

# A303 Amesbury to Berwick Down

TR010025

**Deadline 2**  
**8.10.4 Alternatives (AL.1)**

APFP Regulation 5(2)(q)

Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

May 2019



# Infrastructure Planning

Planning Act 2008

## The Infrastructure Planning (Examination Procedure)

Rules 2010

### A303 Amesbury to Berwick Down

Development Consent Order 2019

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#### Air quality and emissions (AQ.1)

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## 4 Alternatives (AL.1)

### Question AL.1.1

Having regard to paragraph 46 of the NPSNN, please identify all legal requirements relating to the assessment of alternatives applicable to this project.

### Response

1. The Applicant understands that the question refers to paragraph 4.26 and 4.27 of the National Policy Statement for National Networks ("**NPS NN**").
2. As is noted in paragraph 4.27, all projects should be subject to an options appraisal. In respect of projects within the Road Investment Strategy, such as the Scheme, option testing need not be considered by the Examining Authority or the decision maker. This is because a proportionate consideration of alternatives has been undertaken by the Applicant as part of the investment decision making process and it is not necessary for this process to be reconsidered by the Examining Authority or the decision maker, but they should be satisfied that this assessment has been undertaken. A summary of the options appraisal process for the Scheme is included in section 3 of the Case for the Scheme [APP-294].
3. Paragraph 4.26 of the NPS NN requires applicants to comply with all legal requirements and any policy requirements on the assessment of alternatives set out in the NPS NN.
4. The relevant legal requirements are as follows:

#### **EIA**

- a. The EIA Directive, implemented through the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, requires an environmental statement to include "*a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chose, taking into account the effects of the development on the environment.*". Chapter 3 of the Environmental Statement [APP-041] includes this description of the reasonable alternatives studied by the Applicant.

#### **Habitats**

- b. Under the Habitats Directive, implemented through the Conservation of Habitats and Species Regulations 2017, alternatives need only be considered if the appropriate assessment of the plan or project concludes that it would adversely affect the integrity of the European protected site in question but that the plan or project is nonetheless justified on grounds of imperative overriding public interest and there being no alternative solutions (see regulation 64).

- c. The Applicant's Habitat Regulations Assessment Likely Significant Effects Report [APP-265] concludes that an appropriate assessment of the Scheme is required. The Applicant's Habitat Regulations Assessment [APP-266], produced to inform the Secretary of State's appropriate assessment, concludes that, with mitigation, there would be no residual effects that would adversely affect the integrity of any European sites alone or in combination with other projects or plans. Consequently, in the Applicant's view the legal requirement to consider alternative solutions in the context of an imperative overriding public interest does not arise in respect of the Scheme.

### **Water Framework Directive**

- d. Where a project would cause deterioration of the status of a water body a derogation under article 4.7 of the Water Framework Directive would be required in order for that project to proceed. One of the tests relevant to the grant of a derogation requires consideration of alternatives. The Applicant's Water Framework Directive Compliance Assessment [APP-280] concludes that the Scheme will not lead to the deterioration of the status of any waterbodies, nor would it lead to delay in compliance with Water Framework Directive objectives for the relevant waterbodies and so no derogation under article 4.7 is sought. Therefore, the consideration of alternatives does not arise in the context of the Water Framework Directive.

### **Policy requirements**

- e. Consideration of the sequential and exception tests for flood risk is detailed in the Level 3 Flood Risk Assessment [APP-283], paragraphs 4.1.8 to 4.1.25. The sequential test was considered as part of the options appraisal process for the Scheme (see paragraph 2 above).
- f. The Scheme is not located within a National Park or Area of Outstanding Natural Beauty (AONB) and so the consideration of alternatives required in the context of paragraphs 5.150 to 5.153 does not arise. Chapter 7 of the Environmental Statement [APP-045] concludes that there are no adverse impacts to the landscape within the Cranborne Chase and West Wiltshire AONB Management Plan (see paragraph 7.9.136) which is within the Study Area of the Landscape and Visual Impact assessment.
- g. DCLG's guidance '*Planning Act 2008: guidance related to procedures for the compulsory acquisition of land*' paragraph 8, advises applicants to ensure that they are able to demonstrate to the Secretary of State's satisfaction that all reasonable alternatives to compulsory acquisition (including modifications to the scheme) have been explored. Section 5 of the Applicant's Statement of Reasons [APP-023] explains how the Applicant has complied with this guidance.

## Conclusion

- h. In the Applicant's view the only considerations of alternatives relevant to the examination of the Scheme are (i) under paragraph 4.27 of the NPS NN, to be satisfied that an options appraisal has taken place and (ii) under paragraph, 4.26 first bullet, in respect of the assessment of reasonable alternatives for the purposes of the EIA Directive and (iii) in respect of the alternatives to the compulsory acquisition of land.

## Question AL.1.2

Document 7.1 - Case for the scheme and NPS accordance, Appendix A, considers the scheme compliance with the NPSNN. In relation to paragraph 47 of the NPSNN it identifies the consideration given to viable modal alternatives.

Please explain in greater detail why it would be impossible for rail improvement to entirely solve the identified problems in the scheme location.

## Response

1. Paragraph 4.27 of the NPSNN is relevant to this question, which states that, "All projects should be subject to an options appraisal. The appraisal should consider viable modal alternatives and may also consider other options (in light of the paragraphs 3.23 to 3.27 of this NPS). Where projects have been subject to full options appraisal in achieving their status within Road or Rail Investment Strategies or other appropriate policies or investment plans, option testing need not be considered by the examining authority or the decision maker. For national road and rail schemes, proportionate option consideration of alternatives is undertaken as part of the investment decision making process. The Examining Authority and the decision maker should be satisfied that this assessment has been undertaken."
2. Consideration was given to alternative options to a road scheme during Project Control Framework Stage 1: Option Identification for this project, one of which was rail improvement. The outcome of this assessment is contained in Appendix 8.5 of the Transport Assessment [APP-297] and provides greater detail on why rail improvement cannot entirely solve the identified problems in the Scheme location. The submitted response to Question Tr 1.37 also provides further detail on the consideration of a rail alternative.
3. As contained in Section 8.5 of the Transport Assessment [APP-297], which summarises Appendix 8.5, a review of the extent to which rail improvements could reduce traffic volumes on the A303 Amesbury to Berwick Down has shown that hypothetically, if there were a step-change in rail services, the maximum conceivable reduction in traffic flow on A303 is 11%. An explanation of what a "step-change" would require and its feasibility is contained in the response to Question Tr 1.37. This level of modal transfer to rail would reduce the 2041 Do-Minimum forecasts flows to 31,000. This is still much higher than the flows experienced today. Therefore, the problems currently experienced on the network today would only get worse. In this context, it is clear that rail improvements alone would not solve the identified problems in the scheme location.

### Question AL.1.3

Document 7.1 - Case for the scheme and NPS accordance, Appendix A, considers the scheme compliance with the NPSNN. In relation to paragraph 46 of the NPSNN, it refers to ES Appendix 11.2 Water Framework Directive (WFD) Compliance Assessment. That assessment, paragraph 8.1.6, concludes that overall the scheme would be compliant with the requirements of the WFD.

- i. Does the EA agree that there would be no specific legal requirements within its remit with which the scheme would fail to comply? If not, please explain why?
- ii. Are there any policy requirements, for example, in relation to the flood risk sequential test that remain of concern? If so, please explain why?

### Response

1. We note that this question is directed to The Environment Agency.
2. The Water Framework Directive (WFD) Compliance Assessment [APP-280] identifies that whilst there is the potential for localised impacts from the construction of some of the Scheme elements, including the tunnel, cross-passages and piling for the River Till viaduct, these are unlikely to result in any effects which may cause a deterioration in any quality element for the waterbodies within the study area (River Till, River Wylye (Lower), River Avon (Upper) and Upper Hampshire Avon groundwater body).
3. Any localised impacts are predicted to be minimal as a result of the implementation of sensitive construction techniques and the mitigation secured through items PW-G1, PW-G5, PW-BIO1, PW-GEO2, PW-WAT1, PW-WAT2, MW-G5, MW-G7-G9, MW-G20, MW-BIO3, MW-BIO5-BIO6, MW-GEO2-GEO3, MW-GEO6-GEO8, MW-WAT1-WAT11 and MW-WAT14-WAT15 of the OEMP [APP-187].
4. The WFD Compliance Assessment also identifies that the Scheme is unlikely to prevent future attainment of the identified WFD objectives for each of the respective water bodies, both surface and groundwater. For both the Upper Hampshire Avon groundwater body and River Avon (Upper) upstream of the Nine Mile River confluence water body there are no specific River Basin Management Plan (RBMP) measures in place to achieve the WFD status objectives as these have been identified by the Environment Agency as disproportionately expensive. For the River Wylye it was concluded that none of the Scheme elements are likely to prevent the waterbody from continuing to achieve 'good' status.
5. For the River Till it was concluded that none of the Scheme elements are likely to impact measures implemented to improve the hydrological regime status of the river, thereby not affecting the future status of the water body.



6. For the River Avon (Upper) downstream of the Nine Mile River confluence, it was concluded that the Scheme elements are unlikely to have a detrimental impact on the attainment of 'good' phosphate status by 2021.
  - i. **Does the EA agree that there would be no specific legal requirements within its remit with which the scheme would fail to comply? If not, please explain why**
    7. It has been agreed between Highways England and the Environment Agency (EA) that the methodology used for the WFD Compliance Assessment is the one recommended by the EA which is appropriate and that the findings of the WFD.
    8. Compliance Assessment are also appropriate. This is set out in the Statement of Common Ground between the parties to be submitted to the Examination at Deadline 2.
  - ii. **Are there any policy requirements, for example, in relation to the flood risk sequential test that remain of concern? If so, please explain why?**
    9. The legislative and policy framework relevant to road drainage and the water environment are set out in section 11.2 of ES chapter 11 Road Drainage and the Water Environment [APP-049]. The EA has not raised any concern that the Scheme would fail to comply with any of these requirements.

## Question AL.1.4

In the light of the NPSNN, paragraph 4.27, please explain why the options appraisal carried out should be regarded as a full options appraisal and a proportionate option consideration of alternatives.

## Response

1. The Scheme Assessment Report (SAR), [REP1-023] and Technical Appraisal Report (TAR), [REP1-031] were compiled by the Applicant to describe and explain the process of options appraisal which led to the identification of the preferred route. This process followed Highways England's Project Control Framework (PCF) which is an established staged process starting with problem and opportunities identification (Stage 0), options identification (Stage 1) (see Chapter 5, Page 72, TAR [REP1-031]), and options appraisal (Stage 2) (see Chapter 6, page 98, SAR [REP1-023]). The TAR and SAR include the results of the WebTAG (online Transport Appraisal Guidance) process, which is a Department for Transport process used to inform Government funding decisions.
2. The process used during PCF Stage 1 had a number of stages (referred to as 'Design Fixes', see paragraph 5.1.1 of TAR [REP1-031]) in order to sift the large number of corridor and route options identified from historical sources (see Section 1.3, page 19, TAR [REP1-031]). This process was used due to the large and complex nature of the project to ensure that all possible options were considered in a proportionate way. These stages of appraisal are described in the remainder of the TAR (Chapter 5 onwards).
3. The SAR, prepared at PCF Stage 2, then summarises the work undertaken in Stage 0 and 1, and also describes the further work carried out in Stage 2 to select a preferred route, following further detailed appraisal. This is described in Chapter 6 (page 98) onwards [REP1-023].
4. The environmental aspects of the appraisal process are also summarised in Chapter 3 of the Environmental Statement [APP-041].
5. During Scheme development, the options were subject to public consultation as set out in Figure 2.1 of the Consultation Report [APP-026] and described in Chapter 2 of that report. This included information events in February 2016 and non-statutory consultation between January and March 2017. Statutory consultation was then undertaken between February and April 2018 and non-statutory supplementary consultation undertaken between July and August 2018.
6. The Applicant considers that the options appraisal undertaken is a full options appraisal and a proportionate option consideration of alternatives, not only following the WebTAG and PCF processes normally used to assess road schemes, but going further during PCF Stage 1 by introducing additional stages in order to take account of the number of options requiring consideration. The Applicant notes that paragraph 4.27 of the NPSNN states that it is not necessary for the Examining Authority and the decision maker to reconsider this process.

