

Application by Highways England for an Order Granting Development Consent for the M4 Junctions 3 to 12 Smart Motorway (Case ref. TR010019)

Agenda for issue specific hearing dealing with matters relating to the environment

On 14 January 2016 interested parties and others were notified that an issue specific hearing dealing with matters relating to the environment would take place on **Wednesday 10 February and Thursday 11 February 2016** at the **Holiday Inn Maidenhead/Windsor, Manor Lane, Maidenhead, West Berkshire, SL6 2RA**. The hearing room will be available from 9.30am and the hearing will commence at 10.00am on both days. On Wednesday 10 February the hearing is expected to adjourn by about 5.00pm. It will resume at 10.00am on Thursday 11 February and is expected to close by about 5.00pm. In order to ensure that those attending the hearing can make the best use of the time, we have prepared an agenda as attached.

Administrative arrangements

If you did not do so by the pre-notified deadline, it is vital for parties intending to attend to now give prior notice to the case team of who will attend, who will speak and which points they wish to address. In accordance with Rule 14(3) of the Infrastructure Planning (Examination Procedure) Rules 2010 (as amended), any oral representations should be based on representations previously made in writing by the particular participant.

Please provide your interested party reference number in any communication and mark it for the attention of the M4 Junctions 3 to 12 Smart Motorway case team.

Agenda for issue specific hearing dealing with the environment

10 and 11 February 2016

A. NOISE AND VIBRATION

1. *Working hours at the weekend*

Re question 4.7.1 of Examining Authority's (ExA) second round questions PD-011 regarding working hours at the weekend:

- i. Would the applicant and London Borough of Hillingdon (LBHill) please state the current position, and whether agreement has now been reached?
- ii. Although the applicant says that consultation is mandatory prior to approval of the Construction Environmental Management Plan (CEMP), would the applicant please clarify how stakeholders' views, including those of the local authorities, would be taken into consideration, and when?
- iii. Since it also appears that the CEMP may be revised by Highways England (HE) at any point, and although the local authorities would be consulted, what provision will be made in the draft Development Consent Order (dDCO) to prevent HE unilaterally altering the CEMP?
- iv. What additional controls and/or consultation is LBHill seeking through the CEMP that are not available to the council through section 61 applications?

2. *Night time noise during construction*

Re question 4.7.2 of ExA's second round questions:

- Would the applicant and local authorities – notably Slough Borough Council (BC), South Buckinghamshire District Council and LBHill, but not excluding other councils - please state the current position and whether agreement has now been reached?

3. Enhanced Noise Mitigation Study (ENMS)

Re question 4.7.3 of ExA's second round questions regarding the Enhanced Noise Mitigation Study (ENMS)¹, the applicant has published its ENMS which includes a number of mitigation measures, EM1-EM34. The applicant has also, in its response to the second round questions, addressed the ten issues raised by affected and interested parties.

- i. Would these parties, and any other parties who may wish to do so, please provide their observations on the ENMS?
- ii. Would the applicant please confirm that where the Significant Observed Adverse Effect Level (SOAEL) is exceeded for night or day time that the scheme will not make the situation significantly worse?
- iii. Would the applicant please confirm the status of the draft Transport Analysis Guidance (TAG) monetization guidance? Has it been adopted as national guidance? How are the health benefit values derived? Has this approach to determining the costs and benefits of noise reduction barriers been used on any other schemes?
- iv. Do the local authorities agree with this cost-benefit approach being used to determine which areas should have additional barriers?
- v. Would the applicant please state how the delivery of the recommendations for additional and enhanced noise barriers in the ENMS will be secured in the dDCO?
- vi. Would the applicant please state what will happen if calculated reductions in noise levels in the ENMS do not occur? Will there be any long term monitoring to verify the output from the model? Would any additional mitigation be proposed if the predicted noise reduction levels were not achieved?

¹ Available here: <http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010019/Events/Deadline%20V%20-%202008-01-2016/Highways%20England%206.zip> and here <http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010019/Events/Deadline%20V%20-%202008-01-2016/Highways%20England%209.zip>

- vii. Would the applicant please state when and how proposals to reduce localised effects (such as those at Thames Bray) will be considered? Are these proposals aspirations or firm commitments, and in the latter case where in the dDCO will they be secured?

