Chiltern Railways (Bicester to Oxford improvements) Order 2012 and Deemed Planning Permission

Report by Brian Hemsworth (Independent Noise Assessor) on

Noise Scheme of Assessment for Route Section H

Report Reference 0221083/11/H05 dated 11th February 2015 prepared by ERM

1. Introduction

Paragraph 9 of Condition 19 of the relevant planning conditions for this scheme states:

The submitted schemes of assessment shall show how the standards of noise mitigation set out in the Policy will be achieved. Supporting calculations, or printouts of inputs and outputs from recognised computer software, shall be provided. Each scheme shall be accompanied by a report, prepared by an independent expert previously approved in writing by the local planning authority, on the robustness of the noise-related elements of the scheme of assessment. Noise mitigation measures shall be permanently installed as approved.

This report has been written in accordance with the requirement of the above in respect of the Scheme of Assessment for Route Section H.

2. General Methodology

The general methodology for train noise level predictions was made available to me via the Environmental Health Lead Officer for Oxford City Council in December 2014[1]. Since then and following my response to this and discussions between the Lead Officer and ERM staff, more details of the prediction methodology have been provided. These included information on train numbers, train speeds and train noise source terms for the existing and future rail services appropriate to Route Section H. I have used these data in my modelling to determine operational railway noise relevant to receptors in Route Section H.

On 23rd February I received, via the Lead Officer, a proposed revised Noise Scheme of Assessment (NSoA) for consideration and comment. A summary of my questions, relating to this and earlier documents, and the answers I received is attached as Appendix 1 to this Report. I accept the ERM responses and have modified my modelling accordingly to provide a comparison with the results presented in the NSoA. The modelling used by ERM is appropriate for determining operational railway noise levels from a railway.

I have also been provided with information from ERM via the Lead Officer comprising electronic copies of 56 pieces of correspondence from residents to ERM and 56 individual replies. I have, therefore, been able to consider the contents of those pieces of correspondence in the context of my review of the proposed revised NSoA.

3. Noise Mitigation Options

The Noise and Vibration Mitigation Policy[2] requires noise to be reduced at source where it is reasonably practicable to do so. Assessments by the applicant and the manufacturer of rail-tuned absorbers into the effectiveness of such treatments have indicated little or no benefit would result from their use. As a result of this and other reasons stated in the Scheme of Assessment the applicant intends that these techniques will not be used for the mitigation of airborne noise for trains operating in this or any other section of the route. Instead noise mitigation is in the form of noise barriers and, where necessary to meet the requirements of the Noise and Vibration Mitigation Policy, offers of noise

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[1] 0221083 Scheme of Assessment_Section H_Rev 3.pdf

[2] Noise and Vibration Mitigation Policy, January 2011 (Inquiry document CD/1.29/2.1)

insulation.

4. Results of Noise Modelling

The results of noise modelling are given in Appendix D of the Scheme of Assessment, Tables D4.1 (without mitigation) and D4.2 (with mitigation). The conclusions are summarised in Table 5.2 of the main body of the report.

5. Assessment of Noise Modelling

The L_{Aeq} noise levels in Tables D4.1 and D4.2 were checked using a railway noise model based on the Calculation of Railway Noise[3], with train data as presented in Section D2 of the assessment report. Relevant train speed assumptions and track/receiver distances were provided separately by ERM[4].

I have derived L_{Amax} levels from a model I developed as an excel spreadsheet which predicts the noise level time history for the passby of a Class 66 locomotive, at different speeds and at various distances to the track, for a train with a dipole noise source located at each axle position of the locomotive. I calibrated the model by comparing the noise energy derived from this model, at a distance of 25m from the track, with the reference noise level for a Class 66 locomotive given in a supplement to reference 1[5].

The results of these models show agreement with the unmitigated and barrier mitigated levels in the Scheme of Assessment and indicate agreement with the conclusions in Table 5.2..

6. Conclusions

I have considered the submitted information and have referred to relevant guidance and practice elsewhere. In my opinion the noise related elements of this Noise Scheme of Assessment are robust

[redacted]

BSc, CEng, FIOA, 13 March 2015

[3] Calculation of Railway Noise, Department of Transport 1995 (compulsory prediction model for assessing eligibility for noise insulation under Noise Insulation Railway and Other Guided Transport Systems) Regulation 1995.

[4] e-mail Deacon/Stevens 19 December 2014 (updated e-mail Deacon/Stevens – Bartholomew 23 February 2015) reproduced in Appendix 1

[5] Additional railway noise source terms for “Calculation of Railway Noise 1995” Department for Environment and Rural Affairs (Defra) January 2007

Appendix 1 Summary of questions I raised regarding earlier versions of the NSoA and the responses I received from ERM.

1. e-mail 15 December 2014, Brian Hemsworth to David Stevens (Lead Officer OCC)

   Dear David
   I have managed a first look at the ERM report you forwarded to me, In the past, to assist with my noise level prediction for the different receptors ERM have provided additional information e.g. 1. distance of each receptor from near rail of up and down tracks (plan distance), 2. height of up and down rails relative to datum 3. height of each receptor window relative to the same datum 4. chainage of receptor using same datum as track (important in locating receptor relative to ends of barrier for multi segment CRN predictions) 5. speed of centre of each train type as they pass each receptor. 6.the barrier geometry, relative to the track, is normally obtained from Table 5.1 but for this section for the barriers on the top of the cutting geometry is defined relative to the ground level and edge of rail boundary. I need barrier geometry (height and distance) relative to the head of the rail of the nearest rail. (Attached is the format ERM have used in the past)
   Could you request this information for me from ERM?
   best regards
   Brian

2. ERM response to David Stevens 19 December 2014

Note to Provide Requested Additional Information to the Independent Expert For Noise on the Noise Scheme of Assessment covering Route Section H

December 2014

Reference: 0221083/11/H04

Author: Jack LathamTechnical Reviewer: Jamie Hogg

For and on behalf ofEnvironmental Resources Management

Approved by: Bruce Davidson

Signed:Position: Partner Date: 19/12/2014

This document provides additional information requested by Brian Hemsworth on the 31st of March 2014.

Table 1.1 provides speed information for each noise sensitive receptor (NSR), *Table 1.2* provides the height of each receptor and their distance from the railway and *Figure 1.1* to *Figure 1.10* display cross-sections of the model at a number of NSR locations.

Table 1.1 ***Speed Information***

Receptor	Track	Centre of Train Speed (kph)			
		Chiltern	EWR	Freight	Stone Freight
SoA 1, Peartree Hill Farm	Up	79	89	113	41.8
	Down	113	113	113	6.4
PI 14, 110 Linkside Avenue	Up	81	90	113	43.5
	Down	113	113	113	6.4
SoA 2, 108 Linkside Avenue	Up	81	90	113	43.5
	Down	113	113	113	6.4
SoA 3, 106 Linkside Avenue	Up	81	90	113	43.5
	Down	113	113	113	6.4
SoA 4, Peartree Travelodge	Up	82	92	113	45.1
	Down	113	113	113	3.2
PI 15, 15 Lakeside	Up	86	96	113	53.1
	Down	113	113	113	6.4
SoA 5, 11 Lakeside	Up	87	97	113	53.1
	Down	113	113	113	9.7
SoA 6, 9 Lakeside	Up	87	97	113	53.1
	Down	113	113	113	9.7
PI 16, 398 Woodstock Road	Up	92	103	113	62.8
	Down	113	113	113	29
SoA 7, 8 Carey Close	Up	91	101	113	61.2
	Down	113	113	113	22.5
PI 17, 396 Woodstock Road	Up	93	104	113	64.4
	Down	113	113	113	32.2
SoA 8, 84 Five Mile Drive	Up	93	104	113	66
	Down	113	113	113	32.2
SoA 9, 1 Godstow Road	Up	97	107	113	72.4
	Down	113	113	113	32.2
SoA 10, 15 Sheriffs Drive	Up	97	108	113	72.4
	Down	113	113	113	32.2
PI 18, 7 First Turn	Up	99	111	113	78.9
	Down	113	113	113	32.2
ES 14, Wolvercote Primary School	Up	100	111	113	80.5
	Down	113	113	113	32.2
SoA 11, 4 Bladon Close	Up	100	111	113	80.5
	Down	113	113	113	32.2
PI 19, 3 Bladon Close	Up	100	112	113	80.5
	Down	113	113	113	32.2

