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NOISE AND VIBRATION IMPACT ASSESSMENT 109-119 NORTH ROAD, MANCHESTER

1. BACKGROUND & OBJECTIVES

E3P were commissioned to undertake attended noise and vibration monitoring at 109-119 North Road, Manchester, hereby referred to as '*the site*'. The purpose of the monitoring was to determine the impact, if any, of a nearby existing wastewater detention tank at the nearby proposed residential properties.

The measured noise and vibration levels will be compared to the applicable criteria detailed in the relevant guidance.

2. RELEVANT GUIDANCE

2.1. BS 5228-1: 2009+A1:2014 'CODE OF PRACTICE FOR NOISE AND VIBRATION CONTROL ON CONSTRUCTION AND OPEN SITES – PART 2: VIBRATION'

This standard provides recommendations for basic methods of vibration control relating to construction and open sites. The legislative background to vibration control is described and guidance is provided concerning methods of measuring vibration and assessing its effects on the environment.

Guidance criteria are suggested for the assessment of the significance of vibration effects, such criteria are provided in terms of Peak Particle Velocities (PPV) and are concerned with both human and structural responses to vibration. Those applicable to human perception and disturbance are presented within Table 2.1.



TABLE 2.1: PPV CRITERIA – HUMAN EXPOSURE

VIBRATION LEVEL	EFFECT
0.14 mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

The Standard goes on to present guidance criteria applicable to the vibration response limits of buildings in terms of the component PPV, these are presented within Table 2.2.

TABLE 2.2: PPV CRITERIA – BUILDINGS

TYPE OF BUILDING	PEAK COMPONENT PARTICLE VELOCITY IN FREQUENCY RANGE OF PREDOMINANT PULSE	
	4 Hz to 15 Hz	15Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4Hz and above	50mm/s at 4Hz and above
Unreinforced or light framed structures Residential or light commercial buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

Note 1: Values referred to are at base of the building

Note 2: At frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) is not to be exceeded.

It should be noted that the values presented within the Table are applicable to cosmetic damage only. It is stated within BS 5228-2 that minor damage is possible at vibration magnitudes which are greater than twice those given in the Table. The guide values for building damage are an order of magnitude higher than for human disturbance.

2.2. BRITISH STANDARD BS 8233:2014+A1:2019 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

2.2.1. NOISE CRITERIA LIMITS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 2.2.



TABLE 2.2 BS 8233:2014 RECOMMENDED INTERNAL NOISE LEVELS

CRITERION	TYPICAL SITUATION	DESIGN CRITERION, $L_{Aeq,T}$ (dB)
Suitable Resting and Sleeping Conditions	Living Room	35
	Bedroom	30

BS 8233 goes on to recommend noise levels for gardens:

It is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted.

BS 8233 goes on to say:

In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.



3. SURVEY RESULTS

E3P has undertaken attended measurements at 109 – 119 North Road to quantify the levels of noise and vibration associated with the underground wastewater retention tank located to the west of the proposed site. Measurements were undertaken after a day of rain and during wet weather conditions as it is assumed this is when the tank will be in operation.

The survey was carried out over the following time periods:

- ✿ Tuesday 7th December 2021 – 10:48 - 12:31.
- ✿ Thursday 9th December 2021 – 05:06 - 06:26

The following noise measurement position was chosen for the Noise and Vibration Survey:

- ✿ Noise & Vibration Measurement Position 1 (NMP1): Located approximately 10 m from the manhole covers where the wastewater detention tank is located. The microphone of the sound level meter was set at a height of 1.5 m above local ground level and in free-field conditions. The geophone of the vibration meter was levelled and coupled to the ground using a 15 kg sandbag.

FIGURE 1 NOISE AND VIBRATION MEASUREMENT POSITION



3.1. VIBRATION MONITORING RESULTS

Monitoring was undertaken continuously between 10:49 and 12:39 on the 7th of December 2021 and 05:05 to 06:26 on the 9th of December 2021. The vibration meter was located on the western boundary of the site approximately 10 m from the manhole covers where the wastewater retention tank is located.

The geophone of the meter was located on exposed earth and levelled using the attached spirit level. The geophone was then coupled to the ground by way of a 25 kg sandbag that was left on for the duration of the survey to ensure no decoupling of the geophone from the floor.

The meter was set in 'piling (continuous) mode' with the following default settings:

-  PPV Peak.
-  Continuous mode.
-  5 second data storage interval; and
-  0-200 mms⁻¹ auto scale.

The meter used for the measurements is detailed in Table 3.1.

TABLE 3.1 VIBRATION MEASUREMENT EQUIPMENT AND CALIBRATION DATES

EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
Vibration Meter	Vibrocock V9000	2329	30 th September 2021
PPV Transducer			