4. *Single-sided noise barriers and noise reflection*

Re question 4.7.4 of ExA's second round questions:

- i. Would LBHill, Mid and West Berkshire Local Access Forum, and Arborfield and Newland Parish Council please provide their observations on the applicant's response?
- ii. Would the applicant please state what validation has been carried out (not necessarily by the applicant but more generally) for the assumptions about reflectivity in the Calculation of Road Traffic Noise (CRTN)?
- iii. Would the applicant please state how it was determined which receptors would be exposed to elevated noise levels due to noise reflections?
- iv. Since there would appear to be no response from the applicant to the Mid and West Berkshire Local Access Forum's issues and requests with regard to extra safety barriers and the cattle creep crossing REP4-020, unless they've been provided elsewhere, would the applicant please respond to these points?
- v. Would the applicant please state whether high performance absorptive barriers will be used where existing barriers are being replaced under the ENMS, as well as where completely new barriers are being put in place?

5. *Low-noise surfacing*

Re question 4.7.5 of ExA's second round questions:

- i. Can the applicant please state whether requirement 5 in Schedule 2 of the dDCO will be made specific, so that the minimum 15-year maintenance period for low-noise surfacing is secured?

- ii. Is the deterioration in noise reduction one of the factors that would be taken into account when deciding the timing for whether to replace the road surface? If so, at what frequency will the deterioration in noise reduction be measured, at which locations, and how will this be secured in the dDCO?

B. VISUAL IMPACT

1. The 15m high concrete batching plants referred to in Night Time Lighting Assessment (submitted at Deadline III) ^{REP03-009} are not mentioned in Chapter 8 of the Environmental Statement (ES) and the Panel is concerned that the impact from this feature, including the impact from night time lighting on sensitive receptors has not been assessed.
 - i. Can the applicant confirm if this was assessed in the Landscape and Visual Impact Assessment?
 - ii. Has the Zone of Visual Influence taken into account the potential for 15m high concrete batching plants, in order to have assessed the worst case scenario?
2. Paragraph 5 of the Explanatory note to clarify the position on lighting columns (submitted at Deadline V), states that the revised heights have been considered by the landscape architect for the scheme who predicts no perceptible change to the visual impact.
 - Can the applicant provide further details of how this conclusion was reached?
3. The use of lighting columns up to 16m high has not been discussed in the ES.
 - i. Has the Zone of Visual Influence taken into account the inclusion of lighting columns which may be up to 16m high?
 - ii. Can the applicant provide plans showing the locations of lighting columns which are proposed to be higher than 12.9m?
 - iii. In locations where the applicant intends the columns to be higher, does this mean there will be fewer columns? Or are the numbers proposed to be the same?

4. With regard to the applicant's Deadline V response to Reading Friends of the Earth additional written representations² the following questions are raised:
- i. At para 2.15.7 it is stated that the photobiological effects of light will be secured through the use of neutral or warm white LED sources. However para 2.15.9 states that warm white LEDs will not be used in the Scheme. How will photobiological effects be reduced?
 - ii. Para 2.17.3 states that new columns are to be used for the lighting of the scheme with the luminaires installed horizontally to reduce potential glare. However the applicant has stated that existing columns are to be re-used and a new requirement is being proposed in the DCO to enable existing columns to be re-used. If this is the case, how will horizontal installation of the luminaires be secured, and has the impact on glare arising from the use of existing columns been assessed?

C. TRAFFIC FORECASTING

1. *Traffic forecasting scenarios*

Re question 4.9.3 of ExA's second round questions regarding traffic forecasting scenarios:

- What are the applicant's quantified confidence levels, expressed as a standard deviation around a mean, for the traffic forecasting scenario that predicts the most onerous conditions for air quality – i.e. the worst anticipated case?

2. *Traffic modelling assessment reports*

Re question 4.9.4 of ExA's second round questions:

² Available here: <http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010019/Events/Deadline%20V%20-%202008-01-2016/Highways%20England%203.zip>

- Would the applicant please state the position with regard to ExA's request for a copy of the traffic modelling assessment reports by the HE Traffic Appraisal, Modelling and Economics (TAME) Appraisal Certifying Officer and the Department for Transport (DfT) Transport and Strategic Modelling Team?

3. *Uncertainty in modelling*

Re question 4.9.7 of ExA's second round questions regarding uncertainty in modelling:

- Would the applicant, Buckinghamshire County Council, and LBHill please state the current position with regard to dialogue between the applicant and the two councils, highlighting areas now agreed, areas not yet agreed and proposals for action? Is the Construction Traffic Management Plan (CTMP) tabled at Deadline V now satisfactory from the Councils' points of view?

