

THE PLANNING ACT 2008

**M4 (JUNCTIONS 3 TO 12) (SMART MOTORWAY) DEVELOPMENT CONSENT ORDER
APPLICATION**

TR010019

Written Summary of Issue Specific Hearing Dealing With Matters Relating to Noise and Vibration

Date: Wednesday 10 February 2015

Venue: Holiday Inn Maidenhead/Windsor, Manor Lane, Maidenhead, West Berkshire, SL6 2RA

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?*

Highways England Comment

1. Highways England noted that the draft Statement of Common Ground between Highways England and LBHill is silent on the matter of working hours. At a meeting held on 21 December 2015 to progress areas not yet agreed in the Statement of Common Ground, the issue of working hours at the weekend was not raised by LBHill.
2. Highways England stated that the proposed the core working hours for the Scheme construction were included within the DCO application (the "Application") to the Secretary of State on 30 March 2015. The proposed core working hours are set out within section 5.4 of the Construction Environmental Management Plan ("CEMP"). Night time and weekend working will be required for certain construction activities where off-peak, overnight lane closures will be required to provide additional safe working space. Examples of construction activities undertaken at night include the following:
 - a) Installation of bridge beams;
 - b) Installation and removal of temporary works that could affect the safe operation of the M4;
 - c) Bridge demolition;
 - d) Installation, reconfiguring and removal of traffic management;
 - e) Resurfacing works to the M4;
 - f) Underbridge joint replacements;
 - g) Erection of gantries and associated technology;
 - h) Cross carriageway ducts and drains; and
 - i) Delivery and removal of large items of plant into the works.
3. Highways England noted that it is standard practice that motorway construction and maintenance activities such as these are carried out at night, in order to mitigate disruption to the travelling public and to minimise congestion on the local road network.

4. The specific working hours will be subject to agreement with local authorities as part of the applications for consent under section 61 of the Control of Pollution Act 1974 as stated in section 12.4 and 5.2 of the CEMP. To date, these discussions have not started as the detailed construction planning for the Scheme is not sufficiently advanced.
5. Highways England confirmed that the CEMP will be amended to say that particular consideration would be given to the impacts of Saturday morning working. However, Highways England considers that a start time of 7am is required for the following reasons:
 - to optimise the benefit of reduced traffic flows on Saturday morning when compared to weekday morning peak traffic flow;
 - to be consistent with construction supplier deliveries which start and finish earlier on a Saturday; and
 - to enable the construction workforce to finish at the earlier time of 1600hrs on Saturdays whilst maintaining programme efficiency (i.e. the cost and delivery programme).
6. At the Hearing, LBHill expressed a concern that the CEMP includes provision for one hour start up and close down periods either side of the core working hours. Highways England reiterates the commitment, given at 5.4.10 of the CEMP, that these start up and close down periods will not include operation of plant or machinery likely to cause a disturbance to local residents or businesses. Further, these periods will not be used to otherwise extend core working hours.
 - 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?*

Highways England Comment

7. Highways England stated that requirement 8 in the draft DCO provides that no part of the authorised development is to be carried out until a CEMP, substantially in accordance with the outline CEMP submitted with the Application, is approved by the Secretary of State, in consultation with the relevant planning authorities and the Environment Agency. The procedure governing how consultation will be carried out in respect of the provisions of the final CEMP (to be submitted to the Secretary of State for approval pursuant to requirement 8), were provided in Highways England's explanatory notes on the discharge of requirements, submitted at Deadline III (REP3-015) and Deadline V (REP5-002).

8. Highways England confirmed that consultation will be undertaken by Highways England in preparing its application to the Secretary of State for the discharge of requirement 8. The responses received as part of that consultation are required to be reflected in the details submitted to the Secretary of State for approval, pursuant to paragraph 4(2) of Part 2 of Schedule 2 to the DCO. Further, in making its application for discharge to the Secretary of State, Highways England is required under paragraph 4(1) of Part 2 of Schedule 2 to the DCO to provide the Secretary of State with a summary report setting out the consultation undertaken.

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?

Highways England Comment

9. Highways England stated that it is not correct that it could revise the CEMP at any time. Requirement 8 requires a final CEMP to be approved, which must be substantially in accordance with the Outline CEMP, which was submitted with the Application. As explained above, (and in response to section ii. of question 4.7.1 of the Examining Authority's Second Written Questions), relevant stakeholders will be consulted on the wording of the final CEMP prior to it being submitted to the Secretary of State for approval. This is also explained in Highways England's explanatory notes on the discharge of requirements, submitted at Deadline III (REP3-015) and Deadline V (REP5-002).

iv. What additional controls and/or consultation is LBHill seeking through the CEMP that are not available to the council through section 61 applications?

