PUBLIC SESSION

MINUTES OF ORAL EVIDENCE

taken before

HIGH SPEED RAIL COMMITTEE

on the

HIGH SPEED RAIL (LONDON – WEST MIDLANDS) BILL

Tuesday 14 July 2015 (Morning)

In Committee Room 5

PRESENT:

Mr Robert Syms (Chair)
Mr Henry Bellingham
Sir Peter Bottomley
Geoffrey Clifton-Brown
Mr David Crausby

_____

IN ATTENDANCE:

James Strachan, QC, Counsel, Department for Transport

Witnesses:

Mr John Gladwin, Chiltern Society
Dr Haydon Bailey, Chiltern Society
Mr Tim Smart, International Director for High Speed Rail, CH2M Hill

_____

IN PUBLIC SESSION

INDEX

(At 09.50)

1. CHAIR: Order, order. Welcome to the HS2 Select Committee. Nice to see you all here today. We're going to start with the fly-through of the Chilterns.

2. SIR PETER BOTTOMLEY: Where are we?

3. CHAIR: Coming north to south.

4. MR STRACHAN QC (DfT): We're going south starting at Chesham Road. We just started at Chesham Road and we're heading south. Did you want to come farther back? Can we start farther north? We skipped forward; can we go back? The road crossing over the line here is Nash Lee Road, and you can see Wendover up on the left towards the top of the screen and the start of the green tunnel, which goes past Wendover. I'll let this fly-through continue.

5. MR BELLINGHAM: The famous cricket pitch –

6. MR STRACHAN QC (DfT): It would be on the right. Just pause there.

7. MR BELLINGHAM: Can we see it?

8. MR STRACHAN QC (DfT): It's coming up on the right. Just pausing there, I think that's the cricket pitch just underneath there.

9. SIR PETER BOTTOMLEY: It's a short boundary.

10. MR STRACHAN QC (DfT): It's a short boundary. The A413 and the Chiltern Line are just to the left of it, and Wendover here. Just pausing there, coming out of the green tunnel just here, the portal, I think you looked at a photo montage yesterday of a view from this bridge, if you just move the cursor.

11. SIR PETER BOTTOMLEY: Is that the church?

12. MR STRACHAN QC (DfT): St Mary's Church is up to the left and then we're coming to the Small Dean Viaduct, which is just in the foreground, and then a section of embankment heading towards the Wendover Dean Viaduct just coming up shortly. Wendover Dean Viaduct is now in the foreground, and now into the cuttings. That's Hunts Green Farm, which is shown here obviously with a green area. That's obviously

now not subject to sustainable placement. It is used for temporary material stockpiling, but not for sustainable placement anymore. South Heath is on the left and the cut-and-cover tunnel going past South Heath we're just coming to there. The tunnel starts at that point.

13. SIR PETER BOTTOMLEY: That tunnel is environmental protection for the locals or because of the topography.

14. MR STRACHAN QC (DfT): I think it's both, but primarily for the local protection of South Heath. Then of course we come towards the entrance for the bored tunnels at Mantle's Wood. You can see Mantle's Wood on either side. I'm not sure how much you want to see of the line from there on, but you're now into the bored tunnels section.

15. CHAIR: Just keep going. I just want to see what the countryside is like.

16. MR STRACHAN QC (DfT): The area in light green is the vent shaft at Little Missenden.

17. MR BELLINGHAM: What road is crossing over it?

18. MR STRACHAN QC (DfT): That's the A413. You just come past the vent shaft and the A413 is just there. The River Misbourne, which we'll hear something about is just – Shardeloes Lake and the River Misbourne are coming up. This is the Amersham vent shaft, just in the foreground there.

19. CHAIR: Keep going to the lakes.

20. MR STRACHAN QC (DfT): Yes.

21. SIR PETER BOTTOMLEY: Do you have transformers by the vent shafts or do you not need them?

22. MR STRACHAN QC (DfT): You do, yes, because there are electrics. Mr Smart is telling me not all, but yes, these ones.

23. SIR PETER BOTTOMLEY: Where you need them, that's how you do it.

24. MR STRACHAN QC (DfT): Yes. We've been past the Chalfont St Peter vent

shaft. This one is Chalfont St Giles coming up.

25. CHAIR: No, I think the other way around.

26. MR STRACHAN QC (DfT): Sorry, it's the other way around. I apologise. Then the Chalfont St Peter vent shaft and then coming up into the foreground is the exit or entry into the twin-bored tunnels. We're moving into the Colne Valley, and you can see the lakes, Broadwater Lakes and the other lakes, coming up in the distance.

27. CHAIR: This is the construction site.

28. MR STRACHAN QC (DfT): Yes. We're now crossing the M25. Those are where the slips would come off the M25, which we talked about.

29. CHAIR: Keep going just over the lakes, so we hit Hillingdon at the other side.

30. MR STRACHAN QC (DfT): You see Broadwater Lake is on your left, as we come with the islands in the lake. We're coming round on to the Colne Valley Viaduct, which is crossing the lakes.

31. CHAIR: We're about to go over HOAC.

32. MR STRACHAN QC (DfT): We're about to go over the canal, the marina there, and HOAC is where the arrow is pointing to your right.

33. CHAIR: Good, thank you. Right, well we're pleased to hear petitioner 761 from the Chiltern Society. Are you going to kick off, Mr Gladwin?

The Chiltern Society

34. MR GLADWIN: Yes, I will, sir. Thank you. My name's John Gladwin. I'm the Roll B agent for the Chiltern Society. I'm also a trustee and, by profession, a chartered accountant.

35. This first slide shows the Chilterns, both the AONB which is in dark green, and the lighter green, which is the area of the Chilterns that we take to be our bailiwick. Next slide, please.

36. Our presentation covers these topics. We will deal with them in more detail

through the presentation. Please note, we're asking for a three-bore tunnel to completely mitigate the impact of HS2 on the AONB. Next slide, please.

