Response to the Examining Authority's Written Questions and Request for Information ExQ1 Question 1.8.18 regarding the Applicant's methodology for noise assessment in the proposed Hinckley National Rail Freight Interchange.

Deadline for receipt of Responses: Tuesday 9th January 2024

Unique Reference Number: 20040614

Introduction

On the 10th October 2023, I submitted a Written Representation to the Examining Authority regarding the Environmental Statement submitted by Tritax Symmetry (Hinckley) Ltd in respect of their proposed Hinckley National Rail Freight Interchange and with particular reference to Chapter 10: Noise and vibration.

My Written Representation was a technically-based document that identified and discussed several serious failures and shortcomings in Tritax's Noise and vibration report. It ran to 38 pages and comprised 12 main Sections.

On the 1st and 2nd November 2023, I attended both the Issue Specific Hearing 3 and the Open Floor Hearing 2, and at the latter I presented an Oral Submission as an Interested Party. This was necessarily very condensed at only 3 minutes long, but outlined just one of the numerous methodological shortcomings of Tritax's Noise and vibration report. I explained that this, in itself, would likely require a new Noise and vibration report.

On the 14th November 2023, I further submitted to the Examining Authority my Comments on the Responses by Tritax Symmetry (Hinckley) Ltd to my Written Representation. In those Comments, which extended to 26 pages, I passed through those same 12 Sections in order, summarising what I said in my Written Representation, and providing additional detail where appropriate to reflect any (exceedingly sparse) response from Tritax, and to update on more recent events.

On the 28th November 2023, the Examining Authority issued Written Questions and Request for Information ExQ1, in which Question 1.8.18 was directed to Dr David Moore and William Moore as follows:

"Tabular Comparison for Noise Effects

It is stated that there are a number of deficiencies in the applicant's methodology for noise assessments and corrections to dB levels are suggested accordingly. Could Dr David Moore and Mr William Moore provide a tabular comparison of the overall effects in terms of noise at NSRs between the Applicant's stated levels of effect and those predicated using suggested revised methodologies."

I here make my Response to the Examining Authority's ExQ1 Question 1.8.18.

For reasons of brevity, I have in this Response used “Tritax” to refer to both the contents of the Applicant’s Environmental Statement and to their other Submissions.

Dr David Moore

MA (Cantab) PhD

David Moore is a Chartered Engineer, and a Fellow of the Institution of Mechanical Engineers. He has some 25 years experience in Industrial Design Consultancy. Clients have included 3M, Procter & Gamble, GSK, London Underground, Johnson & Johnson, Ricardo, Monsanto, DePuy, AstraZeneca, BAE Systems, Unilever, Reckitt, Sanofi and Alstom. Now retired, his technical interests include Mechanical Design, Mathematical Modelling, Computational Fluid Dynamics and Digital Signal Processing.

Overview

Stretching back to my Consultation Response of the 7th April 2022 to Tritax in respect of their PEIR Documents, I have at every opportunity advised, with I believe convincing arguments, that critical formative sections of Tritax's Noise and vibration report contain fundamental and significant methodological errors. The effects of such failures progressively accumulate within the report until you reach a point where the conditions that the report is considering, and later goes on to investigate in yet further increasing levels of detail, become fundamentally wrong. This has the effect of washing away all of the latter part of Tritax's Noise and vibration report and its results. And all of those errors would favour the Proposed Development.

Despite all of this, we are now, at the time of writing, just two months away from the end of the Statutory Examination Period, yet Tritax's Noise and vibration report still stands unchanged.

It is against this backdrop that the Examining Authority now request that I should provide a tabular comparison of the overall effects of deficiencies in Tritax's methodology for noise assessments.

Well, given the circumstances, I will do what I can.

The Centrepiece of the Noise and vibration report for the HNRFI must surely be the Table where the Baseline Conditions at the NSRs are compared with the Proposed Additional Noise Sources at those same NSRs. In that Table the two halves are brought together to form the basis for the comparison. Their juxtaposing also allows Rating penalties to be applied to the Additional Noise Sources to reflect their intrusiveness, as gauged from their excess over the Baseline Conditions, and considering too their impulsivity, tonality, and intermittency.