Highways England Comment

10. This question was not addressed to Highways England.

2. *Night time noise during construction*

Re question 4.7.2 of ExA's second round questions:

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

Highways England Comment

11. Highways England noted that the local authorities have not reported any in principle objections to night-time working, and that the concerns of local authorities relate solely to matters of detail and mitigation. In response to the Examining Authority's further questions, Highways England confirmed that night-time working would mainly relate to online M4 construction activities. During night-time works, some activity would need to take place in some construction compounds, in order to support the construction activities. However, these activities would be limited and would include, for example, storage and transportation of gantries for erection, on the mainline M4.
12. Further, as explained above, and in Highways England's response to question 4.7.1 i. of the Examining Authority's Second Written Questions, night time working will be required for construction activities where overnight lane closures are required to provide additional safe working space. The specific working hours will be subject to agreement with the relevant local authority as part of the applications for consent under section 61 of the Control of Pollution Act 1974 as stated in section 12.4 and 5.2 of the CEMP. To date, these discussions have not started as the detailed construction planning for the Scheme is not sufficiently advanced. .
13. Section 61 applications will be made to the relevant local authority at least 28 days before the work is planned to commence. In response to issues raised during the Issue Specific Hearings, Highways England clarified how residents would be notified of night-time works, and explained that the CEMP sets out in paragraphs 4.3.9 to 4.3.15, how Highways England will engage with local communities and how it will communicate ahead of activities, particularly those activities at night.
14. At the Issue Specific Hearing, Slough Borough Council expressed concern that there had not been detailed dialogue on the section 61 applications, and noted that construction compounds would be used at night, which could have secondary impacts on residents. Slough Borough Council also expressed the view that noise insulation provision in the CEMP required more

detail. It was noted that the CEMP stated that background measurements will be undertaken 6 months prior to the works, and Slough Borough Council believes that this is too limited a period to carry out the assessment and then to insulate properties. The Examining Authority asked that Highways England and Slough Borough Council discuss the points raised and report the outcome of their discussions in writing. Highways England reports these discussions under the heading of ‘Concluding Points on Construction, Noise and Vibration’ following Noise Question 5 below.

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.

Item i. Would these parties, and any other parties who may wish to do so, please provide their observations on the ENMS?

Highways England's response

15. At the Issue Specific Hearing, Slough Borough Council expressed concern that there had not been detailed dialogue on the section 61 applications, and noted that construction compounds would be used at night, which could have secondary impacts on residents. Slough Borough Council also expressed the view that noise insulation provision in the CEMP required more detail. It was noted that the CEMP stated that background measurements will be undertaken 6 months prior to the works, and Slough Borough Council believes that this is too limited a period to carry out the assessment and then to insulate properties. The Examining Authority asked that Highways England and Slough Borough Council discuss the points raised and report the outcome of their discussions in writing. Highways England reports these discussions under the heading of ‘Concluding Points on Construction, Noise and Vibration’ following Noise Question 5 below.
16. Highways England noted that it was going further than the requirement in the National Policy Statement for National Networks, and had not only considered potential environmental enhancements as requested by the Examining Authority, but also proposing to deliver a number of enhancements, which would provide considerable environmental benefits.
17. Highways England confirmed that a 2m high barrier was proposed at Cranford Park, and this is shown on the updated Enhanced Noise Mitigation drawings, provided for Deadline VII.

18. Highways England noted that section four of the ENMS provided a summary of the lengths of the new proposed barriers. Some 3,300 residential properties will benefit from several thousand metres of new or replacement barriers at a significant cost (£9.71m).
19. Further, Highways England stated that it had developed a procedure to assess mitigation for road schemes. As explained in the ENMS, the procedure is a three part process: a calculation of noise reductions; a calculation of the cost/benefit and monetisation of health and amenity benefits; and a third part applying professional judgement to finesse the outcome of the calculations where necessary.
20. This procedure has been applied to the Scheme, has been applied to other road schemes and will be applied to road schemes in the future. This ensures that Highways England applies the same procedure for areas of mitigation across the Strategic Roads Network, and it becomes the standard approach for analysing the benefit of noise barriers.
21. For the Scheme, Highways England identified a number of areas that experience the highest noise levels, and sought opportunities to provide mitigation to those areas. The assessment process was applied equally throughout the Scheme, and the results indicated that provision should be made to provide a specific barrier height (eg 3.5m at Winnersh and 2.5m at Lower Earley). The results at each location were based on the same criteria.
22. In relation to the specific points raised regarding extending the barrier provision at Lower Earley eastwards, Highways England noted that Sheet 4 of Drawing 2 in the ENMS shows the residential areas of Lower Earley are moving further away from the motorway at this point. The B3270 road also lies between the residences in question and the M4. The B3270 is not as heavily trafficked as the M4, but noise from the road makes a contribution to the noise climate at these residential receptors.
23. Highways England noted that the performance of a noise barrier is dependent on a number of factors in addition to the height of the barrier, including the distance of the receptor from the barrier. The identified receptors, east of the eastern extent of the proposed enhanced noise barrier provision, are 300m or more from the Scheme, and reductions in noise levels that could be achieved through the extension of barrier would be minimal, and would not satisfy the criteria for expected noise reductions. This is exacerbated by the fact that the noise environment is affected by noise from the intervening B3270 road.