37. The Society was founded to conserve and enhance the Chiltern Hills. It's expanded steadily over the past 50 years, with currently nearly 7,000 members. Next slide, please. We have 500 volunteers, which is the largest group in any AONB. They cover a wide range of activities. Next slide, please.

38. We have eight interest groups, which cover both conservation and recreation. Next slide, please. The Rights of Way Group has a network of path wardens, who ensure footpaths are kept clear and call for maintenance where needed. The group provides the maintenance. We also manage a number of nature reserves and historic monuments, including the John Hampden memorial. Next slide, please.

39. Some notable achievements: the windmill was virtually derelict when we took it over and here you can see it as it is today. Next slide, please. A few more: we have recently expanded our recreation offering, with Nordic walking and geocaching to promote activities for younger people. Donate-a-Gate is about improving access to the countryside for disabled people. Next slide, please. We work with a number of Government agencies and non-government organisations. Next slide, please.

40. Why are we petitioning? This list covers the major reasons. I will deal with each in more detail through the presentation. One thing I would like to highlight is that we believe that higher standards of design need to be applied in the AONB, particularly with the design of viaducts and vent shaft head houses. We note that HS2 will be working with Chiltern District Council to develop a design code for works within the AONB. Unfortunately, this is constrained by cost. Next slide, please. We will come on to each one of these. Next slide, please.

41. The AONB was designated in 1965. It's the only AONB in either Phase One or Phase Two of HS2. Indeed, HS2 Ltd, in talking about developing Phase Two, stated that it was difficult to find a route through the National Parks, AONBs and SSSIs, but they managed it. However, it raises the question as to why it was decided to go through the Chilterns AONB. Next slide, please.

42. Here again we have the Chiltern Hills. They stretch from east of Luton down to

the Goring Gap. You can see from this that the Misbourne Valley, where the proposed route goes, is in the centre of the Chilterns at its widest point.

43. CHAIR: Order, order. I'm just going to adjourn for two minutes so they can switch the system on and off, and give it a kick. Sorry to disturb you just a moment, and you were making such good progress.

Sitting suspended
On resuming—

44. CHAIR: Carry on, Mr Gladwin.

45. MR GLADWIN: I'll start at the beginning of this again. Here we have the Chiltern Hill, starting in Luton in the east and going right the way down to the Goring Gap. As you can see, the Misbourne Valley is right in the centre of the Chilterns and the proposed route effectively severs them. Next slide, please.

46. I will deal with landscape from footpaths in more detail subsequently. I would like to add that Natural England has raised many of the same issues as we have raised today, as set out in HS2's evidence paper 0506, which I found quite interesting. Hedgerows act as routes for animals. Destroying 41 kilometres of these ancient features of the landscape is unbelievable. The cuttings and embankments will cut animal migration routes. Together, these will lead to a decline in wildlife, despite HS2's proposed mitigations. They already admit that we're going to lose barn owls and red kites through collisions.

47. To put this in perspective, 41 kilometres is a quarter of the route from London to Birmingham. Even HS2 has described ancient woodland as 'irreplaceable'. Grim's Ditch, a scheduled monument, is part of the pass that will be destroyed forever. The permanent loss of 530 acres of farmland, much of it best and most versatile, is something the country can hardly afford, and to lose more farmland to replacement planting for ancient woodland hardly makes sense. You will be aware of the temporary and permanent damage to a number of the farm enterprises. Next slide, please.

48. This slide shows the permanent features added to the landscape from construction. Our map of the Chilterns over here highlights the impact of construction on the Upper Misbourne Valley. You can see the number of work sites, etc. From Mantle's Wood to

Wendover, the cuttings, embankments and viaducts will form a scar across the land. The 27 balancing ponds will be a completely alien feature in the Chiltern landscape. Add to this the paraphernalia of the railway – catenary towers, etc., and security fences – not only by the track but around the balancing ponds and the vent house compounds, these change the landscape forever.

49. HS2 has announced recently the dumping of millions of cubic metres of spoil at Hunts Green Farm to be a temporary, rather than a permanent, measure. During that period, it will represent massive change to the landscape, as you will have seen on your visit. The question is: will this ever be returned to its original form? Next slide, please,

50. The introduction of noise and light pollution from trains running in the evening and early morning, together with night-time maintenance, will substantially impact the tranquillity. You've only to be in the Chilterns at night to be able to appreciate the night sky, often a carpet of stars. Compare this to looking at a night sky with light pollution and one realises what is being proposed to be lost. Next slide, please.

51. The Chilterns have long been recognised as an ancient landscape. A map of Chequers Estate in 1620, prepared for Lady Mary Wolley, the then owner, shows the Upper Misbourne Valley, which was part of the estate at that time. The map was discovered by a local landscape historian, Alison Doggett, and compared to the current Ordnance Survey map. She found that the lanes, fields and names have hardly changed in 400 years. Alison is a petitioner; I'm sure she will take you through this in due course. The picture there shows the relationship between Chequers, HS2 and Coombe Hill, which I believe you visited recently or some of you did.

52. The Ridgeway National Trail, together with the Icknield Way, are believed to be the oldest long-distance trading route in Britain. They run along the Chiltern escarpment. They will be impacted by the building of the Wendover cut-and-cover tunnel, with long diversions. The Society is involved in maintaining these national assets, as part of the Ridgeway Partnership. Natural England has raised the same concerns in their letter to HS2, in evidence paper 0506.

53. There are 19 hill forts in the Chilterns. Boddington Camp, in Wendover Woods, overlooks the Misbourne Valley. This was recently cleared by some of our volunteers. It gives you some stunning views from there. There is evidence of Romano-British

villas every two to three kilometres in the Misbourne Valley. These are at risk if we build this railway above ground. We believe that this landscape is a living heritage.

