National Highways: A303 Amesbury to Berwick Down Project, Development Consent Order Application

Scheme Reference: TR010025

Comments on National Highways Document: Redetermination 4.1 A303 Amesbury to Berwick Down: response to Secretary of State's letter 20 June 2022: Applicant's response to the request for comments on Q1, Q3-6 Response Documents and Redetermination 4.2, 4.7 and 4.8 – response to request for comments on Q2 Response Documents

(re: Geology and Soils, Noise and Vibration, and Adverse Impacts of Tunnelling Through Chalk)

for

The Stonehenge Alliance
(Reference No. 2001870)

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Submissions relating to Geology and Soils, Noise and Vibration and Adverse impacts of tunnelling through Chalk commenting on

National Highways Document: Redetermination 4.1 "A303 Amesbury to Berwick Down: Response to Secretary of State's letter 20 June 2022: Applicant's response to the request for comments Q3-6 – Response document"; and National Highways Documents: "Redetermination 4.2", "Redetermination 4.7" and "Redetermination 4.8 Response Documents"

1. <u>Alternative Routes</u> (ref. National Highways Documents Redetermination [R]4.1, paras.3.3.23-28 and R4.2 - Conclusions on alternative routes)

<u>Note</u>. Readers are directed to the *extensive* presentations by the current author, and others, to the 2004 Public Inquiry and 2019 Examining Authority, relating to A303 tunnel proposals (see Appendix). These specialist geotechnical, hydrogeological and geological datasets and discussions need to be examined properly, by experienced and well-informed specialists, so that the Planning Inspectorate and the Secretary of State can adequately understand the technical, financial and environmental implications of the proposed scheme. <u>At present this situation does not apply</u>.

Overview

1.1. The four documents prepared by National Highways (NH, listed below in references) were produced in response to the Secretary of State's letter of 20 July 2022. This required NH to explain how they arrived at the conclusion that the alternative tunnel routes would only have minimal additional heritage benefits over the Development and, as a consequence, did not assess these alternatives.

National Highways was asked to:

1. Explain fully the basis on which they reached this conclusion.
2. Provide an explanation including full detail of reasoning, the matters considered and any methodology that was used and, where applicable, be cross-referenced to the examination material or subsequent information provided to the Secretary of State.
3. Provide any additional documents that are relevant to understand the conclusion that they reached on this matter.

The alignment of the tunnel route would remain as proposed at the 2019 Examination into the Highways England Planning Application, apart from the following variations:
(a). A deeper tunnel alignment should be investigated (with consequent repositioning of the Western portal some metres further to the west, outside the World Heritage Site boundary).
(b). A cut and cover option was to be assessed.

1.2. **As detailed numerous times in evidence prepared by the present author, both at the 2019 Examination and subsequently, poor quality Chalk and adverse groundwater conditions are predicted: these are relevant to the current proposal and both cut-and-cover or extended bored tunnel options. The soft Chalk bedrock along the proposed tunnel alignment will present very challenging conditions, especially in the deep-bored western section of the tunnel. West of Stonehenge Bottom the occurrence of highly altered Phosphatic Chalk and excessive groundwater problems will necessitate the use of extensive grouting for ground support.** Whilst any proposals for a deeper tunnel profile will require additional ground characterisation work (involving further drilling, testing and possibly deeper seeking geophysical surveys), it could be argued that deeper tunnelling would cause less surface ground disturbance, with consequent less damage to surface structures and artifacts, than tunnelling at the current proposed depths.

