

# 13 June 2014

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09:45

NC	APP131 is a note to say that SATUR used horizontal stacking for junctions. APP-130 will follow.
MW	Mr Jones to cross-examine Mr Hanson.
GJ	Are you in a position to produce the brief you were given and then the comments from the client?
PH	The initial brief to develop the LTM is a matter of public record - tender was open. Once it was commissioned in 2010 I was commissioned under the framework contract we have with Metro. The client asked us to undertake work, [there was a discussion] the client reviewed it and instructed us.
GJ	That's the bit I'm interested in in - what were the objectives and purpose of modelling. Once you got the tender you responded and then the response from the client. Can you provide that?
PH	That's not for me but for the client.
NC	Just to check, not the original tender for the LTM?
GJ	No - you said following receipt of the contract we had to speak to them, they asked for so many things and we had to get it focused - I want to see what the end objectives were for the model, so that we can see them in black and white.
GJ	Now on your personal experience.... You were not involved in Sheffield?
PH	No. Heathrow Express and Terminal 5.
GJ	Any experience of modelling in respect of trolley buses?
PH	I've worked in Brisbane and Budapest models that include trolley bus, but not a new one.
GJ	Not on a scheme for introducing a new trolley bus?
PH	No.
GJ	Have you worked on the introduction of a tram scheme?
PH	Several. I worked on plans for a cross-river tram service in central London and on the Croydon Tramlink to a degree.
GJ	As a junior participant or as the lead modeller?
PH	I provided some technical advice.
GJ	Were you the main modeller, leading the team?
PH	No
GJ	When pressed about why there was no more information, you said it came down to "proportionality" - do you recall?
PH	I certainly used that word, yes.
GJ	When were you first involved in this scheme?
PH	2010 when the first tasks were to assess the performance of the LTM along the NGT corridor.
GJ	You were not involved in Supertram?
PH	No
GJ	You were familiar with Supertram as part of the context for the modelling?
PH	With what's in the press and so forth.
GJ	That's all?
PH	In terms of the details, I've no familiarity.
GJ	Supertram didn't get funding in the end - you were aware of that?
PH	Yes

GJ	When we are looking at proportionality and degrees of confidence, you were aware that it got through initial funding approval?
PH	Yes
GJ	Then Transport and Works Act inquiry and was granted T&WA consent?
PH	Yes
GJ	Funding was refused after expenditure of all that money, in short because the government didn't believe the patronage forecasts and the business case?
PH	I understand it was unaffordable
GJ	You've not looked at that?
PH	No I'm not aware of the details.
GJ	First-stage funding approval is in no way a guarantee that the government will accept the forecasts?
PH	Certainly there are subsequent stages of scrutiny.

GJ	In order to judge whether smth is proportionate, one needs to have at least 3 factors in mind, don't we. Let's say you're wrong and the plug were to be pulled at the 11th hour we'd need to know what it would cost to get to that stage, how much is at stake if I've got it wrong and I don't do this test?
PH	Yes
GJ	Also, how much the exercise would cost to do the extra analysis?
PH	Yes. It's a balance of factors.
GJ	When you make decisions, have you set out those costs?
PH	I haven't set out that cost in my evidence.
GJ	Do you even know?
PH	I have worked on similar schemes.
GJ	If plug pulled at the last minute, how much lost?
PH	Maybe 10% of the scheme costs - in this case £25m. That is the planning costs to getting on the ground.
GJ	A third factor - a delay in actually finding the right answer - another cost?
PH	It is, but a delay in developing modelling tools is also a cost.
GJ	But these promoters have had 10 years to think about models since Supertram. No evidence about how long the tests would take?
PH	Days and weeks not hours and minutes.
GJ	Small beer compared to months and years?
PH	For each test.
GJ	These factors are not set out and analysed in your evidence and it doesn't set out a proportionality case does it?
PH	I would accept that criticism.
GJ	In respect of some of the assumptions that have been made. One assumption is of particular interest to my clients which is how the model considers the response of other bus operators to NGT.
	We all know, however good your model is, if the assumptions are not robust it can't make them more robust - rubbish in, rubbish out?
PH	You're right. There is a bit of sense check I can do but you're right.
GJ	I'm anxious to know how the input works. We need Mr Chadwick's and Mr Henkel's PoEs. Henkel, section 6 "anticipated bus operator response to NGT" - paras 6. to 6.17 other operator responses. Do you have Mr Chadwick's as well. At 3.42 he talks about the team he

	oversees, LTM inputs and refers to Mr Haskins. The team has also developed an assumption relating to rationalisation of bus services.
PH	Whereabouts?
GJ	Just one sentence- 3.42, end of first bullet point at "page 18 of 76" of Mr Chadwick.
PH	I see it.
GJ	An we just start with Mr Henkel. I cross-examined him. Did you get your input from Mr Henkel as to anticipated operator responses? Or Mr Chadwick or what?
PH	Mr Chadwick's sentence is correct - his team provided me with the input.
GJ	What about Mr Henkel?
PH	You need to ask Mr Chadwick as my inputs were taken, were provided by Mr Chadwick.
GJ	At 6.7 he says "a competitive response...could involve...fares and frequency". The response he's postulating is reduction in fares ad/or increase in service frequency. Had you read Mr Henkel's proof before?
PH	Not in depth.
GJ	We're told at 6.6: "been assumed on the basis that...." It's Mr H who sets that out. The at 6.7 he says...dismisses that as a likely competitive response".
PH	Yes I can see it says that.
GJ	Is there any, so far as you are concerned, is there any link whatsoever...well, is that assumption something that feeds into the LTM?
PH	What?
GJ	6.7
PH	That is a consideration by Mr Chadwick's team but I wasn't party to that consideration.
GJ	Assuming it's right, and it would be misleading to say otherwise, isn't that the assumption input into your model?
PH	That's a question for Mr Chadwick.
GJ	No it's a question for you - pass the parcel - you've got to know the inputs to the model.
PH	The input into my model was that the service frequency would be reduced.
GJ	You were predicting a one-third reduction in patronage and suggested maintaining frequency was a serious competitive response. You're not qualified to say that - reliant on others?
PH	Yes.
GJ	Outside your expertise, you can't suggest that is a serious competitive response?
PH	Correct.
GJ	We can agree that if the assumptions about other operators was flawed, the model outputs would also be flawed?
PH	'Flawed' is a distortion. It's a question of sensitivity. The outputs would be different.
GJ	At (a) and (b) in Henkel and the bullet-points, are those the assumptions your model has made?
PH	Correct, those are the inputs.
GJ	The only sensitivity analysis done is other operators to maintain services.
PH	The sensitivity test I've done is that, and as you correctly said, I can't interpret that as serious competition or not.
Gj	If those assumptions are wrong, then the model will come out, to whatever degree, with a flawed answer.
PH	There's uncertainty in any model.
GJ	Not the Q. If the input assumptions are wrong then the output would be wrong and we don't know how wrong because the sensitivity check has not been done?
PH	If inputs are wrong and don't affect reality then the outputs will be wrong.