24. Highways England has adopted a reasonably practical approach for specifying noise barriers and considers that the procedure outlined previously for the assessment of enhanced noise mitigation was appropriate for determining the provision of noise barriers. The requested further extension of the noise barrier provision at Lower Earley would provide negligible additional protection to the receptors to the north. Moreover, paragraph 4.2 of the ENMS records that the proposals being put forward by Highways England have neutral or beneficial visual effects. The provision of further noise barriers could potentially create negative visual impact, in exchange for a negligible noise benefit.
25. Highways England were asked by the Examining Authority to provide a note on the difference in noise reductions between a 2.5 metre high noise barrier to Lower Earley (as proposed in the ENMS) and a 3.5 metre high noise barrier. That note is provided at Appendix A to this Summary.
26. In relation to the interim night-time noise target level ("IT") employed in the ENMS as the Significant Observed Adverse Effect Level ("SOAEL"), Highways England stated that the 55dB level comes from the World Health Organisation ("WHO"), who recognize that in many areas achieving 40dB is not feasible at this moment in time. Highways England based the ENMS on identifying those areas above the night-time SOAEL (taken as 55dB) and if 40dB was the displayed noise contour on Drawing 1 of the ENMS, the whole of the study area would be within it. The WHO states that "all member states are encouraged to gradually reduce the proportion of the population exposed to levels over the IT within the context of meeting wider sustainable development objectives". In the professional opinion of Highways England's noise experts, it is unclear how the WHO expects the 40dB level to be achieved for many areas affected by transport noise or whether there is a plan to implement this stricter regime at any point in the foreseeable future.
27. In response to questioning regarding the quantum of benefit that increasing the height of a noise barriers could provide, Highways England noted that the level of benefit from increasing the height of a noise barrier would not be as significant as local residents might anticipate. This is illustrated by the fact that the assessment criteria provides for a reduction of only 1 decibel for each 0.5m increase in barrier height.
28. In relation to provision of noise fencing near Emmbrook (EM 11 - stop 5 on the site visit), Highways England noted that the affected properties in the area are over 300m from the Scheme. Highways England confirmed that noise barriers are less effective at this distance and that in Highways England's view, additional noise barriers at this location did not meet this criterion for a 3dB reduction that is required for provision of a new barrier.

29. In response to a question and in relation to the area of the proposed development of Hatch Farm Dairies to the west of Winnersh (stop 7 on the site visit), Highways England confirmed that the assessment is not tailored for developments that may (or may not) come forward in the future and the existing properties in this area did not meet the criteria for a new barrier due to their distance from the M4 (at over 300m from the Scheme). Noise barriers are less effective at this distance. The reduction criterion for a new barrier is a minimum of 3dB, and, in Highways England's view, if additional noise barriers were provided at this location, the reduction would be less than 1dB and so would not meet this criterion.
30. Highways England stated that any developer bringing forward a new scheme would need to commission a noise assessment for that development in order to secure planning permission, and it would be the developer's responsibility to specify noise mitigation to provide a suitable noise climate for that development.
31. Highways England agreed to include cost estimates for the extension of the barriers at Emmsbrook and the Hatch Farm Dairies in the above areas as part of the note detailed in paragraph 10 above and provided at Appendix A to this Summary. For developments recently granted planning permission, Highways England stated that the noise impact of the current motorway and its current barriers would have been a material consideration for the planning application. Planning permission must have been granted on the basis of the barriers as they currently stand and the existing noise climate. The ENMS represents an improvement to the existing noise climate, and it must therefore follow that the permitted development must still be acceptable with the ENMS in place.
32. Highways England also addressed the noise attenuation properties of vegetation, and confirmed that a wide band of vegetation or trees is required to provide any significant noise attenuation. Tens of metres is the amount generally accepted as being required. For that reason, vegetation is not usually used as a noise barrier.
33. Highways England addressed the impact of wind direction on the Scheme's noise assessment, and commented that the assessment as provided in the ES and the ENMS was based on calculations carried out according to the methodology provided in the Calculation of Road Traffic Noise ("CRTN"). CRTN assumes an adverse moderate wind blowing from each defined road segment to a given receptor, wherever that road segment is located and wherever that receptor is located. For example, for a receptor to the north of the motorway, it is assumed the wind is blowing south

to north, and for a receptor to the south of the motorway, it is assumed the wind is blowing north to south. This ensures the provision of a reasonable worst case assessment.