54. SIR PETER BOTTOMLEY: You've very kindly written out the words on the slides. There's no absolute need to read them aloud as well. If you just say, 'Look at 17,' then you might say, 'Look at 18,' we might –

55. MR GLADWIN: Sorry, I'm in a pattern with this. I will try to accommodate.

56. SIR PETER BOTTOMLEY: We understand. Do the best you can, please.

57. MR GLADWIN: Yes, I will. We believe this landscape is a living heritage, which should be kept intact for future generations. Next slide, please.

58. The network of footpaths in the Chilterns is believed to be the largest network in southern England. The footpaths across the valleys link the network of footpaths concentrated on the hills. Loss of this connectivity will reduce the number of people enjoying these routes. The impact of temporarily closing 29 footpaths is hard to imagine. I will not go into the details of individual footpaths, as there will be many petitions relating to these.

59. SIR PETER BOTTOMLEY: How many footpaths in the Chilterns are not affected?

60. MR GLADWIN: How many are not affected?

61. SIR PETER BOTTOMLEY: Yes. You start telling us there are 2,000 –

62. MR GLADWIN: There are 36 paths here that are affected.

63. SIR PETER BOTTOMLEY: I know. I was asking how many are not affected in the Chilterns.

64. MR GLADWIN: We've got 2,000 kilometres of footpaths. How many individual footpaths there are I couldn't tell you. Just alone related to Missenden there are 32. There are another 32 related to Wendover.

65. SIR PETER BOTTOMLEY: We need to pay attention to how the railway affects the local area. Every now and again, we get what I call 'kitchen sinked', where we're

given the impression that the whole of the Chilterns is affected, when we know we're going through the Chilterns. It's still serious.

66. MR GLADWIN: That's why I've said it's 36 paths that are affected directly by the HS2 route. The network is quite incredible, but it is destroying it in this area.

67. CHAIR: We saw a lot of backpackers when we were there.

68. MR GLADWIN: Sorry, I'll get back to where I was. As I said, the proposed diversions will run along the proposed route to get to a common crossing point – hardly a walk in the country. Next slide, please.

69. We now come to the environment statement, which we believe to be flawed. Surveying only 40% of the route risks missing rare flora and fauna. As an example, the draft environmental statement identified Bacombe Hill SSSI as the only home in Britain of the fringed gentian. However, this was ignored in the final environment statement. The Wendover cut-and-cover tunnel – sorry, green tunnel – comes within 25 metres of this SSSI, with all the risks of construction pollution. Geological surveys are not comprehensive. Sink holes are not uncommon in the Chilterns. How will these be dealt with?

70. The traffic assessments were flawed, given a misleading picture of the impact of construction traffic on the local roads. An example is the roundabout of the A413 and the A404 at Amersham – that's near Amersham Hospital – where 60 HGVs entering the roundabout magically disappear; they never leave it. Another is a section of the A40, where the am peak flow shows over 4,000 vehicles per hour eastbound, and four westbound in the evening peak flow. These examples demonstrate that the environmental statement was not properly review or corrected and, therefore, should not be relied upon.

71. HS2 defines the rush hour as 8 to 9 in the morning, and 5 to 6 in the evening. In most of the Chilterns the rush hours are from 7 in the morning to 9.15, and from 3 to 7 in the evening. The morning starts with commuters, progresses through senior school to junior school; the order reverses in the evening. HS2 estimates that 15% of HGVs will be in the one-hour rush hour. How many more will impact the longer rush hours?

72. Thus, the environment statement underestimates the impact of construction traffic on local areas. This particularly applies to Beaconsfield on the A355. That's the road that runs from Amersham up to Beaconsfield. This is a defined construction route for virtually all the worksites in the Misbourne Valley, and will add up to 800 vehicles morning and evening to the already severely congested route. Currently, it can take 20 minutes or longer to get through one roundabout. This impact on communities more than one kilometre from the proposed route has been ignored.

73. A number of communities were missed, although quite severely impacted by the scheme. An example is Prestwood, which has 6,500 people. This is just next to Great Missenden, just above it. It's the largest community in the Upper Misbourne after Wendover. I will talk a little bit more about the communities in a minute.

74. In the environmental statement, HS2 recognises the sensitivity of the AONB as a national asset. They have then sought to reduce the severity of the impact, with comments like, 'As 18% of the area is woodland, compared to a national average of 10%, woodland is a receptor of low sensitivity.' The sensitivity of woodland, we believe, should be seen in a national context, where it would be a receptor of high sensitivity. There are a number of other examples. I think Mr Mould gave a couple yesterday, when he was talking about it's only a very small percentage of the AONB that's going to be impacted. There were a couple of other comments like that.

75. Natural England has also expressed concern about the evaluations of sensitivity by HS2 Ltd. I refer you again to HS2 evidence note 0506 from Natural England. HS2 has clarified phrases like 'reasonably practical' in their petition response document, such as are used in the code of construction practice. However, the overall impression is that there is wriggle room everywhere. We believe that a higher standard of performance should be required of contractors working in the AONB, and are pleased that HS2 Ltd has confirmed that they recognise the importance and special character of the Chilterns AONB, and will seek to work with Chiltern District Council to develop design principles that could reasonably be applied to the design and appearance of HS2 works in the AONB. We are somewhat concerned that this is caveated with 'reasonable' and 'within the HS2 budget'. This does not give a lot of comfort. Next slide, please.

76. There will be up to 18 trains per hour each way, more than one every two minutes.

These will add noise, both in the day and at night. In addition at night, they will add light from the train. We estimate the last train will pass through at nearly 11pm, and the first train will be at about 5.30am. Chance for a night's sleep, one might think, but no; all the track maintenance will be at night, including rail driving and train movements from and to the sidings at Stoke Mandeville. Imagine the impact of this area of medium tranquillity. That's HS2's assessment.

77. In addition, local businesses will have suffered from the disruption, particularly tourism and farming, including some that will have to close. We believe it will take a number of years for those that survive to recover after the route opens. Next slide, please.

