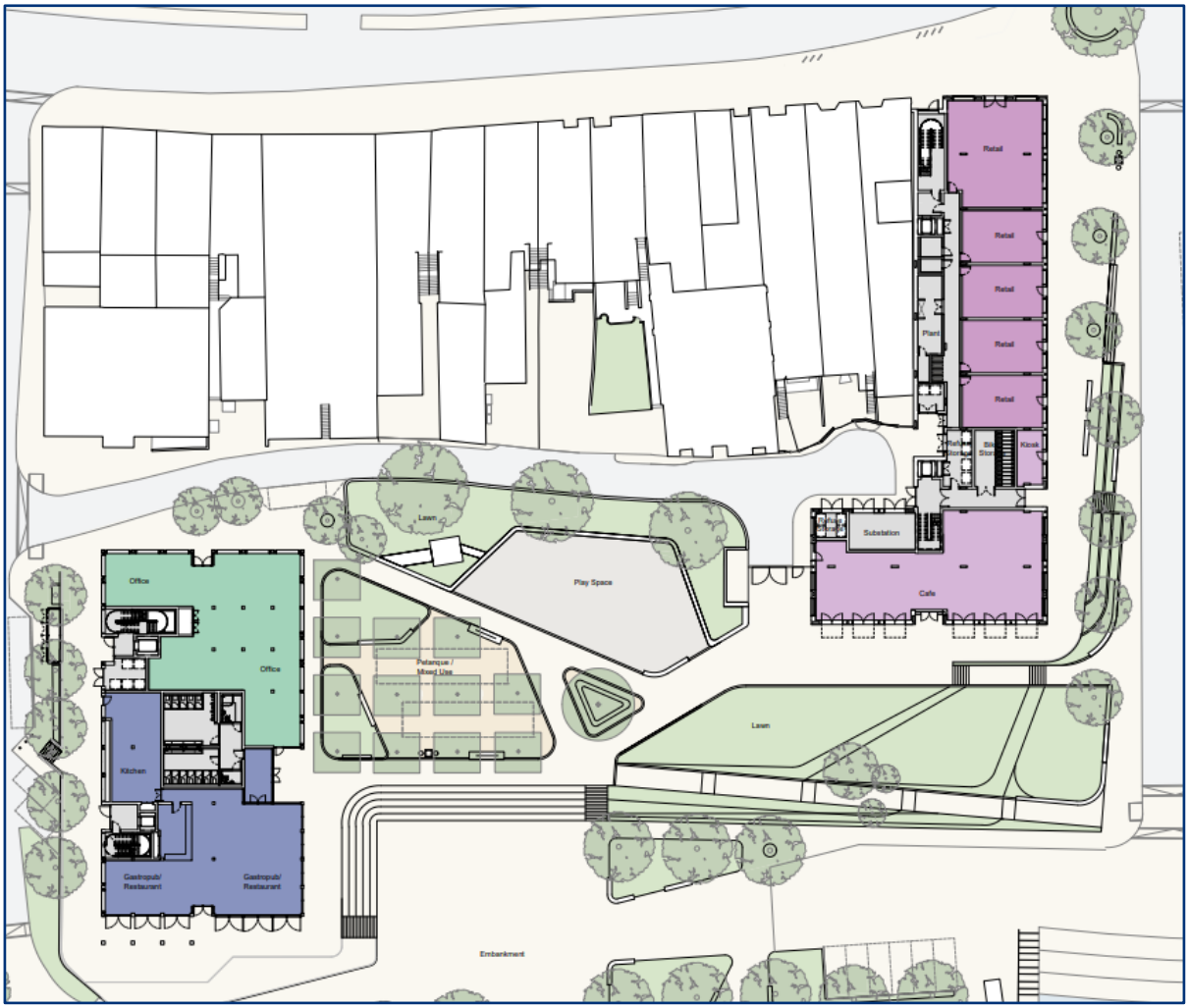
Twickenham Riverside, Richmond, TW1 3SD

Noise Technical Note

784 -B023999



Noise Technical Note of the Outdoor Event Spaces

Prepared on behalf of London Borough of Richmond upon Thames

July 2022

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CONTENTS

1.0 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This report presents the findings of a noise technical note in support of a planning application 21/2758/FUL, at Twickenham Riverside, Richmond, TW1 3SD. This technical note takes cognisance of the comments received by the Environmental Health Officers of London Borough of Richmond upon Thames to determine the impact, if any, of the proposed outdoor Events space and increased size of the children's play area on existing and future receptors.

1.2 PROPOSED DEVELOPMENT

The description of development is detailed below:

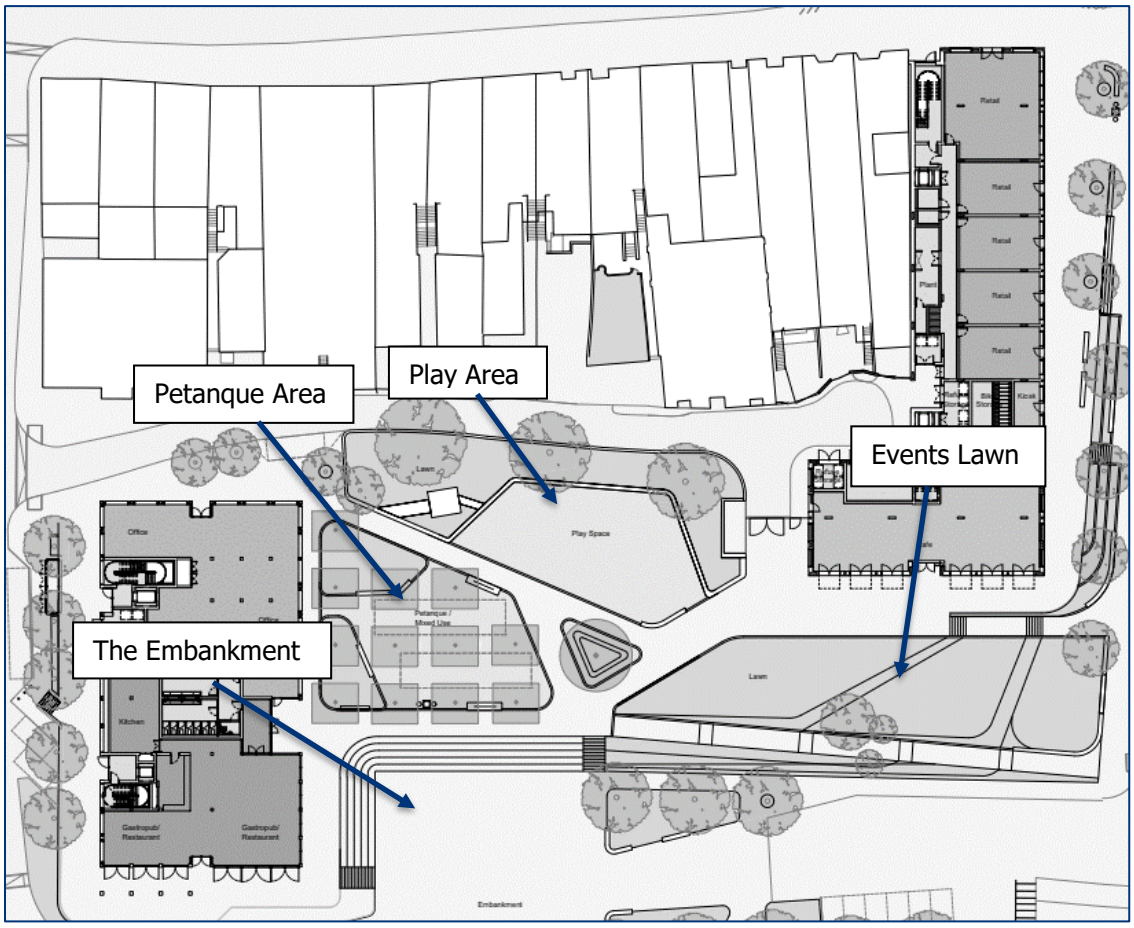
> *'Demolition of existing buildings and structures and redevelopment of the site comprising residential (Use Class C3), ground floor commercial/retail/cafe (Use Class E), and public house (Sui Generis), boathouse locker storage and floating pontoon with associated landscaping, restoration of Diamond Jubilee Gardens and other relevant works.'*

The outdoor event space will consist of the following areas:

- The Embankment.
- Petanque.
- Lawn.

In addition, a Play Space will also be developed, refer to Figure 1.1 below.

Figure 0.1. Proposed Outdoor Event Space and Play Area



2.0 ASSESSMENT CRITERIA

2.1 NATIONAL PLANNING PRACTICE GUIDANCE - ASSESSMENT CRITERIA

In order to enable the assessment of the proposed event space in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from standards and design guidance:

- BS 4142:2014 + A1 2019 *'Methods for rating and assessing industrial and commercial sound'.*
- IEMA Guidelines 2014 for '*Environmental Noise Impact Assessment* '

Table 0.1 Noise Level Criteria and Actions

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level	Proposed Building Service Plant	BS4142 Score of zero or lower	No Action Required Score of zero or lower is an indication of the sound source having a low impact
	Assessment of Overall Change in Noise Levels	Up to 3.0 dB Change or a Reduction in Noise Levels	No Action Required – Change in noise levels unlikely to be perceptible
Lowest Observed Adverse Effect Level	Proposed Building Service Plant	BS4142 Score of +5 or lower	Difference of +5 dB likely to be an indication of an adverse effect Mitigate to achieve: BS4142 Score of plus 5 or lower
	Assessment of Overall Change in Noise Levels	Up to 4.9 dB Increase in Noise Levels	No Action Required Slight Impact at Receptor of Some Sensitivity
Significant Observed Adverse Effect	Proposed Building Service Plant	BS4142 Score between +5 and +10	Difference of +10 dB likely to be an indication of a significant adverse effect Mitigate to achieve as low as practicable
	Assessment of Overall Change in Noise Levels	3.0 to 5.0 dB Change in Noise Levels at receptor of high sensitivity or Greater than 5.0 dB Increase in Noise Levels	Mitigate to achieve: Increase in Noise Levels of less than 3.0 dB (high sensitivity) or Increase in Noise Levels of less than 5.0 dB (receptor of some sensitivity)
Unacceptable Observed Adverse Effect	Proposed Building Service Plant	BS4142 Score of +10 or higher	Prevent Mitigate to achieve as low as practicable
	Assessment of Overall Change in Noise Levels	Greater than 5.0 dB Increase in Noise Levels	Mitigate to achieve: Increase in Noise Levels of less than 5.0 dB

2.2 CONCERT NOISE

With regards event noise, consideration has been given to noise from the proposed development in relation to the Noise Council's 'Code of Practice (*CoP) on 'Environmental Noise Control at Concerts'* (1995 as amended). It provides guidelines for noise levels and a noise control procedure to minimise any disturbance caused.

For the purposes of this report and the assessment, the following guidance has been used for to assess potential concerts and cinema showings at the events spaces. Figure 2.1 below presents the guideline values outlined in Table 1 taken from CoP Environmental Noise Control at Concerts.

Figure 0.1: Table 1 extracted from CoP Environmental Noise Control at Concerts.

Table 1

Concert days per calendar year, per venue	Venue	Guideline
1 to 3	Urban stadia or arenas	The MNL should not exceed 75dB $L_{Aeq, 15min}$
1 to 3	Other urban & rural venues	The MNL should not exceed 65dB $L_{Aeq, 15min}$
4 to 12	All venues	The MNL should not exceed the background noise level by more than 15dB(A) over a 15 minute period

The main source of noise at open air concerts and events is from music but other sources of noise may occur. This can include guests entering/exiting the site and crowd noise. This can cause noise nuisance in the surrounding the area. Therefore, control and management of noise is needed during sound checking and rehearsals, and during the event to ensure no adverse impacts occur.

