

TECHNICAL MEMORANDUM

Project	11863 Grundon Services, Banbury		
Date	26 October 2020	Memo No	M003
Memo to	Mark Berry, JSA Planning	Copies to	-
From	Mat Tuora MIOA	Checked by	Adrian James FIOA
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REPLIES TO QUESTIONS RAISED BY TREVOR DIXON ON 4 AUGUST 2020

This memorandum sets out our replies to questions raised by Trevor Dixon, Environmental Protection & Licensing Manager for Cherwell District Council. The questions were among a number of questions on various subjects raised in an email from Trevor Dixon to JSA Planning on 4 August 2020.

The questions address two areas relevant to acoustics, the first being vibration and the second being airborne noise which impacts on to the proposed development at Grundon Services. They refer to information contained in the following reports:

- Noise and Vibration Report 19 November 2015 Rupert Taylor Document Ref: SMD/GWB1
- Supplementary Note on Noise Mitigation 15 September 2017 Rupert Taylor Document Ref: SMD/GWB2
- AJA Acoustic Assessment 11863/1A 12 September 2018
- AJA Acoustic Assessment 11863/2A 16 May 2019
- AJA Acoustic Assessment 11863/2B 2 September 2019
- AJA Acoustic Technical Memorandum 11863/M001 2 September 2019
- AJA Acoustic Technical Memorandum 11863/M002 11 October 2019

1 VIBRATION

Question 1

The Noise and Vibration Report 19 November 2015 from Rupert Taylor has considered vibration levels from train movements on the main line. Measurements were made at one location approximately 12m from the boundary between the application site and the railway and the estimated vibration dose values (VDV's) compared to guidance in BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings, see table below.

For the daytime the estimated VDV is below the level of 'Low probability of adverse comment', and at night time is at the lower end of the level of 'Low probability of adverse comment'. Vibration from train movements on the main line is unlikely to be a problem although, as recommended in the report, further studies should be undertaken to determine if any mitigation is required as part of the design, and this should include an assessment of vibration levels from the LMD which was not operational when the Rupert Taylor assessment was undertaken.

Reply 1

We would not expect vibration from the Light Maintenance Depot to be significant compared with that from train movements on the main line. Following our conversation with Trevor Dixon we understand that he would like some assurance that the assessment carried out by Rupert Taylor is still valid.

We have therefore obtained working passenger and freight timetables from Network Rail's website and freedom of information team, and we have repeated the calculations based on these updated movement figures. Table 1 summarises the results of this updated assessment.

Train type	Highest VDV m/s ^{1.75}	DAY		NIGHT	
		Number per Day	16-hr VDV m/s ^{1.75}	Number per Night	8-hr VDV m/s ^{1.75}
Passenger	0.026	314	0.11	40	0.065
Freight	0.044	88	0.14	69	0.127
Overall VDV			0.15		0.129

Table 1 – Updated VDV assessment

BS 6472-1:2008 sets out guidance on the probability of adverse comment in residential buildings. This is shown in Table 2.

Place and time	Low probability of adverse comment m/s ^{1.75}	Adverse comment possible m/s ^{1.75}	Adverse comment probable m/s ^{1.75}
Residential building 16 h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential building 8 h day	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 2 - BS 6472-1:2008 Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings

The daytime VDV's are below the level which would indicate a Low probability of adverse comment. Night-time VDV's indicate a Low probability of adverse comment.

This is consistent with the conclusions of the Rupert Taylor report and we therefore conclude that the site is not subject to high levels of vibration.

It should be noted that the data provided for freight activity was relatively extensive and for the purposes of our assessment we have generalised the data in to the following categories:

1. Trains scheduled to run for more than a week – These were assumed to run indefinitely or be replaced with trains running on similar schedules and therefore represents a typical weeks movements over the long-term.
2. Trains scheduled to run for only a few days – These were considered sporadic and the total number of movements were averaged over a single month to represent an average number of sporadic movements in a day.

