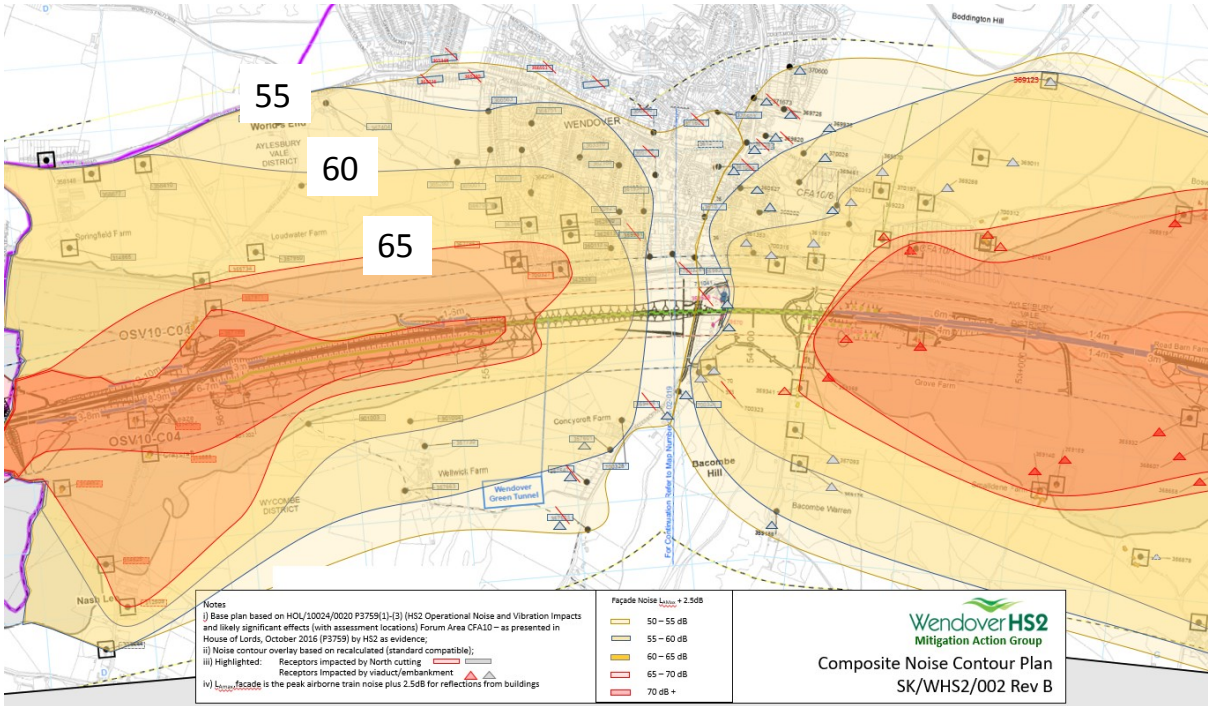
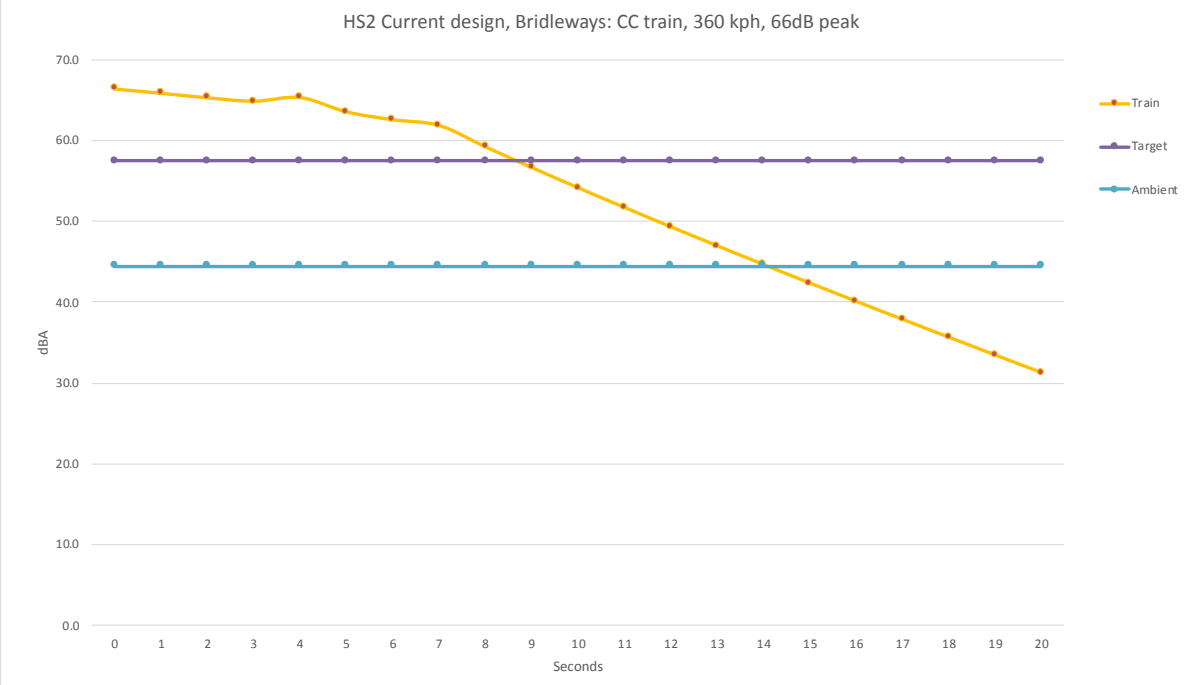
The HS2 promised levels