78. The impact during construction will be much more severe. The substantial increase in vehicle movements will create delays for many commuters, mothers taking their children to school, etc. Significant numbers of pupils travel by bus to schools in Chesham, Amersham and Aylesbury from Great Missenden, with inevitable increases in their travel time. This impact on their education could last up to six years.

79. I believe you visited Wendover Campus, a school for children with behavioural issues. There is another similar sized branch of that school in Prestwood, which was not recognised in the environment statement. They draw pupils from all over the county. The majority of the pupils at both schools arrive by taxi. Many are likely to be disrupted. Villages such as South Heath and The Lee use Great Missenden for banking, professional services, schools, as well as to shop, eat out, access the railway, etc. This interconnectivity was not identified by HS2 Ltd. With the construction work between Mantle's Wood and Leather Lane, there will be significant delays in travelling between them. It will also have an impact on the businesses relying on their custom. Next slide, please.

80. The Colne Valley is an invaluable resource for Northwest London. It provides an area of recreation and relaxation close to the outer edge of London. It also has an important SSSI for migratory waterfowl. The introduction of a huge viaduct will eliminate facilities like the Hillingdon Outdoor Activities Centre, the sailing club and the water-ski centre. You have recently heard a substantial number of petitions on this subject. Therefore, we will not go into more detail, other than to say that we support

proposals by Hillingdon Council to tunnel underneath the Colne Valley. Next slide, please.

81. We now come to one of our major concerns with regard to the proposed route. That is the impact on water. These are the particular areas of concern to the Society. Next slide, please.

82. We are concerned about the risk to the River Misbourne, both the loss of water and the loss of wildlife habitat. Chalk streams are globally rare. There are only 210 chalk streams in the world, 76% of which are in England. This makes each one very precious. The Misbourne is vulnerable to abstraction for drinking water and to lack of rainfall, thus it needs careful management. Recently, we have discussed with Affinity Water and the Environment Agency about how to reduce the abstraction in the valley to help maintain the flow. Tunnelling through the aquifer underneath risks changing the flow of water through the aquifer and away from the river. Next slide, please.

83. The main concern here is the impact of construction on the water in the Colne and the Colne aquifer. HS2 Ltd has confirmed that there is some risk here. As I understand it, their expectation is that it will be low, but should one be taking such a risk with part of London's water supply? The proposed route passes very close to the Chalfont St Giles public water supply abstraction point. We understand that there is a good possibility that this pumping station will have to close because of the HS2 tumbling.

84. Next slide? These pictures here are – that's the Misbourne and there you can see Shardeloes Lake which we saw in the flyover. There are risks to the mid-Colne Valley and Weston Turville SSSI, both of which provide important habitats for resident and migratory birds. The Colne Valley SSSI is important for migratory birds with over 70 bird species regularly breeding there. It is sensitive to pollution in the Colne.

85. The Weston Turville SSSI is fed from the spring line which runs along the base of the northern escarpment of the Chiltern Hills. It was formed in 1797 to feed the Wendover arm of the Grand Union Canal. This is home to 46 breeding bird species. The Wendover Green tunnel and subsequent cutting threaten to divert water away from the SSSI, thus risking its future. I believe you will hear more about this this afternoon from Wendover – yes, Wendover and Halton are coming aren't they.

86. CHAIR: Are you opposed to the Green Tunnel at Wendover?

87. MR GLADWIN: Yes.

88. CHAIR: So we should take it out?

89. MR GLADWIN: What we believe is that there should be an underground tunnel, because with the underground tunnel, you can go deeper and you can avoid the problems.

90. CHAIR: Right.

91. MR GLADWIN: We've raised the issue of settlement along the line, particularly at Chalfont St Giles. The underlying ground here is particularly fractured, with the risk of significant settlement. You will hear more about this later. The concerns are increased by the number of older numbers in Chalfont St Giles which have minimal foundations.

92. Next slide please? How do we reduce these risks? Well, tunnelling near the top of the aquifer brings greater risks of diverting water through a different route. Basically, water in the aquifer runs through fractures. If you disturb that, you can channel the water away from the existing route. Drilling deeper reduces these risks. Our witness, Dr Bailey, will elaborate on this. This brings – next slide please? – this brings me to Dr Bailey, over to you Haydon?

93. DR BAILEY: Thank you very much, John. In addition to the note you've got there with regard to my CV, I'd like to add that I'm just an ordinary member of the Chiltern Society; I've been a member for probably about 12 years now. I was asked to be the geological advisor to the Chiltern Society back in the Spring of 2009. So, some time before HS2 became an issue.

94. One of the things I have to ask: why are we tunnelling at all? Why do we – there's a basic principle: tunnels are built to go under physical barriers. We put them under seaways, such as the Channel Tunnel; under major rivers, such as HS1 going under the Thames or the Mersey Tunnel; we put them under mountains, like the Gotthard Tunnel; or under cities, like Crossrail. Rarely if ever do we drive a tunnel under a valley for a small, ephemeral stream, such as the River Misbourne.

95. There's been a change in public attitude in recent years, away from putting a scar on the landscape, such as the M40 cutting at Stokenchurch through the Chilterns; or the M3, down through Twyford Down in Wiltshire. Public opinion has now moved to tunnelling, including the A3 Hindhead tunnel under the Devil's Punch Bowl in the Surrey Hills area of outstanding natural beauty.

96. SIR PETER BOTTOMLEY: Was that a worthwhile…?

97. DR BAILEY: It depends on how much you value the landscape around there.

98. SIR PETER BOTTOMLEY: If you'd tucked the A3 just to the Farnham side of Hindhead, and come up by the A3 south of Hindhead, you could've built the thing with only a minor viaduct at Thursley and you would've built a road for £71 million; and had an extra £300 million for environmental protection and improvement elsewhere couldn't you?

99. DR BAILEY: I'm not going to argue with you; it's not a project I was involved in. But what I would say is that I'm using that as an example; the fact that people have now gone to tunnel to actually looking upon that as a protection for the visual landscape.

