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8.10.14 Noise and Vibration Effects (Ns.1)

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A303 Amesbury to Berwick Down

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14 Noise and Vibration Effects (Ns.1)

Question Ns.1.1

Noise and vibration

What agreements have been made with the relevant Environmental Health Authorities regarding permissible levels of noise and vibration?

Response

1. Agreement has been reached with Wiltshire Council, the host local authority, regarding the assessment methodology, which includes noise and vibration criteria for the onset of potentially significant effects. This agreement is confirmed in the Statement of Common Ground (SoCG) between Highways England and Wiltshire Council, which will be submitted to the Examination as an initial draft SoCG at deadline 2 (DL2). Wiltshire Council commissioned an independent Peer Review of the Noise Assessment which did not identify any concerns with the results of the assessment. Wiltshire Council is content that the proposed operational mitigation identified in the Environmental Statement is suitable and sufficient. This agreement is also included in the SoCG.

Question Ns.1.2

i. What agreement has been reached with relevant Environmental Health Authorities on working hours?

ii. Can the Applicant explain why there is no specific requirement within the dDCO to secure the general provisions relating to working hours as set out in the OEMP?

iii. Given the apparent importance of noise and vibration management plans set out in the OEMP for both preliminary and main works, can the Applicant explain why these are not a stipulation under dDCO Requirement 4?

iv. Can the Applicant explain why no draft noise and vibration management plans have been prepared as part of the application documents?

Response

1. With regard to Preliminary Works, core working hours are set out in PW-G4 of the Outline Environmental Management Plan (OEMP) [APP-187] and are 07:30-18:00 Monday to Friday and 07:30-13:00 Saturday throughout the year.

2. With regard to the Main Works, core working hours (for all works except tunnelling and earthworks) are set out in MW-G12 of the OEMP and are 07:00-19:00 Monday to Friday and 07:00-13:00 Saturday.

3. Extended hours for earthworks in summer are 07:00-22:00 Monday to Saturday. At other times of the year the main works core working hours apply to earthworks.

4. However, the above main works core working hours, and main works extended summer hours for earthworks, are reduced to site specific working hours of 07:30-18:00 Monday to Friday and 07:30-13:00 Saturday (all year round) for all works within Chainage 3520 to Chainage 4180 and Chainage 11300 to Chainage 12400 i.e. Winterbourne Stoke and Amesbury, as set out in MW-G13 of the OEMP.

5. Agreement has been reached with Wiltshire Council with regard to all the above working hours with the exception of the extended hours for earthworks in summer, which are subject to ongoing discussions.

6. The OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO [APP-020]. As such, compliance with the measures is secured via the dDCO and therefore there is no need to specify specific measures, such as working hours, in the DCO itself. As provided for by section 161 of the Planning Act 2008, failure to comply with the terms of a DCO is an offence.

7. The requirement for the contractor to produce a construction Noise and Vibration Management Plan is set out in the OEMP (PW-NOI3, MW-NOI3). As set out above, the obligation to comply with the OEMP is a legal obligation in the DCO, therefore there is no need to specify the requirements relating to construction Noise and Vibration Management Plans in the DCO itself.

8. Until a contractor is appointed it would be premature to produce such a plan given the potential for precise methodologies to differ, although the OEMP does set out the required minimum contents of the plan (PW-NOI3, MW-NO13). As set out in the OEMP [APP-187], the Construction Environmental Management Plan (CEMP), to which the Noise and Vibration Management Plan will be appended [MW-G7], will be developed in consultation with Wiltshire Council [MW-G5].

Question Ns.1.3

Noise and vibration

Temporary adverse effects are recognised to occur on residential properties in close proximity to Countess roundabout and the northern edge of Winterbourne Stoke.

i. What is meant by northern edge?

ii. What is meant by close proximity?

iii. Can these be defined?

Response

i. What is meant by northern edge?

1. Northern edge of Winterbourne Stoke is defined as the individual property, Foredown House, on the edge of the village labelled as construction noise receptor C18 in Figure 9.1 [APP-164] (Noise Location Plan).

ii. What is meant by close proximity?

2. Paragraph 9.9.73 of the Environmental Statement (ES) Chapter 9 [APP-047] Identifies that a temporary significant adverse construction noise effect is predicted at this stage at two locations: receptors in 'close proximity' to Countess Roundabout (which are represented by C8, C9 and C10) and a receptor north of Winterbourne Stoke (Foredown House - C18)

iii. Can these be defined?

3. Figure 9.1 [APP-164] (Noise Location Plan) of the ES Chapter 9 shows the locations of the construction receptors employed in the noise and vibration assessment, labelled C1 to C19. As detailed in paragraph 9.3.6 Chapter 9 of the ES [APP-047] these selected receptors are also representative of neighbouring properties in their vicinity. By choosing a selection of the closest identified potentially sensitive receptors for the quantitative assessment the reported impacts are, therefore, typical of the worst affected receptors and all potentially significant effects are identified. At receptors further away from the works the impact would be reduced.

Question Ns.1.4

Noise and vibration

Paragraph 9.3 .7 of the ES Chapter 9 [APP-047] states that the noise and vibration assessment is an estimate based on information which includes the number and type of machinery likely to be required for each activity.

i. How can it be ensured in those circumstances that the worst-case scenario has been considered and the noise and vibration generating activities would fall within the scope of the ES?

ii. How would the OEMP and/or the dDCO provide enough control for the worst-case scenario and meet the requirements of the NPSNN? (ie how does the OEMP/dDCO provide sufficient assurance that the assumed construction plant fleet presented in Appendix 9.2 [APP-268] are not exceeded?).

Response

1. It is not possible to guarantee the appointed contractor will utilise the exact schedule of plant as presented in the Environmental Statement (ES) Appendix 9.2 on construction noise, which is [APP-269], not [APP-268] as specified in the question. In line with other major infrastructure projects, until a contractor is appointed to construct the Scheme precise details of the construction works cannot be confirmed. However, the assessment reported in the ES is based on robust information as supplied by the contractor appointed to provide reasonable assumptions regarding the likely construction works at the ES stage when preparing the application. Some flexibility on exact plant and methods is essential to ensure the contractor can adapt as the detailed design evolves, and to ensure they can incorporate the latest innovations. In addition, a worst-case approach has been taken in that the ES assessment does not include the benefit of site hoarding/enclosures in the assessment of noise impacts as at this stage precise details of the location of construction plant is not confirmed.

2. Item MW-G7 in the Outline Environmental Management Plan (OEMP) [APP-187] requires the main works contractor to prepare a Noise and Vibration Management Plan. As set out in the OEMP [APP-187], the Construction Environmental Management Plan (CEMP), to which the Noise and Vibration Management Plan will be appended (MW-G7), will be developed in consultation with Wiltshire Council (MW-G5). Item MW-NOI3 provides further details on the content of the Noise and Vibration Management Plan and requires the integration of noise control measures into the preparation of all method statements for the works. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (DCO) [APP-020].

3. In addition, Highways England will place a contractual responsibility on the contractor to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation.

Question Ns.1.5

Noise and vibration

It appears that there is an assumption that only continuous flight auger or cast *in situ* piles would be used (Paragraph 9.3.12 of the ES).

i. Can you confirm this would need to be added to the dDCO as a requirement or if not?

ii. How would the ES be revised to accommodate alternative forms of piling?

iii. What would the effect be on affected premises?

Response

i. Can you confirm this would need to be added to the dDCO as a requirement or if not?

1. The assessment reported in Chapter 9 of the Environmental Statement (ES) is based on robust information on the likely works as provided by the contractor appointed to provide reasonable assumptions on the likely construction works at the ES stage. This included the use of continuous flight auger piling, which as an augured method is not a significant source of vibration. A commitment to non-impact piling at the Countess flyover bridges and the River Till viaduct will be added to the next revision of the OEMP [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO).

ii. How would the ES be revised to accommodate alternative forms of piling?

2. On the basis of the response to part i) no revision to the ES is required.

iii. What would the effect be on affected premises?

3. Impact piling carried out in close proximity to potentially sensitive receptors could have the potential to result in significant construction vibration effects. On this basis the commitment outlined in the response to part i) will be added to the OEMP [APP-187].

Question Ns.1.6

Noise and vibration

Paragraph 9.3.22 of the ES [APP-047] indicates that at this stage full information is not available regarding the time periods during which construction activities causing vibration would occur.

How can the obligations under the PA2008 be satisfied without this information?

Response

1. Paragraph 9.3.22 of the Environmental Statement (ES) [APP-047] refers to the methodology used for the purposes of the assessment reported in the ES and how the duration of the works is considered when identifying significant adverse construction noise/vibration effects.

2. In line with other major infrastructure projects, until a contractor is appointed to construct the scheme precise details of the construction programme cannot be confirmed and some flexibility on the exact programme is essential to ensure the contractor can adapt as the detailed design evolves. However, the assessment reported in the ES is based on robust information on the likely programme as provided by the contractor appointed at the ES stage during the preparation of the application. A reasonable worse case approach to the assessment has been taken, for example in terms of the position of activities relative to the receptors, and no benefit from side hoarding/enclosures has been included, as at this stage precise details of the location of construction plant is not confirmed. It is therefore considered that the ES represents a robust and reasonable scenario in terms of construction effects.

3. In that context, it is recognised that suitable controls are required to be secured. Construction noise and vibration mitigation measures are contained in the Outline Environmental Management Plan (OEMP) [APP-187], compliance with which is secured by Paragraph 4 of Schedule 2 of the dDCO [APP-020]. Working hours are controlled in the OEMP by MW-G12 to G16, any works outside of the core hours will be agreed with Wiltshire Council prior to undertaking the works under Section 61 of the Control of Pollution Act 1974. MW-NOI1 requires the contractor to adopt Best Practicable Means (BPM) to control noise and vibration. As set out in the OEMP [APP-187] a Noise and Vibration Management Plan will be prepared by the contractor appointed to construct the scheme (MW-NOI3) which will contain further details on noise and vibration mitigation and monitoring measures.

4. For this reason, the Applicant considers that the assessment reported in the ES is compatible with the relevant legal obligations. Further information on how the scheme demonstrates compliance with the noise requirements of the National Policy Statement for National Networks (NPSNN) is provided in Appendix A of the Case for the Scheme [APP-294]. The ES follows the standard approach for large infrastructure projects of assessing a reasonable and robust scenario, in

the absence of a detailed construction methodology, with adequate controls secured through the dDCO.

5. It should be noted however, that the Applicant is not clear as to which 'obligations under the PA2008' are being referred to in the question

Question Ns.1.7

Noise and vibration

Paragraph 9.3.36 of the ES [APP-047] indicates that a full assessment would still need to be completed once the design has been finalised to assess which properties would qualify under the noise insulation regulations.

In light of the need for transparency in decision making, how are the parties to be informed of this and how would this be delivered and secured by the dDCO?

Response

1. All new/altered highways fall under the remit of the Noise Insulation Regulations 1975. The regulations lay down a required procedure, which includes an obligation to carry out the assessment within 6 months of opening, the purpose of which is to identify qualifying properties. Qualifying properties would be notified in accordance with the Regulations. Therefore a requirement in the DCO to apply the Noise Insulation Regulations is not necessary as they apply under their own statutory regime.

Question Ns.1.8

Noise and vibration

In Chapter 13 13.9.82 [APP-051] The assessment of effects in respect of noise conclude that there would be significant adverse effects experienced by residents of some properties due to proximity to the construction activities and or construction traffic routes.

Why is the mitigation required to ameliorate this not within the dDCO?

Response

1. Chapter 9 of the Environmental Statement (ES) Noise and Vibration [APP-047] concludes there is a risk of significant construction noise effects at the closest receptors to the works, represented by C8, C9, C10 and C18. However, it should be noted that this assessment conclusion represents a worst case scenario as it does not include the potential attenuation through the use of the localised temporary site hoardings or noise barriers which would be used by a contractor and which would be finalised once the contractor is appointed.
2. Construction noise and vibration mitigation measures are set out in the Outline Environmental Management Plan (OEMP) [APP-187], including the requirement for the contractor to apply Best Practicable Means (BPM) to minimise noise and vibration (PW-NOI1, MW-NOI1), to develop specific proposals for localised noise screening and to produce a Construction Noise and Vibration Management Plan (PW-NOI3, MW-NOI3). The measures secured in the OEMP would contribute to minimising the effects on the properties in question from construction noise. The obligation to comply with the OEMP is a legal obligation, secured by paragraph 4 of Schedule 2 in the Development Consent Order (DCO) [APP-020]. As such, there is no need to specify particular mitigation measures in the DCO itself.

Question Ns.1.9

Noise and vibration

Paragraph 9.10.1 of the ES Chapter 9 [APP-047] confirms that the OEMP would set out monitoring to be undertaken during construction. It is also specified however in section 9.8 that the specific operational mitigation measures would be confirmed at the detailed design stage.

i. How could it be ensured that satisfactory standards would be delivered?

ii. What is the proposed monitoring of potential significant effects which might occur?

iii. In the event monitoring indicates significant adverse effects, what is the strategy for dealing with this?

iv. Based on the outcomes of the assessment, figures 9.4 -9.5 and Appendix 9.2, why has the Applicant not prepared a framework for the likely specification and location of noise and vibration monitoring?

Response

i. How could it be ensured that satisfactory standards would be delivered?

1. The noise mitigation measures are included as items PW-NOI1 to PW-NOI5, MW-NOI1 to MW-NOI6 and D-NOI1 to D-NOI2 in the Outline Environmental Management Plan (OEMP) (Environmental Statement (ES) Appendix 2.2) [APP-187]; compliance with the OEMP would be secured through Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO) [APP-020]. These include the provision of thin road surfacing and noise barriers at the Countess Junction flyover. The exact performance specification of specific operational mitigation measures (such as the specific product to be used for the Countess noise barriers) would be confirmed at the detailed design stage but will need to comply with the above requirements of the dDCO and contract.

ii. What is the proposed monitoring of potential significant effects which might occur?

2. The OEMP [APP-187, PW-NOI5 and MW-NOI6], as secured by the dDCO, sets out monitoring to be undertaken during the **construction** stage to ensure that the mitigation measures embedded in the Scheme design are appropriately implemented.

3. As detailed in section 9.8 of the ES [APP-047] the performance specification of specific **operational** mitigation measures would be confirmed at the detailed design stage to ensure the performance assumed in the assessment is achieved. Compliance with the requirements of the Noise Insulation Regulations will ensure a further assessment of operational road traffic noise changes will be completed within the statutory timescales of the Regulations i.e. the first 6 months of opening. Highways England does not consider that routine operational noise monitoring is necessary because it cannot practically be used to check

definitively whether the impacts are greater or less than those reported in the ES. Ambient noise levels are not constant, they vary on a day to day basis depending on factors such as traffic and weather conditions. The assessment completed in the ES is based on annual average conditions with and without the Scheme to ensure a like for like comparison, which is not possible to replicate through monitoring within a reasonable timescale. The without scheme monitoring would need to be completed before the start of the construction works, and would therefore be a number of years before the with scheme monitoring. The assessment completed for the ES is based on calculated road traffic noise levels, whereas ambient noise monitoring can be affected by other noise sources such as people, agricultural activities, military activities, aircraft etc. The Design Manual for Roads and Bridges (DMRB) recommends that road traffic noise is calculated using the Calculation of Road Traffic Noise (CRTN) and this prediction methodology was used for the ES. It is also the method that the National Policy Statement for National Networks (NPSNN) (paragraph 5.191) states should be used. Paragraph A4.45 of DMRB states 'The preferred method for calculating noise levels from road traffic is by prediction rather than by measurement'.

iii. In the event monitoring indicates significant adverse effects, what is the strategy for dealing with this?