However, as evidenced above and in the SAR and TAR, the Examining Authority and decision maker can be satisfied that the assessment was undertaken.

## Question AL.1.5

The ES, Chapter 3 Assessment of alternatives, paragraph 3.1.3, refers to the Road Investment Strategy (RIS) for 2015-2020 as including proposals for dualling the A303 from Amesbury to Berwick Down with a twin-bore tunnel at least 2.9km long through the WHS. In addition, Document 7.1 - Case for the scheme and NPS accordance, Appendix A, refers to the RIS December 2015.

- i. Does that represent the latest RIS or has the RIS referred to in those documents been superseded?
- ii. Please confirm that the project retains its status within the RIS referred to or any later one?

## Response

- i. **Does that represent the latest RIS or has the RIS referred to in those documents been superseded?**
  1. The Applicant confirms that the RIS 2015-2020 is the latest version and has not been superseded.
- ii. **Please confirm that the project retains its status within the RIS referred to or any later one?**
  2. The project retains its status in the current RIS and it is currently envisaged that it will not be necessary to carry it over into the next RIS period.

## Question AL.1.6

The ES, Chapter 3 Assessment of alternatives, Table 3.1 Development of the preferred route, Stage 2, states that the three route options within Corridor D incorporating the 4.5km tunnels had costs significantly in excess of the available budget for the scheme and were therefore not considered further.

- i. Please confirm that the rejection of those options was based solely on costs grounds.
- ii. Please provide full details of the costings supporting that decision including the budget for the project at that time, the status of that budget and quantify “costs significantly in excess” in absolute and in percentage terms in comparison to the 2.9km tunnel Corridor Route D options.

## Response

- i. **Please confirm that the rejection of those options was based solely on costs grounds.**
  1. This point is addressed by Paragraph 7.4.1 in the Technical Appraisal Report (TAR) [REP1-031] which states that three of the Corridor D route options utilised a 4.5km long tunnel under the WHS. At the time, those options were assessed to generate capital costs in the region of £2 billion which were unaffordable and in excess of budget. On that basis, the options were rejected at that stage as unreasonable alternatives in favour of shorter tunnel route options which it was known (as set out below) had the potential to deliver acceptable heritage and environmental effects. Had those shorter tunnel options been unable to produce a scheme with acceptable heritage and environmental effects, the other aspects of those longer tunnel options would have been considered further. However, the shorter options were able to achieve this and so it was not necessary to revisit the longer tunnel options. The answers to AL1.29 – 32 inclusive explain the longer tunnel options that were considered in response to subsequent ICOMOS comments and explain why they were determined to be less preferable than the Scheme option by reference to a full appraisal on a range of grounds.
- ii. **Please provide full details of the costings supporting that decision including the budget for the project at that time, the status of that budget and quantify “costs significantly in excess” in absolute and in percentage terms in comparison to the 2.9km tunnel Corridor Route D options.**
  2. The £2 billion costing of a 4.5km long tunnel option was at the time based on a pro rata comparison with the estimated cost of a 2.9km long tunnel option. The budget set for the Scheme at the time was for the estimated cost of the 2.9km long tunnel option, being the basis on which the Government had announced the inclusion of the Scheme in its Road Investment Strategy at the end of 2014 (following a joint assessment by English Heritage and the National Trust which indicated that a tunnel length up to 2.9km would provide the basis for improving the A303 and delivering benefits for the WHS - <https://www.nationaltrust.org.uk/stonehenge-landscape/projects/our-ouv-impacts->

[assessments-](#)). The most likely cost estimate reported in the TAR (Table 11-5) for the 2.9km long tunnel was £1.385 billion. As such the longer 4.5km tunnel was estimated to be some £615 million more, and therefore 44% more than the 2.9km long option based on a pro-rata comparison per metre.

## Question AL.1.7

The ES, Chapter 3 Assessment of alternatives, Table 3.1: Development of preferred route: Please supply layouts showing the routes of the various options considered from Stage 1, and cost-benefit analyses for those options developed from Stage 2 onwards.

## Response

1. The following Figures in the Technical Appraisal Report (TAR) [REP1-031], provide the route of the corridors assessed in PDF Stage 1:
  - Figure 5-2 (page 75): Corridor A
  - Figure 5-3 (page 76): Corridor B
  - Figure 5-4 (page 77): Corridor C
  - Figure 5-5 (page 78): Corridor D
  - Figure 5-6 (page 79): Corridor E
  - Figure 5-7 (page 80): Corridor F north
  - Figure 5-8 (page 81): Corridor F south
  - Figure 5-9 (page 82): Corridor G
2. In addition, Figure 3 in the TAR (page 7) shows the route options within Corridor D and Figure 4 (page 9) shows the route options within Corridor F. These are shown in more detail in Appendix C of the TAR [REP1-034].
3. The economic assessment of each of the options carried forward to PCF Stage 2 is set out in Chapter 10 of the Scheme Assessment Report (SAR) [REP1-023], including the information on benefit-cost ratios.

## Question AL.1.8

The ES, Chapter 3 Assessment of alternatives, Table 3.1: Development of preferred route: Stage 1 – What are the substantial harmful impacts indicated that led to the exclusion of Corridor A?

## Response

1. The assessment of each of the route corridors is set out in paragraph 5.2.115 onwards of the Technical Appraisal Report (TAR) [REP1-031 to 038]. A summary of the conclusions of the environmental appraisal for Corridor A are set out below, relating to the substantial harmful impacts identified in Table 3.1.
2. Corridor A would have the potential to harm the setting and key assets of the World Heritage Site (WHS) due to its proximity, including Durrington Walls, and substantial harm to the Outstanding Universal Value (OUV) of the WHS was considered probable, as well as the removal of other Scheduled Monuments. Corridor A would also run through Bulford possibly requiring the demolition of listed buildings and substantially harming their setting and affecting a Conservation Area as described in Table B5.1, page I [REP1-032].



## Question AL.1.9

Please provide evidence of a detailed evaluation which supports the conclusions in [APP – 294] Table 3.1: Conclusions from route corridor assessment, that:

- i. There is limited scope for surface routes north of the WHS (within Corridor A) because of the proximity of Larkhill and Durrington.
- ii. This northern route corridor would also cause substantial harm to important heritage features such as Durrington Walls and the Outstanding Universal Value (OUV) of the WHS, and so would not deliver overall heritage benefits.
- iii. There would also be significant adverse impacts on the environment and local communities.

## Response

- i. **There is limited scope for surface routes north of the WHS (within Corridor A) because of the proximity of Larkhill and Durrington.**
  1. There are a high number of potential receptors in Larkhill and Durrington and Corridor A would bring traffic (and therefore traffic noise, emissions and visual impacts) closer to those receptors, as well as increased severance at Larkhill. Paragraph 5.2.130 of the Technical Appraisal Report (TAR) [REP1-031] refers to the landscape (visual) impacts of Corridor A on Larkhill in particular as a reason for ruling out this corridor. Please also refer to Appendix B4 (Table B4.1), B5 (Table B5.1) and B6 (Table B6.1) [REP1-033]. These references provide evidence that there is limited scope for surface routes north of the WHS (within Corridor A) because of the proximity of Larkhill and Durrington.
- ii. **This northern route corridor would also cause substantial harm to important heritage features such as Durrington Walls and the Outstanding Universal Value (OUV) of the WHS, and so would not deliver overall heritage benefits.**
  2. The northern route corridor would cause substantial harm to important heritage features such as Durrington Walls and the OUV of the WHS and would therefore not deliver overall heritage benefits due to its proximity and the potential removal of Scheduled Monuments, listed buildings at Bulford and substantial harm to their setting, as well as a Conservation Area. Paragraph 5.2.122 of the TAR [REP1-031] refers to the impacts of each Corridor on the historic environment, as does Appendix B4 (Table B4.1), B5 (Table B5.1) and B6 (Table B6.1) [REP1-033]. These references provide evidence that the northern route corridor would cause substantial harm to these important heritage features.
- iii. **There would also be significant adverse impacts on the environment and local communities.**
  3. Section 5.2 of the TAR from paragraph 5.2.115 onwards [REP1-031] and Appendix B4, B5 and B6 [REP1-033] provide evidence that there would be

significant adverse impacts on the environment and local communities caused by Corridor A. These include traffic noise, air quality and visual impacts, as well as direct and indirect impacts on heritage assets as described above.

## Question AL.1.10

The ES, Chapter 3 Assessment of alternatives, Table 3.1: Development of preferred route: It is noted that Route F010 outperformed the other two (Corridor F) options in all the assessed cases – please explain why?

## Response

1. The Technical Appraisal Report [REP1-031] explains the consideration of Scheme options. Paragraphs 6.4.11-6.4.23 explain the development of options to the south of the existing A303 corridor. Section 7.5 then sets out the assessment of the southern corridor options explaining their relative merits, as summarised in Table 3.1, Stage 2, of Chapter 3 of the Environmental Statement [APP-041].
2. Where the assessment was able to differentiate, Table AL.1.10-1 summarises how F010 was assessed to perform relative to the other corridor options. Whilst the more southerly options would not be visible from the world heritage site and option F05 was assessed as being likely to give rise to slightly fewer accidents, in all other respects where the schemes could be differentiated the performance of the F010 was assessed to be better than the alternatives. The assessment was summarised in four cases and for all the assessed cases (summarised in grey in Table AL.1.10-1 below) F010 outperformed the other options.

Table AL.1.10-1: Relative merits of southern corridor options

TAR paragraph	Measure	Summary of relative performance
7.5.25 4.1.4 to 4.1.7 App D [REP1- 034]	Client scheme requirements (CSR)	Alignment to economic growth and transport CSRs , F004 and F005 options considered to align less closely with environment and community than F010, because those options were longer and further from the existing A303 with the potential for larger adverse air quality impacts due to greater potential to increase traffic on local roads north of the A303.
7.5.26 4.1.8 to 4.1.14 App D [REP1- 034]	National and Local Policies	F010 performed slightly better against national and local policies reflecting air quality considerations, because it is the shortest of the F corridor options. The other options have a greater potential to increase pollutant concentrations due to redistribution of traffic on to local roads north of the A303
7.5.27	Strategic Case overall	Overall, in terms of the strategic case assessment, Route Option F010 was therefore found to perform best of the Corridor F options.

7.5.33, 7.5.40	Impact on the economy	Disbenefits for F010 are lower than the other two options; reflecting the longer length and journey times of the other options
7.5.42	Greenhouse gases	F010 assessed as having the lowest carbon impact, based on length of route and number of new structures
7.5.47 7.5.48	Heritage	Scale of harm on scheduled monuments least for F010. Risk of harm on unknown archaeology lower for F010 as it has the shortest length with reduced area to impact.
7.5.51	Air quality	F010 outperformed F004 and F005, because it is the shortest route. The other options have a greater potential to increase pollutant concentrations due to redistribution of traffic on to local roads.
7.5.51	WHS	F004 and F005 would not be visible from the WHS, whereas F010 is closer to the existing A303 corridor and would be visible from the southern boundary of the WHS
7.5.54 to 7.5.56	Social impacts	User benefits assessed to be higher for F010, as this route option impacted the fewest communities.
7.5.56	Community	Slight preference for F010 which impacted fewest communities
7.5.59 to 7.5.62	Distributional impacts	Slight preference for route F010, impacting fewest communities, because it is the shortest route. The other options have a greater potential to increase traffic through the villages of Durrington, Larkhill and Shrewton, where there are high concentrations of children.
7.5.63, 7.5.65	Public accounts	F010 is least costly, because the route would be shorter
7.5.66,	Costs and benefits	F010 is least costly and has the highest benefits
7.5.68	Economic Case/ Value for money assessment overall	Overall F010 is best performing route against criteria which contribute to the Economic Case
7.5.70, 7.5.71	Financial Case overall	F010 is least costly, because the route would be shorter
7.5.77	Delivery Case overall	Given reduced scale of construction, F010 is best performing

3. Further detail of the assessment is provided in Technical Appraisal Report: Appendix D Initial route option assessment (Design Fix C) [REP1-034].

## Question AL.1.11

Non statutory consultation in 2017 was limited to two Route Options, as illustrated in Figure 3.6 of [APP – 294]. A concern expressed in numerous RRs is that they were not presented with a full evaluation of alternative routes which avoided the WHS altogether, particularly of a southern route to the east of Boscombe Down, and through the Woodford Valley.