2.3 ASSESSMENT OF ECOLOGICAL RECEPTORS

Additional consideration has been given to the effects of noise on identified species in the vicinity of the application site; Table 2.2 below details the equivalent noise level criteria detailed within the TIDE Tidal River Development Toolbox 2016 for waterbird disturbance.

Table 0.2 Noise Disturbance Thresholds for Water Birds (from TIDE Tidal River Development Toolbox 2016)

Noise Disturbance Significance Level	Associated Noise Levels/Types
High Noise Level Effects	Sudden noise event of >60 dB Prolonged noise event of >72 dB
Moderate Noise Level Effects	Occasional noise events >55 dB Regular noise events of 60 – 72 dB Long term regular noise events of >72 dB where birds have become habituated
Low Noise Level Effects	Noise events of <55 dB

3.0 ASSESSMENT METHODOLOGY

3.1 NOISE MODELLING METHODOLOGY

Three-dimensional noise modelling has been undertaken based on the monitoring data to predict noise levels at a number of locations both horizontally and vertically. CadnaA noise modelling software has been used. This model is based on ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically.

The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data and model settings as given in the table below have been used.

Table 0.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Ordnance Survey
Ground levels – other areas	Site Observations and Ordnance Survey	OS 1:25,000 contours and OS 1:10,000 spot heights.
Building heights – around site	Tetra Tech Observations	8 m height for two storey residential properties, and 4 m for Bungalows. 3m per storey for multi-storey developments.
Barrier heights	Tetra Tech Observations	All existing barriers at 1.8 m with the exception of hedges and trees which are considered to offer no noise protection.
Receptor positions	Tetra Tech	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor properties. 1.5 m height for model grid and monitoring locations for validation.
Plans	Hopkins IT	Drawing Title: Red Line Boundary Dated: 11/06/2021

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst-case.

3.2 Events Space Noise

As there are a number of proposed uses for the Events space, a number of assessments have been undertaken. The following assumptions have been assessed for this space which is based on the design and access statement submitted as part of application 21/2758/FUL:

- Concert/Cinema
- Ice Skating
- Farmers' Market
- Fun Fair

The additional sound sources that have been included within different modelled scenarios for the events space are detailed below.

The proposed development will have power supply points throughout the site; therefore, generators have not been included within this assessment.

It is understood that the events space will not be used after 11pm, as such only daytime noise levels have been assessed, with exception of the background comparison for the chiller units associated with a potential ice rink.

For proposed music noise associated with concerts or outdoor cinemas, a music limit has been set to achieve the guidance stated in Code of Practice (*CoP) on 'Environmental Noise Control at Concerts'*.

Chiller Noise – Ice Skating

Although generators will not be required as power is available in the events space, a potential Ice Skating Rink will require chillers to maintain frozen ice, as such these have been included within the assessment. Two-point source has been defined in the model to represent proposed chiller units. Noise levels from a similar assessed chiller for an ice rink have been utilized for this model and are detailed in Table 3.2 below.

Table 0.2 Chiller Noise Data

Description	Linear Octave band centre frequency (dB(lin))									Single Figure (dB)A At 1m
	31.5	63	125	250	500	1K	2K	4K	8K	
2 x Chiller Units	77.1	75.0	74.4	74.3	70.0	67.0	63.4	57.7	51.0	72.6

Crowd Noise

To represent noise from potential crowds of people within the proposed events space and events lawn, noise measurements taken from an outdoor seating area at a town centre bar in Leamington Spa have been utilised for this assessment. To represent full use of the proposed area, the L_{Aeq} levels detailed in Table 3.3 below have been modelled as an area source across the area events space and lawn and has been included for all modelling scenarios.

Table 0.3 Crowd Noise Data

Description	Octave Band Centre Frequency (Hz) dB (A)									Single Figure (dB)A At 1m
	31.5	63	125	250	500	1K	2K	4K	8K	
Noise from outdoor seating area	28.3	43.6	55.0	60.6	70.4	71.4	69.1	61.9	49.7	79.1

Food/Drink Vans

Noise levels associated with potential food/drink vans as part of the events space have been included as point sources. Noise levels used within the assessment are based on measurements taken from a typical food and drinks vans at a football event. These have been included within the assessments for the potential farmers market and fun fair.

$L_{Aeq,1hr}$ *Noise Level*= 74.1 dB at 1m distance

Concert/Cinema Noise

Noise limits from noise associated with live music events vary depending on the type of music. For the purposes of this assessment, noise limit guidance defined by the Health and Safety Executive (HSE) has been used to inform the initial assessment. The guidance states that *"HSE strongly recommends that the A-weighted equivalent continuous sound level over the duration of the event (Event L_{Aeq}) in any part of the audience should not exceed 107 dB."* Noise from speakers has been modelled as a vertical area source across an indicative stage location so as to represent a worst-case scenario, facing towards the nearest existing and proposed sensitive receptors. Noise limits have been specified based on the number of potential events per year that events such as concerts or outdoor cinemas could occur.

Amplified Music - Funfair

Potential Music associated with a potential funfair located at the events space has been included within the model and have been modelled as point sources. Noise levels associated with potential amplified music are detailed in Table 3.4 below.

Table 0.4 Amplified Music

Description	Octave Band Sound Pressure Levels (Hz)									Single Figure (dB)
	31.5	63	125	250	500	1K	2K	4K	8K	
Music Breakout $L_{Aeq, 10mins}$ @ 5m	66.9	76.0	68.7	58.6	61.2	57.3	53.2	47.0	46.6	63.0

Playground Noise Levels

An area source has been used in modelling at 1m height to represent noise from the playground area to the west of the nursery building. Noise levels have been based upon measurements taken at a comparable sized playground at a similar site as follows:

- Playground Noise = 60 dB $L_{Aeq,1hour}$ at 3m distance from edge of playground (area source)

As worst case for the fun fair scenario and playground modelling, point sources have been used to represent shouting. Noise levels used to represent shouting are taken from guidance within Building Bulletin 93 'Acoustic Design of Schools' as follows:

- Playground Shout = 80 dB L_{Amax} at 1m distance (point source)

3.3 SENSITIVE RECEPTORS

Table 3.5 summarises the existing and proposed receptor locations selected for the assessment of the events space associated with the Development; the locations of the receptors are shown in Figure 3.1 below.