4. The OEMP [APP-187] sets out the requirement for monitoring to be undertaken during the construction stage to ensure that the construction mitigation measures embedded in the Scheme design are appropriately implemented (MW-NOI5 and MW-NOI6). The Construction Environmental Management Plan (CEMP), to which the Noise and Vibration Management Plan (NVMP) will be appended [MW-G7], will be developed in consultation with Wiltshire Council [MW-G5]. The NVMP will include specific details of the location and methodology of the construction noise and vibration monitoring. It will also include actions to be taken based on the outcomes of the monitoring, which would include investigation of the source of any elevated levels and could potentially result in changes to the working methods to reduce any elevated levels. For the reasons explained above, monitoring during operation of the Scheme is not proposed or appropriate.

iv. Based on the outcomes of the assessment, figures 9.4 -9.5 and Appendix 9.2, why has the Applicant not prepared a framework for the likely specification and location of noise and vibration monitoring?

5. Until a contractor is appointed it would be premature to produce a Noise and Vibration Management Plan at this stage given the potential for precise methodologies to differ, although the OEMP does set out the required minimum contents of the plan (PW-NOI3, MW-NO13), compliance with which is secured in the dDCO.

Question Ns.1.10

Vibration

At 9.9.20 of ES Chapter 9 [APP-047] An estimate of 14 days tunnelling is suggested when in close proximity to Stonehenge Cottages – with a gap between the east and westbound tunnelling taking place. The OEMP – requires vibration surveys – to verify the predictions.

i. What is meant by 'in close proximity'?

ii. What do you propose to do if the predictions are incorrect?

iii. How do you propose to ensure the vibration experienced at the Stonehenge Cottages remains at an acceptable level?

iv. How would this be achieved and monitored?

Response

i. What is meant by 'in close proximity'?

1. The risk of exceeding the Significant Observed Adverse Effect Level (SOAEL) for construction vibration annoyance is estimated to occur when the tunnel boring machine (TBM) is within a distance of approximately 55m of Stonehenge Cottages. This is detailed in paragraph 9.9.20 of Chapter 9 of the Environmental Statement (ES) [APP-047].

ii. What do you propose to do if the predictions are incorrect?

2. The prediction methodology for vibration from tunnelling follows the methodology prescribed in BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites'. This methodology is conservative as it is derived from worst case source data for tunnelling in rock using a hydraulic hammer. Source data for TBM works and chalk ground conditions indicates lower levels of vibration are likely to be generated, however as a precautionary approach the BS 5228 tunnelling vibration prediction methodology has been used. Therefore, vibration levels above those reported in the ES at Stonehenge Cottages are considered to be very unlikely and indeed vibration levels are expected to be below the levels reported in the ES. In the unlikely event higher vibration levels than predicted are indicated by the monitoring as the TBM approaches Stonehenge Cottages, the mitigation in the form of temporary re-housing, as detailed in the response to iii, below, will be implemented.

iii. How do you propose to ensure the vibration experienced at the Stonehenge Cottages remains at an acceptable level?

3. If the monitoring of vibration levels as the TBM approaches the properties indicates exceedances of 1mms^{-1} are likely (the SOAEL for construction vibration annoyance) residents will be offered temporary re-housing for the necessary duration of each tunnel bore past the Cottages, as indicated by the continuous

vibration monitoring at the Cottages. Therefore, if the offer is taken up, residents would not be exposed to levels of vibration above the SOAEL.

4. This mitigation measure has been agreed with Wiltshire Council and is included in the Statement of Common Ground (SoCG) which is submitted to the Examination as an initial draft SoCG at deadline 2 (DL2).

iv. How would this be achieved and monitored

5. The requirement for monitoring of vibration levels at Stonehenge Cottages as the TBM approaches is secured within the OEMP (MW-NOI6). The OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO [APP-020].

Question Ns.1.11

Noise and vibration monitoring

Notwithstanding the specification within MW-NO16 of the OEMP:

i. Who would the contractor report the monitoring to?

ii. How frequently and under what circumstances would this take place?

iii. In the event a problem was being encountered ie vibration or noise above an agreed standard – what is the outcome?

What process would be in place to resolve or arbitrate on such issues?

Response

1. The Outline Environmental Management Plan (OEMP) [APP-187] requires the contractor to produce a Noise and Vibration Management Plan (NVMP) (MW-NOI3) which will contain the detailed noise and vibration monitoring protocol (this links to item MW-NOI6 of the OEMP). This will include details of reporting requirements, how the results will be published, under what circumstances monitoring would be carried out (i.e. routine monitoring and in response to particular issues), the frequency of monitoring, and actions to be taken based on the outcomes of the monitoring, which would include investigation of the source of any elevated levels and could potentially result in changes to the working methods to reduce any elevated levels. As set out in the OEMP [APP-187], the Construction Environmental Management Plan (CEMP), to which the Noise and Vibration Management Plan will be appended [MW-G7], will be developed in consultation with Wiltshire Council [MW-G5]. The consultation with Wiltshire Council would include discussions on a process to arbitrate on any elevated levels identified by the monitoring as necessary. The OEMP is secured through paragraph 4 of Schedule 2 of the draft DCO [APP-020].

Question Ns.1.12

Noise and vibration

Please clarify the summer and working hours as set out in the OEMP particularly in respect of the earthworks working hours.

Response

1. With regard to Preliminary Works, core working hours are set out in PW-G4 of the Outline Environmental Management Plan (OEMP) [APP-187] and are 07:30-18:00 Monday to Friday and 07:30-13:00 Saturday throughout the year.
2. With regard to the Main works, core working hours (for all works except tunnelling and earthworks) are set out in MW-G12 of the OEMP and are 07:00-19:00 Monday to Friday and 07:00-13:00 Saturday.
3. Extended hours for earthworks in summer are 07:00-22:00 Monday to Saturday. At other times of the year the main works core working hours apply to earthworks.
4. However, the above main works core working hours, and main works extended summer hours for earthworks, are reduced to site specific working hours of 07:30-18:00 Monday to Friday and 07:30-13:00 Saturday (all year round) for all works within Chainage 3520 to Chainage 4180 and Chainage 11300 to Chainage 12400 i.e. Winterbourne Stoke and Amesbury, as set out in MW-G13 of the OEMP.
5. Compliance with the OEMP is secured by way of the requirement contained in paragraph 4 of Schedule 2 to the draft Development Consent Order [APP-020].

Question Ns.1.13

Noise

Could the Applicant indicate where in the dDCO the requirement for noise absorbent finish to the walls of the entrance/exits of the tunnel and Green Bridge 4 Referred to in Section 9.8 of ES Chapter 9 [APP-047] is set out?

Response

1. This is set out in MS-N1 of the Environmental Mitigation Schedule [APP-186] This would be secured through Highways England placing on the Main Works contractor a contractual responsibility to deliver each mitigation measure as specified in the Environmental Statement (ES), unless the contractor is able to define an alternative measure or measures, approved by Highways England, which would achieve the same level of mitigation.

Question Ns.1.14

Noise

i. Could the Applicant indicate where in the dDCO is it provided that the thin noise surface shown to be used in paragraphs 9.7.8 and 9.9.80 of Chapter 9 of the ES [APP-047] would be so used?

ii. How would this be delivered?

Response

1. The obligation to use a thin surfacing system on the mainline of the new A303 and its associated slip roads is set out in Ref DNOI-1 of the Outline Environmental Management Plan (OEMP) [APP-187] and would be delivered by the appointed contractor. Compliance with the obligations contained in the OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO.

Question Ns.1.15

Vibration

The application documentation indicates tunnel boring machine vibrations could impact on a long barrow. It is suggested that the situation would be monitored but no remedy is offered for damaging impacts.

i. Is there potential for damage to archaeological known or unknown remains, such as fragile inhumations, on or close to the tunnel?

ii. How has the impact of vibration been taken into consideration relative to the sensitivity of the historic environment?

iii. The tunnel workings indicate a degree of settlement what implications would this have for the surrounding archaeology and the historic environment?

iv. What mitigation is proposed, how would this be monitored?

v. What degree of tolerance would be regarded as appropriate to minimise or avoid any adverse effects?

Response

i. Is there potential for damage to archaeological known or unknown remains, such as fragile inhumations, on or close to the tunnel?

1. The Heritage Impact Assessment considers the potential vibration impacts on archaeology during tunnelling (see Environmental Statement Appendix 6.1 - Heritage Impact Assessment [APP-195], paragraphs 9.2.6-9.2.8. The Environmental Statement Chapter 6, Cultural Heritage [APP-044], paragraph 6.8.2 notes that the mitigation embedded within the bored tunnel design (i.e. the use of a bored tunnel rather than a cut and cover tunnel design) minimises the risk of direct physical impacts on archaeology. This is because heritage assets are concentrated at or close to the surface, therefore the use of a bored tunnelling method for the majority of the tunnel, instead of surface based construction methods, minimises the potential for any direct physical impacts.

2. The Heritage Impact Assessment (HIA)[APP-195], para. 9.2.8 notes that the tunnel passes directly beneath a long barrow 250m north of Normanton Gorse (NHLE no. 1008953). The long barrow is a small, consolidated earthwork which has settled to its present state over c.5000 years and is unlikely to contain any voids. Significant impacts due to construction vibration are not anticipated as outlined within the Heritage Impact Assessment (HIA) [APP-195, para 9.2.8] however, as a precautionary approach, monitoring at this feature is proposed during nearby tunnelling works [APP-195, para 9.2.8].

3. The monitoring will be undertaken in line with the measures as set out in Environmental Statement Appendix 2.2 - Outline Environmental Management Plan (OEMP) [APP-187], items MW-NOI5 and MW-NOI6. The implementation of the OEMP is secured by Requirement 4 of schedule 2 of the draft DCO.

4. With regard to unknown fragile archaeological remains, such as inhumations, these will be within cut features (pits, ditches), or natural features (such as tree throws) with consolidated fill deposits surrounding them, and without voids. Vibration damage impacts on these remains are therefore not anticipated.

5. As such, in overall terms, the tunnelling works would be unlikely to have a significant effect on archaeological remains.

ii. How has the impact of vibration been taken into consideration relative to the sensitivity of the historic environment?

6. A conservative assessment of vibration was undertaken following the relevant British Standard as outlined under the answer to (v) for archaeological assets on the line of or close to tunnel. An assessment of Stonehenge, even though it is remote from the tunnel, was also undertaken. The results are reported in the Environmental Statement Appendix 6.1 - Heritage Impact Assessment [APP-195], paragraphs 9.2.6-9.2.8, and outlined at (i) above. The assessment of cultural heritage takes a holistic approach including considering the different physical and mechanical properties of archaeological earthworks, buried archaeological deposits and artefacts in their depositional context. Barrows are small, consolidated earthworks which have settled to their present state over 5000 years and are unlikely to contain any voids, and burials are surrounded by consolidated firm soil matrix, therefore significant effects to archaeological assets on the line of or close to tunnel are not anticipated as reported in Environmental Statement Appendix 6.1 - Heritage Impact Assessment [APP-195], paragraphs 9.2.6-9.2.8.

iii. The tunnel workings indicate a degree of settlement what implications would this have for the surrounding archaeology and the historic environment?

7. From the preliminary ground movement assessment [see Section 6.4 Tunnel Construction Movement Assessment, in the Environmental Statement Appendix 10.6 - Land Instability Risk Assessment [APP-278], para. 6.4.3 peak movements would be located along the centreline of the proposed alignment. The 1mm settlement contour line extends to a maximum of 85m from the centreline of the proposed tunnel alignment based on worst case assumptions as follows:

    - Conservative ground conditions of a weaker rock mass are used in the assessment to predict larger ground movements.
    - The minimum depth of the tunnel vertical alignment is used to predict the maximum settlement.
    - The maximum depth of the vertical tunnel is used to predict the maximum width of the settlement trough i.e. the maximum horizontal zone of influence of tunnelling from the centreline.

8. Settlement can result in a change to surface and sub-surface conditions. The effects of settlement may not be noticeable at ground level because the undulation of the natural surface is much greater and tends to mask subsidence

movements. The level of impact that can occur to surface and sub-surface features depends on the magnitude of movement that occurs, and the sensitivity of each feature to these movements. Movements that are sensitive to one feature might easily be accommodated by another.

9. The modelling of tunnel settlement informed understanding of the potential settlement impact from tunnelling on archaeological earthworks, buried archaeological deposits and artefacts considered in the ES Cultural Heritage chapter [APP-044] and the Heritage Impact Assessment [APP-195] – see answer at (i) above. The ES notes two assumptions:

   '*It is assumed that ground settlement will be minimal at the surface from the boring of the twin bored tunnel and any changes to heritage assets on the surface would be negligible and imperceptible to the eye*'; and

   '*It is assumed that vertical and lateral displacement from the excavation of deep cuttings or the retained cut will be minimal and any changes to heritage assets on the surface would be negligible and imperceptible to the eye*' [APP-044], para. 6.4.1.

iv. What mitigation is proposed, how would this be monitored?

10. The Outline Environmental Management Plan (OEMP) [APP-187] sets out general and topic-specific principles and requirements for the control, mitigation and monitoring of potential construction impacts. With regard to vibration this includes the use of Best Practicable Means (BPM) and the development of the Construction and Environmental Management Plan, to which the Noise and Vibration Management Plan will be appended [MW-G7], in consultation with Wiltshire Council [OEMP item: MW-G5]. MW-NOI5 also requires the main works contractor to identify sensitive cultural assets and agree actions to control or mitigate impacts (including monitoring). Compliance with the OEMP is secured by paragraph 4 in Schedule 2 to the draft Development Consent Order [APP-020].

11. The draft Detailed Archaeological Mitigation Strategy (DAMS), submitted at Deadline 2, will be a certified document and its implementation is secured by paragraph 5 of Schedule 2 of the draft Development Consent Order [APP-020]. The DAMS includes details of the archaeological mitigation and also identifies areas to be protected in situ, including the placement of ground movement and vibration monitoring stations above and perpendicular to the line of the tunnel.

12. The DAMS and Environmental Statement Appendix 2.2 Outline Environmental Management Plan (OEMP) [APP-187] both require the development of a Scheme-wide Heritage Management Plan (HMP) for the Main Works phase (detailed in the OEMP [APP-187, MW-CH1]) which will indicate how the historic environment is to be protected in a consistent and integrated manner including the effects of construction (including vibration). This will include the monitoring of heritage assets scheduled in the OEMP [APP-187, MW-CH7] that may be sensitive to vibration and agree actions to control/mitigate impacts to minimise as far as reasonably practicable vibration impacts on archaeological remains. The

HMP will be developed in consultation with the Heritage Monitoring and Advisory Group (HMAG). The draft DAMS also sets out a monitoring programme for areas that are being preserved in situ (for example, those heritage assets situated above the tunnel). This will include condition surveys in advance of the works and monitoring at identified sensitive assets during the works.

v. What degree of tolerance would be regarded as appropriate to minimise or avoid any adverse effects?