100. SIR PETER BOTTOMLEY: The alternative, I suppose, consideration is not to have a tunnel but a choice of a viaduct at Oakhampton; you could've put the road on a viaduct to the north of the town, instead of which it crawls along inside the National Trust land, alongside the disused railway that was invisible to virtually everybody.

101. DR BAILEY: I agree with that. I think the move – in terms of one of the examples that I would also include in that is the A505 tunnelling along the north side of the Chilterns at Baldock where green tunnels were introduced and in fact, where those tunnels were put in place, driving along that road now, you're completely unaware that you're going to go to a tunnel until about – less than half a mile before you reach it. So it has – the amount of visual impact in the region has been reduced right down. That's the move that – when you compare that with what you have at Stokenchurch for example in the Chilterns already – it makes a major difference. That's what we're talking about here.

102. So what we're doing, we're actually putting a tunnel underneath the valley

principally to conserve an area of area of outstanding natural beauty. Can I have the next slide please? This is a geological cross-section, running from north to south, through the Chilterns, roughly along the line of the proposed HS2 route. The hills of the Chilterns are made up of the chalk, and if we look at the geology of the chalk, without going into a huge amount of detail, traditionally, it can be split into three broad, informal units. We have an upper chalk there, and I've made a note there that this is a first class aquifer; it's well documented, it's intensely fractured, but it also has common to abundant flints running through it. It's the typical chalk that we see with banded flints. So that, therefore, causes difficulty. Flint is one of the most difficult things to tunnel through; there are issues when tunnelling machines are used in going through flint.

103. Below this we have the middle chalk, which is graded as a moderate aquifer. It is still fractured; it has fewer flints, far fewer flints, and therefore it's easier to tunnel through. Then below that we have the lower chalk. The lower chalk is much richer in clay and marl. It's a poor aquifer; there are few, very few fractures running through it. There are no flints. So it's the easiest to tunnel through; in fact it's the direct equivalent of the Channel Tunnel. So the level that we're talking geologically, if you compare it with the Channel Tunnel, would be the middle to lower chalk.

104. Can I have the next slide please? The current HS2 proposal – can we go back to the previous one? There are two lines of tunnels in there. There's an upper one; that is, if you like, the level of the HS2 proposal, which goes through the upper and middle chalk, causing the maximum potential damage to the aquifer. It goes through the most difficult strata to tunnel, which is the flint ridge, upper chalk.

105. If we actually remove, sort of ignore that, and then look at the lower level, the lower tunnel through there. This is the level of a three-bore tunnel that we are proposing, targeting the older chalk. It would cut through the middle and lower chalk, below the main aquifer and below the level where flints occur. This would actually create a major time saving when it comes to tunnelling, with the potential reduction in costs.

106. Can we have the next slide please?

107. SIR PETER BOTTOMLEY: How much lower is that second tunnel, roughly?

108. DR BAILEY: You're probably talking about dropping it by about 30 metres or so.

109. SIR PETER BOTTOMLEY: Right.

110. DR BAILEY: The proposed route for HS2 crosses the Misbourne Valley in the southern area, in the vicinity of Chalfont St Giles.

111. SIR PETER BOTTOMLEY: If you want to poke at the screen, it miraculously –

112. MR GLADWIN: There's Chalfont St Giles there.

113. SIR PETER BOTTOMLEY: Okay.

114. DR BAILEY: So that gives you an area where it's roughly crossing – where, in fact, on the screen that you've got in front of you, there's a circle with an 'x' in it, which is quite useful. That's very, very close to where the line crosses.

115. Now, half a million years ago, before what was called the Anglian glaciation, this area lay within the valley of a major river. It was the proto-Thames. The Thames used to flow north-eastwards, over the Beaconsfield area, past to the north of where Watford now lies, and through the Vale of St Albans, moving eastwards, until it reached the North Sea through East Anglia. That major river – and it was a very major river, would have had a considerable impact on the underlying chalk, which formed the riverbed. Added to which this chalk would've been very badly damaged and broken up by the natural freeze thaw action and the cycles of freezing and thawing which occurred during the glaciation. So, the presence of this broken, rubbly chalk in the subsurface, is proven. If we examine borehole data, which comes from the existing borehole marked with that 'x' in the Chalfont St Giles pumping station.

116. So can we go to the next slide please? This is a diagram – it's a copy of the original driller's description for when the borehole was drilled. I'm just going to go through it from top to bottom very briefly. From around about a metre – 1.10 metres down to 5.6 metres, it's described as being rounded flint and gravel – so we just have gravel there. From 5.6 metres down to a depth of 16 metres, it's described as 'firm, brownish, white putty chalk, with some gravel sized pieces of moderately weak white chalk', and in brackets, the driller has put, 'Weathered upper chalk'. In other words,

we're going through the upper chalk and this has been damaged, it's weathered, it's been damaged by that river action and by that frost action from the glaciation. It's not until we get down to 16 metres – between 16 and 18.5 metres – that it's described as moderately weak to moderately strong white chalk. Then below that, at 18.5 metres, we have what is regionally known as the chalk rock, which is a very hard, white, crystalline chalk. So, at best, the first moderately strong chalk is at about 16 metres. We don't see solid, competent, white, hard chalk until 18.5 metres below surface.

117. Can we have the next slide please? So this slide illustrates the interpretation beneath Chalfont St Giles, with the original tunnel crown around about 22 metres below surface. Consequently, there's the proposed route of the Misbourne Valley, the tunnel crown will be at a level with less than 6 metres of competent chalk above it. Above this, we've got gravel and where the rubbly chalk – in my opinion, there's certainly a threat of ground failure at the valley crossing point at Chalfont St Giles. I just don't think it's been taken into consideration sufficiently to date.

118. Can we just try the next slide, to see what happens? No, we will go back to that one. Had the slide been animated, you would've seen the river disappear at this point. The chances of the Misbourne River surviving must be closer to zero, with the resulting loss of environmental benefits, the wildlife habitats and the public amenities.