Now, in Tritax's Noise and vibration report there are four such Tables, each of which is based upon Tritax's different assumptions with regard to Baseline Conditions (either Background or Ambient) and the Additional Noise Sources (either Unmitigated or Mitigated). In all of their four Tables, Tritax consider only one Additional Noise Source (which they misleadingly term the "Completed Development Noise").

Taking first the Baseline Conditions, although in theory it is possible to compare Tritax's various Tables by simply scrolling up and down their Noise and vibration pdf document, in practice it is extremely difficult to build up a picture of their differing Baseline Conditions. Further, there are serious errors and omissions that I have identified but which Tritax have done nothing to correct. So a simple Table that directly compares all of these Baseline Conditions and corrects lingering errors would be very useful here. This is considered further in Section 1 below, and appropriate Tables are presented.

Regarding the Additional Noise Sources too, it would again clearly be an advantage to have a simple Table showing, for example, the Unmitigated and the Mitigated conditions for direct comparison. However, the situation with these various Additional Noise Sources is very different from the Baseline Conditions.

In terms of ***structure***, I have indicated in Section 6 of both my Written Representation and my Comments Document that Tritax should Accumulate together all of the Additional Noise Sources (these being variously their "Completed Development Noise", the Off-Site Train Noise, the Off-Site

Road Noise, the Gantry Crane Noise and the Construction Noise etc.) ***before*** making the comparison with the Baseline Conditions and then going on to establish Rating penalties for the Accumulated Additional Noise Sources. This Accumulation can be very easily be done by simple Logarithmic Summation of the contributions of the Additional Noise Sources at the individual NSRs.

However, the deeper issue is that few, if any, of those Additional Noise Sources appear to have been resolved to the level where their contributions at the individual NSRs is known. For this reason it is very difficult for me to go forward and derive a complementary second Table in the way that the Examining Authority have requested.

For example, in Section 4 of both my Written Representation and my Comments Document, I indicated that the Tritax's "Completed Development Model" should not be set to G=0.5 (50% acoustically absorptive ground) as Tritax have done, but instead should be set to G=0.0. However, Tritax have made no response to this, and without access to Tritax's CadnaA model I have no way of applying the effect this would have upon their "Completed Development Noise" at the individual NSRs.

For the Off-Site Road Noise, Tritax have released very little other than coarse Noise Contour maps which are quite unsuited to this present purpose.

For the Gantry Crane Noise, there is considerable ongoing dispute, and Tritax's treatment of Construction Noise is both rudimentary and obviously wrong.

However, on the positive side there is one Additional Noise Source for which I am well able to make a contribution, and that is Off-Site Train Noise. I have previously discussed this in Section 7 and Section 8 of both my Written Representation and my Comments Document, and have been doing some further work on it since then.

So in the following Section 2 of this document, I have included a further discussion of Off-Site Train Noise and have generated some additional data for use in the subsequent Section 3.

In Section 3, I then go on to develop a Table that Accumulates together just two of the Additional Noise Sources, these being Tritax's "Completed Development Noise" in its present (un-amended) form, and the Off-Site Train Noise derived in Section 2. Obviously, contributions from amended and other Additional Noise Sources can be included as they become available.

1. Baseline Conditions

Table 1 shows Baseline Conditions in three Columns and is largely self-explanatory.

Column 1 shows the Background Noise levels at the NSRs, and is taken directly from Tritax's Tables 10.39 to 10.42.

Column 3 shows Tritax's Unattenuated Ambient Noise levels at the NSRs, and is taken directly from their Tables 10.43 and 10.44. These are essentially the same as the Ambient Noise levels measured at the Noise Monitoring Positions and shown in Tritax's Table 10.22 and 10.23. Tritax's values of 50.1dB shown in red for the Weekend night-time are wrong and I have replaced them by corrected values of 44.0dB. This is explained in more detail in Section 2.

