

SLOUGH BOROUGH COUNCIL

DEADLINE VII SUBMISSIONS: emails, HS2 Documents and Ricardo Energy and Environmental response

HIGHWAYS ENGLAND'S RESPONSE

1. *Email from Slough Borough Council to Highways England dated 12th February 2016 regarding further clarification following the Issue Specific Hearing on the 10th and 11th February Noise and Vibration Question 2 (Night-time noise during construction). The email requests more details regarding noise insulation and re-housing policy for those residents who may be eligible, as covered in Section 12.5 of the CEMP. Slough Borough Council's principal concern relates to the relatively short time frame between the contractor carrying out noise monitoring and the start of works on the Scheme, and the potential for there to be only a short time to carry out noise insulation works.*

Highways England Response

- 1.1 Highways England confirmed in paragraph 100 of its Written Summary of the Issue Specific Hearing Dealing With Matters Relating to Noise and Vibration submitted at Deadline VII that further consideration had been given to the measures included in the CEMP in relation to noise insulation. In accordance with the measures provided in a number of similar schemes, Highways England has removed the noise insulation measures and insulation and temporary rehousing measures from the CEMP, as these will be assessed by local authorities as part of their consideration of Highways England's applications under section 61 of the Control of Pollution Act 1974.
- 1.2 This approach is consistent with other recent smart motorway projects, such as M1 Junctions 6-10A, M25 Junctions 16 to 23 and 27 to 30, M4 Junctions 19 to 20, M5 Junctions 15 to 17 and M3 Junctions 2 to 4A. The approach in these projects can be contrasted with, and preferred to, the approach to the construction of a new high speed railway, for which example documentation has been submitted by Slough Borough Council. For a smart motorway scheme, the noise impacts are entirely different to those of a new railway: the majority of the construction activities associated with the improvement of an existing motorway will only last for a short duration at any one location and the works are spaced out so that any high noise events will be of short duration. As such, Highways England does not believe that the documentation submitted by Slough Borough Council in relation to HS2 is applicable to, or appropriate for, the Scheme.
2. *Email from Slough Borough Council to Highways England dated 12th February 2016 advising that the Ricardo's full response would available at Deadline VII and enquiring about the Highways England position regarding the Slough Borough Council proposal to*
 - a) *provide an automatic air quality monitoring station installed within Council owned land as close to residents in Spackmans Way, and*
 - b) *to extend the EM23 barrier along the slip road and round onto A355 and extension of the EM24 barrier along the slip road and round onto A355.*

Highways England Response Highways England does not consider that either of Slough's proposals are necessary or appropriate for the M4 Scheme. These issues were addressed by Highways England at the Issue Specific Hearings, and are detailed within the Deadline VII - Written Summary of Issue Specific Hearing – Air Quality E4 at paragraphs 4 and 6.

3. *Report by Dr Scott Hamilton, Ricardo on behalf of Slough Borough Council*

Highways England Response

- 3.1 Where required, Highway England has responded to issues raised by the Ricardo Report within the text of the Report appended at Appendix A to this document.

Appendix A – Highways England Comments embedded in the “M4 SMART Motorway air quality issues in Slough” report by Dr Scott Hamilton, Ricardo

REF: M4 SMART Motorway air quality issues in Slough- response from Dr Scott Hamilton, Ricardo

On instruction from Slough Borough Council this letter report sets out my responses to the following documents:

- 1) *The Planning Inspectorate- Issue specific hearing agenda for matters dealing with the environment, Wednesday 10th February and Thursday 11th February*¹.
- 2) *Highways England’s document, footnoted “Deadline V: Response to Written Representations: Slough Borough Council”. Specifically, this is the HE response to my written evidence provided subsequent to the special issues hearing “Issue Specific Hearing - 17-11-2015 - 1000 - Radisson Blu Edwardian Hotel, Hayes”*².