13. For the purposes of the tunnelling vibration assessment reported in Chapter 9 of the ES Noise and Vibration [APP-047] the minimum depth, within Tunnel Limits of Deviation Plan [APP-019] has been adopted to ensure a worst case approach (in terms of predicted vibration levels). Furthermore, the vibration from the operation of the Tunnel Boring Machine (TBM) is predicted in accordance with the tunnelling methodologies prescribed in in BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites' (Ref 9.6 in ES chapter 9 [APP-047]). With regard to tunnelling this methodology is conservative as it is derived from worst case source data for tunnelling in rock using a hydraulic hammer. Source data for TBM works and chalk ground conditions indicates lower levels of vibration are likely to be generated, however as a precautionary approach the BS 5228 tunnelling vibration prediction methodology has been used. The monitoring will be used to verify that the predicted calculated vibration levels are worst-case and that actual levels during TBM operation are not in exceedance of those predicted. The Outline Environmental Management Plan (OEMP) [APP-187], specifically MW-NOI5, requires the main works contractor to identify sensitive cultural heritage assets and agree actions to control or mitigate impacts (including monitoring). The OEMP is secured by paragraph 4 in Schedule 2 to the draft Development Consent Order [APP-020].

Question Ns.1.16

Noise

Could the Applicant provide a plan with measurements and justification for the distinction in working hours in the proximity of Countess Roundabout, and River Till Viaduct so that the ExA can understand what is understood by 'in the vicinity of'?

Response

1. Site specific working hours for the main works are required within Chainage 3520 to Chainage 4180 and Chainage 11300 to Chainage 12400 i.e. Winterbourne Stoke (River Till) and Amesbury (Countess), as set out in MW-G13 of the Outline Environmental Mitigation Plan [APP-048], compliance with which is secured pursuant to paragraph 4 at Schedule 2 of the dDCO. Plan 'HE551506-AMW-DR-GI-00597 Chainages of working hours 07:30-18:00 Monday – Friday and 07:30-13:00 Saturday' illustrates these chainages. These chainages were identified as appropriate locations to apply reduced working hours, as they cover the closest approach of the works to areas of large numbers of residential properties i.e. Amesbury and Winterbourne Stoke. Only a small number of individual properties are located outside of these chainages.

Question Ns.1.17

Noise

Could the applicant provide:

i. Details of where the mitigation identified as required in 9.8.14 (d)-(h) is set out as a requirement in either the dDCO or OEMP.

ii. To the ExA an explanation as to why an absorptive material is proposed at the Countess Roundabout but not the River Till viaduct; and

iii. An explanation of what is to be understood by the term maximising in (e)?

Response

1. The mitigation measures set out in paragraphs 9.8.14(d)-(h) of the Environmental Statement (ES) [APP-047] are secured as follows:

d. **Noise absorbent finish at the entrance/exit of the tunnel and Green Bridge Four.** This is set out in MS-N1 of the Environmental Mitigation Schedule [APP-186]. This would be secured through Highways England placing on the Main Works contractor a contractual responsibility to deliver each mitigation measure as specified in the Environmental Statement (ES), unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation (para 2.3.62 of the ES).

e. **Maximising the use of earthworks at Countess flyover and minimising the extent of retaining walls.** This measure has been incorporated into the design developed for the ES and will be secured through requirement 3 of Schedule 2 of the draft Development Consent Order (dDCO) [APP-020] which requires that 'the authorised development must be designed in detail and carried out so that it is compatible with the works plans, the engineering section drawings (plan and profiles) and the engineering section drawings (cross sections)'. With regard to the Examining Authority's query at point iii) the term maximising is used to illustrate that the design as developed for the ES has, within the physical constraints of the Countess junction, evolved to minimise the extents of vertical retaining walls, which can reflect noise, and instead maximise the extent of the earthworks which will be vegetated and therefore reduce the reflection of noise.

f. **The use of a thin surfacing system, which results in lower levels of noise generation than a standard hot rolled asphalt surface.** This is set out in DNOI-1 of the Outline Environmental Management Plan (OEMP) [APP-187]. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO.

g. **Inclusion of 1.8m high absorptive noise barriers between the slip roads on both the north and south side of Countess flyover.** This is set out in DNOI-2 of the OEMP [APP-187]. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO.

h. **Inclusion of a 1.5m high solid parapet on the south side of the River Till viaduct** is set out in D-LAN2 of the OEMP [APP-187]. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO.

2. In relation to the Examining Authority's query at point (ii), it is standard practice when noise barriers are proposed on both sides of a road to use an absorptive finish to minimise reflection of noise from the barrier towards receptors on the opposite side of the road. At Countess flyover, noise barriers are proposed on both the north and south side of the flyover, and hence an absorptive finish is proposed to minimise reflection of noise. At the River Till viaduct, a solid parapet is proposed on the south side of the viaduct only, though as detailed in paragraph 9.9.82 it is not deemed an essential noise mitigation measure, and therefore an absorptive finish is not proposed.

Question Ns.1.18

Noise and vibration

i. Do you agree that statutory exemption to nuisance should apply across the whole site and the whole scheme for the whole period of the construction?

ii. If not, what elements do you consider should be excluded and why?

Response

i. Do you agree that statutory exemption to nuisance should apply across the whole site and the whole scheme for the whole period of the construction?

1. The Applicant acknowledges that this question is directed to Wiltshire Council but considers it to be appropriate to provide its views on the issues raised.
2. In the Applicant's view, and as is explained in its Statement of Statutory Nuisance [APP-293] it is appropriate for the statutory exemption to nuisance to apply across the Scheme. In respect of noise, adequate measures are included in the Outline Environmental Management Plan (OEMP) [APP-187] (compliance with which is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO) [APP-020]) to regulate the effects of construction noise. These measures include:
   - MW-NOI1 – requirement to use Best Practicable Means to minimise noise and vibration from construction;
   - MW-G12 and MW-NOI2 – requirements in relation to consent under section 61 Control of Pollution Act 1974 for works outside of core working hours;
   - MW-NOI3 – requirement for Noise and Vibration Management Plan(s)
   - MW-NOI4 – requirement to develop a Noise Insulation and Temporary Rehousing Policy and to offer noise insulation and temporary re-housing to qualifying parties.
   - MW-NOI6 – requirement to monitor compliance with the Noise and Vibration Management Plans.
3. While significant residual adverse effects are predicted during construction, taking into account the mitigation measures secured in the OEMP, and the temporary and transient nature of the noise generating works, the construction of the Scheme is unlikely to be prejudicial to health or cause a nuisance and is unlikely to give rise to a statutory nuisance.
4. Nonetheless, the statutory exemption from nuisance is an essential feature of the Planning Act 2008 and is required to ensure that the Scheme can be delivered without the delay or outright prohibition through injunction, that would be engendered by nuisance claims. It should be noted that where the exemption applies, persons debarred from pursuing a claim due to that exemption would be entitled to be compensated.
5.

ii. If not, what elements do you consider should be excluded and why?

6. The Applicant considers it to be appropriate that the full exemption applies across the Scheme for the reasons set out in the Statement of Statutory Nuisance.

Question Ns.1.19

Noise

A number of RRs refer to the potential risk that either the construction works, or the subsequent operation of the road would cause vibrations such that the stones would/could be destabilised.

Could you provide a comment/evidence to refute this?

Response

1. Based on the considerable distance between the stones and the closest approach of the works to construct the scheme of approximately 200m horizontally, this location would not normally have been included in a construction vibration impact assessment. As detailed in paragraph 9.3.13 of Chapter 9 of the Environmental Statement (ES) [APP-047] it is standard practice to consider vibration impacts to a distance of 100m from the works. However, due to the level of interest in the potential impact of the construction of the Scheme on the stones, the construction vibration impact assessment completed for the ES [APP-047] did include consideration of the impact of the tunnel boring machine (TBM) used to construct the tunnel at the stones. The tunnelling vibration methodology prescribed in BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites' has been applied to predict vibration levels from the TBM. This methodology is conservative as it is derived from worst case source data for tunnelling in rock using a hydraulic hammer. Source data for TBM works and chalk ground conditions indicates lower levels of vibration are likely to be generated, however as a precautionary approach the BS 5228 tunnelling vibration prediction methodology has been used.

2. Using this methodology the maximum predicted peak particle velocity (PPV) from tunnelling is half the Lowest Observed Adverse Effect Level (LOAEL) for annoyance, as reported in paragraph 9.9.21 of Chapter 9 of the ES [APP-047]. At levels below the LOAEL, vibration is not generally considered perceptible and therefore there is no risk of the stones being destabilised.

3. Mitigation measures during the construction works are detailed in the Outline Environmental Management Plan (OEMP) [APP-187]. The OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO [APP-020].

4. Operational ground-borne vibration impacts have been scoped out of the assessment, as detailed in Table 9.2 of Chapter 9 of the ES [APP-047]. DMRB identifies that the potential for significant ground-borne vibrations due to road traffic is limited to locations close to heavily trafficked roads with a poor road surface. The A303 Amesbury to Berwick Down scheme will be constructed with a new smooth surface and, in line with standard Highways England maintenance regimes, will undergo regular routine maintenance to ensure the quality of the surface is maintained over time. With regard to Stonehenge specifically, the current A303 is over 150m away at its closest approach and is not a source of

perceptible vibration at the stones. The new alignment of the A303 will be even further from the stones.

Question Ns.1.20

Noise

In the event that the tunnel is at its maximum length within the defined degree of deviation:

i. How would this affect the likelihood/frequency of ventilation fans being operated?

ii. What impact would this have on the noise assessment?

iii. Would this remain within the scope of the current ES?

Response

i. How would this affect the likelihood/frequency of ventilation fans being operated?

1. The maximum extension of the tunnel within the limits of deviation is +200m at the west end and +30m at the east end as per article 7 of the draft Development Consent Order (dDCO) [APP-020]. As detailed in paragraph 9.9.67 of chapter 9 of the Environmental Statement (ES) [APP-047], the main purpose of the fans is to extract smoke out of the tunnel in the event of a fire. However some fans may also operate if exhaust emissions build up in the tunnel to an unacceptable level. To reach this level, a high volume of traffic would need to be moving through the tunnel very slowly (less than 20km/hr). This situation is not anticipated to occur on a regular basis as the aim of the Scheme is to alleviate congestion on the A303 and is very unlikely to occur at night when ambient noise levels are lower. The likelihood of this occurring does not change whether or not the tunnel is constructed to its maximum extension and therefore the frequency of use of the ventilation fans would also remain unchanged. In addition, the small extension of the tunnel to its maximum extent would not require an increase in the number of fans.

ii. What impact would this have on the noise assessment?

2. The conclusion of the ES assessment that significant noise effects from the operation of the fans are not anticipated, as reported in Chapter 9 of the ES [APP-047] para 9.9.67-68, does not change.

iii. Would this remain within the scope of the current ES?

3. As a result of the above, the tunnel at its maximum length is within the scope of the assessment contained in the ES.

Question Ns.1.21

WHO Noise Guidelines

The WHO Environmental Noise Guidelines for the European Region were published in October 2018.

Could the Applicant confirm whether these guidelines have any implications on the noise assessment conclusions within the ES Chapter 9 Noise and Vibration [APP-047]?

Response

1. The World Health Organization (WHO) Environmental Noise Guidelines for the European Region (ENG) were published on 10 October 2018, at a similar time as the DCO application for this Scheme was submitted to the Inspectorate (18 October 2018).

2. The ENG provides guidelines for specific noise sources including road traffic. It does not cover noise sources on construction sites. Therefore the ENG is only potentially of relevance to the traffic noise assessment.

3. The WHO Community Noise Guidelines (CNG) published in 1999 and the Night Noise Guidelines for Europe (NNG) published 2009, in conjunction with UK specific guidance and legislation, were used to inform the definition of Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) values for traffic noise in the assessment, as reported in the Environmental Statement (ES) Chapter 9 Noise and Vibration [APP-047]. The CNG and NNG guidelines were the relevant and applicable guidelines at the time the assessment was carried out in August 2018.

4. As the ENG was published in October 2018, subsequent to completion of the noise and vibration assessment and approximately contemporaneous with the submission of the DCO application to the Inspectorate, it was not possible to include consideration of the ENG in the noise and vibration assessment.

5. The LOAELs and SOAELs (defined in Table 9.7 of ES Chapter 9 Noise and Vibration [APP-047]) are used to inform the assessment of overall Scheme compliance with the National Policy Statement for National Networks (NPSNN), and to inform the judgement of significant environmental effects, as defined by the EIA Directive (Directive 2014/52/EU "On the assessment of the effects of certain public and private projects on the environment").

6. As set out on page 20 of ENG, the approach taken by WHO in preparing the ENG differs from the previous guidelines as the guideline exposure levels in the ENG are 'not meant to identify effect thresholds', such as the LOAEL and SOAEL. Instead the ENG exposure levels are based on the 'smallest risk or relevant risk increase' for various effects. For example, the guideline value for the percentage of people 'highly annoyed' is set at a 10% absolute risk increase. By definition the LOAEL is set at the lowest level of adverse effect and is therefore a slightly lower level than the ENG guideline. For example, for road

traffic noise the external night time level in the ENG is 45 dB $L_{Aeq,8h}$, whereas the LOAEL used in the ES is 40 dB, based on the NNG which explicitly defines the night time LOAEL. The ENG does not provide guidance on SOAELs.

7. Consequently, as the ENG does not directly relate to LOAELs and SOAELs, and instead provides guidelines slightly above the LOAEL, had the ENG been published in sufficient time to be considered within the application, the traffic noise LOAELs and SOAELs would have been the same as set out in the noise assessment of the Scheme. Therefore, the conclusions of the noise assessment, in terms of Scheme compliance with NPSNN and judgements on whether significant environmental effects would be generated by the Scheme, would be the same as set out in the ES Chapter 9 Noise and Vibration [APP-047], paragraphs 9.9.28 to 9.9.63 and paragraphs 9.9.77 to 9.9.84.
8. Other major infrastructure schemes have also reviewed the implications of the ENG and concluded they would not change the adopted LOAEL and SOAEL values. These include the A303 Sparkford to Ilchester scheme, where this conclusion was provided as a response to a written question at DCO Examination (Ref 1.4.1).

Question Ns.1.22

Noise

Since the construction of both the Countess flyover and the River Till Viaduct are regarded as having adverse effects during construction and post operation, is it appropriate to assess the effect of the scheme as neutral?

Response

1. Chapter 9 Noise and Vibration of the Environmental Statement (ES) [APP-047] does not assess the effect of the Scheme as neutral. Tables 9.25 and 9.26 summarise the residual significant construction and operational effects, both adverse and beneficial respectively. Chapter 13 People and Communities of the ES [APP-051] as a component of its assessment of human health has assessed the outcomes of the Scheme proposals in respect of 'noise, air quality and neighbourhood amenity', this being a determinant of human health. The assessment concludes a neutral outcome on this determinant arising from the Scheme overall during construction and a positive outcome during operation.

2. The human health assessment findings have been reached based on an overall consideration of the assessment of effects in the ES principally in Chapter 9 Noise and Vibration, Chapter 5 Air quality [APP-043] and elsewhere in Chapter 13 People and Communities in respect of neighbourhood amenity. The assessed outcomes have been informed by the assessment conclusions presented in the relevant ES chapters to provide an overall outcome for the human health determinant for construction and operation.

