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SOUND MANAGEMENT PLAN

KINETICS ISLAND

EASTVILLE PARK
BRISTOL. BS5 6XA

SA 21 - SU 22 SEP 2024

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Definition

BCC	Bristol City Council
BL24	Kinetics Island 2024
ESL	Electric Star Live
dB	Decibel. A relative unit of measurement to express a sound level
MNL	Specific Music Noise Level of regulated entertainment in dB at Noise Sensitive Receptor
Leq	Equivalent sound level. A logarithmic average of sound level over a specified period
L90	Background sound level, noise level exceeded for 90% of the measurement period
A / C / Z (e.g., dBA or LCeq)	Weighted Sound Measurements to correlate to human ear response. Z means no correction
EMOP / EOP / EMP	Event Management and Operational Plan / Event Operating Plan / Event Management Plan
SMP / NMP	Sound Management Plan (aka Noise Management Plan)
NSR	Noise Sensitive Receptor
SLM	Sound Level Meter use for Sound Measurements
FOH	Front of House is the sound control position at any stage
HSG195	The Event Safety Guide. HSE publication 195 (aka The Purple Guide)
Pop Code	Noise Council Code of Practice on Environmental Noise Control at Concerts
LA03	Licensing Act 2003
DPA	Data Protection Act

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1 Summary

Kinetics Island is a proposed music event with wide appeal at Eastville Park in Bristol Sa 21 – Su 22 September 2024.

Electric Star are contracted to implement a Sound Management Plan (SMP) developed with the key stake holders. The purpose is to discharge our obligations balanced with the demands of delivering an excellent audience experience.

This live document is a Best Practical Means framework & appendix of the Event Management Plan (EMP) covering operation details, times & plans. The overarching policy promotes the Licensing Act 2003 objective for the prevention of public nuisance from regulated entertainment. The operational framework contained in this plan serves as a noise Risk Assessment and Method Statement that references relevant guidelines & specific licence conditions.

Collaborative working practices with the responsible authorities and key stakeholders shall be adopted to promote effective & transparent sound control throughout the project. Our aim is to:

- Discharge our obligations, minimising the impact on the local community for the prevention of public nuisance
- Measure & manage acceptable sound levels for compliance, the enjoyment & safety of the public & participants
- Promote good public relations with the local community, operating a helpline with prompt, effective action

Overview: Eastville Park is a public realm space situated in a mixed residential & commercial area offering a scenic lake & walkways. It is a versatile outdoor space known for hosting vibrant community festivals & events throughout the year. Noise Sensitive Receptors are listed in section 3.2. The nearest dwellings are on Muller Rd around 100m south from the nearest stages. Other sensitive receptors include the Avery Rd & Rowland Av areas 200m north.

A list of sound sources is provided on page 7, featuring a main stage, supporting stages, bars, & concessions. The EMP details activities & operational timings. For context, the first act goes on stage from around lunchtime & ends no later than 23:00. The objective is to commence the site egress & manage the peak noise to occur before midnight. The doors open with sufficient time of the first act to facilitate a gradual build-up. The likely aural impact is the event shall be of marginal significance & discernible above the prevailing soundscape, albeit not at a level that causes an unacceptable disturbance, appropriate for the day, time & duration.

Control: The scheme aims to build on the positive experience of previous events in the park. Sound shall be proactively managed during the event, including sound system checks by a competent person. We shall monitor sound levels continuously for the duration, avoiding the likelihood of disturbance & respond to any concerns in an effective manner. Measurements, observations & actions will be logged. The Music Noise Level at representative monitoring locations shall not exceed the agreed values. Construction & operations noise shall adopt good working practice (BS5228). Any overnight operations & plant shall be of no observable adverse impact as best practical.

Specific robust controls have been incorporated in this plan. These include but are not limited to: Directional sound systems to minimise break-out. The specified sound systems are selected for the award-winning performance & noise control. Robust monitoring & control procedures. Sound engineers shall follow instruction without exception or delay.

Community: The organisers recognise the potential for adverse impact. The Music Noise Level control & finish time provides adequate mitigation. All practicable steps will be taken to maintain good public relations. Information shall be published locally in advance, including helpline contacts operating for the duration. A reported noise concern will trigger a prompt response to assess & reduce levels as required with follow-up monitoring & communication where appropriate. The aim will be to avoid complaint by engaging with the community & monitoring music levels in the first instance. The event team shall handle any complaint that does arise reducing likelihood of escalation to the authorities.

Conclusion: The licensing objective to prevent public nuisance can be maintained & adverse noise impact mitigated subject to implementing this robust plan & dynamically assessed on-site controls. Relevant guidelines, legislation & best practical means shall be adopted as appropriate. We conclude that the level of disturbance can be minimised to an acceptable level on the basis that these noise control measures are successfully implemented.

1.1 Outline

Title	Kinetic Island
Location	Eastville Park. Bristol. BS5 6XA
Event dates	Sa 21 - Su 22 Sep 2024 – See EMP for times
Build & break	See EMP
Attendance	Working capacity up to 24,499, dependant on time & day. See EMP for details
Profile	See EMP
Primary sound sources	Main open-air stage, covered 2 nd stage, open-air bandstand, Live Music & DJ's
Secondary sound sources	Bars with background music. Ancillary: F&B, retail & activities (no camping)

Timings

Regulated Entertainment	See EMP for specific times. Doors 11:00 – 23:00
Soundchecks	See EMP
Build / Break general hours	07:00 – 20:00 NB. NOAEL ² offsite before 08:00
Site operations	06:00 – 00:00 NB. NOAEL offsite 23:00 – 07:00

Music noise

The Music Noise Level (MNL) controls is agreed with the Licensing Authority:

An upper music noise limit of 75dB LAeq (15 min) & 90 dB LCEq (15 mins) will be in place with a target level of 72dB LAeq (15 min) & 87 dB LCEq (15 mins)

This proposed limit adopts current best practice for Low-Frequency Noise (LFN) control. All measurements shall be free-field unless otherwise stated. See notes on page 15.

1.2 Stakeholders

Licensing Authority:	Bristol City Council	Event Management:	We Are The Fair Ltd
Venue management:	Bristol City Council	Promotor:	Motion Events Ltd
Applicant/Licensee:	We Are The Fair Ltd		

Licensee

We Are The Fair Ltd (CRN 09327525) shall be the commercial contracting body, project management & the common point of coordination between the event management team, production team & participants.

Event Management

We Are The Fair Ltd are a leading production agency with over 20-years' experience successfully managing large-scale events reaching over a million people annually. Projects include Eastern Electrics, Boiler Room, NTS & Houghton.

Promoter

Voted as DJ Mag's as the UK's best large club & in the global top 11, Motion is one of the world's most exciting & ever evolving venues. Motion promotes & hosts over 75 live events annually across a diverse range of genres.

Acoustic consultant

Electric Star Live (CRN 08881618) is an award-winning independent company specialising in live event sound control. Principle consultants are associate members of the Institute of Acoustics, Audio Engineering Society, The Production Services Association & are personal licence holders. We work with some of the world's greatest artists & events, including Prince, The Eagles, Elton John, Houghton, Bestival, Nocturne Live Blenheim Palace, & UK tours with Michael Bublé, Bryan Adams & Diana Ross. Our customers include BBC, AEG Live, Live Nation, Festival Republic & U-Live.

1.3 References

There are several applicable legislation & guidelines, including, but not limited to:

- Licensing Act 2003, Premises License conditions & Licensing authority policy
- Noise Council Code of Practice on environmental noise at concerts (1995)
- The Event Safety Guide (HSG195) & The Purple Guide (www.thepurpleguide.co.uk)

² No Observable Adverse Effect Level

2 Location

2.1 Environs

Eastville Park is an urban green space, dominated by mixed conurbation with major transport networks.

The park has a positive track record of hosting large scale music events including Tokyo World & Love Saves The Day.

Mixed use residential & commercial premises border the park. The M32 motorway flanks the west & north side with major arterial roads, Muller Rd (B4469) & Fishponds Rd (A432), immediately south & east of the park.

The wider area is intersected from north-east to the south-west by the Frome river; also comprising hills in Stapleton & Stoke Park to the north-west, plus Speedwell & Lodge Hill in the & south-east. See map on page 25. The park rises by approximately 20m from the lower west side to Thingwall Allotments in the east. The prevailing wind is typically south-westerly $\approx 5\text{m/s}$. The soft ground & areas of vegetation partially mitigate noise propagation.

Road & rail noise is the predominant residual contribution with levels between 65 & 75dB L_{den} , see page 23.

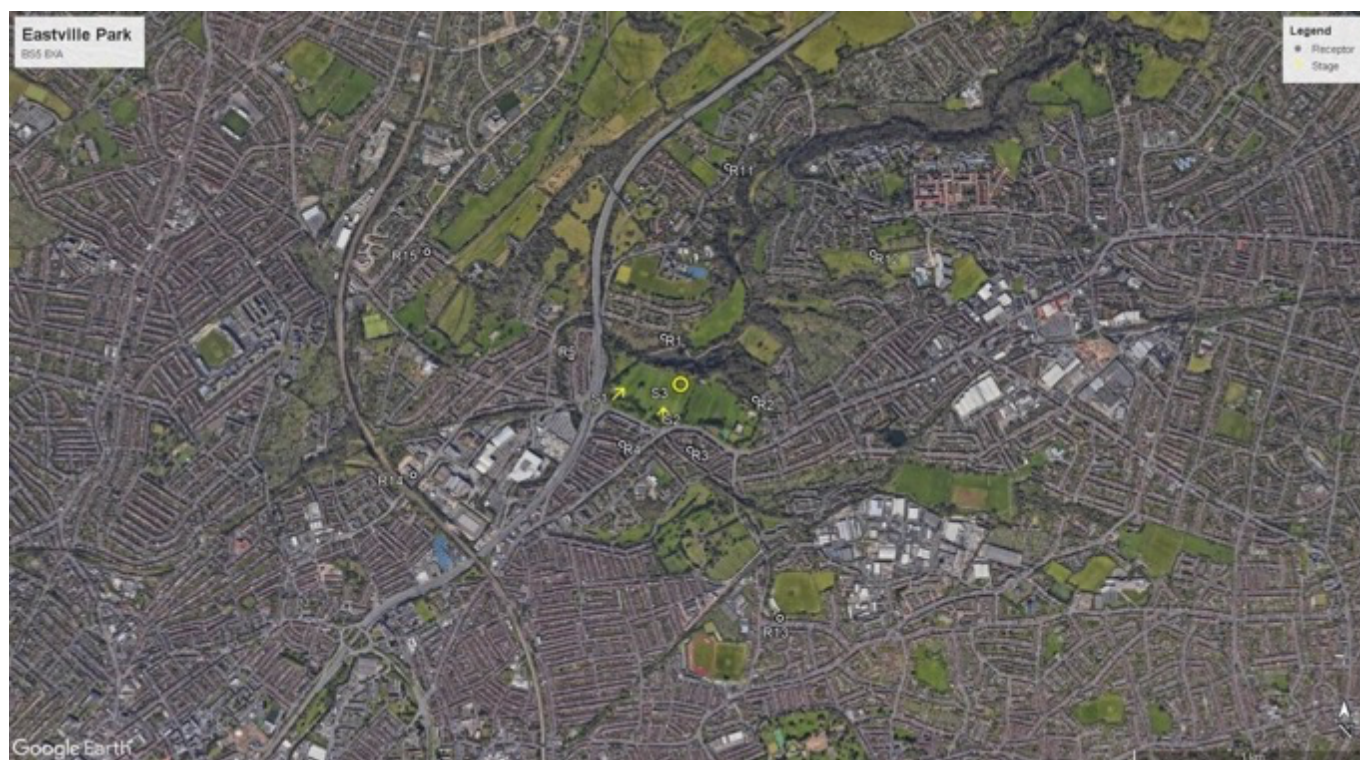


Figure 1 - Aerial

2.2 Receptors

Noise Sensitive Receptors (NSR) have been identified by previous events as representative locations where immissions may impact the community. See map on page 29 for locations. Initial monitoring during sound checks & opening events will help determine the apparent impact. The environmental noise monitoring procedure is outlined in section 5.