4. *Effects on local road networks*

Re question 4.9.9 of ExA's second round questions regarding effects on local road networks:

- Would the applicant and other interested parties please state the current position with regard to dialogue between them, highlighting areas now agreed, areas not yet agreed and proposals for action?

- 5.** Re question 4.6.8 of ExA's second round questions regarding future proofing for the M4 Smart Motorway, the applicant has argued that the traffic and air quality forecasting is sufficiently robust, and that '*there is no need for air quality mitigation measures*', nor '*a need for a scheme-specific monitoring strategy*' as a future proofing measure in the DCO '*as there are no significant impacts predicted*'.

HE confirmed in answer to second round question 4.6.2 iii that the outputs from the traffic model for do minimum and do something for 2022 have been used in the air quality assessments for the scheme. In order to further assess whether it would be appropriate to allow for a level of uncertainty in the air quality forecasts, the ExA is considering the basis for the traffic forecasting in more detail, and will ask questions at the hearings concerning the following topics:

- Choice of traffic forecasting model form
- Matrix development and data sources

- Model validation

Documents to be referred to in questions:

- Traffic Forecasting Report (TFR) Oct 2014 (Deadline 1 Doc 3, Appendix 1) REP1-003
- Local Model Validation Report (LMVR) May 2013 (Deadline 1 Doc 3, Appendix 7) including pages 18, 21, 40, 43, 52, and 73; Section 2.7 including commentary re. Fig 2.20; Section 3 and Section 5 Figure 5.1; Section 5.4.4 matrix validation pages 57 and 59; Section 5.5/5.6; Section 5.6.2; Section 7.7 p.101; Section 8.1 p.102 REP1-003
- TAG M2 Section 4 (4.4/4.5) and Section 5 (5.1/5.6); TAG Unit 3.19 (Now Unit M3.1) para 8.1.1

D. TRAFFIC SAFETY

1. Comparative Measurements from M25

- Would the applicant please provide an update on the measurements that are underway on the M25, as discussed at the first M4 Smart Motorway hearings in November 2015, and due by January 2016?

E. AIR QUALITY

1. Re question 4.6.8 the applicant states at paragraph 14 that the '*scheme is assessed as not having a significant air quality impact it is, however, still likely to lead to some worsening at a small number of properties*' REP5-004. At response to question 4.6.6 10 receptors are predicted to be above the annual average NO₂ objective (B867-B871, B877-B880 and X9). The applicant states that only two of the ten receptors would be considered as part of the overall evaluation of significance (X9 and B867) as they have changes greater than 0.4µg/m³.
 - Can the applicant confirm that these are the only receptors forecast to exceed the annual average NO₂ objective? Can the applicant also state what mitigation measures are proposed at these locations?

2. In response to oral hearings issues from LBHill at para 1.33.2^{REP5-005} HE gives the range of concentration of the annual mean NO₂ measured as between 1.9 and 9.3µg/m³ with a standard deviation of between 0.9 and 3.5µg/m³.
 - If the data used in the modelling has this level of standard deviation, can HE explain how these, and other, standard deviations of data are reflected in the output of the model?
3. Within the response to oral hearings^{REP5-005} HE comments on LBHill's consultant's review of the methodology for calculating air quality impacts.
 - Is LBHill content with the response from the applicant? If not, what are the outstanding concerns?
4. Within the response to oral hearings^{REP5-005} HE comments on Slough BC's consultant's characterisation of Future NO₂ Concentrations in Slough, particularly concerning uncertainties in the modelling.
 - Is Slough BC content with the response from the applicant? If not, what are the outstanding issues and areas of disagreement?
5. Slough BC requests that the assessment of Air Quality for Construction Compound 9 (CC9) should be in accord with Institute of Air Quality Management (IAQM) guidance^{REP5-005, Additional Evidence of Slough BC, para 8.5 p24}. The ExA notes that the applicant uses the Design Manual for Roads and Bridges (DMRB) since the IAQM guidance is not intended for highway schemes promoted by HE. However, CC9 is within an air quality management area (AQMA), it is separate from the M4 in which highway works are be carried out, and is located within a residential area.
 - In these circumstance would it not be appropriate to use the IAQM guidance?
6. The continuing uncertainty regarding real driving emissions was referenced in the Defra document 'Improving air quality in the UK – Tackling nitrogen dioxide in our towns and cities'^{REP5-004, Appendix E}. Within that document a press release from the European Commission dated 28 October 2015 was referenced which said '*currently produced Euro 6 diesel cars exceed the NO_x limit 4-5 times (400%) in real driving conditions compared to laboratory testing*'. A further document 'Real-world Exhaust Emissions from Modern Diesel Cars', Vincente Franco et al, October 2014 referenced by HE^{REP5-005} states that '*the average on road emission levels of NO_x were estimated at 7 times the certified emission*

limit for Euro 6 vehicles. Within the paper the worst performing car was identified as having a conformity factor of 25.4, i.e. 25.4 times the certified emission limit.