Column 2 shows the Attenuated Ambient Noise levels at the NSRs. The necessary Attenuation calculations were performed in an Excel Spreadsheet and follow the example I included in Section 1 of my Comments Document.

All of the NSRs I have shown relate to NMP4, with the exception of NSR19 which is on Burbage Common and relates to NMP3. I have tried to include this NSR19 because of its obvious importance, but because Tritax have not provided any night-time noise measurements for NSR19 I have been unable to complete those parts of the Table.

Finally, as I described in Section 1 of both my Written Representation and my Comments Document, Tritax have not indicated the distance of any of their Noise Monitoring Positions from the rail track or road and that there is strong evidence that NMP3 and NMP4 were placed too close to the rail track. The result of this is that the values in Column 3 (and only Column 3) are very likely to be 3.2db too high, as I have indicated in the Table. I decided not to introduce a fourth Column just to show that! This is discussed further in Section 2.

With reference to Table 1, it is easy to see that, by using Unattenuated Ambient levels rather than Background levels, Tritax gain an immediate advantage for themselves of approximately 20.2dB. This 20.2dB will be substantially increased by the effect of Rating penalties to give Tritax an overall gain of perhaps 25dB or 30dB. For Tritax, this makes the impossible possible, and it is happening in plain sight!

With reference to Table 1, it is also easy to see that, by using Attenuated Ambient levels rather than Background levels, Tritax gain only a much smaller advantage for themselves of around 4.2dB.

In my Oral Submission, I described the effect of using Attenuated Ambient levels rather than Unattenuated Ambient levels, which from the above will obviously have an effect of approximately 20.2dB – 4.2dB = 16dB plus Rating penalties.

Background levels are almost universally used.

Please see Section 1 and Section 5 of both my Written Representation and my Comments Document for further information.

		Column 1				Column 2				Column 3				
		Background Noise at NSRs Tritax's Tables 10.39 to 10.42 dB				Attenuated Ambient Noise at NSRs dB				Unattenuated Ambient Noise at NMPs and NSRs Tritax's Tables 10.43 and 10.44 dB				
NSR	Distance from NMP in metres	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekend Night-time
1	200	39	38	41	37	45.7	43.6	44.8	44.0	59.2	56.2	53.7	44.0	50.1
2	430	39	38	41	37	43.3	41.8	44.2	44.0	59.2	56.2	53.7	44.0	50.1
3	460	39	38	41	37	43.1	41.7	44.2	44.0	59.2	56.2	53.7	44.0	50.1
4	415	39	38	41	37	43.4	41.9	44.2	44.0	59.2	56.2	53.7	44.0	50.1
5	370	39	38	41	37	43.6	42.1	44.3	44.0	59.2	56.2	53.7	44.0	50.1
6	366	39	38	41	37	43.7	42.1	44.3	44.0	59.2	56.2	53.7	44.0	50.1
7	275	39	38	41	37	44.5	42.7	44.5	44.0	59.2	56.2	53.7	44.0	50.1
8	341	39	38	41	37	43.9	42.2	44.4	44.0	59.2	56.2	53.7	44.0	50.1
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18														
19	87	36	-	38	-	47.4	-	43.9	-	57.4	-	51.8	-	-
20														
21														
22														
23														
24	80	39	38	41	37	49.8	47.2	46.6	44.0	59.2	56.2	53.7	44.0	50.1
25	234	39	38	41	37	45.1	43.2	44.7	44.0	59.2	56.2	53.7	44.0	50.1
26	157	39	38	41	37	46.7	44.4	45.2	44.0	59.2	56.2	53.7	44.0	50.1

The values in Column 3 (and only Column 3) are likely to be 3.2dB too high because NMP3 and NMP4 were placed too close to the rail track.
The values in Column 3 of 44.0dB are not affected.