GJ	On the assumptions at 6.6 and sensitivity. In respect of the assumptions that are made, it's common ground that they were made without any consultation of bus operators. Did you know that?
Ph	That was my understanding.
GJ	I'm trying to see what checks you took, even rough and ready. If you see the assumptions at (a) and (b) and the 2 bullet points, I pressed Mr Henkel as to the source of the evidence. He wasn't able to direct the inquiry to the source of the assumptions. We went through 2 issues he said were confirmatory and dealt with those - Leeds-Bradford Airport and First's response to a competition investigation. Did you see any other evidence as to how these assumptions were arrived at?
PH	I was not provided with the analysis as to how they were derived. The action I took myself was to look at scale of demand reduction (about a third) and the forecasts of a decline of services of about a third. My sense-check was that the scale of delivery was of the same order of magnitude, same scale. That's how I satisfied myself that the assumptions had some foundation.
GJ	All you do is look in a mathematical way whether they look internally correct? Not check whether the assumptions are well-founded.
PH	That's correct. As you established earlier, that isn't my role or expertise.
GJ	So we're not ambushed, you've not in modelling seen any other evidence about those assumptions?
PH	Correct.
GJ	Are you aware of where Mr Chadwick explains it?
PH	No I can't point you to anything else. I don't know- doesn't mean there isn't any.
GJ	Can you agree with me, your starting position is that your model followed WebTAG guidance?
PH	I followed guidance, yes.
GJ	Difference between following guidance and not following guidance but providing a justification as to why you've not followed it?
PH	The guidance...Yes there is a difference. But where the guidance has ambiguities it's quite difficult to interpret...bites into tensions inherent in any guidance.
GJ	Where you depart from guidance for reasons, or you are unsure because it's ambiguous what it means, the role of the modeller is to set that out in the evidence and explain what you've done?
PH	I'll accept that.
GJ	To take one example of the zones. Mr Bonsall gave you the benefit of the doubt whether it could encompass a cluster of bus stops, you've not provided a justification. All had to be teased out by Prof Bonsall.
PH	I'd not accept that - I've set out the strengths and weaknesses in my model.
GJ	Not my question. We don't find set out in your evidence an acknowledgement followed by where you disagree.
PH	You're asking ...Let e take you to C-2-8. Well 4.3, page 11 where it talks about the zone system. The third sentence: "while the public transport zones would ideally be positioned...this is not the case".
GJ	Not acknowledged that you are departing from WebTAG guidance?
PH	I disagree - it does explain the WebTAG guidance is being departed from.
GJ	Can you take me anywhere where I would know that this is an admission you are not following WebTAG guidance, when you've told us at the outset that you are? First duty of an expert is not to make misleading statements.
PH	And, I think the description here is quite open and honest about the level of detail and description.
GJ	Where does it's not following WebTAG guidance?

PH	It doesn't.
GJ	You think it's open and honest. How is someone who is not a professor of transport modelling to know that you are not following the guidance? The Insp or SoS?
PH	Through the discussions we've had.
GJ	Where a claim is made by an expert that he has followed expert guidance and he has not, can't we agree that the duty of the expert is to make that clear?
PH	I think the documentation makes the strengths and weaknesses clear. We're talking semantics. The info given here explains the model.
GJ	Let's be clear. An expert who says he followed the guidance should have indicated where the approach, you say that's a matter of semantics?
PH	It does explain what has been done.
GJ	I'm not asking whether that document says what has been done.
MW	[to GJ] Where does it state that in his written evidence? [i.e. That he was following guidance].
GJ	He did state it orally. PoE para 3.36. I'm suggesting that it's critical to the credibility of your evidence. I say it is a serious flaw that we cannot see in your evidence where you have departed from WebTAG. Do you want the Insp to record that our disagreement is a matter of semantics.
PH	We could have referred to Webtag though it would have made these docs much longer.
GJ	I'm not suggesting you should in every document cross-refer to WebTAG. But you say in your proof that you followed webTAG. Statement at the outset unqualified is positively misleading. I suggest highly important and goes to your credibility?
PH	I agree that it is important.
GJ	Now you were taken to webTAG guidance that explained that crowding was a factor to take into account. You said in your judgment you didn't include it because bus companies were able to respond to crowding issues?
PH	Well that was the essence of my response.
GJ	That's because of the greater flexibility of bus operators to lay on extra uses?
PH	Or larger uses yes they can change quite quickly.
GJ	So why is webTAG saying to look at crowding on buses.
PH	WebTAG influences people's choice of route and is an imp't factor. The reason I chose not to look at it is that it introduces a penalty and suppresses bus demand. There are policies to encourage public transport. The risk is that the model would understate public transport and discourage buses. I provided figures that would predict <i>potential</i> capacity.
GJ	Well. WebTAG says you should look at crowding as a penalty and doesn't say buses should be exempt from that penalty?
PH	No. Though most of the research was on rail.
GJ	Nothing peculiar about this project?
PH	No though was something peculiar about the original objectives of the model.
GJ	One of the objectives was to reduce crowding on buses at peak times.
PH	Yes. A model that understated demand for buses would be misleading.
GJ	Is there anywhere where you have set out why you haven't followed webTAG guidance for Leeds-specific reasons?
PH	Yes C-2-8. Page 22.
GJ	Even here, you don't acknowledge you are departing from WebTAG. Where's the Leeds specific reasons?
PH	This an explanation at the time in relation to the objectives of the scheme.
GJ	None of the bus stuff is dealing with Leeds, is it - a general discussion.
PH	This is a discussion of model for Leeds. Specifically about the model <i>for</i> Leeds.

