



UNIVERSAL DESTINATIONS & EXPERIENCES UK PROJECT

Former Kempston Hardwick Brickworks
and adjoining land, Bedford

Environmental Statement Volume 3

Appendix 9.5 - Demonstration of Compliance with Operational Phase Noise Limits

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1. INTRODUCTION

- 1.1.1. This appendix has been prepared in support of the planning proposal for the Proposed Development as described in **Chapter 2: Description of the Proposed Development (Volume 1)** of the Environmental Statement (ES).
- 1.1.2. Information is provided on the proposed method to demonstrate compliance with the Core Zone noise limits and with the Utility Compound noise limits. Further commentary is provided on the proposed method for demonstrating compliance with noise limits applicable to the Utility Compound.
- 1.1.3. Information is also provided on the procedure to be adopted, in the event that noise related complaints from nearby residents are received by UDX.

2. NOISE LIMITS

2.1. CORE ZONE NOISE LIMITS

2.1.1. The following noise limits are applicable only to noise generated by the operation of the Core Zone and apply at the Receptor Control Locations (RCLs) identified in **Table 2-1** and **Image 2-1**.

Daytime (from 07:00 to 23:00 hours):

- 60 dB $L_{Aeq,1hour}$
- 79 dB $L_{eq,1hour}$ at 63 Hz
- 69 dB $L_{eq,1hour}$ at 125 Hz

Night-time (from 23:00 to 07:00 hours – applicable to all RCLs with the exception of RCL04 (Wixams) and RCL05 (Stewartby)):

- 55 dBL $_{Aeq,15minutes}$
- 74 dB $L_{eq,15minutes}$ at 63 Hz
- 64 dB $L_{eq,15minutes}$ at 125 Hz

Night-time (from 23:00 to 07:00 hours – applicable to RCL04 (Wixams) and RCL05 (Stewartby)):

- 50 dBL $_{Aeq,15minutes}$
- 69 dB $L_{eq,15minutes}$ at 63 Hz
- 59 dB $L_{eq,15minutes}$ at 125 Hz

Table 2-1 – Core Zone Noise Limit Receptor Control Locations (RCLs)

RCL Ref.	Description	Approximate Distance from Core Zone ⁽¹⁾	Coordinates, British National Grid	
			X (m)	Y (m)
RCL01	Manor Road	100m	502752	244667
RCL02	Manor Road, west of B530	200m	503445	244228
RCL03	Amphill Road, north	450m	503607	244024
RCL04	Amphill Road, south	780m	503765	243673
RCL05	Brick Crescent, Stewartby	250m	502493	243019
RCL06	Broadmead Road, Stewartby	50m	502252	243350
Notes				
(1) This is the approximate distance to the closest boundary of the Core Zone				

- 2.1.2. The Core Zone noise limits stated above would only apply to an RCL for as long as any of the properties associated with that RCL remain in residential use. In the case of RCL01, this would include all residential properties east of the Marston Vale line and west of the B530, excluding the two properties associated with RCL02. RCL locations are shown in **Figure 9.8: Receptor Control Locations (Volume 2)**, an excerpt is shown below for context.



Image 2-1:Receptor Control Locations

2.2. UTILITY COMPOUND NOISE LIMITS

2.2.1. The following noise limits for the normal operation of the Utility Compound apply at the following Utility Compound Receptor Control Locations:

Table 2-2 - Utility Compound Receptor Control Locations

RCL Ref	Description	Coordinates, British National Grid	
		X (m)	Y (m)
RCL01	Representative of the nearest sensitive receptor to the Utility Compound which is located on Manor Road	502752	244667
NSR13	Representative of the nearest sensitive receptor to the west of the Utility Compound.	502124	245297