Ref.	Name	Dir	Dist m	Use	Notes	W3W	Postcode
R1	Averay Rd 46	NE	270	Residential	Close residents. Masked by M32 overpass.	///pushes.urban.cherry	BS16 1AP
R2	Ashdene Av 15	E	570	Residential	On axis with main stage. Minimal attenuation.	///hears.punk.fake	BS5 6QH
R3	Herbert Cres 18	SE	400	Residential	Semi-reverberent terraced crescent.	///twice.crown.basic	BS5 6QD
R4	Freemantle Rd 21	S	260	Residential	Terrace parallel with Muller Rd.	///mostly.bills.hunt	BS5 6SY
R5	Cottrell Rd 68	W	275	Residential	Close residents. Masked by M32 overpass.	///ritual.topped.facing	BS5 6TN
R11	The Elms	N	1070	Residential	Care home. Possible flanking via valley.	///trick.misty.bats	BS16 1AA
R12	Pennyroyal Grove 12	NE	1220	Residential	On axis with main stage.	///charmingly.known.luxury	BS16 1XE
R13	Gordon Av 80	SE	1220	Residential	Low residual soundscape.	///mixer.give.dragon	BS5 7ED
R14	Glenfrome Rd 101	SW	1000	Commercial	Commercial zone adjacent to rail line.	///smug.sang.item	BS2 9UX
R15	Lindsay Rd 12	NW	1050	Residential	Elevated location with Line-of-Sight.	///brick.stuck.fuzzy	BS7 9NP

Table 1- Receptors

3 Sources

Sound Sources is the collective term for regulated entertainment, construction & associated sound emission sources.

3.1 Primary Sources

Primary Sound Sources (PSS) concern the significant amplified sound systems & regulated entertainment forming the primary Music Noise Level (MNL) contribution at sensitive receptors.

See map on page 29 for locations & EMP for timings.

Noise Impact Assessment with calculations is provided on page 8 with relative contribution in Table 4.

On-site PSS monitoring shall support control of sound at source as outlined in section 5.

The primary contribution is the main stage facing north-east towards the lake & Earls Mead.

Other significant contributions include stages 2 facing north towards Averay Rd & 360° stage 3 near the lake.

The audio specification is designed for use in flagship live shows. It features multiple loudspeaker cabinets connected to form a continuous wavefront. This setup gives the user pinpoint accuracy and control over their sound while reducing noise levels due to its directional dispersion capabilities. It adjusts spectral parameters according to the acoustic environment, which ensures consistent sound quality in any setting. Delays may be deployed where appropriate to assist with distributed coverage.

The audio supervisor, Bryan Mclean, has an established track record as a systems engineer & acoustic designer. Previously managing the R&D team at Void Acoustics & product support engineer for Funktion-One Research. These skills & expertise shall facilitate good coordination, system design & implementation with the audio contractor.

Ref.	Name	Aim	Times	Notes	W3W
S1	Main stage	NE	See EMP	Open-air. Main music	///glow.took.these
S2	Stage 2	N	See EMP	Covered	///swept.unity.wake
S3	Bandstand	360°	See EMP	In the round	///staple.showed.flows

Table 2- Primary Sources

3.2 Secondary Sources

Secondary Sound Sources (SSS) is auxiliary entertainment & on-site operations such as waste, plant, or construction.

Considerate initial planning helps to control at source as outlined in Section 7. SSS are unlikely to significantly increase noise levels or cause disturbance in the immediate area.

There are no public campsites or significant sources of overnight noise.

Ref.	Location	Activity	Times	Notes
-	Attractions	General mixed activity	Regulated hours	Sponsors, activations, games, rides & similar
-	Bars	General F&B activity	Regulated hours	No/low background music. No observable impact off-site
-	Vendors	General retail activity	Regulated hours	No observable impact off-site
-	Gates/highways	Traffic	Continuous	Peak Friday & Monday
-	Static plant	Generators & towerlights	Continuous	Silenced equipment. Inaudible off-site
-	Moving plant	Telehandlers & forklifts	Social hours	Peak during build & break
-	Waste	Collection & compacting	Social hours	
-	Construction	Build/brek	Social hours	Site wide. Time limited

Table 3- Secondary Sources

3.3 Impact Assessment

The Music Noise Levels (MNL) shown in the prediction models is the specific impact from regulated entertainment up to 2km from the event without residual contribution. The outcome of this enhanced noise modelling informs the Best Practicable Means planning such as site layout, PA specification & monitoring.

Predictions using SoundPlan Noise³ & accepted methodology are shown on page 26.

The sound sources used in the prediction model are based on representative specifications & levels, see page 20.

The ISO 9613-1 calculation is considered worst-case. The system design in the model is representative & uses a standardised music profile. While uncertainty is not calculated, a ±5dB margin is representative of similar projects⁴.

The MNL is likely to be an upper level given the dynamic content & reduced levels during changeovers, i.e., not all stages will be operating all of the time & the sound level at source reflects audience sizes & content.

Bass octave levels close to the venue are considered to be adequately managed by the A-weight limit⁵. Nonetheless, for robust control of Low-Frequency Noise (LFN) the LCeq MNL shall be monitored in parallel with LAeq. Individual octave band measurements cannot exceed the LC value.

Guidance states tonal imbalance triggers complaint. We shall track the LC-LA difference for tonal balance assessment.

Music Noise Level (MNL) in the table below is the predicted level⁶ from the Primary Sound Sources listed on page 7.

Location	Dir	Dist'm	Predicted		LZoct		Notes	
			LA	LC	63Hz	125Hz		
R1	Averay Road 46	NE	270	70	86	85	71	< 2dB of limit
R2	Ashdene Av 15	E	570	64	82	82	69	
R3	Herbert Crescent 18	SE	400	61	78	78	67	
R4	Freemantle Road 21	S	260	65	82	81	72	
R5	Cottrell Road 68	W	275	64	83	83	62	
R11	The Elms	N	1070	53	73	74	59	
R12	Pennyroyal Grove 12	NE	1220	58	75	74	61	
R13	Gordon Avenue 80	SE	1220	47	67	67	52	
R14	Glenfrome Rd 101	SW	1000	51	70	70	59	
R15	Lindsay Road 12	NW	1050	51	75	75	58	
S1	Main stage	NE	50	90	105	104	91	
S2	Stage 2	N	30	90	106	106	96	
S3	Bandstand	360°	10	90	104	103	89	

Table 4- Prediction

The predictions are compatible with the proposed controls with a reasonable margin for uncertainty.

With the stage operating, the prediction indicates the most impacted locations ≈ 70dBA, below the proposed limit. To safeguard, additional rotational measurements shall be taken on Averay Rd.

The MNL at all residential receptors beyond the immediate boundary is below a typically acceptable level of 65dBA.

We anticipate the Stage FOH levels above to be a ‘worst-case’ scenario. Audience levels of 104dBC/90dBA are below typical concert levels. It is likely the audio supervisor & contractor shall improve the audience levels by system design & site layout while protecting the wider community by compliance with the agreed noise controls.

³ SoundPlan Noise is a global market leading acoustic modelling software application

⁴ Owing to source configuration, meteorology, ground effect & boundaries. See ISO9613-1 for influencing factors.

⁵ J. Griffith et al *A Study of Low Frequency Sound from Pop Concerts* 1993 – NB. This study considers music noise at 2Km & does not apply to receptors closer to the venue.

⁶ 1m from the façade at 1.5m above ground level using accepted ISO 9613 or NORD2000 methodology. Updated calculations to follow in the next revision.

4 Monitoring

Monitoring shall be undertaken for compliance with expected standards & minimise the likelihood of complaint.

Sound levels will be monitored continuously for the duration, using calibrated attended & unattended equipment. See Instrumentation below. A combination of rotational offsite measurements, continuous on-site level monitoring, plus fixed unattended equipment where appropriate will help maintain acceptable sound levels for the event's duration while open to the public.

Propagation measurements during system checks shall be undertaken before doors as an early indicator of apparent levels.

Rotational offsite measurements will initially focus on the most adversely affected premises & dynamically reassessed as required.

Additional sound measurements may be conducted at residents' properties on request where safe to do so & observing safe protocols.

For timely response, the level should be monitored over 5' & 15'. Where the Leq 5' is likely to result in an Leq 15' value exceeding the controls, the audio contractor shall be advised to prepare for a level reduction.

The mix position of primary stages (Table 5) will be issued with an SLM for easy reference by the sound engineer to help maintain level continuity. Once the FoH level is determined, the noise levels will be monitored & appropriate action is taken when considered necessary, e.g., a loud act, a change in wind direction or receiving a complaint. Direct contact with Stage Managers & Sound Engineers shall be maintained to make any required adjustments.

The sound report log shall record LAeq, LCEq, location, date, time, duration, levels, operator, sound meter & observations at locations shown on the map on page 29. See procedure on page 23. The level should be monitored for timely response over 5' & 15'. Where the Leq 5' is likely to result in an Leq 15' value exceeding the controls, the sound contractor should be advised to prepare for a level reduction.

Instrumentation

The following SLM deployment scheme is proposed & subject to dynamic assessment & redeployment on-site:

Class 1: Attended	Class 1: Unattended	Class 2: Attended	Class 2: Unattended
Consultants	In situ assessment	S1 Main stage S2 Stage 2 S3 Bandstand	N/A

Table 5- SLM deployment

Notes

All measurements shall be free-field unless otherwise stated.

For timely response, the Music Noise Level should be monitored over 5' & 15'. Where the Leq 5' is likely to result in an Leq 15' value exceeding the controls, the sound contractor should be advised to prepare for a level reduction.

An operational lower threshold of 73dBA & 87dBC Leq 15' should be observed as a safe margin 3dB below the maximum limit of 75dBA & 90dBC Leq 15' to minimise likelihood of excessive levels.

As general guidance, frequency bands below 31Hz can be safely attenuated by 15dB or more without compromising the creative integrity. These deep LF & infrasound spectral components are likely to cause annoyance off-site.

Dwellings immediately adjacent to the site are most likely to be at risk from disturbance. However, Road Traffic Noise (RTN) & Air Traffic Movement (ATM) on the perimeter may mask the Music Noise Level impact. For qualitative assessment, dynamic assessment shall be taken in adjacent streets, especially in semi-reverberant spaces.

Many buildings on the perimeter are 3 & 4-floor properties where the upper floors may have limited line-of-sight of the stages. Upper floors shall be awarded a +1dB correction where street measurements may not be representative.

Due to traffic noise, it is unlikely that the MNL can be accurately measured at the following properties 742-784 (evens only) Muller Road, 192-330 (evens), 295-341 (odds) Fishponds Road & 634-716 (evens only) Stapleton Road.

Reporting

A log containing measurements, actions, complaints & conclusions will be available within 28 days of the request.

Monitoring

- Overseen by competent person
- Robust procedure in place
- Calibrated instrumentation
- Continuous cover during live event
- On & off-site measurements logged
- Rotational attended assessment
- Attend premises as required
- Inform if levels are excessive

5 Community

Effort shall be made to facilitate good relations through positive community engagement. The ambition is for community representatives to be positively engaged with the proposals.

The management team has extensive experience operating events in challenging locations with good community relations & without excessive disturbance. We shall undertake steps to inform & engage the community in advance via traditional & social media communication. This understanding of how to minimise disturbance, ameliorate & engage in effective communication supports confidence in the robust controls. General details shall include timings & contacts.

Key points

Layout	The stage(s) are positioned to minimise noise at the nearest dwellings.
Timings	Concert ends in social hours. The sound checks will be limited to the shortest possible duration. Noise impact from soundchecks & setup/dismantling are limited to social hours where practical.
Sound system	The system configuration promotes control with highly directional speakers. The sound level & bass shall be carefully controlled to ensure they are not excessive. The bass speakers have noise-cancelling technology that focuses the low frequency energy within the venue.
Limits	We anticipate operating within the permissible sound levels. The licence conditions & associated guidelines are not a target, but the upper action limit. Staff will be alerted to a lower threshold so action can be taken in advance of approaching the maximum permissible level.
Monitoring	Sound meters shall record the combined sound emissions from the site. Event management & sound engineers shall be alerted to excessive levels & will follow specific instruction for immediate & appropriate action
Review	The community helpline will be in operation for the duration to engage with residents, addressing any specific concerns in a timely & effective fashion

5.1 Helpline

A dedicated helpline shall be made available for the duration of the event. See procedures in the appendix.