Other matters

34. In response to a question regarding public rights of way, Highways England noted that it has responded to written representations in that regard at Deadline 5. The written representation is reference REP4-040 and Highways England's response is REP5-003.
35. In response to a request for consideration of further barrier at Paddock Drive, a local BMX track and community orchard, Highways England noted that it had already committed to £9.71M of additional expenditure on enhanced noise mitigation across the Scheme and in excess of 10,000m of new or replacement barriers. As a result, Highways England stressed that it would not be able to provide further barrier(s) at this location as the benefits of doing so would be negligible. As is the case throughout the Scheme, Highways England are only providing such barriers where they would provide a proven benefit, and those benefits outweigh the costs. This is not the case at Paddock Drive.

Additional Questions

36. In response to a question from the Examining Authority regarding measures at EM6, Highways England confirmed that the noise barrier provision shown on Sheet 3 of Drawing 2 of the ENMS would be revised and reissued.

The Examining Authority - Regarding Sheet 15, Harlington. How will ENMS be dealt with at St Peters subway?

37. In relation to the provision of enhanced noise mitigation at St Peter's subway, shown on Sheet 15, Harlington, Highways England confirmed that it had considered three options:
- i. Positioning the noise barrier over the subway, in the motorway verge. This option while potentially the easiest to construct, is unlikely to be feasible due to space constraints. The verge in this section of the M4 motorway is narrow at around 1.5m – 1.8m wide measured from the back of the hardshoulder to the wall (parallel to the M4) forming the subway and its access ramp. This width will be required to accommodate features such as drainage, communication ducts and vehicle restraint system.

- ii. A chicane arrangement around the south of the access ramp with a gap for pedestrian access. However, this option would require the acquisition of land outside of the Order Limits and so was discounted.
 - iii. Highways England's preferred option is to anchor the new noise barrier directly to the top of the access ramp wall, following the line of the existing pedestrian barrier.
38. Highways England explained that its preferred option would be shown on the revised ENMS drawings to be submitted at Deadline VII.

The Examining Authority - How will the proposed new barrier to Harlington (EM34) be installed in relation to the subway entrance. Also, why is there a gap between the retained existing barrier and the new barrier on the E/B carriageway in this location?

39. Highways England explained that the ENMS mirrored the existing barriers at the relevant location, where a gap was retained at the subway. Highways England noted that there is a road running parallel with the M4 to the west of this gap in the noise barriers, which then heads to the north at the gap in the noise barriers. Traffic on this road is a contributor to the noise climate at the properties north of the gap (at a distance of more than 150 metres from the M4), and would reduce any noise reduction benefits which would result from the provision of a noise barrier in this gap.
40. Highways England confirmed that the ENMS provided for the retention of a barrier to the west and to provide a new barrier to the east of the subway. This will be shown on the revised ENMS drawings to be submitted at Deadline VII.
41. In relation to barriers on bridges, Highways England agreed that there would be some reduction in the height of some barriers, as going above the given height might mean that significant structural works would be needed to implement noise barriers at some locations, which would significantly increase the amount of work required, as well as the cost. The limit of 2m was based on an engineering judgement to minimise the effects on the existing bridges. The surface area of even a 2m barrier on a bridge was considerable in any event, and to go above this in height to provide an even greater surface area would increase the risk of the need to strengthen existing cantilevers and edge beams, in order to protect the barriers, and road users, from strong winds. During the accompanied site inspection on 9 February 2016, the Examining Authority was shown at Dorney a typical arrangement of holding down bolts used to attach a 1.8m high noise fence to the top of a retaining wall. A photo showing this arrangement is attached at Appendix B. It was clear that any significant increase in the size of the anchorage could not be accommodated on a

typical bridge parapet beam 450-500mm in width. In any event, Highways England confirmed that all bridges with proposed barriers were to be subject to a structural assessment during detailed design in order to confirm their capacity to accommodate the additional loading, or to identify any required strengthening. Highways England confirmed further that its noise calculations took this into account, and stated that the change in acoustic performance would be minimal as the contribution of the bridge to the noise climate would only form a part of the effect of the motorway at a given receptor. Highways England noted that if major strengthening or reconstruction work were to be necessary as a result of the imposition of higher barriers, such works may have environmental impacts which have not been assessed and might require land outside the Order limits. For these reasons, Highways England consider that the imposition of new or higher noise barriers across structures could potentially impact the delivery of the Scheme.

42. For some bridges, for example Bray Bridge over the River Thames at Amerden, barriers are not proposed for the bridges, on the basis that they would increase the work and costs involved significantly and so have failed the cost/benefit analysis. As noted previously, existing structures may not be able to support the additional loading resulting from new barriers without substantial additional work and such work may have significant consequences for the Scheme.

Item 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?