Can the Applicant point to evidence of a detailed evaluation which supports its conclusions in respect of Route F010, in particular that:

- i. The route would pass through a largely unspoilt, high quality tranquil landscape.
- ii. The route would have a much larger footprint and a greater overall impact, despite having greater benefits for the WHS.
- iii. The route would not interact effectively with the local road network.
- iv. The route would result in higher levels of rat-running traffic, adversely affecting the quality of life in local communities. It is also stated that the disbenefits for road users of having to use a longer route would offset lower construction costs.
- v. To what extent is this the case, having regard to the substantially lower capital cost of building a surface route, even one that would be somewhat longer?

## Response

1. The Consultation Report [APP-026] sets out the approach to stakeholder engagement and public consultation and explains how Highways England has complied with the pre-application consultation requirements set out in the Planning Act (2008), the Infrastructure Planning (Application: Prescribed Forms and Procedure) Regulations 2009 (APFP Regulations) and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations).
2. Chapter 1 and Chapter 2 of the Consultation Report [APP-026] describe the consultation undertaken in advance of the Preferred Route Announcement (PRA), including engagement to support the options appraisal process (2015-2016) [APP-026 para 2.1.1 to para 2.4.23], non-statutory consultation (January to March 2017) [APP-026 para 2.5.1 to para 2.5.31], and announcement of the preferred route (September 2017) [APP-026 para 2.6.1 to para 2.6.3].
3. As explained in those documents, extensive public consultation has been undertaken during the options appraisal process on a wide variety of routes, including those that avoided the WHS. It was that appraisal and consultation process that resulted in the selection of the proposed scheme.

4. The Technical Appraisal Report (TAR) [REP1-031] provides details in relation to the identification, sifting, evaluation and appraisal of route options, including the F010 option.
5. As part of the TAR [REP1-031], three routes (D061, D062 and F010) were subject to appraisal to assist in the determination of the route options to be taken forward to public consultation and further design development. The F010 option is shown within TAR Figure 5 [REP1-031]. This stage is also referred to as the 'Route Options Appraisal Stage'.
6. Evaluation of the alternative options, including the F10 route, was undertaken in accordance with the Web-based Transport Appraisal Guidance's (WebTAG) Early Assessment and Sifting Tool (EAST) and included consideration of the National Policy Statement for National Networks (NPSNN).
  - i. **The route would pass through a largely unspoilt, high quality tranquil landscape.**
7. The TAR [REP1-031] describes the landscape and visual assessment undertaken at the route options appraisal stage, including the methodology adopted. In summary, impacts on landscape were appraised following the methodology guidance presented in TAG Unit A3, Chapters 5 and 6 [REP1-031, para 18.2.17]. The study area covered the general extent of the anticipated 'Zone of Theoretical Visibility' (ZTV) of the route options within a 2km wide corridor comprising largely open agricultural land and woodland blocks and small settlements as well as the town of Amesbury [REP1-031, para 18.2.18].
8. The assessment considers each route option based on the associated engineering design and alignment and considered the impacts as at year one of opening [REP1-031, para 18.2.19].
9. The visual analysis was informed via a preliminary site survey and desk study using the ZTV plans in combination with the study of landform, aerial and "street view" images [REP1-031, para 18.2.20].
10. An overall landscape assessment of Very Large Adverse was assigned to Route Option F010 [REP1-030, para 18.3.30] and an overall landscape assessment of Moderate Adverse assigned to routes D061 and D062 [REP1-031, para 18.3.29].
11. In relation to the F010 route, the TAR Appraisal Summary Table (AST) [REP1-038] states that 'overall it is considered that this 21.5km route would affect the landscape as a result of Very Large Adverse impacts identified on the Upper Avon Narrow Chalk River Valley and Large Adverse impacts identified on the Larkhill and Winterbourne Chalk Downland and Till Narrow Chalk River Valley Landscape Character Areas. This includes the introduction of a highly visual and intrusive feature as the route is elevated and aligned against the grain of the existing landscape, and at complete variance with the landform, scale and pattern of the landscape as it passes through the Upper Avon Narrow Chalk River Valley'.

- ii. **The route would have a much larger footprint and a greater overall impact, despite having greater benefits for the WHS.**
12. At 21.5km in length, the F010 route is 8.5 km longer than the 13km proposed Scheme length. Evaluation of the impacts associated with the overall F010 footprint are considered within the TAR [REP1-031] and include the landscape issues described in (i) above along with the biodiversity and water environment issues outlined below.
  13. Impacts on biodiversity were appraised following the methodology guidance presented in TAG Unit A3, Chapter 9 [REP1-031 para 18.2.29]. The appraisal followed guidance in DMRB Volume 11, Section 3, Part 4 (Ecology and Nature Conservation) and IAN 103/10. These guidelines set out a process of identifying the value of ecological resources and then characterising the impacts that are predicted [REP1-031, para 18.2.29].
  14. The assumptions of the appraisal included a working area that extended to 75m either side of the centre line of Route Options D061, D062 and F010 (i.e. a 150m total width for each route option). The study area varied depending on the receptors considered, e.g. 2km for internationally designated sites, 1km for national and 500m for local sites and priority habitats. This distance was extended where hydrological links were present or where other potential impact pathways occur [REP1-031 para 18.2.30].
  15. Para 18.3.48 of the TAR [REP1-031] states 'Route Option F010, a proposal nearly twice as long as Route Options D061 and D062, and completely above ground, was assigned an overall assessment score of Very Large Adverse effect. This is due to the direct impacts to the River Avon SAC (encompassing the River Avon and River Till) and the River Till and River Avon System SSSIs (which overlap with the River Avon SAC).
  16. Route Option F010 would also result in impacts to two CWS, and numerous hedgerows and woodlands. The likely direct impacts that would occur are habitat change/loss; habitat severance and/or obstructions; hydrological connectivity change/loss; wildlife road fatalities; wildlife displacement; lighting; noise and vibration and pollution. Indirect impacts, such as from lighting and reduced air quality would occur to Salisbury Plain SAC & SPA; Parsonage Down SSSI & NNR; Yarnbury Castle SSSI; Salisbury Plain SSSI; Porton Meadows SSSI; five CWS and one PRV' [REP1-031, para 18.3.49].
  17. In relation to the F010 route, the TAR Appraisal Summary Table (AST) [REP1-038] states 'the two new river crossing structures would result in direct adverse impacts to the River Avon SAC (including the River Till) and River Avon System SSSIs. Additionally, the scale of this 21.5km route option would result in a significant loss of priority habitats and associated biodiversity'.
  18. In relation to water resources, the F010 route would cross 2.4km of a Source Protection Zone Category 2 [REP1-031 para 18.3.55], designated to protect groundwater resources. Within this area construction may be allowed but it is not

recommended as it can compromise the quality of water. The tunnel options avoid Source Protection Zones.

19. Further detail on the environmental impacts of F010 are presented in the answer to Question AL1.12. This includes an explanation of how the TAR sought to balance the pros and cons of the options under consideration by assessing their respective performance against the client scheme requirements, and how they align with national and local policies (Tables 9-1, 9-2, and 9-3 in the TAR). While acknowledging the benefits to the WHS of option F010, the TAR concluded [REP1-31 para 22.1.5] that, on balance, Route Options D061 and D062 would deliver a better fit against the relevant local and national planning, transport and economic policy objectives, than Route Option F010, thus providing better alignment with the scheme objectives.

iii. **The route would not interact effectively with the local road network.**

20. Section E.1 of TAR Appendix E [REP1-036] provides a Figure showing route options D061, D062 and F010, in relation to the existing road network. It can be seen that the A3028 (The Packway) and A360 run parallel to the existing alignment of the A303 through the villages of Bulford, Larkhill and Shrewton. The alignment of D061 and D062 is close to the existing alignment of the A303 and maintains the A303 connection between Countess and Longbarrow Roundabouts. The higher speed of the new road will lead to a reduction in journey times between these locations and make the A303 more attractive for movements between local communities including Amesbury, Bulford, Larkhill, Winterbourne Stoke and Shrewton. The traffic forecasts presented in Section 10 of the TAR, indicate that there is likely to be a reduction in traffic using the A3028 (The Packway) with options D061 and D062.
21. The eastern tie-in of option F010 with the existing A303 is east of Solstice Park and the existing A303 within the World Heritage Site is closed between Countess and Longbarrow Roundabouts. The longer distance and alignment of F010 make this option less attractive for local movements than D061 / D062 and it is more likely that trips making local movements, including HGV's, will use the local roads north of the A303.
22. Route option F010 therefore interacts less effectively with the local road network than D061 and D062 and is likely to increase traffic using the local road network, particularly the roads north of the A303, as shown in the traffic forecasts presented in Section 10 of the TAR.

iv. **The route would result in higher levels of rat-running traffic, adversely affecting the quality of life in local communities.**

23. As explained above, F10 is more distant from the A303 corridor and longer with the result that for this option more traffic would use the local roads through Shrewton, Larkhill and Bulford than would be the case with the tunnel options. The consequence of the additional 'rat-running' traffic adversely affecting the quality of life in local communities was then assessed as follows.



- Section 12.3.4 of the TAR sets out the Severance impact assessment for Option F010, indicating a Moderate Adverse impact for residents of Durrington, Larkill and Shrewton due to the increase in forecast traffic. Severance for options D061 and D062 was assessed as Moderate Beneficial.
  - Section 13 of the TAR sets out the Distributional impact assessment for F010 and indicates a Large Adverse impact for Severance due to the high volume of vulnerable groups in areas impacted, including Durrington and Larkhill. Severance distributional impact for options D061 and D062 was assessed as Large Beneficial.
- v. **It is also stated that the disbenefits for road users of having to use a longer route would offset lower construction costs. To what extent is this the case, having regard to the substantially lower capital cost of building a surface route, even one that would be somewhat longer ?**
24. Table 11-7 of the TAR [REP1-038] compares the monetised benefits and costs used to calculate the initial BCR for the options. The total user benefits, £204m (in 2010 prices and values), assessed for option F010 are, respectively, £343m and £428m less than Options D061 and D062. The relative costs of the options are also presented. The £642m capital construction costs estimated for surface based route, Option F010, are £271m lower than those assessed for the tunnel options. The lower benefits assessed for road users from having to use the longer route exceeded the lower construction costs for the surface route.
25. In assessing value for money of schemes a wider range of impacts is assessed and maintenance and operating costs are considered in addition to the construction costs. Table 11.9 of the TAR [REP1-038] presents the overall appraisal results. The net present value (NPV) represents the overall net difference between benefits for which a valuation is included and costs. It shows the NPV range assessed for F010 (£236-£440m) is lower, albeit overlapping with the range assessed for Options D061 (£327-£531m) and D062 (£411- £615m). This shows that, even allowing for the higher operating costs as well as construction costs of the tunnel options, the higher benefits of the tunnel options would be likely to be greater than the additional costs of constructing and operating a tunnel. Additional consideration of the wider economic benefits along the corridor described in Section 11.8 indicates that the quicker and shorter journey times delivered by the more direct options rather than F010 would increase the economic performance of the tunnelled options to a greater extent than F010.

## Question AL.1.12

The ES, Chapter 3 Assessment of alternatives, Table 3.1 Development of the preferred route, Stage 4, explains the process that led to the rejection of option F010 being taken forward as a preferred route for consultation.

- i. Please explain in detail, providing illustrative evidence, the disadvantages of Route F010.
- ii. Please provide full justification for this decision explaining the perceived greater overall environmental impact and disbenefits for road users.
- iii. How were these factors weighed in the balance against the greater benefits for the WHS that this option would have achieved?

## Response

### **i. Please explain in detail, providing illustrative evidence, the disadvantages of Route F010.**

1. The disadvantages of the F010 route are identified in detail in response to question AL.1.11 and within the TAR [REP1-31].
2. The F010 route would have a greater impact on the environment as it would create a road where one does not currently exist, running through largely undisturbed countryside and with a far larger land-take than the proposed tunnel options (D061 and D062) which largely re-uses the existing road alignment. The much longer F010 route would impact a larger number of communities close to it, including Berwick St James, Stapleford, Upper, Middle and Lower Woodford, Great Durnford and Little Durnford.
3. The environmental impacts of the F010 route, compared to the tunnel options are considered in further detail below, under the headings of landscape and visual impacts, biodiversity (including the water environment), people and communities (including noise impacts), and concluding with cultural heritage.