Introduction

1. *To aid the Inspector, and as a prescript to my discussion below, it is my professional opinion that the DCO should require that Highways England undertake hourly air quality monitoring to the same standard as the UK AURN at a location to be agreed with Slough Borough Council (Mr Newman has sent a separate email to HE proposing a location for the monitor) and which represents worst case human residential exposure. The time period should cover pre-construction, construction, and operational phases of the M4 scheme for a period of no less than 10 years in total. Costs for such a programme are normally in the order of £10,000 per year at current market rates. If this programme of measurements at any point demonstrates a 10% or greater change in annual average NO₂ concentrations during the operational phase compared with the baseline, and where this is coupled with a breach of the EU Limit Value for NO₂ of 40 µg/m³, the DCO should require that Highways England provide mitigation to reduce concentrations so as to achieve legal compliance with the EU Limit Value for NO₂ along the M4 in Slough.*
2. *A reasonable question to Highways England would be, what mitigation actions will they take if their NO₂ forecasts turn out to be wrong? My understanding is that currently no mitigation actions are before the Inspectorate should the scheme not perform as expected. Given the M4 is amongst the largest air pollution sources in the region, if not the UK this is in my view, quite surprising.*
3. *My suggested approach would at least reassure the people living very close to the motorway that they can expect no detriment from additional traffic pollution from the scheme in the short to medium term, whilst also providing a guarantee of mitigation from Highways England for several years into the future. If the NO₂ predictions offered by Highways England turn out to be accurate then engine technologies will improve and NO₂ concentrations should decline over time- this is currently extremely far from certain however and my suggestion offers at least some guarantee of protection to a local population already over exposed to air pollution that Highways England will mitigate unforeseen air pollution issues arising post development.*

Highways England Response

- 3.1 Highways England has previously set out that there is no need for a monitoring and mitigation requirement in relation to air quality, most recently in its written summary of the oral representations made the Issue Specific Hearing into Air Quality, submitted at Deadline VII.

¹ [http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010019/2.%20Post-Submission/Hearings/Issue%20Specific%20Hearing%20%2010-02-2016%20-%201000%20-%20Holiday%20Inn%20\(3\)/Issue%20specific%20hearing%20agenda%20-%20environment.pdf](http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010019/2.%20Post-Submission/Hearings/Issue%20Specific%20Hearing%20%2010-02-2016%20-%201000%20-%20Holiday%20Inn%20(3)/Issue%20specific%20hearing%20agenda%20-%20environment.pdf)

² <http://infrastructure.planninginspectorate.gov.uk/projects/south-east/m4-junctions-3-to-12-smart-motorway/?ipcsection=docs&stage=4&filter=Deadline+V+-+08-012016> (Highway England ZIP responses to written summaries of oral representations made at the November Hearing (and additional evidence) – submitted to Deadline V PDF document Additional Evidence of Slough Borough Council

- 3.2 The air quality effects of the Scheme have been assessed in line with best practice to minimise uncertainty. Significant air quality effects are not predicted overall and nor is a compliance risk in relation to EU Limit Values predicted, as set out in Table 6.22 of chapter 6 of the Environmental Statement (APP-146). On this basis, air quality monitoring and mitigation is not proposed for the operational phase of the Scheme.
- 3.3 The proposal set out by the Report is unnecessary, has no basis in the applicable guidance and is not required under the National Policy Statement for National Networks ("NPS NN"). The Report seeks to apply mitigation to the underlying M4 motorway, and not to the Scheme. This is an erroneous interpretation of the relevant law and policy.
- 3.4 Moreover, the Report does not challenge the methodology or the findings of the assessments. Instead, it suggests that on-going mitigation should be a requirement in circumstances where the assessment has predicted no significant effect, and has not identified any compliance risk. Were the approach set out in the Report to be adopted, the implication would be that any scheme, project or development should be required to carry out continuous, expensive and unnecessary monitoring, even if no significant impacts are predicted.
- 3.5 By contrast, Highways England's reasonable approach is to provide monitoring where such monitoring may be necessary, where there is the potential for significant effects, such as in relation to the A556 Knutsford to Bowdon Scheme.
4. *Since Question 4 of the Inspectorate agenda referred to above pertains to HE's response to my previous written evidence on air quality, it makes sense to begin with a general response to the Inspector's Question 4. I'll then answer to the HE responses in turn throughout this note, before returning to questions 5,6 and 8 of the hearing agenda.*
5. *Rather than reprint my initial written evidence and the subsequent HE response, I have provided the paragraph reference for each of the HE Comments which can be cross referenced from their document (number 2 above).*
6. *Questions 4, 5, 6 and 8 are of particular relevance to air quality and you asked me to respond to these as well. These questions are taken directly from the Inspectorate document referenced above. These responses are intended to provide you with additional insights on the evidence presented by me previously, and to respond to HE's comments on my submissions.*

Highways England Response

- 6.1 These points are addressed in turn below.