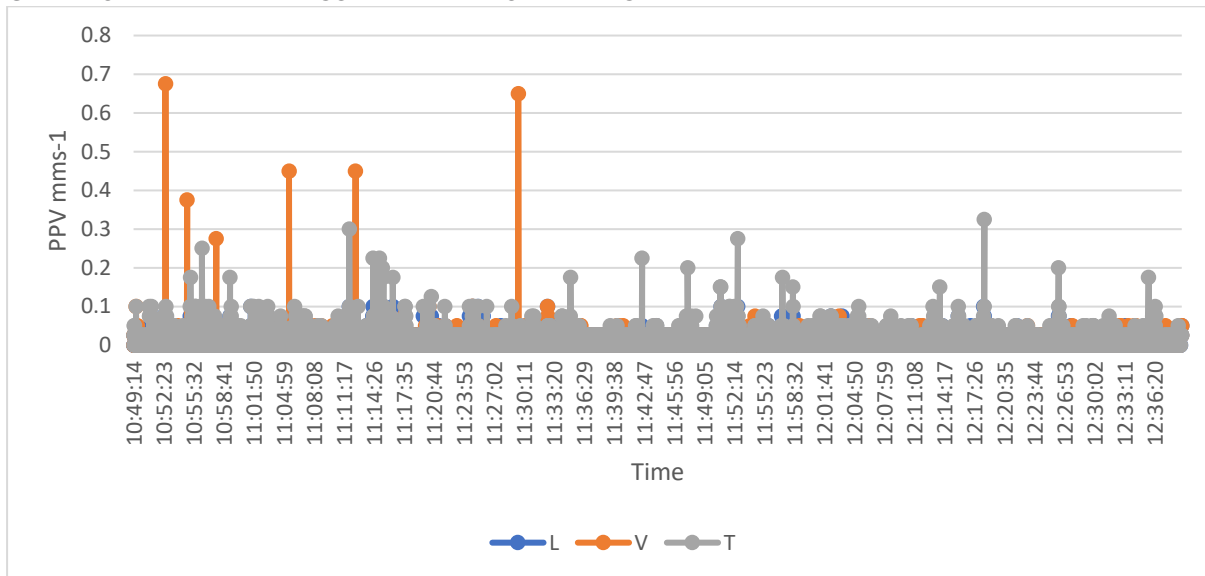
Table 3.2 details the highest measured Peak Particle Velocity (PPV) for each axis. The highest peak frequency is also noted for reference to structural response to vibration in accordance with BS 5228.

TABLE 3.2 SUMMARY OF MEASURED PEAK VIBRATION LEVELS

DATE	TIME OF PEAK MEASUREMENT	LONGITUDINAL PEAK (mms ⁻¹)	VERTICAL PEAK (mms ⁻¹)	TRANSVERSE PEAK (mms ⁻¹)	PEAK FREQUENCY (Hz)
07/12/2021	10:52	0.100	0.675	0.325	29.4
09/12/2021	05:27	0.050	0.975	0.100	46.0



GRAPH 3.1 DAYTIME MEASURED VIBRATION LEVELS



GRAPH 3.2 NIGHT-TIME MEASURED VIBRATION LEVELS



The highest levels of vibration were noted to be caused by delivery vans using the access road that run parallel to the western site boundary and car pass bys on the surrounding road network. Any vibration generated by the wastewater retention tanks would be below the levels stated above.



3.2. NOISE MONITORING RESULTS

Attended noise monitoring was undertaken 10:48 to 12:31 on the 7th of December 2021 and 05:06 to 06:36 on the 9th of December 2021. The sound level meter was located on the western boundary of the site approximately 10 m from the manhole covers where the wastewater retention tank is located. The microphone was fixed to a tripod at a height of 1.5 m and in free-field conditions.

TABLE 3.3 MEASURED SOUND PRESSURE LEVELS $L_{Aeq,15MIN}$

DATE	TIME PERIOD	SOUND PRESSURE LEVELS, $L_{Aeq,T}$ (dB)
TUESDAY 7th DECEMBER 2021	10:48 – 11:03	57.8
	11:03 – 11:15	56.9
	11:16 – 11:31	57.2
	11:31 – 11:46	57.5
	11:46 – 12:01	57.3
	12:01 – 12:16	57.6
	12:16 – 12:31	55.9
THURSDAY 9th DECEMBER 2021	05:06 – 05:21	48.8
	05:21 – 05:36	51.2
	05:36 – 05:51	52.4
	05:51 – 06:06	51.4
	06:06 – 06:21	52.8
	06:21 – 06:36	54.1

The dominant source of sound was road traffic sound from the surrounding road network and delivery vans using the access road that runs parallel to the western site boundary. No audible noise could be heard from the wastewater retention tanks.

The sound level meter used for the measurements is detailed in Table 3.4

TABLE 3.4 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
NMP1	Sound Level Meter	01dB Fusion	12039	30/06/2023
	Pre-amplifier	01dB Pre22	Internal	
	Microphone	01dB 40CE	330832	
	Calibrator	01dB Cal31	87281	03/02/2022

The sound level meter was field calibrated on site using the above-mentioned calibrator prior to and after noise measurements were taken. No significant drift was witnessed as noted above. Calibration certificates are available upon request



4. COMPARISON OF RESULTS WITH CRITERIA AND DISCUSSION

4.1. VIBRATION MONITORING

Table 4.1 states that the highest measured levels for each axis were as follows:

-  Longitudinal Peak – 0.050 mms^{-1} .
-  Vertical Peak – 0.975 mms^{-1} ; and
-  Transverse Peak – 0.100 mms^{-1} .

Comparing the above to the criteria given in Tables 2.1 and 2.2 shows that these levels may just be perceived by residents.

For these peak events, BS 5228 states the following

Vibration might be just perceptible in residential environments

However, it is worth noting that these peak levels were caused by a delivery van using the access road that runs parallel with the proposed site and road traffic on the surrounding road network. Therefore, it is thought no meaningful vibration levels are being generated by the wastewater retention tank.

4.2. ATTENDED NOISE MONITORING

No audible noise from the wastewater retention tank could be heard at the closest site boundary. The noise levels shown in Table 3.3 are dominated by road traffic sound from the surrounding road network and delivery vans using the nearby access road that runs parallel to the western site boundary.



5. CONCLUSION

No notable noise or vibration was audible for the wastewater retention tanks. The dominant noise sources were from the surrounding road network and deliveries via the access road that runs parallel to the western boundary of the site.

As such, noise and vibration from the wastewater retention tanks is not considered to cause any adverse impact on the proposed development.

Yours sincerely,

For and on behalf of E3P Ltd

Scott Boughton
Acoustic Consultant