3. With regard to 'noise, air quality and neighbourhood amenity' the overall neutral outcome assessed during construction was based on consideration of the following: noise effects experienced at residential properties in the study area with the majority of residential properties experiencing no significant adverse effects; no significant adverse effects experienced by human receptors in the study area in respect of air quality; and no significant adverse effects on the amenity of residents, users of public rights of way, community facilities or businesses from construction activities or construction traffic.

4. The assessed outcomes for this determinant have also taken into consideration mitigation measures, including the use of best practicable means, secured through the Outline Environmental Management Plan (OEMP) [APP-187] (compliance with which is secured in the draft Development Consent Order [APP-020]), Environmental Mitigation Schedule [APP-186], and the contract, which places a contractual responsibility on the contractor to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation.

Question Ns.1.23

Noise

i. In light of the need for openness and transparency of decision making can you advise of the standard of noise attenuation that can be expected by the provision of screens at both the Countess Roundabout and River Till Viaduct?

ii. What is the timing of the installation of these noise screens and how would this be delivered to ensure the anticipated noise mitigation would be achieved?

Response

i. In light of the need for openness and transparency of decision making can you advise of the standard of noise attenuation that can be expected by the provision of screens at both the Countess Roundabout and River Till Viaduct?

1. At Countess roundabout the addition of the 1.8m noise barriers is anticipated to provide up to 3.5 dB reduction in LA10,18h operational traffic noise levels at the closest residential properties. It should be noted that based on the advice in the Design Manual for Roads and Bridges (DMRB) the small additional benefit of the absorptive finish to the noise barriers, which is designed to minimise reflections from the barriers on opposite sides of the carriageway, has not been included in the results used in the Environmental Statement (ES). The requirement to provide the Countess flyover absorptive noise barriers is set out in D-NOI2 of the Outline Environmental Management Plan (OEMP) [APP-187]. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO) [APP-020].

2. At the River Till viaduct the 1.5m solid parapet on the south side provides up to 2.6 dB reduction in operational LA10,18h traffic noise levels at the closest residential receptor Foredown House. The requirement for the solid parapet at the River Till viaduct is set out in D-LAN2 of the OEMP [APP-187]. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO. The OEMP requirements need to be read alongside the landscaping requirement in the dDCO (paragraph 8 of Schedule 2) as they are linked.

ii. What is the timing of the installation of these noise screens and how would this be delivered to ensure the anticipated noise mitigation would be achieved?

3. The timing of the installation of the noise barriers and solid parapet within the construction programme will be finalised by the contractor, however they would be in place before the Scheme is operational as required by the OEMP and secured by the dDCO.

Question Ns.1.24

Noise and vibration

Paragraph 9.8.7 of Chapter 9 of the ES refers to a referral system for complaints in respect of noise and vibration.

How would this be managed independently to ensure no conflict of interest?

Response

4. The Noise and Vibration Management Plan (MW-G7) will be appended to the Construction Environmental Management Plan (CEMP) required by the Outline Environmental Management Plan (OEMP) [APP-187]. The Noise and Vibration Management Plan will be produced by the contractor and would include details of the system for responding to any noise or vibration complaints received during construction. The CEMP will be developed in consultation with Wiltshire Council (MW-G5). There is scope within this engagement with Wiltshire Council to discuss how to ensure no conflict of interest arises. In addition, the OEMP contains community liaison obligations (see, for example, MW-G31 and G32). The OEMP is secured through paragraph 4 of Schedule 2 of the draft DCO [APP-020].

Question Ns.1.25

Noise and vibration

Paragraph 9.8.13 of Chapter 9 of the ES states that "*vibration surveys would be undertaken at Stonehenge Cottages commencing when the TBM is approaching the cottages*".

i. What does 'approaching' mean?

ii. What distance could be regarded as a safe distance to ensure adverse effects would not be occurring?

iii. How has this been assessed?

Response

i. What does 'approaching' mean?

1. The risk of exceeding the Significant Observed Adverse Effect Level (SOAEL) (peak particle velocity (PPV) of 1mms-1) for construction vibration annoyance is estimated to occur when the tunnel boring machine (TBM) is within a distance of approximately 55m.

ii. What distance could be regarded as a safe distance to ensure adverse effects would not be occurring?

2. As a conservative approach monitoring of vibration at Stonehenge Cottages is proposed to start when the TBM is within 250m of the Cottages. At this distance the predicted vibration PPV is less than half the Lowest Observed Adverse Effect Level (LOAEL) for vibration annoyance effects, and therefore this would allow for a period of monitoring to occur before there is a risk of perceptible vibration.

iii. How has this been assessed?

3. The prediction methodology for vibration from the TBM follows the tunnelling vibration methodology prescribed in BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites'. This methodology is conservative as it is derived from worst case source data for tunnelling in rock using a hydraulic hammer. Source data for TBM works and chalk ground conditions indicates lower levels of vibration are likely to be generated, however as a precautionary approach the BS 5228 tunnelling vibration prediction methodology has been used.

Question Ns.1.26

Noise

The use of a thin surfacing system is referred to to reduce noise impacts.

Please provide a plan showing the lengths of road this is proposed for.

Response

1. The thin surfacing is proposed on the mainline and slip roads within the scheme extent. Please see plan 'HE551506-AMW-DR-GI-00598 Location of Thin Surfacing'. As detailed in paragraph 9.4.3 of the ES Noise and Vibration chapter [APP-047], the benefit of such surfacing is achieved at higher speeds (≥75km/hr) where noise from the interaction of the tyre with the road surface dominates over engine noise. Therefore it is not essential on low speed roads such as roundabouts.

Question Ns.1.27

Noise

The surface finish of the retaining walls to both the tunnels and the Countess Flyover is referred to as being designed to reduce reflection of noise.

i. What noise reduction would be achieved?

ii. How would this be secured as a requirement for the scheme?

Response

i. What noise reduction would be achieved?

1. The use of a surface finish on the retaining walls to reduce reflection is an enhancement mitigation measure and not an essential mitigation measure which is embedded in the Scheme design. The potential benefits of the surface finish are small (less than 0.5 dB at the closest properties at Countess flyover and less than 1 dB in the World Heritage Side immediately adjacent to the tunnel approaches). Based on the advice in the Design Manual for Roads and Bridges (DMRB) to adopt a cautious approach to the benefit of absorptive surfaces, this small potential additional benefit has not been included in the results reported in the Environmental Statement (ES) Noise and Vibration chapter [APP-047].

ii. How would this be secured as a requirement for the scheme?

2. As detailed above this is an enhancement mitigation measure not an essential mitigation measure. However, it would be secured through Highways England placing on the Main Works contractor a contractual responsibility to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation.

Question Ns.1.28

Noise and vibration

In light of the properties identified C1 – C19 please advise which properties you consider are eligible for insulation in line with the Noise Insulation Regulations.

Response

1. The properties identified at C1-C19 are the selected representative construction noise receptors. C3 is the property Lindisfarne which is the property identified in Chapter 9 of the Environmental Statement (ES) in paragraph 9.9.49 as potentially qualifying for operational noise insulation under the Noise Insulation Regulations. Qualification under the Regulations is based on the absolute traffic noise levels, the change in traffic noise levels over the first 15 years after opening and the contribution to the overall traffic noise level from traffic on the scheme. Please see response to Ns.1.7 regarding the process and timescales for the Noise Insulation Regulations assessment, as prescribed in the Regulations.

2. The Outline Environmental Management Plan (OEMP) [APP-187] requires the contractor to have a Noise Insulation and Temporary Rehousing policy (MW-NOI4) in relation to construction noise. This sets out the criteria for offering noise insulation or temporary re-housing to qualifying parties. Compliance with the OEMP is secured in the requirement contained in paragraph 4 of Schedule 2 to the draft Development Consent Order [APP-020].

Question Ns.1.29

Noise and vibration

A series of adverse effects are identified through both construction and operation of the new road. Mitigation to ensure the road meets the standards expected in the NPSNN for the road to be regarded as sustainable are therefore required. To date Noise and Vibration Management Plans have not been prepared.

What is before the ExA which provides evidence of compliance with the NPSNN and that the appropriate mitigation would be provided in a timely manner and subsequently maintained?

Response

1. Chapter 9 of the Environmental Statement (ES) [APP-047] contains a section on 'compliance with policy' which outlines how the Scheme meets the aims of the National Policy Statement for National Networks (NPSNN) during construction and operation, paragraph 9.9.69 to 9.9.84. Further details are provided in response to question Ns.1.45. Further details on compliance with the wider noise requirements of the NPSNN are provided in Appendix A of the Case for the Scheme [APP-294].

2. Construction and operational mitigation measures are secured through the Outline Environmental Management Plan (OEMP) [APP-187] and the Environmental Mitigation Schedule [APP-186].

3. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO) [APP-020]. The OEMP (ref. PW-NOI3; MW-G7) contains an obligation to prepare Noise and Vibration Management Plans. Given that OEMP compliance is secured in the DCO, it follows that the obligation to prepare Noise and Vibration Management Plans is a legal obligation. As per the Planning Act 2008, failure to comply with the terms of the DCO is an offence. It is therefore this legal mechanism that gives comfort in respect of the provision of appropriate mitigation and therefore compliance with the NPSNN.

4. The Environmental Mitigation Schedule would be secured through the contract. Highways England will place a contractual responsibility on the contractor to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation.

5. In addition to the Scheme-specific measures outlined above, in common with the rest of the Strategic Road Network, Highways England has a duty to maintain the network including the road surface and noise barriers. The Scheme will, post-opening, become part of this network.

Question Ns.1.30

Noise and vibration

Paragraph 9.3.10 refers to assessments of impacts along existing roads.

Can you clarify whether this includes new routes for example Ratfyn Road to the proposed site compound to the north east of the Travel Lodge?

Response

1. As detailed in Table 9.2 of the Environmental Statement Chapter 9 [APP-047] the construction noise assessment includes the use of the off road haul routes within the works, including the haul route to the site compound to the north east of the Travelodge at Countess roundabout. No haul road is proposed at Ratfyn Road to the south of the A303. Construction traffic impacts along existing roads are also assessed as set out in paragraph 9.3.10.

Question Ns.1.31

Noise

According to the information provided no noise monitoring was undertaken to the north of the A303 near either Ratfyn Farm or Ratfyn Farm Cottages or to the rear of the residential properties off Countess Road.

As these are likely to be adversely affected throughout the construction period can you explain the reason for this?

Response

1. No noise monitoring was undertaken at Ratfyn Farm (C2) or Ratfyn Farm Cottages. Baseline monitoring was completed at Countess Farm (M3/C8) on Countess Road facing the A303. No baseline monitoring was completed at the rear of properties further north on Countess Road.

2. It should be noted that inclusion in the baseline noise survey is not essential for inclusion as a receptor in the construction noise assessment. This is because, as detailed in paragraph 9.3.9 of Chapter 9 of the Environmental Statement [APP-047], the criteria for the onset of potentially significant construction noise effects are based on predicted 2017 baseline traffic noise levels at the relevant façade of each of the selected receptors, rather than measured baseline levels. This approach enables any façade of any receptor to be selected for inclusion in the construction noise assessment. A larger number of representative receptors have been included in the construction noise assessment than the number of baseline monitoring locations. It is not practicable to monitor baseline levels at all selected construction receptors and constraints on site can restrict the position of the noise meter at a property such that monitoring at the preferred façade for the construction noise assessment is not possible.

3. Ratfyn Farm (C2) is included as a receptor in the construction noise impact assessment, as are a number of receptors on Countess Road, including C6 at which the assessment is based on the rear façade facing the satellite compound.

4. Details of the results of the construction noise assessment are reported in paragraph 9.9.1 to 9.9.13 of Chapter 9 of the Environmental Statement [APP-047] and Appendix 9.2 [APP-269]. Worst case construction noise levels have been predicted over the duration of the works, the predictions include the set up and operation of the satellite compound at Countess roundabout. Criteria for the onset of potentially significant construction noise effects are set in accordance with the relevant British Standard (BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites') and, as detailed above, are not dependent on the availability of baseline noise monitoring data.

5. At C2, due to the location of the receptor relative to the proposed works, the criteria for the onset of a potentially significant construction noise effect is not predicted to be exceeded. Therefore, whilst a temporary adverse construction noise effect is anticipated during the works, a significant adverse construction noise effect is not anticipated at this property (Table 9.14).

6. At the rear of C6 on Countess Road the criteria for the onset of a potentially significant construction noise effect is predicted to be slightly exceeded during some works, however the risk of the duration of the exceedance occurring for more than 10 days in 15, or 40 days in 6 months is limited. Therefore, whilst a temporary adverse construction noise effect is anticipated during the works, a significant adverse construction noise effect has not been identified (paragraph 9.9.9).

Question Ns.1.32

Vibration

In light of the recognition in paragraph 9.3.14 that ground borne vibration is highly dependent on the nature of the intervening ground and the sensitivity of Stonehenge Cottages and the Stones at Stonehenge themselves what assessment of the ground conditions between the proposed tunnel and these two receptors has been undertaken to assess the extent of sensitivity, and the potential harmful effects?

Response

1. Ground conditions along the route of the tunnel are chalk. Vibration from the Tunnel Boring Machine (TBM) has been predicted based on the tunnelling vibration methodology prescribed in BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites'. This methodology does not provide different calculations for different ground conditions. Instead it adopts a conservative approach as it is derived from worst case source data on tunnelling in rock using a hydraulic hammer. Source data for TBM works and chalk ground conditions indicates lower levels of vibration are likely to be generated, however as a precautionary approach the BS 5228 tunnelling vibration prediction methodology has been used.

2. The sensitivity of Stonehenge Cottages and Stonehenge to vibration effects are assessed in Chapter 9 of the Environmental Statement (ES) [APP-047] in relation to annoyance effects and damage effects (paragraphs 9.3.11-9.3.21). The criteria for annoyance are considerably lower than for damage. The predicted vibration levels at Stonehenge Cottages and Stonehenge are reported in Table 9.15. Paragraph 9.9.20 reports the impact at Stonehenge Cottages as being above the Significant Observable Adverse Effect Level (SOAEL) for annoyance, but well below the onset of cosmetic damage criteria. Paragraph 9.9.21 reports the impact at Stonehenge as half the Lowest Observable Adverse Effect Level (LOAEL) for annoyance. At levels below the LOAEL, vibration is not generally perceptible.

3. The Outline Environmental Management Plan (OEMP) [APP-187] requires the contractor to undertake vibration monitoring at Stonehenge Cottages commencing when the TBM is approaching (MW-NOI6) (also see response to Ns.1.25). The monitoring data will allow validation of the predicted vibration levels derived using the BS 5228 methodology as presented in the ES [APP-047] Table 9.15. The precise details of the monitoring will be developed further in the Noise and Vibration Management Plan, which is required by the OEMP [APP-187].

Question Ns.1.33

Noise and vibration

In Chapter 9 para 9.3.12 "*the proposed method of piling is continuous flight auger (CFA) or cast in situ piles*" whilst in Table 8.4 you specify "*There would be no piling works within the channel of the River Till (or Avon)*".

Within the OEMP PW-NO14 "*Activities requiring an appraisal could include tunnelling, vibratory compaction, **impact** or vibratory piling*."

Please confirm:

i. That there would be no piling within either river and confirm this is to be added to the OEMP or dDCO.

ii. The method of piling within the development and this is to be specified within the OEMP or dDCO.