- 2.2.2. The location of the nearest sensitive receptors are the dwellings on Manor Road as represented by RCL01 and the single dwelling associated with NSR13 to the west of the Utility Compound:
- Noise associated with the operation of the Utility Compound, when assessed in accordance with BS4142:2014+A1:2019¹, will not exceed the following rating levels:
 - 56 dB $L_{A_{r,Tr}}$ during the day and 47 dB $L_{A_{r,Tr}}$ at night².
- 2.2.3. This is equivalent to a rating level of +10 dB above the representative background sound levels, as defined in BS4142:2014+A1:2019.
- 2.2.4. If the Utility Compound is to be located on the western side of Public Road B, Segment 1 (road location as shown on **Parameter Plan – Access and Roadways (Document Reference 1.11.0)**, the receptor at NSR13, as identified in **Table 2-2** and **Figure 9.8: Receptor Control Locations (Volume 2)**, may experience higher noise levels than RCL01. If this is the case, the limits would apply at both RCL01 and NSR13.
- 2.2.5. The Utility Compound noise limit stated above would only apply to RCL01 for as long as any of the properties associated with RCL01 remain in residential use. If all properties associated with RCL01 were removed from residential use, the Utility Compound noise limit would apply only at NSR13.

¹ BS4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound*

² $L_{A_{r,Tr}}$ is the rating level as defined in BS4142:2014+A1:2019.

3. DEMONSTRATION OF COMPLIANCE

3.1. CORE ZONE NOISE

- 3.1.1. In order to demonstrate compliance with the Core Zone noise limits set out in Section 2, a combination of noise modelling and monitoring is proposed. The procedure to be followed is set out below:

PREPARATION OF A VERIFIED NOISE MODEL

- a) A noise model will be developed during the detailed design of the Core Zone using proprietary 3D noise modelling software in order to predict noise levels at the RCLs defined in Section 2.
- b) A report will be prepared and issued to MHCLG at least one month prior to Grand Opening summarising the noise modelling work undertaken during the detailed design process, and the predicted Core Zone noise levels at each of the RCLs and at the two selected boundary monitoring locations.
- c) Prior to Grand Opening, two locations at the boundary of the Core Zone and on UDX owned property will be identified and agreed in advance with MHCLG where continuous noise monitoring (for the period stated in Item k)) will be undertaken. The two boundary locations will represent the two closest residential communities to the Core Zone, namely Manor Road to the north and Stewartby to the south, unless there is justification for selecting alternative locations, e.g. if all residential properties associated with the nearest RCL have been removed from residential use.

NOISE MONITORING

- d) Prior to Grand Opening, noise monitoring equipment will be installed at the two boundary locations together with a data logging weather station at one of these locations. This will allow noise to be monitored continuously in 15-minute intervals at fixed monitoring positions using Class 1 sound level meters (SLMs) conforming to BS EN 61672-1:2003 or an equivalent standard and with 1/1 or 1/3 octave band filters. Each SLM shall have the functionality to enable the remote monitoring and collation of noise data. The monitoring equipment will hold a current certification of calibration/conformance and checks will be made to confirm the equipment is fully operational and logging noise levels correctly, prior to Grand Opening.
- e) Within the first few days of Grand Opening, once UDX confirms that the Core Zone is considered to be operating normally and subject to suitable meteorological conditions, noise monitoring will be undertaken at all RCLs defined in **Table 2-1** concurrently with the two locations at the boundary of the Core Zone. Suitable meteorological conditions are considered to be dry with wind speeds <5m/s. Reasonable endeavours will be made to undertake measurements during downwind conditions³ at each RCL and the weather conditions during each measurement will be clearly stated in the report.

³ Downwind conditions (i.e. from Core Zone to receiver) are preferable as these provide the likely worst-case outcome for sound propagation.