For consistency with the report by Rupert Taylor our calculations are based on the highest VDV of each vehicle type. Our calculations therefore represent a worst case assessment.

2 AIRBORNE NOISE IMPACT

Question 1

The train movements on the main line and the Light Maintenance Depot (LMD) are the dominant sources of noise impacting the proposed development site. The LMD operates throughout the night from 18.30 hours to 06.30 hours the following day (as stated in the AJA assessment 11863/2bB) with noise from idling diesel trains and compressed air brake releases. The LMD has already been a source of complaints to Environmental Protection.

Reply 1

This report confirms that the train movements from the main line and noise from the Light Maintenance Depot are the dominant source of noise. We cannot comment on the number or relevance of the complaints, but were aware of complaints occurring following our discussions with the Council.

Question 2

All reports confirm that satisfactory internal noise levels can only be achieved in the upper storeys with windows being permanently closed and alternative means of ventilation provided. Alternative ventilation will need to be mechanical and not by passive or trickle vents.

Reply 2

We agree that the site should not rely on ventilation by means of open windows. However, the conclusions in our reports do not preclude the use of natural ventilation systems. Although we recommend a mechanical system is used we also provide the minimum normalised element differences that would be required of acoustically attenuated natural ventilation systems to meet the internal noise requirements. This is stated in Section 8.3 of our report 11863/2B.

Question 3

External daytime levels at a height of 1.5 metres are mostly within the desirable level of 50dB or the upper level of 55dB with a 6 meter barrier (bund and/or acoustic fence) in place. However, the barrier will only be effective at mitigating low level noise sources for example wheel noise on the rails that are close to the barrier, and protect ground floor dwellings and amenity areas. For diesel locomotives running on full power where the source height is 4 metres and sources further from the barrier such as the LMD, the barrier will offer less protection and no protection to the upper storeys. Also, the rail line is approximately 1.5 metres higher than the site towards the south east end of the site and it is not clear if this been accounted for in the barrier calculations.

Reply 3

The question is not correct. The CadnaA noise model used in our calculations takes account of the site topography and including the existing height of the railway line and the proposed heights of the barrier and buildings relative to this. This is intrinsic to the CadnaA noise modelling methodology. The figure below shows a section through part of the site showing the different heights of the railway line, the barrier, and the receptors.

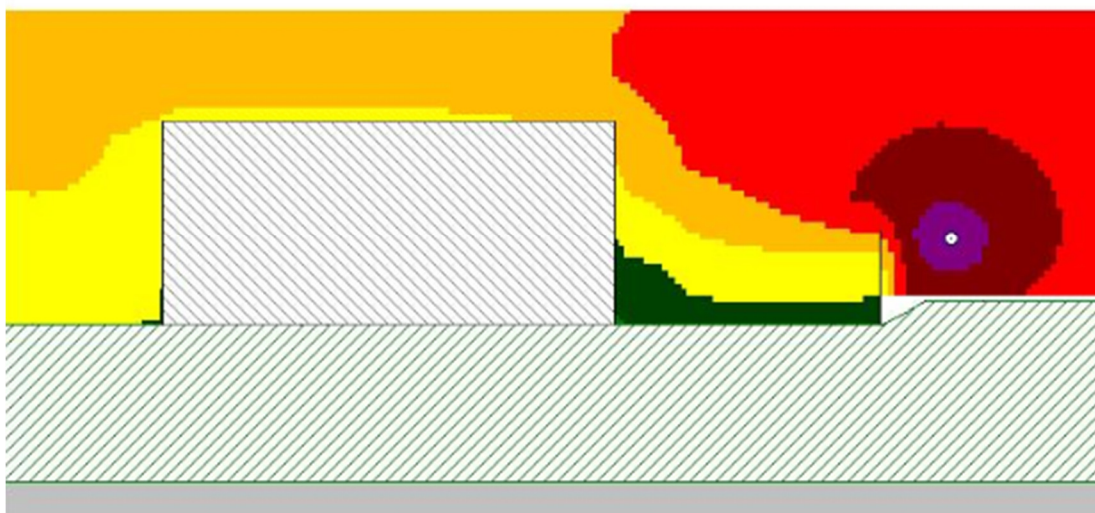


Figure 1 - Sample section through site

We have therefore accounted for the elevated ground to the south east of the site. Our model assumes a train line height of 0.25 metres to the South-West and 1.5 metres to the South-East.