Response

1. To confirm, no piling is proposed within the channels of the River Till or River Avon. The works at the existing crossing of the River Avon at the eastern end of the Scheme are minimal, no piling at this existing bridge is proposed. The two closest supports for the River Till viaduct would be beyond the boundary of the SAC/ SSSI, which the channel of the River Till falls within. This is secured by D-BIO1 in the Outline Environmental Mitigation Plan (OEMP) [APP-187]. However, for clarity this commitment to no piling within the channel of the River Till will be confirmed in the next revision of the OEMP [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO).

2. The assessment of noise and vibration impacts reported in Chapter 9 of the Environmental Statement (ES) [APP-047] is based on the information provided by the contractor appointed to provide reasonable assumptions on the likely construction works at the ES stage. This included the use of continuous flight auger piling at the River Till viaduct, which as an augured method is not a significant source of vibration. A commitment to non-impact piling at the River Till viaduct will be added to the next revision of the OEMP.

Question Ns.1.34

Noise and vibration

In Chapter 8 para 8.8.26 you consider that the OEMP would safeguard the identified impacts to ecology. Within the OEMP under Noise and Vibration you state that "*should the application of BPM at source not prove effective and noise exposure exceeds the relevant trigger level the contractor **may** offer noise insulation or temporary housing*."

i. Why should the ExA consider this sufficiently robust a remedy?

ii. How does this address potential impacts on ecological receptors?

iii. In light of the requirements of the NPSNN (paragraph 5.194-5.195) how does this achieve the necessary standards?

Response

i. Why should the ExA consider this sufficiently robust a remedy?

1. MW-NOI4 in the Outline Environmental Management Plan (OEMP) [APP-187] (compliance with which is secured in paragraph 4 of Schedule 2 to the draft Development Consent Order) provides more detail on the noise insulation and temporary re-housing policy, including clarification that this will be offered if the relevant criteria from BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites' are met. The use of noise insulation and/or temporary re-housing is the last step in the application of Best Practicable Means (BPM) for residential receptors. Noise insulation and temporary re-housing provide a robust approach to avoiding or mitigating construction noise impacts at residential properties by removing the receptor completely or reducing the magnitude of the construction noise levels experienced inside the property.

ii. How does this address potential impacts on ecological receptors?

2. With respect to ecological receptors, the requirement for the noise insulation and temporary re-housing policy is not relevant as this relates to residential receptors. MW-NOI1 of the OEMP [APP-187], requires BPM to prioritise the control of noise and vibration at source as the first step as this minimises the levels generated at both sensitive ecological and residential receptors.

3. The ecological receptors that are likely to be particularly susceptible to noise and vibration impacts, such as fish, have been assessed within the Environmental Statement (ES) Chapter 8 Biodiversity (paragraph 8.9.17) [APP-046]. Where these sensitive biodiversity receptors have been identified, suitable working methods would be used. For example, as detailed in the response to question Ns.1.33, no piling is proposed within the channel of the River Till. This commitment will be confirmed in the next revision of the OEMP [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO).In the unlikely event that levels

are considered to be high enough to have an adverse effect on individuals / local populations of species, exclusion zones and restrictions on the timing of works may be implemented. These measures would be secured through MW-BIO1 of the OEMP [APP-187].

iii. ***In light of the requirements of the NPSNN (paragraph 5.194-5.195) how does this achieve the necessary standards?***

4. Noise insulation and temporary re-housing provide a robust approach to avoiding or mitigating construction impacts at residential properties, as required by the National Policy Statement for National Networks (NPSNN), by removing the receptor completely or reducing the magnitude of the construction noise levels experienced inside the property.

Question Ns.1.35

Noise and vibration

What is meant by *"will use low vibration and noise piling methods as described in the OEMP"* as stated in 8.9.17 of Chapter 8 of the ES?

Response

1. Item MW-BIO3 in the Outline Environmental Management Plan (OEMP) [APP-187] requires the use of a low vibration and low noise piling method to reduce the vibration and noise impacts on the aquatic ecology within the river, should piling for viaduct piers need to be progressed when water is flowing within the River Till. In addition, as detailed in the response to question Ns.1.33, no piling is proposed within the channel of the River Till. The two closest supports for the River Till viaduct would be beyond the boundary of the SAC/ SSSI, which the channel of the River Till falls within. This is secured by D-BIO1 in the Outline Environmental Mitigation Plan (OEMP) [APP-187]. However, for clarity this commitment to no piling within the channel of the River Till will be confirmed in the next revision of the OEMP [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO).

2. Item MW-NOI1 in the OEMP requires the use of Best Practicable Means (BPM) to minimise noise and vibration from the construction of the Scheme, at all times.

3. The assessment of noise and vibration impacts reported in Chapter 9 of the Environmental Statement (ES) [APP-047] is based on the information provided by the contractor appointed to provide reasonable assumptions about the likely construction works at the ES stage. This included the use of continuous flight auger piling, which as an augured method is not a significant source of vibration and does not generate impact type noise. No impact piling, which can be a potentially significant source of vibration and impact type noise, is proposed at the River Till viaduct. As detailed in the response to Ns.1.33, a commitment to non-impact piling at the River Till viaduct will be added to the OEMP.

Question Ns.1.36

Noise and vibration

i. Please explain whether the impacts of piling or other construction over the River Till has been assessed in the event the river is not seasonally dry.

It would appear that it is proposed to undertake works over the River Till when this section of the river is likely to be dry.

ii. What are the consequences should the river not be dry at the point the works are due to take place?

Paragraph 8.9.101 suggests that the low noise technique is only required when there is flow in the river.

iii. Please state clearly the method of construction and the mitigation necessary to ensure no adverse impacts occur or if they do how they are proposed to be mitigated.

Response

i. Please explain whether the impacts of piling or other construction over the River Till has been assessed in the event the river is not seasonally dry.

1. As detailed within paragraph 8.9.17 of the Environmental Statement Chapter 8 [APP-046], where practicable the construction works within the river valley would be undertaken when the river is seasonally dry to avoid any risk of noise and vibration having an adverse effect on species present within the river. However, the potential impacts of piling and other construction works over the River Till in respect of the proposed new viaduct were also assessed, taking into account the possibility that the River Till would be in flow when construction work was carried out (paragraph 8.9.17 of Environmental Statement Chapter 8 [APP-046]).

ii. What are the consequences should the river not be dry at the point the works are due to take place?

2. If the river is in flow during the construction of the viaduct, there would be the potential for disturbance to fish. However, as detailed in the response to part iii) of the question below, based on the location and abundance of the fish species, the choice of construction methods and the application of mitigation measures, noise and vibration from construction is unlikely to result in an adverse effect on fish species, regardless of whether the river is in flow or not.

iii. Please state clearly the method of construction and the mitigation necessary to ensure no adverse impacts occur or if they do how they are proposed to be mitigated.

3. The potential for effects would be limited because, as detailed in paragraph 8.9.17 of Environmental Statement Chapter 8 [APP-046], salmon and brown trout spawning areas are located in the River Till downstream of the existing A303, which would be unaffected by construction upstream of the existing A303, and

bullhead (an Annex II species) is present at low abundance, when the river is in flow in the section crossed by the Scheme.

4. In addition the risk of disturbance is further reduced due to the proposed construction methods, which are the same regardless of if the river is dry or not. The two closest supports for the River Till viaduct would be beyond the boundary of the SAC/ SSSI, which the channel of the River Till falls within. This is secured by D-BIO1 in the Outline Environmental Mitigation Plan (OEMP) [APP-187]. However, for clarity this commitment to no piling within the channel of the River Till will be confirmed in the next revision of the OEMP [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO).

5. The assessment of noise and vibration impacts reported in Chapter 9 of the Environmental Statement (ES) [APP-047] is based on the information provided by the contractor appointed to provide reasonable assumptions regarding likely works at the ES stage. This included the use of continuous flight auger piling at the River Till viaduct, which as an augured method is not a significant source of vibration and does not generate impact type noise. As detailed in the response to Ns.1.33, a commitment to non-impact piling at the River Till viaduct, which can be a potentially significant source of vibration and impact type noise, will be added to the next revision of the OEMP.

6. Item MW-NOI1 in the OEMP requires the use of Best Practicable Means (BPM) to minimise noise and vibration from the construction of the Scheme, at all times.

7. Further mitigation measures that have been set out within the OEMP include exclusion zones, sensitive lighting and suitable ecological supervision (MW-BIO1, MW-BIO3, and MW-BIO4 of OEMP) [APP-187].

8. Hence, the overall conclusion is that fish species or any other species associated with the River Till will experience no significant adverse effects, even if the River Till is in flow at the time of construction work, as set out within paragraphs 8.9.95 – 8.9.102 of the Environmental Statement Biodiversity Chapter 8 [APP-046].

Question Ns.1.37

OEMP

The language used could be regarded as imprecise – 'may', 'generally'.

In light of the fact that you seek to rely on this as the foundation on which CEMPs would be prepared what confidence can the ExA or the Secretary of State have that this would actually set a clear basis for the works to go ahead within the terms of the PA2008, the need for transparency of decision making and the lack of oversite the current phraseology facilitates.

Response

1. The Applicant considers the language in the OEMP to be sufficiently precise to serve the important role that it plays. As is noted in the question, the role of the OEMP is to establish the contents of the Construction Environmental Management Plans (CEMPs) that will be developed by the Contractor. As such they must necessarily include a degree of flexibility to enable the appropriate measures to be developed in detail once the detailed design of the Scheme is completed, otherwise they would be the final CEMP.
2. In terms of the degree of oversight, it must be noted that all main work CEMPs must be prepared in accordance with the OEMP prior to the commencement of the relevant phase and, in preparing the CEMP the Contractor must consult Wiltshire Council and the Environment Agency. This consultation is secured by reference MW-G5 and the contractor is required to consult those bodies again where a CEMP is to be updated or revised (see MW-G6).
3. In respect of the use of the words 'may' and 'generally' in relation to the measures specific to the topic of Noise and Vibration:
4. 'may' is used in PW-NOI1 b) and MW-NOI1 b) to denote that through the CEMP the contractor 'may' be required to offer noise insulation or temporary re-housing. In respect of MW-NOI1 this is dependent on meeting a number of criteria, including exceedance of the applicable trigger levels referred to in MW-NOI4. In respect of PW-NOI1 this is in respect of the requirement in PW-NOI3 h) to consider a noise insulation and temporary re-housing policy as part of the Noise and Vibration Management Plan.
5. 'may' is used in PW-NOI3 and MW-NOI3 to denote the need to consider any corrective action to avoid or address non-compliance. This is to acknowledge that non-compliance is not expected.
6. 'may' is used in MW-NOI4 to acknowledge that persons requiring noise insulation or temporary rehousing "*may have special circumstances"* that should be taken into account.
7. 'may' is used in MW-NOI5 and PW-NOI4 to require the CEMP to identify "any buildings that may be unusually vulnerable to vibration that are located within 50m of any activities that may give rise to significant vibration". Here "may" is wider and more onerous than alternatives such as "are".

8. 'generally' is used only in MW-NOI5 and PW-NOI4 to require through Best Practical Means to control vibration levels so that the BS 7385 Part 2 Guide to damage levels from groundborne vibration, are *"generally*" not exceeded. However, the contractor is required, through MW-NOI5 and PW-NOI4, to undertake a vibration appraisal to identify any likely exceedances of the 6 mms^{-1} trigger level and, in consultation with Wiltshire Council, put in place suitable mitigation measures to reduce vibration levels. The 6 mms^{-1} trigger level is the lowest guideline value for the onset of cosmetic building damage set out in BS 7385-2.

Question Ns.1.38

Baseline

i. Can the Applicant explain the extent to which relevant consultation bodies were engaged in agreeing the appropriate baseline data?

ii. Can the Applicant also explain the extent to which they consider the baseline assessment to accurately represent the entirety of the noise assessment study areas?

Response

i. Can the Applicant explain the extent to which relevant consultation bodies were engaged in agreeing the appropriate baseline data?

1. The baseline noise data has been agreed with Wiltshire Council. The scope, locations, methodology and purpose of the baseline noise monitoring were discussed with Wiltshire Council on 9/11/17. A plan confirming the proposed monitoring locations was sent to Wiltshire Council on 10/11/17. The Draft Noise and Vibration Methodology and Baseline Monitoring sections of the Environmental Statement (ES) Noise and Vibration chapter [APP-047] and associated ES Appendix 9.4 Noise Monitoring [APP-271] were sent to Wiltshire Council on 26/7/18 for review. A meeting was held with Wiltshire Council on 7/8/18 at which the baseline noise monitoring results formed part of the discussion.

2. Wiltshire Council confirmed on 8/8/18 that the meeting had answered their queries on the baseline monitoring. On 6/9/18 confirmation of the previous discussions on baseline monitoring was provided to Wiltshire including the statement 'Locations, methods, time periods and weather all discussed at previous meeting. Wiltshire content with the locations selected, approach taken and monitoring durations. Some adverse weather during the monitoring but sufficient data obtained over the approx. 2 weeks at each long term location. Agreed'. The draft Statement of Common Ground (SoCG) between Highways England and Wiltshire Council, to be submitted to the Examination for deadline 2 (DL2), confirms the baseline noise monitoring data is agreed with Wiltshire Council.

ii. Can the Applicant also explain the extent to which they consider the baseline assessment to accurately represent the entirety of the noise assessment study areas?

3. The baseline noise monitoring locations were chosen to give a spread of locations along the length of the existing and proposed route of the A303, focussing on those locations likely to be most directly affected by the scheme, such as Foredown House on the northern edge of Winterbourne Stoke and receptors in the vicinity of Countess roundabout.

4. The baseline monitoring accurately represents the ambient noise climate at the time of the monitoring at the selected locations. Whilst monitoring was not completed in some parts of the quantitative noise modelling study area which are

more remote from the A303 this is considered acceptable and proportionate given the purpose of the baseline monitoring within the assessment, as detailed in paragraphs 9.6.5-9.6.6 of Chapter 9 of the ES [APP-047], to assist with developing an understanding of the general noise climate along the route of the Scheme and for use as part of a verification exercise for the traffic noise prediction modelling.

5. Therefore, the baseline assessment is considered to accurately represent the noise assessment study area and the number and location of monitoring locations is considered to be sufficient for the purposes of the assessment.

Question Ns.1.39

Baseline

Can the Applicant explain whether there has been a vibration baseline undertaken, and confirm the extent to which this has been agreed with relevant consultation bodies?

Response

1. The assessment of construction vibration effects is based on compliance with absolute criteria, not the change from an existing level. This is detailed in paragraphs 9.3.11-9.3.21 of Chapter 9 of the Environmental Statement [APP-047].

2. The baseline survey has been agreed with Wiltshire Council, as detailed in the draft Statement of Common Ground (SoCG) between Highways England and Wiltshire Council, to be submitted to the Examination for deadline 2 (DL2). The absence of existing noise or vibration complaints relating to the existing A303 was discussed with Wiltshire Council on 9/11/17. It was confirmed that the only existing vibration issues Wiltshire Council are involved with relation to mining which is not an issue in the study area. Given the absence of existing potentially significant sources of vibration in the area, and the discussion with Wilshire Council, no baseline vibration monitoring was proposed or undertaken.

Question Ns.1.40

Noise and vibration

In assessing vibration and the need for mitigation, what has been done in terms of assessing and subsequently mitigating potential harm to archaeology?