In the ES the Noise profile maps as shown to the Parliamentary Select Committees have a grey shaded area which suggests that the noise nuisance will be away from the main Wendover area. However this describes the 40dB average (LpAeq) night time contour rather than the 60dB peak (LpAfMax) impact, as defined in the E20 information paper. This paper defines this as "60 LpAFMax (at the façade, from any nightly noise event)".

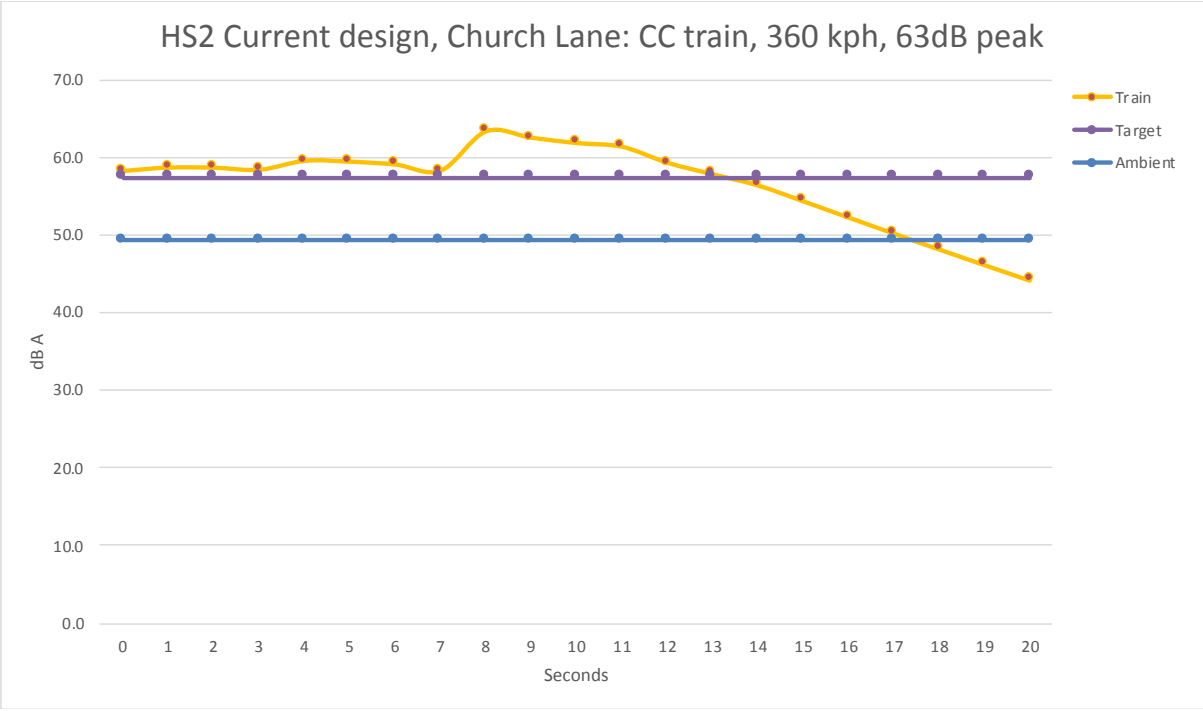
During 'Phase 1' operations HS2 plan to only use Conventional Compatible trains, and their assumption is that these will be 1dB noisier than the original specification (for HS2 trains). These are expected to operate at speeds of up to 360kph in the Wendover Green Tunnel, and E20 we need to allow for the 'façade' effect which adds 2.5dB. When we take these factors into account we can see a very different picture as shown below:



The yellow line in the following graph shows the "pass-by" noise levels at Bridleways (at the end of Lionel Avenue and Dobbins Lane) as a train heading north emerges from the green tunnel. The noise exceeds the purple target line (60dB façade) for 14 seconds. This is likely to be very intrusive, with a peak level of 66 dB being 22dB higher than the HS2 defined ambient level of 44dB shown by the blue line at night.



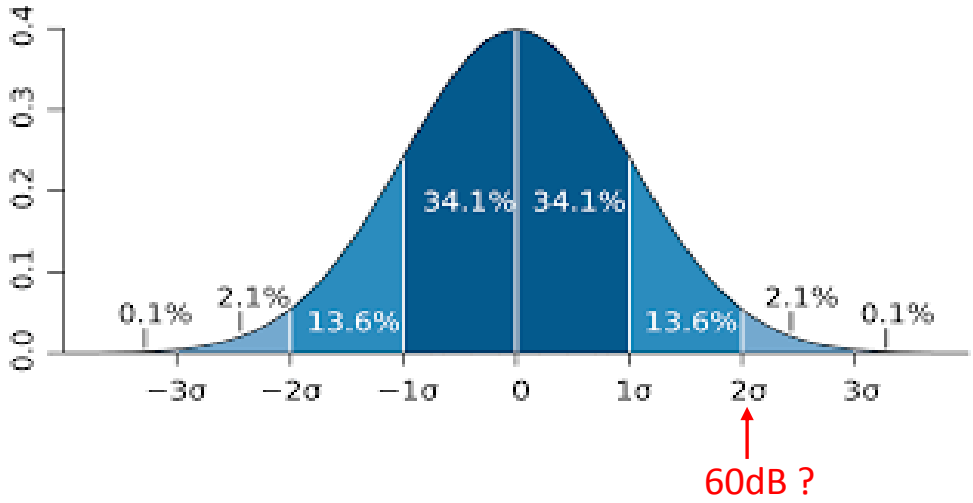
The next graph shows the similar pass-by profile at Church Lane near St Mary's Church and the Chiltern Way Academy. The yellow line shows the noise levels as a train heading south emerges from the green tunnel on the Small Dean embankment and viaduct. The noise exceeds the purple target line (60dB façade) for 14 seconds. This is also likely to be very intrusive, with a peak level being 14dB higher than the HS2 defined ambient night level of 49dB shown by the blue line.



These graphs were produced by using the HS2 noise forecasting algorithm, and are subject to their "Standard Error" of +/- 3dB. This requires further explanation, as it relates to a statistical "standard deviation" as measured values are likely to diverge from the

predicted value for various reasons; including the weather, train and track maintenance quality, and actual train speed.