Because of the difficulty of separating wheel-rail noise and locomotive noise in the measurement process, for our calculations we have assumed that all train noise, including that from the wheel-rail interaction, comes from a height of 4 metres. This represents a “Worse than worst case” condition and our calculations are therefore likely to overestimate the resulting noise levels.

It is well known that barriers are less effective for sources and receivers at higher elevations, particularly if a noise source has a clear line of sight to the receptors. This is why the barrier has to be as much as 6 metres tall. The results are demonstrated in Figures 19 - 24 in Section 7.4 of our report 11863/2B, which show the predicted noise levels at heights of 1.5 m and 7.5 m. Noise levels at intermediate heights will, of course, be between these values.

Question 4

The BS 4142 assessment for the noise sources at the LMD gives a rating level of 74dB, 25dB above the background level, which is a significant adverse impact (a difference of around +10 dB or more is an indication of a significant adverse impact and +5 dB an indication of an adverse impact).

Reply 4

This is indeed the conclusion of first stage of the BS4142 assessment in Section 5.4 of our report. This initial assessment does not, however, include the effect of mitigation. Section 5.5 “Full Assessment” states :

“If the noise mitigation measures set out in Section 7.2 and façade insulation measures set out in Section 8.3 of this report are incorporated into the development, the Light Maintenance Depot should not have a significant adverse impact upon residents of the development”.

Sections 7.2 and 8.3 of the report show the effects of this mitigation, including the noise barrier and building façade sound insulation with mechanical ventilation.

For ease of reference Section 8.4 is reproduced below :

8.4 Internal levels with proposed treatment

Table 8 shows the free-field external levels and calculated internal levels using the above treatments.

Location	External free field level			Internal reverberant level		
	L _{Aeq,18hr} Daytime	L _{Aeq,8hr} Night-time	L _{AF,max} Night-time	L _{Aeq,18hr} Daytime	L _{Aeq,8hr} Night-time	L _{AF,max} Night-time
Facades facing the railway line	56dB	57dB	77dB	22dB	20dB	40dB
Facades facing away from the railway line	53dB	50dB	63dB	31dB	28dB	41dB

Table 8 – External and internal levels

As stated in Section 7.3, these are calculated at a height of 7.5 m as a worst case to indicate the noise levels in the flats on the upper storeys.

These are summarised on Section 9:

“With the proposed mitigation measures and the facade treatments in place, internal noise levels should comply with the noise criteria set out by the Council”.

Question 5

Q. AJA Acoustic Technical Memorandums 1863/M001 2 September 2019 and 1863/M002 11 October 2019 were submitted to answer queries previously raised regarding their acoustic assessments 11863/2A 16 May 2019 and 11863/2B 2 September 2019, however I still have the following queries:

Question 5.1

With regard to the background level it would have been useful if the raw data had been presented as an appendix in the reports so that it was possible to see the range of levels at different times of the night time period. The background should exclude noise from passing trains and the LMD because these are the noise sources of concern but include noise from the distant M40. Even using a night time background level of 49 (it is incorrectly stated again as 48 in paragraph 6 of memorandum 1863/M002 and also in Table 3 of assessment 11863/2B) the BS 4142:2014 rating level is still significant adverse impact

Reply 5.1

The amount of raw data associated with 0.1 second logging over approximately nine days is exceptionally large and it would obviously not be practical to include this in our report. We would also note that without the tools to analyse this the data would be somewhat difficult to interpret.