Table 0.5 Existing and Proposed Residential Receptor Locations

Ref.	Description	Height (m)
R01	Eris Garden, 3 Water Lane	1.5/4.0
R02	2 The Embankment	1.5/4.0
R03	The Nook, Eel Pie Island	1.5
R04	Flat 6, Eyot Lodge	4.0
R05	37-39 King Street Parade	1.5/4.0
R06	13 King Street	4.0
R07	3 King Street	4.0
R08	Flat 2, 10a King Street	4.0
R09	Proposed Wharf Lane Building	4.0
R10	Proposed Water Lane Building	4.0

Figure 3.1 Existing Sensitive Residential Receptor Locations

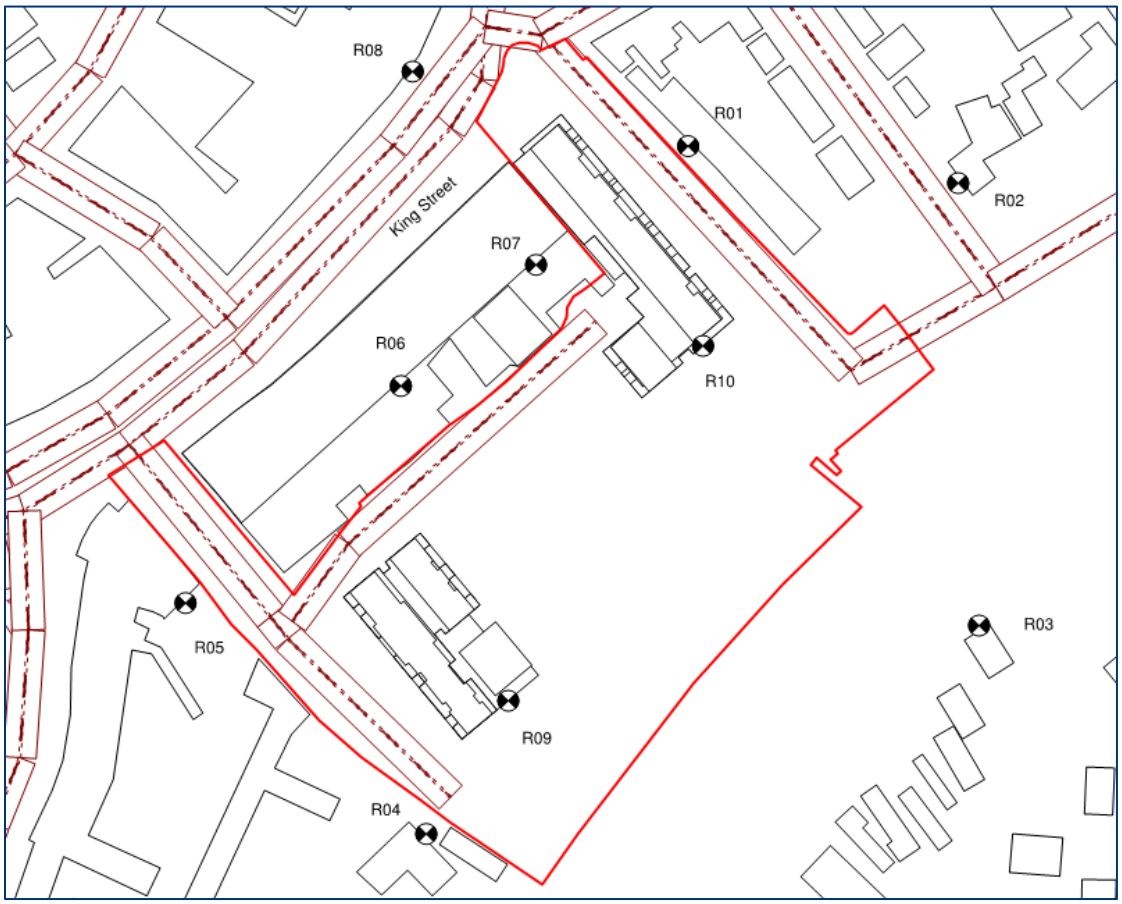
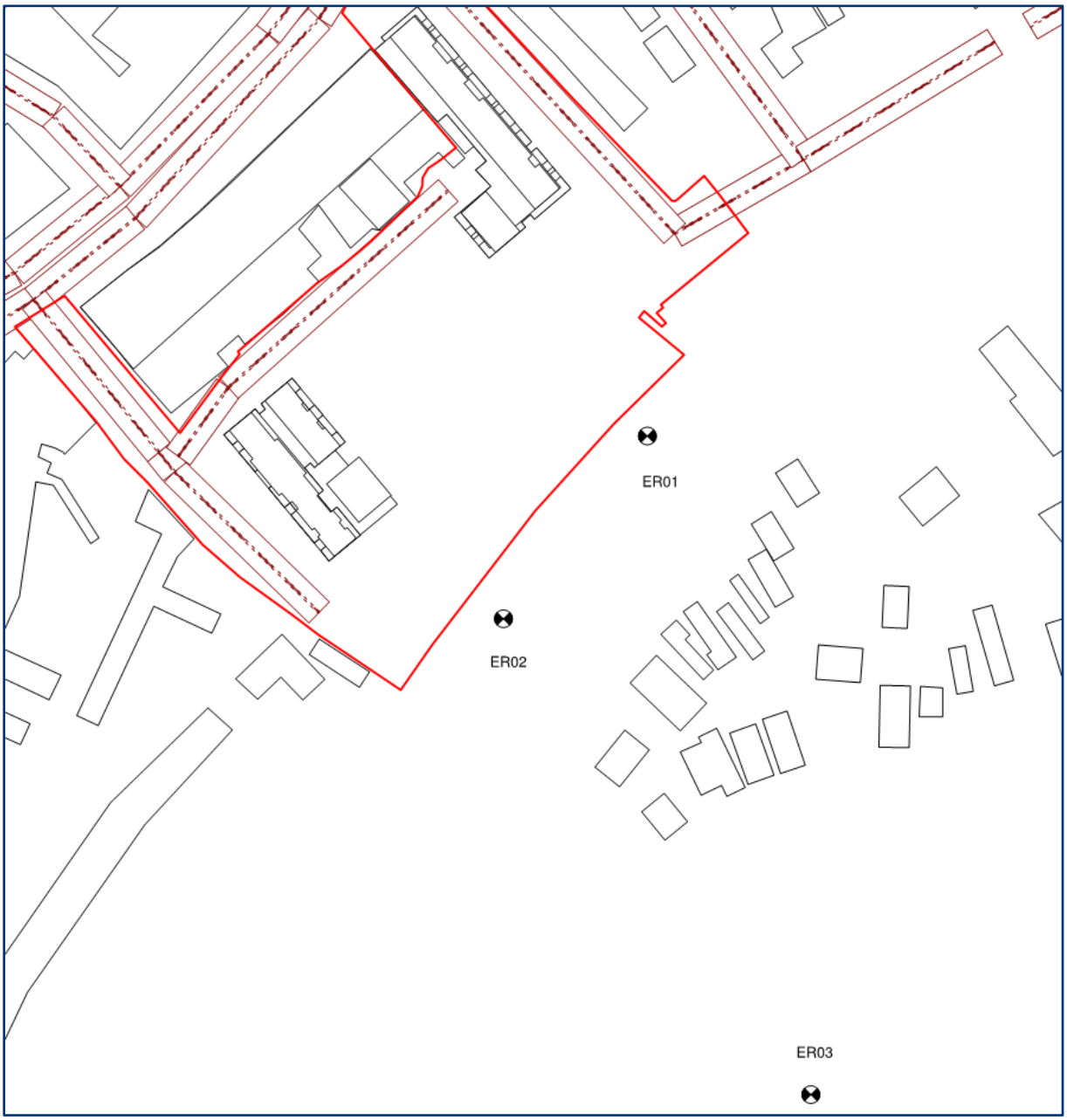