Highways England's response

43. Highway England confirmed that, where the Significant Observed Adverse Effect Level ("SOAEL") is exceeded for night or day time, the Scheme will not make the situation significantly worse.
44. Drawing 12.4 and Drawing 12.5 of the ES (Document Reference 6-2, APP 265 to 268, and APP 269 to 272) show the short term and long term changes in $L_{A10, 18h}$ noise levels resulting from the implementation of the Scheme. There are noise decreases within the major part of the Scheme corridor resulting from the implementation of the Scheme. Where there are noise increases, these are confined to negligible noise increases close to roads other than the Scheme. Highways England explained that "significant" was applied to moderate or major effects, not negligible (up to 1dB) or minor (1-3dB) effects.
45. The $L_{A10, 18h}$ noise changes shown in Drawing 12.4 and Drawing 12.5 are mirrored in the daytime and night-time L_{Aeq} noise changes. The implementation of the Scheme will generally result in an improvement in the noise climate within the Scheme corridor.
46. The Enhanced Noise Mitigation Study Report was submitted at Deadline V (REP5-002). With the enhanced mitigation (comprising the provision of a number of additional noise barriers and the replacement of a number of existing noise barriers with higher noise barriers), the noise climate within the Scheme corridor will be improved further from the position shown in the drawings submitted with the Environmental Statement, particularly at those locations exposed to the highest noise levels, on which the enhanced mitigation was concentrated.
47. A revised Enhanced Noise Mitigation Study Report was submitted on 8 February 2016. The revised report includes Drawing 3, which shows the short term noise level change contours (Do Something 2022 minus Do Minimum 2022) with the enhanced mitigation in place.

Item 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?

Highways England's response

Status of the Draft Transport Analysis Guidance

48. The Transport Analysis Guidance ("TAG") relating to noise was adopted and published by the Department for Transport ("DfT") on 23 December 2015 as part of a revised TAG Unit A3 Environmental Impact Appraisal. The previous version was withdrawn.

49. The current TAG Unit A3 Environmental Impact Appraisal can be accessed via the following link:

<https://www.gov.uk/government/publications/webtag-tag-unit-a3-environmental-impact-appraisal-december-2015>

50. The associated noise workbook (excel format) can be accessed via the following link:

<https://www.gov.uk/government/publications/webtag-environmental-impacts-worksheets>

How are the health benefit values derived

51. Section 2 of TAG Unit A3 Environmental Impact Appraisal deals with noise impacts. Paragraph 2.2.27 states:

*“[Monetary] valuation is based on the recommendations of the study **Environmental Noise: Valuing Impacts on sleep disturbance, annoyance, hypertension, productivity and quiet (Defra 2014)** and their accompanying noise modelling tool. More detail on the derivation of the values and underlying research is given in that report.”*

52. The study referred to can be accessed via the following link:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/380852/environmental-noise-valuing-impacts-PB14227.pdf

53. The monetary valuation uses an “impact pathway” approach and covers a range of impacts on:

- Annoyance;
- Sleep disturbance; and
- Health impacts, including heart disease (acute myocardial infarction ("AMI"), stress and dementia).

54. Defra's noise modelling tool (a link to which is provided in paragraph 3 above) contains dose-response functions for each impact pathway. These functions describe, at different noise levels, the percentage of the population affected (for sleep disturbance and annoyance/amenity) or the increased risk of adverse health outcomes (for AMI, stroke and dementia).

55. The Defra tool goes on to develop, per household, marginal monetary values for each impact pathway. The monetary valuation is based on the estimation of the number of Disability Adjusted Life Years ("DALY") lost or gained under each impact pathway, with a value of £60,000 per DALY.

Has this approach to determining the costs and benefits of noise reduction barriers been used on any other schemes

56. Highways England has adopted this monetization approach as part of the procedure to assess the benefits of mitigation options (e.g. the provision of new or replacement noise barriers). This approach was also employed in relation to the application for development consent for the A14 Cambridge to Huntingdon Improvement Scheme. Highways England is also using this approach (in a less detailed way) to assess the benefits of mitigation options for identified Important Areas on the highway network.

Item iv. Do the local authorities agree with this cost-benefit approach being used to determine which areas should have additional barriers?

Highways England's response

57. This item is not addressed to Highways England.

Item 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?

58. Requirement 22 in the DCO requires a scheme for the installation and replacement of acoustic barriers to be agreed and implemented. Previously, that requirement referred to acoustic barriers being provided in the locations shown on Figure 12.2 of the Environmental Statement.
59. However, the requirement is to be amended in the next iteration of the draft DCO, to require acoustic barriers to be installed in the locations shown on the Environmental Masterplan, which is being updated to show the locations of both the noise barriers previously shown on Figure 12.2 and those that form part of the ENMS.
60. Consequently, following those amendments, the delivery of the recommendations in the ENMS will be secured by way of requirement 22 in the draft DCO.

Item 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?