Question 4- Special Hearing Agenda

4. Within the response to oral hearings REPS-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?
7. *Given the responses provided (which I will address in turn below) I recommend that SBC's position remains that there is a definite yet unknowable degree of uncertainty in the modelling chain used in the air quality assessment. The most sensible way to deal with this going forward would be for the DCO to include a provision for an air quality monitoring station at the M4 in Slough. This would ensure that the NO₂ forecasts from the HE prove accurate with time, and if they do not they will provide a quantitative basis for mitigation.*
8. *The uncertainties as I see them affect the future year forecasts most and hence the HE characterisation of potential exceedances of the NO₂ annual mean standard in Slough can be questioned, though it will be simple to check whether they come true by monitoring.*

9. *With this in mind, SBC should seek the inclusion of roadside air quality monitoring near Spackman's Way in Slough in the DCO that will cover the pre-construction, construction and operation of the M4 scheme. Should measurements from that measurement station show a significant deterioration in air quality SBC should seek the inclusion of mitigation options to reduce NO₂ and protect public health in the area.*
10. *The mitigation trigger level would need agreement but a sensible value may be in the order of 10% of the standard being measured- so 4 µg/m³ of NO₂ as an annual average in this instance. This value would also align with industry standards for error in NO₂ models which should always have less than 10% error on comparison with robust measurements.*

Highways England Response

- 10.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination, and above. At no point does Dr Hamilton provide any evidence either mathematically or with reference to published evidence to support his assertion that uncertainty can be described as 10% of the annual average air quality objective for NO₂ i.e. 4µg/m³.

My responses to Highways England comments on my written evidence

11. *I will take Highways England points in turn and provide a response below using the numbering provided in the response document (item 2 referenced in my introductory section above).*

2.1.1 Highways England Comments 2.3.1, 2.3.2, 2.3.3 - Ricardo response

12. *HE's comments here provide a description of the air dispersion modelling recipe that was undertaken for the application. Whilst these may be considered "best practice" amongst the road infrastructure development community there is no reliable means to understand the cumulative uncertainties in this work. I would recommend that SBC's position should remain that the applicant has no means to reliably predict future conditions with the accuracy implied by the presented assessment results. Drawing the Inspector's attention to comment 2.3.3 by HE (see below), there is no way to know whether this will be the reality in 2022.*

2.3.3 **Because a realistic worst case has been assessed, the likely outcome in practice can be expected to fall within the assessed scenario.**

13. *This statement asks the Inspector to accept that every link in the modelling chain (from traffic modelling, to emissions calculations, via meteorology and the dispersion modelling itself) has knowable uncertainty and that this has been factored in as what HE call, a "realistic worst case scenario". The margin of uncertainty is particularly pressing in Slough where conversely there is no room for errors given roadside receptors will be exposed either to breaches of the NO₂ standard, or concentrations that if affected only slightly would breach the standard.*
14. *For instance we can look at the provided predictions to see how they may change if the concentrations estimated are too optimistic. If air quality improvement have been overestimated by 10% by HE i.e. all those properties that are likely to exceed 36µg/m³ on year of opening it would appear there will be 41 properties in Slough compared to 11 currently forecast exceeding 40µg/m³. It is feasible, even likely that uncertainties of 10% (or more) will exist within the predictions offered by HE for NO₂ at scheme opening. In such instances a precautionary approach is warranted.*
15. *Indeed, it would be viewed as a well-conceived NO₂ model if only 10% error existed for the current year. In my opinion the model will carry potentially much larger uncertainties by scheme opening.*

Highways England Response

15.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination, in particular at the Issue Specific Hearings held in February.

15.2 Highways England has previously noted that there is no guidance on uncertainty regarding a published mechanism for quantifying uncertainties in air quality modelling and assessment. However, IAN 174/13, in Appendix A3, discusses the probability of an effect occurring and confirms that the approach to assessment undertaken by Highways England is reasonable and robust:

“Is there a high probability of the effect occurring? (Checklist Question 11)

Whilst there is uncertainty in air quality monitoring and modelling (and the traffic data used in the assessment), the air quality assessment undertaken is based on the most reasonable, robust and representative methodologies. The context for this is that the assessment has been completed taking advice from published guidance and the results have been verified against monitoring data.

On this basis, whatever the outcomes of the air quality assessment, it can be considered to have a high probability that they will occur and the results and consequent evaluation of significance can be used to inform professional judgement accordingly.”

15.3 Highways England has through the use of LTT_{E6} made for allowance in the uncertainty of future Euro 6/VI emission projections. The use of LTT_{E6} represents a precautionary approach.