In the interest of providing useful data we have included the processed data from our survey in Appendix A of this memo this is in terms of $L_{AF90,15\text{-minutes}}$. This should be far easier to review, but if the Council requires the 0.1 second log data we would be happy to provide this on an online share point. We are happy for the Council to contact us directly to discuss how the log data may best be reviewed. This data excludes contributions from train movement and activities at the Light Maintained Depot.

It must be understood that L_{AF90} represents the quietest 1 minute and 30 seconds out of a 15 minute period, hence the noise from passing of trains is unlikely to contribute significantly to this measure.

Question 5.2

I had previously questioned why the night time background level is higher than the daytime level in the absence of all noise sources attributable to passing trains and the LMD and a reason given by AJA is the percentage of HGV's is higher at night. I would agree that the percentage of HGV's relative to the total traffic flow would be higher at night than during the day, but not that the number of HGV movements is greater at night. This was the reason for asking for the traffic data on which their modelling was based but the data provided only shows the average annual daily flows and not a breakdown between day and night.

Reply 5.2

We were only provided with average daily traffic flows and not with a breakdown between daytime and night-time traffic flows. The split between daytime and night-time noise levels was predicted using the inbuilt function in CadnaA. This derives the daytime and night-time contribution from road traffic in accordance with the standard method set out in the Transport Research Laboratory's 'Method for Converting the UK Road Traffic Noise Index LA_{10,18h} to the EU Noise Indices for Road Noise Mapping'.

Although the guidance above focuses on converting an LA_{10,18h} to the LA₁₀ day and night level the CadnaA software reverse engineers this to provide estimated hourly traffic counts. The approximate hourly counts, on average, are 4,234.3 vehicles for each hour during the day and 1210 vehicles each hour at night.

Following the assumptions of the percentages of heavy good vehicles on the road this would result in 1059 HGV movements during a typical daytime hour and 545 HGV movements in a typical night-time hour. As discussed in the previous reports we believe that this is an over estimation of actual HGV movements, and hence is likely to represent a worst case assessment.

The LA₁₀ was converted to an LA_{eq} using the method detailed in the 'Department of Transport – Calculation of Road Traffic Noise'. It is important to understand that that it is not possible to calculate background noise levels (LA₉₀) from traffic flow data, which is why we had to rely on measured background noise levels.

The nature of the site is such that noise from idling trains occurs for much of the night, so that the amount of useable data to calculate the background levels is limited mainly to the start of the night and end of the night. We made every effort to ensure that our data processing was accurate and, but have further reviewed the audio files and have excluded further data in which idling train noise may have affected the background measurements. Even with these additional exclusions the results still show night-time background levels of approximately 48 dB LA_{F90} and daytime background levels of approximately 45 dB LA_{F90}, which is consistent with our original findings. We have received no alternative data from the Council or any other source to contradict this.

The lowest background during the night was measured at 47 dB LA_{F90, 15 minutes}. Even if this were taken to be representative the outcome of the BS4142 assessment would remain the same. For that matter even if the background at night was significantly lower than this the assessment would still remain the same as the BS4142 assessment already concludes a significant adverse impact would occur without mitigation. Please refer to our reply to question 4 for the results with that mitigation.

Question 5.3

The internal levels given in BS 8233:2014 are used when assessing anonymous noise sources such as rail and road noise and not industrial noise sources such as the LMD. BS 8233:2014 states that for industrial noise the methods in BS 4142:2014 should be applied to rate and account for the character of the noise. My previous comment that the rating level outside from the BS 4142 assessment still needs to be addressed was based on the fact that the assessment hadn't taken account of the character of noise from the LMD, but simply taken the rating level (74dB) and calculated the contribution to the internal level. The glazing specifications in section 8 of 11863/2B gives the performance over octave bands from 125Hz to 4K, however the noise from idling trains is likely to include lower frequencies so has the character of the noise inside been properly considered i.e. do the glazing specifications make this noise anonymous?