Response

1. Heritage assets above the tunnel were assessed for impacts from tunnel vibration, as well as an assessment as to whether tunnel vibration would impact Stonehenge. The assessment results are summarised in Environmental Statement Appendix 6.1 [APP-195, paragraphs 9.2.5-9.2.9]. Only one heritage asset is of note in this regard following the assessment, a long barrow 250m north of Normanton Gorse (NHLE no. 1008953), which lies directly above the tunnel and no significant effects are anticipated.

2. Chapter 9 of the Environmental Statement (ES) Noise and Vibration [APP-047] outlines the methodology for predicting vibration levels during construction and sets out the assessment criteria in terms of annoyance to occupiers of residential buildings and structural damage (paragraph 9.3.11-9.3.21). Vibration from the operation of the Tunnel Boring Machine (TBM) and the use of vibratory rollers/compactors for pavement works are predicted in accordance with the methodologies prescribed in BS 5228:2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites' (Ref 9.6 in ES chapter 9 [APP-047]). With regard to tunnelling this methodology is conservative as it is derived from worst case source data for tunnelling in rock using a hydraulic hammer. Source data for TBM works and chalk ground conditions indicates lower levels of vibration are likely to be generated, however as a precautionary approach the BS 5228 tunnelling vibration prediction methodology has been used. The depth of the tunnel would be within the parameters set out in the Draft Development Consent Order (dDCO) [APP-020] within Article 7(5) Limits of Deviation and as shown in Volume 2.16 Tunnel Limits of Deviation Plan [APP-019]. For the purposes of the tunnelling vibration assessment [APP-047] reported in the ES the minimum depth has been adopted to ensure a worst case approach.

3. As noted above, the Heritage Impact Assessment [APP-195, para. 9.2.8] notes that the tunnel passes directly beneath a long barrow 250m north of Normanton Gorse (NHLE no. 1008953). The long barrow is a small, consolidated earthwork which has settled to its present state over c.5000 years and is unlikely to contain any voids. Significant impacts due to construction vibration are not anticipated as outlined within the Heritage Impact Assessment (HIA) [APP-195, para 9.2.8] however, as a precautionary approach, monitoring at this feature is proposed during nearby tunnelling works [APP-195, para 9.2.8].

4. The draft Detailed Archaeological Mitigation Strategy (DAMS), submitted at Deadline 2, will be a certified document and its implementation is secured by paragraph 5 of Schedule 2 of the draft Development Consent Order [APP-020]. The DAMS includes details of the archaeological mitigation and also identifies

areas to be protected in situ, including the placement of ground movement and vibration monitoring stations above and perpendicular to the line of the tunnel.

5. The DAMS and Environmental Statement Appendix 2.2 Outline Environmental Management Plan (OEMP) [APP-187] both require the development of a Scheme-wide Heritage Management Plan (HMP) for the Main Works phase (detailed in the OEMP [APP-187, MW-CH1] which will indicate how the historic environment is to be protected in a consistent and integrated manner including the effects of construction (including vibration). This will include the monitoring of heritage assets scheduled in the OEMP [APP-187, MW-CH7] that may be sensitive to vibration and agree actions to control/mitigate impacts to minimise as far as reasonably practicable vibration impacts on archaeological remains. The HMP will be developed in consultation with the Heritage Monitoring and Advisory Group (HMAG). The DAMS also sets out a monitoring programme for areas that are being preserved in situ (for example, those heritage assets situated above the tunnel). This will include condition surveys in advance of the works, and monitoring at identified sensitive assets during the works.

6. With regard to noise and vibration, a package of mitigation measures is proposed to mitigate impacts on receptors, including heritage assets. The Outline Environmental Management Plan (OEMP) [APP-187] sets out general and topic-specific principles and requirements for the control, mitigation and monitoring of potential construction impacts. With regard to vibration this includes the use of Best Practicable Means (BPM) (PW-NOI1, MW-NOI1) and the development and implementation by the contractor of a Noise and Vibration Management Plan (PW-NOI3, MW-NOI3) which will include the proposed monitoring regime. Specifically, MW-NOI5 requires the main works contractor to identify sensitive cultural assets and agree actions to control or mitigate impacts (including monitoring).

7. Haulage and compound activities are not anticipated to be a significant source of vibration. The surface of the haul roads and site compounds will be maintained in good condition as required in the OEMP [APP-187, MW-AIR2]. The DAMS identifies a number of locations where suitable fill material on top of a protective barrier membrane will be used to bury sensitive archaeological remains to ensure that they are not disturbed during construction and to preserve them for future generations. These include areas at the Winterbourne Stoke and Countess compounds. Site specific Method Statements will be developed by the contractor which will set out suitable methodologies for filling areas without disturbing or impacting sensitive archaeological remains, and also for removing the fill at the end of construction. The Method Statements will be prepared in consultation with HMAG/Wiltshire Council Archaeology Service (WCAS). Toolbox talks will be undertaken to inform construction supervision staff and site operatives of the relevant procedures.

Question Ns.1.41

Noise

In light of the recognition of the noise profile across the River Till please explain why you do not propose a noise barrier on the north side of the viaduct when this creates an opportunity to improve the environment and the sustainability of the scheme

Response

1. Chapter 9 of the Environmental Statement (ES)[APP-047] demonstrates that a barrier on the northern side of the River Till is not necessary as no residential properties, or other noise sensitive receptors are located to the north of the River Till. The only potentially affected feature is the public right of way (PRoW) which crosses the scheme in a north-south direction (Ref WST04) and extends southwards to the existing A303. A relatively small section of the PRoW primarily to the north of the viaduct further from the existing A303 would experience a moderate or major increase in traffic noise levels, though absolute noise levels are not high (below the daytime Significant Observed Adverse Effect Level (SOAEL) for residential receptors, which are considerably more sensitive than a PRoW). Users of the PRoW currently experience higher road traffic noise levels at the intersection with the existing A303 to the south, than are predicted north of the River Till viaduct with the scheme in operation due to the elevated nature of the road at the viaduct. On this section of the PRoW close to the existing A303 users will experience a corresponding major and moderate reduction in road traffic noise levels as traffic transfers to the scheme. Given the linear nature of the PRoW, the range of noise impacts along the PRoW, the absolute noise levels, and the transient usage of a PRoW, a material change in the experience of using the footpath as a whole is not anticipated and a significant EIA or policy adverse noise effect has not been identified north of the River Till viaduct.

2. The NPSNN requires that the scheme demonstrates compliance with the aims to avoid significant adverse impacts on health and quality of life, mitigate and minimise adverse impacts on health and quality of life and contribute to improvements to health and quality of life where possible, in the context of sustainable development. With regard to identifying sustainable noise mitigation measures, in addition to the level of traffic noise and the change due to the scheme, various other factors have been considered – these include the cost versus the benefit, engineering practicality, generation of knock-on impacts (such as vegetation clearance, ecological effects, landscape and visual effects), and consultation and stakeholder engagement responses. In the absence of sensitive receptors it is not possible to quantify a monetarized benefit of reducing traffic noise to the north, instead a qualitative appraisal of the benefits can be completed. The adverse landscape impact of the viaduct would be unchanged with or without a barrier on the north side. Paragraph 4.6.16 of the Consultation Report [APP-026] details that there was strong support for a barrier on the southern side of the viaduct. Conversely Table 5.1 of the Consultation Report illustrates that reference to a barrier on the northern side was made twice (RT#30 and RT#33). Although RT#30 relates to a perceived potential benefit at

Shrewton, such a barrier would not provide a noise benefit in Shrewton. In the absence of residential properties or other noise sensitive receptors, the nature of the impact at the PRoW and the consultation/stakeholder engagement responses, a barrier on the northern side of the River Till viaduct is not considered to be a sustainable mitigation measure and has not been proposed as part of the scheme.

Question Ns.1.42

Noise

Please clarify which property you are referring to when you talk about 'a single receptor north of Winterbourne Stoke'.

Response

1. In the Summary of Effects Tables 9.25 and 9.26 of Chapter 9 of the Environmental Statement [APP-047] this refers to Foredown House, an individual property on the northern edge of the village. This property is marked on Figure 9.1 of the Environmental Statement [APP-164] as monitoring location M7 and construction noise receptor C18.

Question Ns.1.43

Noise and vibration

Indicative periods for impacts on individual receptors are set out in Appendix 9.2 Construction Noise [APP-269].

i. What construction programme is this based on?

ii. What degree of confidence can the ExA have in the periods of time the effects are indicated to occur?

Response

1. Subject to securing a DCO and as noted in paragraph 1.2.5 of the Outline Environmental Management Plan (OEMP) [APP-187], preliminary works are planned to start in 2020 (in advance of the appointment of the main works contractor), with the main construction works following in 2021 and with the Scheme due to open to traffic in 2026.

2. For the purposes of the EIA and the traffic assessment, two principal phases of the construction programme for the main works have been identified. These correspond to:

   a. Phase 1, when Winterbourne Stoke bypass, Longbarrow Junction and Countess Roundabout flyover are under construction (likely 2021-2023); and

   b. Phase 2, when the construction of the tunnel is the primary construction activity (2024 onwards). The Winterbourne Stoke bypass, Longbarrow Junction and Countess Roundabout flyover constructed in Phase 1 would be operational during Phase 2.

3. 3. The construction noise impact assessment is based on the above and outline programme information provided by a contractor appointed during preparation of the application to provide reasonable assumptions on the likely works, this set out an indicative timing for each of the identified construction activities.

4. 4. In line with other major infrastructure projects, until a contractor is appointed to construct the Scheme precise details of the construction programme cannot be confirmed and some flexibility on the exact programme is essential to ensure the contractor can adapt as the detailed design evolves. However, the assessment reported in the ES is based on robust information on the likely programme as provided by the contractor appointed at the Environmental Statement (ES) stage. A reasonable worse case approach to the assessment has been taken, for example in terms of the position of activities relative to the receptors. It is therefore considered that the ES represents a robust and reasonable scenario in terms of construction effects.

5. 5. In that context, it is recognised that suitable controls are required to be secured. Construction noise and vibration mitigation measures are contained in the Outline Environmental Management Plan (OEMP) [APP-187], compliance with which is secured by Paragraph 4 of Schedule 2 of the dDCO [APP-020]. Working hours are controlled in the OEMP by MW-G12 to G16, any works

outside of the core hours will be agreed with Wiltshire Council prior to undertaking the works under Section 61 of the Control of Pollution Act 1974. MW-NOI1 requires the contractor to adopt Best Practicable Means (BPM) to control noise and vibration. A Noise and Vibration Management plan is required by the OEMP (MW-G7) this will be developed by the contractor appointed to construct the scheme and will contain additional details on noise and vibration mitigation measures and monitoring protocols.

Question Ns.1.44

Noise and vibration

In order to ensure there is no adverse effect on the fish population of either the River Till or the River Avon provide construction method statements that specify how these effects would be controlled in order to ensure any effects during construction are kept within agreed tolerances, how this would be monitored throughout the construction process?

Response

1. Piling is required to construct the new viaduct over the River Till, however, no piling within the channel of the river is proposed. The works at the existing crossing of the River Avon at the eastern end of the Scheme are minimal, no piling at this existing bridge is proposed. The two closest supports for the River Till viaduct would be beyond the boundary of the SAC/ SSSI, which the channel of the River Till falls within. This is secured by D-BIO1 in the Outline Environmental Management Plan (OEMP) [APP-187]. However, for clarity this commitment to no piling within the channel of the River Till will be confirmed in the next revision of the OEMP [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO).

2. The assessment of noise and vibration impacts reported in Chapter 9 of the Environmental Statement (ES) [APP-047] is based on the information provided by the contractor appointed to provide reasonable assumptions regarding likely works at the ES stage. This included the use of continuous flight auger piling at the River Till viaduct, which as an augured method is not a significant source of vibration and does not generate impact type noise. As detailed in the response to Ns.1.33, a commitment to non-impact piling at the River Till viaduct, which can be a potentially significant source of vibration and impact type noise, will be added to the next revision of the OEMP.

3. Item MW-G7 of the OEMP [APP-187] requires the contractor to set out the procedures to address health and wellbeing, safety, site security and environmental issues in method statements prepared as part of the construction process. The method statements shall define any specific environmental control measures, to be implemented to meet the requirements of the CEMP, any relevant Topic Specific Plans, and will consider the cumulative effects of concurrent construction activities.

4. The mitigation measures that would be implemented during construction are set out in the OEMP [APP-187] which would be secured through paragraph 4 of Schedule 2 of the DCO [APP-020]. Noise and vibration specific mitigation measures and monitoring procedures are detailed in MW-NOI1 to MW-NOI6. These include a commitment to require the use of Best Practicable Means (BPM) to minimise noise and vibration from the construction of the Scheme, at all times, and monitoring of noise and vibration as set out in the Noise and Vibration Management Plan to be developed by the contractor.

5. With particular regard to biodiversity, Table 2.1 of the OEMP [APP-187] states that the contractor's Ecological Clerk of Works will be required to 'monitor works during construction at sensitive sites, including but not limited to, Parsonage Down National Nature Reserve (NNR), the River Till and the River Avon Special Area of Conservation (SAC) and the Salisbury Plain SAC and Special Protection Area (SPA)'.

Question Ns.1.45

Noise

The Noise Policy Statement for England Policy Aims seek to achieve three elements:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

In light of this how has the Proposed Development:

i. Sought to avoid significant adverse impacts particularly in respect of residents in Amesbury and users of the PRoW network in the River Till Valley?

ii. Minimised adverse effects across the project area?

iii. Contributed to an improvement to quality of life?

Response

1. The Noise Policy Statement for England (NPSE) and NPSNN both specify that the three aims should be met 'within the context of Government policy on sustainable development'. Noise impacts cannot be considered in isolation.

2. As detailed in paragraph 9.9.71 of Chapter 9 of the Environmental Statement (ES)[APP-047], with regard to identifying sustainable mitigation measures, in addition to the absolute noise levels and the change due to the construction or operation of the Scheme, other factors including the cost versus the benefit, engineering practicality, any other impacts (such as landscape/visual) and consultation/stakeholder engagement responses must be considered.

3. The text below is based on the Compliance with policy section of Chapter 9 of the ES [APP-047] which is in paragraphs 9.9.69-9.9.84 and deals with each of the three aims in turn for both construction and operation.

4. Construction

5. Significant policy adverse effects are identified in the ES for construction noise and vibration levels above the Significant Observable Adverse Effect Level (SOAEL) (see Table 9.3 and paragraph 9.3.16 in Chapter 9 of the ES) [APP-047] in respect of activities which have the potential to occur for more than 10 days in 15, or 40 days in 6 months. Adverse effects would occur at construction noise or vibration levels between the Lowest Observable Adverse Effect Level (LOAEL) and SOAEL. The third aim 'to where possible contribute to the improvement of health and quality of life' applies to all construction noise levels.

6. First aim

7. With regard to the first aim, a significant adverse effect is predicted in the ES as likely to occur at two locations: receptors in close proximity to works at Countess Roundabout (represented by receptors C8, C9 and C10) and Foredown House north of Winterbourne Stoke (receptor C18). This is due to the robust

assumptions which have been adopted in the assessment process together with the close proximity of these receptors to construction activities and the duration of the works.