2.1.2 HE Comments 2.4.1, 2.4.2, 2.4.3 - Ricardo Response

16. *I note the observation from HE with regard to air quality along the M4 in Slough-*

2.4.1 *In relation to air quality standards (i.e. air quality objectives in the above context), the air quality assessment has identified that some locations along the Scheme route within Slough may already be above air quality objectives for annual average nitrogen dioxide.*

17. *SBC have no regulatory power over the emissions on the M4, so will rely on HE to mitigate both the existing exceedances, and any that could be made worse by the scheme. SBC should seek evidence from HE as to the mitigation measures they are currently undertaking for this stretch of motorway given the problems that exist and which could be made worse by the scheme. Mitigation of existing environmental concerns was a stated aim of the Inspector at the special issues hearing on November 17th.*

18. *HE state that they have used the Highways England Long Term Trend (LTT) future projection curve to make calculations as to future NO₂ concentrations. SBC should request that the Inspector requests application of the earlier version of the curve which provides higher concentrations than the version used by HE. In taking this suggestion SBC, in seeking to protect human health, would be adopting a precautionary principle appropriate to the scale of the development.*

19. *The Inspector may wish to note that the very fact that two versions of the LTT curve exists show how variable and shifting the air quality evidence base is currently. There is no way to know how that may change again in the intervening years (for example when the full ramifications of the current NO_x emissions scandals have played out fully). In its statutory role in protection of public health, SBC should prefer the earlier version of the LTT as it is more conservative and therefore would seem best able to provide some safety in the predictions and any mitigation that is therefore required.*

Highways England Response

19.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the

Examination. In addition, Highways England considers that the Scheme is not an opportunity for Slough Borough Council to seek to mitigate or exercise "regulatory power" over existing emissions from the M4. If mitigation of emissions from the current M4 is required by Slough Borough Council, this is properly addressed through liaison between Highways England and Slough Borough Council at a strategic level.

- 19.2 The use of the LTTE6 projection curve is in recognition of the possibility that air quality is not improving as quickly as envisaged by Defra. Even considering if Euro 6/VI does not achieve their emission standards they will still be lower than Euro 4/IV and 5/V vehicle emissions. Consequently, it is reasonable to assume some level of reduction in emissions in the future, and not an almost static trend. In adopting the LTTE6 approach, Highways England has still allowed for a level of uncertainty in future performance to enable the management of risk.

2.1.3 HE Comments 2.5.1, 2.5.2, 2.5.3 - Ricardo response to the above.

20. *SBC are through this process being asked whether they think that the HE forecasts of future air quality are robust, and perhaps more importantly conservative.*
21. *That future is a scientifically complex mixture of engine technology, weather, concentrations of a host of interacting chemical species in the atmosphere, human behaviour and engineering performance of a road scheme.*
22. *Meanwhile receptors have no control over any of these factors and are faced with the consequences regardless of how future conditions change. Forecasting air quality levels in even a few years in the future is a significantly challenging task and if HE have this wrong, human health will suffer along the M4. In my experience future projections of NO₂ using any method have always proven to be optimistic mainly due to the unknown influences of complex externalities to the scheme in question. If HE's forecasting methods are robust, SBC should request that evidence is provided of this with past cases.*
23. *HE have chosen and outlined their approach but I do not agree that the results presented are sufficiently free from uncertainty to the degree that it can be known whether concentrations will exceed the relevant NO₂ standard in Slough along the M4 when the scheme is operational.*
24. *As additional evidence HE should demonstrate cases where the approaches used here have been followed, and the forecast levels of NO₂ that were predicted for the future year in the scheme came to be when the scheme was operational. We would again make the observation that the Inspector's stated aim was that the scheme should improve the environment, and potentially somewhat mitigate existing poor air quality (which HE should be working with SBC to achieve in any case).*

Highways England Response

- 24.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. Further, Highways England notes that other schemes where the same, or similar, methodologies have been utilised are not currently operational and therefore the level of information on performance post-completion of other schemes requested in this submission is not available.

2.1.4 HE Comments 2.7.1, 2.7.2. - Ricardo response to the above.

25. *Whilst I understand that there are obligations and processes laid out in various guidance and statutory documents, none of these alter the fact that this road is demonstrably affecting human health in Slough.*
26. *This scheme presents an opportunity to do something about the existing problem whilst protecting for potential unforeseen issues in the future. Again I would reiterate HE's responsibilities to mitigate the existing poor air quality along the M4 and would suggest that the scheme affords an opportunity for them to discharge a responsibility with tangible benefits to human health.*

Highways England Response

- 26.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. Further, the Ricardo response fails to properly address the impact of the Scheme, as opposed to the existing M4.