### **Landscape and Visual Impact**

4. The F010 route would introduce a new major highway into an undisturbed rural landscape. The impacts of the F010 route on the landscape and on views, compared to the tunnel options include:
5. The F010 route would create adverse effects to the valued landscapes of the River Avon (including a Special Landscape Area) and the River Till valleys
6. More widely, it would damage the landscape character of the countryside along its length, and damage existing views from houses, footpaths and bridleways. An overall assessment of Very Large Adverse was assigned to Route Option F010 as a result of the impacts identified on the Upper Avon Narrow Chalk River Valley character area [APP1-31, para 18.3.30].

7. The TAR [REP1-31 para 18.3.31] states 'this route option would result in a range of Slight to Very Large Adverse changes to the landscape character along its length. As the route passes through the Upper Avon Narrow Chalk River Valley, it would be elevated and aligned against the grain of the existing landscape. This would be a highly visual and intrusive feature and the potential effects would extend north and south some way along the valley due to the substantial height of the route over the valley floor, being at complete variance with the landform, scale and pattern of the landscape. This results in a Very Large Adverse effect due to impacts on visual receptors, pattern, landform and the setting of Ogbury Hill Scheduled Monument. By contrast, the tunnel options make use of an existing bridge over the River Avon, north of Amesbury with no adverse effects on the character of the river valley.
8. More widely, the southern surface route would introduce an entirely new route corridor into an existing unspoilt landscape for 21.5km, cutting across the landscape along new embankments and cuttings. There would be widespread changes to existing views from a large number of houses, as well as views from footpaths and bridleways. In contrast, by using a tunnel, by removing a section of the existing surface road, and by re-using much of the current alignment, adverse changes to existing views as a result of the tunnel options would be significantly fewer.
9. In addition to the impacts on landscape character and views described above, south of Winterbourne Stoke, the southern surface route would be just 2km from the Cranbourne Chase and West Wiltshire Downs AONB and is likely to be visible from higher ground within the AONB south of the River Wylye, with impacts on its setting.

### **Biodiversity and the Water Environment**

10. The F010 route would cross largely undisturbed countryside through a habitat mosaic of farmland, hedgerows and woodland and would require two new river crossings. The impacts of the F010 route on nature conservation and the water environment, compared to the tunnel options include:
11. The F010 route would require two crossings of the River Avon SAC (a site of European Importance), with potentially greater impacts to the European site than the tunnel options.
12. It would also lead to a greater total loss of woodlands and hedgerows than the tunnel options.
13. A Source Protection Zone for groundwater lies on the F010 route.
14. The F010 route would require a new crossing of the River Avon between Upper Woodford and Great Durnford. A new crossing of the River Avon would not be required for the tunnel options as these would use the existing bridge over the river, north of Amesbury.

15. Both the tunnel options and the F010 route would cross the River Till within the European site.
16. Within the TAR, Route Option F010 was assigned an overall assessment score of Very Large Adverse effect [REP1-31, para 18.3.48]. This is due to the direct impacts to the River Avon SAC (encompassing the River Avon and River Till) and the River Till and River Avon System SSSIs (which overlap with the River Avon SAC).
17. In relation to water resources, the F010 route would cross 2.4km of a Source Protection Zone Category 2 [REP1-031 para18.3.55], designated to protect groundwater resources. Within this area construction may be allowed but it is not recommended as it can compromise the quality of water. The tunnel options avoid Source Protection Zones.

### **People and Communities**

18. The F010 route would introduce a new major highway close to a number of small rural villages and fragment existing linkages between them and also between them and Salisbury and Amesbury.
19. A new road along the southern corridor would lead to adverse traffic noise for people living in Allington, Boscombe, Idminton, Porton, Great Durnford, Upper Woodford, Netton and Berwick St James. The tunnel options would not have adverse traffic noise impacts on these communities.
20. Within the River Till and River Avon Valleys, an extensive network of Public Rights of Way (PRoW) links the villages of Berwick St James, Stapleford, Winterbourne Stoke, Upper, Middle and Lower Woodford, Great Durnford and Little Durnford. This network provides access to the wider countryside. The F010 route would cut fourteen PRoW including six bridleways, three footpaths and five byways; substantially more than for the tunnel options. The southern surface route would also cross Sustrans national cycle route 45 north of Upper Woodford, where it follows the Avon Valley.

### **Cultural Heritage**

21. The F010 route circumnavigates the southern side of the WHS and avoids direct physical adverse impacts on the WHS. It is noted, however, that the F010 route is directly adjacent to the WHS boundary line in its southwest corner and it is likely that direct physical impacts to the southwest corner of the WHS could not be avoided.
22. Although the F010 route is sited beyond the WHS boundary, the boundary was drawn at the time of inscription to follow existing roads, land boundaries and the River Avon and does not relate to the extent of significant archaeology that may contribute to the OUV of the WHS; the F010 route lies within the setting of the WHS and could directly impact as yet unidentified archaeological remains that relate to the OUV of the WHS.

23. The F010 route would be sited within the setting of a number of barrows within the WHS that contribute to the Outstanding Universal Value (OUV) of the WHS including the Lake Down Barrow Group and several barrows at Westfield Farm and Rox Hill Clump. These barrows currently do not have a trunk road situated in close proximity, unlike the Winterbourne Stoke Barrow Group or the Normanton Down Barrow Group. The F010 route would also introduce new setting impacts to other scheduled monuments outside the WHS including Ogbury Camp Iron Age Hillfort, Heale Hill Round Barrows and barrows north-west of Little Down of national importance.
24. The construction of the F010 route would introduce a new dual carriageway trunk road into a rural landscape that includes a number of historic villages that are designated as conservation areas and / or contain listed buildings (including Berwick St James, Upper Woodford, Great Durnford, Netton, Idmiston, Porton, Boscombe and Allington). The villages of Great Durnford and Idmiston also contain Grade I listed churches.
25. The F010 route would sever historic boundaries and connections between the river valley settlements and the downs, and between closely connected historic villages (e.g. Winterbourne Stoke and Berwick St James, Upper Woodford and Lake and Upper Woodford with Great Durnford) by the introduction of new viaducts in the River Till and River Avon Valleys. Many of the villages, associated manors and estates, noted above have Anglo-Saxon origins and some are situated at fording points on the River Avon, some of which probably date from the period when Wilton (situated 5 miles (8km) to the southwest of the F010 route) was the centre of the Wilton Burghal Hidage, which gave its name to the County of Wiltshire and which was a Royal Burgh under Alfred the Great in the 9th century. A military road from Wilton, known as the Theod Herepath (the people's highway), has been speculated to have crossed the River Avon in the vicinity of Lower Woodford.
26. Data from the Wiltshire and Swindon Historic Environment Record (WSHER) suggests the F010 route would directly physically impact a number of undated enclosures, settlements and associated field systems immediately to the south of the WHS. Although these may date from the later prehistoric or Romano-British period, within the WHS very little evidence for early or later prehistoric settlement has been uncovered, and therefore, apart from use for later prehistoric field systems, the WHS appears to have been avoided and not used for prehistoric settlement (apart from perhaps at its northeast corner at Durrington Walls, close to the River Avon). The 'landscape of the dead' within the WHS, would have been sustained by its counterpoint, or 'landscape of the living' outside of the WHS, which would have built and venerated it. The F010 route, with its large greenfield landtake and route across the fertile valleys of the Rivers Till, Avon and Bourne, would be expected to be more detrimental to archaeological remains associated with the 'landscape of the living' where they survive, as compared to the tunnel options.

27. The F010 route has not been subject to systematic archaeological evaluation and is likely to contain further previously unidentified prehistoric or later remains of national importance and/or remains that may contribute to the OUV of the WHS, whereas the tunnel options are situated within a landscape that is relatively well understood archaeologically and has been the subject of previous systematic archaeological investigations.

**ii. Please provide full justification for this decision explaining the perceived greater overall environmental impact and disbenefits for road users.**

28. The conclusions are summarised in Table 3.1, Stage 4 of Chapter 3 of the Environmental Statement [APP-041] which states that, on balance, tunnel options D061 and D062 performed better than option F010 in terms of the assessed impacts. Key differentiators were F010 being a significantly longer route which would pass through a largely unspoilt, high quality, tranquil landscape with an additional crossing of the River Avon Special Area of Conservation (SAC). It would have a much larger footprint and a greater overall environmental impact, despite having greater benefits for the WHS. There would be disbenefits for road users having to travel on a longer F010 route, offsetting lower construction costs. F010 would also not interact effectively with the local road network, leaving higher levels of rat-running traffic adversely affecting the quality of life in local communities.
29. The response to written question AL.1.11 details the main differences in performance of the F010 option. Concluding from a summary of the differences in performance between the three route options, Chapter 22 of the TAR explains that the two tunnelled options performed better than F010. It also explains that since there was insufficient difference in performance between them both would be taken forward for public consultation and further appraisal.

**iii. How were these factors weighed in the balance against the greater benefits for the WHS that this option would have achieved?**

30. Overall, the TAR [REP1-31 para 22.1.13] recognises that option F010 would have a Large beneficial effect on the WHS, compared to slight/moderate beneficial effects for the tunnel options. However the TAR also recognises [REP1-31 paras 22.1.12 and 22.1.14] that the tunnel options perform better than F010 with regard to impacts on landscape, biodiversity and the water environment.
31. In addition, the TAR identified that there would be disbenefits for road users having to travel on a longer F010 route, offsetting lower construction costs. F010 would also not interact effectively with the local road network, leaving higher levels of rat-running traffic adversely affecting the quality of life in local communities.
32. The TAR sought to balance the pros and cons of the options under consideration by assessing their respective performance against the client scheme requirements (CSRs), and how they align with national and local policies (Tables

9-1, 9-2, and 9-3 in the TAR, replicated below). Route options were scored against each CSR and policy objective using the following three point Red-Amber-Green (RAG) scale:

3	Strong alignment. Route option makes a substantial positive contribution towards meeting relevant objectives.
2	Moderate alignment. Route option makes some contribution towards meeting relevant objectives.
1	Weak alignment. Route option makes little or no contribution towards meeting relevant objectives.

**Table 9-1 Client Scheme Requirements summary table**

Document	Client Scheme Requirements	D061	D062	F010
Client Scheme Requirements	Transport: to create a high quality route that resolves current and predicted traffic problems and contributes towards the creation of an Expressway between London and the South West	3	3	2
	Economic growth: in combination with other schemes on the route, to enable growth in jobs and housing by providing a free flowing and reliable connection between the East and the South West peninsula	3	3	2
	Cultural heritage: to contribute to the conservation and enhancement of the WHS by improving access both within and to the site	2	2	3
	Environment and community: to contribute to the enhancement of the historic landscape within the WHS, to improve biodiversity along the route, and to provide a positive legacy to communities adjoining the road	3	3	2

**Table 9-2 National policy summary table**

Document	Relevant objectives	D061	D062	F010
National Policy Statement for National Networks (NPSNN)	Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs	3	3	2
	Networks which support and improve journey quality, reliability and safety	3	3	2
	Networks which support the delivery of environmental goals and the move to a low carbon economy	1	1	1
	Networks which join up our communities and link effectively to each other	3	3	1
Road Investment Strategy: for the 2015/16 – 2019/2020 Road Period (RIS1)	Making the network safer	3	3	2
	Improving user satisfaction	3	3	2
	Supporting the smooth flow of traffic	3	3	2
	Encouraging economic growth by working to minimise delay	3	3	2
	Delivering better environmental outcomes	2	2	2
	Helping cyclists, pedestrians and other vulnerable users	3	3	2



**Table 9-3 Local policy summary table**

Document	Relevant objectives	D061	D062	F010
Wiltshire Core Strategy	Strategic Objective 1: Delivering a thriving economy	3	3	2
	Strategic Objective 4: Helping to build resilient communities	3	3	2
	Strategic Objective 5: Protecting and enhancing the natural, historic and built environment	2	2	2
	Strategic Objective 6: Ensuring that adequate infrastructure is in place to support our communities	2	2	1
	Core Policy 4: Spatial strategy for the Amesbury Community Area	2	2	2
	Core Policy 6: Stonehenge	2	2	3
	Core Policy 59: The WHS and its setting	2	2	3
Wiltshire Local Transport Plan	Support economic growth	3	3	2
	Reduce carbon emissions	1	1	1
	Contribute to better safety, security and health	3	3	2
	Promote equality of opportunity	2	2	2
	Improve quality of life and promote a healthy natural environment	2	2	2
WHS Management Plan	Aim 3: Sustain the OUV of the WHS through the conservation and enhancement of the Site and its attributes of OUV.	2	2	3
	Aim 6: Reduce significantly the negative impacts of roads and traffic on the WHS and its attributes of OUV and increase sustainable access to the WHS.	2	2	3
Swindon and Wiltshire LEP, Strategic Economic Plan	Transport infrastructure improvements: we need a well-connected, reliable and resilient transport system to support economic and planned development growth at key locations	3	3	2
	Place shaping: we need to deliver the infrastructure required to deliver our planned growth and regenerate our City and Town Centres, and improve our visitor and cultural offer	3	3	2

33. Consequently, while acknowledging the benefits to the WHS of option F010, the TAR concluded [REP1-31 para 22.1.5] that, on balance, Route Options D061 and D062 would deliver a better fit against the relevant local and national planning, transport and economic policy objectives, than Route Option F010, and thus they would achieve the scheme objectives more effectively.