The following graph shows a “normal” distribution, where statistically only 68% of train pass-by events would be expected to fall within 3 dB of the average value defined by HS2. 1 in 6 trains would exceed this threshold. A more realistic worst case to meet the 60dB target would be to design the system with the average result being 2 standard deviations (or 6dB) below the target.



Allowing 2 standard deviations we could expect 98% of trains to be below the target, with only 1 in 42 exceeding the threshold.

Std dev	Amount	Covers	Excess
1	3dB	84.1%	1 in 5.3
2	6dB	97.7%	1 in 42
3	9dB	99.8%	1 in 499

Putting this into context, from the 2020 HS2 Business Case we expect 49 trains to pass Wendover each night between 23:00 and 07:00; as shown below.

	19:00	20:00	21:00	22:00	23:00	00:00		04:00	05:00	06:00	07:00	08:00	09:00	10:00
Northbound	16	14	14	12	1	0	-	0	8	17	16	16	16	16
Southbound	16	16	16	16	16	0	-	0	0	7	13	14	15	16
total	32	30	30	28	17	0	-	0	8	24	29	30	31	32

HS2 Phase 1 train pass-by events, following the opening of Euston Station

An alternative scenario is that people could experience noise 6dB above the HS2 predicted figures 9 days a year.

Homes affected in Wendover

HS2 assessed the noise impact for 1876 residential 'impacts' close to the line in the Dunsmore, Wendover and Halton community focus area (CFA10) based on the design of the track included in the Act. 1211 of these are in the North Wendover area, which would experience noise from the cutting to the north of the green tunnel. A further 522 houses are close to the Small Dean embankment and viaduct south of the green tunnel.

In north Wendover HS2 predict that 319 of the 1211 houses are expected to routinely exceed the 60dB night time threshold 50% of the time when a Conventional Compatible train passes by at 360 kph. The 319 figure rises to 824 affected properties when HS2's 'standard error' statistical distribution is applied for the 98% reasonable worst case of 1 in 42 trains.

In south Wendover HS2 predict that 166 of the 522 houses are expected to routinely exceed the 60dB night time threshold when a Conventional Compatible train passes by at 360 kph. The 166 figure rises to 310 affected properties when HS2's 'standard error' statistical distribution is applied for the 98% reasonable worst case of 1 in 42 trains.

In summary, over 65% (1134 of the 1733) houses in Wendover could expect excessive night time noise with the trains and track design as defined in the HS2 Act.

However, based on the Wendover HS2 analysis of the error in the HS2 noise algorithm we think that the situation is even worse. Instead of 485 houses routinely experiencing excess noise we found that 590 would be affected. 409 of these are in North Wendover and 181 to the South.

So what can be done about this?

Firstly, there is an Undertaking from the Department of Transport (DfT) making a requirement for the Contractors to "*take all reasonable steps*" to improve the design beyond the description in the Act to reduce the excess noise to the 60dB target level.

Eiffage Kier Ferrovial BAM Nuttall (EKFB) is the joint venture contractor designing the Wendover section, but is working confidentially with Buckinghamshire Council on the necessary Planning Documentation – the Schedule 17(3) Noise Demonstration Report. We have escalated through our MP to the Prime Minister to obtain access to the draft documentation, but this has been rejected.

However from public documentation we know that EKFB are working on things. In September 2018 they revealed an artist's impression of the Small Dean Viaduct as part of a public consultation exhibition.

Small Dean Viaduct - A413 London Road view

Since then HS2 shared another picture with their Design Panel, who subsequently published it in their 2020 handbook as below. This suggests that the barriers now have a "cranked" top edge, but no further details have been made available.

What we can do is to identify improvements compared with the design included in the Act, and we've identified two key proposals.

Firstly north of Wendover we've looked at the redesigning the proposed cutting with near vertical walls rather than the current gentle slopes. This would reduce the 409 houses impacted in our estimate to only 7.

South of Wendover we've proposed barriers with an effective height of 10 metres, which would reduce the 181 houses impacted in our estimate to 60.