Reply 5.3

Our calculations of internal noise levels and of the necessary glazing specifications were undertaken in octave bands in accordance with the relevant standards and guidance, and not merely by considering overall A-weighted noise levels. The available data for this only goes down to the 125 Hz octave band or the 100 Hz 1/3 octave band because that is the limit specified in the relevant British and international standards for the measurements and calculation of sound insulation.

The sound insulating performance of all types of glazing is least at low frequencies, so for all types of noise break-in from road traffic, trans, aircraft and industrial noise the resulting internal A-weighted noise level is almost invariably governed by low-frequency components. The ear, however, is considerably less sensitive to low-frequency noise than to that at high frequencies. This is the basis of the A-weighted noise criteria set out in BS8233 and the Council's own noise criteria.

The internal noise levels from noise break-in (see Table 8 of our report) are in any case significantly lower than other noise levels generated inside dwellings including that from the mechanical ventilation systems.

We do not consider the character correction of the noise in BS4142 to be relevant to the internal noise level rated in accordance with BS 8233. Section 1.3 of BS4142:2014 + A1 2019 states that 'the standard is not intended to be applied to the assessment of indoor sound levels' and this is further reiterated in the recent technical note issued by the ANC in March 2020.

The noise criteria in BS 8233:2014 do not include for character corrections. We are not aware of any policy in the Cherwell local plan which would require low frequency noise to be considered from train lines. Section 2.5 of our report 11863/2B summarises the conversation we had with Mr Dixon and is as follows:

2.5 Criteria set by the council

We have had discussions with Trevor Dixon at Cherwell District Council. Mr Dixon has agreed that noise levels within dwellings and in external amenity areas should not exceed the levels set out in BS 8233:2014. Mr Dixon also asked us to consider noise generated from the nearby Light Maintenance Depot and any other industrial noise sources that may become apparent during the noise survey.

We have taken all reasonable measures to specify the sound insulation required by the glazing and ventilation to meet these requirements.

Question 5.4

It is not clear if the calculated external levels include a 3dB correction for reflection from the façade?

Reply 5.4

Our calculations were undertaken in accordance with BS 8233-2014 (taken from BS EN ISO 12354-3-2000) which requires break-in to be calculated from a free-field level. We have, however, allowed for reflections from the adjacent buildings in our model.

Question 6

The scheme is reliant on windows being unopenable to mitigate the noise from the main line and LMD. An overheating risk assessment should therefore be required to determine if closed windows provides an acceptable living environment. For information some appeal decisions relating to windows being closed:

- Appeal Ref: APP/Q3820/W/18/3202034 Land north of Tilgate Forest Business Centre, Brighton road, Tilgate, Crawley RH11 9PT*
- Appeal Ref: APP/U4230/W/19/3221051 Apartments in Lexington Court, Hudson Court and Madison Court, 56, 54, 52 Broadway Salford, Greater Manchester, M50 2UG*
- Appeal Ref: APP/U4230/W/19/3221051 Apartments in Lexington Court, Hudson Court and Madison Court, 56, 54, 52 Broadway Salford, Greater Manchester, M50 2UG*
- Appeal Ref: APP/J0540/W/18/3215519 Cranmore House, Thorney Road, Eye, PE6 7U*

Reply 6

The recommendations contained in our report are to allow for background ventilation to be achievable while providing a reasonable internal noise level. We do not state that windows must be unopenable, but that the necessary rates of ventilation must be achieved with windows closed.

Where purge ventilation is required on occasion to aid removal of high concentrations of pollutants such as smoke from burnt food or odours from painting and decorating, it may be necessary to open windows. It is expected that this would only be required occasionally in exceptional circumstances and would be under the occupants' control.

An acoustics report is not reasonably expected to include an overheating risk assessment. We understand that this will be provided by the appropriate professional.