Table 3.6 below summarises the ecological receptor locations that have been selected to represent worst-case receptors with respect to noise during an event on the surrounding ecological receptors surround the site. The locations of the receptors are shown in Figure 3.2 below.

Table 0.2 Ecological Receptor Locations

Ref.	Description	Height (m)
ER01	River Thames	1.0
ER02	River Thames	1.0
ER03	Hams Lands Local Nature Reserve	1.0

Figure 3.2 Ecological Receptor Locations



4.0 NOISE SURVEY

4.1 NOISE SURVEY METHODOLOGY

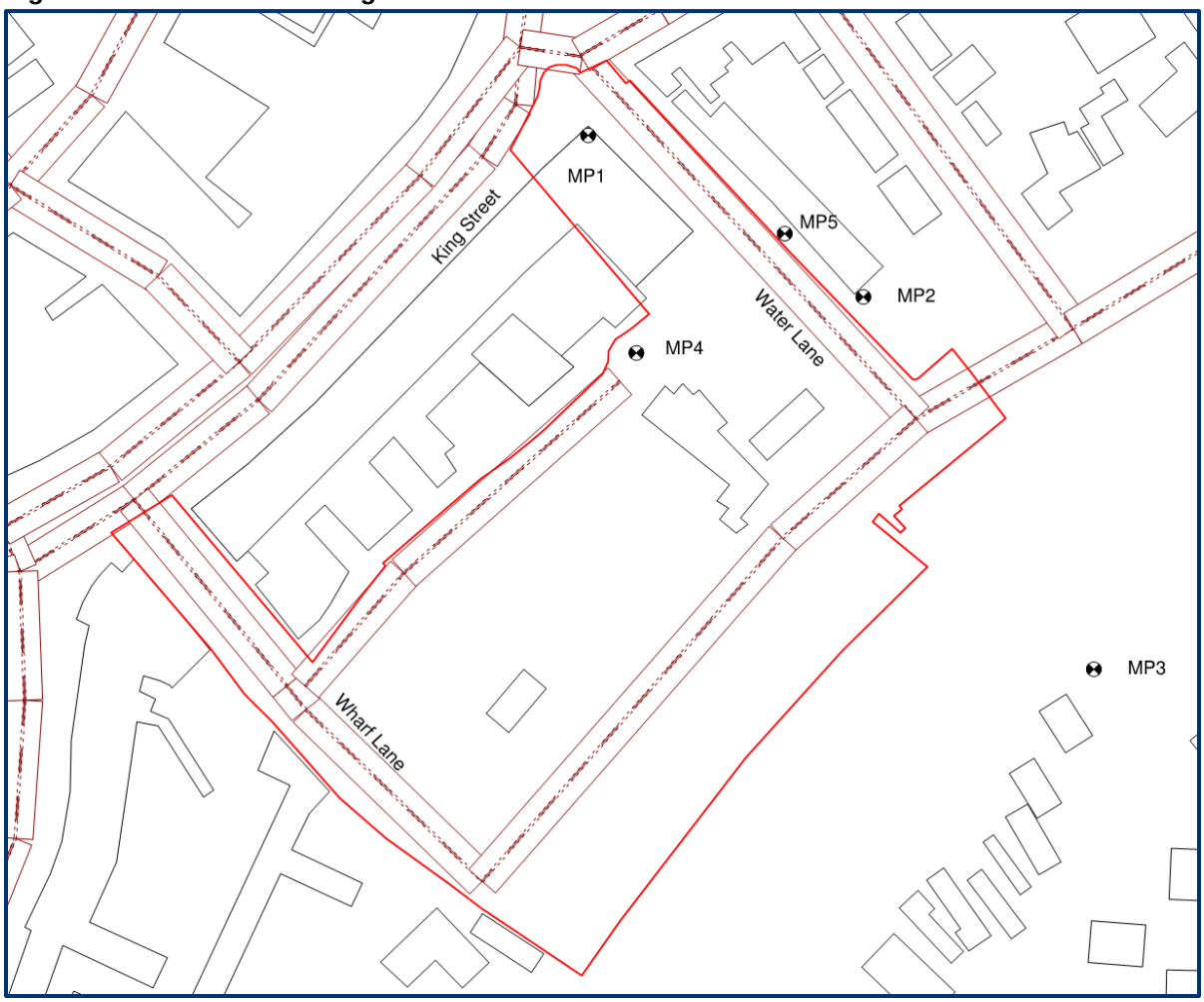
Paragon Acoustic Consultants undertook an environmental noise survey for the proposed development site in July 2017. Due to Covid-19 restriction in place during 2020 and 2021, it was determined that using this 2017 noise survey provided more representative noise levels for the surrounding environment.