1.3. Furthermore, as stated to the Examination (Deadline 9 Submission - Response to Highways England Deadline 8 Documents by Dr George Reeves: REP9-045, Section 3.2, Summary), and repeated here:

> *"The construction of cross passages, introduced at the last stages of the Issue Specific Hearing on 29th August is another poorly presented and explained step proposed for the tunnel construction. Presumably these will be mostly hand-excavated (or partially hand-excavated) after construction of the twin bores, with the expectation that rock stability and groundwater control have been successfully gained. It was admitted at ISH 10 that some dewatering might be necessary in construction of the cross passages and the Environment Agency reminded the Examination that there would be limits to the amount of dewatering permissable. The concern remains, therefore, that greater amounts of dewatering might be necessary, with knock-on effects at Blick Mead, private boreholes, etc. The Applicant has provided no certainty that this could not happen.*
>
> *No comparative Chalk tunnelling project in an unconfined and locally important aquifer has been undertaken in the UK in the vicinity of such an important archaeological landscape as the Stonehenge World Heritage site.*
>
> *Since the use of a closed-face bentonite slurry based TBM method was only adopted and announced by Highways England after the Examination had started (specifically by Highways England's QC, Mr. Taylor on 23rd May 2019, well after the Highways England scheme documentation was published), it would appear that this fact, together with all the above and previously mentioned shortcomings of the investigation and design process, especially relating to ground (specifically rock) and groundwater conditions leaves many unanswered questions, and a great deal to be desired in thorough and complete understanding of a potentially extremely difficult tunnelling environment."*

2. <u>Noise and Vibration</u> (ref. NH R4.1, para. 3.3.22)

2.1. NH R4.1, para 3.3.22 states:

> "*On Noise and Vibration, the Stonehenge Alliance claim that "*the problem of potential damage to archaeological remains resulting from vibration of the tunnel boring machine was not fully resolved at the Examination stage and appears not to have been further addressed by NH in the interim*". However, section 5.13 on this topic in the Examining Authority's Recommendation Report specifically considers construction vibration effects on archaeology*

including from the Tunnel Boring Machine, with the Examining Authority concluding (in paragraph 5.13.156) that:

*"*In respect of the vibration effects that could occur the ExA are satisfied that with the appropriate mitigation in place as secured through the OEMP [Outline Environmental Management Plan] and dDCO that no significant adverse effects would occur, and that the development would comply with the requirements of the NPSNN, NPPF and local planning policies"."

2.2. Despite the assurances given by NH and taken up by the Examining Authority, no specific definitions of "appropriate mitigation" (apart from the obvious cessation of tunnelling work) have been made, specified or published.

2.3. In addition, repercussions of ground movement, through smaller scale subsidence or by catastrophic collapses to surface (i.e., with the formation or regeneration of karstic "sinkhole" features) will have enhanced effects on any surface features and artifacts.

3. <u>Geology and Soils</u> (ref. Response - Wiltshire Council, NH R4.1, Section 3.5, pp.22-28)

3.1. With reference to observations and commentary from Wiltshire County Council into deficiencies in NH's understanding of many aspects of both contaminated land and groundwater, it is the opinion of the Stonehenge Alliance (SA), and others (including the Environment Agency: see "Geology and Soils: Response – EA", NH R4.1, Section 3.8, pp. 35-43) that suitable and sufficiently detailed investigations and assessments of these areas are still significantly incomplete.

3.2. The Stonehenge Alliance claimed that this is so all through the 2019 Examination and maintains that this is still the situation.

3.3. (ref. Response - Rachel Hosier, NH R4.1, Section 3.9, pp.50-52)
Consistent with SA's hydrogeological advice presented at the 2019 Public Inquiry, Mrs. Hosier continues with her hydrogeological advice that the fundamental approach (in terms of scale, detail, data input and accuracy) of the Applicant's groundwater modelling is grossly inadequate, unfit for purpose, and of a thoroughly inappropriate scale to be of any relevance in the detail required for assessing predictions and responses to the tunnelling, grouting and dewatering that will be required and is proposed. This is especially relevant to the expected changes in recharge, yield and reliability of the existing groundwater supplies to her farm.

4. <u>Issues relating to adverse impacts of tunnelling through Chalk bedrock</u> (Ref. NH R4.1, Section 4.3, pp. 59-62)

4.1. Much interaction of diverse opinions on possible tunnelling concerns in the weak Chalk horizons along the proposed tunnel line have occurred both during the 2019 Examination and in subsequent SA submissions. Such concerns were first introduced during the 2004 A303 Stonehenge Public Inquiry by the present author.

