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NOISE & VIBRATION INVESTIGATION BRANDON MEWS BARBICAN

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1. COMPLAINT DETAILS

Complaint ref.	Brandon Mews, Barbican (13299245)		
Property location	Hammersmith & City / Metropolitan line: Barbican to Moorgate (see Figure 1)	LCS Codes	M134/MORLO 465m M134/MIRLO 40m

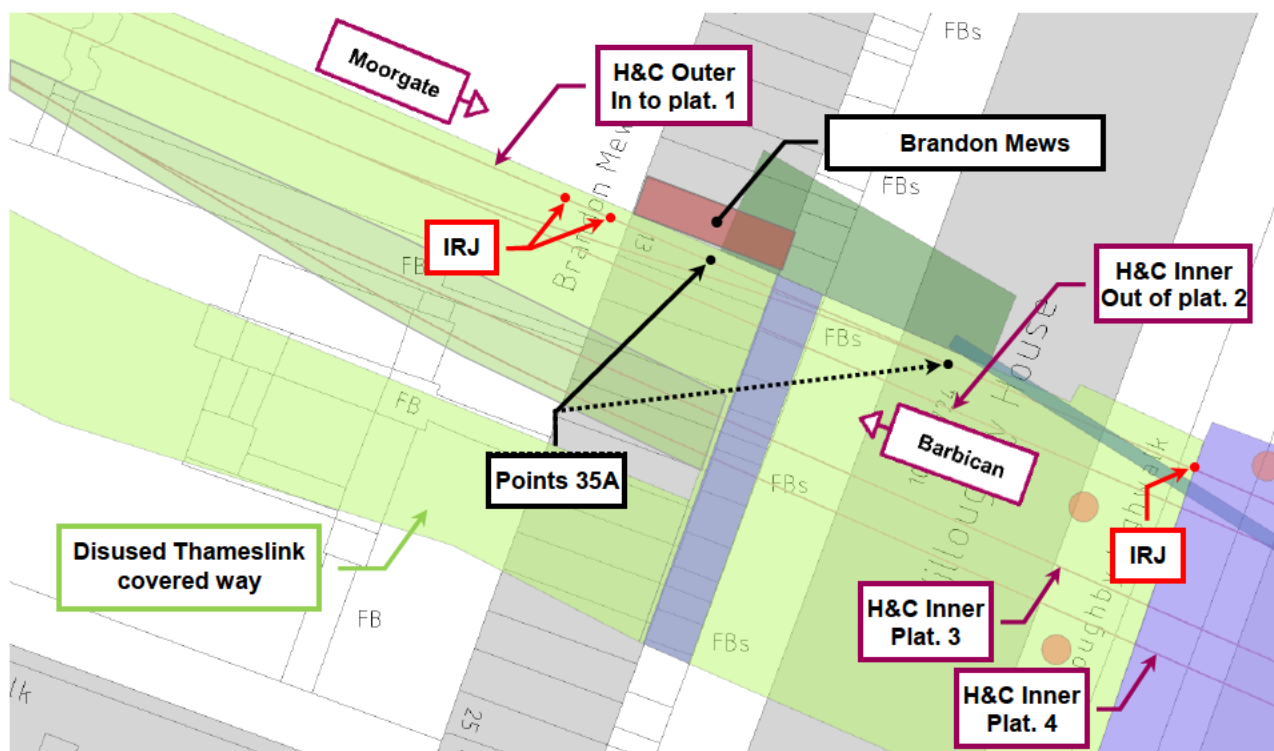


Figure 1 - Location of Brandon Mews in relation to the Hammersmith & City / Metropolitan line.

Brandon Mews is a row of terraced properties at the lowest level of the Barbican development. The properties are close to the western end of the platforms at Moorgate, which are approximately 5.5m below street level. It is estimated that the lowest level of the Brandon Mews properties is only marginally above the roof of the tunnels below.