Table 1. Baseline Conditions

Finally here, after all of this discussion of Background versus Ambient, and Attenuated versus Unattenuated, I would like to present an additional Table which indicates the Background and Ambient Noise levels ***ruling at the NSRs over all of the time that no trains are passing by.***

This actually constitutes over 96% of the total time. And this brings into focus that all of the issues we have been discussing above apply only to the remaining 4%.

During this 96% of the total time, the Attenuated Ambient Noise and Tritax's Unattenuated Ambient Noise inevitably become the same, simply because there are no Train Pass Bys to attenuate.

The Ambient Noise levels will therefore be very different from those shown in Table 1, and are indicated in Table 1a below.

These are ***without question*** the noise levels presently ruling at the NSRs for 96% or more of the time. And it is against these values that the Accumulated Additional Noise Sources caused by the Proposed Development will inevitably be judged, both by the residents at the NSRs, and by visitors to Burbage Common and the surrounding amenity areas.

Should this Proposed Development be approved on the basis of the very different Baseline Criteria advocated by Tritax, the ramifications for those residents and for recreational visitors to Burbage Common and its surroundings are not difficult to predict, and will not be long in coming.

		Column 1				Column 2				Column 3			
		Background Noise at NSRs Tritax's Tables 10.39 to 10.42 dB				Attenuated Ambient Noise at NSRs when no train passing by dB				Unattenuated Ambient Noise at NMPs and NSRs when no train passing by dB			
NSR	Distance from NMP in metres	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time
1	200	39	38	41	37	42	41	44	44	42	41	44	44
2	430	39	38	41	37	42	41	44	44	42	41	44	44
3	460	39	38	41	37	42	41	44	44	42	41	44	44
4	415	39	38	41	37	42	41	44	44	42	41	44	44
5	370	39	38	41	37	42	41	44	44	42	41	44	44
6	366	39	38	41	37	42	41	44	44	42	41	44	44
7	275	39	38	41	37	42	41	44	44	42	41	44	44
8	341	39	38	41	37	42	41	44	44	42	41	44	44
9													
10													
11													
12													
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16													
17													
18													
19	87	36	-	38	-	39	-	41	-	39	-	41	-
20													
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23													
24	80	39	38	41	37	42	41	44	44	42	41	44	44
25	234	39	38	41	37	42	41	44	44	42	41	44	44
26	157	39	38	41	37	42	41	44	44	42	41	44	44

Table 1a Baseline Conditions when No Trains are Passing By (i.e. 96% of the time!)

2. Off-Site Train Noise

In Sections 7 and 8 of both my Written Representation and my Comments Document, I demonstrated with reference to Real Time Trains data that Tritax had wildly overstated the number of existing Freight Train movements, and also greatly underestimated the Off-Site Train Noise that would be caused by the Proposed Development.

I also demonstrated, again with reference to Real Time Trains data that, contrary to Tritax's belief, it was entirely typical that no trains, neither Passenger nor Freight, ran on Saturday nights.

With reference to Column 3 in my Table 1, the Ambient Noise levels shown in red of 51.1dB that Tritax have indicated in their Noise and vibration report in Table 10.44 actually relates to data they measured at NMP4 on the night of Sunday the 25th April, on the grounds that the data they measured on the night of Saturday the 24th April was "not considered typical" because there were no trains over that night-time period.

Subsequently, I have gathered additional Real Time Trains data, especially with regard to Weekends and to the night-time periods. This has provided a very robust justification for the reinstatement of the data that Tritax gathered at Noise Monitoring Position NMP4 on Saturday the 24th April but then wrongly rejected as not being typical. The data for NMP4 on Saturday the 24th April has been recovered from Tritax's Technical Appendix 10.10 "Summary Results" [APP-184]. Because there are no trains running over the whole of the night-time period, the Attenuated and the Unattenuated Ambient Noise levels are of course the same, and are easy to establish from the "Summary Results" as 44dB.

Restoring this data also serves to demonstrate that the NSRs, and indeed all those residents in both directions along those several kilometres of line, enjoy undisturbed Saturday nights.