The operator is based in the onsite event control on show days.

The helpline shall be tested in advance to demonstrate operation.

In the event of a complaint, the organisers shall take proactive steps to engage with the resident, minimise disruption & implement measures to minimise the likelihood of repetition.

A noise complaint shall be relayed to the sound management contractors by instant text messaging as the primary mechanism to facilitate an adequate response. Alternatively, a mobile phone or 2-way radio where practical

Complaint locations shall be noted to enable early identification of any geographical patterns. The acoustic consultant shall visit complaint locations where appropriate, observing safety protocols, to assess & help resolve concerns.

6 Control

6.1 Organisation

The organisers acknowledge the importance of robust noise control.

Please refer to the EMP for details of the specific roles, procedures, command & control structure.

The organisation framework & communication shall be compatible with the Pop Code and normative references.

An essential selection criterion for the production team is to successfully ensure that individuals hold the experience, respect & authority to command a proficient & responsive sound department.

Drawing on the experience of previous events, there is a clear line of communication between the silver level management team & those directly in control of the sound, such as engineers & stage managers.

6.2 Collaboration

The sound management contractor aims to meet with the responsible authorities, key stakeholders, production & technical contractors before doors on the first concert day. Timing to be confirmed in the production schedule. Updated situation reports may be disseminated and reviewed by scheduled meetings, instant messages, and email.

6.3 Communication

A sound management representative shall convene with the responsible authorities, key stakeholders, production, and technical contractors as best practical to promote collaborative working. This may include, but not limited to, meetings or other forms of communication. For example, a meeting in advance of doors on the first concert day may be helpful. Updated situation reports may be disseminated and reviewed by scheduled discussions, instant messages, & email.

External communication with responsible authorities and the public shall use telephone, email & in-person contact.

During the live event, Instant Messaging (IM) is the primary channel for internal communication between sound management, control, production & technical contractors., e.g., WhatsApp or SMS. Where practical mobile phone or 2-way radio may be used as an alternative, however, these forms of communication are generally not compatible with the responsibilities and workflow of sound management and audio contractor personnel.

6.4 Strategy

This plan adopts SMARTER methodology to deliver effective results:

Specific, Measurable, Achievable, Relevant, Timely, Evaluated, Reviewed

Activities that may potentially cause noise disturbance to neighbours shall be identified. We shall ensure the developed procedures are adequate for these potential hazards. The implementation shall be reviewed in-situ to circumvent unforeseen pitfalls & minimise the likelihood of complaint.

For example, the artists' management shall be informed of sound limits in advance as outlined on page 12.

Factors such as community engagement, programming, locations, timings & systems shall be carefully considered.

The statutory criterion for noise preudial to health or nuisance (e.g., EPA 1990, section 79) have been considered:

Frequency	Adverse cumulative impact is unlikely given the short tenancy & the operational schedule
Duration	The event days are limited to under 12-hours
Timing	All amplified music ends in social hours with appropriate sound levels for the day & time
Intensity	A wide dynamic range is typical of the diverse music profile where extended periods of high-intensity music is unlikely. The controls shall be in place to minimise environmental noise impact to an acceptable level. Changeover breaks help to regulate Temporary Threshold Shift.

6.5 Sound Systems

The consultant shall liaise with the sound contractor & technical production in advance regarding system design, noise limits & propagation.

Systems

- Good layout & specification
- Advance information before arrival
- Under the control of an engineer
- Maintain appropriate levels
- Local monitoring
- Strict time keeping

Planning

In general terms, the site layout draws on the experience of previous events & impact calculations. Please refer to the site plan in the EMP for details.

The sound systems shall point away from the nearest sensitive receptors where practicable. The potential for the off-axis bass-spill has been considered during the planning.

The stage layout, programming & timings further minimise the opportunity for a soundclash between sound sources.

Unexpected adverse effects of acoustic reflection, diffraction, resonance & reverberation are problematic to predict in a large area with a complex mix of temporary sources, temporary structures & variable metrological conditions. However, the noise monitoring procedure should identify such issues & mitigating action shall be taken where practicable.

Before arrival, the audio contractor, managers, artists/ engineers shall be informed of strict noise control requirements. Sound engineers shall not exceed the agreed MNL levels without exception or delay.

Systems will be under the supervision of a competent sound person at all times. System controllers may be fitted with limiters that may further help control levels.

Sound engineers shall not exceed the agreed MNL levels without exception or delay.

Site levels will always reflect the audience size & dynamics. Audience capacities tend to be lower earlier in the day & transient throughout.

The organisers will endeavour to prohibit portable music equipment that is not part of the licensed entertainment or for the sole purpose of background music at an authorised trader's concession area.

There shall be amplified sound outside the licensed hours of operation.

Low Frequency Noise

Special consideration will be awarded to the bass break-out. Low Frequencies contain the greatest acoustic energy & subject to less geometric & barrier sound attenuation than higher octaves. Specific frequencies may require 'notching' for fine control. Directional sub-array may be deployed to attenuate off-axis radiation by up to -18dB⁷.

Bands below 31Hz may be attenuated to control LFN disturbance. Frequency bands between 40 – 160Hz should be monitored where an excessive tonal component is likely to cause annoyance. Pop code advice⁸ shall be observed.

Technical Rider

Any third-party technical equipment shall be assessed by the Production or Technical Manager for any possible adverse effect it may have on overall sound levels. Any such equipment such as backline amplifiers or additional PA speakers would be regarded in the context of this document & members of the technical team would:

- Prevent the use of any equipment that appears incompatible with this plan
- Avoid any external sound engineer operating outside the agreed noise level limits at the Front of House.

⁷ SSE / Vanguardia Hatfield test of L'Acoustics K1 and Martin MLA line array

⁸ Ref 8. Griffiths, J et al *A study of Low-Frequency Sound from Pop Concerts*, (1993)

6.6 Build & Break

Some construction noise is expected during the Build, Break & overnight changeovers. We shall eliminate, reduce & mitigate noise emissions as best practicable. This noise source shall be minimised & confined to General hours between 07:00 – 20:00 whenever possible. Noisy activities of observable significance shall not be undertaken before 08:00. Activity likely to be intrusive & discernible offsite will be scheduled during social hours.

Best practicable means are employed to keep the build & strike noise as low as reasonably possible. Measures to be considered will be consistent with the recommendations of BS5228 & all activities will be carried out with due care to minimise potential disturbance, e.g.:

- Overnight build/break & change over activities shall not exceed a No Observable Adverse Effect Level (NOAEL). i.e., just audible at the boundary of any noise-sensitive premises but unlikely to be intrusive & cause excessive disturbance
- Careful selection of plant and construction methods
- Use of site enclosures, where practicable & necessary, to provide acoustic screening at the earliest opportunity
- Choice of transport routes & scheduling shall minimise public disruption

On event days, we shall remove the touring artists' equipment from the stage & change over for the following days' line-up. This means immediately after the show, some technical equipment is dismantled & loaded into vehicles & on changeover days other equipment is unloaded & setup. Activities will avoid noise impact where possible, supervised by the production or site manager. The activities undertaken include lowering equipment from flown positions & repacking into transit cases. Significant impact noise that may be intrusive, such as noisy metal-on-metal operations, is limited to general hours between 08:00 – 20:00, wherever practicable. More extensive dismantling work commences the following morning, including dismantling stages & similar temporary structures at the close of the event.

Practical steps to reduce the construction & dismantling noise disturbance will include the following where practicable:

- Significant impact noise, such as metal-on-metal operations, shall be limited to the agreed hours
- Minimise impact noise: metal-on-metal operations. Refrain from dropping heavy or metal items, e.g., tubes & decks
- Temporary use of damping/packing materials when lowering equipment or loading vehicles
- Avoid unnecessary noise: Keep conversations to a minimum. Use a 2-way radio & refrain from shouting
- Where practical, reduce idling & switch off. Request vehicles with pink noise reversing alarm where possible
- Efficient handling: Optimise the handling operation & time taken to complete the task safely. Use bulk transit cases to minimise handling operations. Locate vehicles as near as possible

6.7 Plant

Plant equipment can be either static or moving noise sources that require attention. Plant will often operate continuously throughout the site & therefore, may cause disturbance to nearby NSR. The site management team shall consider any plant's type, location & operating hours.

Network power or hybrid supplies shall be deployed where practicable. Plant shall be switched off overnight where practicable. Any essential plant equipment operating during unsocial hours, such as chillers, shall have no observable adverse effect within dwellings with windows open for ventilation. Plant fitted with properly lined & closed sealed acoustic covers while in use.

6.8 Traffic

All onsite vehicular traffic, including exits onto the public highways, shall be controlled per the EMP &/or Traffic Management Plan (TMP). This plan regulates vehicle movements and minimises disruption. Traffic inherently reduces overnight and will likely be of No Observable Adverse Impact Level (NOAEL). Routes are planned to minimise community impact, unnecessary reversing, hill starts & long periods of vehicle idling. Traffic staff working in residential areas between the hours of 23:00 & 07:00 will be issued with 2-way radio earpieces to minimise disturbance.

Unloading & loading

Location of loading & unloading operations shall consider proximity to sensitive receptors where practicable. Low-impact routine activities such as toilet cleaning, consumable restocking & portable equipment items such as backline & instruments are unlikely to cause a disturbance. Bulky items, such as production deliveries, will be carried out as per the production schedule & have been planned to avoid the likelihood of complaints. Loading operations & associated traffic, such as forklifts, will be carried out with due care to minimise potential disturbance between the hours of 23:00-07:00.

Construction

- Overseen by management
- Observe BS5228 recommendations
- General hours 07:00 – 20:00
- No excessive noise before 08:00
- Overnight work minimise disturbance

Plant

- Overseen by management
- Consider sensitive receptor proximity
- Observe BS5228 recommendations
- Use maintained/silenced equipment
- Minimise operating times
- Follow manufacturers procedures

6.9 Bars & vendors

Other than incidental use, amplified systems are not permitted in bars & concession areas. Responsible staff shall eliminate, reduce & mitigate noise to the lowest practicable levels & not cause unreasonable disturbance.

Operational noise, such as deliveries and waste collection, shall follow the EMP.

Plant such as chillers shall be suitably located & maintained to avoid noise disturbance overnight.

6.10 Noise at Work

The Control of Noise at Work Regulations 2005 (the Noise Regulations) intends to prevent or reduce risks to health and safety from exposure to noise at work as reasonably practicable. The high noise levels over long periods are essential elements of a live entertainment event.

Everyone employed at a live event may be exposed to the upper noise exposure level levels. This means that all event staff need to be aware of this and take personal responsibility to think about their noise exposure & take reasonable care not to damage their own hearing or other people.

Multiple contractors, self-employed, performers & sound engineers are a complex environment. An overall employer is problematic to determine in this context. Everyone in the production chain has a role in managing the risks.

This means anyone working in this industry should be responsible for understanding the personal risks & control of Noise-Induced Hearing Loss (NIHL). As 'tools-of-the-trade', individuals should use hearing protection of around 10-20dB (SNR15-25) when necessary & 20-30+ (SNR25-35) when working in high exposure areas such as in front of the stage.

6.11 Public

There is no precedent and no locus of law for controlling human activity or crowd noise. However, the gradual build-up, peak & slow-down nature will help to identify environmental noise hotspots & the practicability of managing crowds to minimise disturbance.

There are no public campsites or similar sources of late-night noise.

All reasonable steps shall be taken to ensure that customers leave and disperse from the event without causing public nuisance or disorder; staff & notices at exits will remind customers to leave quietly not to disturb residents.

The management team will implement a customer behaviour policy. Anti-social behaviour is unlikely given the public demographic; however, rowdy, anti-social or disorderly conduct shall not be tolerated & proportionate action will be taken by security staff.

Unlike workers, there is no specific legislation setting noise levels for the audience exposure to noise. However, the guidance strongly recommends that the sound pressure level not exceed 140 dB LC peak & 107 dB LAeq throughout the event (LAeq Event).