2.1.5 HE Comments 2.8.1, 2.8.2, 2.8.3, 2.8.4, 2.8.5 - Ricardo response to the above.

27. *The complex modelling chain that has yielded the final concentrations is clearly laid out in these responses from HE but no comment on the uncertainty of each step is provided.*
28. *SBC's position should remain that each step as laid out is uncertain which makes the following step uncertain, errors building as the model chain grows.*
29. *As uncertainty is clearly evident, the precautionary principle should be applied. Again perhaps to give SBC some confidence in the predicted outcomes, HE could submit evidence of cases where these methods have been applied in the past, and in which the predictions of future outcomes have happened in reality. SBC should be unwilling to accept the findings "as is" if evidence of past satisfactory performance for forecasting NO₂ concentrations cannot be demonstrated for other HE schemes.*

Highways England Response

- 29.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. Further, Highways England notes that other schemes where the same, or similar, methodologies have been utilised are not currently operational and therefore the level of information on performance post-completion of other schemes requested in this submission is not available.

2.1.6 HE Comments 2.8.6, 2.8.7 - Ricardo response to the above.

30. *See our comments around uncertainty throughout this note.*
31. *In addition I would like to add that the verification process followed provides no statistical measure of the model's forecasting reliability in 2022. It merely shows that a mixture of factors in this case have amounted to a relationship between a measurement and a prediction when in actuality the reason for this relationship is completely unknown.*
32. *The model has under predicted NO_x (and by extension NO₂) by large margins at Slough's receptors (before arithmetic adjustment of the results) and some quite large adjustments have been made to account for that.*
33. *During this process the modeller does not know why their model performs poorly for a given case-reasons can include incorrect emission, poor meteorological data, capability of the chosen modelling tool to represent the case put before it.*
34. *In practice this means that the relationship between measurement and model prediction during a verification exercise is a snapshot of current conditions, and there is no scientifically sensible argument to be made that the same relationship will apply in years to come. HE's position remains that the forecasts are accurate, so SBC should seek evidence of the approaches that have been used here to make future predictions of NO₂ would aid the Inspectorate in its decision making.*

Highways England Response

- 34.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. Further, Highways England notes that other schemes where the same, or similar, methodologies have been utilised are not currently operational and therefore the level of information on performance post-completion of other schemes requested in this submission is not available.

2.1.7 HE Comment 2.8.8 - Ricardo response to the above.

35. *HE did not include terrain in their modelling inputs so there is no representation of the effect of the land itself on flows around the motorway. Surface roughness merely slows the wind down somewhat in the domain and introduces some additional mechanical mixing- though the steady state nature of the Gaussian code used means that the same adjustments to the wind field are made throughout the domain.*
36. *The effect of berms and road barriers most certainly is not included in the model.*

Highways England Response

- 36.1 Highways England agrees that berms and road barriers are not included in the detailed modelling assessment. As set out in the response to Slough Borough Council at Deadline VI, the ADMS-Roads tool is designed for the modelling of road schemes. The flow regime was considered through surface roughness and model verification, whereby monitoring data from locations around the motorway (i.e. locations subject to the flow regimes around the motorway) were used to verify model outputs. The approach to model verification to address this interaction was also based on industry best practice.

2.1.8 HE Comment 2.8.9, 2.8.10 - Ricardo response to the above.

37. *This is another uncertain area, while it may be industry standard that does not make it immune from error in the coming years. The Defra tools used are always subject to change and it is not yet clear what amendments will be required to reflect the changes in traffic emissions models as a result of the known issues with Euro 6 diesel vehicles (which will make up a large part of the fleet on scheme opening).*

Highways England Response

- 37.1 Highways England is required to carry out assessments in accordance with policy and guidance. The air quality assessment for the Scheme uses the tools published by Defra including emission factors, background maps and NOx to NO2 conversion tool. Highways England's scheme assessment is also informed by Defra's published technical air quality guidance. The Ricardo Report does not suggest any other relevant industry standard, nor does it suggest that the tool is not suitable for use in assessments. Moreover, no evidence is supplied to support the assertions made.
- 37.2 Highways England is aware that Defra is advised by Ricardo on the development and production of the emission factors, background maps and NOx and NO2 conversion tool.