Using the additional Real Time Trains data, which I gathered during the months of September and early December 2023, I have further investigated the effects of the Additional Train Movements caused by Tritax's Proposed Development.

Table 2 shows the Off-Site Train Noise as a dB Increase in a similar manner to Tritax's own Table 10.50. However, Table 2 is not confined to just the Weekday period, but indicates the dB Increase over both the Weekday and Weekend periods, and covers both daytimes and night-times.

Please note that, in preparing Table 2, it has been necessary to aggregate the Train movements over both the Saturday and the Sunday night-times in order to ***limit*** the Weekend dB Increase values. The present situation is that there are no trains running on Saturday night-times, which means that the dB Increase, if calculated from Saturday night-times as the worst-case condition, would be Infinity!

	Off-Site Train Noise Increase dB
Weekday Daytime	4.6
Weekday Night-time	5.5
Weekend Daytime	6.9
Weekend Night-time	10.9

Table 2. Off-Site Train Noise dB Increase

Although it is interesting to compare the dB Increase values shown above in Table 2 with Tritax's results from their Table 10.50, which are much lower, it is actually of limited real use to us because it is not possible to relate that dB Increase directly to the resulting increase at the individual NSRs. What we have to do to accomplish this is to express the Off-Site Train Noise in terms of Ambient Noise Levels at the relevant Noise Monitoring Positions NMP3 and NMP4.

These Off-Site Train Noise levels have therefore been calculated for both the Weekdays and Weekends periods, both daytimes and night-times, and are shown in Table 3. These values are used in the following Section 3, which Accumulates the Additional Noise Sources.

	Off-Site Train Noise at Noise Monitoring Positions dB
Weekday Daytime	64.1
Weekday Night-time	64.0
Weekend Daytime	63.5
Weekend Night-time	63.4

Table 3. Off-Site Train Noise at Noise Monitoring Positions

For the avoidance of doubt, Tritax's Table 10.50 shows data for a Notional Receptor and cannot directly be compared with Table 3 above.

The above calculations have all been performed in accordance with the "Calculation of Railway Noise" (CRN), published by the Department of Transport in 1995. The results I have obtained using CRN show very close agreement with the measured results obtained from Tritax's Noise Monitoring Positions NMP3 and NMP4, provided that due correction is made for NMP3 and NMP4 having been placed too close to the track (as I have previously indicated in Section 1 of both my Written Representation and my Comments Document).

This is testament to the accuracy of the CRN procedures.

3. Accumulated Additional Noise Sources

Table 4 shows, in four Columns, the Ambient Noise levels at the NSRs caused by the Accumulated Additional Noise Sources.

As discussed in the Overview, these represent the Accumulated Additional Noise of just two of the Additional Noise Sources that will be caused by the Proposed Development. These are Tritax's "Completed Development Noise" and the Train Noise derived in Section 2.

Columns 1 and 2 show the Unmitigated and the Mitigated "Completed Development Noise" respectively. In each case these are Accumulated with the Attenuated Train Noise.

Columns 3 and 4 also show the Unmitigated and the Mitigated "Completed Development Noise". In each case these are Accumulated with the Unattenuated Train Noise.

You may remember that in Tritax's Noise and vibration report, the effect of the Additional Train Noise was dismissed in their Section 10.212 as being negligible. But Table 4 shows that this is by no means the case.

With reference to Table 4, by directly comparing between Column 1 and Column 2, it is possible to see that the effect of Tritax's Mitigation measures upon the Ambient Noise levels experienced at the NSRs has been generally reduced to between 1.0dB and 5.5dB, depending upon the individual NSR concerned.

And by comparing Column 1 and Column 2 with the Tritax's own "Completed Development Noise" levels in their Noise and vibration report, it is also possible to see that the Additional Train Noise has increased the Ambient Noise levels at the NSRs by between 0.5dB and 7.7dB.

Similarly, by directly comparing between Column 3 and Column 4, it is possible to see that the effect of Tritax's Mitigation measures upon the Ambient Noise levels experienced at the NSRs has been very greatly diminished to between 0.0dB and 0.8dB.