Compliance with the LAeq Event guideline is likely given an operational limit on each FoH, the dynamic nature of the programming, quieter periods during changeovers & relatively short concert duration compared to an all-day event.

Compliance with LC Peak is likely given the pit barrier separating a loudspeaker and the audience. Where practicable, the audience will not be permitted within 3m of a loudspeaker & no less than 1m under any circumstance. Warnings are typically published in the Terms & Conditions.

Occupational

- People who control sound must recognise their role for providing a safe workplace
- All individuals working on-site should acquire & use appropriate hearing protection (earplugs etc.)
- Avoid prolonged periods in high-volume areas where possible
- Staff should rotate between quieter areas during shifts when practicable
- Find a quiet space to take breaks

7 Appendix

A. Music Noise Level

The following criteria parameters is agreed with the Licensing Authority:

An upper music noise limit of 75dB LAeq (15 min) & 90 dB LCEq (15 mins) will be in place with a target level of 72dB LAeq (15 min) & 87 dB LCEq (15 mins)

Reason

A permitted level of 75dBA at any Noise Sensitive Receptor (NSR) is common practice. See examples on page 18.

An MNL limit of 75dBA at the nearest dwellings is likely to facilitate an adequate audience experience.

A limit below 75dBA is likely to result in an unsatisfactory experience rendering the event unviable.

A Music Noise Level (MNL) of 90dBA at the Main Stage control position known as Front-Of-House corresponds to a level of 70dBA at Averay Rd. i.e. a 20dB difference.

The predicted MNL at ten representative receptors are listed on in Table 4 on page 8, ranging from 47-70dBA.

This does not mean a MNL limit of 70dBA is satisfactory.

A concert FOH level of between 95-100A is typical⁹, 5-10dB above the predicted values.

The predicted level at any Noise Sensitive Receptor (NSR) should be at least 5dB below the limit to indicate compliance with reasonable confidence.

E.g., a predicted NSR level of 70dBA is a reasonable indication that compliance with a 75dBA MNL limit is practical.

A 5-10dB margin for Uncertainty is typical to allow for variables such as weather, see page 19 for further explanation.

We anticipate a combination of system refinement, real-world conditions & careful monitoring we can achieve acceptable levels both on & off-site. i.e., a level in excess of 95dBA for the audience and below 75dBA for residents.

65dBA at Averay Rd on the north perimeter would equate to a level of 85dBA in the audience at main stage. This would be perceived as lively background music & half as loud as a concert.

The number of Stages is not the most significant factor owing to the way sound power combines logarithmically. E.g.:

$$90\text{dB} + 90\text{dB} = 93\text{dB}.$$

$$93\text{dB} + 90\text{dB} = 95\text{dB}$$

$$95\text{dB} + 90\text{dB} = 96\text{dB}$$

In this instance, simply reducing the number of stages or reducing the sound level on Stages 2 & 3 will not have a significant impact on the achievable sound levels at the Main Stage. The most significant influence to perceived impact off-site is the dominant Stage. i.e. which stage you hear the most becomes the focus.

A person is usually unable to detect a difference in sound level of 3dB, however a difference of 5dB is noticeable.

To minimise likelihood of exceeding the MNL limit, operational upper threshold should be 3dB below the limit. 5-minute measurements provide adequate indication of the 15-minute trend & action taken before the limit is exceeded.

In summary, this means:

- a) A Music Noise Level limit between 70dBA & 75dBA does not have a significant impact on the community, compared to either 70dBA or 75dBA.
- b) A MNL limit of 70dBA corresponds to an unviable audience music experience of 90dBA.
- c) 5-minute measurements are a good indicator of the 15-minute trend for action before the limit is exceeded.
- d) An operational lower threshold of 73dBA & 87dBC Leq 15' is a safe margin 3dB below the maximum limit.

⁹ Pop Code notes the music level for a concert audience is typically 100dBA and anything below 95dBA would prove unsatisfactory.

Tokyo World

The MNL limit for Tokyo World (TW) in 2017 comprised eight concurrent parameters as shown in the table below:

Location	Dir	Dist'm	L _{Aeq} 15'	L _{Zeq} 15' 63Hz oct	L _{Zeq} 15' 125Hz oct
R1 Averay Road 46	NE	270	70	85	85
R2 Ashdene Av 15	E	570	70	85	85
R3 Herbert Crescent 18	SE	400	65	80	80
R4 Freemantle Road 21	S	260	65	80	80
R5 Cottrell Road 68	W	275	65	80	80
R11 The Elms	N	1070	-	75	75
R12 Pennyroyal Grove 12	NE	1220	-	75	75
R13 Gordon Avenue 80	SE	1220	-	75	75
R14 Glenfrome Rd 101	SW	1000	-	75	75
R15 Lindsay Road 12	NW	1050	-	75	75

Table 6 – Tokyo World

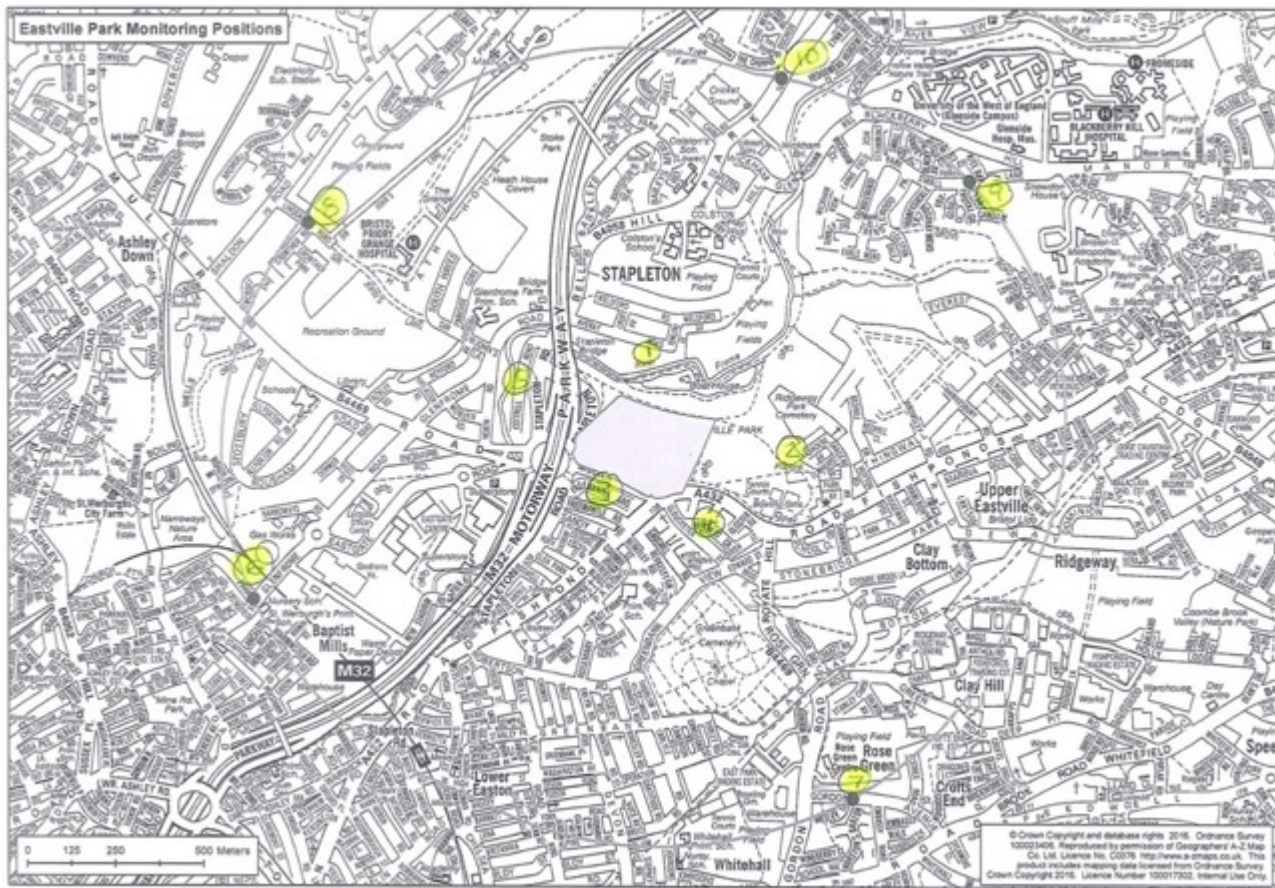


Figure 2- Monitoring points

The inherent complexity of assessing compliance with eight criteria is practically challenging to implement effectively. Furthermore, implementing a LFN guidance level at half the anticipated distance also halves permissible sound levels. Anecdotal TW customer feedback suggests an unacceptable audience experience, associated with unviable limits.

The proposed simpler conditions aim to improve robust LF noise control by single value simplicity. Implementing an LC criterion permits LFN control across the entire LF spectrum. This improves on the previous controls of just two octave bands centred on 63Hz & 125Hz, ignoring a common part of the music spectrum in the critical 25-50Hz range.

B. References

There are a number of relevant legislation and guidelines including, but not limited to:

- Licensing Act 2003 and Premises License conditions
- Noise Council *Code of Practice on environmental noise at concerts* (1995)
- The Event Safety Guide (HSG195) and The Purple Guide <https://thepurpleguide.co.uk>
- Research into Attitudes to Environmental Noise from Concerts. DEFRA NANR292 (2011)

BS7445-1:2003

BS7445 part 1 specifies the descriptions and measurements of environmental noise. This standard serves as a guideline for the necessary procedures and methodologies to be followed. Accurate, repeatable & traceable assessment is supported by application.

BS5228-1:2014

As the code of practice for noise and vibration control on construction and open sites, BS 5228 refers to the need for the protection against noise and vibration of persons living and working in the vicinity of and those working on construction and open sites. This Standard provides effective practical procedures for the control of noise & vibration.

Code of Practice on Environmental Noise Control at Concerts

The Code of Practice on Environmental Noise Control at concerts (1995) also known as the Pop Code (Pop) provides guidelines for managing music noise disturbance. The Pop Code is a guideline & endorses flexibility for different levels & criteria to address site-specific context. When assessed, the Music Noise Level (MNL) must not exceed the guidelines shown below at 1 metre from the façade of any noise-sensitive premises between 09:00 and 23:00. For events running between 23:00 and 09:00, music should not be audible inside noise-sensitive premises with the window open (PPG approximates 15-20dB attenuation). The Pop accepts there is no universally accepted guideline for inaudibility but assumes that music just audible outside the noise-sensitive is acceptable.

Concert days per calendar year	Venue Category	Guideline
1-3	Urban Stadia or Arenas	The MNL should not exceed 75dB LAeq 15'
1-3	Other Urban and Rural Venues	The MNL should not exceed 65dB LAeq 15'
4-12	All Venues	The MNL should not exceed the background noise level by more than 15dB'

Table 7 - Pop code criteria

As a note to the table above, the Pop states; For those venues with more than three events per calendar year are expected, the frequency and scheduling of the events will affect the level of disturbance. In particular, additional disturbance can arise if events occur on more than three consecutive days without reducing the permitted MNL. The Pop states that where arrangements are satisfactory with either higher or lower noise levels than the proposed guidelines, these existing limits should continue.

The MNL in an audience close to the mixer position is typically 100dBA and anything below 95dBA would prove unsatisfactory to an audience. The Pop includes a footnote regarding bass; 'Although no precise guidance is available the following may be found helpful (ref 8) a level up to 70dB in either the 63Hz or 125 Hz Octave Band is satisfactory; a level of 80dB or more in either of these octave frequency bands causes significant disturbance'. This is often misused as Ref 8 relates to 'A study of Low-Frequency Sound from Pop Concerts, J.E.T. Griffiths, J. Staunton and S Kamath (Proc IOA, Vol 15, Part 7, 1993)' which assessed disturbance beyond 2km and therefore should not be applied to receptors closer than 2km. From experience, the low-frequency sound is adequately controlled by the LAeq limit. Note to Guideline 3.4 states it is the frequency imbalance that causes a disturbance. Consequently, there is less of a problem from low-frequency content near an open-air venue.