Highways England's response

61. Highways England stated that it had proposed a scheme calculated to produce benefits, and that the most effective approach to ensuring that the noise effects are not materially greater than those reported in the Environmental Statement (or, in this case, in the Enhanced Noise Mitigation Study Report, submitted on 8 February 2016) is to ensure compliance by design, making sure that the Scheme is built in accordance with the approved design and in so doing any potential defects in the noise mitigation are avoided.
62. Highways England stated that it was confident in the methodology and criteria that had been applied to the noise assessment. The Calculation of Road Traffic Noise has been in use since 1988, and its use is specified in clause 5.191 of the National Policy Statement for National Networks. Highways England noted that no parties had raised any issue concerning the methodology used, and on that basis there is no reason why any requirement should be imposed upon the Scheme requiring the use of additional public funds to carry out noise monitoring which has been shown to be unnecessary by the assessments. The test for imposing monitoring of this nature is not "*could such monitoring be imposed*" - rather it is "*should the monitoring be imposed*" and the technical, scientific and expert answer (which has not been disputed) to that question is "no".
63. Highways England was asked by the Examining Authority to confirm what noise monitoring provisions had been adopted on other schemes. Highways England's response is:
 - a. noise monitoring was undertaken on the M25 J23-27 ALR scheme as reported in the one year report, where it is noted that all the sites for which comparable data was available showed a decrease in noise level. The M25 J23-27 was the first of the ALR schemes, and has thus been subject to increased scrutiny. On that basis, monitoring was requested across all types of criteria (not just noise) in an attempt to measure the effectiveness of ALR schemes in general;
 - b. on the A14 scheme the Examining Authority for that scheme drafted a post construction noise monitoring provision into the DCO, but this was not included in the DCO at the end of the Examination;

- c. the A30 DCO contains a requirement (requirement 17) that before completion of the authorised development, a post construction noise monitoring plan must be submitted to, and agreed by, the local planning authority; but
- d. no other post construction noise monitoring requirements were identified in any other similar schemes within the Planning Act 2008 procedure.

64. In respect of the noise climate at residential receptors near the Thames Bray Bridge, Highways England noted that the Scheme would provide low noise surfacing throughout, which would produce noise reductions along the Scheme, including at Bray. As the particular residential receptor identified is more than 150m from the M4, the effect of providing a barrier would be minimal. However, Highways England consider that the possibility of noise increasing at that location was highly unlikely as:

- e. the Scheme is not a significant intervention in terms of noise from the motorway, as it is largely an online scheme and only increases the traffic by one lane; and
- f. Highways England is providing low noise surfacing along the complete extent of the Scheme.

Item 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?

Highways England's response

65. Consequently, following those amendments, the delivery of the recommendations in the ENMS will be secured by way of requirement 22 in the draft DCO.

66. Following previous reference to Highways England considers that any localised noise and vibration from Thames Bray Bridge it is likely to be caused by vehicle interaction with the bridge expansion joints, loose drainage chamber covers and existing bridge surfacing.

67. The existing drainage system on the bridge includes chambers at the corners of the bridge, the covers of which are within the live traffic lanes of the motorway. The detailed design for the modified drainage system will relocate or remove these chamber covers to eliminate this source of noise. This will be secured by way of the drainage strategy, secured under requirement 14 of the draft DCO.

68. As part of the bridge widening works, the Scheme will also replace the bridge expansion joints. However, the function of these joints is to accommodate movement of the bridge deck and, as such, any replacement joint will always include a discontinuity in the motorway surface and therefore Highways England cannot guarantee that the new joints will be any quieter than the existing joints.
69. Highways England acknowledges that these types of localised effects may never be entirely eliminated. However, with the Scheme in place, these localised effects would be expected to reduce.
70. It should be noted that unusual, localised effects such as these are not covered in the method provided in the Calculation of Road Traffic Noise ("CRTN") employed in the noise assessment for the Scheme (as required under paragraph 5.191 of the National Networks National Policy Statement ("NN NPS")), as it would be extremely difficult, if not impossible, to accurately predict this type of noise.

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

Re question 4.7.4 of ExA's second round questions:

Item 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?

Highways England's response

71. This item is not addressed to Highways England.
72. In response to issues raised, Highways England noted that it had made a commitment to use absorptive barriers at some locations, which were shown in the latest Environmental Masterplans.
73. Further, the CRTN method for calculating noise levels provides a method for assessing reflective surfaces. Highways England's assessment assumed a worse case whereby all barriers are reflective.
74. In relation to validation of the method employed in CRTN for reflected noise, Highways England is continuing to investigate validation data, but no data have yet been forthcoming.

Item 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)?