## Question AL.1.13

Section 11.11 of the HE Technical Appraisal Report 2017 (<https://highwaysengland.citizenspace.com/cip/a303-stonehenge/results/sar-volume-1.pdf>) sets out the economic assessment conclusions in respect of the assessment of the tunnelled options and F010 (surface route through the Woodford Valley). Taking into account impacts on the WHS and the wider non-monetised landscape and environmental impacts, Table 11-17 demonstrates that there is very little if anything to choose between the tunnelled routes through the WHS and the surface route (Option F010) as regards the Benefit/Costs Ratio of the schemes. Option F010 appears to perform as well or marginally better than the tunnelled options.

Please provide further details of the key determinants that led to the selection of the preferred route and the elimination of route Option F010 from further consideration including the matters identified in ES Chapter 7.1 Table 3-2.

## Response

1. Paragraph 11.11.7 of the Technical Appraisal Report (TAR) [REP1-031] concludes in respect of Table 11-17 that 'the BCRs for the options are similar'. The Benefit/Costs Ratio sets out monetised benefits and costs of the scheme. Section 20 of the TAR explains the overall assessment of both monetised and non-monetised impacts to inform the overall assessment of the route options.
2. We assume the question refers to Table 3.1 in Chapter 3 of the ES. The assessment conclusions are summarised in Table 3.1, Stage 4 of Chapter 3 of the Environmental Statement [APP-041] which states that, on balance, tunnel options D061 and D062 performed better than option F010 in terms of the assessed impacts. Key differentiators were F010 being a significantly longer route which would pass through a largely unspoilt, high quality, tranquil landscape with an additional crossing of the River Avon Special Area of Conservation (SAC). It would have a much larger footprint and a greater overall environmental impact, despite having greater benefits for the WHS. There would be disbenefits for road users having to travel on a longer F010 route, offsetting lower construction costs. F010 would also not interact effectively with the local road network, leaving higher levels of rat-running traffic adversely affecting the quality of life in local communities.
3. The response to written questions AL.1.11 and AL1.12 further explain the main differences in performance of the F010 and tunnel options.
4. The TAR sought to balance the benefits and disbenefits of the options under consideration by assessing their respective performance against the client scheme requirements (CSRs), and how they align with national and local policies (Tables 9-1, 9-2, and 9-3 in the TAR, replicated below). Route options were scored against each CSR and policy objective using the following three point Red-Amber-Green (RAG) scale:

3	Strong alignment. Route option makes a substantial positive contribution towards meeting relevant objectives.
2	Moderate alignment. Route option makes some contribution towards meeting relevant objectives.
1	Weak alignment. Route option makes little or no contribution towards meeting relevant objectives.

Table 9-1 Client Scheme Requirements summary table

Document	Client Scheme Requirements	D061	D062	F010
Client Scheme Requirements	Transport: to create a high quality route that resolves current and predicted traffic problems and contributes towards the creation of an Expressway between London and the South West	3	3	2
	Economic growth: in combination with other schemes on the route, to enable growth in jobs and housing by providing a free flowing and reliable connection between the East and the South West peninsula	3	3	2
	Cultural heritage: to contribute to the conservation and enhancement of the WHS by improving access both within and to the site	2	2	3
	Environment and community: to contribute to the enhancement of the historic landscape within the WHS, to improve biodiversity along the route, and to provide a positive legacy to communities adjoining the road	3	3	2

Table 9-2 National policy summary table

Document	Relevant objectives	D061	D062	F010
National Policy Statement for National Networks (NPSNN)	Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs	3	3	2
	Networks which support and improve journey quality, reliability and safety	3	3	2
	Networks which support the delivery of environmental goals and the move to a low carbon economy	1	1	1
	Networks which join up our communities and link effectively to each other	3	3	1
Road Investment Strategy: for the 2015/16 – 2019/2020 Road Period (RIS1)	Making the network safer	3	3	2
	Improving user satisfaction	3	3	2
	Supporting the smooth flow of traffic	3	3	2
	Encouraging economic growth by working to minimise delay	3	3	2
	Delivering better environmental outcomes	2	2	2
	Helping cyclists, pedestrians and other vulnerable users	3	3	2

**Table 9-3 Local policy summary table**

Document	Relevant objectives	D061	D062	F010
Wiltshire Core Strategy	Strategic Objective 1: Delivering a thriving economy	3	3	2
	Strategic Objective 4: Helping to build resilient communities	3	3	2
	Strategic Objective 5: Protecting and enhancing the natural, historic and built environment	2	2	2
	Strategic Objective 6: Ensuring that adequate infrastructure is in place to support our communities	2	2	1
	Core Policy 4: Spatial strategy for the Amesbury Community Area	2	2	2
	Core Policy 6: Stonehenge	2	2	3
	Core Policy 59: The WHS and its setting	2	2	3
Wiltshire Local Transport Plan	Support economic growth	3	3	2
	Reduce carbon emissions	1	1	1
	Contribute to better safety, security and health	3	3	2
	Promote equality of opportunity	2	2	2
	Improve quality of life and promote a healthy natural environment	2	2	2
WHS Management Plan	Aim 3: Sustain the OUV of the WHS through the conservation and enhancement of the Site and its attributes of OUV.	2	2	3
	Aim 6: Reduce significantly the negative impacts of roads and traffic on the WHS and its attributes of OUV and increase sustainable access to the WHS.	2	2	3
Swindon and Wiltshire LEP, Strategic Economic Plan	Transport infrastructure improvements: we need a well-connected, reliable and resilient transport system to support economic and planned development growth at key locations	3	3	2
	Place shaping: we need to deliver the infrastructure required to deliver our planned growth and regenerate our City and Town Centres, and improve our visitor and cultural offer	3	3	2

5. Consequently, while acknowledging the benefits to the WHS of option F010, the TAR concluded [REP1-31 para 22.1.5] that, on balance, Route Options D061 and D062 would deliver a better fit against the relevant local and national planning, transport and economic policy objectives, than Route Option F010, and thus they would achieve the scheme objectives more effectively.

## Question AL.1.14

Would F010 and other routes which avoid the WHS permit the proposed removal of motorised vehicles (apart from those using private means of access) from the route of the existing A303 through the WHS, and the perceived benefits of connectivity within the WHS?

## Response

1. At the time the tunnel options D061 and D062 were selected in preference to option F010, it was assumed that all the options included the removal of motorised vehicles from the route of the existing A303 through the WHS.
2. Highways England did raise concern that the longer F10 diversion route, and the associated increased local journey times and impacts on affected communities, may lead local communities to petition for the old A303 to be retained for local access. However, this was not a determining factor in the selection of the tunnelled options as the preferred options for consultation at that time, and all routes were considered to permit the proposed removal of motorised vehicles and the comparison of route options was conducted on this basis.

## Question AL.1.15

Please provide evidence of a detailed evaluation which supports the conclusion that a route in Corridor G (south of Salisbury) would lead to substantially increased habitat loss and severance compared to other corridors, would fail to reduce journey times for use of the A303 and therefore would not meet the objectives of the scheme?

## Response

1. Paragraphs 5.2.1 to 5.2.9 of the Technical Appraisal Report [REP1-031] describe how appraisal at 'Design Fix A' was undertaken to provide a high level assessment of all historical routes against the Client Scheme Requirements, discarding routes that:
  - "Would clearly fail to meet the key objectives identified for the scheme.
  - Do not fit with existing local, regional and national programmes and strategies, and do not fit with wider Government priorities.
  - Would be unlikely to pass any of the following key viability and acceptability criteria (or represent significant risk):]
    - Deliverable in a particular economic, environmental, geographical or social context e.g. options which would result in severe adverse environmental impacts which cannot be mitigated or where the cost of doing so is too high.
    - Technically sound.
    - Financially affordable.
2. Acceptable to stakeholders and the public." (paragraph 5.2.3)
3. The appraisal also included an assessment of the corridors against National Networks National Policy Statement (NN NPS) objectives and the Early Assessment Sifting Tool (EAST) based on WebTAG (described in paragraph 5.2.29 to 5.2.121 of the TAR [REP1-031]).
4. The EAST uses a five-point scoring system based on the five cases used in a business case (strategic, value for money, managerial, financial and commercial). This methodology therefore considers every aspect of each Corridor option, including environmental criteria, to provide a detailed appraisal.
5. Please refer to paragraph 5.2.115 onwards of the Technical Appraisal Report [REP1-031], together with Appendix B4 (Table B4.8) [REP1-033], Appendix B5 (Table B5.8) [REP1-033] and Appendix B6 (Table B6.8) [REP1-033] which contain an evaluation of the various Corridor options. In particular, paragraph 5.2.128 [REP1-031] and Table B5.8 'Biodiversity' [REP1-033] refer to the impacts of Corridor G on biodiversity. Paragraph 5.1.145 to 147 [REP1-031] compares the corridors in terms of severance. Journey time reliability is referred to in Table B6.8 [REP1-033] under 'Economic Case' 'Connectivity'.

## Question AL.1.16

The ES, Chapter 3 Assessment of alternatives, Table 3.1 Development of the preferred route, Stage 5, explains the process for the identification of the Preferred Route in the light of the public consultation, key engineering and environmental topics, and the results of further geophysical surveys.

- i. Please explain and provide details of the potential harm to the attributes of the OUV of the WHS and impacts on the fabric and setting of important archaeological remains that were identified at that time as being associated with Option 1Nd.
- ii. Please provide details of the consultation responses that led to the further modification of Option 1Nd through the western part of the WHS.
- iii. Explain how the alterations that were made in response to that consultation would mitigate the anticipated impacts on archaeology, the winter solstice alignment and the Normanton Down RSPB reserve.

## Response

- i. **Please explain and provide details of the potential harm to the attributes of the OUV of the WHS and impacts on the fabric and setting of important archaeological remains that were identified at that time as being associated with Option 1Nd.**
  1. The potential impact to the attributes of the OUV of the WHS is as set out in Section 5.4, Table 10 (and also in Table 2 where Table 10 states that the impact would be the same as Option 1Na) of the Scheme Assessment Report (SAR) - Volume 7 Historic Environment - Appendix E [Deadline 1 Submission REP1-029] provided at Preferred Route Announcement. The following details the impacts and resultant effects on each Attribute that conveys the OUV of the WHS from Option 1Nd:
    - Attribute 1 (Stonehenge itself as a globally famous and iconic monument): Option 1Nd is assessed as having a Major Beneficial impact and resulting in a Very Large Beneficial effect.
    - Attribute 2 (The physical remains of the Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape): Option 1Nd is assessed as having a Minor Adverse impact and resulting in a Moderate Adverse effect.
    - Attribute 3 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape): Option 1Nd is assessed as having a Minor Adverse impact resulting in a Slight / Moderate Adverse effect.
    - Attribute 4 (The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy): Option 1Nd is assessed as having a Moderate / Large Beneficial impact resulting in a Very Large Beneficial effect.