- Can the applicant and the local planning authorities give their considered views on the possible impact of these figures on the modelling of the scheme currently and in the future?
- 7.** In response to question 4.6.3 at 3ii Table 2 the applicant gives NO_x emission rates for a single diesel car.
- Can HE confirm if these represent the levels adopted in the air quality assessment? If so, how do they compare to levels using 5xRDE and 7xRDE as indicated in the documents referred to in the preceding question? What difference would it make to the outcomes of the HE assessment if the levels were increased to those referred to in the Defra and the paper by Vincente Franco et al referenced in the preceding question?
- 8.** In the technical report issued with Defra's document 'Improving air quality in the UK - Tackling nitrogen dioxide in our towns and cities' at section 6.1, the issue that vehicle performance and emissions in the real world have not corresponded with those measured in the European test cycles is considered. An alternative scenario was modelled based on the assumption that emissions would be higher than previously predicted and the comparative results are presented in Table 6.1. This shows that the number of zones not meeting the limit value in 2020 would increase from 8 to 30 if the Euro 6 emissions do not perform as modelled.
- Can the applicant and the local planning authorities give their considered views on the effect on the relevant zones within the scheme if this scenario is realised and what measures should be taken to mitigate the effects? In addition, the views are sought on how this would affect compliance of the zones within the scheme with the National Policy Statement for National Networks (NPSNN) at paragraphs 5.10 – 5.13.
- 9.** The applicant refers to the Emission Factor Toolkit in several of its responses to ExA second questions REP5-004, for example question 4.6.3. The ExA needs to understand the assumptions and options selected from this toolkit by the applicant in the modelling.
- The applicant should be prepared to give further explanation on the options selected, including advanced options, with a reasoned description and the effect these selections might have had on the output of the models.

- 10.** In response to question 4.6.8^{REP 5-004} at paragraph 9 the applicant states that it has not been able to consult with the eleven local authorities in time for the 8 January Deadline V and hence has provided an initial response.
- Have any discussions been held with the local authorities concerning future air quality issues? If so, which local authorities have been consulted, what has been discussed, and what are the outcomes?
- 11.** At paragraphs 16 and 17 the applicant states that it does not agree that a requirement on future proofing is necessary proportionate or appropriate in respect of the scheme. It goes on to state that HE *'is looking to achieve improved air quality across the Strategic Road network.'* In the Highways England Licence^{REP4-005} the aims and objectives are listed at Part 4 and states that *'the Licence holder **must**, in exercising its functions and complying with its legal duties and other obligations, act in a manner which it considers best calculated to:*
- a. Ensure the effective operation of the network;*
 - b. Ensure the maintenance, resilience, renewal, and replacement of the network;*
 - c. Ensure the improvement, enhancement and long-term development of the network;*
 - d. Ensure efficiency and value for money;*
 - e. Protect and improve the safety of the network;*
 - f. Cooperate with other persons or organisations for the purposes of coordinating day-to-day operations and long-term planning;*
 - g. Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment;*
 - h. Conform to the principles of sustainable development.'*

4.2(c) is further defined in paragraph 5.6(c):

'Provide for sufficient flexibility and future-proofing in planning the long-term development and improvement of the network, taking account of long-term trends, uncertainties and risks - including new and emerging technologies and long-term trends in climate and weather conditions.'

- As the terms of the Highways England Licence specifically states that future proofing must be taken into account can the applicant clarify why it does not see the need to incorporate future proofing for elements such as air quality, climate change and other uncertainties and risks into this scheme such as by requirement in the dDCO?