Highways England's response

75. In accordance with the requirements of paragraph 5.191 of the NN NPS, the calculations for the noise assessment were carried out according to the methodology provided in CRTN, which includes the calculation of reflected noise from barriers. CRTN is the accepted method in the UK for the calculation of road traffic noise levels and has been successfully employed for many years.
76. Investigations have been carried out in conjunction with Highways England's Principal Noise Advisor. Highways England is not aware of any published papers on the validation of the method for dealing with reflected noise provided in CRTN.
77. Further investigation is on-going, including making contact with one of the authors of CRTN. If the results of any validation exercises come to light, these will be provided to the Examining Authority.

Item iii. Would the applicant please state how it was determined which receptors would be exposed to elevated noise levels due to noise reflections?

Highways England's response

78. Two sets of noise calculations were carried out:

- i) With the noise mitigation as proposed in the Environmental Statement; and
- ii) With the enhanced noise mitigation, as proposed in the Enhanced Noise Mitigation Study Report.

79. In the calculations, as has been noted previously, all noise barriers were assumed to be reflective, which provides a worst case in terms of reflected noise.

80. The noise changes (Calculation ii) minus Calculation i)) at all properties within the study area were derived and those properties where the noise change was greater than +0.2 dB were identified (this represents an onerous condition given that the limit of perceptibility in the short term is a change of 1 dB). These noise increases can only be as a result of reflected noise from noise barriers.

81. The noise model was then employed to show the locations of these identified properties within the study area, and absorptive noise barriers specified accordingly to mitigate these adverse effects.

82. The following absorptive barriers are proposed:

- i) new and replacement barriers between J10 and J11 (ref EM8, 8A, 9, 10 and 11);
- ii) new 2.5 metre high barrier to The Myrke (ref. EM26); and
- iii) new 2.5 metre high barrier to Harlington (ref. EM34).

83. Thus, the noise levels at these identified properties with the Scheme in operation will not be greater than the noise levels presented in the Environmental Statement (which showed general noise reductions within the Scheme corridor).

Item 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?

Highways England's response

84. A response to the written rep from Jan Heard on behalf of the Mid and West Berkshire Local Access Forum (REP4-020) was provided by Highways England as REP5-003 at Deadline V.

Item 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?

Highways England's response

85. The locations along the Scheme where existing noise barriers are being retained or are being replaced (either with a noise barrier of comparable height or with a higher noise barrier) and where new noise barriers are being provided, were included in the analysis described in the response to Q4(iii) above and the following absorptive barriers are proposed:

- i) new and replacement barriers between J10 and J11 (ref EM8, 8A, 9, 10 and 11);
- ii) new 2.5 metre high barrier to The Myrke (ref. EM26); and
- iii) new 2.5 metre high barrier to Harlington (ref. EM34).

86. These barriers are shown on the Environmental Masterplan, and are required to be provided as part of the Scheme for acoustic barriers secured under requirement 22 in the draft DCO. In addition, Highways England has made a previous commitment (as secured by Requirement 22(3) of the draft DCO, submitted at Deadline V, REP5-002) to replace existing noise barriers on a like for like basis. Where existing noise barriers are of an absorptive type, they will be replaced with absorptive type noise barriers. This includes those locations where the existing noise barrier is being replaced with a higher noise barrier.

87. Highways England confirmed that the updated ENMS drawings to be submitted at Deadline VII would show whether each proposed barrier was absorptive or not.

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?*

Highways England's response

88. Highways England confirmed that an additional provision would be added to Requirement 5 so that maintenance of the low noise surfacing was required for 15 years. This wording was provided in the amended DCO submitted to the Examining Authority on 15 February 2016.
89. Highways England confirmed that it would include an obligation under requirement 5 to maintain the low noise surfacing for 15 years. However, it does not consider it to be appropriate to constrain the M4 in perpetuity in terms of the surfacing to be used. For example, it may be that in the future it is no longer a policy supported by Highways England, the material may not be available, it may no longer be economical, or circumstances may have changed on the Strategic Road Network such that it is no longer necessary or appropriate.
90. Highways England stated that it was unwilling to adopt the language suggested by the Examining Authority as it could create an obligation to repeatedly return to the Secretary of State for approval in perpetuity that could unnecessarily increase delay and cost.
91. Highways England clarified that the requirement as drafted would not necessarily mean that the noise attenuation properties of the surface would end after 15 years, as any resurfacing that does take place within the 15 year period, such as after 13 years, would extend the life of the low noise surfacing further.