Receptor	Track	Centre of Train Speed (kph)			
		Chiltern	EWR	Freight	Stone Freight
SoA 12, Cedar House, Bladon Close	Up	101	112	113	82.1
	Down	112	113	113	32.2
ES 15, 2nd Floor Quadrangle House, St Peter's Road	Up	101	113	113	83.7
	Down	112	113	113	32.2
SoA 13, 57 Blenheim Drive	Up	103	113	113	88.5
	Down	111	113	113	32.2
SoA 14, 55 Blenheim Drive	Up	103	113	113	88.5
	Down	111	113	113	32.2
SoA 15, 78 Ulfgar Road	Up	104	113	113	91.7
	Down	109	113	113	32.2
SoA 16, 74 Ulfgar Road	Up	105	113	113	91.7
	Down	109	113	113	32.2
SoA 17, 72 Ulfgar Road	Up	104	113	113	91.7
	Down	109	113	113	32.2

Table 1.2 *Height and Distance Information*

Receptor	Distance to Nearest Track (m)		Rail Height (m)		Receptor Window Height (m)
	Up	Down	Up	Down	
SoA 1, Peartree Hill Farm	21.5	18.1	68.9	68.9	72.4
PI 14, 110 Linkside Avenue	58.8	62.2	69.0	69.0	75.2
SoA 2, 108 Linkside Avenue	70.7	74.1	68.9	68.9	75.6
SoA 3, 106 Linkside Avenue	82.3	85.7	68.9	68.9	75.9
SoA 4, Peartree Travelodge	141.4	138.0	69.0	69.0	73.8
PI 15, 15 Lakeside	23.1	26.5	68.8	68.8	73.8
SoA 5, 11 Lakeside	53.2	56.6	68.7	68.7	75.0
SoA 6, 9 Lakeside	67.8	71.2	68.7	68.7	75.5
PI 16, 398 Woodstock Road	41.0	37.6	66.6	66.6	82.7
SoA 7, 8 Carey Close	30.3	33.7	67.3	67.3	80.2
PI 17, 396 Woodstock Road	29.9	26.5	66.1	66.1	79.8
SoA 8, 84 Five Mile Drive	33.5	36.9	65.9	65.9	79.3
SoA 9, 1 Godstow Road	29.9	26.5	65.0	65.0	79.5

Receptor	Distance to Nearest Track (m)		Rail Height (m)		Receptor Window Height (m)
	Up	Down	Up	Down	
SoA 10, 15 Sheriffs Drive	23.3	26.7	64.9	64.9	76.5
PI 18, 7 First Turn	23.8	20.4	64.5	64.5	73.0
ES 14, Wolvercote Primary School	30.3	26.9	64.5	64.5	82.0
SoA 11, 4 Bladon Close	19.0	22.4	64.4	64.4	71.2
PI 19, 3 Bladon Close	14.8	18.2	64.4	64.4	70.8
SoA 12, Cedar House, Bladon Close	11.3	14.7	64.4	64.4	70.0
ES 15, 2nd Floor Quadrangle House, St.Peter's Road	11.0	7.6	64.3	64.3	71.0
SoA 13, 57 Blenheim Drive	35.7	39.1	63.6	63.6	72.1
SoA 14, 55 Blenheim Drive	48.4	51.8	63.6	63.6	72.1
SoA 15, 78 Ulfgar Road	33.8	30.4	63.0	63.0	66.3
SoA 16, 74 Ulfgar Road	53.5	50.1	62.9	62.9	66.1
SoA 17, 72 Ulfgar Road	63.7	60.3	63.0	63.0	66.6