- f) Noise measurements at the RCLs will be made by a competent person⁴ and will be of short duration, comprising sequential 15-minute measurements over a 1-hour period during the day and night at each RCL. Measurements will include, as a minimum, dB $L_{Aeq,T}$ and octave band $L_{eq,T}$ data. Reasonable endeavours will be made by the competent person taking the measurements to exclude contributions from noise sources other than those associated with the Core Zone. It would also be acceptable to undertake this exercise during post-processing of the noise measurement data, but only if a much shorter measurement time period than 15 minutes, for example, sequential 1-second measurements, is selected at the time of measurement. Detailed contemporaneous site notes would also need to be taken for reference purposes. It will still be necessary to derive the appropriate $L_{Aeq,T}$ value, i.e. $L_{Aeq,1hr}$ during the day and $L_{Aeq,15min}$ at night, for comparison with the noise limits.
- g) Notes will be made by the attending competent person of the subjective acoustic climate at each RCL, identifying audible noise sources and noting which are located within the Core Zone. Measurements will be made at a height of 1.2 – 1.5m above the ground using a tripod.
- h) In the event that the daytime or night-time measurements made at each RCL indicate that the Core Zone noise limits have been exceeded at any of the RCLs, UDX will take action within 5 days of the completion of the noise survey to identify the cause of the exceedance. If the cause of the exceedance is determined to be noise source(s) within the Core Zone, UDX will initiate remedial action to rectify the exceedance. Measurements will then be repeated during the daytime and, if applicable, night-time at each RCL that indicated an exceedance of the noise limits. This process will be repeated until the noise limits have been demonstrated to have been met at all RCLs.
- i) Following completion of the noise monitoring survey at the RCLs, and subject to the Core Zone noise limits having been demonstrated to have been met, a report will be prepared for submission to MHCLG summarising the results of both the short-term attended measurements at each RCL and the concurrently measured noise and weather data from the two boundary locations (note that the boundary monitoring will continue up to the end of the continuous monitoring period).
- j) Comparisons will be made between the measured noise levels and the noise levels predicted by the computer model with any discrepancies between the two identified and analysed. This will determine any changes to the noise model that may be required to improve its accuracy to within ± 3 dB of measured noise levels at each RCL. The outcomes of this exercise will be summarised within the noise monitoring report. This process will confirm the verification of modelled noise levels with those measured. In reviewing the report, MHCLG will verify the acceptability of the noise model and in turn confirm whether the noise model can be considered verified for future use.
- k) Continuous noise monitoring at the two boundary locations will be maintained for a period of 120 days from Grand Opening. UDX targets the Grand Opening of its entertainment resort complexes during the spring or summer when visitation is highest and therefore when noise tends to be elevated as compared to slower periods in the autumn or winter. In the unlikely event that the Grand Opening of the Entertainment Resort Complex did not occur during the spring or summer, then the 120-day monitoring period would be extended to a sufficient period to ensure that the first summer period is included within the monitoring period.

⁴ A competent person in this context is defined as a person competent in the measurement of environmental noise, holding an Institute of Acoustics professional qualification (e.g. MIOA).

- l) Continuous weather monitoring will be maintained at one boundary location for the duration of the continuous noise monitoring period. A minimum of 95% compliance with the noise limits during that 120-day period will be sought under suitable meteorological conditions (as defined in Item e)).
- m) Reasonable endeavours will be made to keep the noise monitoring equipment running at all times and any failures will be attended to within 48hrs of a failure being identified. Where equipment failure beyond 48hrs is identified, the monitoring period will be extended by the length of time the equipment was not operating.
- n) A monthly compliance report (in addition to the RCL monitoring/modelling verification report) will be produced to include a summary of the boundary measurement data, weather conditions and percentage compliance against noise limits. This will be submitted to MHCLG for review. The format of the noise monitoring report will be agreed with MHCLG in advance of the first report being issued.
- o) On completion of the 120-day monitoring period and subject to 95% compliance with the Core Zone noise limits having been demonstrated, continuous noise monitoring will cease.
- p) In addition to the 120-day monitoring period, each type of special or seasonal event that takes place during the night (i.e. after 23.00) within the first 12 months of Grand Opening will be subject to a round of night-time measurements at each RCL concurrently with monitoring at the two boundary locations, in line with the procedures detailed in Item d) and Item f). In the event of any exceedances of the night-time noise limits being identified, the procedures for remedial action described in Item h) are to be followed. The results of these measurements will be summarised into a report for submission to MHCLG.
- q) On completion of the noise monitoring process described above, noise monitoring would cease.