- 12.** IAN 175/13 para 2.4 discusses exceedance levels. Whilst exceedances of less than $0.4\mu\text{g}/\text{m}^3$ are considered to be imperceptible, any exceedance above that level would indicate a risk that a new exceedance in excess of the EU Limit Values would be created. There are a number of locations along the route of the scheme where the exceedance is forecast to be within an imperceptible range, but these results depend on the emissions limits adopted in the assessment being attained. The ExA considers that there is a high level of uncertainty in the future emission levels that will be achieved for Euro 6/V1 vehicles, which in addition to the usual uncertainties which must be inherent in any modelling exercise, give reasons for the dDCO to provide safeguards in the event that emissions levels are higher than the level adopted in the M4SM assessment.

Sections 4.2(c) and 4.2(g) of the HE Licence set out the duties and the obligations of the company regarding long term development and minimising environmental impacts of the network. However, the ExA is not satisfied that these duties and obligations are sufficiently targeted to ensure that measures would be taken to secure mitigation for the M4 scheme in the event that the levels forecast in the air quality assessment are not achieved.

- The applicant is requested to reconsider the potential for mitigation measures against breach of EU Limit Values as a result of the scheme which could be included within the dDCO, and which would be in accordance with the terms of the HE Licence.

- 13.** In response to LBHill_{REP5-005} at 27 HE states that a monitoring scheme for the scheme would be challenging as total concentrations of pollutants will relate to elements out of HE's control. Elements such as realisation rates of new vehicle uptake into the national fleet, vehicle emission technology performance etc are listed.

- i. Can the applicant clarify why these elements would be a challenge as it has previously stated that these elements have been taken into account in its modelling process?

HE goes onto say that the background air quality includes contributions such as industrial and power emissions etc. However, the Defra air quality plans state that 80% of NO₂ emissions in the UK are from transport REP5-004, Appendix E

- ii. Can the applicant explain why then background air pollution from other sources cannot be estimated and factored into the monitoring results?

F. WATER ENVIRONMENT

1. DCO requirements

In the Statement of Common Ground (SoCG) with the Environment Agency (EA) REP5-002 at 4.3 it states that the wording of requirements relating to floodplain compensation and maintenance, water quality, biodiversity management and the CEMP have still to be agreed.

- i. Can the applicant and the EA provide an update on the wording of these requirements (R8, R14, R23, and R26)? Where there has been agreement, the wording should be submitted?

At 4.4 of the SoCG, the EA has reserved its judgment on the potential mechanism for discharging the requirements of the DCO involving the Secretary of State.

- ii. Has the EA reached a formal position? If so, the EA is requested to provide it.

2. Flood Risk and mitigation

At 4.6 of the SoCG the EA did not agree that the Flood Risk Assessment (FRA) adequately assessed the fluvial flood risk, but would review the new FRA submitted at Deadline V.

- i. Is the EA now satisfied that the risks are adequately assessed? If not, please identify any outstanding issues.

At 4.7 of the SoCG it is stated that further discussions will take place to ensure that where floodplain compensation is required it can be demonstrated that it is viable, hydraulically linked and on land within the order limits and in HE's control.

- ii. Could both parties provide an update including the discussion on suitable alternative floodplain compensation areas if the current areas are not viable?

At 4.9 it is not agreed that an increase of 10mm of flood level is acceptable. However HE has stated that they are seeking no increase in flood level.

- iii. Please confirm if the EA is now satisfied with the position in the updated FRA.

BCC, in the summary of oral submission at question 6, raised concerns from South East Water (SEW) regarding ponding of water and poor operational capacity of the drainage system and requested a more detailed maintenance plan to cover drainage ^{REP4-032}. HE in its response says the M4 was not designed to the current HE design standards and that the design is not resilient to the predicted impacts of climate change ^{REP5-005}. HE also states that it is required to carry out maintenance in accordance with its licence ^{REP5-004}. Section 4.2(b) of the licence states that HE should *'ensure the maintenance, resilience, renewal, and replacement of the network'*.

- iv. What assurance can the applicant give that the terms of the licence are sufficient to ensure the maintenance, resilience, renewal and replacement of elements of the network such as the drainage systems?

South East Water stated that it would provide comment whether they are satisfied that the scheme had considered potential risks to groundwater and mitigation on receipt of the Hydrological Risk Assessment (HRA).

- v. As this has now been issued to SEW can it confirm if it is now satisfied with the position in the HRA? If not, please identify outstanding issues. Can the applicant and SEW give an update on their SoCG?