A baseline monitoring survey was undertaken by Paragon Acoustic Consultants at five locations (as specified in Table 4.1 and shown on Figure 4.1 below) from 12th July to 14th July 2017. Attended short term measurements were undertaken at four locations (MP2-MP5) during daytime and night-time periods with one additional location being measured unattended over a 48-hour period (MP1).

Table 0.1 Noise Monitoring Locations

Ref	Description
MP1	In the Rood of 1C King Street on the King Street Elevation
MP2	South End Residential on of Water Lane
MP3	Eel Pie Island
MP4	Back of properties with their frontage on King Street
MP5	Outside Number 15 Water Lane

Figure 0.1 Noise Monitoring Locations



4.2 NOISE SURVEY RESULTS

The results of the noise monitoring survey are detailed below in Table 4.2.

Table 0.2 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Monitoring Date and Times	Location	$L_{Aeq,T}$ (dB)	L_{AmaxT} (dB)	$L_{A90,T}$ (dB)
Daytime 07:00 – 23:00	12/07/2017-14/07/2017	MP1	66.8	-	54
	14/07/2017	MP2	55.8	-	43
	14/07/2017	MP3	57.9	-	33
	14/07/2017	MP4	63.2	-	48
	14/07/2017	MP5	60.5	-	47
Night-time 23:00 - 07:00	12/07/2017-14/07/2017	MP1	61.4	82.8	34
	17/07/2017	MP2	41.5	63.0	34
	17/07/2017	MP3	38.3	53.0	33
	17/07/2017	MP4	44.4	57.0	36
	17/07/2017	MP5	49.9	68.0	35

All values are sound pressure levels in dB re: 2x 10^{-5} Pa

5.0 ASSESSMENT OF EFFECTS

It should be noted that an event management plan will be in place as part of the routine planning for organised activities associated with the proposed outdoor events space and as such the micro-siting of noise sources and events will be considered in detail ahead of any event.

5.1 ICE SKATING RINK

BS4142 ASSESSMENT: POTENTIAL CHILLERS

This assessment has been undertaken to establish the impact of the potential Ice-Skating Rink as part of the events spaces of Twickenham Riverside development. The assessment compares the predicted noise levels from proposed chillers that would be required on site with the existing measured average background noise L_{A90} at the closest existing residential receptors for both daytime and night-time as shown in Table 5.1 below.

In accordance with section 9.2 of BS4142:2014 an overall +3 dB character correction has been applied to account for any intermittent characteristics of noise from the plant units which may be perceptible at the closest sensitive receptors.

Table 0.1 BS 4142 Assessment for Potential Chiller Plant

Ref	Existing Measured Average Background L_{A90}		Noise rating level from plant (with +3 dB Correction)		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
R01	47	34	11	11	-36	-23
R02	43	34	23	23	-20	-11
R03	33	33	27	27	-6	-6
R04	48	36	22	22	-26	-14
R05	48	36	11	11	-37	-25
R06	48	36	24	24	-24	-12
R07	48	36	22	22	-26	-14
R08	54	34	6	6	-48	-28
R09	48	36	33	33	-15	-3
R10	48	36	29	29	-19	-7

Based on the potential ice rink at the events space, noise rating levels are predicted to be at least 6 dB below existing background levels during daytime hours and at least 3 dB below background levels during night-time, which is an indication of a low adverse impact. It should be note this is based on indicative data for a chiller unit and takes into account no barriers.

CHANGE OF AMBIENT NOISE LEVELS: ICE SKATING RINK

Noise levels from the chillers and potential crowd noise have been modelled as detailed in section 3.1.

This assessment compares the noise from the existing ambient noise climate (based on existing measured ambient L_{Aeq} noise levels). The difference between the lowest 'existing' and the 'worst-case proposed' scenarios for a potential ice rink during the daytime is presented in Table 5.2.

Table 5.2 Difference between Baseline and Proposed Scenario (Daytime)

Ref.	Daytime		
	Measured Baseline $L_{Aeq, 16\ hour}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Proposed Scenario L_{Aeq}
R1	60.5	60.5	0.0
R2	55.8	56.3	0.5
R3	57.9	58.8	0.9
R4	63.2	63.3	0.1
R5	63.2	63.2	0.0
R6	63.2	63.4	0.2
R7	63.2	63.3	0.1
R8	66.8	66.8	0.0
R9	63.2	64.3	1.1
R10	63.2	63.5	0.3

The results presented in the table above show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution a potential ice-skating rink. When the differences between the 'existing' and 'proposed' scenario are compared with the noise change criteria given in Table 2.1 of this report, the contribution falls within the Lowest Observed Adverse Effect Level. Therefore, the proposed worst-case scenario is expected to have a negligible impact at surrounding residential locations and the change in ambient L_{Aeq} noise levels is not considered to be significant.

5.2 FARMERS' MARKET

Change of Ambient Noise Levels: Farmers' Market

Noise levels from the food and drink vans and potential crowd noise have been modelled as detailed in section 3.2.