And by comparing Column 3 and Column 4 with the Tritax's own "Completed Development Noise" levels, it becomes evident that the Additional Train Noise has greatly increased Ambient Noise levels at the NSRs by between 7.3dB and 23.0dB.

Clearly, these latter values in particular are not insignificant.

The Ambient Noise levels in Table 4 show the combined effects of only two of the Additional Noise Sources that would be caused by the Proposed Development. The further Additional Noise Sources of the Off-Site Road Noise, Gantry Crane Noise and Construction Noise etc, can easily be Accumulated into the Noise Model as they are established and will obviously increase the Ambient Noise levels at the NSRs further.

Given the circumstances, I have tried my best to provide the tabular information shown, which I hope is what you had in mind. Please see below for my final Table 4.

I would be quite willing to provide additional information and guidance on these calculations if required.

David Moore

Accumulated Additional Noise Sources , comprising the "Completed Development Noise" **plus** Train Noise - showing the Impact at the NSRs

		Column 1				Column 2				Column 3				Column 4			
		"Completed Development Noise" **without** Mitigation **plus** Attenuated Train Noise dB				"Completed Development Noise" **with** Mitigation **plus** Attenuated Train Noise dB				"Completed Development Noise" **without** Mitigation **plus** Unattenuated Train Noise dB				"Completed Development Noise" **with** Mitigation **plus** Unattenuated Train Noise dB			
NSR	Distance from NMP in metres	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time	Weekday Daytime	Weekday Night-time	Weekend Daytime	Weekend Night-time
1	200	51.6	53.5	51.4	53.3	50.6	50.6	50.3	50.3	64.2	64.2	63.6	63.7	64.1	64.1	63.6	63.5
2	430	50.7	51.5	50.6	51.5	48.3	46.2	48.1	46.0	64.2	64.2	63.7	63.6	64.1	64.0	63.6	63.4
3	460	48.9	48.9	48.8	48.8	46.0	44.3	45.8	44.0	64.2	64.1	63.6	63.5	64.1	64.0	63.5	63.4
4	415	50.7	50.7	50.6	50.6	47.6	45.8	47.5	45.5	64.2	64.1	63.7	63.6	64.1	64.0	63.5	63.4
5	370	50.1	50.9	50.0	50.8	47.3	46.2	47.1	45.9	64.2	64.1	63.6	63.6	64.1	64.0	63.5	63.4
6	366	50.1	50.9	50.0	50.8	47.4	46.3	47.1	46.0	64.2	64.1	63.6	63.6	64.1	64.0	63.5	63.4
7	275	52.2	51.4	52.0	51.2	49.5	47.6	49.2	47.2	64.3	64.1	63.7	63.6	64.1	64.0	63.6	63.4
8	341	50.2	49.5	50.1	49.3	47.6	46.2	47.4	45.8	64.2	64.1	63.6	63.5	64.1	64.0	63.5	63.4
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19	87	55.1	53.4	54.7	52.8	55.1	53.4	54.7	52.8	64.2	64.0	63.7	63.4	64.2	64.0	63.7	63.4
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24	80	58.8	58.7	58.6	58.5	55.4	54.7	55.0	54.2	64.8	64.8	64.4	64.3	64.2	64.1	63.7	63.5
25	234	53.2	51.1	53.1	50.9	50.0	48.4	49.8	48.0	64.3	64.1	63.8	63.5	64.1	64.0	63.6	63.4
26	157	52.4	52.4	52.1	52.1	51.0	50.7	50.6	50.3	64.2	64.1	63.6	63.5	64.1	64.0	63.5	63.4

These values will need to be updated when Tritax indicate the additional "Completed Development Noise" that will result from changing the Ground Absorption factor from G=0.5 to G=0.0

The night-time values for NSR19 on Burbage Common do not include "Completed Development Noise" as Tritax have not indicated their values

Table 4. Accumulated Additional Noise Sources – showing the Impact at the NSRs