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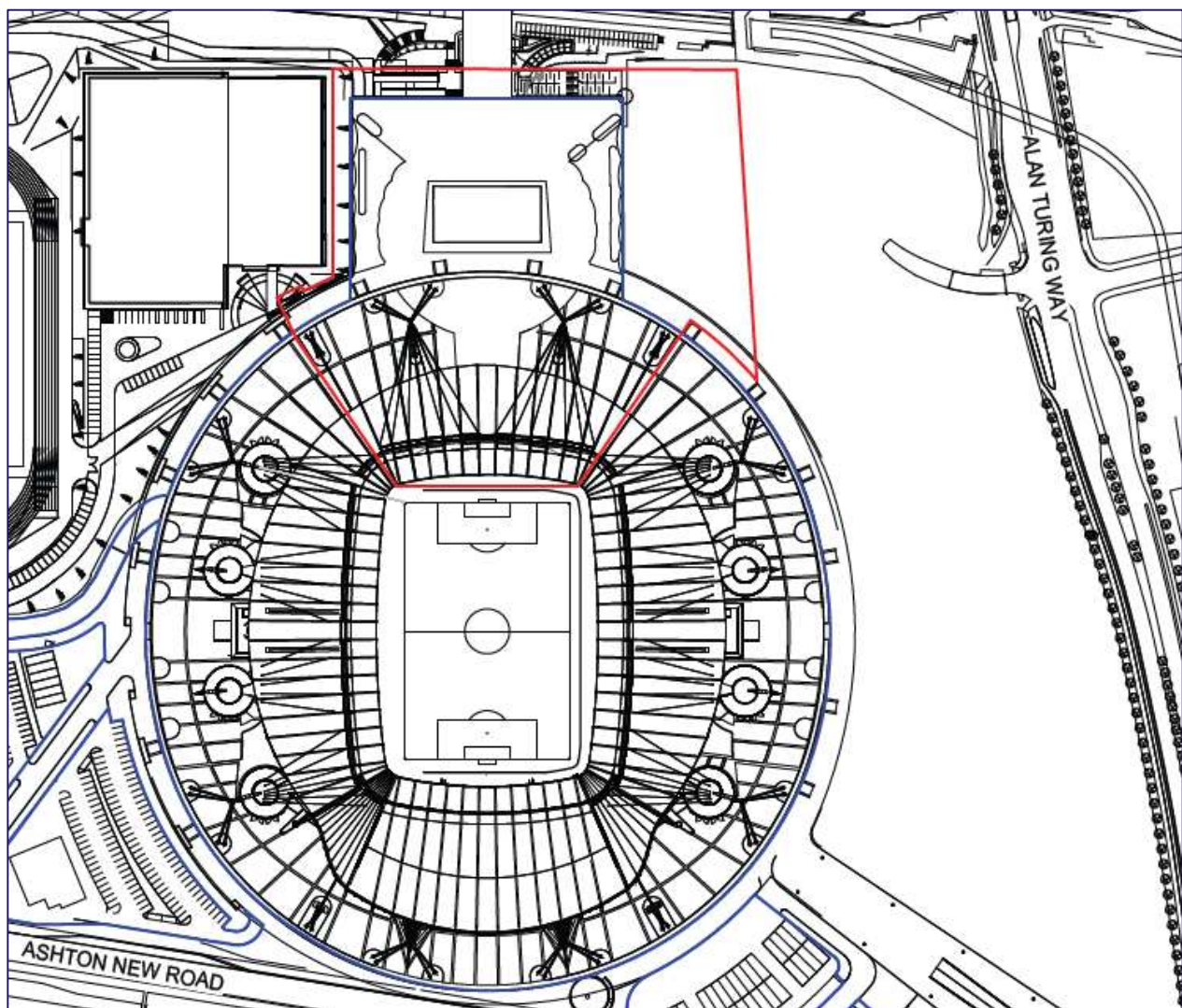
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1 Introduction

Buro Happold has been instructed by Manchester City Football Club to carry out a noise impact assessment to support a planning application for a series of site improvement works to be undertaken at the Etihad Stadium in Manchester. The works will take place on the north side of the stadium on weekdays during the daytime only (07:30 to 17:30). A formal description of the site improvement works is contained in the planning application cover letter and on the planning application form.

Figure 1—1 below shows the red line boundary associated with the planning application.

Figure 1—1 Red Line Boundary for Site Improvement Works



This report discusses the approach to the assessment of potential noise and vibration impacts from the site improvement works, and the results of that assessment.

2 Assessment Methodology

2.1 Works Information

Details of the primary plant (type and quantities) to be used to undertake the site improvement works have been provided by the works contractor for each activity (see Appendix A), together with the locations that the activities will take place and an indicative programme. Data on traffic generation associated with the works has also been provided.