Figure 1.1 Cross Section at PI 15, 15 Lakeside

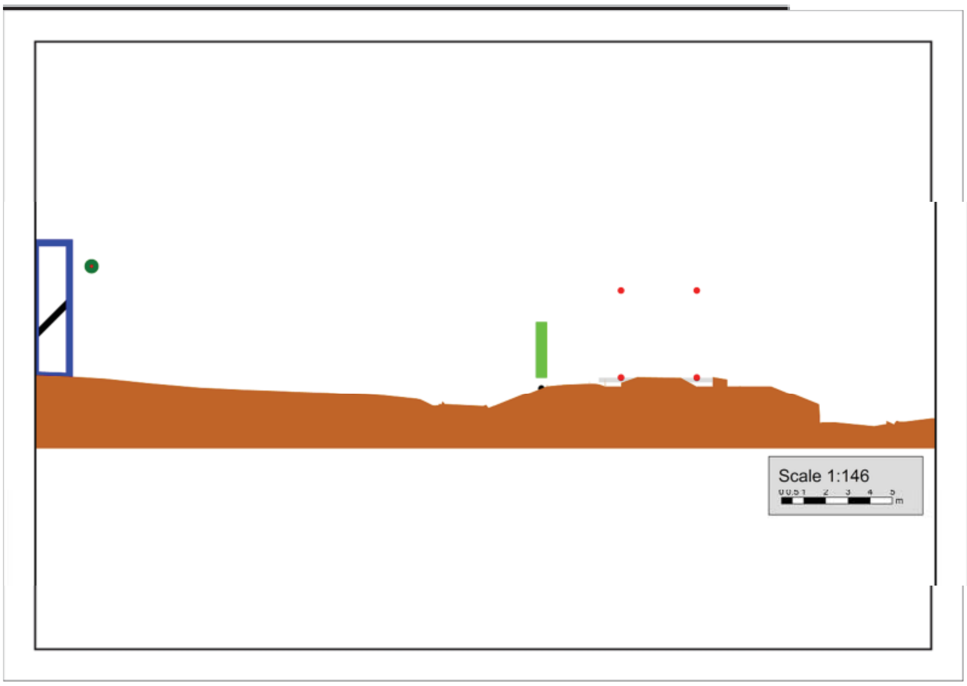


Figure 1.2 Cross Section at SoA 7, 8 Carey Close

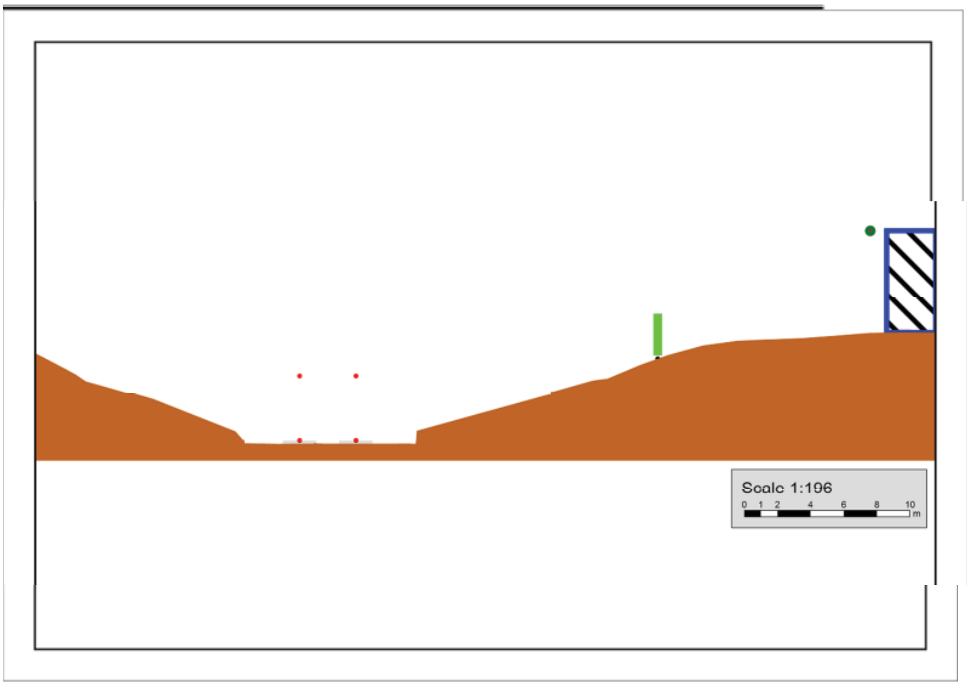


Figure 1.3 Cross Section at PI 17, 396 Woodstock Road

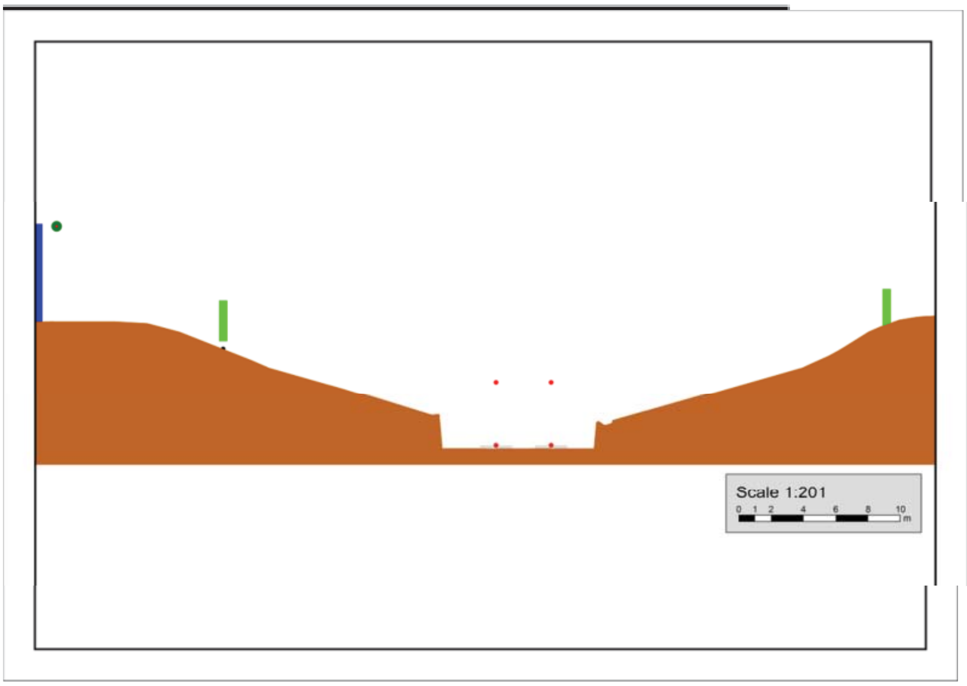


Figure 1.4 Cross Section at SoA 9, Upper Close, 1 Godstow Road

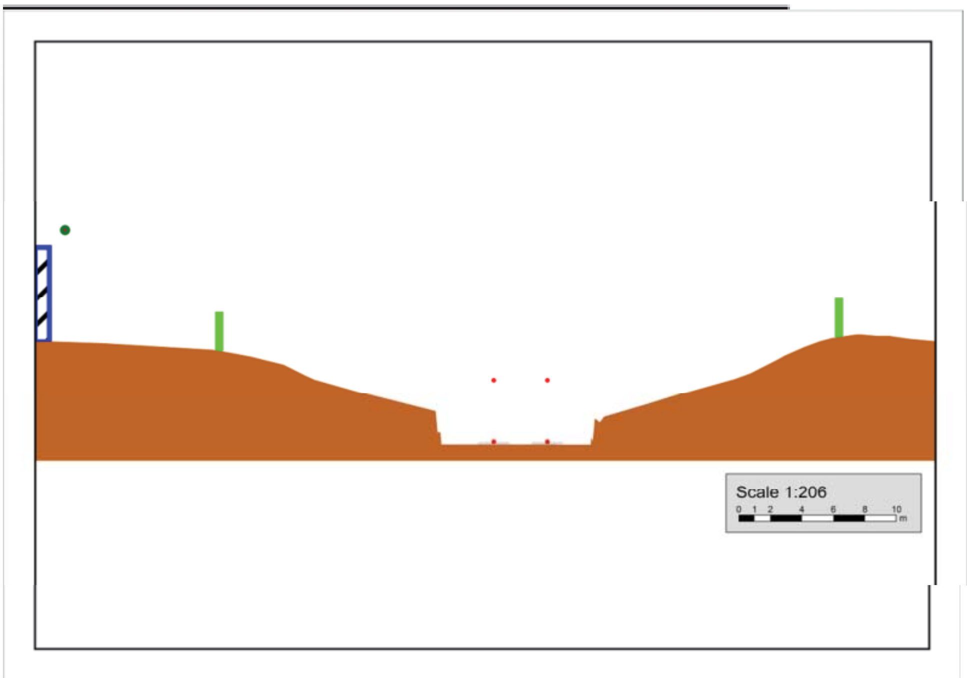


Figure 1.5 Cross Section at SoA 10, 15 Sheriffs Drive

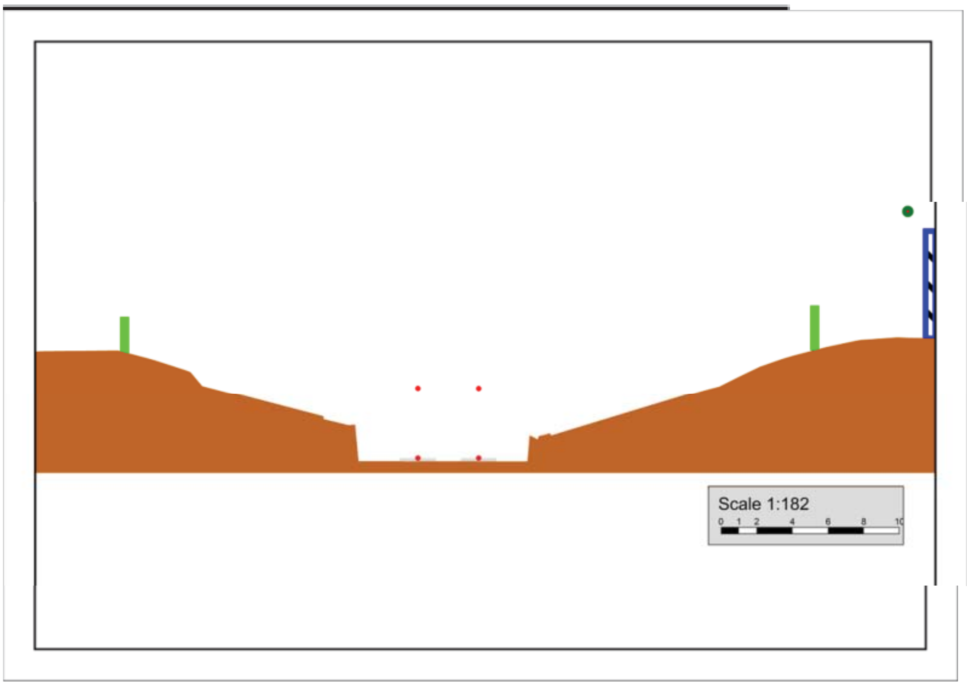


Figure 1.6 Cross Section at PI 18, 7 First Turn

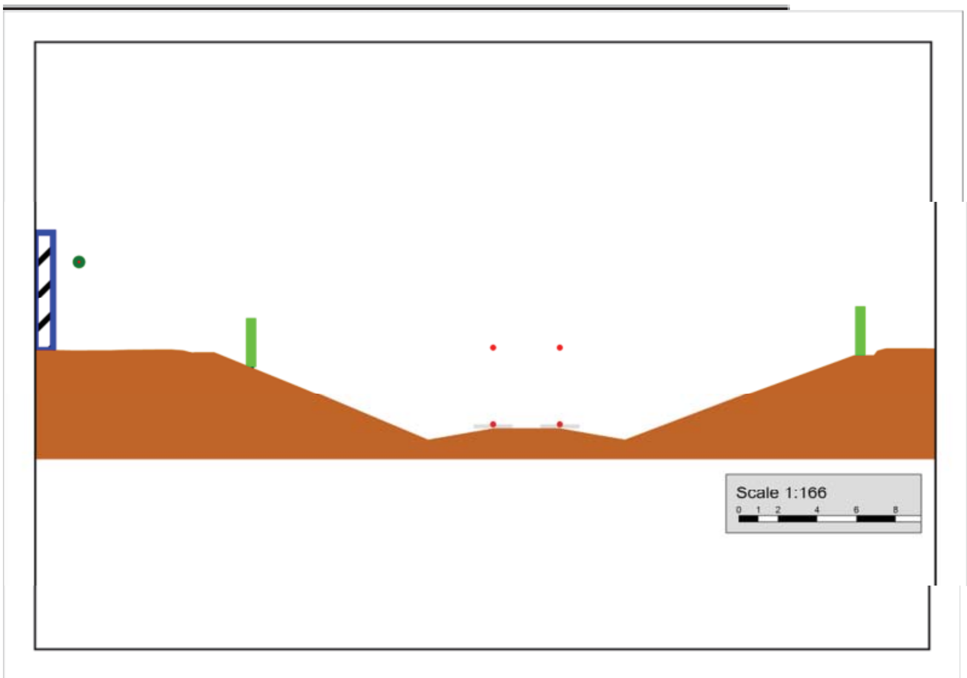


Figure 1.7 Cross Section at PI 19, 3 Bladon Close

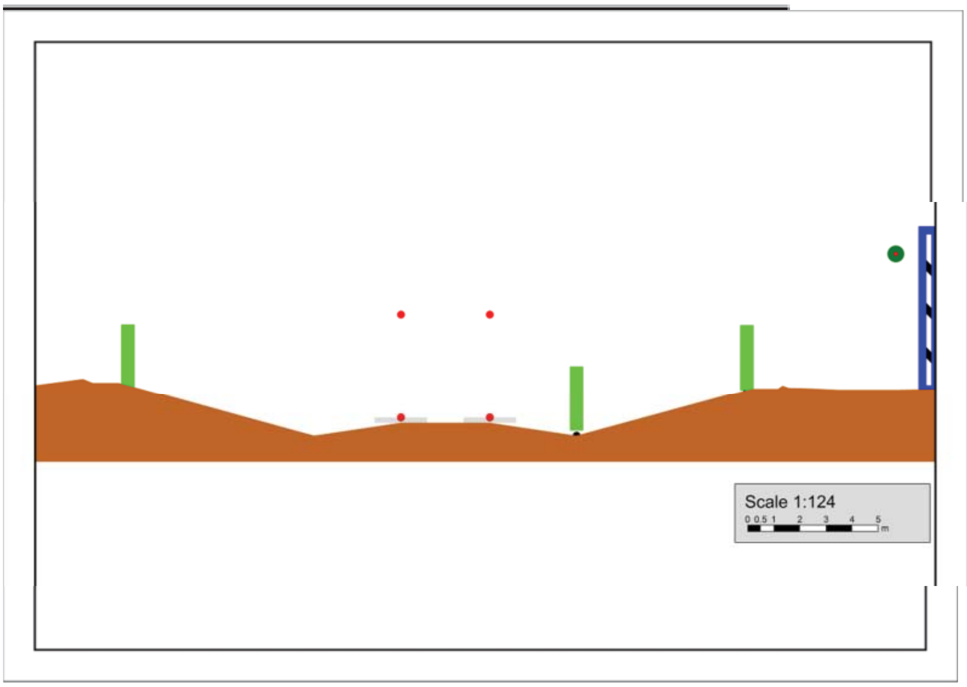


Figure 1.8 Cross Section at ES 15, Qudrangle House, St. Peters Road

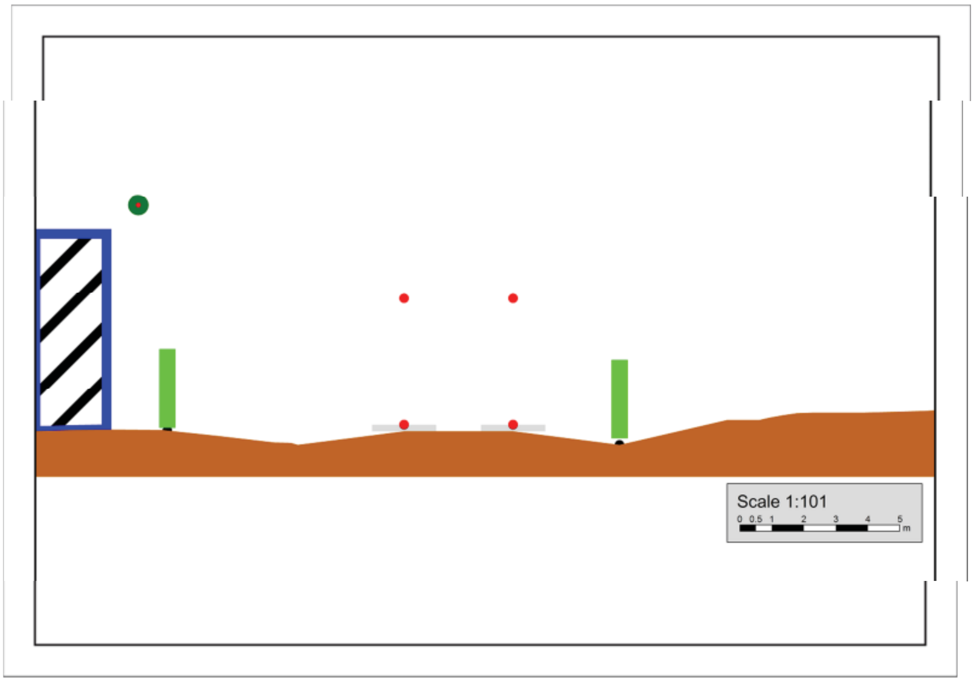


Figure 1.9 Cross Section at SoA 13, 57 Blenheim Drive

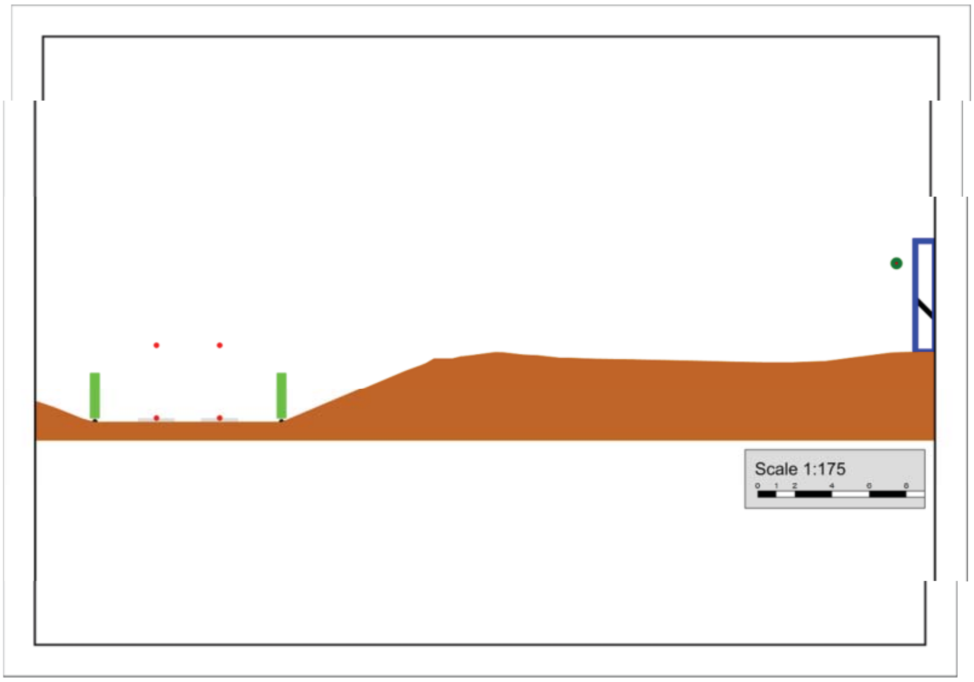
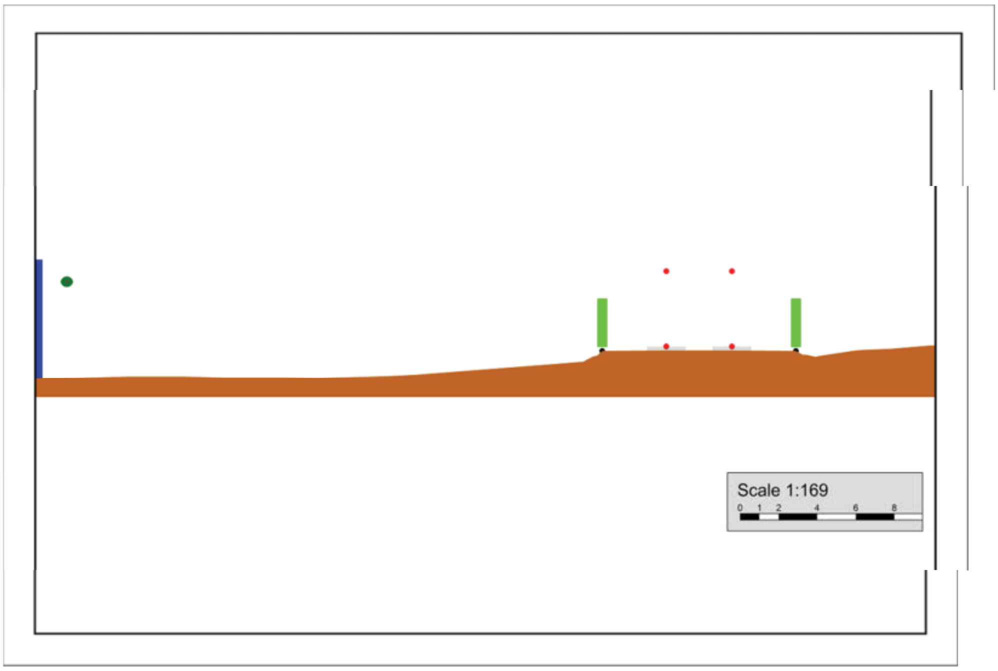


Figure 1.10 Cross Section at SoA 15, 78 Ulfgar Road



3. B Hemsworth Questions 22 January 2015, submitted to ERM via David Stevens, Oxford City Council

   Following my initial request for information on 15 Dec 2014and response received 19 Dec 2014, I have set up a spreadsheet based on CRN methodology to predict umitigated noise levels at receptors SOA1 – SOA7 in route Section H. There is agreement with the ERM data in Table D4.1 of the SOA but there are a number of differences, listed below, that need to be answered before I run the mitigated prediction model.

   1. Receptor PI14 – I predict day and night noise levels some 3 dBA higher than in SOA. Is this due to shielding by intervening property in Lakeside are there a further propagation issues that should be included?
   2. Receptors SOA2 & SOA 3 - Higher levels are predicted for day and night(+2 dBA, SOA2 and 5 dBA, SOA3). Their facades are normal to the railway line. Is this the explanation or are there other factors?