G. OTHER MATTERS

1. HE in response to question 4.10^{REP5-004} states that it is still trying to establish with DfT if DfT is happy for HE to share its response with the examination concerning carbon figures.
 - Can the applicant please provide this information as evidence for the examination?
2. HE was also seeking advice from DfT to identify any circumstances in which the CO₂ attributable to the scheme would need to be re-assessed.
 - Can the applicant please provide an update?
3. BCC has raised an issue re the effect of the scheme on the historic parkland of Riching Park in view of the location of a new gantry at the south end of the canal and the detrimental impact this may have (Deadline V, additional comments³).
 - Has this been assessed by the applicant?
4. BCC has asked for the applicant to update its Materials Management Plan to reflect discussions with BCC.
 - Would the applicant and BCC please state what progress has been made on the matter?
5. Has progress been made in discussions between the applicant and BCC in respect of Old Slade Lane mitigation?
6. In its response to summaries of oral hearing submissions^{REP5-005}, the applicant advised that the SoCGs with LBHill and Slough BC are still not agreed.
 - Would the applicant and the Councils please state whether they intend to submit the SoCGs before the close of the examination, and if so by which dates?

³ Available here: <http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010019/Events/Deadline%20V%20-%202008-01-2016/Buckinghamshire%20County%20Council.pdf>

Addendum to agenda for issue specific hearing dealing with matters relating to the environment

Detailed Questions for Hearing on Traffic Forecasting

C. TRAFFIC FORECASTING

Model Description, Specification and Design

6. *Traffic Modelling: Inherent Modelling Errors*

- i. We note the use of AECOM for the Demand model and SATURN for the Assignment model (Local Model Validation Report [LMVR] Section 2.1, p4). Can the applicant please explain why these were chosen?
- ii. What is the relationship between the demand and assignment models?
- iii. How does the quality of input data affect the outcomes of both forms of model?

7. *Model Base Years:*

Data was used from a number of existing models (LMVR Section 2.5, p18-19):

- i. Would the applicant please state the base years for all of the data sets that were used including:
 - M25 model
 - Heathrow Model
 - West London Model
 - Berkshire Local authorities for which "some count data has been used for calibration"?
- ii. What are the implications for the reliability of the data for the model?

8. Other Data Sources:

- i. The Local Model Validation Report (LMVR Section 2.5, p17) refers to Roadside Interviews (RSI) and traffic counts sourced from Traffic Information Database (TRADS) data. What other data sources were used?
- ii. What are the base dates for these?

9. Model Development Process:

In the model development process, the report states (LMVR, Section 2.7, p19) that the objective was to create a fully observed traffic model with the core simulation area, based on 2009/2010 origin-destination data wherever possible.

- i. Would the applicant please identify which data elements were from which years, including what proportion of the data used for this purpose was based on 2009/2010 origin-destination data?

10. M3M4 Managed Motorway Highway Assignment Model – Development Process (LMVR Section 2.5, p20, Figure 2-20).

Would the applicant please provide the following:

- i. The source of the 09/10 Traffic Count dataset?
- ii. The date of the GIS Database and Junction Survey Data and the reliability of these data?
- iii. The source of data and date thereof for the M25AM Model matrices
- iv. The source of the Roadside Interview (RSI) Surveys Data M3M4 09/10 and London Area Traffic Surveys (LATS) data, with proportions used?
- v. The base date of data and reliability of MDS Transmodal HGV matrices?

Data Collection/Transport Surveys

11. Data Sources (LMVR Section 3, p21):

- i. To what extent was LATS RSI data from 1991 and 2001 used in the development of the model?
- ii. Please list data by year for each data type, including the base date for the data from TfL used in building the observed matrices?

12. Data Collection/ Transport Surveys (LMVR Sections 3.1-3.2, p22-26):

- i. With regard to the use of the LATS screenlines from 2001 for the Roadside Interview data collection in 2009/10, what are the risks and how are they allowed for?
- ii. Does the RSI data collected in 2009/10 fully update the 2001 data, or was a mix of 2009/10 and 2001 data used?

13. Trafficmaster Data (LMVR Section 3.3, p26):

- i. What was the base date of the Trafficmaster data?
- ii. What use was made of Trafficmaster origin-destination data?
- iii. How representative is the Trafficmaster data in relation to the wider population?

14. HGV Data (LMVR Section 3.5, p27):

The report states that Highways England used the Great Britain Freight Matrix from MDS Transmodal, and Mouchel provided traffic count data:

- i. What was the date for the traffic count data?
- ii. The MDS matrices showed an under representation of HGV trips – how was this found?
- iii. Can the applicant give any indication as to how it arose?