2.2 Noise (on-site works)

With respect to noise from the on-site works, based on the works information provided, appropriate source noise levels for the different plant items have been selected from the reference dataset in Annex C of the current version of the British Standard BS 5228 Part 1¹. These selections are detailed in **Appendix A**.

For the purposes of predicting noise from the works, it has been assumed that all plant will be in use for 90% of the day, i.e., for 9 of the 10 hours between 07:30 and 17:30. This is likely to be very conservative, particularly when applied to all plant items; however, it is considered to represent a worst-case in terms of potential noise levels.

Construction noise levels have been predicted for each activity at the areas representing the two nearest sets of noise sensitive receptors, which are those to the north-east of the works on the east side of Alan Turing Way (the residential buildings 'The Cube' off Gibbon Street and 'The Drum' on Stuart Street), and those to the south of the stadium on the south side of Ashton New Road. These areas are shown in **Figure 2—1** below, circled in red. For simplicity and to provide a worst-case assessment, it has been assumed that all the activities considered are at the location closest to the noise sensitive receptors; in reality, their position would vary, and the distance would change. Additionally, no screening/obstacles have been assumed between the sources and the receptors.

Figure 2—1 Noise Sensitive Receptor Areas (circled in red)



¹ BS 5228-1:2009 +A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

Noise from the works has been predicted using the method described in Annex F of BS 5228 Part 1, which considers the noise source details (source noise level, quantity, usage over a day), distance to the receptor, intervening ground type (soft/hard), and any screening/obstacles between the source and receptor. The output is a $L_{Aeq,10hr}$ noise level for each activity, a type of average level of noise over a 10-hour period. The results are façade noise levels, i.e., they include a correction for the sound being reflected from the façade of the receptor buildings.

In terms of assessment, the construction noise levels have been compared to the following noise thresholds, which are based on those described in Annex E of BS 5228 Part 1 and align with the identification of adverse noise effects and significant adverse noise effects described in national planning policy². The thresholds are termed the lowest observed adverse effect level (LOAEL) and the significant observed adverse effect level (SOAEL).

Table 2—1 Noise Thresholds for Assessment

Effect Level	Time Period	Noise Threshold (dB $L_{Aeq,T}$)
LOAEL	Day	65
SOAEL	Day	75

Where the predicted noise levels are above the LOAEL but less than or equal to the SOAEL, then adverse effects are expected to occur which should be mitigated and minimised. When levels are above the SOAEL, then significant effects are predicted to occur which should be avoided, although it should be noted that potential significance typically also considers the duration of the SOAEL exceedance, i.e., for how many days it occurs.

2.3 Noise (works traffic)

Regarding the vehicles that arrive at and depart from the Site (e.g., deliveries), preliminary analysis indicates that there will be no material increase in road traffic noise as a result.

The vehicles will access the Site via Alan Turing Way to the east, which is a busy major road, and via Rowsley Street to the west, a minor road off Ashton New Road which has no adjacencies to sensitive receptors. The information provided by the contractor indicates that the peak number of vehicles accessing the Site over the entire programme would be 22 in a day, resulting in 44 total movements (i.e., in and out of the site).

Using the latest road traffic statistics for Alan Turing Way published by the Department for Transport in 2021³, the addition of vehicles using the peak number of daily movements for the whole programme would result in a negligible increase in road traffic noise on Alan Turing Way (<0.1 dB). On this basis, no adverse effects are expected, and noise from traffic associated with the site improvement works has not been considered further.

2.4 Vibration

Regarding the potential for vibration from the works to affect the nearest sensitive receptors, there are some sources that could generate ground-borne vibration, namely use of rotary bored piling rig for the trial piling activity, a core drilling rig as part of the grouting process, and a vibratory roller to compact the ground following services and drainage diversions.

² National Planning Policy Framework, Ministry of Housing, Communities & Local Government (2021)

³ Road traffic statistics, Department for Transport (2022): <https://www.gov.uk/government/collections/road-traffic-statistics>

However, these activities are not expected to generate high levels of vibration and will be over 100 m from the sensitive receptors. On this basis, no adverse effects are expected, and vibration from the site improvement works has not been considered further.

3 Predictions and Assessment

3.1 Predicted Noise Levels from On-site Works

Based on the plant information in **Appendix A** and the assumptions detailed in the previous section (e.g., worst-case usage per day and distance to receptors), noise levels from the activities comprising the site improvement works have been predicted and are presented in **Table 3—1** below.

