost house along B5268, near roundabout			
Car windows closed	52.9	31.0	-21.9
Car windows open	52.9	34.1	-18.8
Southmost house along B5268, away from roundabout			
Car windows closed	48.5	30.2	-18.3
Car windows open	48.5	33.3	-15.2

6.3 IOA / IEMA 'Guidelines for Noise Impact Assessment'

The increase in noise level due to proposed temporary events is predicted to have 'negligible' noise impact at all NSPs except for Norcross Hall farm, meaning noise increase is unlikely to be noticeable at these locations.

At Norcross Hall farm, cars idling in combination with typical stereo noise, with either car windows open or closed, is predicted to result in 'moderate' significance of noise impact. This means that increase in noise levels is likely to be noticeable in affected buildings and outdoor recreational areas (i.e. gardens).

The increase in noise level at Norcross Hall farm due to cars idling without stereo audio and for cars entering and leaving the site is predicted to have 'minor' significance of noise impact, meaning a slight increase in noise level may be perceivable.

6.4 World Health Organisation (WHO) guidelines

Predicted operational noise egress exceeds the WHO threshold for moderate annoyance of L_{Aeq} 50 dB for all modelling scenario at Norcross Hall farm and for scenario 3 (with windows open) at the building to north west of site on Norcross Lane.

It should be noted that the WHO criteria is provided as a 16 hour average, however it is understood that events are only proposed between 16:00 and 22:00, i.e. 6 hours.

For all other NSPs, predicted operational noise egress is below the L_{Aeq} 50 dB criteria.

There are no cases where the WHO threshold for serious annoyance of L_{Aeq} 55 dB is predicted to be exceeded.

6.5 Code of Practice on Environmental Noise Control at Concerts

Predicted noise emissions from car stereos are within criteria provided in Code of Practice on Environmental Noise Control at Concerts for all NSPs with either windows open or closed.

7 Mitigation measures

Mitigation measures could be introduced to reduce the predicted noise impact at Norcross hall farm from 'moderate' to 'minor' as per IOA / IEMA 'Guidelines for Noise Impact Assessment'. Possible options that are expected to be capable of achieving this are investigated below.

7.1 Exclusion zone

This could be achieved by requiring customers car windows to be closed and introducing a 30 x 10 m exclusion zone close to Norcross Hall farm, as per Figure 7. This may result in a small reduction to maximum capacity.