119. The chalk aquifer below the Misbourne Valley is a major regional water supply with numerous public water sources and boreholes in proximity to the proposed route, including the one I've illustrated at Chalfont St Giles. That public water supply will certainly be jeopardised by tunnel construction, and several other boreholes along the Misbourne Valley at Amersham and Great Missenden will also be threatened. In addition, as we've already noted to this – I'm using HS2 figures – something like 22% of all of London's water supply is at risk should there be any damage or pollution to the chalk aquifer in this and the adjacent Colne Valley. From a tunnelling point of view, modern engineering and tunnelling methods can certainly tunnel through difficult ground. But by putting a three bore tunnel deeper, we would alleviate a considerable number of the risks that we've highlighted in this presentation, thank you very much.

120. MR GLADWIN: Thank you, Haydon. Next slide please? I would like to review the trend taken by successive governments over the previous 60 years on planning

policy and guidance towards AONBs. Next slide please? Set out here is the legal history of the protection for the National Parks and the AONBs and I will not dwell on it as you've probably heard it many times before. Suffice to say that the emphasis is on placing great weight on conserving and enhancing our highest quality English landscape and protection their scenic beauty. Next slide please? The National Planning Policy Framework replaced a series of planning guidelines, in particular PPS7. The latter goes back to 1992 and sets out four key tests related to planning in an AONB or a National Park. These were reconfirmed in the NPPF. These tests are highlighted here. The key issue is that major development should not take place in AONBs except in exceptional circumstances after appropriate tests have been made. These tests relate to the most rigorous examination including assessing development not impacting the AONB or National Park and ensuring that the decision is in the national interest. Is this relevant? I suggest that it is. In our view, the tests were not rigorous enough. In this case, the first principle of mitigation should be applied, i.e. avoid rather than mitigate or compensate.

121. We will now review the steps taken. Next slide please? As I'm sure you're aware, HS2's evaluation of alternative routes was carried out at a strategic level and at a relatively early stage of their analysis. Alternative routes that did not cross the Chilterns AONB were ruled out for a variety of reasons quite early on in the process. One route, following the M1, which goes up by Luton and there's a gap in the AONB up there, was ruled out because it required too much tunnelling and was five minutes slower. Even though HS2 Limited marked it as not crossing the AONB. There might've been a score for it! It's interesting to note that since then, quite a lot of tunnelling has been added to the proposed route, since its selection.

122. HS2 Limited did not continue to evaluate this route in greater depth, even though it might've been regarded as their preferred non-AONB route. This would've enabled them to demonstrate that they had complied with the thrust of public policy, and two, to have a second-best solution before Parliament, should Parliament have rejected a route across the AONB. Thus, we believe they failed the four tests. We suggest that this was tantamount to denying Parliament the opportunity to conduct a comprehensive and fair assessment of whether exceptional circumstances exist or existed to allow for HS2 to cross the Chilterns AONB. The key question is: has the government's obligation to conserve and enhance the AONB been met? We believe that answer is no.

123. We recognise, of course, that the issue of alternative routes that do not cross the AONB is outside of the Select Committee's remit. The various Acts that also laid down that a relevant authority shall have regard to the purpose of conserving and enhancing the natural beauty of the AONB. A relevant person is any Minister of the Crown, and public body, and statutory undertaker, any person holding public office. As such, we respectfully suggest that it is open to the Select Committee to consider these longstanding principles of public policy and to recommend to Parliament the solution that causes the minimum of harm to the Chilterns AONB. In our view, gentlemen, that solution should be a three-bore tunnel under the Chilterns AONB. Thank you.

124. Next slide please? Why a three-bore tunnel? Let's look at these in more detail. Next slide please? Here are some of the key factors of a three-bore tunnel. It's the same design concept as the Channel Tunnel. The central tunnel provides a safe area for passengers in the event of an incident where passengers need to evacuate the train. It provides good access to the tunnels for maintenance work; it's also capable of running motorised transport. Imagine an incident in one rail tunnel, such as a derailment, where the train could not reach a fire fighting point. The only escape for passengers in a two-bore system is the other tunnel. However, in this case, this has up to 18 trains per hour running at 320km/h. Even HS2 admit this is hardly a safe area. That's in SC16, Extracts from Tunnelling Options.

125. Next slide please? The greatest advantage of a three-bore tunnel is that it eliminates all damage to the AONB. It greatly reduces the risk of damage to the aquifer. It offers a proven safety system; to date, there have been a number of incidents in the Channel Tunnel but not one with a loss of life. The minimal gradient offers operational benefits, when compared to a tunnel that goes up and down. A deeper tunnel offers more flexibility in choosing an alignment.

126. Next slide please? Turning to safety: best practice safety management requires a rigorous safety assessment of alternatives. EU Regulations reflect this with a requirement for a special safety investigation for any long tunnel, particularly where there are significant numbers of trains running in that tunnel. Next slide please? We believe that rigorous comparative safety assessments should be made by HS2 Limited for all Chiltern tunnel options, including the proposed scheme and verified by independent specialists. This would inform the Select Committee on any trade off on

safety against cost. We believe a key question for the Select Committee is, can the prospect of a higher level of public safety provided by a three-bore tunnel be discounted?

127. Next slide please? This all comes at a cost. Please note that the estimate at the top of the slide is not by HS2 Limited. This was left on the slide in error, and I apologise for that. The cost differential of £800 million is our estimate of the construction cost differential compared to the proposed scheme. This has been calculated using the tunnel, costing model that the Select Committee asked HS2 to provide for petitioners. Thank you for that.

128. MR CLIFTON-BROWN: Can I just ask you, what was the change between HS1 and HS2. HS1 doesn't have a third tunnel, so why should HS2 have this third tunnel arrangement which is obviously going to be a lot more expensive?

129. MR GLADWIN: Well, it depends on what length of tunnel you're looking at. HS1 does have a third tunnel; it's called the Channel Tunnel.