Table 3—1 Predicted Individual Activity Noise Levels

Activity	Predicted activity noise level at receptor (dB L _{Aeq,10hr} , façade)	
	Gibbon St / Stuart St (to NE)	Ashton New Road (to S)
Set-up site accommodation	57	52
Grouting works		
Erect/remove hoarding	56	52
Grouting	61	58
Make good area	56	52
Trial Piling	62	58
Demolition	57	52
External alterations		
Remove signage	59	54
Decommission & relocate lighting	57	52
Establish safe route for fans	58	53
Drainage & service diversions	58	53

While **Table 3—1** presents the individual activity noise levels, it is possible that some activities may take place at the same time. Based on the indicative programme, for the worst-case set of overlapping activities, the following noise levels have been predicted:

Table 3—2 Predicted Overlapping Activity Noise Levels (worst-case)

Activity	Predicted overlapping activity noise level at receptor (dB L _{Aeq,10hr} , façade)	
	Gibbon St / Stuart St (to NE)	Ashton New Road (to S)
Worst-case overlapping activities	67	63

3.2 Assessment of Noise from On-site Works

Comparing the predicted individual site improvement works activity noise levels presented in **Table 3—1** to the assessment noise thresholds in **Table 2—1**, it can be seen that the results at Gibbon/Stuart Street are at least 3 dB below the LOAEL, and at Ashton New Road are at least 7 dB below the LOAEL. On this basis, no adverse effects are predicted due to noise associated with the individual site improvement works activities and there are no specific requirements for any mitigation measures.

In terms of the worst-case overlapping activity noise levels presented in **Table 3—2**, it can be seen that at Gibbon/Stuart Street the predicted level is 2 dB above the LOAEL but well under the SOAEL. This indicates that in the worst-case situation of overlapping activities, some short-term minor adverse effects may occur, but they would not be significant.

Furthermore, as mentioned in the previous section, the predictions are worst-case and do not take account of any potential screening or other mitigation options; it is anticipated that the site hoarding alone will reduce the overlapping activity noise levels to below the LOAEL, indicating that no adverse effects are expected to occur.

The planning application will be supported by a Construction Management Plan (CMP), which will provide details of how the works will be managed, including standard mitigation measures to be employed in terms of noise such as confirming working hours, use of hoarding and other localised barriers where required, and operating practices such as throttling down plant/equipment between periods of use.

At Ashton New Road, the worst-case overlapping activity noise level is 2 dB below the LOAEL, indicating that no adverse effects are likely and there are no specific requirements for any mitigation measures.

4 Conclusions

Buro Happold has been instructed by Manchester City Football Club to carry out a noise impact assessment to support a planning application for a series of site improvement works to be undertaken at the Etihad Stadium in Manchester.

The assessment has focused on works taking place on-site and, based on the results of predictions of construction noise at the nearest noise sensitive receptors, has found that no adverse effects are expected from the site improvement works with the use of the standard mitigation measures.

The assessment has also considered the traffic generated by the works and concluded it would have a negligible effect on road traffic noise, as well as the potential for ground-borne vibration from the works which is not expected to result in any adverse effects at the nearest sensitive receptors.

The planning application will be supported by a Construction Management Plan (CMP), which will provide details of how the works will be managed, including standard mitigation measures to be employed in terms of noise such as confirming working hours, use of hoarding and other localised barriers where required, and operating practices such as throttling down plant/equipment between periods of use.

Appendix A Data used for construction noise predictions

Activity	Plant Item	Quantity	BS 5228-1 Ref.	L _{Aeq,T} at 10 m (dB)	On-time (%)
Set-up site accommodation	Delivery Vehicle - Lorry Mounted crane	1	C4.53	77	90
Grouting works					
Erect/remove hoarding	4 wd All terrain forklift	1	C4.54	79	90
Grouting	Core Drilling rig	1	C3.15	82	90
	Agitator/mixer	1	C4.22	76	90
	20Tn mobile telescopic crane	1	C4.46	67	90
	360 12Tn Excavator	1	C2.24	73	90
	5Tn Dumper	1	C4.7	78	90
Make good area	360 12Tn Excavator	1	C2.24	73	90
	5Tn Dumper	1	C4.7	78	90
Trial Piling	Large rotary bored piling rig	1	C3.14	83	90
	360 12Tn Excavator	1	C2.24	73	90
Demolition	360 18Tn Excavator with cutting jaws	1	C1.3	80	90
	Cart away vehicle	1	C2.8	68	90
External alterations					
Remove signage	360 18Tn Excavator with cutting jaws	1	C1.3	80	90
	Cart away vehicle	1	C2.8	68	90
Decommission & relocate lighting	MEWP	1	C4.59	78	90
Establish safe route for fans	4 wd All terrain forklift	1	C4.54	79	90
Drainage & service diversions	360 18Tn Excavator	1	C4.64	75	90
	5Tn Dumper	1	C4.7	78	90
	Roller Compactor	1	C5.26	77	90

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