This assessment compares the noise from the existing ambient noise climate (based on existing measured ambient L_{Aeq} noise levels). The difference between the lowest 'existing' and the 'worst-case proposed' scenarios for a potential ice rink during the daytime is presented in Table 5.3.

Table 5.3 Difference between Baseline and Proposed Scenario (Daytime)

Ref.	Daytime		
	Measured Baseline $L_{Aeq, 16\ hour}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Proposed Scenario L_{Aeq}
R1	60.5	60.5	0.0
R2	55.8	56.2	0.4
R3	57.9	58.6	0.7
R4	63.2	63.3	0.1
R5	63.2	63.2	0.0
R6	63.2	63.4	0.2
R7	63.2	63.3	0.1
R8	66.8	66.8	0.0
R9	63.2	64.0	0.8

Ref.	Daytime		
	Measured Baseline $L_{Aeq, 16\ hour}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Proposed Scenario L_{Aeq}
R10	63.2	63.4	0.2

The results presented in the table above show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution a potential farmers' market. When the differences between the 'existing' and 'proposed' scenario are compared with the noise change criteria given in Table 2.1 of this report, the contribution falls within the Lowest Observed Adverse Effect Level. Therefore, the proposed worst-case scenario is expected to have a negligible impact at surrounding residential locations and the change in ambient L_{Aeq} noise levels is not considered to be significant.

5.3 FUN FAIR

Change of Ambient Noise Levels: Fun Fair

Noise levels from the food and drink vans, potential crowd noise, amplified music and people shouting have been modelled as detailed in section 3.1.2.

This assessment compares the noise from the existing ambient noise climate (based on existing measured ambient L_{Aeq} noise levels). The difference between the lowest 'existing' and the 'worst-case proposed' scenarios for a potential ice rink during the daytime is presented in Table 5.4.

Table 5.4 Difference between Baseline and Proposed Scenario (Daytime)

Ref.	Daytime		
	Measured Baseline $L_{Aeq, 16\ hour}$	Measured Baseline Combined with Contribution from the Proposed Scenario	Contribution from Proposed Scenario L_{Aeq}
R1	60.5	60.6	0.1
R2	55.8	58.6	2.8
R3	57.9	59.1	1.2
R4	63.2	63.3	0.1
R5	63.2	63.3	0.1
R6	63.2	63.7	0.5
R7	63.2	63.4	0.2
R8	66.8	66.8	0.0
R9	63.2	64.1	0.9
R10	63.2	66.1	2.9

The results presented in the table above show the change in noise levels between the existing measured L_{Aeq} noise levels and the contribution a potential ice-skating rink. When the differences between the 'existing' and 'proposed' scenario are compared with the noise change criteria given in Table 2.1 of this report, the contribution falls within the Lowest Observed Adverse Effect Level. Therefore, although noise associated with a funfair is likely to be distinguishable, the overall change in ambient L_{Aeq} noise levels is not considered to be significant and as noted above, would remain subject to an event management plan.

5.4 CONCERT/ CINEMA EVENT NOISE

Noise from potential use of music concerts or cinema showings have been assessed against the NCCPENCC criteria found in Table 2.2 of this report. Limits have been set for 1-3 events per year and 4-12 events per year, based on the relevant criteria used. The tables below show the predicted Music Noise Levels at the existing and proposed sensitive receptors and assesses this against the relevant criteria for 1-3 events and representative background noise levels for 4-12 events. The music noise levels that have been assessed are the limits based on the relevant criteria. Noise levels have only been assessed during daytime hours as it is expected that events will not occur after 11pm.

Table 0.5 Difference between Typical Proposed Scenario and Event Noise – 1-3 Events

Receptor Type	Daytime		Code of Practice Table 1, Music Noise Level (MNL) Criterion	
	Ref.	Proposed Event Noise $L_{Aeq, 15mins}$	1-3 Concert Days per Calendar Year Table 1, Music Noise Level (MNL) Criterion $L_{Aeq, 15mins}$	Difference
Existing and Proposed Residential Receptors	R1	58.6	75	-16
	R2	65.6	75	-9
	R3	69.2	75	-6
	R4	67.5	75	-8
	R5	57.9	75	-17
	R6	67.4	75	-8
	R7	64.5	75	-11
	R8	55.1	75	-20
	R9	74.6	75	0
	R10	71.5	75	-4

The assessment of 1-3 music/high noise level events within a single year, noise levels are required not to exceed 106.3 dBA at 1 m from the stage or screen (assuming a single source). Providing these limits are set, noise level at existing receptor and proposed receptor location are predicted to meet the requirements detailed in the NCCPENCC detailed in section 2 of this report.

Table 0.6 Difference between Typical Proposed Scenario and Event Noise – 4-12 Events

Receptor Type	Daytime		Code of Practice Table 1, Music Noise Level (MNL) Criterion	
	Ref.	Proposed Event Noise $L_{Aeq, 15mins}$	Relevant Measured Background L_{A90}	Difference
Existing and Proposed Residential Receptors	R1	37.6	47	-9
	R2	44.6	43	2
	R3	48.2	33	15
	R4	46.5	48	-2
	R5	36.9	48	-11
	R6	46.4	48	-2
	R7	43.5	48	-5
	R8	34.1	54	-20
	R9	53.6	48	6
	R10	50.5	48	3

The assessment of 4-12 music/high noise level within a single year, noise levels are required not to exceed 85.3 dBA at 1 m from the stage or screen to be no more than 15dB above existing background levels measured around the site. Providing these limits are set, noise level at existing receptor and proposed receptor location are predicted to meet the requirements detailed in the NCCPENCC detailed in section 2 of this report.

5.6 ECOLOGICAL ASSESSMENT

The locations of ecological receptors have been informed by the use of Defra's online MAGIC tool, which details the location of all ecological sensitive habitats. It is understood that there are no SSSI or RAMSAR sites within 1km of the site, the Ham Lands Local Nature Reserve is located approximately 170m to the south and River Thames is located to the immediate south of the development site. As such, this assessment considers noise levels that may affect and sensitive/vulnerable species on the river and nature reserve. In order to assess the effects of noise, the following noise level criteria presented within the TIDE Tidal River Development Toolbox have been adopted to determine the likelihood of disturbance to noise-sensitive species in the vicinity of the application site.