Edinburgh Napier University researched attitudes to environmental noise from concerts (Defra NANR 292). It suggests the perceived level of entertainment noise and not the category of a venue that is significant, stating that 'annoyance' rates for urban venues appear to be linked to MNL rather than a category or concert days. The report also suggests that resident's disturbance is linked to a subjective perception of how loud the noise must be at the source and concludes a significant percentage of the population will form an opinion of the noise's subjective annoyance irrespective of the actual level. Because of this research, events adopt similar noise criteria to Stadia or Arenas as provided Pop criteria table above. There is good evidence of licensing authorities successfully applying MNL limits of 75dBA/90dBC Leq15' to temporary venues with more than 3 and as many as 40 concert days per year.

Venue	Concert days per annum	Licence condition	Notes
Alexandra Palace Pk, Tower Hamlets	30 (3x type A, 4x B, 23 x C)	A: 75dB, B: 65dB, C: 55dB LAeq 15'	No low-frequency limit
Victoria Park, Tower Hamlets	Unknown	75dB LAeq 15' at 1m from façade	
Trafalgar Sq., Westminster	40 amplified events	75 dB LAeq 15' at 1m from façade	No low-frequency limit
Central Park, East Ham, London	Unknown	75dB LAeq 15' at 1m from façade	
Lambeth parks: (Clapham Common, Brockwell Park, Kennington Park, Streatham Cmn, Norwood Park)	Up to 8 major events per venue (Total maximum of 40 major events in Lambeth Parks)	75dBA and 90dBC Leq 15' free-field	Non-major on a case-by-case basis. Typically, 65dB LAeq 15'

Table 8 - Venue noise limit

Since the publication of the Pop in 1995, best practice has progressed following changes in the events industry, increase demand for outdoor events and changes to associated guidelines and legislation such as the Licensing Act 2003. Thus, it has been under review for some time, particularly in relation to the number of concerts and corresponding levels.

C. Urban venues

The Code of Practice on Environmental Noise Control at Concerts, Noise Council, 1995 (Pop Code) has been withdrawn by The Chartered Institute of Environmental Health (CIEH). While the replacement remains in consultation, the 1995 Pop Code continues to provide guidance, including 'Table 1' relating to the type of venue and number of concert days per calendar year & reproduced in Table 7 on page 17.

The table indicates a level of up to 75dB LAeq 15' is satisfactory for up to 3 concert days for some venues. The revised code suggests more than 3 events per year are acceptable contingent on context.

Table 4 below summarises the conditions currently in use at 21 urban park venues. The local authority is clearly satisfied having issued Premises Licences & there is no evidence to suggest that there is any public nuisance caused.

Urban venues	Days per Year	Music Noise Level guidance
Queen Elizabeth Park, London	6	75dB LAeq 15'
Hyde Park, London	6	75dB LAeq 15'
Victoria Park, London	9	75dB LAeq 15'
Lambeth parks (5 parks), London	8	75dB LAeq 15'
Heaton Park, Manchester	6	75dB LAeq 15'
Crystal Palace Park, London	6	75dB LAeq 15'
Central Park, East Ham, London	4	75dB LAeq 15'
Beckenham Place Park, London	3	75dB LAeq 15'
Alexandra Park, London	3	75dB LAeq 15'
Bellahouston Park, Glasgow	3	75dB LAeq 15'
Morden Park, Merton	3	75dB LAeq 15'
Dreamland, Margate	8	75dB LAeq 15'
Victoria Park, Leicester	3	75dB LAeq 15'
York Sports Club, York	3	75dB LAeq 15'
Victorious Festival, Southsea	3	75dB LAeq 15'
High Tide Festival, Bournemouth	3	75dB LAeq 15'
On The Beach, Brighton	6	75dB LAeq 15'

Table 9- Urban venue limits

It is widely recognized that how often a noise occurs plays a significant role in how much annoyance or disturbance it causes. This means that when assessing the impact of noise, it is not just about the intensity or how loud it is perceived, but also the recurrence or how frequently it happens. For instance, large music events that occur 12 days by year are generally considered to have a greater impact than those that happen only 6 days by year.

The community can be adequately protected from excessive Music Noise exposure by controlling the frequency in combination with intensity. For example, the Music Noise Level can be safely increased, by limiting the number of days. This concept was considered in the guidelines for outdoor concerts, where recommended noise limits were influenced by how often these events took place.

Since the 1995 Code of Practice, there has been a significant increase in the number of outdoor events in the UK, both in terms of venues used and their frequency. Surprisingly, this growth has not led to disproportionately adverse effects on communities. This suggests that the original thresholds based on frequency of occurrence, while cautious at the time, may have been unduly limiting in context. Therefore, there is scope to adjust these thresholds for a contextual increase in Music Noise Level or event days without causing unacceptable disturbance to affected communities.

D. Terminology

This section is meant as a primer to those unfamiliar with the subject and hopefully will serve to navigate some of the most basic principles & common misunderstandings. Unfortunately, deciBel (dB) values are often used with poor insight. A classic example is the newspaper headline of the “horrifying” music played at 120dB! intended to sensationalise & provide no helpful information.

Not all sound is noise. Noise is defined as unwanted sound, typically loud, annoying, or disturbing neighbours. The noise's character and tone may be more significant than the relative loudness. The bass & repetitive beat components of music have the potential to trigger complaints. Most of the jargon used relates to deciBels (dB) and the different methods sound level is assessed:

- dB is a relative unit of sound level measurement
- A change of 3dB is typically considered a “just noticeable” difference in sound level
- An increase or decrease of 10dB is perceived as a doubling or halving of the sound level
- A typical conversation is around 60dBA, a moderately busy bar is around 80dBA and 100dBA for a concert or club

A decibel is simply a way of stating a ratio between two numbers. It originates from a method to describe telegraph signal loss over long-distance cables. It does not describe how loud something is without a reference informing what, where, when & how. With the availability of cheap domestic noise meters & smartphone applications, the general public routinely shares confident nonsense with dB values that are misleading & factually inaccurate.

When the sound level is below about 65-70 dBA, the sound level does not relate well to people's noise evaluation¹⁰. Non-acoustic factors, including socio-economic & contextual factors such as built environment, air quality & odour, play a dominant role. Consequently, there is active discussion in the acoustics community about the validity of using decibels to determine the likelihood of nuisance. Complaint rates have strong linear relationships with urban density¹¹; i.e., complaints are likely to increase in higher-density areas. The poor correlation between disturbance and sound level alone has been further demonstrated after the Covid-19 lockdown, the prevailing noise level decreased significantly, but the noise complaints increased almost three times, suggesting that reducing noise level would not always mitigate annoyance¹².

The ear is naturally less sensitive to low bass and high treble sounds than mid-range. To approximate how the ear responds, sound levels are often measured with adjustments or ‘weightings’ to represent the human ear. A-weighting is the most common adjustment when measuring environmental noise and reduces the level of bass and treble measured to mimic our ear's frequency response. Consequently, it is common for sound levels to be expressed as dBA. i.e., dB with A-weighting adjustment. Other weightings include C-weighting, which approximates how the ear responds in a loud environment like a concert. C-weighted criterion is more effective at controlling Low-Frequency Noise (LFN) than A-weighted plus the octave bands centred on 63Hz & 125Hz. Z-weighting, which means unweighted or linear response where no adjustment is applied.

Music Noise Level (MNL) is the specific noise level of the music from the venue, excluding the residual noise, which is the combination of routine noises in the environment, such as traffic, but excluding any specific noise from an event or venue. The true MNL must be calculated as the measured level less the residual. In practice, it is unviable to turn the event music on and off to compare the relative residual levels only with combined residual and music noise. Consequently, it is necessary to take measurements when the music is inaudible to determine a representative residual level. Decibels are logarithmic & the residual level is logarithmically subtracted from the measured level to determine the music level, not simply subtracted like regular values.

Entertainment sound levels typically fluctuate over time. A Sound Level Meter (SLM) will measure over time and calculate the Equivalent Level (Leq), an overall level similar to an average, representing the sound level while moderating transitory noises such as a door slamming or passing vehicle. The Leq measurement may also be A-weighted and expressed as $L_{Aeq T}$, where T is the minutes. E.g., $L_{Aeq 15'}$. Noise limits aim to protect neighbours from disturbance, so noise limits often refer to a sound level measured 1m from the façade of a neighbour's property where the MNL should not exceed 65dB $L_{Aeq 15'}$ at 1m from the receptor façade.

Background levels have a specific meaning describing a statistical assessment of the level that was exceeded 90% of the time and is expressed as L_{90} . The L_{90} approximates the background or ambient sound level when 90% of the loudest sounds are omitted. Licence conditions are often derived from the Noise Council Code of Practice, which defines the background as the L_{A90} over the last 4 hours of a proposed event or the entire event if shorter. A reasonable rule of thumb is the background L_{A90} will be 5 – 10dB lower than the residual L_{Aeq} during the day. The difference will be 3 – 5 dB or less at night-time when there is less general activity.

Every measurement or calculation comes with inherent Uncertainty caused by a variety of factors, such as variations in environmental conditions, or the acoustic properties used in the prediction model & calculation. Uncertainty can significantly affect the value, reliability, and validity of the results. By quantifying Uncertainty and understanding the cause, we can make more informed decisions¹³. In this application, a margin of +/- 5dB is typical.

Specialist environmental noise assessment should be carried out to an appropriate standard¹⁴ & by competent¹⁵ personnel. Monitoring should be carried out by a person who can demonstrate competency in environmental acoustics rather than, for example, live audio production or occupational health & safety work.

¹⁰ Kang, J. (2007) Urban Sound Environment

¹¹ Kang J et al (2019) Relationship between urban development patterns and noise complaints in England

¹² Tong H et al (2021) Increases in noise complaints during the COVID-19 lockdown in Spring 2020. A case study in Greater London

¹³ Further reading: R Peters et al, Uncertainty in Acoustics Measurement, Prediction and Assessment, 2019

¹⁴ BS7445 - Description and measurement of environmental noise

¹⁵ Institute of Acoustics Diploma or BSc in Acoustics or a Certificate of Competence in Environmental Noise Measurement, with relevant experience

E. Spectral profile

A/C-Weighting

The ear not equally sensitive to sound at all frequencies at all sound pressure levels.

A-weighting is typically used to represent human response at moderate sound pressure levels. Notably A-weighting is not sensitive to low-frequencies, adjusting 50Hz by -30dB. Every 10dB reduction is perceived a half. A-weighting effectively ignores the Low-Frequency Noise (LFN) emissions.

The Pop Code references a study of LFN at 2Km from a pop concert series in 1987 at Wembley Stadium by artists including U2, David Bowie, Genesis & Madonna. The study found the main sound energy occurs between 31-125Hz. It concluded that A-weighted criterion minimises complaints near to the venue but can underestimate LFN annoyance at greater distances. A level over 80dBZ 63Hz_{oct}/125Hz_{oct} is likely to increase complaint in excess of 2Km from source.

Unfortunately, licence conditions often misinterpret the Pop Code applying a LFN limit closer than 2Km from the venue.

C-weighting is a better representation of perception at higher sound pressure levels such as concerts & festivals. Unlike A-weighting, it is influenced by MNL in the significant range between 31-125Hz. Consequently, monitoring both LA & LC facilitates both MNL & LFN control at any distance from the venue by assessing sound level & tonal balance.