The resident initially contacted TfL in May 2019 to report an increasingly disturbing level of train noise. He stated that “the noise has been continuing for many years, but has got progressively worse over the past five years or so”. The noise was described as “a loud bang and deep, continuous rumble as trains pass beneath the property”.

Noise measurements were taken at the property in June 2019. The higher noise levels were found to be due to trains on the outer / eastbound road (report ref. R2618).

Subsequent to these measurements work was carried out on the nights of Tuesday 6th and Wednesday 7th August 2019 on rail joints beneath Brandon Mews. This work involved consolidating the block joints (jointed insulated plates), which consisted of lifting the sleepers and packing the ballast in tight beneath 5 sleepers either side of the joint, to stop any movement from voiding when trains move over them. The resident was then contacted in order to arrange for follow up measurements (R2675).

The latest set of results in the present report, reflect the outcome of a 15mph Temporary Speed Restriction (TSR) on the Outer road, between signals OE45 and OE43. It should be noted that no TSR was implemented on the Inner road.

2. MEASUREMENT DETAILS

Date of measurement	8 th November 2019
Measurement location	Ground floor living room
Equipment used	01dB Fusion logging sound level meter (sn. 11489).

3. RESULTS OF NOISE MEASUREMENTS – ($L_{AMAX, FAST}$) dB(A)

	Metropolitan											
	Outer				Inner				Outer during TSR			
	No. of Trains	Min.	Max.	Mean	No. of Trains	Min.	Max.	Mean	No. of Trains	Min.	Max.	Mean
11/06/2019 10:25 to 11:05	14	47	55	51	14	42	46	44	/	/	/	/
27/08/2019 13:09 to 13:51	17	50	58	53	16	45	48	47	/	/	/	/
27/08/2019 17:29 to 18:07	19	46	56	50	15	44	49	46	/	/	/	/
27/08/2019 20:39 to 21:40	23	47	58	52	21	44	48	47	/	/	/	/
27/08/2019 23:51 to 00:52	12	48	59	54	16	43	48	46	/	/	/	/
28/08/2019 05:07 to 06:18	13	49	57	53	11	46	47	46	/	/	/	/
28/08/2019 08:02 to 09:02	23	46	52	49	22	44	48	46	/	/	/	/
08/11/2019 20:31 to 23:53	28	48	57	52	40	44	50	48	20	44	46	45

The direction of travel of Hammersmith & City / Metropolitan line trains was determined from subsequent reference to TrackerNet (an internal application).

4. OBSERVATIONS

From figure 1, the source of the loud groundborne noise is quite evident, namely the existence of the set of points 35A.

The figure below shows the discontinuity on the right hand rail located at LCS M134/MORLO 466m.



Figure 2 – Rail discontinuity (nose of points 35A) on the right hand rail at LCS M134/MORLO 466m



The open gap at a fixed V-crossing forms a point on the track where the heavily loaded wheel must bump across the resulting gap of about 10 cm, supported only by the portion of the wheel tread which is on the wing rail.

This pounds the rail so heavily, that often the steel deforms and/or wears out. This damage may easily spread to other components including the wheels, and as a consequence, the noise becomes an issue for neighbouring properties.

4.1. NORMAL SPEED MEASUREMENTS

The latest results were taken during the evening period, which in previous measurements, showed to have higher noise levels than during the remainder of the day.

As such, current results when compared to previous results taken during the evening period as well, show very similar levels, event matching those taken in the evening of the 27th August 2019.

Given the inherent variability of manual operated trains, it should then be assumed that noise levels have remained more or less unchanged over the previous 3 months.

The perceived character of the train noise was a deep and loud impulsive noise as trains traverse discontinuities over the P&C's on both roads.

As in previous measurements, the leading car of trains on the outer road goes through the crossover at maximum speed, producing the highest noise levels of the pass by. As trains slow down, the magnitude of every subsequent impulse is reduced as each bogie and each car traverses the crossover.