130. MR CLIFTON-BROWN: But there are a lot of tunnels on HS1 that don't have a third tunnel.

131. MR GLADWIN: Yes, but they don't run with the frequency of trains; the highest frequency of trains running at the moment in Europe is 12 trains an hour in France. Here we are looking at running 18 trains an hour. Obviously, if you're going to build and design a railway system, then you need to test it at the maximum capacity that it's designed to run at. Also, I think you'll find that most of the trains on HS1 don't run at 320km/h. I think they're somewhere around 250.

132. MR CLIFTON-BROWN: But presumably you wouldn't be just arguing for the third tunnel in the Chilterns tunnel; you'd be arguing it as a third – if you're arguing this on safety grounds, there would need to be a third tunnel all the way along this HS2 route. Have you costed that?

133. MR GLADWIN: Not necessarily. I mean, it depends on how many long tunnels are there on the route. I don't think there are that many; most of them are relatively short.

134. SIR PETER BOTTOMLEY: What's the longest continuous tunnel on HS1?

135. MR STRACHAN QC (DfT): 10km.

136. SIR PETER BOTTOMLEY: You need to go a bit beyond that before you need either an intervention gap or you need a third tunnel?

137. MR STRACHAN QC (DfT): Certainly.

138. MR GLADWIN: I think it depends – until you do the safety assessment, you cannot say that, because as I say, I think the HS1 or the Channel Tunnel runs somewhere in the region of about 10 trains an hour, each way – that's including both passenger – about four passenger trains an hour –

139. SIR PETER BOTTOMLEY: Just to save a semi-technical description, the reason for having a third tunnel or an intervention is if there's a problem you need to be able to get people out? And you can either do that with an intervention gap or you can do it with a third tunnel, or –

140. MR GLADWIN: As is proposed here, if you have a – in the proposed scheme, if a train derails, and you can't get to an intervention gap or you can't get out of the tunnel, the only other place that passengers can go to is the alternative tunnel.

141. SIR PETER BOTTOMLEY: That's the first time you've said it; I'm just trying to help you and Geoffrey, let you move on.

142. MR GLADWIN: Sorry, let me re-gather my thoughts. The £800 million is made up of a differential calculated for two and three-bore tunnel, of £400 million; plus there was an identified differential cost for a two-bore tunnel such as the Chilterns Long Tunnel of £400 million. I believe that £400 million is, from what I saw yesterday - £467 million is it now, I think it's something like that. There was some increase yesterday. However, there are offset and savings, such as those listed. These savings have been prepared by a consultancy called S2W, retained by Chiltern Ridges Action Group. I don't propose to go into these costs, these figures here, because I understand they will be explained by Chiltern Ridges Action Group.

143. CHAIR: I was going to ask you as an accountant, a saving of £206 million for no

landscape impact, what does that mean?

144. MR GLADWIN: Well, it's how do you value landscape? I know we had a discussion yesterday on that, where Mr Mould was saying that the landscape impact on the whole proposed scheme was £1 billion. So there are methodologies for it; I am not in that business.

145. CHAIR: So as an accountant, it's not real money, in the sense that isn't a saving? So you have a cost; that wouldn't come off the bill, because that is an assumed cost of that loss of view, or an environment. But it's not cash?

146. MR GLADWIN: I think you're right; it's not particularly cash, but you need to value your environment because if you tear up the environment, where do we finish up? I mean, why are we having so many conversations about maintaining the greenbelt when we have such pressure for housing? Because everybody recognises that you need to have open spaces for people, and there are methodologies now that monetise that. I don't know them; I'm not that type of accountant. I spent most of my life in the chemical industry.

147. I think the other interesting thing is that most of the spoil that would be derived from this tunnel by going deeper would be, I understand, chalk and clay that would be suitable for cement making. The interesting thing is, when you do the calculation, that if you just sold the cement for the cost of removal, that's a saving of £163 million. I believe these things need to be looked at in the round, carefully by HS2. I don't think they've looked at it carefully.

148. We believe that the Select Committee should require HS2 Limited to prepare comparative costings with offsetting benefits of each tunnel option with a review by an independent panel, much as requested by your colleague Nick Hurd on 1 July for the Colne Valley options.

149. Interestingly, Natural England have confirmed at paragraph 2.37 of evidence paper 0506 that they believe it would seem that an extended bore tunnel could provide the most effective means of mitigating the landscape and visual effects on the AONB. The CFA9 report goes on to consider a range of additional, extended tunnel options. We advise there is a need for greater clarity regarding the environmental benefits and

dis-benefits of all the extended tunnel options, to aid understanding and comparison between them.

150. Next slide please? I would like to wrap up with a review of mitigation. Next slide please? This sets out our minimum expectations: lowering the line will reduce the visual impact of viaducts and embankments and catenary towers and enable more of the natural landscape to be unchanged. We believe that, as much as possible, that the spoil generated should be removed from the AONB and not used to alter its landscape. Green bridges, at least 100m wide would enable each footpath to be reconnected on its original alignment. They would also help to create new migration routes for animals. HS2 have said they will restore hedgerows, but we would want an undertaking that these will recreate the old field patterns, with species-rich hedges to encourage wildlife. Currently the main undertaker will have the right to alter the vertical line of the track by up to 5 metres. We ask that this is restricted to ensure that the main undertaker cannot raise the track; he would almost certainly do so to reduce his construction costs.

151. The construction routes defined by HS2 Limited include the A413 and the A4010 – that's the road from High Wycombe up towards Aylesbury. These are the two main routes from Southern Bucks to the main Accident and Emergency Centre at Stoke Mandeville. With the forecast congestion, this suggests that people's lives are put at risk. Add to this the number of men working for HS2 on a dozen worksites, in inherently dangerous jobs, and we believe that HS2 Limited need to fund a minimum of one additional air ambulance to provide a safe level of emergency cover. You can see just from this map just how many worksites there are with people working.