GJ	Right, you deal with rail. Then go on to modelling crowding on buses- nothing to do with Leeds particularly?
PH	Written in the general...yes.
GJ	Third paragraph- refers to the NGT <i>forecast</i> , relying on another assumption rather than referring to an empirical statement of the facts in Leeds?
PH	That's what is stated.
GJ	That's about the closest you come to acknowledging that you are not following webTAG in not modelling crowding on buses or indeed NGT. That's what you rely on?
PH	That is the thinking that was undertaken at the time.
GJ	Let's just look at it. NGT also doesn't have any crowding penalty does it?
PH	No it hasn't. I have however presented a sensitivity test to look at the scale of that.
GJ	Prof Bonsall dealt with that and we may look at it. But there's no explanation why no crowding penalty has been imposed for NGT?
PH	Yes. How the forecasts were made is in a different document C-1-8.
GJ	Here we see the explanation why there is a justification for that assumption, in this document, which is the same stage of development?
PH	The doc I'm referring to explains how the mode was developed which at the time was primarily for the Transport Innovation Fund.
GJ	This is the document that relates to the January 2014 model?
PH	Yes.
GJ	Is this where the assumption was first made- you recall that the Statement of Case had to be put in in January 2014. At that stage, all that was in the public domain was the original business case and the assumptions that supported it.
PH	The assumptions were the same.
NC	Just to e clear, Mr Jones isn't referring to 2009 but 2012?
GJ	Yes. Main point is, was the assumption set out in documentation before January 2014.
PH	Yes.
GJ	It wasn't in that document- is it in the 2012 documentation? I want to see when it was first made and what the justification was.
PH	It's wrapped up with the quality actors for NGT.
GJ	I want to trace through where the assumption was made and where we see it clearly set out so that people can understand what is going on.
PH	Representation of quality is set out at C-2-4.
GJ	This was prepared by SDG, Sept 2011?
PH	Correct.
GJ	These came from SDG did they, rather than you, AECOM?
PH	[smiles] Correct
GJ	Where do we find justification for the non-penalty?
PH	A question you may need to refer to Mr Chadwick. See - this is explained in this note.
GJ	You're fed this note. Circulation - Adam Trueman is the AECOM man - your boss or underling? File note 15th March 2011?
NC	C-2-4, Appendix A.
PH	He was on the team at the time, the analyst who would have entered the numbers.
GJ	Yu wanted to take me to table 2: "willingness to pay".
PH	That relates to crowding and can be interpreted to explain crowding.
	Sorry, that's not a note I wrote. A note from SDG advising on the inputs.

GJ	Where does it say, don't make a penalty for crowding on NGT?
PH	You're referring to a note I didn't author.
GJ	Mr Hanson, you're the modeller.
PH	If you ask me to point to a sentence that says don't make an allowance for crowding, I can't do that. If you ask, can we interpret the note and see, it does not include crowding, Prof Bonsall demonstrated that.
GJ	So you rely on this note as the source of the assumption not to represent crowding on NGT?
PH	Correct.
GJ	Do you want to take me to anything else by way of explanation?
PH	There will be nothing more specific than that document.
GJ	I want to test with you whether to any extent knocking out crowding unfairly promotes the NGT case. We don't find anywhere a note from you or your team setting out...your approach, how that approach fits with WebTAG?
PH	I can't think of anything that would specifically refer to WebTAG in the way you've described.
GJ	Anything from your team, you, the modellers, that explains why that assumption has been made? Nothing to show whether it is justified?
PH	No there's not anything.
GJ	Ordinarily, webTAG would expect a penalty to be made for NGT - not exempt.
PH	WebTAG does suggest that crowding should be considered.
GJ	If we look at SDG's note is there anything where SDG acknowledge that WebTAG does recommend it be considered but this says you should not, because..."
PH	WebTAG suggests crowding be considered and I have done a sensitivity test.
GJ	I'm looking at the central assumptions- nothing from SDG one way or the other.
PH	No there isn't.
GJ	They didn't draw your attention to it and advise you on it, did they?
PH	No.
GJ	Let's look at why you didn't include it on buses. Because of the rapid response of buses.
PH	And also because the model would understate demand for buses.
GJ	Can quickly lay on extra buses- can't do that for NGT?
PH	The business case does allow extra services and extra flexibility.
GJ	There would be 2 extra services o peak periods?
PH	That may be correct
GJ	Those spare trolley buses have to deal with a range of things- if another bus is in repair.
PH	I believe the costings allow for that. There is provision for 2 extra services.
MW	Mr Henkel says 20 vehicles and provision for 3 spare vehicles in his proof.
GJ	We went through that and it was wrong - at peak times there was provision for 2 spares. 4 off-peak.
PH	I'll accept that.
GJ	This is not highly flexible in the same way as buses.
PH	That is not my area of expertise.
GJ	Well I have to test your assumptions. Our case is that it overstates the case for NGT
PH	Not to a material extent.
GJ	Well let's take it in stages. Starting point is, big diff btwn bus operators' ability to respond to extra demand and NGT which have a maximum of 2 vehicles theoretically available.
PH	It would take the operator much longer to respond.