   3. Receptors SOA5 & SOA6 - See Question 2.
   4. Receptor PI16 – Higher Day and night levels are predicted (+5 dBA). Does the top of the retained cutting side act as a barrier?
   5. Receptor PI17 – see Question 4.
   6. Receptor SOA 8 - Higher Day and night levels are predicted (+8-9 dBA). Are there other propagation factors to include?
   7. Receptor SOA9 - Higher Day and night levels are predicted (4 - 5 dBA). Does the top of the retained cutting wall act as a barrier?
   8. Receptor SOA10 - Higher Day and night levels are predicted (2 -3 dBA). Does the top of the retained cutting side act as a barrier?
   9. Receptors SOA13 & SOA14 - Higher Day and night levels are predicted (4 -5 dBA). Have ERM assumed a barrier effect of the cutting shoulder?
   10. Receptors SOA15 & SOA17 - Higher Day and night levels are predicted (2 -5 dBA). Is this a result of the facades being normal to railway line and is there any shielding by other properties in Ulfgar Road?

   Brian Hemsworth 22 January 2015

4. Response to 3 from ERM 23 February 2015, submitted to B Hemsworth via David Stevens (Oxford City Council)

   Receptors for which specific noise predictions have been provided in the SoA were chosen to define the start and end points of the noise barriers. Consequently some of them do not face directly towards the railway and are located further back from the railway than the closest receptors. In these areas streets can curve away from the railway, and therefore are significantly screening or have restrictions to their views of the railway from intervening properties.

   1. NSR PI 14 is screened from the railway by intervening properties, as shown in *Figure 5.1a* from the Scheme of Assessment (SoA).