The area is considered to have a high level of disturbance with existing boatyards located on Eel Pie Island as well as significant recreational activity along the River Thames. As such, the criterion of 72 dB has neem adopted within this assessment equates to low level noise effects in a highly disturbed urbans area, with moderate noise level effects occurring above this threshold.

The TIDE toolbox identifies that noise effects typically occur during loud events, as such, events from a proposed concert and cinema have been assessed for a worst-case assessment. Two scenarios are shown based on the number of potential events as detailed in section 5.5 above and assume no localised screening to noise sources within a stage/screen area.

Table 5.7 Noise Levels at ecological Receptor Locations – 1-3 Events Per Year

Location	External L_{Aeq} Noise Level	Criteria (TIDE, dB)	Noise Disturbance Significance Level
ER01	80.7	72	Moderate-high Noise Level Effects
ER02	74.0	72	Moderate-high Noise Level Effects
ER03	61.1	72	Low Noise Level Effects

Based on the noise levels associated with a concert/cinema event, that only occur 1-3 times a year, noise levels are predicted to have a moderate-high noise level effect at transient receptor locations on the river Thames immediately to the south of the development site. However, as noted above each event will be subject to specific management controls (such as the micro-siting of noise sources) and it is considered that through the provision of localised screening to stages and speakers, overall noise levels affecting the river could be significantly reduced. Indeed, a fully obstructed line of sight between a noise source and receptor location can reduce noise levels by around 10 dB and therefore entertainment noise levels are expected to be significantly lower within the river area.

Table 5.8 Noise Levels at ecological Receptor Locations – 4-12 Events Per Year

Location	External L_{Aeq} Noise Level	Criteria (TIDE, dB)	Noise Disturbance Significance Level
ER01	59.7	72	Low Noise Level Effects
ER02	53.0	72	Low Noise Level Effects
ER03	40.1	72	Low Noise Level Effects

Based on the noise levels associated with concert/cinema events that only occur 4-12 times a year, entertainment noise levels are predicted to result in low noise level effects.

5.6 PLAYGROUND ASSESSMENT

Following comments from the environmental health officer, an assessment comparing the noise levels from the existing playground (including its maximum extent and location) with the noise levels from the proposed playground (including the full extent and location) have been undertaken. This comparison for existing receptors is shown in Table 5.9 below.

Table 5.9 Playground Noise Level Comparison

Location	Contribution from Existing Playground Noise Levels dB	Contributions from Proposed Playground Noise Levels dB	Measured Baseline $L_{Aeq,\ 16\ hour}$	Measured Baseline Combined with Contribution from the Proposed Playground	Contribution from Proposed Scenario L_{Aeq}
R01	46.0	32.6	60.5	60.5	0.0
R02	31.1	39.3	55.8	55.9	0.1
R03	37.4	39.3	57.9	58.0	0.1
R04	52.9	35.8	63.2	63.2	0.0
R05	54.3	44.0	63.2	63.3	0.1
R06	47.8	49.7	63.2	63.4	0.2
R07	41.1	47.0	63.2	63.3	0.1
R08	32.1	33.1	66.8	66.8	0.0

The results in Table 5.8 above demonstrate that the relocation of the existing playground facility is expected to result in an insignificant change to existing ambient noise levels. Although the nominal contribution from playground sources is expected to increase at some existing sensitive receptor locations, the overall contribution from the playground area is expected to be at least 10 dB below existing ambient noise levels and it should be noted that there are also a number of locations where contributions from the existing playground are expected to reduce significantly.

6.0 CONCLUSIONS

This technical notes presents the findings of a number assessments associated with a proposed Events space at Twickenham Riverside, London Borough of Richmond Upon Thames (Planning Application no: 21/2758/FUL), that were requested by the Environmental Health Officer at London Borough of Richmond upon Thames.

A number of scenarios have been assessed to represent different uses of the events space, including potential Farmers' Market, Ice Skating Rink and Fun fair, noise levels associated with these events are not expected to result in significant changes to ambient noise levels in the vicinity of the development site.

Although all events at the site will be subject to an events management plan as well as considerations in relation to the micro-siting of noise generating sources, noise emission limits have been specified for the use of the space for events such as concerts and outdoor cinemas; if only 1-3 events are to occur throughout the year, noise levels are not to exceed 106dB at 1m from the stage/screen, which is in line with the requirements of the HSE. If 4-12 events are to occur within a year, noise limits would be required to achieve 85.3dB at 1m from the stage and screen.

During concert/cinema event, noise levels on ecological receptors are predicted to result in moderate noise level effects, however due to the commercial and recreational uses of the river at this location there are not expected to be any significant adverse impacts at this location associated with noise disturbance.

An assessment of the relocated playground has demonstrated that the proposed facility is expected to result in an insignificant change to existing ambient noise levels.

APPENDICES

APPENDIX A – ACOUSTIC TERMINOLOGY AND ABBREVIATIONS

An explanation of the specific acoustic terminology referred to within this report is provided below.

dB — Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.

dB(A) — Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.

L_{Aeq} — Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq,\ 07:00 - 23:00}$ for example, describes the equivalent continuous noise level over the 16 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower that the $L_{Aeq,\ 07:00 - 23:00}$.

L_{Amin} — The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.

L_{Amax} — The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.

L_n — Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say. 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the $L_{A10,\ 1\ hr}$ = x dB.

The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.

R_w The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.

An explanation of abbreviations used within this report is provided below.

CadnaA – Computer Aided Noise Abatement
DMRB – Design Manual for Roads and Bridges
HGV – Heavy Goods Vehicle
UDP – Unitary Development Plan
UKAS – United Kingdom Accreditation Service

APPENDIX B – REPORT CONDITIONS

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