GJ	And less scope to add services as a maximum of 2?
PH	I'll agree that.
GJ	You are given an assumption by NGT not to add a crowding penalty- not your advice?
PH	Their assumptions on quality were given by SDG.
GJ	And your interpretation of those was not to include a crowding penalty?
PH	Yes.
GJ	I'm trying to test with you that your justification for not including the penalty for buss doesn't apply to NGT - less flexible and less scope to add capacity?
PH	That's right but they will have considered that.
GJ	If you knock both penalties out, you give NGT the same flexibility as buses?
PH	Yes.
GJ	A misrepresentation isn' it?
PH	That's your word.
GJ	I'm asking you to agree with them
PH	In the context you are phrasing it, yes I would agree with you/
GJ	And I'm not taking a different context - we looked at rail and by knocking out overcrowding, inflating the NGT case in the modelling
PH	There is that risk.
GJ	Not a risk. That's what happened?
PH	If there was significant crowding on NGT that would suppress demand and would be an effect.
MW	[11:18]. I'll adjourn for 15 mins.
MW	[11:31] The inquiry is resumed. Mr Jones, how much progress have you made and is there a likelihood you'll finish today.
GJ	Possibility I'll go into Tuesday but likelihood not. I hope. I'll give you a progress report for your note Sir. Just C-1-10 para 2.28 the Operating Costs Report states 18 trolleybuses required for Trolleybus Phase 1 which gives 2 spare. We explored it with Mr Henkel.
	Mr Hanson as I think you agreed with Prof Bonsall, taking crowding into account would have an effect for times?
PH	If so crowded that that people couldn't get on the vehicle yes. But spare vehicle would be operating at he busy period and not some other time.
GJ	Well these vehicles have to be used for other things.
PH	Well that's beyond my knowledge. If these buses were not available, if they were maintenance only, then there would be an impact.
GJ	Well now you say it's beyond your knowledge. But we agreed it's more difficult to slip in a trolleybus to meet a particular peak
PH	Well this is moving beyond my expertise but my understanding is, a company such as yours has a large fleet and ca reorganise to have more or larger vehicles. The trolleybus flee is less.
GJ	Well, the business case only has provision for anther 2 vehicles.
PH	Yes.
GJ	You can only go on what you've been fed and I just want to look at the consequences for the model. We've got Mr Robertson's evidence that once you get beyond 10, the signalling difficulties mean the benefits start declining, when you get beyond and again 11.
PH	You are correct that there can e difficulties in prioritisation. If run times were slower then demand would be reduced.
GJ	We know, these 2 would be expected to cater for special events like Headingley rugby and cricket matches.

PH	We're moving beyond my expertise but such events are not normally in the morning peak hour.
GJ	Some may be though.
PH	They might be.
GJ	There would be other places along the network where overcrowding might occur at the same time- a limit to what 1 or 2 extra buses can do?
PH	A linear service and I have shown that demand peaks in the centre. The peak of demand is between the university and the centre.
GJ	That won't be accommodated by 1 trolley bus in any event. You can't say whether 1 bs or 2 is sufficient to overcome overcrowding?
PH	There could be peculiar circumstances in theory where there are concatenations of events.
GJ	Well it was Mr Farrington's evidence that it wouldn't be so peculiar the cricket ground, but leaving that to one side it's not your evidence that that would overcome the overcrowding>
PH	Where we went yesterday was that in the busiest quarter of an hour additional capacity might be needed.
GJ	Your evidence does not go further to show that those 2 buses would deal with it.
PH	I've given no evidence on capacity.
GJ	So o evidence from you that it would solve the problem. Now you said you were reliant on the penalties Mr Chadwick gave you for the sensitivity- I think a minute or a half.
PH	I assumed they would apply to everyone including people sitting so would overstate the case.
GJ	Whose estimate?
PH	Mr Chadwick gave me the figures.
GJ	If those understated the case, the output would be incorrect?
PH	Yes.
GJ	Is how those were derived a question for Mr Chadwick or for you?
PH	Mr Chadwick.
GJ	Now, rejection of Supertram was on grounds of cost?
PH	Yes.
NC	Well the letter referred to costs not patronage.
GJ	I accept that- it's a matter of submission as to what this means. I want to correct it.
	Staying with the subject of costs. Mr Bonsall asked you about the possibility of running the model again combining for example 2 factors e.g. Low growth; higher NGT run times; and no reduction in frequency of no.1 and no.6 buses. Going back to proportionality - if you were to combine those tests again. My understanding is that if you were to run 3 of the issues that would take about half a day?
PH	No - probably about a week.
GJ	That's to do all 3 in combination?
PH	Most tests require somewhere in the region of a week or 2 weeks. Some are less and some are more.
GJ	I'm not pinning you down exactly.
PH	That sort of order, about a week.
GJ	Now WebTAG, E-3-25. TAG Unit 3.19 highway modelling. I just want to have a look at what's been done. We look at modelled areas 2.2.3 and 2.2.5. They vary - may represent the whole country.
PH	The model does represent the whole country though not in the detail as Leeds.
GJ	Then area of high level of detail - all realistic choices available to drivers.
PH	Correct.

GJ	We want a model sufficient so that the choices available to drivers is something we should be able o assess from the model?
PH	Yes
GJ	Include "particularly rat runs"?
PH	Yes
GJ	"in future years"
PH	Yes.
GJ	"most desirable" that the effectiveness of the scheme is assessed. Do you agree with that?
PH	Yes
GJ	So isn't it saying that it <i>might</i> involve more work but you do need to look in more detail?
PH	This guidance is particularly in relation to highway. If I ws looking at a highway scheme to increase capacity on the A660 then I would have said it was essential to do that. But this scheme has a very modest impact on capacity of the A660. I think it does sufficiently represent flows of more than 3 or 4 hundred vehicles but doesn't consider those in accuracy or detail.
GJ	This is a highways scheme with buses, although with overhead power?
MW	Do you accept that?
PH	The works are on the highway network
GJ	Highways scheme.
PH	Not designed primarily for car users but public transport?
GJ	Where does t say that this guidance doesn't apply to public transport highway schemes?
PH	It doesn't.
GJ	No suggestion of that, is there?
PH	No but it is guidance for the modellers to apply their judgment.
GJ	Prof Bonsall has put to you that the objectives were to increase capacity and address rat running. I won't repeat that but the highway works will have an impact on buses adjacent and across the A660.
PH	Yes the priority will.
GJ	Not picked up in your model?
PH	They are.
GJ	Not in sufficient detail.
PH	The network is represented. I've shown that delays at the junctions ar represented within tolerances.
GJ	I'm not asking that. Let's deal with buses connecting into or across the NGT corridor - was not assessed in any detail in your model. It's about journey times "in, one end and out the other".
PH	There will be inaccuracies. No biases.
GJ	That has an impact in terms of predicting the impact not just for people siting in he cars but also the residual bus network
PH	Yes, there are uncertainties.
GJ	Those uncertainties have not been assessed?
PH	No.
GJ	Why I'm interested in this is Mr Chadwick's case is that having been deprived of its profitable route, First would "spread out" to other services.
PH	The assumption in the modelling is that other services stay the same.
GJ	Your model doesn't help us with that assumption.