   2. The facades at NSRs SoA 2 and SoA 3 are normal to the railway and are also screened by intervening properties. SoA 3 is set further back from the railway than SoA 2 and is screened more than SoA 2 as a result. This can be seen in *Figure 5.1a* of the SoA.

   3. The facades of NSRs SoA 5 and SoA 6, similarly, are normal to the railway and screened by intervening properties, as shown in *Figure 5.1a* of the SoA.

   4. The cutting is predicted to provide screening from train noise at NSR PI 16, particularly from trains using the Down line. This can be seen in the cross section provided in *Figure 2.1* below.

   5. The cutting is predicted to provide screening from train noise at NSR PI 17, particularly from trains using the Down line. This can be seen in the cross section provided in *Figure 1.3* of the previous additional information document [(1)].

   6. Both the cutting and an intervening electricity substation (shown in *Figure 5.1b* of the SoA) are predicted to provide screening from train noise at NSR SoA 8. A cross section showing NSR SoA 8 is provided in *Figure 2.2*.

   7. The footprint of NSR SoA 9 has been updated since the draft SoA was issued (0221083/11/H03). The information provided in the additional information document [(1)] has been updated and is provided below in *Table 2.1* and *Table 2.2*. Speed information is also provided, although this has not changed. A cross section is provided in *Figure 2.3*. Unmitigated train noise levels, L_{Aeq} of 59 dB are predicted during the day and 57 dB at night. To look at the effect of the cutting as requested, predictions have been carried out replacing the cutting with flat ground. This results in predicted noise levels, L_{Aeq} of 61 dB during the day and 59 dB at night, which can be more readily compared with your predictions.