4.2. TSR MEASUREMENTS

The results during the current TSR show that within the property, outer train noise levels were reduced by 7dB, on average.

The resident initial feedback was quite positive, denoting that noise levels during the TSR window, improved significantly and that the thunderous thumps and vibrations he experienced were a lot lower.

The plot below shows the noise level plot of trains on the outer and inner road during the current set of measurements.

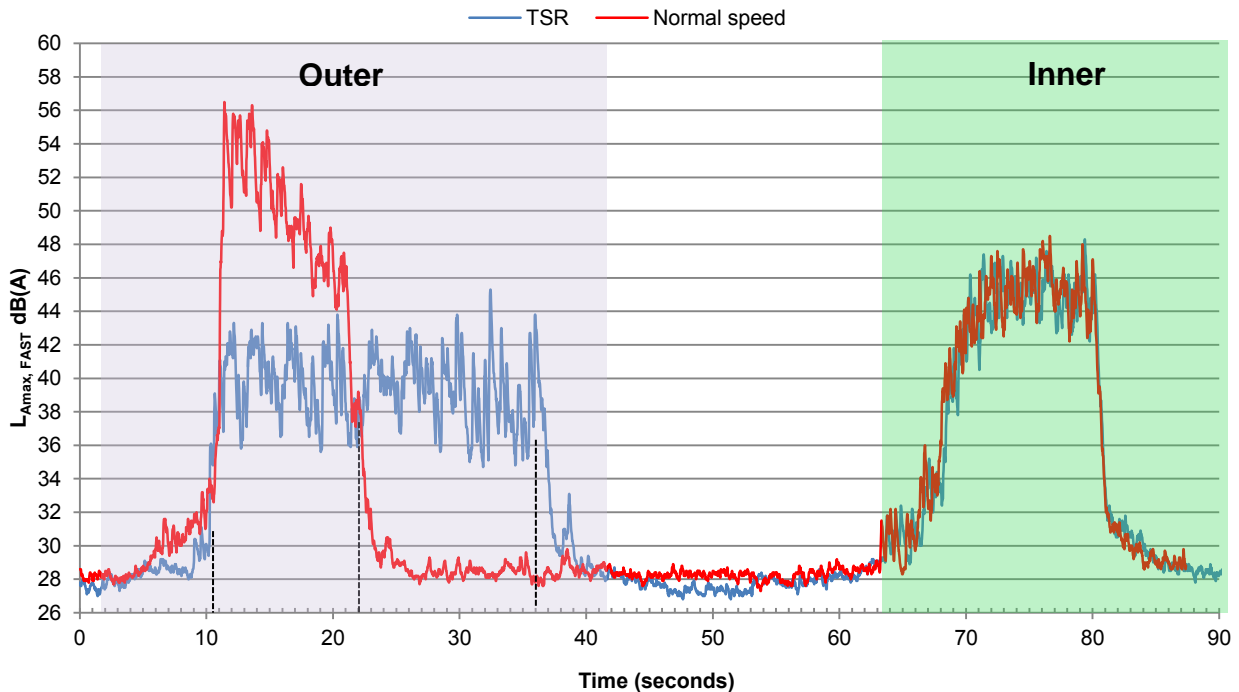


Figure 3 - Noise plots of trains on the outer and inner road

From the plot above, outer trains had their average speed reduced by roughly 55%, from approximately 35mph down to 15mph. The train pass by time increased as a consequence, correlating with the reduction in speed; ~11 seconds to ~24 seconds.

With the speed reduction, every bogie traversed the gap on the right hand rail at LCS M134/MORLO 466m, at a constant speed as observed in the plot above.

This constant speed, i.e. 15mph, was slightly lower than the speed of the last and slowest train bogie during normal operation, which is estimated to be roughly 18mph.

It should be noted that the pass by time during both modes of operation, corresponds to a travelled distance of ~165m, which is longer than a train length, which is ~115m.