- 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?*

Highways England's response

92. Highways England confirmed that the deterioration of noise reduction properties is not a specific factor taken into account when deciding the timing and whether to replace the road surface. Highways England's activities to routinely maintain the surfacing in a safe and serviceable manner indirectly result in the low noise surfacing being renewed when worn.
93. When laid, the low noise surfacing will be laid to the required specification for that material. Samples will be taken of the laid material to test whether it meets the required specification. The tests normally include checking the properties of the aggregate (stone) and the binder (bitumen), and other properties such as the density of the material and the surface texture (roughness). All of these tested properties combine to give the surfacing material its 'low noise' properties.
94. Over time, all surfacing materials are subject to wear from traffic, accident damage and weather. Highways England's maintenance agents are contracted to regularly inspect all routes and to report defects to the infrastructure including the surfacing. Defects can include:
- a. Loss of surface texture of the surfacing. 'Polishing' occurs as tyres slowly wear down the aggregate. Polishing of the surfacing decreases the skid resistant properties of the surfacing and increases braking distances. Highways England has a programme of surveys to measure the skid resistance of surfacing on roads and has set values which indicate where intervention (retexturing or resurfacing) will be required.
 - b. Deformation of the surface as a result of vehicle traffic. This is generally found in the nearside lanes which have higher HGV use and can be seen as grooves forming along the wheel tracks, also known as 'rutting'. This defect will be programmed for treatment once the depth of the rut is approaching an intervention value set by Highways England.
 - c. Cracking and potholes generally occur as a result of weather breaking up the surfacing and the plucking action of tyres passing over the surface. Again, there are intervention values set by Highways England for the extent/depth/width of

these defects after which treatment must occur. The treatment can range from patching and crack filling (overbanding) in the short-term to address immediate safety issues, to including areas of defects in the programme for full resurfacing.

95. These routine maintenance activities are specified in the contracts Highways England has with its maintenance agents. These maintenance and renewal activities are the key clauses of these contracts, and ensure that Highways England's roads are maintained in a safe and serviceable state. Monitoring and repairing the surfacing in this way maintains the surfacing material's required specification. Maintaining the specification preserves the noise reduction properties of the surfacing.
96. Highways England noted that all road surface types degrade over time, with consequent increases in tyre/road noise. However, research has indicated that new low noise surfaces provide, on average, between 4 and 6 dB(A) benefit over tested hot road asphalt ("HRA") surfaces. In spite of the better acoustic durability of the HRA surfaces, the research concluded that low noise surfaces still outperformed the HRA surfaces by 1 to 3 dB(A) after 10 years. The -3.5 dB correction for a low noise surface, as prescribed in DMRB and used in the noise assessment for the Scheme, is a reasonable average over the life of the surface for calculation and assessment purposes.
97. Although low noise surfacing is a mitigation measure for noise for the Scheme, Highways England explained that a noise criterion for road condition replacement assessment would not be appropriate. Ultimately, it should be the general wear of the surfacing which results in it being replaced, which of itself will ensure the continued noise reduction properties of the surface as it is general wear which results in a reduction in the surface's acoustic properties.
98. With regards to slip roads, Highways England confirmed that its intention is to resurface all slip roads with low noise surfacing, as specified in requirement 5. The exact extent of surfacing along the slip roads will be confirmed during detailed design.

Addendum on construction, noise and vibration

Noise Insulation

99. Although the outline CEMP has clauses which explain the noise insulation package at section 12.5, Highways England agreed to review suggested changes to the CEMP provided by Slough Borough Council ("SBC"), and to discuss the suggested changes with them. Highways England, agreed to submit details of any proposed amendments to the CEMP as soon as the amendments were agreed (outwith the specified deadlines).
100. Following the issue specific hearings in February 2016, Highways England has given further consideration to the measures regarding noise insulation included in the CEMP. On the basis of the measures in a number of similar schemes, Highways England has removed the noise insulation and temporary rehousing measures from the CEMP, as these will be assessed by local authorities as part of the process for Highways England's applications under section 61 of the Control of Pollution Act 1974. This approach is consistent with other smart motorway projects that have been carried within the last 10 years, 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. Most of the construction activities 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. These details will also be addressed within Highways England's application under section 61 of the Control of Pollution Act 1974, and appropriate mitigation measures will be suggested as required following discussions with the local authorities. Highways England will discuss the details of this approach further with SBC at the meeting with them on 22 February 2016.

Applications under s.61 of the Control of Pollution Act 1974

101. In relation to applications to be made under section 61 of the Control of Pollution Act 1974, Highways England entered into further discussions with the London Borough of Hillingdon. Highways England confirmed the process in relation to applications under the Control of Pollution Act 1974. The salient points agreed are as follows:
- i. Before carrying out works Highways England's contractor will submit a section 61 application, which will contain details of the proposed working methods and noise mitigation steps;

- ii. The local authority will consider the section 61 application, and if it considers that the application contains sufficient information and noise mitigation it will grant the application;
- iii. If the local authority does not accept that the section 61 application is suitable, having regard to various issues such as the protection of persons, it can apply section 60 of the Control of Pollution Act 1974, and use this power to limit the duration of works and to impose conditions, such as the type of plant to be used;
- iv. If a section 60 notice is issued by the local authority then Highways England's contractor will have the right to appeal to the magistrates court;
- v. Failure to comply with a section 61 or section 60 notice is a criminal offence; and
- vi. Local authorities usually publish details of applications granted under the Control of Pollution Act 1974.