8. The cutting is predicted to provide screening from train noise at NSR SoA 10. This has been tested by replacing the cutting topography with flat ground. Using flat ground gives predicted noise levels, L_{Aeq} of 61 dB during the day and 60 dB at night, which can be more readily compared with your predictions.

9. The cutting is predicted to provide screening from train noise at NSRs SoA 13 and SoA 14. This can be seen in the cross section for NSR SoA 13 provided in *Figure 1.9* of the previous additional information document [(1)].

10. NSRs SoA 15 and SoA 17 are screened from all or part of the railway by intervening properties, as shown in *Figure 5.1c* of the SoA. The situation is similar at NSR SoA 16.

'igure 2.1 Cross Section at PI 16, 398 Woodstock Road

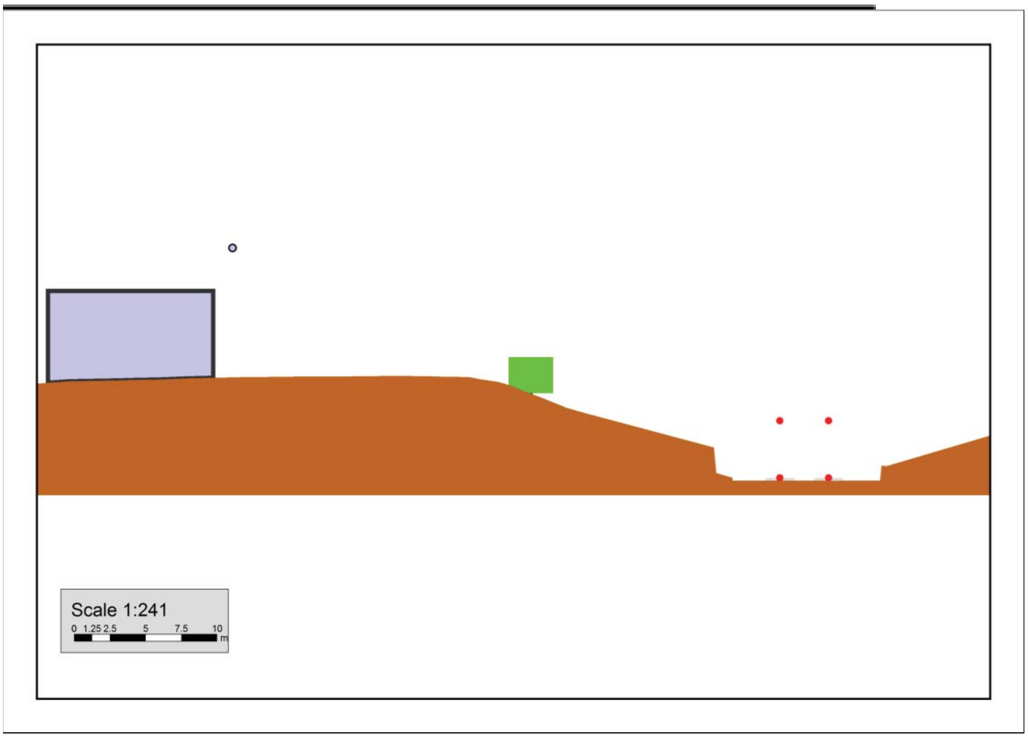


Figure 2.2 ***Cross Section at SoA 8, 84 Five Mile Drive***

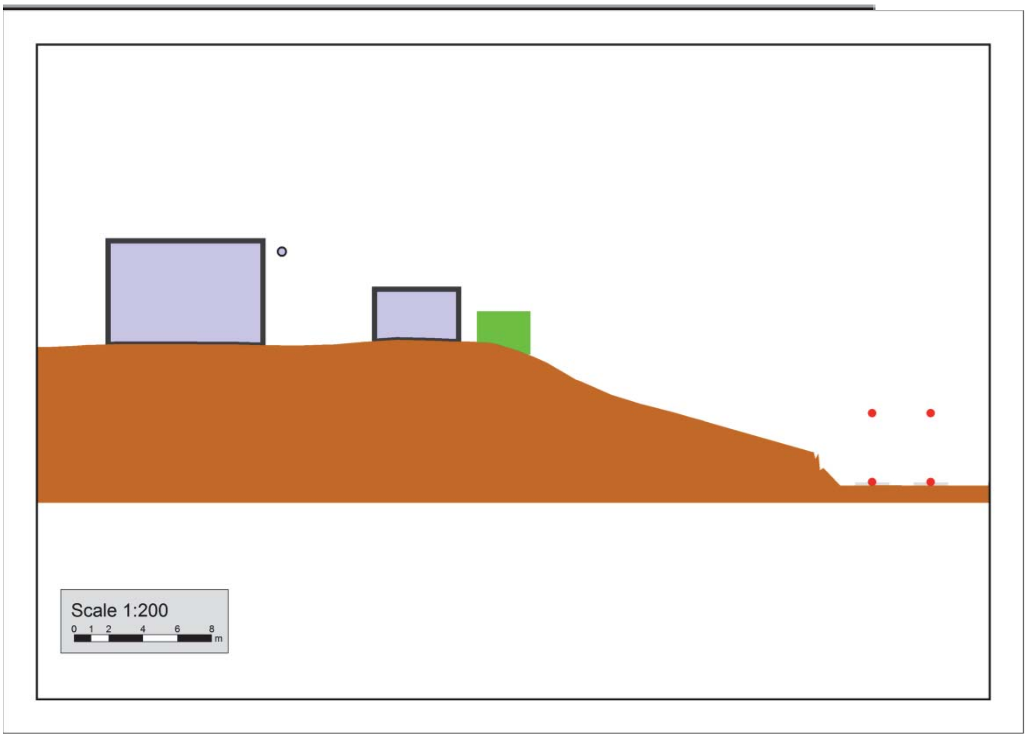


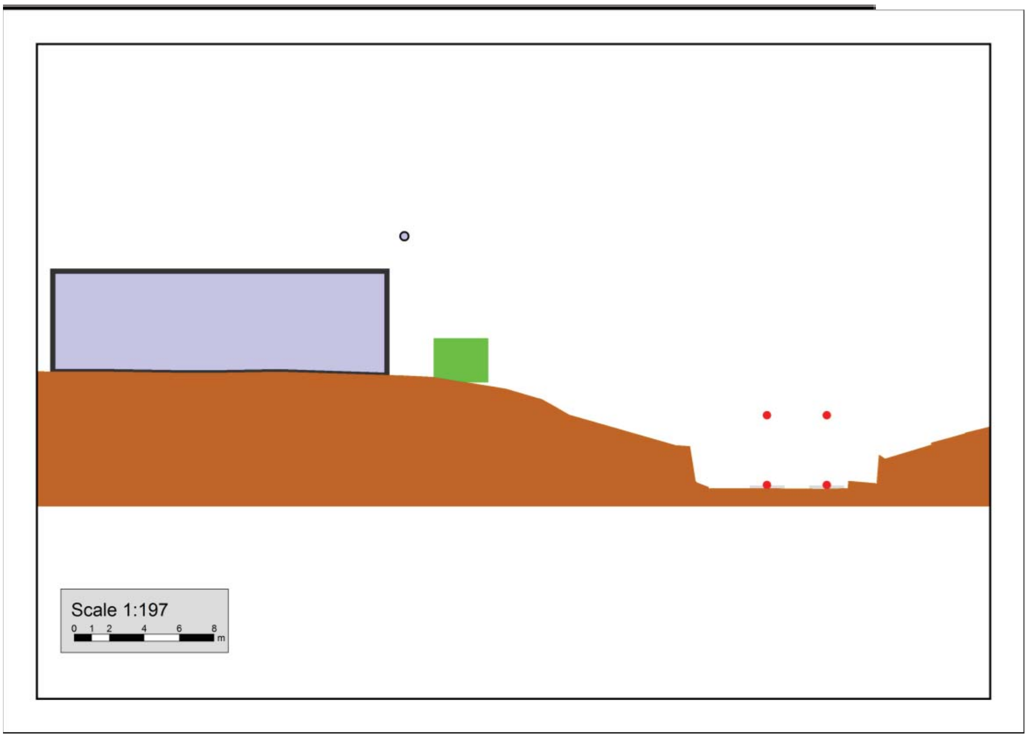
Table 2.1 ***Speed Information for NSR SoA 9, 1 Upper Close***