PH	The modelling represents to a reasonable accuracy, sets out the vehicles within tolerances in webTAG.
GJ	Where are the tolerances for buses? You've not looked at the routes?
PH	The model represents data directly from the timetable. Impacts on congestion not on the corridor are represented. And the NGT corridor I looked at the runtime.
MW	[12:03] I thought we were talking about tolerances.
GJ	What are the tolerances of your model for the timing of buses going across. What are the error rates?
PH	There is nothing in guidance that identifies tolerances or error rates for journey times.
GJ	So we have no idea what the tolerances are for our buses? Could be 50% wrong or 100% wrong?
PH	No they are not of that scale. The starting journey times are a faithful reproduction of journey times in 2008. The changes represented are changes in congestion. The changes in traffic speeds- the changes in highway journey time I have shown the scale of change.
GJ	Which is?
PH	There might be a 5% or 10% increase of journey times.
GJ	What's the tolerance of that range?
PH	At an aggregate level, relatively modest. I have presented a high and low growth forecast and that does represent an indication of the uncertainty.
GJ	Well we don't know how robust the 5 or 10% is.
PH	That change in journey time is then added to the bus journey time.
GJ	My understanding of 5 or 10% is that the bus journey will go up 5 or 10 per cent.
PH	Let's say highway journey time of 20mins- forecast 15 years into the future, adds 1 or 2 mins to the journey. Buses stop at the stops and are slower than cars. Equivalent might be 30mins for the same journey. So 1 or 2 minutes added.
GJ	That's different to how reliable that predicted change is.
	If I said, inflation is likely to go up 0.1 to 0.2 per cent, the question would then be, whether it could be 50% either way.
PH	I have done sensitivity test low and high growth which look at different levels of congestion.
	The variation shown in that- C-1-9
MW	And I'm confused - your low and high growth - were journey times <i>along</i> the corridor not across it. [GJ] And doesn't show link to congestion.
PH	Page 11, table 7, C-1-9. Average speed 26mph in low and drops to 24.8mph in high growth. I'll have to hunt further to work out what proportion of the change in speed forecast over time that relates to. Okay so also Table 28 in C-1-8 at page 27. I'll read the numbers...
GJ	That 5 to 10% is looking over the whole network
PH	It is an aggregation. It will be different for individual services.
GJ	That's right. Say I have a bus crossing from Meanwood to Kirkstall which includes going through Shaw Lane, your model doesn't pick that up - because the modelling was to look at base year and in future years - to future-proof for 60yrs plus. We can't look and see what is the impact on a particular bus route going across the NGT; only a sort of globalised assessment?
PH	Well can I come to the point using the info I have to try and answer it. The global numbers are, Table 28 in doc C-1-8. Uncertainty in growth of demand are about a quarter of the change in congestion.
GJ	That's overall.
PH	The model represents individual junctions; there are areas where there are uncertainties in it. First of all these are the scale of change. The change is of the order of 5 or 10% across the network. There are uncertainties for individual routes which reflect the accuracy of the model. And that

	scale of uncertainty - 10% plus or minus 2.5% (the uncertainty) would be larger for indiv routes. Collectively, that would not.
GJ	Is done across the area . You end up with a 5 or 10% -contingency of 2.5% and can vary. It all depends on he critical detail and pinch points of where the route is affected. You accept the contingency may be much greater than 2.5%
PH	It may be.
GJ	And the impact may be much larger than 5 o 10 %?
PH	On indiv routes yes.
GJ	And indiv bus routes may vary in their importance and value to us and to the individual users using hem.
PH	Not material.
GJ	You say that be we re talking about a minute here, a minute there, quite marginal differences. So it matters .
	Going back to guidance, do you accept it is important that we need to know with a degree of accuracy the impact on indiv bus routes?
PH	In terms of First and their operational response that is the case. In terms of a business case for NGT it is not.
GJ	For determining the likely operational response, it is not fit for purpose?
PH	No and nor has it been used for that.
GJ	Go back to Henkel's Proof para 6.6. He sets out the assumptions made in the business case about competitive responses. Elaborated 6.7 onwards. Wherever these assumptions have come from, they are not justified by the modelling work you have done?
PH	Yes, the modelling work is not suitable to develop a detailed commercial response.
GJ	Not fit for purpose for determining likely response?
PH	I agreed. Any applications would be based on judgment.
GJ	If they relied on your modelling work, they'd be wrong.
PH	I've agreed with you, if they were but I don't think they are.
GJ	I's not just for the bus operators- isn't it also important as well for residents. They also, from your modelling, it's not fit for purpose for determining their use of bus services?
PH	Well, NGT would have an effect on the bus service pattern. It's not one I'd recommend relying, not fit for purpose, for determining their commercial response.
GJ	Has there been any modelling with sufficient detail that would allow bus operators to plan a response?
PH	I'm not aware of anything else.
GJ	Before you can make assumptions about a competitive response you need to know the impacts to a sufficient detail?
PH	That's something I'd think you'd look at.
GJ	And you can't do that from your model as it's no fit for purpose?
PH	I would not use it to replan particular sections of routes, no. It's not for that.
GJ	So if my clients came to you, said there's a prospect of this NGT going ahead you'd say you needed to model to another level of detail to plan what the appropriate response would be an impacts on indiv routes?
PH	Yes.
GJ	Now, if we go back to E-3-25. The Inspector has our competing positions on 2.4.1 and 2.4.2. I want to go to 2.5, "Time Periods". Just want to explore this. You've taken a average peak hour is that right?
PH	I n terms of highway modelling no, the model represents 7 time periods.
PH	You see 2.5.3. Peaks "could represent one o the following". What has been done is each indiv