2.1.9 HE Comment 2.8.11, 2.8.12 - Ricardo response to the above.

38. *This is another uncertain area, while it may be industry standard that does not make it immune from error in the coming years. The LTT curve used has an alternative, more conservative version and it may be prudent for SBC to seek its application in subsequent discussions.*

Highways England Response

- 38.1 The use of the LTTE6 projection curve is in recognition of the possibility that air quality is not improving as quickly as envisaged by Defra. Even considering if Euro 6/VI does not achieve their emission standards they will still be lower than Euro 4/IV and 5/V vehicle emissions. Consequently, it is reasonable to assume some level of reduction in emissions in the future, and not an almost static trend. In adopting the LTTE6 approach, Highways England has still allowed for a level of uncertainty in future performance to enable the management of risk.

2.1.10 HE Comment 2.8.13, 2.8.14, 2.8.15 - Ricardo response to the above.

39. *Whilst the approach has been commonly applied in road infrastructure assessments this does not mean that the model in question is capable of predicting the future accurately. Since HE wish SBC to accept use of best practice and industry standards as a means of reassurance SBC should seek from HE evidence of cases where such methods have been applied in the past and the predictions of NO2 in the*

passage of time have proven accurate. If the methods described by HE are indeed robust then there should be numerous cases where future predictions have proven reliable.

Highways England Response

- 39.1 Highways England is required to carry out assessments in accordance with policy and guidance. The air quality assessment for the Scheme uses the best available, industry standard tools for each stage of the assessment process, which includes the NO_x to NO₂ conversion tool. The Ricardo Report does not suggest any other relevant industry standard, nor does it suggest that the tool is not suitable for use in assessments. Moreover, no evidence is supplied to support the assertions made.
- 39.2 As set out by Highways England in its Deadline V response to Slough Borough Council, the air quality assessment for the Scheme minimises any uncertainty as it presents a realistic worst case scenario.

2.1.11 HE Comment 2.8.16 - Ricardo response to the above.

40. *HE offer a very positive picture of what may come to be in regard traffic emissions. There is simply no way to tell what will happen as to vehicle NO_x emissions (in particular from Euro 6 light diesel vehicles) by 2022. The auto industry is embroiled in a scandal that has shown that they will struggle to deliver Euro 6 compliant vehicles with no quick fix in sight.*
41. *Again, if this is best practice which is capable of the certainty offered by HE for calculating future NO₂, SBC should seek from HE past cases where the methods have been applied and future conditions turned out to be accurately forecast.*

2.1.12 HE Comment 2.8.17, 2.8.18, 2.8.19 - Ricardo response to the above.

42. *HE present these methods as robust and best practice. It should therefore be straightforward to demonstrate their predictive power to the Inspectorate by providing evidence from past cases in forecasting future NO₂ concentrations for major road schemes.*

Highways England Response

- 42.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. Further, Highways England notes that other schemes where the same, or similar, methodologies have been utilised are not currently operational and therefore the level of information on performance post-completion of other schemes requested in this submission is not available.

2.1.13 HE Comment 2.8.20 - Ricardo response to the above.

43. *I agree these uncertainties are dealt with methodologically in the air quality industry. I would therefore suggest that the Inspector seeks evidence of the application of these methods in forecasting NO₂ to assess whether they can be considered reliable.*

Highways England Response

- 43.1 Highways England is required to carry out assessments in accordance with policy and guidance. The air quality assessment for the Scheme uses the best available, industry standard tools for each stage of the assessment process. The Ricardo Report does not suggest any other relevant industry standard, nor does it suggest that the tool is not suitable for use in assessments.

2.1.14 HE Comment 2.9.1 - Ricardo response to the above.

44. *As above, I would suggest that SBC would welcome evidence of forecasting accuracy from previous assessments.*

Highways England Response

- 44.1 As explained above, Highways England notes that other schemes where the same, or similar, methodologies have been utilised are not currently operational and therefore the level of information on performance post-completion of other schemes requested in this submission is not available.

2.1.15 HE Comment 2.10.1 - Ricardo response to the above.

45. *This is a minor point which I made merely to show that presenting air quality values to such high precision does not provide any indication as to the accuracy of the value. An incorrect value can be presented to several significant figures yet still be wrong.*

Highways England Response

- 45.1 Highways England presents air quality information to 1 decimal place consistent with the requirements of IAN 174/13, page 6, which states that “Modelled results and the assessment of changes in pollutant concentrations between without and with scheme scenarios should be reported to 1 decimal place”.