	Centre of Train Speed (kph)			
Track	**Chiltern**	**EWR**	**Freight**	**Stone Freight**
Up	97	107	113	72.4
Down	113	113	113	32.2

Table 2.2 ***Height and Distance Information for NSR SoA 9, 1 Upper Close***

Distance to Nearest Track (m)		Rail Height (m)		Receptor window height(m)
Up	**Down**	**Up**	**Down**	
23.2	19.8	65.0	65.0	79.5

Figure 2.3 Cross Section at SoA 9, Upper Close, 1 Godstow Road



5. B Hemsworth Questions 5 March 2015, submitted to ERM via David Stevens, Oxford City Council

Dear David

Please find below my comments and questions regarding the January Version of Section H SOA.

1. I have run my models for the receptors to compare with the predictions presented Tables D4.1 and D4.2 of the SoA.

Following the responses I have received with respect to earlier questions, I am happy that the levels presented in Table D4.1 can be used to compare the noise levels against the Noise and Vibration Mitigation Policy and the requirements of the Planning Conditions. The same applies to the mitigated levels in Table D4.2 with the exception of receptors PI14, SoA3 and SoA4 where although the receptors are in the shadow zone of the barrier the predicted noise reductions are similar to those I would expect for a receptor in the illuminated zone, Could you please confirm the levels in Table D4.2 for these receptors.

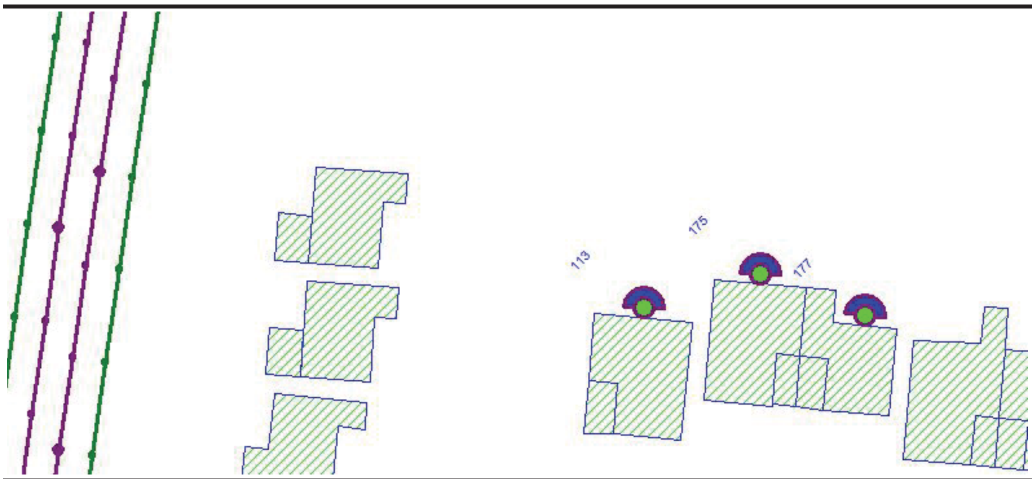
I am also surprised by the change of text in the Jan 2015 version where instead of stating in the preamble to Table D4.3 " the table presents an estimation of those properties which **may be** (my bold) eligible to sound insulation under the noise insulation regulations" and in the table heads a column "Likely to be eligible" the latest version in the preamble to table D4.3 states " the table presents an estimation of those properties that **will** (my bold) be eligible to sound insulation under the noise insulation regulations" but the table still heads a column "Likely to be eligible"

6. Response to 5 from ERM 6 March 2015, submitted to B Hemsworth via David Stevens (Oxford City Council)

To assist in the noise modelling checks we have extracted cross sectional views from the railway to the group of receptors where the IE has requested confirmation about screening effects at PI14, SoA2 and SoA3. SoA 4 was also question, but the cross section shows the source heights relative to the barriers which we believe explains the relatively small screening values that might be expected in for this section of track which also affects SoA4.

The plan view is shown in *Figure 1.1*.

Figure 1.1 Plan View of Receptors

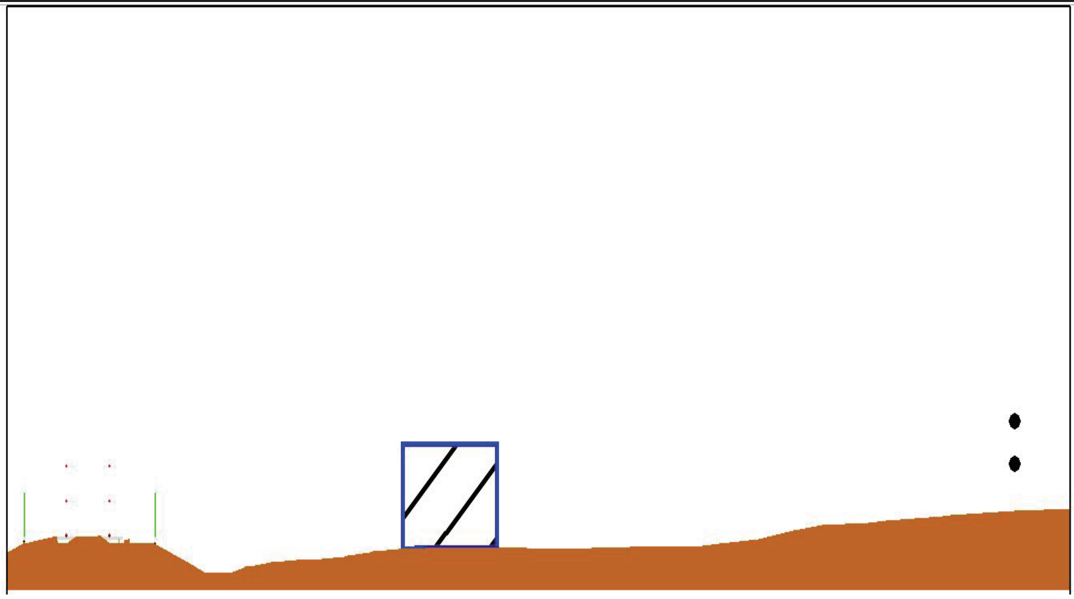


The receptor object shown as 175 is SoA2. The cross section between the railway and receptor is show in *Figure 1.2*. It is noted that for the purposes of the screening calculation we are only interested in the section of the railway which is screened only by the barrier. A perpendicular cross section has been shown consistent with CRN.

The cross section produced by the model shows the source heights assumed for the closest (up) line and the furthest (down) line. During the night (the most critical period) there are locomotives that are on-power on the down line which are travelling up hill. The source height of these will be 4 m above the rail, which is equivalent to the highest of the three dots that are shown. Since the barrier height is only 2.5 m above the rails this is not screened. The other trains are in the acoustic shadow zone and will benefit from screening with the source being the lowest of the three source dots at the railhead.