4.2. The prime authority (and Chalk stratigraphy specialist), Professor Rory Mortimore, has been retained by Highways England (now National Highways) since the ground investigation campaign led by Halcrow in the early 2000s and during the 2004 Public Inquiry. He has been much quoted and his publications were cited by both sides at the 2019 Examination. Dr Reeves also provided evidence of

difficult Chalk tunnelling and groundwater conditions to the Planning Inspectorate at the 2004 Public Inquiry.

4.3. Dr Reeves proposed on a number of occasions during the 2019 Examination, that Professor Mortimore be invited to address the Examining Panel and give his opinions on Chalk bedrock conditions, etc. He is the only person with such extensive experience of both exploration in the Chalk of Southern England and Europe, with involvement in other significant engineering projects in these horizons, and especially with detailed knowledge of the engineering properties, geotechnical and hydrogeological concerns associated with the (relatively) recently discovered very weak Phosphatic Chalk deposits of the Salisbury Plain area.

4.4. For reasons only known to themselves, Professor Mortimore's expertise was not made available by National Highways to the Examination. Such information, in this writer's experience, would have greatly informed the Panel in areas where they were sadly lacking in such detailed expertise.

4.5. In the interests of openness and transparency relating to the understanding of the engineering properties of the Newhaven (and especially the Phosphatic) Chalk horizons, it is of considerable detriment to the planning process for this project, that Professor Mortimore was not called to give evidence to the Inspectors at the 2019 Examination.

4.6. It is proposed (once again) that Professor Mortimore's advice and opinions are made available to the Secretary of State in the progress of this current re-determination through the Secretary of State requesting such information and guidance.

5. Conclusions on alternative routes Environmental Appraisal – Bored Tunnel Extension Redetermination R4.7 and Cut and Cover Tunnel Extension R4.8

5.1. To state that during construction, "*No significant effects are anticipated*" (NH R4.7, para. 4.7.2, p.18 of 40; NH R4.8, para. 4.7.2, p.18 of 41), and that in the long term "No geology and soils impacts are predicted" (NH R4.7, para. 4.7.3, p.18 of 40; NH R4.8, para. 4.7.3, p.19 of 41) is an extremely irresponsible and naïve standpoint coming at this stage of "consultations" with National Highways for the current proposal, the Bored Tunnel Extension, or any Cut and Cover alternative.

5.2. As with the current proposal, an extended bored tunnel would significantly derogate the current groundwater flow, recharge and discharge situation especially at the western end of the proposed tunnel, as would any "cut and cover" extension. This would occur as a result of the requirement for significant and extensive surface and underground grouting regimes necessary to stabilise the very weak (and especially the Phosphatic) Chalk zones.

5.3. Such an extensive grouting regime (probably required both from surface and advanced from the tunnelling faces underground) would create a massive "Groundwater Dam", changing the whole system of groundwater flow in the Stonehenge Bottom to Longbarrow Roundabout areas.

6. Conclusion on alternative routes – Overarching response Redetermination R4.2

6.1. As stated repeatedly and consistently by SA and others, the inadequately and poorly advised National Highways and their associated consultants have significantly understated the potential financial, technical and environmental detrimental effects of the proposed A303 Amesbury to Berwick Down Scheme.

6.2. Notwithstanding the huge environmental and cultural effects on an iconic World Heritage Site that are proposed, the massive financial, environmental and project completion timeframes must be evident to anyone who takes the time to examine the extensive evidence so far submitted to the Secretary of State.

6.3. Resubmission of the same technical, environmental and planning issues (many dating back to the early 2000s) does not make the accumulated information any better, or technically sounder, to inflict such profound implications on one of Britain's most important World Heritage Sites.

7. Overall Conclusions

7.1. In all aspects of this partial re-assessment process (triggered by the Secretary of States' request for thorough-going assessments of alternatives to the original - as yet unchanged - proposals for route, tunnel and road configuration), no detailed and independent assessments of the original scheme, nor of any viable alternatives, have been properly considered by an Examining Authority of the Planning Inspectorate or presented to the Secretary of State.