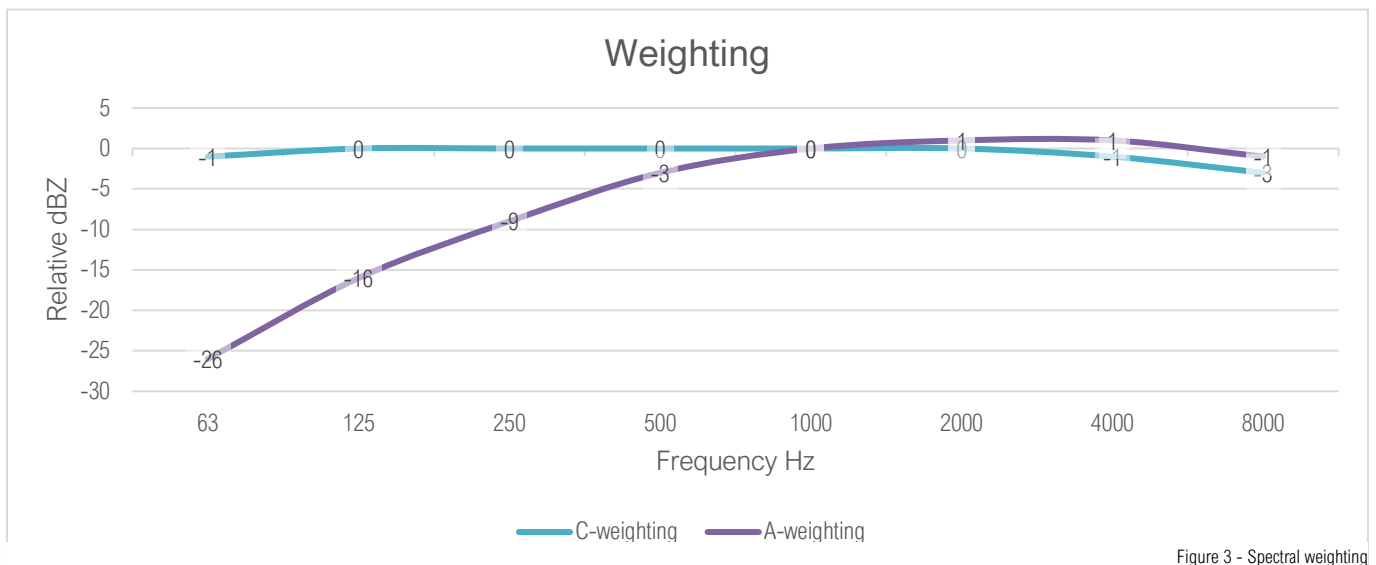


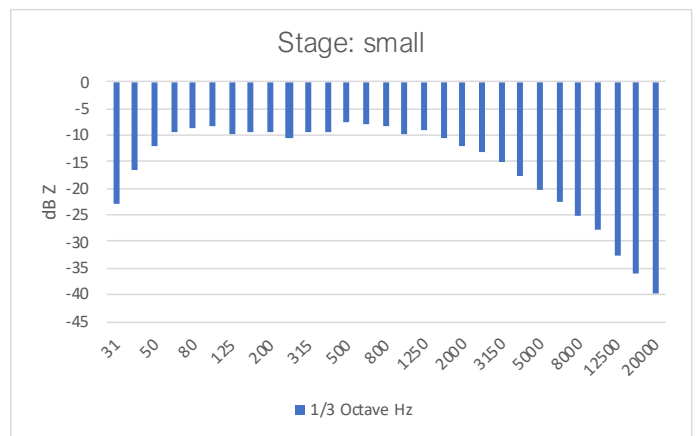
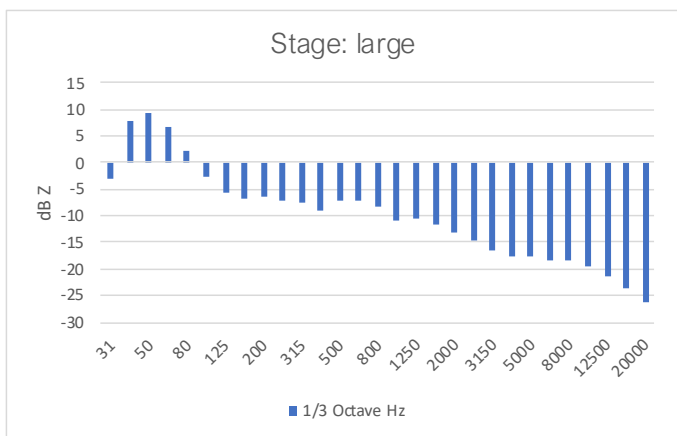
Figure 3 - Spectral weighting

Music profile

The acoustic model uses reference music profiles with representative spectral characteristics.

A Large Stage features a 14dB LC-LA differential typical of a wide range of music genres. A Small Stage features a 3dB LC-LA differential common for spoken word, playback without sub bass & light acoustic instruments.

Source: Saxon leisure noise study, large stage, March 2019, Acoustics Bureau Dresden Engineering Company Ltd.



F. Accreditation

Our experience

Electric Star is the first call for sound management by leading live entertainment companies. We get involved in around 50 concerts & festivals each year for some of the most iconic and creative live music experiences.

At Radio 2 In The Park 2023, the Environmental Protection officer for Leicester City Council described our service as the 'Gold Standard', an accolade of confidence & professional pride.

Electric Star is the incumbent acoustic contractor for BBC Radio 1 Big Weekend 2024, Brockwell Park Live, Cardiff Bay, Dreamland Margate & many other urban parks.

As a prominent award-winning independent company with over 30 years of experience in live music, we specialise in the assessment, management & control of environmental acoustics for concerts, festivals, tours & venues.

We work at many events in challenging urban spaces, such as London Southbank, Queen Elizabeth Olympic Park, Dreamland Margate, The Tower of London, & Cardiff Castle. We are recognised as noise control experts in these temporary venues with close residents.

We work with some of the world's greatest artists & events, including Prince, The Eagles, Elton John, Houghton, Bestival, Nocturne Live Blenheim Palace, & UK tours with Michael Bubl , Bryan Adams & Diana Ross.

We aim to deliver a captivating aural experience, prioritising the artists' and audience's creative and commercial demands while protecting the clients' regulatory obligations. As applied practitioners, resourceful thinkers, and problem solvers, we work at the forefront of environmental acoustics, sound system design and noise control.

Managing the environmental impact beyond regulatory requirements is a core principle. We are committed to reducing our environmental impact and continually improving our sustainability performance as an integral part of our strategy & operating methods. We will encourage customers, suppliers, & other stakeholders to do the same.

Our customers include AEG Live, Live Nation, Festival Republic, U-Live, Superstruct, IMG, Wasserman & others.

Current projects include BBC Radio 1 Big Weekend, Brockwell Live, Camp Bestival, We Out Here, & Houghton.

Our blend of practical functionality, sustainable procedures, value & reliability makes us integral production partners.

Our team

We aim to provide a user-friendly, comprehensive service. This capability is rooted in our consultants, who take pride in working in the Culture, Media, & Sports industry. In addition to the relevant qualifications and experience, our team members will have a background in live production, sound engineering, environmental health & licensing.

Director Gareth Hance is an active Associate Member of the Institute of Acoustics and holds an IOA Diploma in Acoustics and Noise Control. Gareth Since the mid-1980s, Gareth has worked in live audio production worldwide with acclaimed artists. Today, his work typically involves detailed computer simulation of complex stage designs and projects with Low-Frequency challenges. He positively enjoys the responsibility of working through the red tape, interpreting the jargon, and communicating in plain language to deliver excellent experiences.

Qualifications

- Institute of Acoustics – Associate member
- IOA Certificate in Environmental Noise Control
- IOA Diploma in Acoustics & Noise Control
- IOA Certificate in Workplace Noise Risk Assessment



G. Helpline procedure

Contacts will be published locally in advance.

The objective is to resolve any issues to the satisfaction of all parties. The time scale from the first contact to resolution depends on the nature of the complaint; however, all steps will be taken in a timely fashion for any given action.

The event management team will deal with any complaints in the first instance. In the event of a complaint, the operator will immediately respond to the complainant to acknowledge contact. This will be followed by further investigation & response by the appointed noise representative¹⁶.

The helpline shall adopt a Data Protection Act (DPA) complaint procedure. The complaints log will be shared with responsible authorities, including personal details subject to compliance.

Calls will be directed to a helpline operator:

1. The following information shall be logged:
 - Name, Address & Telephone / email¹⁷.
 - Date & time received.
 - Date & times the noise is occurring
 - The location of the noise.
 - Type of noise, e.g., music, plant, etc.
 - Other relevant notes
2. A recurring complaint shall be linked to the initial incident for context & continuity.
3. The operator will attempt to discuss the matter with the complainant to understand the issues better, reassure the complainant that the event will conduct business responsibly, & advise of what steps are being taken.
4. The operator will immediately contact the noise representative.
5. The noise representative will take steps to identify the source of the noise. Measurements may also be taken to quantify the disturbance.
6. The noise representative may conclude that the venue is not responsible for the noise and will ask the complainant to refer to the council.
7. Once the activity producing the noise has been identified, the noise representative will discuss the issue with the appropriate manager or engineer for that area.
8. Where simple measures can be implemented to reduce, or eliminate the disturbance, i.e., turn the bass down, the appropriate person will carry out the changes without delay. Where the issue or resolution is more complex, the noise representative will refer the matter to the production manager.
9. Once controls have been put in place, all relevant managers will be advised of the change.
10. The noise representative will contact the complainant to advise that action has been taken.
11. The noise representative will monitor for recurrence to ensure that the control has been effective.

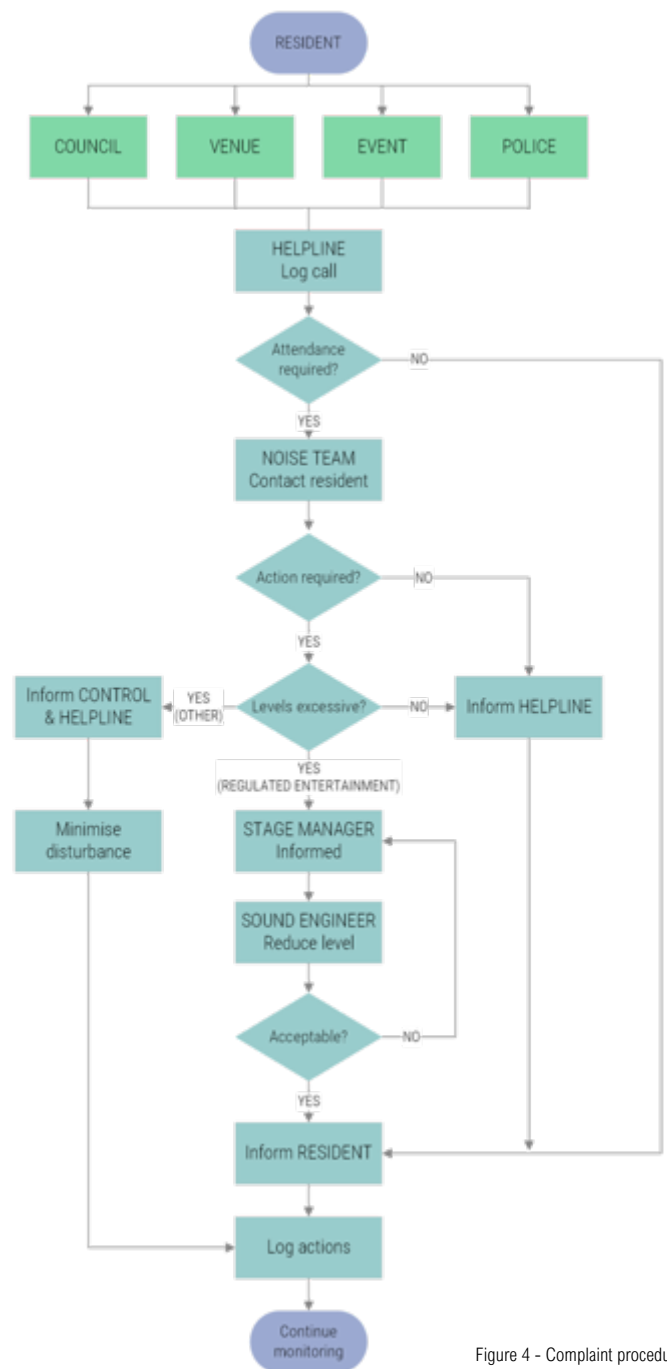


Figure 4 - Complaint procedure

¹⁶ The Noise Representative may be the Sound Consultant, a member of management team, or a Community Liaison representative.

¹⁷ For DPA compliance callers will be asked if their personal information may be retained for the purposes of assessing disturbance and shared with the responsible authorities. In absence of clear and recordable authorisation any personal information shall not be shared or retained.

H. Measurement procedure

Environmental assessment

Attended measurements shall be conducted procedurally & compliant with guidance in BS7445-1. Measurements should be representative of normal operations under typical conditions. i.e., measurement is not necessarily representative during changeovers unless a baseline survey is conducted, while the stage will be quiet.