	hour. That's exactly what I've done
GJ	You've done that for the NGT corridor.
PH	Yes part of the highway network.
GJ	2.5.7 - You've not used average peak hour models.
PH	Not for the highway assignment model.
GJ	What have you used it for?
PH	For public transport modelling it's an average.
GJ	That's what was explored with Prof Bonsall.
PH	No - highways.
GJ	Can you help me with Public Transport WebTAG E-22. Can you help me please- what is the justification in terms of public transport element, for using average peak hours rather than actual peak hour models?
PH	Sorry you're directing me to the wrong unit.
GJ	Well what is the justification?
PH	Relevant unit is in E-3-16. ...[can't find it]
GJ	Why don't we come back to it after lunch. Just going to the penalties and factors that represent generalised costs of transport. -( 2.2.8 at 6): "loading factors...particularly at peak times". You see that there?
PH	Yes.
GJ	We've been through the fact that crowding isn't one of the assumptions. I want to take you to C-2-4 appendix and the SDG memo. Prof Bonsall asked how you'd approached various quality parameters and in respect of CCTV. You said you would adjust your evidence to make allowance for the fact that buses have CCTV.
PH	You mean that quality for NGT is better and certain factors are excluded, yes.
GJ	Prof Bonsall took time penalties and compared them to WebTAG. Your response was you looked overall at the penalty to see whether it was reasonable rather than split it into the components.
PH	Yes.
GJ	Isn't the difficulty then that if there is a change to an element, if you don't have regard to the components that make it up, how can you possibly come to a view that it has been properly arrived at and no bias in terms of penalties in favour of these elements?
PH	I relied on the analysis undertaken by SDG to arrive at these factors. All I have done is look independently at what NGT offers relative to bus to take the view that the parameters are of a similar scale to a substantial improvement of quality.
GJ	If you'd looked at WebTAG you'd have flagged up...
PH	I haven't tried to review or audit the SDG figures. I didn't make changes.
GJ	How does that feed into your assessment.
PH	The SDG figures are based on research in this corridor so it's relevant.
GJ	Didn't it set off an alarm that the figure seemed way higher than WebTAG? Did you not have that conversation?
PH	No I have not audited SDG work.
GJ	So hands off that you don't even look at the figures - and raise issues when they are more than double the penalties suggested by SoS?
PH	To undertake the comparison you would need I'd need considerably more info than you'd have here. There are trade-offs that people express and you want to interpret that. I don't have that info available and I haven't done so.
GJ	I suggest to you that this is a classic example where...you work with...you're familiar with WebTAG.

PH	Yes
GJ	Considerably more than WebTAG
PH	Yeah and evidence in WebTAG suggests wide ranges of tolerance on the parameters.
Gj	Didn't check whether say there was a high crime rate in Leeds?
PH	Not what I did
GJ	No real check at all?
PH	I've explained the work I've done.
GJ	Can you give an example where you were given data by SDG or assumptions and you went back and queried it?
PH	Nothing in the evidence I can point to.
GJ	You recall in your earlier modelling you had a factor of 'Th' which represented variable congestion?
PH	Yes.
GJ	Prof Bonsall was complementary about that and said no doubt the Dept liked that. When was hat removed?
PH	The direct link for traffic directly along the corridor and NGT was removed in January this year. The reason was the important factor is the differential between bus runtime and NGT and this provided more certainty.
GJ	Who in your team suggested that? Or was it SDG?
PH	I can't recollect.
GJ	Removed at a late stage. Not raised by the Dept?
PH	No.
GJ	Was it raised by sb in your AECOM team?
PH	The work was probably commissioned about a year ago. There have been discussions and it was raised about 6 months ago.
GJ	Would I be right that the first suggestion was from outside AECOM and by SDG?
PH	May be right. There was a discussion.
GJ	That's something you could check your notes on?
PH	Not something I could check.
GJ	As a modeller it's surprising and at a late stage. I do have to press you on it.
PH	I honestly can't remember who actually proposed it but it is one I agreed with.
GJ	Is it something that was suggested to you?
PH	It will have been...it must have been discussed.
GJ	It wasn't you who first suggested it?
PH	No.
GJ	Someone outside AECOM team?
PH	Not necessarily.
GJ	Who else was working with you?
PH	Would have been a discussion between AECOM and SDG.
GJ	Not originally suggested by you but agree by you.
PH	I really cannot recollect the discussion.
GJ	Not raised by you ff you own bat?
PH	[pauses, closes eyes]. I honestly cannot recall whether I made that suggestion myself.
MW	Should we have a shorter lunch or would you not finish today? I'm inclined to have a normal lunch and finish at 3 whether you are finished or not. Not fair on Mr Hanson- lots of work.

	Adjourn till 2. [13:01].
MW	[14:00] Inquiry has resumed.
GJ	Hope to finish either entirely or very close by 3pm. Did you have a chance to think about the question.
PH	I have -it's E-3-15 on time period. It is on model structure, section 5.8 at page 21. First 2 paragraphs are most relevant.
GJ	Reads: "splits should be made btwn peak and off peak...chosen to relate to operating practices". Is that something that informed your decision?
PH	It is. If you look at C-2-8 section 4.7 on model development gives specific reference.
GJ	That you say justifies taking an average approach. That's helpful for me to know.
	Now, I'd suggest you've been unfair to Mr Cheek though I've not spoken to him on it. In evidence in chief you were taken to your forecasts on P&R and whether it was filled up after 5 or 11 years. The predicted capacity is about 850 - Bodington?
PH	Erm, 850 or 880, high 800s.
GJ	On your predictions you said it was getting to 840.
PH	Yes
GJ	But we have to make clear that the tolerance levels are 50% either way. So you can't say Mr Cheek is wrong either way - looking at a difference of 10 on a forecast that on your own evidence could be wrong either way?
PH	I would agree the car park is full. The capacity of the car park would constrain demand.
GJ	Well it works both ways. As the tolerance is 50% either way, no idea whether Mr Cheek is right or wrong?
PH	The assertion that capacity is exceeded is wrong. The central forecast is that capacity is not exceeded but there is wide uncertainty either way.
GJ	Okay, well you say it's wrong but if you were giving the inspector a complete answer you'd have given the inspector that there was 50% tolerance either way.
PH	I think my proof was explicit about it.
GJ	Is n't it useless - not much help that degree of tolerance.
PH	That is the accuracy I can give. You may wish more precision but all models have uncertainty.
GJ	But if - and it's an important part of the promoters' case - the attractiveness of the P&R
PH	The use of the P&R. Not the input assumptions.
GJ	All right the predicted use of P&R could be wrong 50% one way or the other - Insp cannot place much faith on it?
PH	The faith is that level of confidence. In any new facility there would be a good deal of uncertainty.
GJ	More work could have been done to give more certainty?
PH	Yes.
G	Why wasn't more work done to get to a meaningful level of certainty?
PH	I think a reasonable amount of work is done.
G	Well it could be 50% higher?
PH	Yes.
GJ	Negative consequences.
PH	Clearly the excess would suppress demand for the car park.
GJ	Equally likely that the forecast use will not be met by 50%.
PH	That is correct.
GJ	Would have significant effects on the benefits of the NGT.

