

Annex 5: Construction noise and vibration assessment

1.1 INTRODUCTION

This is a preliminary noise and vibration assessment, undertaken by ETM for HS2 Ltd, in advance of the appointment of the contractors for the Phase 1 and Phase 2 demolition. It will be the responsibility of the Principal Contractor to provide a detailed noise assessment as part of the application for prior consent under s61 of the Control of Pollution Act, 1974 and apply 'Best Practicable Means' to reducing noise exposure at sensitive receptors.

1.2 BASELINE CONDITIONS

The following eight Noise Sensitive Receptors (NSRs) were identified to represent the locations that could be affected by noise and vibration from the demolition works, as shown in *Figure 1*:

- The Tarns, Varndell Street
- Replacement LB Camden housing, corner of Robert Street/Hampstead Road (under construction)
- 132 Hampstead Road, Bartlett School of Architecture
- Thistle Hotel (West)
- Thistle Hotel (East)
- Insull Wing (office uses)
- Margarete Centre
- Maria Fidelis School, De-Hoet Wing
- Maria Fidelis School, Main Building

Figure 1. Noise Sensitive Receptors



Baseline noise surveys were carried out to establish current daytime noise levels, as reported in Annex 6, and summarised in *Table 1*.

Table 1. Baseline Noise Levels (Daytime)

Noise Sensitive Receptor	Baseline Noise Levels $L_{Aeq, T}$ dB
The Tarns, Varndell Street	68*
Replacement Housing, corner of Robert Street and Hampstead Road (under construction)	69*
132 Hampstead Road, Bartlett School	62
Thistle Hotel (West)	56
Thistle Hotel (East)	56
Insull Wing (office)	52
Margarete Centre	52
Maria Fidelis School De-Hoet Wing, main building	51

*derived from HS2 SES2 and AP3 ES baseline surveys, Long Term monitoring site LM7027 on Hampstead Road.

1.3 CONSTRUCTION NOISE AND VIBRATION SOURCES

Noise levels from the demolition works have been modelled separately for the Phase 1 and Phase 2 of the demolition, using the HS2 construction noise model based on the likely methods to be used. This model has been used for all of the HS2 construction noise assessments at Euston, reported in the Main ES and SES2 and AP3ES, and the assessment presented here is consistent with that in the SES2 and AP3ES.

The assessment has focused on the hard demolition works, leaving aside the initial stages of the works on site involving scaffolding, asbestos removal and soft-strip that will have minimal impact on NSRs.

For the Phase 1 demolition, it has been assumed that there will be a 12 week hard strip works period, within the overall works period from October 2016 to March 2017. Four stages of demolition work have been modelled, each taking place first in the East wing, then the West wing and then the main NTH building:

- Hard strip at 4th floor level
- Hard Strip at ground floor level
- Basement level drainage
- Ground level fill and compaction

Table 2 lists the plant assumed to be used. Noise emission levels modelled were drawn from BS5228.

Table 2. Construction Plant Noise Sources used for both the Phase 1 and Phase 2 Noise Assessments

Equipment or Plant Name	Sound Power Level (dB(A))	Plant % on time	Number of Plant
Hard strip at 4th floor level			
Concrete pulveriser mounted on excavator	104	75	1
Compressor	106	100	2
Tracked Loader (CAT)	114	25	2
Cherry picker	95	25	2
Mobile Crane 80T	99	10	1
Circular saw/Cut off saw/Disc cutter	115	50	1
Tower Crane	104	50	1
Generator (power for site cabins)	87	100	2
Hard Strip at ground floor level			
20T 360 deg Excavator	99	50	1
Concrete pulveriser mounted on excavator	104	75	1
Compressor	106	100	2
Lorry Delivery	109	25	2
Tracked Loader (CAT)	114	25	2
Cherry picker	95	25	2
Mobile Crane 80T	99	10	1
Circular saw/Cut off saw/Disc cutter	115	50	1
Tower Crane	104	50	1
Mobile Crushing Plant	118	25	1
Generator (power for site cabins)	87	100	2
Basement level drainage			
Core drilling concrete 250mm diameter, electric	113	50	1
Compressor	106	100	2
Lorry Delivery	109	25	2
Mobile Crane 80T	99	10	1
Water Pump	90	100	1
Tracked Loader (CAT)	114	20	1
Generator (power for site cabins)	87	90	1
Ground level fill and compaction			
Vibrating Roller Small	102	50	1
20T 360 deg Excavator	99	50	1
Compressor	106	100	2
Lorry Delivery	109	25	2
Tracked Loader (CAT)	114	25	2
Mobile Crane 80T	99	10	1
Water Pump	90	20	1
Tower Crane	104	20	1
Generator (power for site cabins)	87	90	1