- Attribute 5 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other): Option 1Nd is assessed as having a Minor Beneficial impact resulting in a Moderate Beneficial effect.
  - Attribute 6 (The disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other monuments and sites of the period, which together form a landscape without parallel): Option 1Nd is assessed as having a Minor Beneficial impact resulting in a Slight / Moderate Beneficial effect.
  - Attribute 7 (the influence of the remains of the Neolithic and Bronze Age funerary and ceremonial monuments and their landscape setting on architects, artists, historians, archaeologists and others): Option 1Nd is assessed as having a Moderate Beneficial Impact and resulting in a Large Beneficial Effect.
2. In relation to the integrity and authenticity of the WHS, this is as set out in Section 5.4, Table 11 (and also in Table 3 where Table 11 states that the impact would be the same as Option 1Na) of the SAR provided at Preferred Route Announcement. The following details the impacts and resultant effects on Integrity and Authenticity from Option 1Nd:
- Integrity – Option 1Nd is assessed to have a Minor Beneficial impact resulting in a Moderate Beneficial effect.
  - Authenticity – Option 1Nd is assessed to have No change resulting in a Neutral effect.

Table 12 in Scheme Assessment Report - Volume 7 - Appendix E [Deadline 1 Submission REP1-029] outlines the summary of the OUV assessment:

Attribute	Impact Score	Resultant Effect
Stonehenge itself as a globally famous and iconic monument.	Major Beneficial Change	Very Large Beneficial Effect
The physical remains of the Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape.	Minor Adverse Change	Moderate Adverse Effect
The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape.	Minor Adverse Change	Slight / Moderate Adverse Effect
The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy.	Moderate / Large Beneficial Change	Very Large Beneficial Effect
The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other.	Minor Beneficial Change	Moderate Beneficial Effect
The disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other monuments and sites of the period, which	Minor Beneficial Change	Moderate Beneficial Effect



Attribute	Impact Score	Resultant Effect
together form a landscape without parallel.		
The influence of the remains of the Neolithic and Bronze Age funerary and ceremonial monuments and their landscape setting on architects, artists, historians, archaeologists and others.	Moderate Beneficial Change	Large Beneficial Effect
Integrity	Minor Beneficial Change	Moderate Beneficial Effect
Authenticity	No change	Neutral
<b>Overall impact of Route Option 1Nd on OUV</b>	<b>Minor / Moderate Beneficial Change</b>	<b>Moderate / Large Beneficial Effect</b>

3. With regards to the impacts on the fabric and setting of important archaeological remains of Option 1Nd, this is as set out in Section 5 of the SAR (Volume 7 - Appendix E) [REP1-029] provided at Preferred Route Announcement.

A range of benefits for important monuments in the WHS are reported including:

- a. Reconnecting the Avenue and removing the current severance from the A303.
  - b. Removing the visual and aural presence of traffic from Stonehenge and its immediate environs substantially enhancing the setting and appreciation of the iconic monument and a large number of associated monuments in its immediate environs;
  - c. Removing the severance on King Barrow Ridge and enabling the reconnection of the two important barrow groups on the ridge (Old King Barrows and New King Barrows) with monuments and the landscape to the south; and
  - d. Removing the visual presence of traffic from views across the defined topographic bowl around Stonehenge and between monuments within and on the edge of that area.
4. Paragraph 5.1.4 states that the western portal emergence point would lie northwest of Normanton Gorse in a cutting. The emergence point would lie north of the Normanton Down Barrow Group in proximity to an important cluster of scheduled barrows, including a long barrow which forms part of a wider group of related monuments.
5. Paragraph 5.1.5 states that the 300m cut-and-cover tunnel extension would reduce the impact on the setting of the Normanton Down Barrow Group and other scheduled monuments. A single scheduled round barrow (Wilsford G1) would lie close to land required for construction but it was assumed that works would not result in its removal; its setting would be subject to significant impacts. The emergence point would lie close to the valley base, which would reduce the size of the visible cutting but it would still be very noticeable in eastward views from the Winterbourne Stoke Crossroads Barrows.

6. Paragraph 5.1.6 of the report outlines that the route would be in a c. 5-8m deep cutting, obscuring traffic in tangential views, although the route would lie close to a number of scheduled barrows. Vehicles would also be clearly seen from areas of the Normanton Down Barrows (although some screening would be afforded by Normanton Gorse) and the western end of the Winterbourne Stoke Crossroads Barrows. There would also be impacts on the setting of the long barrow and associated monument at the northern end of the Normanton Down Barrows.
7. The report notes in paragraph 5.1.7 that there would be significant views down the trace, with traffic, from the Winterbourne Stoke Crossroads Barrows. The Winterbourne Stoke Clump fractures these views, but visual intrusion is still anticipated. The route remains in cutting under the proposed A360 junction.
8. Paragraph 5.1.8 notes that the junction location with new slip roads would enable the removal of the existing junction beside the Winterbourne Stoke Crossroads Barrows. The new junction would however be clearly visible from the group, and other monuments in the wider landscape.
9. The report also highlights in paragraph 5.1.9 that the option would affect visual and physical relationships between a known cluster of nine Neolithic long barrows spread across the landscape in the area. It notes that Option 1Nd would not sever the relationship between two identified long barrows, as located during the options assessment at Stage 2 by geophysical survey and trial trenching to the south of the A303 and east of the A360, but it would, however, sever the relationships between the Winterbourne Stoke long barrow and the three barrows just south of the A303, (within the Diamond Group); as well as being a new element in views west from the long barrow at the northern end of the Normanton Down Group.
10. Paragraph 5.10 states that the construction of the route would have a physical impact on Bronze Age field systems adjacent to the A360 and A303 and on as yet undiscovered Prehistoric remains. West of the A360, the main route, junction and link roads to the A360 would have a physical impact on Prehistoric, Roman and possible medieval / post-medieval settlement and agricultural remains. In particular, it may affect remains of a Bronze Age settlement northwest of the Winterbourne Stoke Long Barrow and may impact on several suspected round barrows south of the A303 and north-east of Oatlands Hill.
11. Paragraph 5.11 states that Option 1Nd would also have impacts on the setting of scheduled barrow groups to the north of Winterbourne Stoke.
12. Section 5.2 and Appendix B set out the likely impacts on key monument groups and other heritage assets thought to be the case at preferred route announcement stage. Table 9 summarises some of the impacts on key monument groups and other assets. This includes:
  - A Major Beneficial impact on Stonehenge
  - A Slight / Moderate Adverse impact on the Winterbourne Stoke Crossroads Barrows

- A Slight / Moderate Adverse impact on the Normanton Down Barrows
  - A Neutral effect on the Lake Barrows.
13. The table also states for other scheduled and nationally-important assets (to the south of the A303 and to the east of the tunnel emergence point) that there would be moderate / major adverse impacts on their setting, including a scheduled long barrow and the Wilsford Shaft. It states that while the cutting would reduce visibility in tangential views, the road and traffic would still be a notable presence in the setting of these features. It would also sever physical relationships relating to these monuments and other monuments. It notes that there would be lesser impacts on monuments further to the south.
- i. **Please provide details of the consultation responses that led to the further modification of Option 1Nd through the western part of the WHS.**
14. The details of the consultation responses that led to the further modification (development) of Option 1Nd through the western part of the WHS from the non-statutory consultation in 2017 are contained in Chapter 5 of the A303 Stonehenge: Amesbury to Berwick Down - Report on Public Consultation submitted with these question responses at Deadline 2. Chapter 6 (Section 6.2, Table 6-1) then summarises the key considerations arising from the consultation which informed the modification of Option 1N (presented at the 2017 consultation) into Option 1Nd and its choice as the preferred route. The key considerations relating to the western part of the WHS, emerging from responses provided by Historic England, Wiltshire Council, English Heritage Trust and the National Trust, are listed below:
- Impacts on the Attributes that convey the OUV of the WHS, arising from impacts of the western tunnel portal and new road on the integrity of the Neolithic and Bronze Age funerary landscape (particularly the new long barrows discovered during Stage 2 to the south of the A303 and east of the A360 (now part of the Diamond Group), with its unique concentration and disposition of Barrow Groups.
  - Impacts on the winter solstice sunset alignment viewed from Stonehenge, as the single most important sightline in the WHS.
  - Damage to previously undiscovered buried archaeological remains.
  - Impact on the RSPB nature reserves.
  - Impacts arising from the possible junction location for the A303 and the A360 adjacent to the WHS.
15. These key considerations informed the subsequent development and sifting of modifications to the route options presented for consultation, as set out in Chapter 6 of the Scheme Assessment Report (SAR)[REP1-023]. The assessment of those sifted, modified options was then set out in the SAR,

informing the choice of Option 1Nd as the preferred route running on an alignment closely parallel to the existing A303 through the western part of the WHS.

- ii. **Explain how the alterations that were made in response to that consultation would mitigate the anticipated impacts on archaeology, the winter solstice alignment and the Normanton Down RSPB reserve.**
16. The alterations avoided bisecting the two newly discovered long barrows within the Diamond Group and splitting the group in half.
  17. Moving the western portal location north from its position as indicated in route options 1Na and 1Sa (SAR - Volume 7 - Appendix E [Deadline 1 Submission REP1-029, Figure 9] avoids the impacts of the route alignment on the winter solstice sunset as viewed from Stonehenge. Moving the western portal location north from its position as indicated in route options 1Na and 1Sa to its position at option 1Nd avoids impacts on the Normanton Down RSPB reserve, which would have been situated close to the portal (in options 1Na and 1Sa) on its southeast side. Moving the alignment close to the existing A303 increased the distance from the western portal to the RSPB reserve to 720m, which would minimise the risk of disturbance to stone curlews during construction. The road would be in cutting and out of sight of the RSPB reserve.

## Question AL.1.17

The ES, Chapter 3 Assessment of alternatives, paragraph 3.3.1 explains that five options remained under consideration at statutory consultation held between February 2018 and April 2018. Table 3.4: Western portal approach options compares the two options presented for the approach to the western portal.

- i. Please explain why the grass slopes option was considered to be less preferable in terms of OUV impact with particular regard to Winterbourne Stoke crossroads barrow group.
- ii. Please explain the assumptions made in relation to visibility of signage and buildings.

## Response

- i. **Please explain why the grass slopes option was considered to be less preferable in terms of OUV impact with particular regard to Winterbourne Stoke crossroads barrow group.**
  1. The grassed slope option was considered to be less preferable with regard to OUV for two primary reasons:
    - a. The comparatively wider footprint of the option would require greater landtake from within the WHS, resulting in the potential loss of archaeological remains over a wider area, therefore having potentially greater adverse effects on OUV.
    - b. There was considered to be little difference between both options when considering the physical severance affecting the Winterbourne Stoke Barrow Group and other barrow groups, including the Lake Barrow Group and components of the 'Diamond Group' of Neolithic and Bronze Age monuments. However, when considering the key views between these groups, which contribute to the OUV of the WHS, the retained cutting was considered preferential, as the Scheme would be concealed more effectively within the landscape when viewed between these locations than with full grass slopes. This is primarily due to the reduced footprint and limited grassed slope above the retained wall which would ensure that, in views from both the north and south, the top of the wall is not visible.
  - ii. **Please explain the assumptions made in relation to visibility of signage and buildings.**
    2. It was assumed that signage and buildings would be designed for minimal visual impact and would not be visible from key barrow groups. For example, no signs would be set higher than the top of the cutting and all signage would be unlit (OEMP ref D-CH8 [APP-187]). Tunnel service buildings would be located adjacent to the western portal and would therefore be concealed within the deepest part of the cutting approach.

## Question AL.1.18

The ES, Chapter 3 Assessment of alternatives, Table 3.5: Western portal canopy options – please explain what buildings are proposed in association with the canopy, their size, form, location, use and relationship to the canopy and retaining walls.

## Response

1. The building referred to in Table 3.5 of Chapter 3 of the Environmental Statement [APP-041] is the west tunnel services building. This is referred to in Schedule 1 (Work no. 1D (iii)) of the draft DCO [APP-020]. There will be a similar tunnel services building adjacent to the east portal, as referred to in Schedule 1 (Work no. 1G (ii)) of the draft DCO [APP-020].
2. The position of the tunnel services buildings in association with the canopy and retaining walls is shown indicatively in Engineering Section Drawings (Plan and Profiles) [APP-010] sheet 6 (west building) at approximately chainage 7100 and sheet 8 (east building) at approximately chainage 10600 and sheets 7, 8, 10 and 11 of the Structures Drawings [APP-017].
3. As noted in section 5.1 of the DCO Signposting document (work number 1D.iii, p5-15) [AS-009], the tunnel service buildings will be below existing ground level; there will be one located at each end of the tunnel, close to the tunnel portals; and they will be used to house apparatus and equipment supporting the operation of the tunnel, including transformers, switch rooms, power supply, back up generators, pumps and sumps, fire fighting systems, communications, emergency service controls and welfare facilities.
4. The exact size, form and use of the buildings will be established during the detailed design phase; however, for assessment purposes the following assumptions have been made:
  - a. The west tunnel services building is assumed to be set back into the north side of the deep cutting, with only the front face visible from the carriageway.
  - b. The east tunnel services building is assumed to be set back into the south side of the tunnel approach cutting, with only the front face visible from the carriageway.
  - c. The buildings are assumed to be approximately 180m long and 10m deep, with an internal headroom of 4.5m.