PH	It would have effects.
GJ	Has the effect of that been assessed
PH	A Q for Mr Chadwick
GJ	You've not run the model with 50% lower use of P&R?
PH	No a question of business case for Chadwick.
GJ	It will be our case that the impacts of construction need to be assessed in EIA and before the inspector. In terms of your modelling, your model hasn't been set up, you haven't modelled impact of delay and congestion during construction period?
PH	No.
GJ	From the model, it's impossible to tell w/o further adjustments or work what the impacts of construction/blocking up roads would be?
PH	Yes
GJ	What would you need to do to model what the likely impact in and around NGT corridor would be in the construction period?
PH	I understand. I'd need to understand the scale of them. The model should be proportionate to the task - need to know about the nature of the construction, duration, how it's organised.
GJ	Perfectly fair.
	Can I please turn to C-2-9 please on section 3.4 page 11. NGT Model Validation Report. To confirm some matters. Am I right to understand that shows the passenger transport model is validated only from 7 in the morning to 6 in the evening?
PH	The public transport model, that's correct.
GJ	Not for the rest of the day.
PH	No, no separate network for travel say after 6pm.
GJ	Page 13, section 3.7. Refers to 100 roadside interview surveys, 4 of which were on the corridor. Doesn't say how long the surveys were done for?
PH	We'd need to refer to Doc C-2-3- surveys are typically for a 12 hour day.
GJ	Carried out when?
PH	Most in 2008. Some in east of Leeds in 2009.
GJ	No update since 2008?
PH	There has been no update.
GJ	Only 4 are on the NGT route?
PH	They capture the pattern of travel across Leeds, yes.
GJ	Rather thin data for NGT corridor?
PH	No I don't accept that.
GJ	So 4 roadside surveys dating back to 2008?
PH	That is the approach set out in guidance. Says to set up screenlines across the route and that's what we did.
GJ	The guidance doesn't endorse only 4 surveys on the route and data of that age?
PH	Those are your words. I wouldn't agree.
GJ	Has any check been done to see whether there's any reason to update the data of 2008, whether there's been any changes? There's been 6 years.
PH	In a note submitted- Tuesday or Wednesday - I set out the guidance on the age of guidance.
GJ	That's not my question.
PH	There has been no review.
GJ	Either in respect of the age or the extent of the data?
PH	No.

GJ	At 4.2, says "a total of 6 screen lines...calibrated and validated against"- adjusted to an average weekday in October 2008. Then page 25, table 3. LDS J7.
	How do we know that the 12 hour count on 2nd June 2009 is typical and representative?
PH	We don't.
GJ	Can we look across. Comments. "the confidence...less than the other counts".
PH	That refers to the split between cars and HGVs.
GJ	So to take a step back - 1 set of automatic counts and 1 set of manual counts. In which at least in this one, reduced confidence?
PH	Yes.
GJ	None been repeated or updated since 2008?
PH	No the model hasn't been updated since 2008.
GJ	Let's look a bit further- highway journey times. Says validated between modelled and observed. Explains in relation to table 4. Journey times says shown in table 4. Then we see at the end, above table 4 this comment: "this is unlikely to be a true representation".
PH	Yes - a comment that the observed journey time between 7 and 8 am is subject to particular uncertainties.
GJ	Yes- a lot of reliance on observations.
PH	A limitation with the data.
GJ	Do we find out where they are taken and over what time period?
PH	I can't give exact references here - data collection report is E-2-3 - almost certainly in Appendices to it.
GJ	So if we go to the appendices will tell us when they were taken and over what time period?
PH	I believe that is the case. I believe quite a comprehensive report but may have omissions. Don't think so.
GJ	It admits a bias.
PH	It states the limitations. As an aside in terms of validation this is the only hour that the model performs poorly, I accept in part because of that limitation.
GJ	Yes but when Insp is looking at it, it comes back to theme of Prof Bonsall, we have to expect the same level of precision and clarity that the promoters would be expected to produce in a different context for funding?
PH	In any set of data or forecasts there will be uncertainty.
GJ	With more work the magnitude of the uncertainty reduced and the certainty enhanced?
PH	That is absolutely true but proportionality is central to the approach that has been taken.
GJ	Do you know if the Promoters will use this level of detail when asking for funding, or not?
PH	My answer is, if this project is to be taken forward at this point in time, I wouldn't be expecting a substantial update, enhancement, refinement, whatever you want to call it.
GJ	So you're saying you could go with this.
PH	I'd be quite happy to present the forecasts we've produced.
GJ	You know don't you that the Department will bring out its team of Professor Bonsalls to take you to task, but not for the Inspector to ferret out the details - should all have been set out?
PH	The limitations are set out in the documents.
GJ	The more limitations the less confidence we can have in the forecasts.
PH	True.
GJ	Have these come as a surprise to you?
PH	There's nothing that's been raised that isn't mentioned in my proof.
GJ	That's frankly not true is it?

PH	I explained what I wouldn't have done.
GJ	We can agree that the Inspector has to look at all the limitations both individually and collectively?
PH	Yes
GJ	A number of errors 5% here, 10% there might cumulatively undermine the confidence in the model?
PH	That's a reasonable hypothesis.
GJ	Go back to 4.5. "public transport passenger counts". Again, the counts, we see Figure 11 and "counts were collected as vehicle counts" and p.28- as a result of the single day count the confidence would not have been as great as collecting data over several days.
PH	Correct.
GJ	Multimillion pound scheme even before we get to build it= are we saying not proportionate to have more than a single day count?
PH	The set of data was far more extensive than just that count.
GJ	Mr Haskins was cross-examined on demographic changes since 2008. The Inspector asked during Cllr Anderson's cross-examination whether he updated for demographic changes and he said up-to-date demographic data was used where available- a question for Mr Hanson. Was asked about changes in student population. And people living outside the Bodington P&R. Said a question for Mr Hanson to address. How can this data if it hasn't been reviewed reflect changes in demography?
PH	C-1-8 appendix A sets out a schedule. Sets out the developments that have happened and are expected.
GJ	Doesn't address my point about changes in concentration of students that used to exist in Headingley and movement away to the City Centre. That has an impact on public transport usage?
PH	Yes it does.
Gj	Doesn't help with that.
PH	Tells us where population changes.
GJ	No it doesn't - tells us the permissions granted and completed. Doesn't deal with shifts of population.
PH	Some representation of that.
GJ	Rough and ready.
PH	I would agree
GJ	Thing to do is go out and do surveys properly an update them?
PH	That exceeds requirements of guidance. We're looking at a 20 year horizon so updating changes over a 5 year period would not be proportionate. The document comprehensively sets out the limitations.
GJ	Don't you need a clear and accurate baseline before you start forecasting over a 20 year horizon?
PH	Let me take you to C-2-3. We may exceed the 15 minutes left.
GJ	I'm not objecting.
PH	What we discussed was a selection of data available that was independent at the time, to test how the model performed at the time it was prepared. The data used to <i>develop</i> the model was a far more comprehensive set out surveys from across Leeds. Perhaps it's simpler if I refer...I summarised the data in my proof at s.3.18. The scope was comprehensive and large and a good survey programme.
GJ	Firstly, across Leeds as a whole not the NGT area?
PH	Yes what we had.
GJ	The data used to design the model must have been older than the data used to validate it?