2.1.16 HE Comment 2.11.1, 2.11.2, 2.11.3, 2.11.4 - Ricardo response to the above.

46. *The statement from HE that the modelling has “some element of residual uncertainty” is welcome. Unfortunately this is not a quantitative statement that allows the Council to understand the range of risks to health from the scheme when it opens. Again, I suggest it would be straightforward for HE to provide evidence of the application of these methodologies in the past so that SBC can be confident they can represent the phenomena they wish to quantify.*
47. *The suggestion of mitigating in areas that have predicted concentrations >36µg/m³ of NO₂ is based on my precautionary professional belief that the modelling undertaken is uncertain. We do know at this point understand how that uncertainty will affect concentrations of NO₂ at residential locations in Slough at scheme opening. In such cases I would always recommend a precautionary approach such as I have suggested here and that position remains unchanged.*
48. *Whilst I welcome comment 2.11.4 which suggests an inconsistency in my approaches when working for SBC, this has no relevance to the case at hand. In any case local scale models such as the ones we have built for SBC over the years, are derived from robust local traffic datasets, not regional scale traffic models such as that which supports the modelling in evidence here.*

Highways England Response

- 48.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. Further, as noted above, where the Ricardo Report offers no evidence or alternatives to the industry standard approach adopted by Highways England, the fact that Ricardo themselves use the approach they seek to criticise in this Report demonstrates to the Examining Authority that the criticisms raised are without merit.
- 48.2 Dr Hamilton seems to be suggesting that uncertainty referred to in his evidence is solely attributable to perceived levels of robustness in different size traffic models and is not attributed to the air quality modelling process. The traffic model produced for the M4 Scheme assessment is compliant with the published guidance and is therefore robust. The air quality assessment is informed by a robust traffic model as would be the case local traffic model.

2.1.17 HE Comment 2.12.1, 2.12.2, 2.12.3 - Ricardo response to the above.

49. *We do not agree that the case has been fully made to support the assertion in HE comment 2.12.1 for the reasons set out throughout this document and in previous submissions.*

50. *There is a clear problem with air quality along the M4 and it shows signs of persisting for years to come. Whilst it is noted that HE has a “Delivery Plan” and “Strategic Business Plan” I am sure SBC would welcome clarity on what is included specifically which will reduce air pollution along the Slough stretch of the M4.*
51. *If no specific measures are included SBC should not accept that HE are already acting to mitigate the issue in any way specific to Slough.*

Highways England Response

- 51.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination. In particular, this submission confuses the treatment of air quality for the existing M4 with mitigation of the not significant effects of the Scheme.

2.2 Summary of Ricardo responses under Q4 of the special hearing agenda- and responses to questions 5,6,8

52. *My opinion remains unchanged from my previous submissions and oral evidence. It is a matter of fact (and agreement by HE) that the modelling is uncertain for a range of reasons. I therefore question the reliability of the modelling chain used for forecasting the future NO2 climate in Slough regardless of what guidance documents were followed.*
53. *I recognise that the modelling practices are quite standard and therefore the Inspectorate could benefit from HE providing evidence of these methods being applied to similar road schemes in the past, and form a view on whether the forecast NO2 concentrations were shown to be accurate over time. If this cannot be demonstrated SBC should not accept that the methods are capable of quantifying NO2 at the scheme opening year.*
54. *I would recommend that SBC should offer a pragmatic approach however. An automatic monitoring station should be installed along the M4 at a location to be agreed with SBC that should take hourly measurements of NO2 before construction, during construction and during the operational phases of the scheme. If the concentrations deteriorate with time by an agreed “trigger” value, SBC should seek that the DCO includes a provision that mitigation should be provided by HE and that this should be “designed in” to the scheme. This trigger value could be set to be in the order of 10% of the standard under assessment, say 4 µg/m³ of NO2 as an annual average. The precise value would require agreement of course.*

Highways England Response

- 54.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination.