Using this data, 12 weekly noise levels were modelled for each of the three parts of the Vezey Wing to be demolished, thus giving a range of noise levels likely to be experienced over the main 12 week hard strip demolition period.

Vibration levels were modelled for the vibrating compaction roller.

In order to model the Phase 2 demolition, the same process was repeated for the Insull Wing over a two month period. The modelling was done first in isolation and then inserted into the HS2 Euston SES2 and AP3 ES construction noise model to examine the cumulative effect of the demolition on other HS2 works assumed to be taking place at that time. This cumulative assessment was undertaken assuming that the main demolition takes place in January and February 2018. This is the 'worst case' for potential overlap with other HS2 works.

1.2 NOISE AND VIBRATION CONTROL MEASURES

Consideration of Best Practicable Means (BPM) assumes that concrete pulverisers will be utilised and the basement slab will be drilled rather than broken using breakers, in both cases, where practicable to do so. Further details of construction methodologies will be detailed within the prior consent applications under s61 of the Control of Pollution Act 1974.

The noise modelling did not, at this stage, incorporate any other specific noise control measures and did not take into account the noise attenuation that will be obtained from the site hoardings or other local noise barriers. The locations of these will be determined by the way the contractors decide to work the site.

Applications for prior consents under S61 will be made by the contractors. It will be the responsibility of the contractors to provide further detailed noise assessment and to put forward BPM for reducing noise levels.

1.3 PREDICTED CONSTRUCTION NOISE AND VIBRATION LEVELS

The predicted noise levels vary across the demolition periods, as the sources move down each building and as screening changes as the sources move around the site. They also vary up and down the building façade of each NSR as screening varies. Generally, upper floors show the highest noise levels. Table 3 summarises the modelling results for Phase 1 and Phase 2 by giving the full range of noise levels at each NSR. Table 4 gives the predicted noise levels in more detail, showing the noise levels predicted during each of the 12 hard strip demolition weeks in Phase 1. For each NSR the weekly noise levels are shown for the worst affected floor ('max' maximum noise levels) and the least affected floor ('min' minimum levels).

In these predictions, it has been assumed that the LB Camden replacement housing at the corner of Robert Street and Hampstead Road is under construction during the Phase 1

demolition, but may have been occupied by new tenants during the Phase 2 demolition. 132 Hampstead Road is due to be vacated by UCL before the Phase 2 demolition and other buildings, such as the Thistle hotel, are likely to have closed in anticipation of demolition as part of the HS2 Euston works.

Table 3. Predicted Construction Noise Levels (LAeq, day)

NSR	Phase 1 Demolition – between October 2016 and March 2017	Phase 2 Demolition and other HS2 works –January to February 2018
The Tarns, Varndell Street	56-74	75-79
Housing, corner of Robert Street and Hampstead Road (under construction).	Under construction	75-80
132 Hampstead Road, Bartlett School	57-77	Vacant, to be demolished as part of main HS2 works
Thistle Hotel (West)	58-84	Vacant, to be demolished as part of main HS2 works
Thistle Hotel (East)	53-71	Vacant, to be demolished as part of main HS2 works
Insull Wing (office)	55-81	Vacant, to be demolished in Phase 2
Margarete Centre	39-51	66-89
Maria Fidelis School De-Hoet Wing	40-47	71-79
Maria Fidelis School Main Building	40-70	71-77