15. Public Transport Data:

- i. Can the applicant clarify the sources used to produce the base year matrices for rail and bus travel and provide the references for these?
- ii. What was the base date of the data used?
- iii. Was the impact of Crossrail included in the modelling process?
- iv. If different sources were used for data on rail and bus travel, what impact does this have on model outcomes?
- v. What influence would Crossrail have on highway travel demand forecasts? If not, what influence would its inclusion have on outcomes?

Matrix Build

16. Prior Matrix Build Process:

- i. Would the applicant please explain the data used in the prior matrix build at Figure 5-1 (LMVR Section 5.1, p43)?
- ii. What were the implications of abandoning the joint model methodology with the British Airports Authority model (LMVR Section 5.2, p43)?

17. RSI Reversal:

- i. To what extent was data on reverse journey times inferred (LMVR Section 5.3.4, p46)?
- ii. How does the process described for RSI reversal (LMVR Section 5.3.4, pp46-47) affect the reliability of model outcomes?

18. RSI Expansion:

- i. To fill gaps in screenlines, LATS data from 2001 was used (LMVR Section 5.3.4, p52). This is contrary to guidance (TAG 3.19 para 8.1.1) which states that models should use data less than 6 years old. What are the quantified implications of the uncertainty of using this older data in terms of the confidence levels of the model outcomes?
- ii. For the observed matrix build (LMVR Section 5.4, p54), ERICA was chosen to provide a variance weighting method to take account of sample size. What is the confidence level associated with the level of sampling available in the observed matrix build?

19. RSI Matrix Validation (LMVR Section 5.4.4, p57):

- i. The first sentence refers to observed traffic counts. What is the date of these observed traffic counts, and are they a mix of base dates?
- ii. Re Motorway Movement In-Filling using M25AM Matrices (LMVR Section 5.4.5, p57), how much of the data used for movement in-filling was from 2001, and how much was from later RSIs? Please provide a detailed breakdown of the different elements of the infilling process, together with a list of the sources for infilling data for each element.

20. Use of Trafficmaster Data (LMVR Section 5.5.3, pp63-66)

The results of a Trafficmaster pilot study are discussed in the report. The study concluded that there were a number of significant issues with the data, but provided large datasets were used, i.e. two years of data – this did overcome a number of issues with traditional origin-destination survey data to create travel matrices.

- i. Is the two years of Trafficmaster data matched to observed data, and if so at what base date?
- ii. What potential bias may arise from using Trafficmaster data?

- iii. It is stated that the matrices would have been improved if built separately by Car and LGV (LMVR Section 5.6.1, p71), but the data were not available to do so. To what extent would this increase inaccuracy in the model outcomes?

21. Trafficmaster and Partially Observed Matrix Merges (LMVR Section 5.6.2, p 73):

- i. Would the applicant please list all sources of data used to construct the above matrices, their dates and the purposes for which they were used? Is it a mix of 2001 and 2009/10 data?
- ii. What is the data base year for the RSI data and the M25AM matrices?
- iii. If Trafficmaster data did not improve the assignment statistics (p73) for the prior matrix, what was used instead?

22. Heavy Goods Vehicle Prior Matrices (LMVR Section 5.7, pp73-75):

- i. What is the date of the observed screenline traffic counts with which the MDS Transmodal HGV matrices were compared?
- ii. Can the applicant please explain the use of Matrix Estimation techniques used to fit the HGV matrices to individual traffic counts (LMVR Section 5.7, p75)?

23. Prior Matrix Summary/ Estimation:

- i. What are the WebTAG criteria for screenline comparisons (LMVR Section 5.8, p77)?
- ii. Since “No progress has been made” in improving the screenline comparison, what is the significance of this for the accuracy of the model output?

Model Calibration

24. Process Overview:

The Process Overview (LMVR Section 7.1, p83) states that “calibration of the M3M4HAM was undertaken by making realistic adjustments to the network and matrices in order to achieve the expected vehicle routings, flows and speeds”. Four key activities are identified.

- i. Would the applicant please specify which checks and adjustments were made in relation to each element?

25. Matrix Estimation Process and Convergence:

- i. What is the GEH (Geoffrey E Havers) statistic value (LMVR Section 7.3, p83) recommended in guidance (please give the reference) for the fit between observed and modelled flows?
- ii. Since it would appear that a significant number of link flow comparisons do not achieve a GEH of less than 5 (LMVR Sections 7.4/7.5, pp83-88), to what extent was convergence achieved, and conversely to what extent do the comparisons indicate a significant divergence between the modelled and observed data?
- iii. What are the implications for uncertainty of this level of compliance with guidance?