A competent operator should take the measurement using a calibrated BS61672-1 compliant sound level meter fitted with a windshield & mounted on a tripod. The measurement procedure should generally comply with the guidance in BS7445-1. Class 1 meters shall be field-calibrated before & after events. All class 1 instruments are subject to an ISO BS61672-3 calibration scheme.

The operator shall dynamically assess the survey-associated risks & take appropriate safeguards. Risks include but are not limited to Lone working, slips & trips, moving vehicles & personal safety, including relevant safe working protocols.

The Sound Level Meter (SLM) should be placed on the tripod at a height of approximately 1.5m &, where practicable, not within 3 meters of any sound-reflecting surface other than the ground. Measurements within 3m of any surface other than ground shall be annotated as having a façade contribution. Where possible, maintain a direct line of sight to the noise source.

The operator should log the LAeq & LCEq and any relevant notes about where the measurement was taken, the time, the predominant noise observed & conditions such as traffic & weather. The advice given in BS7445 regarding meteorological conditions should be complied with where possible primarily, the weather should be dry & wind speed should be less than 5m/s. Any tonal or impulsive characteristics should be noted, quantifying the frequency band or L_{peak} values where relevant using part octave band or FFT filters.

Measurement should be paused in the event of interfering noise sources such as non-event-related traffic or plant equipment. The meter should be field calibrated at the start & end of each day with any deviation noted in the log.

Measurements should be logged & kept on file for review purposes. A reasonable margin of error is expected to allow for meteorological conditions & the accuracy of measurements, such as practicable access to locations.

The SLM operator should communicate with the sound engineer or stage manager by messaging app/radio &/or phone, relaying any level adjustments needed. In addition to controlling the overall sound level, frequency adjustments can be made to reduce the sound at specific frequencies, often characterised as a bass beat. Where noise reductions are required, address predominant noise.

For timely response, the Music Event Level (MEL) should be monitored over 5' & 15'. Where the Leq 5' is likely to result in an Leq 15' value exceeding the controls, the sound contractor should be advised to prepare for a level reduction.

A reasonable margin for uncertainty is to be expected, nominally between $\pm 3\text{dBA}$.

Checklist

1. Check all equipment is ready & in working order:
 - SLM & field calibrator charged & calibrated¹⁸
 - Radio &/or mobile phone charged
 - Tripod or pole & windshield
 - PPE & logbook
2. Mount SLM on a tripod at 1.2-1.5m height or a pole if appropriate, e.g., upper floors
3. Position SLM no less than 3m distance from any sound-reflecting surface except the ground¹⁹
4. Measure criterion levels over determined periods dB L_{eq,T}, e.g., L_{Aeq15'}, L_{Ceq15'} plus relevant frequency bands²⁰
5. Log all relevant observations, including:
 - Sound Pressure Level using appropriate metrics for the given assessment
 - Tonal or impulsive characteristics. Predominant & secondary sound contribution
 - Weather conditions²¹
 - Boundary / façade contribution
6. Record each measurement for inclusion in a final report
7. Take appropriate action where levels exceed an acceptable range & disturbance is likely

¹⁸ SLM should be BS61672-1 compliant & calibrated with the guidance given in ISO17025. It is recommended that sound calibrators are traceably calibrated at intervals not exceeding 1 year, and SLM at intervals not exceeding 2 years.

¹⁹ Note any façade contribution where a free-field is not practicable

²⁰ A reasonable margin for uncertainty is to be expected, nominally between $\pm 3\text{dBA}$.

²¹ BS7445-1 stipulates dry weather conditions with wind speed below 5 m/s

Source control

Controlling emissions at source is critical to minimising disturbance.

The stage meters shall display $L_{Ceq\ 15'}$ & $L_{Ceq\ 1'}$, with a clear 'traffic light' to indicate the level & warn if exceeding the limit.

The meter shall display an amber warning as the level approaches the limit.

A red display indicates that a level reduction is required.

L_C reliably indicates the human response to music at performance levels.

L_C - L_A correlation adequately manages A-weighted & Low-Frequency environmental impact.

Tracking L_{Ceq} at the source provides low-frequency control with single-value simplicity.

Proactively adjusting level, tone, & dynamic settings as appropriate for the audience & artists ameliorates off-site impact by minimising rapid changes whilst delivering a good audience experience employing a gradual threshold shift.

Modern line array sound systems are the de facto standard in professional settings due to their powerful yet precise audio. These systems use multiple speakers arranged in a vertical plane, allowing for a more consistent sound projection over long distances.

Cardioid sub-bass speaker arrays are also typical, helping to address the audience while keeping the unwanted LF breakout to acceptable levels. Arrays involve multiple loudspeakers in a phase-alignment configuration to form active noise cancellation at the rear & sides of the array. This makes it ideal for situations where focus & accuracy is required.

Professional sound consoles & loudspeaker management systems provide the necessary tools for the sound engineer & system engineer to fine-tune the audio experience with features such as dynamic tone equalisation, optimised low-frequency control & time-aligned speakers for better distribution.

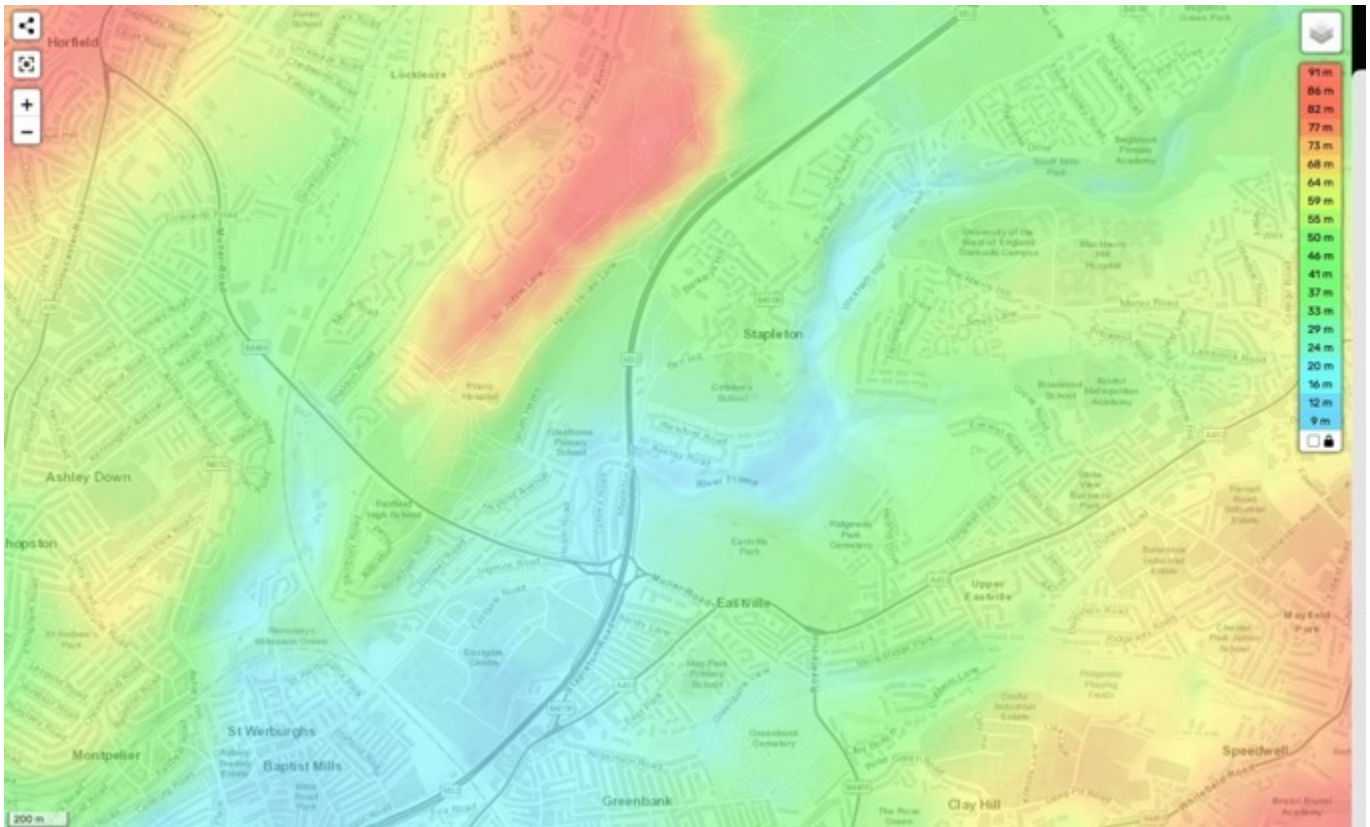
The engineers are competent professionals, able to balance the sometimes-conflicting demands of the artist, audience & environmental impact concerns. Ultimately, the engineer is contracted to perform their duties as instructed by their employer, the event organiser & the relevant authorities.

When asked to make necessary adjustments to the sound output, they are able & willing to comply without exception.

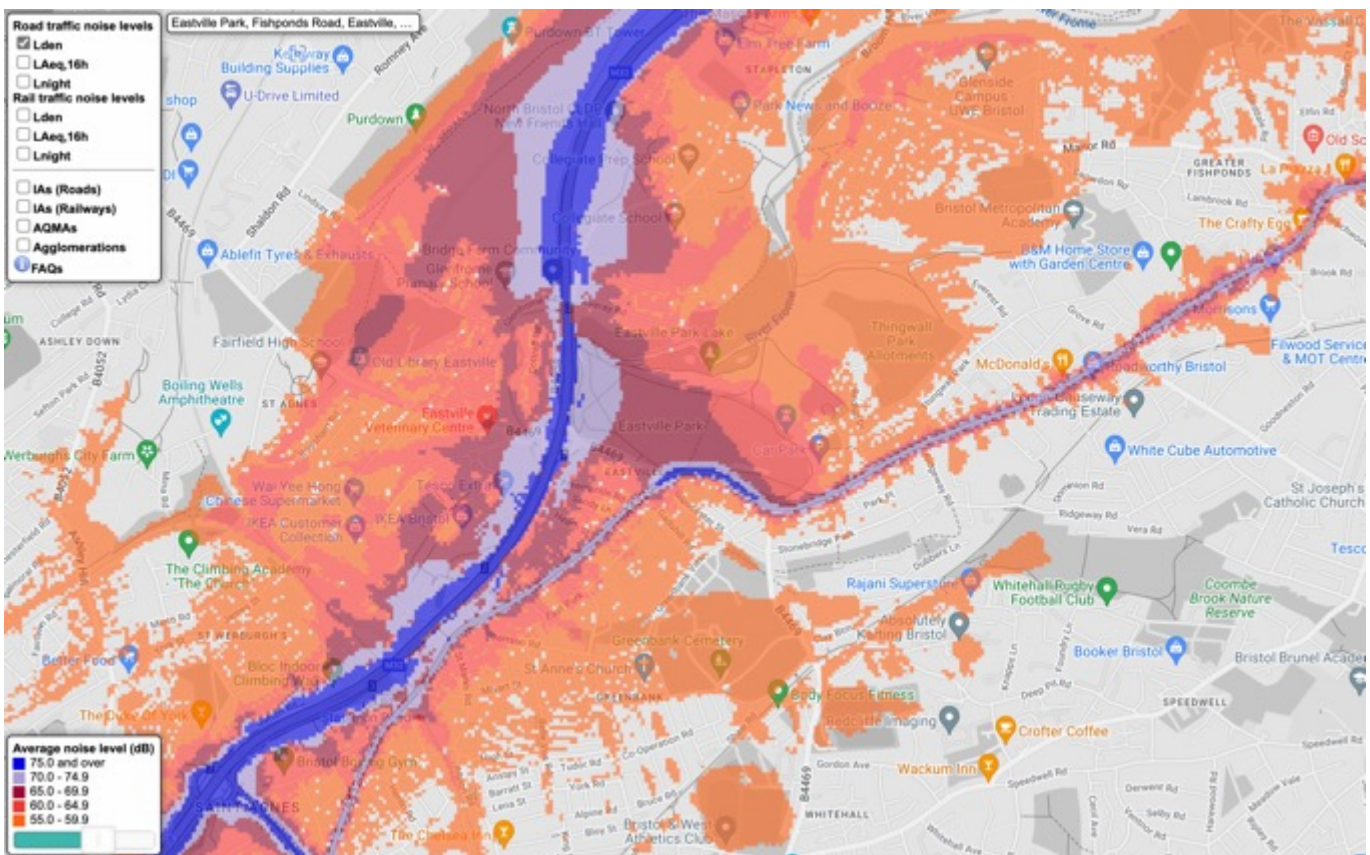
Collaboration & communication between the responsible authorities, organiser, sound control team & audio contractor shall be unimpeded. We recognise our regulatory obligations & the need for robust controls while delivering a good experience for the artist & audience.