Table 4. Predicted Construction Noise Levels (LAeq, day) – Phase 1

Location	Floor	Week of Hard Strip											
		1	2	3	4	5	6	7	8	9	10	11	12
The Tarns	Max	70	72	68	68	73	73	69	68	73	74	70	69
	Min	70	60	55	56	72	60	55	56	73	60	55	56
132 Hampstead Rd	Max	74	76	71	71	74	75	71	70	77	78	74	73
	Min	73	62	57	58	73	62	57	58	77	64	59	60
Thistle Hotel (West)	Max	84	85	81	80	76	78	73	72	82	83	79	78
	Min	83	69	64	65	65	62	57	58	79	67	62	63
Thistle Hotel (East)	Max	71	64	59	60	68	71	66	66	66	67	63	62
	Min	71	58	53	54	68	60	55	56	66	57	52	53
Insull Wing	Max	78	80	76	75	79	81	77	76	75	77	71	71
	Min	70	64	59	60	75	65	60	61	62	60	55	56
Margarete Centre	Max	48	50	45	46	50	51	46	47	46	48	43	44

	Min	43	45	40	42	45	47	42	43	41	43	39	40
Maria Fidelis Wing	Max	47	47	42	43	46	46	42	43	45	46	41	42
	Min	46	46	41	43	45	46	41	42	43	45	40	41
Maria Fidelis Main	Max	69	70	66	65	51	48	42	44	65	67	62	62
	Min	69	59	54	55	45	44	40	41	64	57	52	53

For Phase 2, the predictions were undertaken as monthly values, covering a two month demolition period. The values presented in Table 3 are the maximum and minimum levels predicted for those periods.

Phase 1

Based on this assessment, it is not anticipated that any residential properties in the vicinity of the works will require noise insulation or temporary rehousing in line with the HS2 Information Paper E23: Control of Construction Noise and Vibration for Phase 1 of the works.

No impacts are predicted at the Maria Fidelis School De-Hoet building or at the Margarete Centre, because these are screened by the Insull Wing. At the Maria Fidelis School Main Building, the Thistle Hotel (West), 132 Hampstead Road and the Insull Wing, the upper predictions show high noise levels, which will need to be addressed by the contractors using BPM. Under the Trigger Action Plan for Maria Fidelis School, three rooms in the St Patrick's Wing, used as sanctuary for Special Education Needs children, will be fitted with noise insulation before the Phase 1 noisy works begin.

Predicted levels of ground vibration from the compaction roller vary from 0.1 to 0.5mm/s PPV indicating negligible or minor effects at all NSRs except the Insull Wing where levels peak at 0.9mm/s and the Thistle hotel (West), where levels peaks at 2mm/s when the compaction roller is at its closest. These peak levels will lead to short periods of disturbance to occupants, which will be managed by agreement with CTU and the Thistle Hotel.

When concrete removal is required close to the party wall of the Thistle Hotel, levels of vibration or structure-borne noise in the hotel may give rise to significant disturbance. It is understood the party walls are structurally separate, so it may be that significant energy transfer is avoided. However, if this is not the case, then steps will need to be taken by the contractors to sever the structures early in the demolition process to minimise the duration of impact in the hotel. A party wall agreement is being negotiated with the Thistle Hotel.

Phase 2

The noise from the Phase 2 demolition work has been modelled concurrently with the anticipated HS2 works in the area between October 2017 and March 2018, with the results presented reflecting the 'worst case' within this period, which is January to February 2018.

During Phase 2, the contractor will continue to work with Maria Fidelis School and will work with the Margarete Centre to manage any impacts that arise in the context of the wider HS2

works. It is anticipated that the windows on the north façade of the Margarete Centre will be offered noise insulation.

The Tarns and, if necessary, the replacement housing being built on the corner of Robert Street are likely to have been provided with noise insulation under the agreed wider HS2 works noise insulation scheme, prior to Phase 2 of the works taking place.

1.4 MONITORING

Noise will be monitored during each phase of the demolition works using two permanent noise loggers, which are proposed to be located at the Maria Fidelis Convent School and at another suitable location during Phase 1 and Phase 2. The location of the loggers during Phase 1 and Phase 2 will be agreed with LB Camden through the s61 consents.

Noise levels will be logged continuously against the noise levels as set out in the s61 consents. If levels are exceeded, the monitoring system will automatically notify the contractor, who, under the terms of the contract will be required to consider further noise control measures to ensure BPM are being used to avoid disturbance. The noise levels will also be shared with LB Camden, as agreed in the S61 consent application.