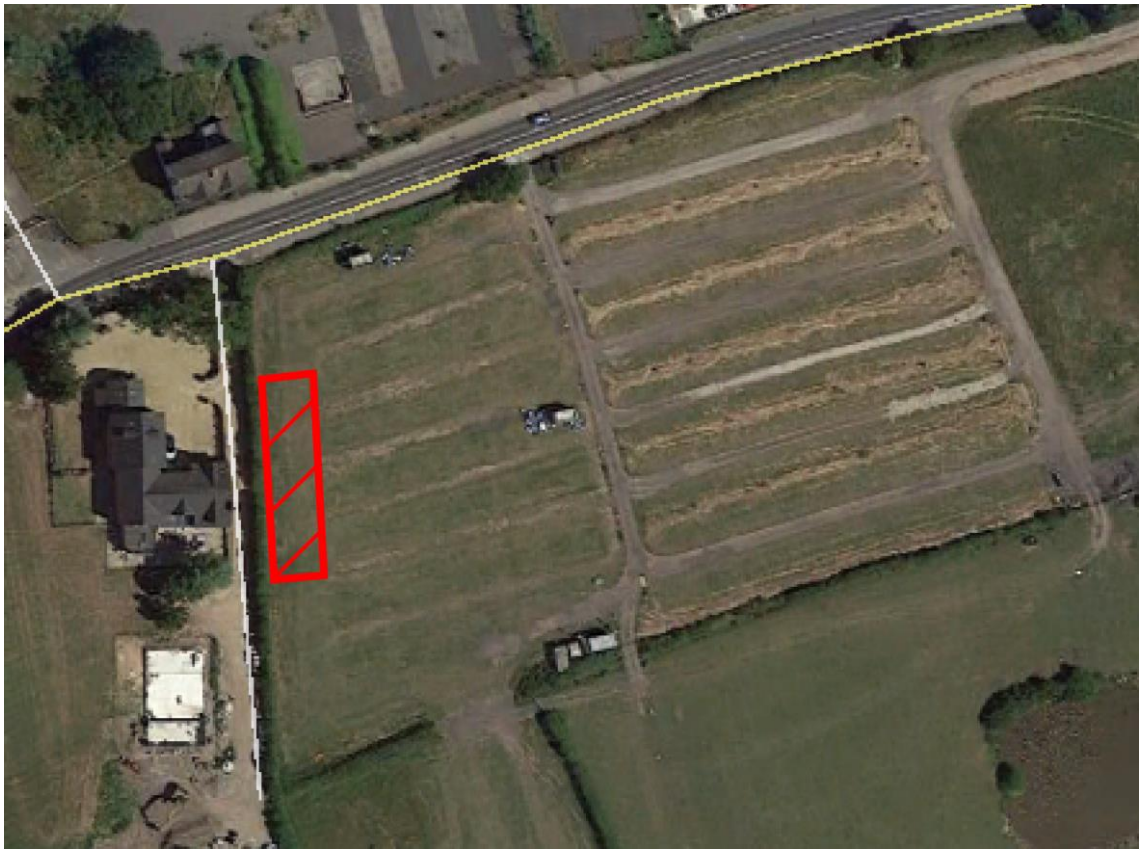

Figure 7 Exclusion zone

Modelling has been performed with this exclusion zone implemented, with 196 cars evenly distributed across the rest of the available area. These results are summarised in Table 7.

Table 7 Predicted operation noise levels with exclusion zone

Scenario	Daytime sound pressure level, $L_{Aeq,15min}$ (dB)			
	Measured existing	Predicted operational noise	Overall	Difference
Scenario 1	52.5[1]	50.1	54.5	2.0
Scenario 2	52.5[1]	51.3	55.0	2.4
Scenario 3	52.5[1]	52.8	55.7	3.2
Scenario 4	52.5[1]	51.0	54.8	2.3

[1] 3 dB correction has been applied to measured free field noise levels to obtain existing facade noise levels.

With the exclusion zone implemented, scenario 3 (with car windows open) is still predicted to have 'moderate' significance of noise impact, hence customers should be required to have car windows closed.

With the exclusion zone implemented and car windows closed, it is predicted that cars idling with stereo audio will have 'minor' significance of noise impact to Norcross Hall farm. Cars arriving and leaving the site is also predicted to have 'minor' significance of noise impact to Norcross Hall farm.

As per previous assessment, all other NSPs are predicted to have 'negligible' noise impact with the exclusion zone implemented.

7.2 Alternative mitigation measures

Alternatively, a solid screen could be implemented along the length of the Norcross Hall farm building, i.e. along the 30 metre length of the exclusion zone indicated in Figure 7, of minimum height 3 metres and minimum weight 15 kg/m^2. This is predicted to allow 'minor' significance of impact or better to be achieved at Norcross Hall farm for all modelling scenarios.

Other mitigation measured could include providing headphones to customers, instead of using car stereo systems. As well as reducing amplified noise egress from car stereos, this would also reduce the need for cars to be idling, as battery powered audio systems could be used (rather than using the car battery).

8 Conclusion

Based on objections raised to the application for temporary events, a noise impact assessment has been performed.

An environmental noise survey has been carried out at the site, with the purpose of determining existing external typical noise levels outside nearby noise sensitive premises.

Predicted noise egress levels have been assessed against guidance given in IOA/IEMA guidelines and the Code of Practice for Environmental Noise Control at Concerts, as well as comparison against WHO guidelines.

The results indicate that at the nearby Norcross hall farm 'moderate' noise impact is predicted. For all other nearby noise sensitive premises, 'negligible' noise impact is predicted.

A 30 m x 10 m exclusion zone could be introduced on the site close to Norcross Hall farm, to reduce the noise impact to 'minor'. This may result in a reduction to maximum capacity. Alternatively, acoustic screening could be provided along the west boundary of the site, or customers could be provided with headphones to reduce the levels of noise egress.

Appendix A

Survey details

Equipment

A Rion NL-52 sound level meter was used to undertake the attended measurements. The calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification no
Sound level meter	NL-52/01143564	Rion	19 Dec 20	TCRT18/1993
Microphone	UC-59/10153	Rion	19 Dec 20	TCRT18/1993
Pre-amp	NH-25/43581	Rion	19 Dec 20	TCRT18/1993
Calibrator	NC-74/34257023	Rion	19 Dec 20	TCRT18/1991

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meter(s) used in this survey are available upon request.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators. No significant deviation in calibration occurred.

Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

The L_{A90} is considered most representative of the background sound level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

During the attended measurements carried out on 1 June 2020, the weather was dry and no rain occurred. Wind speeds were noted to be low during the measurement.

These weather conditions are considered suitable for obtaining representative measurements