I. Topography



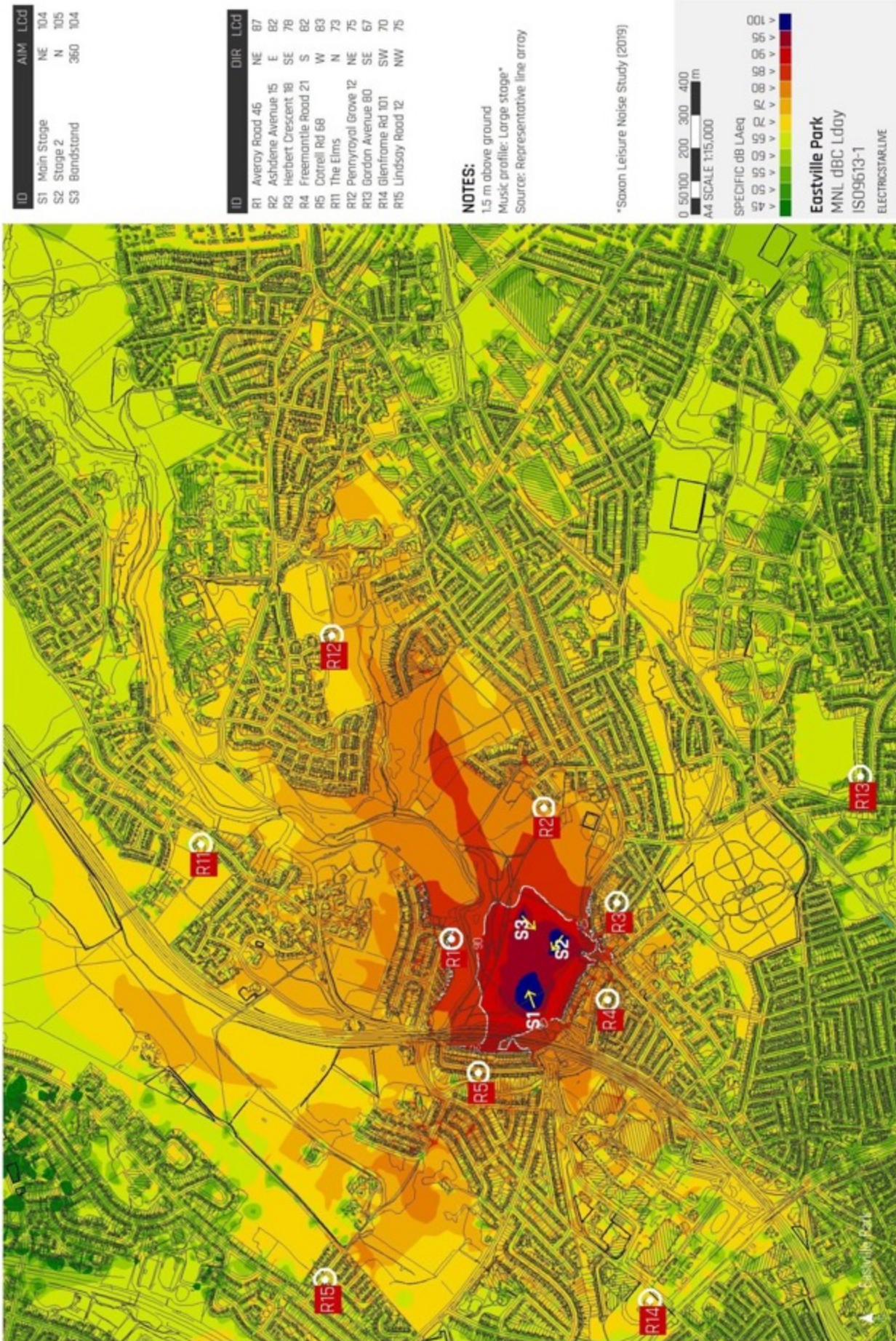
J. Strategic noise map

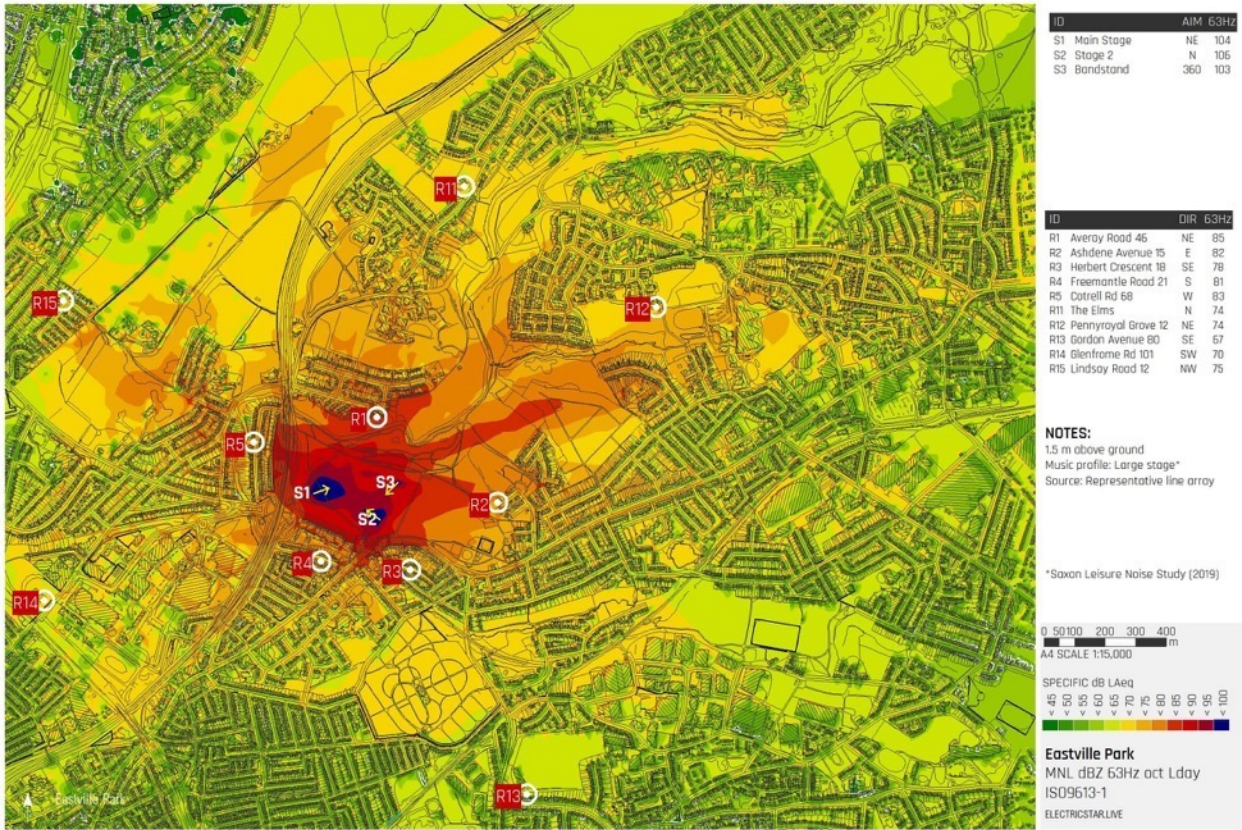


K. Heat map



Figure 6 – MNL dBA





L. Map

KINETIC ISLAND



- Receptor**
- R1 Averay Road 46
 - R2 Ashdene Av 15
 - R3 Herbert Crescent 18
 - R4 Freemantle Road 21
 - R5 Cottrell Road 68
 - R11 The Elms
 - R12 Pennyroyal Grove 12
 - R13 Gordon Avenue 80
 - R14 Glenfronme Rd 101
 - R15 Lindsay Road 12

- Area**
- ▭ 1km
 - ▭ 500m

- Stage**
- ↗ S1 Main Stage
 - ↗ S2 Stage 2
 - S3 Bandstand

Eastville Park

<http://tinyurl.com/kinetic24map>

KINETIC ISLAND

Receptor

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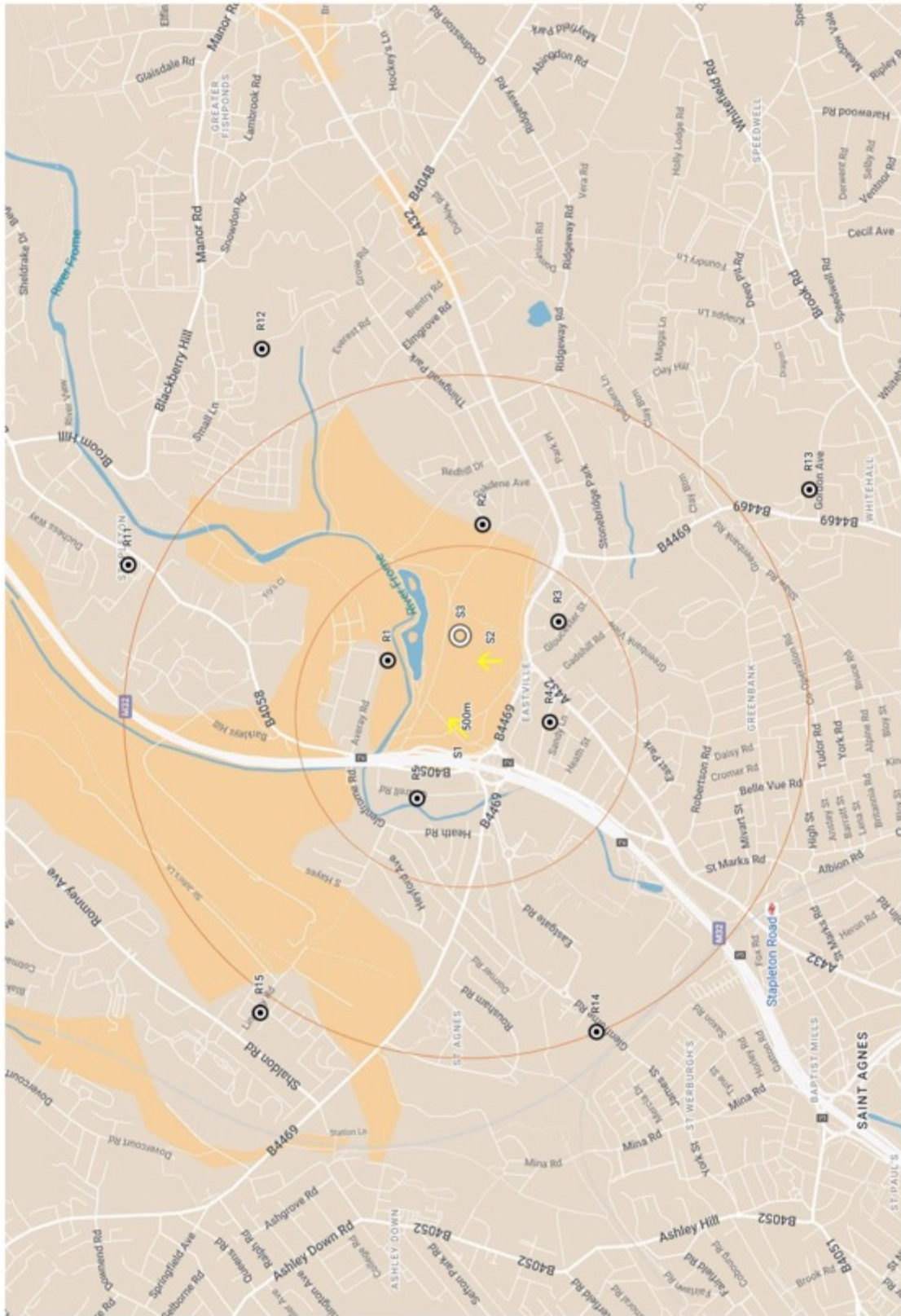
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