Mike Fraser
ERM
06/03/2015 12.25

Figure 1.2 Cross Section to SoA2



7. B Hemsworth Questions 11 March 2015, submitted to ERM via David Stevens, Oxford City Council

SoA Route Section H, review by Brian Hemsworth 11/3/15

Below are extracts from my comments dated 5/3/15 and Mike Fraser's response dated 6/3/15.

B Hemsworth 5/3/15
"Following the responses I have received with respect to earlier questions, I am happy that the levels presented in Table D4.1 can be used to compare the noise levels against the Noise and Vibration Mitigation Policy and the requirements of the Planning Conditions. The same applies to the mitigated levels in Table D4.2 with the exception of receptors PI14, SoA3 and SoA4 where although the receptors are in the shadow zone of the barrier the predicted noise reductions are similar to those I would expect for a receptor in the illuminated zone, Could you please confirm the levels in Table D4.2 for these receptors."

Mike Fraser 5/3/15
"The cross section produced by the model shows the source heights assumed for the closest (up) line and the furthest (down) line. During the night (the most critical period) there are locomotives that are on-power on the down line which are travelling up hill. The source height of these will be 4 m above the rail, which is equivalent to the highest of the three dots that are shown. Since the barrier height is only 2.5 m above the rails this is not screened. The other trains are in the acoustic shadow zone and will benefit from screening with the source being the lowest of the three source dots at the railhead."

I am happy that, in general, the source of "on – power" noise will be above the line of sight from receiver through the top of barrier and there will be little or no screening of this noise source. If "on – power" noise is the major source of noise from the railway I would accept that there could be little or no reduction in the day or night L_{Aeq}.

My modelling, however, indicates that that, at most receptors, rolling noise L_{Aeq} exceeds "on power" L_{Aeq} by levels in the region of 15 dBA. The planned barriers will be effective in reducing rolling noise and with this differential there should also be a reduction in total L_{Aeq}, as my model indicates.

The attenuation of rolling noise by the barrier exceeds the natural screening by significant amounts, except for receptor SoA8, and will therefore be effective in reducing rolling noise. In general, I therefore predict lower L_{Aeq} noise levels in the presence of barriers than are contained in Table D4.2. Whilst this difference is in the right direction with regards to the assessment I would appreciate any comments you have by way of explanation of the difference in the modelling results.

There is general agreement between our models with regards to the assessment of L_{Amax} with the exception of receptors PI16, SoA10, PI18, SoA11, PI19 and SoA12, in the presence of barriers, where I predict significantly lower noise levels than in Table D4.2

If there are any points, which require clarification, please do not hesitate to contact me.

Brian Hemsworth 01332 515705

11/3/15

8. ERM response to 7 12 March 2015, submitted to B Hemsworth via David Stevens (Oxford City Council)

SoA Route Section H, review by Brian Hemsworth 11/3/15

Below are extracts from my comments dated 5/3/15 and Mike Fraser's response dated 6/3/15.

B Hemsworth 5/3/15
"Following the responses I have received with respect to earlier questions, I am happy that the levels presented in Table D4.1 can be used to compare the noise levels against ***the Noise*** *and Vibration Mitigation Policy and the requirements of the Planning Conditions. The same applies to the mitigated levels in Table D4.2 with the exception of receptors PI14, SoA3 and SoA4 where although the receptors are in the shadow zone of the barrier the predicted noise reductions are similar to those I would expect for a receptor in the illuminated zone, Could you please confirm the levels in Table D4.2 for these receptors."*

Mike Fraser 5/3/15
"The cross section produced by the model shows the source heights assumed for the closest (up) line and the furthest (down) line. During the night (the most critical period) there are locomotives that are on-power on the down line which are travelling up hill. The source height of these will be 4 m above the rail, which is equivalent to the highest of the three dots that are shown. Since the barrier height is only 2.5 m above the rails this is not screened. The other trains are in the acoustic shadow zone and will benefit from screening with the source being the lowest of the three source dots at the railhead."

I am happy that, in general, the source of "on – power" noise will be above the line of sight from receiver through the top of barrier and there will be little or no screening of this noise source. If "on – power" noise is the major source of noise from the railway I would accept that there could be little or no reduction in the day or night L_{Aeq}.

My modelling, however, indicates that that, at most receptors, rolling noise L_{Aeq} exceeds "on power" L_{Aeq} by levels in the region of 15 dBA. The planned barriers will be effective in reducing rolling noise and with this differential there should also be a reduction in total L_{Aeq}, as my model indicates.

The attenuation of rolling noise by the barrier exceeds the natural screening by significant amounts, except for receptor SoA8, and will therefore be effective in reducing rolling noise. In general, I therefore predict lower L_{Aeq} noise levels in the presence of barriers than are contained in Table D4.2. Whilst this difference is in the right direction with regards to the assessment I would appreciate any comments you have by way of explanation of the difference in the modelling results.

ERM Further Information on the differences in predicted LAeq noise levels 12/3/2015:

Further inspection of the location of the receptors in question in relation to the railway shows that whilst the barrier does provide screening to some of the railway, it is the unscreened part of the railway which limits the apparent screening effects that you have calculated. In the SoA we have used PI14 and SoA3 to determine the barrier length to avoid noise levels over the night-time noise threshold of 45 dB LAeq, 8 hr, and have not extended the barrier further than is necessary for the requirements of the Noise and Vibration Mitigation Policy to be met.

The reductions required to meet the standards in the Policy for this are only relatively small at SoA3 (3 dB) and hence it may appear that a high level of screening is not being achieved and that illuminated zone screening is being applied, whereas this 3 dB reduction is simply all that is required. It is noted that at PI14 a higher reduction of 6 dB is shown in the SoA and at SoA 4 a reduction of 7 dB is shown which are both in excess of what would be expected in the illuminated zone (i.e. < 5 dB).

Extending the barrier further to screen the track to the north and south of the proposed barriers would result in higher overall noise level reductions. We have tested this in the model and found noise reductions compared to the unmitigated case of 11 dB at PI14, 7 dB at SoA3 and 9 dB at SoA 4.

It is consistent that reductions are no higher than 11 dB overall due to the relative difference between the on and off-power noise contributions that have been highlighted in the above comments and the fact that the screening is only effective at screening the off-power trains. We are therefore confident that the more comprehensive approach that we are implementing in our model is responsible for the differences that you have highlighted.

Mike Fraser ERM 12/3/2015

Maximum Noise Levels

Brian’s comment was as follows:

There is general agreement between our models with regards to the assessment of L_{Amax} with the exception of receptors PI16, SoA10, PI18, SoA11, PI19 and SoA12, in the presence of barriers, where I predict significantly lower noise levels than in Table D4.2

ERM Further Information on the differences in predicted LAmax noise levels 12/3/2015:

Regarding the LAmax we are reassured that the predictions appear to be conservative compared to yours and that adequate mitigation is therefore being applied. Tracing the exact cause of a difference between a hand calculation, or other model and SoundPlan's implementation of the Nordic prediction method is likely to be extremely difficult since the Nordic method includes many factors relating to ground reflections and screening which can affect the results which are difficult to reproduce manually. There is also no sign in Figure 5.1b that the noise contours are following an unusual shape which might suggest an issue with these particular receptors compared to others in the section. As you know we did a lot of verification cases comparing models during the development of the maximum noise level prediction approach and we are following the agreed approach for these receptors which ensures consistency with other route sections. We are therefore confident that the mitigation is being robustly specified in this section in accordance with the Noise and Vibration Mitigation Policy.

Mike Fraser ERM12/3/2015

If there are any points, which require clarification, please do not hesitate to contact me.

Brian Hemsworth 01332 515705

11/3/15