## Question AL.1.19

The ES, Chapter 3 Assessment of alternatives, paragraph 3.3.12, explains that three changes were presented for consideration at the supplementary consultation held between 17 July and 14 August 2018 and decisions were subsequently made in relation to those options. In relation to the proposed modification of the Rollestone crossroads:

- i. Explain in further detail why it would be necessary to reconfigure the junction at Rollestone Corner to accommodate the high load route.
- ii. In relation to the impact on the WHS, please explain the proposed boundary review process and why it is considered reasonable to place reliance upon that review being implemented.
- iii. Given that Option 2 would entail new land take within the WHS explain how it can be claimed that it would have a lesser impact on the integrity and authenticity of the WHS than Option 1 which entails only minor works within the WHS?

## Response

- i. **Explain in further detail why it would be necessary to reconfigure the junction at Rollestone Corner to accommodate the high load route.**
  1. The proposed tunnel would not accommodate high load vehicles. The diversion route would be via Rollestone Junction (see Environmental Statement Chapter 2 [APP-040] paragraph 2.3.63 and 2.3.64). Such loads are typically carried on long vehicles and the existing Rollestone crossroads is not suitable for such vehicles. The proposed new layout at Rollestone crossroads (see Works Plans [APP-008] Sheet 13 of 15 and the Engineering Section Drawings (Plan and Profiles) [APP-010] Sheet 13 of 24) would accommodate long vehicles safely. In addition, the proposed new layout alters the traffic flow priorities, discouraging rat running through Shrewton.
- ii. **In relation to the impact on the WHS, please explain the proposed boundary review process and why it is considered reasonable to place reliance upon that review being implemented.**
  2. The WHS boundary review is currently being progressed by the Stonehenge and Avebury WHS Coordination Unit. With reference to how far the boundary review has progressed, the Department for Culture, Media and Sport (DCMS) State of Conservation Report 2019 [REP1-015] notes that a World Heritage Property Setting Study is currently being commissioned by the Stonehenge and Avebury WHS Coordination Unit. Work had not commenced by the time of the submission of the Scheme's Heritage Impact Assessment (HIA) and so relevant information from it could not be included. After the World Heritage Property Setting Study has been completed, the boundary review at Stonehenge will be progressed.

3. The boundary review is an aim, policy and action in the Stonehenge and Avebury World Heritage Site Management Plan 2015 (Aim 2, Policy 2a, Action 13) (which is readily available online at [http://www.stonehengeandaveburywhs.org/assets/2015-MANAGEMENT-PLAN\\_LOW-RES.pdf](http://www.stonehengeandaveburywhs.org/assets/2015-MANAGEMENT-PLAN_LOW-RES.pdf)). There have historically been assets contributing to the OUV of the WHS outside of the WHS boundary, and Robin Hood's Ball and the long barrows in this general area to the north and west of the WHS (both outside the WHS) were in fact named in the UK Government's nomination documentation of 1985. They are part of the development of the Stonehenge area into a locality of exceptional significance in the later Neolithic and Bronze Ages. These monuments help to understand the Site and without them, the WHS as a whole may lack some elements of integrity. The case for revision of the boundary at Stonehenge has been discussed in previous WHS Management Plans including that published in 2000 and that published in 2009. The 2000 plan recognised that the existing boundary was to some extent arbitrary and excluded features which, if included, might enhance the integrity of the WHS. The 2015 WHS Management makes the boundary review an aim, policy and action for the plan, which means that the boundary review is more certain to be instigated in the future (either in the life-time of the current plan, or in the next WHS Management Plan); it states in paragraph 7.5.6 that an initial study was undertaken in 2013, for the Stonehenge part of the WHS regarding which heritage assets outside the WHS boundary should be considered for inclusion within a revised WHS boundary. It remains for partners to the WHS Management Plan to agree on the new boundary and the scale of any extension, as well as how these will relate to a planned Setting Study for the WHS (as referred to above).
4. A Boundary Review at Stonehenge is a key protection and management issue and requirement set out in the UNESCO Statement of OUV (UNESCO, 2013. Adoption of retrospective Statements of Outstanding Universal Value. Stonehenge, Avebury and Associated Sites. WHC-12/37.COM/8E. Thirty-seventh Session, Phnom Penh, Cambodia: World Heritage Committee, United Nations Educational, Scientific and Cultural Organisation. Available at <https://whc.unesco.org/archive/2013/whc13-37com-8E-en.pdf>). As an aim, action and policy of the WHS Management Plan 2015 it is considered a priority in developing the management of the WHS. This is why it is considered reasonable to place reliance upon this review being implemented. However, whether the review is implemented is not relevant for the purposes of the HIA undertaken for the Scheme. As asset groups beyond the WHS boundary were considered as part of the assessment, and are considered to contribute to the OUV of the WHS, the proposed boundary review would not have an impact on the outcomes of the assessment and the consideration of the Rollestone Corner junction options (see CH.1.58 for further detail). In this respect, it is noted that the conclusions of the HIA are agreed by partners to the WHS Management Plan, including Historic England, Wiltshire Council, English Heritage Trust and the National Trust in relation to the boundary at Rollestone Corner. It is also agreed that the two options considered at this location would be considered to be within a revised WHS boundary that included the Net Down Barrows to the northwest and the Rollestone Barrows that extend to the west beyond the current WHS boundary.



- iii. **Given that Option 2 would entail new land take within the WHS explain how it can be claimed that it would have a lesser impact on the integrity and authenticity of the WHS than Option 1 which entails only minor works within the WHS?**
5. It is noted that the works at Rolleston Corner involve minor improvements to a road junction, with limited landtake in both options, in an area where Asset Groups both within and outside the WHS boundary contribute to the OUV of the WHS. Option 2 was preferred as, although it was within the current boundary of the WHS, it had a smaller footprint and was not situated in close proximity to one of those asset groups that contribute to the OUV of the WHS (the Rolleston Barrows), unlike Option 1. It was therefore judged that Option 2, although situated within the WHS would have a lesser impact in terms of the integrity and authenticity of the WHS than Option 1.
6. As explained above, Rolleston Corner is situated in a corner of the WHS where the WHS may be expanded in the future to include Robin Hoods Ball to the north, the Rolleston Barrows which extend beyond the current western boundary of the WHS and the closely related Net Down Barrows being situated to the northwest and fully outside the WHS boundary. Any future expansion of the WHS boundary in this area would not alter the preference for Option 2.

## Question AL.1.20

In relation to the proposed removal of the previously proposed link between Byways AMES 11 and AMES 12 within the WHS:

- i. Please explain in further detail why this option was considered to be preferential.
- ii. What is the perceived impact of vehicle traffic within the WHS?
- iii. How is it anticipated that such traffic would increase disturbance of nesting stone curlew in the Normanton Down RSPB reserve?
- iv. Explain the consideration given to the needs of motorised users of the Byways in reaching this decision.

## Response

**i. Please explain in further detail why this option was considered to be preferential.**

1. Currently, mechanically-propelled vehicle (MPV) users of byway open to all traffic AMES12 (Byway 12) are permitted to turn left on to the A303 or to cross the A303 and continue along the Byway. Right turns are not permitted onto the A303 from either Byway 12 or byway open to all traffic AMES11 (Byway 11) or onto those byways from the A303. If the Scheme is implemented, the existing A303 would be stopped up and in its place a new restricted byway would be constructed. Restricted byways may be used by pedestrians, cyclists, mobility scooter users, equestrians and horse drawn carriages, but not MPVs. Consequently, access to or from the new restricted byway on the alignment of the existing A303 (to be stopped up), to Byways 11 and 12 would be lost to MPV users, who would also no longer be able to move between the Byways 11 and 12 via the new restricted byway.
2. The impacts of this are that:
  - a) All users, including MPV users, of Byway 12 will continue to be able to proceed in a north/south direction across the WHS, with the benefit of being able to cross the former A303 unimpeded by trunk road traffic;
  - b) MPV users of Byway 11 will be able to approach from the south but on reaching the northern end of the byway will need to turn around and return on the same route they arrived;
  - c) There will be no MPV connection between the two byways in the vicinity of the existing A303;
  - d) Restricted byway users, including pedestrians, users of mobility scooters, cyclists, equestrians and horse drawn carriages, will be able to link between Byways 11 and 12, in both directions, via the new restricted byway being created along the route of the old A303 through the WHS.

3. The link to the south of the existing A303 between Byways 12 and 11 (AMES12 and AMES11 respectively) was originally proposed as it had been determined that mechanically propelled vehicles should not be allowed to use the public right of way along the de-trunked A303 through the World Heritage Site (WHS). This aligns with the desire to remove the sight and sound of traffic caused by the existing A303 as far as possible. Its removal from the Scheme was one of three changes put forward for supplementary consultation, the feedback from which is summarised in Chapter 6 of the Consultation Report [APP-026].
4. Following analysis of this feedback, and ongoing engagement particularly with heritage bodies and Wiltshire Council, Highways England determined that it would no longer propose a new link between Byways 11 and 12. The removal of this proposed link would avoid having an additional route open to vehicular traffic within the WHS, which would have adversely affected the setting of the Normanton Down barrow group and increased disturbance of nesting Stone Curlew in the Normanton Down RSPB Reserve. The removal of this proposed link would also avoid changes to the tranquillity of the WHS at this location. This change will help achieve Highways England's objective to remove the sight and sound of traffic from much of the WHS landscape, a key aspiration also of the WHS Management Plan.

## **ii. What is the perceived impact of vehicle traffic within the WHS?**

5. The dominance of traffic around Stonehenge has long been recognised as an issue for the WHS. The current environment is characterised by excessive and highly intrusive traffic including heavy commercial vehicles, and private cars. At peak times, the Stonehenge Monument's immediate and near-distance setting is dominated by stationary queues of traffic which are entirely at odds with its global status and iconic standing.
6. The issue of traffic congestion around the Stonehenge Monument part of the WHS has been the subject of discussion at the UNESCO World Heritage Committee since 2004. The Statement of OUV adopted by the World Heritage Committee states that roads and vehicles also cause damage to the fabric of some monuments while traffic noise and visual intrusion have a negative impact on their settings. The incremental impact of highway-related clutter needs to be carefully managed (UNESCO 2013, 291-94).
7. The 2018 State Party State of Conservation Report (DCMS 2018) noted that a periodic condition survey recorded that vehicle impacts included damage on tracks and ad hoc damage within fields. Areas of concern within the Stonehenge part of the WHS include Byway AMES12 at Stonehenge, Normanton Down and elsewhere and the long barrow crossed by an access track on the Cursus (NHLE 1009132).
8. One of the priorities of the 2015 WHS Management Plan is to 'Reduce the dominance and negative impact of roads and traffic and ensure any improvements to the A303 support this' (Simmonds and Thomas 2015, 8). The primary purpose of the WHS Management Plan is to sustain the Outstanding

Universal Value (OUV) of the WHS. The Management Plan 2015 includes the following aims:

- Aim 3: Sustain the OUV of the WHS through the conservation and enhancement of the Site and its attributes of OUV,
  - Aim 6: Reduce significantly the negative impacts of roads and traffic on the WHS and its attributes of OUV and increase sustainable access to the WHS.
9. Policies have been formulated within the Management Plan in order to assist in achieving the latter aim:
- Policy 6a – Identify and implement measures to reduce the negative impacts of roads, traffic and parking on the WHS and to improve road safety and the ease and confidence with which residents and visitors can explore the WHS.
  - Policy 6b – Manage vehicular access to byways within the WHS to avoid damage to archaeology, improve safety and encourage exploration of the landscape on foot whilst maintaining access for emergency, operational and farm vehicles and landowners.
  - Policy 6c – Take measures through sustainable transport planning to encourage access to the WHS other than by car.
10. The harmful impacts of roads and traffic on the WHS include visual intrusion, noise and air pollution. It is noted that the presence of busy main roads, such as the A303, traversing the WHS impacts adversely on its “Integrity”. The existing A303 severs the relationship between Stonehenge and its surrounding monuments, and has negative visual, noise impacts and air quality impacts on the WHS and visitors due to traffic. The existing A303 splits the WHS in two, severely impeding safe access between the northern and southern parts and impacting upon the integrity of the WHS. The removal of traffic would improve views to and from Stonehenge, relationships between the monument and other monuments in the landscape (e.g. the numerous barrow groups in elevated positions around the monument) and, importantly, the visitor experience at the monument. The Scheme provides the opportunity to enhance physical access, linking Stonehenge to the wider landscape.
11. Byways 11 and 12, both byways open to all traffic (BOAT), pass through the Normanton Down barrow cemetery. Vehicular use of the byways has an adverse impact on the setting of the monuments within the cemetery and in some cases directly impacts the fabric of the monuments. Byway 12 passes within 250m of the Stonehenge monument to the west and the presence of vehicles parking on the BOAT adversely affects the setting of the monument.
12. Following statutory public consultation, the Scheme design was further developed based on feedback. One of the changes identified was the removal of a proposed link between Byways 11 and 12 in the WHS. This change responds to concerns that vehicles on the new link between Byways 11 and 12 would have an adverse impact on the adjacent Normanton Down Barrow Asset Group

(AG19) and on the tranquility of the WHS at this location. The removal of the link from the Scheme's proposals, aims to help to achieve the Scheme objective to remove the sight and sound of traffic from much of the WHS landscape, a key aspiration of the WHS Management Plan 2015.