26. Sectoral Analysis:

Under Sectoral Analysis (LMVR Section 7.6.3, p94), it is stated that “this level of comparison (of the before and after matrix estimation) does not fully meet the guidance in WebTAG 3.19”.

- i. Can the applicant please justify the claim that the level of compliance which was achieved is acceptable?

27. Matrix Estimation Effects Summary:

- i. In the summary to Section 7 (LMVR Section 7.7, p101), what is meant by “the model has achieved high levels of validation --- at the expense of achieving more significant changes through matrix estimation”? (WebTAG 3.19 states at 8.3.14 that the changes brought about by matrix estimation should not be significant)

- ii. Section 7.7 goes on to state: “WebTAG recommends that, under such circumstances, efforts are made to improve the prior matrices to help reduce the effects of matrix estimation, without compromising overall validation”. However, “the overall prior matrix quality was never improved”. Would the applicant please provide details of the implications arising from this outcome? What is the significance for the statistical robustness of the model and the uncertainties of model outcomes?

28. *Separate Set of Counts:*

- i. Given that the separate set of counts removed from the calibration count set for validation was nevertheless incorporated into the matrix estimation process (LMVR Section 7.4 p85 and Section 8.1 p102), how important is it for independent model validation to retain a separate set of flow data?
- ii. Would a separate set of flow data normally be advised in guidance?

Model Validation

29. *Network Validation:*

- i. Re screenline assessment and validation (LMVR Section 8.4, pp104-5), from which data are the observed screenline flows derived?
- ii. What are the implications for the quality of the network validation of using the full count set for final matrix estimation rather than holding back an independent set of figures for validation purposes?
- iii. Since both the number and percentage of screenlines for which modelled flow is within + or – 5% of observed flow (the WebTAG criteria) is low, what is the implication for traffic modelling?

30. Journey Time Validation:

- i. Re sample sizes (LMVR Section 8.5, p108), the report states that “there are a number of routes where the sample size was well below the five surveys recommended in WebTAG 3.19”. How accurate is the base model validation for journey time within the three AQMAs within the route of the scheme (see pp113-116)?

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31. Best use of Available Data:

- i. The report (LMVR Section 9.1, p121) refers to the “best use of the available data”. If there are any issues as to the quality of the available data (for example the age of data, the variable ages of the sources, and problems with using Trafficmaster data), to what quantified extent does this affect the reliability of output from the model?

32. Data Sources:

The data sources are referred to again in the report (LMVR Section 9.1, p122) which states that “the impacts of matrix estimation on the prior matrices did indicate some significant changes”. Such changes are not in accordance with guidance but were “considered to be acceptable in the light of the data sources used to develop the prior matrices”.

- i. Would the applicant please explain this statement?
- ii. Are the prior matrices unreliable because of the quality of the data used to develop them?
- iii. In order to carry out matrix estimation, was new data introduced which was more reliable than the data used for the prior matrices?

Use of Traffic Forecasting Model for Air Quality Assessment

33. *Interfacing Traffic Models and Air Quality Models:*

The report (LMVR Section 8.6, p116) states that “issues between interfacing traffic models and air quality models are well known and subject to much scrutiny by both modelling communities”.

- i. What are the issues referred to between interfacing traffic models and air quality models?
- ii. How were these issues considered and worked through when the traffic model outputs were applied in the air quality assessment?

34. *Assessing Uncertainty inherent to transport models*

The output from the M4 transport demand and highway assignment models are central to the projections of emissions attributable to the scheme that feed into the suite of tools employed to assess air quality in the affected corridors. The output from these tools is subject to varying levels of uncertainty. We recognise that whilst adding explicit consideration of uncertainty adds further complexity, reliance on scenarios to address the issue of uncertainty leaves the ExA with assessing an unquantifiable level of risk that various air quality and other environmental guidelines thresholds could be breached with completion of the scheme as set out in the DCO and related documentation.

- i. For each output stage in the suite of travel forecasting and air quality tools the applicant is asked to provide quantified estimates of the probability of various outcomes arising from the uncertainty contained in the demand/assignment model system and the suite of air quality projection and assessment tools. The applicant is also invited to provide information on the precision, efficiency and power of various estimators contained in the suite of tools employed.