8. A range of mitigation measures is detailed in section 9.8 of Chapter 9 of the ES [APP-047] and included in the Outline Environmental Management Plan (OEMP) [APP-187] including: selection of quiet and low vibration equipment and methodologies (Best Practicable Means); review of construction programme and methodology to consider low noise/low vibration methods; optimal location of equipment on site to minimise noise disturbance; the provision of acoustic enclosures around static plant, where necessary (not included in the ES assessment); use of less intrusive alarms, such as broadband vehicle reversing warnings; no start-up or shut down of vibratory plant e.g. rollers or compactors, within 50m of receptors, implementation of a construction noise insulation and temporary re-housing policy, and compliance with standard working hours, as recommended by Wiltshire Council, of 7:30am-6pm Monday-Friday and 07:30am-1pm Saturday for the works in these areas. The mitigation measures would be set out in the final Construction Environmental Management Plan (CEMP) produced by the contractor, in consultation with Wiltshire Council. The production of the CEMP is detailed in the OEMP [APP-187], which is secured by paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO)[APP-020].

9. The contractor appointed to construct the Scheme would review the proposed working methods to consider all sustainable mitigation measures with the aim of avoiding significant noise and vibration effects. This would include identifying locations/activities/plant where site hoarding/enclosures would be installed to reduce the magnitude of the construction noise impact. The ES assessment does not include the benefit of such site hoarding/enclosures as at this stage precise details of the location of construction plant are not confirmed. Therefore, there is scope to reduce the construction impacts below those reported in ES. However, at this stage of the project it is not possible to rule out the risk that some significant temporary adverse noise and vibration effects might remain. This is acceptable in the context of sustainable development as factors including engineering practicality, cost versus benefit etc., as outlined above must also be considered. On this basis, it is considered that, with the implementation of the mitigation measures in the final CEMP and in the context of sustainable development, the first aim of the NPSE and NPSNN would be met during Scheme construction.

10. Second aim

11. With regard to the second aim, adverse effects between the LOAEL and SOAEL are predicted in the ES as likely to occur at a range of receptors along the construction of the route. The mitigation and minimisation measures outlined above would be applied throughout the works, and therefore would benefit all receptors experiencing construction noise or vibration, including those with levels between the LOAEL and SOAEL. The restriction on the working hours at

Countess Roundabout and north of Winterbourne Stoke (OEMP MW-G13) has been made in order to minimise disturbance to nearby receptors from construction noise. There is an engineering requirement for tunnelling and directly associated activities, namely the slurry treatment plant (STP), Segment Lining Production Plant (SLPP) and the delivery of segments, to be undertaken on a 24 hour, 7 days a week basis. The location of these works, including the compound which is remote from sensitive receptors, was determined in part to achieve the objectives of the second aim. As detailed above the ES assessment does not include the benefit of site hoarding/enclosures, proposals for which will be developed by the contractor appointed to construct the Scheme, as required by the OEMP. Therefore, there is scope to reduce the construction impacts below that reported in ES. Construction impacts between the LOAEL and SOAEL are acceptable in the context of sustainable development as factors including engineering practicality, cost versus benefit etc., as outlined above, must be considered. On the basis of the above mitigation and minimisation measures the second aim to mitigate and minimise adverse effects is met during construction.

12. Third aim

13. Construction noise and vibration by its nature introduces a new noise or vibration source into the existing environment and is temporary in duration, therefore the opportunity to improve existing noise levels is very limited.

14. Operation

15. Significant policy operational adverse noise effects are identified in the ES to occur at traffic noise levels above the SOAEL (see Table 9.7 of Chapter 9 of the ES [APP-047]) and adverse effects are identified to occur at traffic noise levels between the LOAEL and SOAEL. The third aim applies to the whole of the Scheme.

16. First aim

17. With regard to the first aim, mitigation measures incorporated within the Scheme design have reduced traffic noise levels from above the SOAEL to below the SOAEL at all affected properties in Winterbourne Stoke and Stonehenge Cottages. This is through the selection of a route alignment which bypasses Winterbourne Stoke, and setting the route within a tunnel and deep cutting within the World Heritage Site (WHS) past Stonehenge Cottages.

18. The vast majority of the remaining residential buildings which are forecast to experience noise levels above the SOAEL following the opening of the Scheme are in close proximity to main roads within Amesbury such as the A345. Receptors along such routes are already experiencing noise levels above the SOAEL without the Scheme and would experience only a negligible change in traffic noise levels due to the Scheme. The purpose of the Scheme to improve traffic conditions on the A303 by grade separating Countess Roundabout results in small increases in traffic on roads connecting to the junction. The introduction of mitigation measures along existing roads which already experience high noise levels, to mitigate the negligible effect of the Scheme, is not reasonable or

justifiable in the context of sustainable development. This is because such roads in built up areas have many residential and commercial buildings fronting onto the road, therefore mitigation measures such as barriers are not a practical engineering option and would have other adverse impacts including visual and access difficulties.

19. Overall the number of properties above the SOAEL is reduced by the implementation of the Scheme.

20. Second aim

21. With regard to the second aim of the NPSE and NPSNN, a range of further mitigation measures have been incorporated into the design as outlined in section 9.8 of Chapter 9 of the ES [APP-047]. These include the use of false cuttings on the bypass north of Winterbourne Stoke with a particular aim of minimising the impact at Foredown House; maximising the extent of the tunnel portals and Green Bridge Four; use of a noise absorbent finish at the entrance/exit of the tunnel and Green Bridge Four; minimising the extent of vertical concrete retaining walls at Countess flyover; use of a thin surfacing system which results in lower levels of noise generation than a standard hot rolled asphalt surface at speeds at and above 75km/hr; inclusion of 1.8m high absorptive noise barriers between the slip roads on both the north and south side of Countess flyover; and inclusion of a 1.5m high solid parapet on the south side of the River Till viaduct. These mitigation measures are secured through the dDCO [APP-020], the OEMP [APP-187] and the contract which imposes a contractual responsibility on the contractor to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation (para 2.3.62 of the ES).

22. The decision to include noise barriers at Countess flyover was made in part to achieve the objectives of the second aim. The extent of the noise barriers between the slip roads has been maximised within the physical constraints of the flyover. The proposed height of the barriers has resulted from striking a balance between the noise benefit and the potential visual impacts. Feedback from the public consultation and Wiltshire Council identified the likely benefits of noise barriers at Countess flyover.

23. A solid parapet on the southern side of the River Till is not deemed essential noise mitigation to comply with policy, within the context of sustainable development, as it only reduces the adverse noise impact at a single property. However, it does provide both noise and visual benefits. In addition, feedback from the public consultation and Wiltshire Council was in favour of a solid barrier. Therefore, for these reasons a solid parapet is included in the Scheme design.

24. The inclusion of all the above identified mitigation and minimisation measures demonstrates that, within the context of sustainable development, at receptors between the LOAEL and the SOAEL the Scheme meets the requirements of the second aim. No areas where additional mitigation would be reasonable or

justifiable, within the context of sustainable development, have been identified i.e. considering engineering practicality, cost/benefit, other potential impacts such as landscape/visual and consultation responses.

25. Third aim

26. With regard to the third aim to 'improve where possible', the bypass of Winterbourne Stoke and the use of a tunnel/deep cuttings through the WHS results in significant improvements in traffic noise levels. The noise barriers at Countess are a reasonable balance between the reduction in the traffic noise impact at a significant number of properties and the visual impact of the barriers. On this basis the third aim has been met.

27. ***Users of the PRoW network in the River Till Valley***

28. With regard to the River Till valley, the public right of way (PRoW) (Ref WST04) crosses the Scheme in a north-south direction and extends southwards to the existing A303. A relatively small section of the PRoW primarily to the north of the viaduct further from the existing A303 would experience a moderate or major increase in traffic noise levels, though absolute noise levels are not high (below the daytime SOAEL for residential receptors, which are considerably more sensitive than a PRoW). Users of the PRoW currently experience higher road traffic noise levels at the intersection with the existing A303 to the south, than are predicted north of the River Till viaduct with the Scheme in operation due to the elevated nature of the road at the viaduct. On the section of the PRoW close to the existing A303 users will experience a corresponding major reduction in road traffic noise levels as traffic transfers to the Scheme. Given the linear nature of the PRoW, the range of noise impacts along the PRoW, the absolute noise levels, and the transient usage of a PRoW, a material change in the experience of using the footpath as a whole is not anticipated and a significant policy adverse noise effect has not been identified at the PRoW north of the viaduct in the Till Valley. Similarly a significant beneficial effect on the PRoW north of the existing A303 has not been identified.

29. With regard to the second aim of the NPSE and NPSNN, to mitigate and minimise adverse effects, the mitigation outlined above incorporated into the operation of the Scheme, including the solid parapet on the southern side of the viaduct and the use of thin surfacing, which are secured through the dDCO [APP-020], the OEMP [APP-187] and the contract, would minimise the noise impact on this PRoW. Further mitigation, such as a solid parapet on the northern side of the Till viaduct is not considered to represent sustainable development as detailed in the response to Ns.1.41.

Question Ns.1.46

Noise

In light of the preceding question and the current recognition there would be adverse effects on the community of Amesbury through an increased noise environment both during construction and during operation:

i. What in the DCO requires the final design to meet noise standards which achieve the policy requirements of the NPS and consequently the NPSNN?

ii. When would the noise barriers be provided and how is this facilitated in the DCO?

iii. What standard of mitigation would these barriers achieve?

iv. Where is it stipulated when this would be provided and how would it be maintained throughout the operation of the proposed road?

Response

i. What in the DCO requires the final design to meet noise standards which achieve the policy requirements of the NPS and consequently the NPSNN?

1. The 'Compliance with policy' section of Chapter 9 (paragraph 9.9.69 to 9.9.84) in the Environmental Statement (ES) [APP-047] demonstrates how the noise and vibration effects of the Scheme comply with policy as set out in the NPSNN, including within Amesbury, during both construction and operation. Further details are provided in the response to question Ns.1.45.

2. Achievement of the policy requirements of the NPS and NPSNN is dependent on the implementation of the mitigation measures outlined in the ES. These are secured via the draft Development Consent Order (dDCO), the Outline Environmental Management Plan (OEMP) [APP-187] (which is secured by the dDCO) and the contract, which would place a contractual responsibility on the contractor to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures, approved by Highways England, which achieve the same level of mitigation.

ii. When would the noise barriers be provided and how is this facilitated in the DCO?

3. The requirement for the Countess flyover noise barriers at Amesbury is set out in DNOI-2 of the OEMP [APP-187]. The OEMP is secured by Paragraph 4 of Schedule 2 of the dDCO.

iii. What standard of mitigation would these barriers achieve?

1. At Countess roundabout the addition of the 1.8m noise barriers is anticipated to provide up to 3.5 dB reduction in LA10,18h operational traffic noise levels at the closest residential properties. It should be noted that based on the advice in the Design Manual for Roads and Bridges (DMRB) the small additional benefit of the absorptive finish to the noise barriers, which is designed to minimise reflections from the barriers on opposite sides of the carriageway, has not been included in the results used in ES.

iv. Where is it stipulated when this would be provided and how would it be maintained throughout the operation of the proposed road?

2. The dDCO and the OEMP do not stipulate when the noise barriers would be provided. The timing of the installation of the noise barriers within the construction programme will be finalised by the contractor appointed to construct the Scheme, however they would be in place before the Scheme is operational as required by the OEMP and secured by the dDCO. The noise barriers would be maintained in line with standard Highways England maintenance regimes by virtue of being assets on the strategic highway network, which Highways England are under a duty to maintain. As detailed in MW-G11 of the OEMP [APP-187] a consolidated Handover Environmental Management Plan (HEMP) will be prepared by the contractor at the end of the works detailing the required ongoing maintenance of the Schem

Question Ns.1.47

Noise

The River Till Viaduct is recognised as creating an adverse effect on the noise environment within the River Till valley. To date only mitigation is proposed on the southern side of the viaduct.

i. Explain how this meets the requirements of the Policy as set out in the NPS and NPSNN.

ii. How would the mitigation be provided for in the DCO?

iii. What standard of mitigation would it achieve?

iv. Where is it stipulated when this would be provided and how would it be maintained throughout the operation of the proposed road?

Response

i. Explain how this meets the requirements of the Policy as set out in the NPS and NPSNN.

1. The 'Compliance with policy' section of Chapter 9 (paragraph 9.9.69 to 9.9.84) in the Environmental Statement (ES) [APP-047] demonstrates how the noise and vibration effects of the Scheme comply with policy as set out in the National Policy Statement for National Networks (NPSNN). This is also covered in detail in the response to Ns.1.45. Further details on compliance with the wider noise requirements of the NPSNN are provided in Appendix A of the Case for the Scheme [APP-294]

2. With regard to the River Till valley no residential properties, or other potentially noise sensitive receptors are located to the north of the River Till viaduct. The only potentially affected feature is the public right of way (PRoW) which crosses the Scheme in a north-south direction (Ref WST04) and extends southwards to the existing A303. A relatively small section of the PRoW primarily to the north of the viaduct further from the existing A303 would experience a moderate or major increase in traffic noise levels, though absolute noise levels are not high (below the daytime Significant Observed Adverse Effect Level (SOAEL) for residential receptors, which are considerably more sensitive than a PRoW). Users of the PRoW currently experience higher road traffic noise levels at the intersection with the existing A303 to the south, than are predicted north of the River Till viaduct with the Scheme in operation due to the elevated nature of the road at the viaduct. On this section of the PRoW close to the existing A303 users will experience a corresponding major or moderate reduction in road traffic noise levels as traffic transfers to the Scheme. Given the linear nature of the PRoW, the range of noise impacts along the PRoW, the absolute noise levels, and the transient usage of a PRoW, a material change in the experience of using the footpath as a whole is not anticipated and a significant policy adverse noise effect has not been identified at the PRoW north of the viaduct in the Till Valley.

Similarly a significant beneficial effect on the PRoW north of the existing A303 has not been identified.

3. With regard to the second aim of the NPSE and NPSNN, to mitigate and minimise adverse effects, the mitigation incorporated into the operation of the Scheme, including the solid parapet on the southern side of the viaduct and the use of thin surfacing, which are secured through the dDCO [APP-020], the OEMP [APP-187] and the contract, would minimise the noise impact on this PRoW. Further mitigation, such as a solid parapet on the northern side of the Till viaduct is not considered to represent sustainable development as detailed in the response to Ns.1.41.

i. How would the mitigation be provided for in the DCO?

4. The requirement for the solid parapet at the River Till viaduct is set out in D-LAN2 of the Outline Environmental Management Plan (OEMP) [APP-187]. Compliance with the OEMP is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (dDCO) [APP-020]. The other operational noise mitigation measures are secured via the draft Development Consent Order (dDCO), the OEMP [APP-187] and the contract, which would place a contractual responsibility on the contractor to deliver each mitigation measure as specified in the ES, unless the contractor is able to define an alternative measure or measures which achieve the same level of mitigation to the satisfaction of Highways England.

ii. What standard of mitigation would it achieve?

5. At the River Till viaduct the 1.5m solid parapet provides up to 2.6 dB reduction in operational $L_{A10,18h}$ traffic noise levels at the closest residential receptor Foredown House. As detailed in Chapter 9 of the ES paragraph 9.9.82 a solid parapet at the River Till is not deemed essential noise mitigation to comply with policy, within the context of sustainable development as it reduces the adverse noise impact at a single property. However, it does provide both noise and visual benefits. In addition, feedback from the public consultation events and Wiltshire Council was in favour of a solid barrier. Therefore, for these reasons a solid parapet is included in the Scheme design.

iii. Where is it stipulated when this would be provided and how would it be maintained throughout the operation of the proposed road?