2.2.1 Question 5

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 REPS-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 to be carried out, and is located within a residential area.
- In these circumstances would it not be appropriate to use the IAQM guidance?
55. *If the scheme in question were separate to the major infrastructure project SBC would mandate the assessment be carried out under the IAQM guidance. After all human receptors exposed to the increased concentrations from the HGVs do not care much as to what modelling method is used, but perhaps they would like the comfort of knowing the most conservative and locally specific methods have been used to estimate the effect on their health.*

56. *I agree with this position as the compound has definite implications for one of Slough's AQMAs and I do not think the current methods are detailed enough to account for the effect it may have. The additional work involved is trivial and should be carried out accordingly with the support of SBC in providing data and methodological suggestions.*

Highways England Response

- 56.1 Highways England is required to carry out assessments in accordance with policy and guidance. The air quality assessment for the Scheme uses the best available, industry standard tools for each stage of the assessment process.
- 56.2 It is agreed that if the provision of the construction compound was separate to the M4 J3 to 12 Scheme then the IAQM guidance might be the appropriate guidance document to follow. However, the construction compound and its use forms part of the application for development consent under the Planning Act 2008. The correct guidance to utilise for a highways scheme, as noted by the IAQM guidance itself, is the guidance already available, which is the DMRB air quality guidance, set out at paragraph 3.45 of HA207/07.

2.2.2 Question 6

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' REPS-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 REPS-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?

57. *It is impossible to say what the effect of this issue will be in time. It seems foolish to suggest that emissions from diesel cars will come down at all (at least reliably) in the next few years. The emission factors used in the modelling come from the COPERT model which is then interpreted by Defra experts to produce the UK version of the factors.*
58. *These have not been revisited for some time and it is not clear whether these will need significant revision as a result of on road testing carried out under new conformity protocols. There remains significant uncertainty in emissions from Euro 6 diesel vehicles, which are forecast to make up most of the road fleet by the time the scheme opens. I would argue that this should at the very least steer HE towards installing a monitoring station in Slough, and agreeing a mitigation package with the SoS should the measurements show a deterioration in air quality along the road.*

Highways England Response

- 58.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination.
- 58.2 It is clearly understood that Ricardo are the Defra experts referred to on paragraph 57 and Highways England is not aware that they have raised these issues with Defra, in their development of the tools used in the modelling process nor in their reporting to the European Commission on the recently published National Air Quality Plan.

2.2.3 Question 8

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.
59. *The question of Euro 6 performance (in the diesel fleet mainly) is one which affects modelling across all scales within the UK and the current estimates of zone exceedances could even be subject to revision should new evidence emerge on real world emissions performance. At the special issues hearing on the 17th of November Professor Laxen acting for LB Hillingdon provided evidence to the Inspectorate on the number of zones in the UK that would exceed the NO2 standard in future years if current estimates of Euro 6 performance prove to be too optimistic. He described the output of Defra's modelling increasing from 8 exceeding zones to 30 exceeding zones- clearly future year predictions are currently extremely sensitive to the NOx emissions performance of Euro 6.*
60. *What is clear is that UK's urban areas will be subject to pressures on air quality for years to come which will lead to breaches of standards in European Law. In turn this means that public health in the UK will continue to suffer because of this issue for years to come. The issue is particularly compounded for human receptors who live by the side of our biggest motorways and for whom in this instance no additional protection is offered beyond "things will get better with time because our models say so". As the only agency with any meaningful control over traffic and its environmental impact on motorways, HE should adopt a precautionary approach to its current infrastructure schemes. In this case HE should provide for a programme of air pollution measurements, and potential mitigation options for protection of public health in Slough whilst the traffic emissions science progresses in the next few years.*
61. *The Inspector may like to know that an NO2 monitoring station set up to the same standards as the UK AURN network represents a cost to the development of perhaps as little as £100,000 over the course of the reasonable life of a suitable instrument. Yet this would yield valuable, actionable information to inform mitigation in future in Slough. This would also give SBC some comfort that HE will act on the best evidence available given their statutory duty to work with local partners to reduce air pollution along the strategic road network.*

Highways England Response

- 61.1 Highways England acknowledges the comments made by the Ricardo Report, but believes that all matters raised here have been addressed in previous responses by Highways England to the Examination.
- 61.2 In addition, the Ricardo Report in this response strays into criticism of policy, which is not within the jurisdiction of the Examination under the Planning Act 2008. Further, the Ricardo Report again confuses the mitigation of general air pollution with the mitigation of the not significant air quality impacts anticipated for the Scheme.
- 61.3 Finally, it is not for the Scheme, which is a smart motorway improvement scheme, to provide what would amount to an infrastructure levy in favour of Slough Borough Council by providing additional unnecessary monitoring information out of the public purse for the wider benefit of Slough Borough Council. Moreover, as the response itself acknowledges, there is no reasonable requirement for such provision, as Highways England is already subject to statutory duties, which it must be assumed that Highways England will comply with.