7.2. We suggest that the 2019 Examining Authority would have benefitted from having on its panel a specialist in the detailed areas of geology, geotechnology, hydrogeology and especially modern, machine-based tunnelling technology. It is to be hoped that such a specialist would be employed in any further Examination of the Scheme proposals.

7.3. Although this representation has deliberately avoided discussion of the alternative proposed southern surface route F010, it has to be emphasised that in view of the difficult predicted tunnelling and groundwater conditions expected, especially along the western half of the proposed scheme, the total avoidance of construction works in the vicinity of Stonehenge would be the best practical alternative.

gmr 27.07.2

Reference Documents

'Applicant's response to the request for comments Q1, Q3–Q6 – Response document Document reference: Redetermination 4.1'

'Q2 - Conclusion on alternative routes Environmental Appraisal – Bored Tunnel Extension Redetermination 4.7 '

'Q2 - Conclusion on alternative routes Environmental Appraisal – Cut and Cover Tunnel Extension Document reference: Re-determination 4.8'

'Applicant's response to the request for comments Q2 - Conclusion on alternative routes – Overarching response Document reference: Re-determination 4.2'

Appendix

Representations by Dr George M Reeves to the 2019 Examination on behalf of the Stonehenge Alliance

REP2-131. Deadline 2 Submission - Written Representation on Flood Risk groundwater protection

REP3-064. Deadline 3 Submission - Comments on Written Representations and Additional Submissions to the Examining Authority submitted by Deadline 2 (part)

AS-045. Additional Submission accepted at the discretion of the Examining Authority - Supporting Evidence for Hearings (slide show)

REP4-087. Deadline 4 Submission - Summary of oral presentation and submissions to ISH 4 on water, geology etc. and ISH 5 on noise, vibration etc. by Dr George Reeves. FINAL - Late Submission accepted at the discretion of the Examining Authority

REP4-088. Deadline 4 Submission - Appendix 1 Presentation by Dr. GM Reeves to Session 4 A303 Stonehenge Examination, Tuesday 11th June 2019 - Late Submission accepted at the discretion of the Examining Authority. Slide show.

REP4-056. Deadline 4 Submission - Comments on any further information requested by the ExA and received to Deadline 3 (part)

REP5-024. Deadline 5 Submission - Dr George Reeves Comments on Highways England Deadline 4 Submission REP4-036- 8.31 Comments on any further information requested by the ExA and received to Deadline 3

REP6-065. Deadline 6 Submission - Response to Examining Authority's Second Round of Written Questions and information sought on various topics (part)

REP6-064. Deadline 6 Submission - Response to Examining Authority's Second Round of Written Questions and information sought on geological and groundwater issues by Dr George Reeves

REP6-086. Deadline 6 Submission - Late Submission accepted at the discretion of the Examining Authority - Response by Dr George Reeves to Applicants Comments on any further Information Requested by the Examining Authority and Received at Deadline 4.

AS-090. Additional Submission accepted at the discretion of the Examining Authority - Slide deck concerning groundwater to inform Issue Specific Hearing 8/Issue Specific Hearing 10 - Original version published on 21 August 2019 - Superseded version published on 22 August 2019

AS-098. Additional Submission accepted at the discretion of the Examining Authority - Written note and finalised slide deck to inform presentation at ISH10

REP8-051. Deadline 8 Submission - Slides for presentation by Dr Reeves at Issue Specific Hearing 10

REP8-053. Deadline 8 Submission - Written Summaries of oral submissions at Issue Specific Hearing 10

REP8-052. Deadline 8 Submission - Written Summaries of oral submissions at Issue Specific Hearing 8

REP8-054. Deadline 8 Submission - Comments on Deadline 7 Document - REP7-021 (part)

REP9-046. Deadline 9 Submission - Summary of Case (part)

REP9-045. Deadline 9 Submission - Response to Highways England Deadline 8 Documents by Dr George Reeves