152. Next slide please? Moderate level mitigation. We believe that a two-bore tunnel offers a moderate level of mitigation in that it reduces substantially the impact on a number of areas. However, this still leaves vent shafts and an intervention gap. I believe the vent shafts have now gone up to seven or eight, from the conversation I heard yesterday. An underground intervention gap improves the level of mitigation; an open gap would create traffic and disturbance during construction and leave a large, unnatural hole in the AONB.

153. Next slide please? A three-bore tunnel provides the ideal mitigation of all. This would eliminate any impact on the AONB.

154. SIR PETER BOTTOMLEY: Are you coming to a rough estimate of what the cost of the three-bore tunnel is at a lower depth compared with the possibility of a long tunnel with an intervention gap?

155. MR GLADWIN: We have estimated it at somewhere between £800 million and £1 billion.

156. SIR PETER BOTTOMLEY: I am not sure I put my question clearly enough. You're proposing a long tunnel through the Chilterns. Part of it is going to be tunnelled anyway by the promoters. So, we're talking about the additional part. You're saying that a moderate way would be to have a continued tunnel but with an intervention gap; or to have a lower tunnel with three-bores. I was asking what the different might be between the second and the third of the options.

157. MR GLADWIN: We believe it would be about £500 million more.

158. SIR PETER BOTTOMLEY: Than having a long tunnel with an intervention gap?

159. MR GLADWIN: Yes. The other final thing is, as that line says there, this would enable Parliament to fulfil its obligations to conserve and enhance the natural beauty of the Chilterns AONB. Next slide please? Right, this is our last slide, you'll be pleased to hear. If HS2 has to cross the Chilterns AONB, the only acceptable solution in the national interest is a three-bore tunnel. Thank you.

160. CHAIR: Thank you, sorry for the interruption at the beginning. I hope we got you on television for your public, Mr Gladwin. Mr Strachan?

161. MR STRACHAN QC (DfT): Thank you. I am conscious the committee is mid-way hearing the case in relation to the Chiltern tunnel options which we dealt with yesterday and you're coming back to that on Wednesday, so I'm going to try not to overlap too much and just responding to this.

162. There are two principal areas where there are specific asks or specific concerns, and those concerns to the River Misbourne, and tunnel through chalk, and the consequential requests for a three-bore tunnel. I'm going to ask Mr Smart to deal briefly with those two things first of all if I may? Could I, just before he takes his seat, just ask Dr Haydon Bailey a couple of questions because – he's taking his seat.

163. Dr Bailey, just in respect of your presentation about chalk, I just wanted to check, because I think what you told the committee was that the proposal to tunnel through the layers of chalk you've identified in the Hybrid Bill Scheme, that part which is a twin-bore tunnel, that is all possible to do, as I understood you to say? You're not suggesting it would be –

164. DR BAILEY: Correct, yes.

165. MR STRACHAN QC (DfT): And in fact, you would agree, wouldn't you, that there are plenty of examples of tunnelling through such chalk levels – Mr Smart is going to no doubt give some examples – but there are plenty of examples of where that has been done?

166. DR BAILEY: There are plenty of examples of where it's been done; there are also a number of examples of where, because of the presence of flint within the chalk, then that does cause inherent problems with the tunnelling machines. It doesn't say it's not possible to do it, but it certainly is possible. But as an example, if we were to take something like the Orwell – the River Orwell relief tunnel that was built underneath Ipswich, because technique was used in that case to avoid the flint, by tunnelling through the upper chalk, and identifying a section which was free from flints, that tunnel was completed, I think it was something like five months ahead of schedule, with all the inherent cost savings with that.

167. MR STRACHAN QC (DfT): And Dr Bailey, I didn't think that you were specifically a tunnelling expert?

168. DR BAILEY: No, I'm not.

169. MR STRACHAN QC (DfT): And as I understood it, the three-bore tunnel option you're proposing would have a cost of £500 million more on your current estimates than the options that are being proposed for the longer Chilterns tunnel, which is a twin bore with vent shaft?

170. DR BAILEY: Well, that's not something that I specifically looked at, but that's the figure that's been come up with.

171. MR STRACHAN QC (DfT): And just one point – I think Mr Smart is going to

address this in a moment, but you said a three-bore tunnel would avoid the need for any vent shafts, is what you identified in your slides? In fact, for example, the Channel Tunnel does have two vent shafts obviously on the landward sides, but necessary in order to drive the air, the fans, etc. for the control of the tunnels themselves, so it's not right is it that you would be able to avoid the need for vent shafts in a three-bore tunnel option that you're suggesting?

172. DR BAILEY: Well, that is an area that I've been asked to look at.

173. MR GLADWIN: We're not engineers in that way; if that's the reality, then that's the reality. But, I would suggest that that was necessary because of the length of the Channel Tunnel.

174. MR STRACHAN QC (DfT): Well, what I'll do, I'll ask Mr Smart to address that because he is the expert and not myself.

175. DR BAILEY: Absolutely.

176. MR STRACHAN QC (DfT): But I just wanted to understand whether you had looked at that, and what you're telling me is you're not sure or you haven't – okay. In that case, can I ask Mr Smart – we might as well deal with the – well, can I take it turn. We've got to first of all look at this question of the effects on the River Misbourne, Mr Smart, because the petitioners have raised a concern about the River Misbourne. If we could have up on the screen P7452 please? What I've asked to be put up on the screen, Mr Smart is the identification of where the current scheme crosses the River Misbourne. Obviously it's doing so below, so it's underneath the River Misbourne?

177. MR SMART: Yes.

178. MR STRACHAN QC (DfT): The two areas where the tunnel would pass underneath the River Misbourne, and if we go to the next slide, P7452(2), we see the measures that have already been taken into account as to how one tunnels in that area, and in that chalk, to control the effects of tunnelling?

179. MR SMART: Correct.

180. MR STRACHAN QC (DfT): You can see there the various measures that are