ONGOING NOISE MODELLING FOR NEW RIDES

- r) Subsequently, noise modelling would be undertaken by updating the verified noise model each time a new ride is proposed, using appropriate noise model source data associated with that ride. This will be undertaken to demonstrate to MHCLG that the Core Zone noise limits will continue to be achieved at the RCLs. A compliance report confirming the outcome of the updated noise model will be provided to MHCLG prior to the opening of each new ride.

3.2. UTILITY COMPOUND NOISE

3.2.1. In order to demonstrate compliance with the Utility Compound noise limits set out in Section 2, the following procedure is proposed:

- a) A noise model will be developed during the detailed design of the Utility Compound using proprietary 3D noise modelling software in order to predict noise levels at nearby sensitive receptors on Manor Road. The noise model will be based on the final Utility Compound layout and will include all significant noise generating plant associated with the Compound.
- b) The model will be populated with noise emission data specific to the plant to be installed, as provided by the plant supplier or manufacturer. Where such data is not available, an alternative and relevant data source will be used, for example, manufacturer's data for a comparable plant item.
- c) The Utility Compound noise levels predicted by the model will be corrected for any acoustic features as defined in BS4142:2014+A1:2019 and the daytime and night-time values of $L_{A,Tf}$ determined for comparison with the noise limits.

- d) Within 10 days of the Utility Compound becoming operational (post-commission testing and in use) and subject to suitable meteorological conditions (as defined in Item e)), noise monitoring will be undertaken at RCL01 and, if the noise model indicates higher noise levels, at NSR13.
- s) Noise measurements will be made by a competent person⁴ and will be of short duration, comprising sequential 15-minute measurements over a 1-hour period during the day and night. Measurements will include, as a minimum, dB $L_{Aeq,T}$. Reasonable endeavours will be made by the competent person taking the measurements to exclude contributions from noise sources other than those associated with the Utility Compound. It would also be acceptable to undertake this exercise during post-processing of the noise measurement data, but only if a much shorter measurement time period than 15 minutes, for example, sequential 1-second measurements, is selected at the time of measurement. Detailed contemporaneous site notes would also need to be taken for reference purposes. It will still be necessary to derive the appropriate $L_{Aeq,T}$ value, i.e. $L_{Aeq,1hr}$ during the day and $L_{Aeq,15min}$ at night, for comparison with the noise limits.
- e) Notes will be made by the attending competent person of the subjective acoustic climate at the measurement location, identifying audible noise sources and noting which are associated with the Utility Compound. Measurements will be made at a height of 1.2 – 1.5m above the ground using a tripod.
- f) Following completion of the noise monitoring survey at RCL01 and/or NSR13, as applicable, a report will be prepared for submission to MHCLG summarising the results of the short-term attended measurements.
- g) Comparisons will be made between the measured noise levels and the noise levels predicted by the computer model with any discrepancies between the two identified and analysed. This will determine any changes to the noise model that may be required to improve its accuracy to within ± 3 dB of measured noise levels at the measurement location. The outcomes of this exercise will be summarised within the noise monitoring report. This process will confirm the verification of modelled noise levels with those measured. In reviewing the report, MHCLG will verify the acceptability of the Utility Compound noise model and in turn confirm whether the noise model can be considered verified for future use.
- h) Any subsequent additions or replacements of significant items of noise generating plant will require the noise model to be revised and a report presenting the updates made to the model and the revised predictions at RCL01 and/or NSR13, as applicable, issued to MHCLG for approval.

4. COMPLAINTS PROCEDURE

- 4.1.1. Residents in the local vicinity will be able to make noise complaints to UDX by:
- Phone call to a UDX community hotline or the UDX security department.
 - Email to a UDX community hotline inbox and/or online form via UDX website “report a concern” section.
 - During construction, a call to the local command centre which will inform UDX.
- 4.1.2. Notification will occur to the UDX responsible individuals for investigation and resolution. The following actions would then be implemented:
- UDX will ensure noise levels at the relevant sensitive receptor(s) are within the required levels.
 - UDX will respond to the complainant that any issues have been addressed.



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