APPENDIX A – 15 MINUTE BACKGROUND REPORT

Type	Start	Duration	L 90.0 % [dB]
15'	15/04/2019 15:30	0:02:00.7	53
15'	15/04/2019 15:45	0:14:48.8	52.3
15'	15/04/2019 16:00	0:14:45.8	51.9
15'	15/04/2019 16:15	0:14:50.2	52
15'	15/04/2019 16:30	0:09:56.3	51.6
15'	15/04/2019 16:45	0:00:00	
15'	15/04/2019 17:00	0:00:00	
15'	15/04/2019 17:15	0:00:00	
15'	15/04/2019 17:30	0:00:00	
15'	15/04/2019 17:45	0:00:00	
15'	15/04/2019 18:00	0:00:00	
15'	15/04/2019 18:15	0:00:00	
15'	15/04/2019 18:30	0:00:00	
15'	15/04/2019 18:45	0:04:47.6	52.5
15'	15/04/2019 19:00	0:14:46.4	51.7
15'	15/04/2019 19:15	0:13:53.1	51.4
15'	15/04/2019 19:30	0:14:42.8	52.1
15'	15/04/2019 19:45	0:14:35	52.5
15'	15/04/2019 20:00	0:14:19.3	53
15'	15/04/2019 20:15	0:14:13.2	51.5
15'	15/04/2019 20:30	0:14:51.1	53
15'	15/04/2019 20:45	0:00:00	
15'	15/04/2019 21:00	0:00:00	
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15'	15/04/2019 21:30	0:00:00	
15'	15/04/2019 21:45	0:00:00	
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15'	15/04/2019 22:15	0:00:00	
15'	15/04/2019 22:30	0:00:00	
15'	15/04/2019 22:45	0:00:00	
15'	15/04/2019 23:00	0:00:00	
15'	15/04/2019 23:15	0:00:00	
15'	15/04/2019 23:30	0:00:00	
15'	15/04/2019 23:45	0:00:00	
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15'	16/04/2019 01:00	0:00:00	
15'	16/04/2019 01:15	0:00:00	
15'	16/04/2019 01:30	0:00:00	
15'	16/04/2019 01:45	0:00:00	
15'	16/04/2019 02:00	0:00:00	
15'	16/04/2019 02:15	0:00:00	
15'	16/04/2019 02:30	0:00:00	

15'	16/04/2019 02:45	0:00:00	
15'	16/04/2019 03:00	0:00:00	
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15'	17/04/2019 05:45	0:00:00	
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15'	17/04/2019 06:15	0:00:35.1	47.5
15'	17/04/2019 06:30	0:14:43.9	48.4
15'	17/04/2019 06:45	0:14:50.5	49.5
15'	17/04/2019 07:00	0:14:27.5	47.7
15'	17/04/2019 07:15	0:14:36.2	46.8
15'	17/04/2019 07:30	0:14:47.5	47.7
15'	17/04/2019 07:45	0:14:47.3	47.7
15'	17/04/2019 08:00	0:14:33	47.8
15'	17/04/2019 08:15	0:14:45.6	47.3
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15'	17/04/2019 08:45	0:14:16.8	48.6
15'	17/04/2019 09:00	0:14:16.9	49.1
15'	17/04/2019 09:15	0:14:02.6	46.5
15'	17/04/2019 09:30	0:14:29	45.9
15'	17/04/2019 09:45	0:14:43.6	45.2
15'	17/04/2019 10:00	0:14:46.4	45
15'	17/04/2019 10:15	0:14:31.4	44.7
15'	17/04/2019 10:30	0:14:42.6	47.1
15'	17/04/2019 10:45	0:14:44.2	46.5
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15'	17/04/2019 11:15	0:14:49.7	45.4
15'	17/04/2019 11:30	0:14:45.3	44.8
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15'	17/04/2019 12:15	0:14:37	44.7
15'	17/04/2019 12:30	0:14:23.5	44.3
15'	17/04/2019 12:45	0:14:50.9	46.2
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15'	17/04/2019 13:15	0:13:57.5	45.3
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15'	17/04/2019 14:15	0:14:39.8	46.7
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15'	20/04/2019 08:00	0:14:38	50.6
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Report Status

Revision	Date	Prepared by	Checked by
-	26/10/2020	Mat Tuora MIOA	Adrian James FIOA

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