PH	Collected at the same time it is a dataset. It is an important input. With all models there are limitations.
GJ	Well we've explored the limitations of the data there is and we've been to Appendix A.
PH	The other aspects of the development are the DfT's TEMPRO forecasts of popn growth.
GJ	Govt's forecasts do not look at distribution of students within Leeds?
PH	They give the ages but no they don't.
GJ	So if you are seriously looking at shifting people from buses onto NGT trolley buses...
PH	Well...
GJ	It makes very little difference to modal shift from the cars on the A660 into NGT?
PH	I have taken tables that show the modal shift in the corridor which is quite significant but it back-fills with cars.
GJ	Most of your predicted passengers come from bus?
PH	Yes that's what the tables show.
GJ	So it's really important to know the locations of the people most likely to use public transport and where they live in the city. Apart from older people, students are a big component?
PH	Yes - surveys suggested between 10 and 15% of the users on the corridor.
GJ	There has been a change since 2008 in where students live in the city - not reflected in your model is it?
PH	In precision, no.
GJ	Important because 10-15% of those using the bus on the corridor on your evidence are students. So not, in the context of what we're talking about to promote the case on the trolleybus that the model should be able to capture change in distribution of students?
PH	No. Because of the adjectives you've used. Students and changes where they live will be a factor that influences demand. If a student doesn't live there and a family lives there, will still have a choice whether they use NGT. Whether that would influence the choice...
GJ	You just don't know.
PH	I cannot give you a number but it is unlikely to be substantive. The data indicates there has been an increase in students in the centre but not in the total no of students on the corridor.
GJ	No reports I've seen that are before the inquiry modelling the shift in student popn.
PH	There have been refs to the documents, I don't know if they are before the Inquiry. The total no of students attending the Unis have increased. There has been a corresponding increase in students in the city centre.
MW	Does that mean no change in the corridor?
PH	That's what I understand from these reports.
MW	Just a difference in the proportions?
GJ	You're not able to identify the reports before the Inquiry?
PH	I think both Professor Bonsall and I have referred to the same report.
GJ	You say the numbers overall are the same but that's different to whether Headingley numbers have changed.
MW	Mr Hanson, do you really know?
PH	I think it may be best to say, no I'm not aware of docs with any precision or whether they exist.
GJ	You see their location could have a massive impact on their use of the NGT provision. With my other hat on, from College of Art, they have noticed a great difference because the students now live around the City Centre and can walk to the Uni. See what I mean - if total in "the corridor" is the same or expanding that's different?
PH	Yes. I've explained the assumptions made.
MW	I don't think you've answered the question and you haven't the evidence to answer the

	question - haven't the document here?
PH	No.
GJ	Just taking this one example. Given that the main shift to justify the patronage is from my client's buses to the trolley bus and the students make up at least 10 or 15% of it based on 2008 figures, it's imp't to review them, now given passage of time 6 years and at least strong anecdotal evidence that the patronage group may have shifted away from the corridor?
PH	It's right that the students are a patronage group that may have shifted away- or not. And I've no doubt the owners of the housing stock will have rented them out and the people living there will still want to make journeys.
GJ	You recognise that diff't groups are more or less prone to use public transport.
PH	Yes
GJ	One group more prone to use them - students?
PH	Yes.
GJ	Higher density of occupation?
PH	[Smiles]
GJ	Secondly, a family ordinarily may be less likely to use public transport?
PH	That may be right.
GJ	You can't just assume "oh well it doesn't matter"
PH	I didn't say that.
MW	Would it be quite important?
PH	If there was a 50% change in students - a <i>huge</i> change - a 7% change in bus demand. Some would be made up by others so perhaps a 5% change of patronage in NGT. That's the scale.
MW	Is that important, quite important or what?
PH	I don't think 5% change in the patronage would be a significant change that I would need to take into account in the forecasts specifically.
GJ	Nothing setting out all the inaccuracies that show cumulatively what effect that can have on confidence.
PH	We have done a "low growth" scenario.
GJ	Based on your modelling evidence, it cannot be said it's more likely than not that the predictions forecast in the model are going to come about?
PH	I'm sorry, the forecasts represent in my view reasonable assumptions. I am very near certain that the forecasts I have set out will not happen. There will be a range around them. It's not biased one way or the other. May be appreciably higher or lower either way.
GJ	No sensitivity test showing confidence how appreciably higher or lower they may be?
PH	I've not set that out, no.
GJ	All we have is may be appreciably higher or lower and we don't know how likely that is or how much?
PH	I have set out some sensitivity tests and some would combine but about 5 or 10%.
GJ	You have to go through each to see what the margins are.
PH	Yes
Gj	What you haven't done is say, we can't look and say overall how likely is it that there's a range of deviation overall.
PH	I haven't set that out, no.
GJ	Thank you.
MW	A couple more people to ask questions. Might be helpful to brief Mr Longley who's not here.
NC	Would be helpful and also with Mr Longley we cannot see what in his evidence goes to Mr Hanson.

MW	He's representing a lot of small businesses and raising questions put to him by them. I'm concerned to hear them. Then Mr Chadwick.
NC	I've got APP-130 - it's a note produced by Mr Haskins on consultations that was requested some time ago.
MW	Inquiry will resume 10 o'clock next Tues.