6. The dDCO or the OEMP do not stipulate when the solid parapet would be provided. The timing of the installation of the parapet within the construction programme will be finalised by the contractor, however it would be in place before the Scheme is operational as required by the OEMP and secured by the dDCO. The solid parapet would be maintained in line with standard Highways England maintenance regimes by virtue of being assets on the strategic highway network, which Highways England are under a duty to maintain. As detailed in MW-G11 of the OEMP [APP-187] a consolidated Handover Environmental

Management Plan (HEMP) will be prepared by the contractor at the end of the works detailing the required ongoing maintenance of the Scheme.

Question Ns.1.48

Noise

To date no information has been provided as to the detailed construction programme or consequently the number or location of haul routes.

i. Provide information on these haul routes, in respect of location, timing of construction and reinstatement.

ii. Explain where and how this falls within the scope of the current ES.

Response

1. The locations of the proposed off road haul routes are illustrated on ES Figure 2.7 [APP-061]. These will be constructed at the start of the main works (currently planned to start in 2021) and, for routes on land subject to temporary possession, reinstated in accordance with article 29 of the draft Development Consent Order [APP-020].
2. The construction and use by construction vehicles of the off road haul routes are included within the construction noise assessment, the results of which are reported in the ES Chapter 9 Noise and Vibration [APP-047] in Section 9.9 paragraphs 9.9.1-9.9.13.
3. Please also see response to CH.1.16.

Question Ns.1.49

Noise

The NPSNN at paragraph 5.198 bullet point 2 refers to "*low noise road surfacing*". The ES refers to "*thin surfacing*".

Explain the difference in terminology and whether thin surfacing would result in the same standard of noise reduction.

Response

1. Thin surfacing is the technical name used in Design Manual for Roads and Bridges (DMRB) for what is commonly called low noise surfacing (and is used in the NPSNN). Therefore, these terms are interchangeable and the same standard of noise reduction applies to both

Question Ns.1.50

Noise and vibration

The NPSNN at paragraphs 5.194 seeks schemes to demonstrate that through the optimisation of layout noise emissions would be minimised.

i. How has the layout been optimised to minimise noise emissions?

ii. In light of the fact that there is not to date a detailed design what measures would be in place to ensure that the final design would meet this requirement? Where is this set out?

iii. How would this be delivered through both the construction and operational phases?

Response

i. How has the layout been optimised to minimise noise emissions?

1. Full details on compliance with all the noise requirements of the NPSNN are provided in Appendix A of the Case for the Scheme [APP-294]. As detailed in paragraph 9.8.14 Chapter 9 of the Environmental Statement (ES) [AP-047], the layout of the Scheme minimises operational noise impacts by:

    a. selecting a route alignment which takes the road away from residential receptors in Winterbourne Stoke;

    b. employing a vertical alignment which uses a combination of natural landform and 'false cuttings' to integrate the Scheme into the landscape whilst at the same time, enclosing traffic and reducing noise in adjacent areas. In particular, the use of false cuttings to the north of Winterbourne Stoke to reduce the impact at Foredown House; and

    c. setting the route within a tunnel and deep cutting within the World Heritage Site (WHS).

2. At Amesbury engineering constraints and the need to connect to the existing A303 at the eastern end of the Scheme restrict the potential to adjust the horizontal and vertical layout. Therefore mitigation measures in the form of noise barriers on the Countess flyover have been included in the design.

ii. In light of the fact that there is not to date a detailed design what measures would be in place to ensure that the final design would meet this requirement? Where is this set out?

3. With regard to the layout design, the draft Development Consent Order (dDCO) in Schedule 2 paragraph 3 requires that '…the authorised development must be designed in detail and carried out so that it is compatible with the works plans, the engineering section drawings (plan and profiles) and the engineering section drawings (cross sections)…'. The layout of the Scheme is shown on these drawings and therefore secured by this requirement.

iii. How would this be delivered through both the construction and operational phases?

4. The Scheme would be constructed in line with the finalised detailed design. Construction mitigation measures are detailed in the Outline Environmental Management Plan (OEMP) [APP-187]. Compliance with the OEMP [APP-187] is secured by Paragraph 4 of Schedule 2 of the draft Development Consent Order (DCO) [APP-020]. Once operational the Scheme would be maintained in line with standard Highways England maintenance regimes by virtue of being assets on the strategic highway network, which Highways England are under a duty to maintain. As detailed in MW-G11 of the OEMP [APP-187] a consolidated Handover Environmental Management Plan (HEMP) will be prepared by the contractor at the end of the works detailing the required ongoing maintenance of the Scheme.

Question Ns.1.51

Noise

The NPSNN (paragraph 5.1.93) refers to the NPS for England, the NPPF and associated planning guidance on noise.

i. Do you agree the ES demonstrates compliance with these requirements? If not, please explain where there is disagreement.

ii. Do you agree the assessment has been done in accordance with the appropriate British Standards to meet the requirements of NPSNN paragraph 5.191? If not, please explain where there is disagreement.

Response

1. Chapter 9 of the Environmental Statement (ES) [APP-047] contains a section on 'compliance with policy' which outlines how the scheme meets the aims of the National Policy Statement for National Networks (NPSNN) during construction and operation, paragraph 9.9.69 to 9.9.84. Further details are provided in response to question Ns.1.45. Further details on compliance with the wider noise requirements of the NPSNN are provided in Appendix A of the Case for the Scheme [APP-294]. As detailed in the SoCG the Peer Review of the noise assessment completed on behalf of Wiltshire Council was in agreement that the proposed operational mitigation is suitable and sufficient. The draft Statement of Common Ground (SoCG) between Highways England and Wiltshire Council, is to be submitted to the Examination for deadline 2 (DL2).

2. The methodology adopted in the ES in terms of defining Lowest Observable Adverse Effect Levels (LOAELs) and Significant Observable Adverse Effect Levels (SOAELs) is in accordance with the Noise Policy Statement for England (NPSE). The advice in the NPSE on the application of 'in the context of government policy on sustainable development' has been adopted in the specification of mitigation measures. In particular that the noise impact should not be considered in isolation without taking into account other considerations including economic and social factors.

3. With regard to completing the assessment in accordance with the appropriate British Standards, the assessment has been completed in accordance with the UK standard methodology for road schemes as detailed in the Design Manual for Roads and Bridges (DMRB). The methodology is set out in Section 9.3 of Chapter 9 of the ES [APP-047]. As detailed in the SoCG Wiltshire Council were consulted upon, and are in agreement with, the noise and vibration assessment methodology.

Question Ns.1.52

Noise

Within Table 5 (5.195) of the Case for the Scheme and NPS Accordance reference is made to STP and SPLL which are not included within the Glossary of Terms.

To what do these two acronyms refer?

Response

1. STP refers to the Slurry Treatment Plant. SPLL should read SLPP and refers to the Segment Lining Production Plant.

Appendices Ns.1

Appendices Ns.1

Question Ns.1.16

HE551506-AMW-DR-GI-00597 plan of chainages Ns.1.16

NOTES / LEGEND

- Proposed scheme boundary
- Indicative centreline
- Chainage
- Chainage 11300 to 12400 (North of Amesbury)
- Chainage 3520 to 4180 (North of Winterborne Stoke)

Salisbury Plain SSSI/SAC

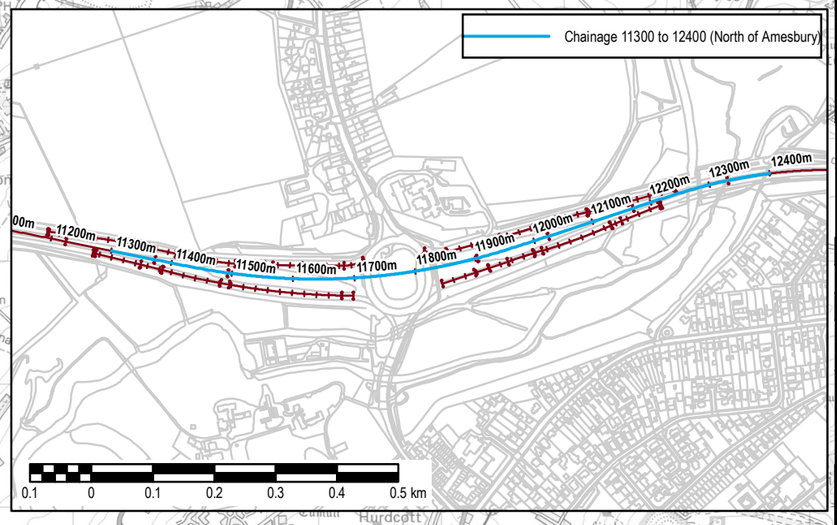
Salisbury Plain SSSI/SAC

Chainage 3520 – 4180

Chainage 11300-12400

Parsonage Down SSSI/SAC/NNR

Berwick Down



Revision Details	By Check	Date	Suffix

Purpose of issue: FINAL

Client: Highways England

Working on behalf of: highways england

Project Title: A303 AMESBURY TO BERWICK DOWN

Drawing Title: FIGURE 1 CHAINAGES OF WORKING HOURS: 7:30-18:00 MONDAY - FRIDAY AND 07:30-13:00 SATURDAY

Designed	Drawn	Checked	Approved	Date
HS	EB	GM	SS	18/04/19

Internal Project No. 60541200

Scale @ A3: 1:50,000 | Zone: SW

Highways England
Temple Quay House
2 The Square, Temple Quay
Bristol
BS1 6HA

AECOM + mace + WSP

Drawing Number				Rev
Highways England PIN	Originator	Volume		
HE551506	AMW	GEN		01
SCHEME WIDE	DR	GI	00597	
Location	Type	Role	Number	

Filename: pw:\\UKLON3AP114.aecomonline.local:PWAECOM_EU\Documents\60541439-A303 Stonehenge Technical Partner\0300 Non Deliverables\0330 Environmental Management Team\GIS\Figures\HE551506-AMW-DR-GI-00597.mxd

Appendices Ns.1

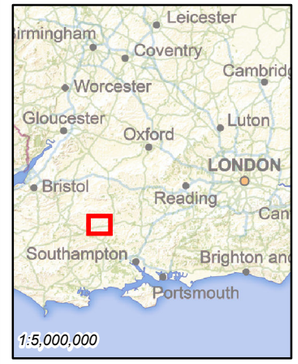
Question Ns.1.26

HE551506-AMW-DR-GI-00598 plan of thin surfacing Ns.1.26

2.

NOTES / LEGEND

- Proposed scheme boundary
- Indicative centreline
- Thin surfacing



Revision Details	By / Check	Date	Suffix

Purpose of issue

FINAL

Client

Highways England

Working on behalf of

highways england

Project Title

A303 AMESBURY TO BERWICK DOWN

Drawing Title

FIGURE 1
LOCATION OF THIN SURFACING

Designed	Drawn	Checked	Approved	Date
HS	EB	GM	SS	29/04/19

Internal Project No. 60541200

Scale @ A3 1:35,000 Zone SW

Highways England
Temple Quay House
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Drawing Number	Originator	Volume	Rev
Highways England PIN			
HE551506	AMW	GEN	01
SCHEME WIDE	DR	GI	00250
Location	Type	Role	Number

1 0 1 2 3 4 5 km

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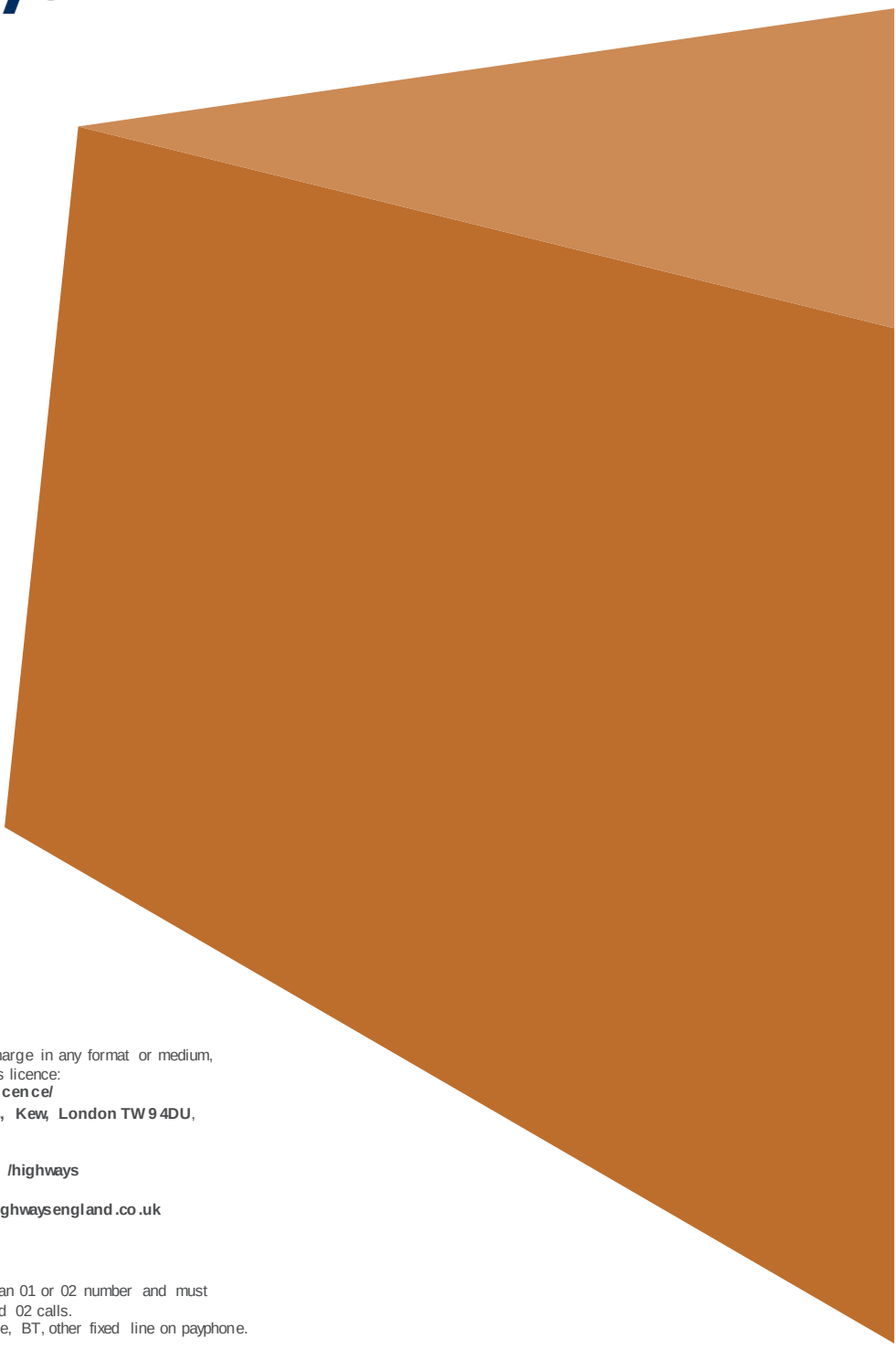

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