**iii. How is it anticipated that such traffic would increase disturbance of nesting stone curlew in the Normanton Down RSPB reserve**

13. A link for MPVs between Byway 11 and Byway 12 would enable MPV users to pass the Normanton Down RSPB reserve on three sides, instead of two as is the case at present and with the Scheme as proposed. This would potentially expose stone curlews to greater visibility of vehicles, but would not necessarily lead to a material increase in disturbance to stone curlew from vehicle use. However, there is the potential for users associated with the vehicular traffic (e.g. from pedestrians) to have a disturbance effect.

**iv. Explain the consideration given to the needs of motorised users of the Byways in reaching this decision.**

14. All existing routes between Byways 11 and 12 using the existing A303, with one exception, require right turns and are not currently permissible. The one exception is the route that approaches the WHS from the south along Byway 11, turns left on to A303 and then left again to head back south on Byway 12. []. If the Scheme is constructed, then access from the Byways to the A303 would be lost, regardless of provision of the link. With the Scheme, the one currently permissible route would not be possible; instead a turning facility would be provided at the north end of Byway 11 to enable motorised users to return south along Byway 11. The impact upon the needs of motorised users was considered to be small compared to the benefits that would be achieved from removing traffic in the vicinity of this part of the WHS.

## Question AL.1.21

In relation to the option to widen the green bridge proposed near the existing Longbarrow Roundabout:

- i. Please explain in detail why the extended 'land bridge' was considered preferential due to increased visual and physical connectivity between key barrow groups within the WHS.
- ii. How would the location and dimensions of the longer Green Bridge Four be secured by the dDCO having regard to the applicable limits of deviation (LoD) and the flexibility afforded by the submitted plans?

## Response

- i. **Please explain in detail why the extended 'land bridge' was considered preferential due to increased visual and physical connectivity between key barrow groups within the WHS.**
1. The extended land bridge was considered preferential when considered against an open cut in this location or a green bridge of lesser width (50m) at either a similar location within the WHS or on the line of the existing A360. The land bridge provided better physical, topographic and landscape connection between the Winterbourne Stoke Crossroads Barrows to the north of the existing A303 and the Diamond Group to the south, with the widest bridge possible to maximise this connection north-south. The land bridge was also placed to physically connect the two upstanding long barrows within each group thus maintaining a physical connection between two of the earliest upstanding funerary monuments within this part of the WHS (part of the wider group of long barrows in this part of the WHS). The land bridge partially mitigates the adverse impact of landscape severance due to the construction of the cutting; this is particularly relevant to Attribute 5 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other) of the OUV of the WHS. The mitigation provided by the land bridge is enhanced by the use of shallow grass slopes in the upper portion of the retained cutting, and essential chalk grassland mitigation beyond the retained cutting edge to north and south and across the land bridge and 200m cut and cover tunnel over the western portal, which together soften views of the cutting and aid its visual integration within the landscape. A narrower bridge would not provide the same benefit in terms of physical landscape connectivity. The omission of a land bridge would place reliance solely on the landscape integration element in mitigating the severance due to the construction of the cutting. The new NMU route across the land bridge connects the two groups and makes it possible for visitors to walk between the two groups; something that is not possible with the existing A303. The land bridge is supported by Historic England, English Heritage Trust and the National Trust.

**ii. How would the location and dimensions of the longer Green Bridge Four be secured by the dDCO having regard to the applicable limits of deviation (LoD) and the flexibility afforded by the submitted plans?**

2. The location and dimensions of Green Bridge No. 4, which forms part of Work No.1D, are secured in the dDCO as follows:
- (a) The centreline of Work No.1D is shown on sheets 5 and 6 of the Work Plans [APP-008]. Article 7(3)(a) of the draft DCO [APP-020] permits the centreline to deviate by up to 3m laterally from the position shown.
  - (b) The proposed levels of Work No.1D are shown on sheets 5 and 6 of the Engineering Section Drawings (Plan and Profiles) [APP-010]. Article 7(4) of the draft DCO permits vertical deviation, by 0.25m upwards or downwards from the existing ground level in respect of Green Bridge Four (Work No.1D(i)).
  - (c) The termination point of Work No.1D (which is also the commencement point of Work No.1E, the cut and cover tunnel and associated works), shown by the "bow-tie" on sheet 6 of the Works Plans, may, in accordance with article 7(7) of the draft DCO, deviate from the position shown:
    - a. 200 meters to the west along the centreline; or
    - b. 1 meter to the east along the centreline.
- This lateral limit of deviation for the termination point of Work No.1D is required in order to accommodate an equivalent deviation to the commencement point of Work No.1F (comprising the bored tunnel and associated works). The commencement point of Work No.1D, shown by the "bow-tie" on sheet 5 of the Works Plans, may in accordance with article 7(7) of the draft DCO, deviate from the position shown by a nominal 3 meters eastwards or westwards.
- (d) The levels are shown on sheet 5 of the Engineering Section Drawings [APP-010] by reference to chainage (6500). The vertical limits of deviation (article 7(4)) allow the height of the reinstated ground above the bridge to be varied by a maximum of 0.25m upwards or downwards by reference to the existing ground level.
  - (e) The width (approximately 150m) is detailed in measure D-CH4 of table 3.2b of the OEMP [APP-187] and compliance with which is secured through paragraph 4 of schedule 2 of the draft DCO [APP-020].
  - (f) The location, by reference to its chainage (6500), is shown on sheet 5 of the Engineering Section Drawings [APP-010] which, as noted above in paragraph (d), also sets the vertical limits of deviation for Work No.1D(i).
  - (g) Requirement 3 of the draft DCO requires the Scheme to be designed in detail and carried out so it is compatible with the Works Plans, Engineering Section

Drawings (Plan and Profiles) and the Engineering Section Drawings (Cross Sections).

3. The limits of deviation and requirements, described above enable a proportionate degree of flexibility required to deliver the Scheme. They also enable the detailed design to maximise the benefits of connectivity between the upstanding long barrows and the Asset Groups (AG12 Winterbourne Stoke Crossroads Barrows and AG13 the Diamond Group) to the north and south of the Scheme at this location.
4. The Applicant is confident that, taken together, there is sufficient certainty as to the location and parameters of Green Bridge Four. The Applicant is in discussion with the heritage stakeholders regarding a mechanism for consulting on key aspects of the detailed design. Once the Applicant has had the opportunity to discuss matters with all heritage stakeholders, it intends to draft for the obligations in the OEMP and submit an updated draft at Deadline 3.



## Question AL.1.22

The ES, Chapter 3 Assessment of alternatives, paragraph 3.3.28, outlines the viaduct options for the River Till crossing that were considered at design development stage.

- i. Please explain why Option 2 would have required a different alignment that would have been likely to have required land take from the Parsonage Down SSSI and why this option would have required a reduction in height from ground level to the bridge structure.

Paragraph 3.3.30 states that the decision was taken to progress Option 1 primarily on the basis of ecological and engineering considerations.

- ii. What other factors were considered to support this option and why did the ecological and engineering factors outweigh the groundwater and floodplain considerations in reaching this decision?

## Response

- i. **Please explain why Option 2 would have required a different alignment that would have been likely to have required land take from the Parsonage Down SSSI and why this option would have required a reduction in height from ground level to the bridge structure.**
  1. The optioneering assessment was qualitative only. Variation in design between the bridge options (number of piers / spans) resulted in variation in the proposed A303 highway approach to the structure. The preliminary design presented for Option 2 identified that the highway approach to the west of the River Till would necessitate encroachment into the south-eastern corner of Parsonage Down SSSI. The preliminary design of Option 2 also identified that the option would have a comparatively deeper bridge deck. The overall height of the bridge is restricted due to limiting landscape and visual impacts, therefore a deeper bridge deck would have reduced the height from the bottom of the bridge to ground level in comparison to the other, slimmer decked, options being considered. This would have increased adverse shading effects experienced within the River Till valley, with a comparatively increased adverse effect on habitats within the River Till SSSI / River Avon SAC which form elements of the designated sites' notifications. The overall ecological impact of Option 2 was therefore considered less preferable, as it would have had potentially greater adverse effects on the River Till SSSI / River Avon Systems SAC, as well as direct landtake from Parsonage Down SSSI.
- ii. **What other factors were considered to support this option and why did the ecological and engineering factors outweigh the groundwater and floodplain considerations in reaching this decision?**
  2. Other environmental factors which supported Option 1 were lessened effects on landscape and visual and the setting of cultural heritage assets through the reduced form of the design. Although Option 1 would have comparatively greater impact on the floodplain and groundwater (by having four sets of piers, as opposed to two), this impact was considered to be of lesser significance than

Option 2's potential impact on the River Till SSSI / River Avon System SAC, through reduced height and adverse shading effects on habitats (potentially adversely affecting elements which form reasons for the designated sites' notifications), as well as the anticipated direct landtake from Parsonage Down SSSI. Engineering factors favoured Option 1 as the five-span arrangement allowed for an acceptable highway approach to the structure with a pier arrangement which suited crossing the River Till while accommodating the bridleway to the west of the valley, as described within the ES Chapter 3, Table 3.10 [APP-041].

## Question AL.1.23

The ES, Chapter 3 Assessment of alternatives, Table 3.11: Longbarrow junction location options, compares the three options considered for the location of the proposed new Longbarrow junction.

Please explain in further detail why Option 1 would offer a reduced benefit to the OUV of the WHS in comparison to Option 3.

## Response

- Option 1 reflects the junction alignment as proposed in the Stage 2 Scheme Assessment Report, Volume 7, Appendix E [REP1-029, Figure 8].



- Excerpt from Figure 8 from the A303 Stonehenge Amesbury to Berwick Down Scheme Assessment Report (Volume 7) Appendix E Historic Environment Assessment [REP1-029].
- Option 1 would distance the sight and sound of traffic at the junction from the Winterbourne Stoke Crossroads Barrows, including the Neolithic Longbarrow. This would be a benefit in terms of removing the existing adverse impacts of the A303 and A360 on the setting of the barrow group and on Attributes 2-3 and 5-6

that convey the OUV of the WHS. The option, however, required land-take from the WHS for the slip roads for the junction as can be seen in Figure 8 above.

4. Option 3 moves the alignment of the junction approximately 180-200m west of Option 1 to ensure the slip roads do not enter the WHS (and start / finish at the current A360 / WHS boundary; as proposed in the Scheme). The option layout would distance the sight and sound of traffic at the junction from the Winterbourne Stoke Crossroads Barrows by a further 180m (compared with Option 1), including the Neolithic Longbarrow. This would be an increased benefit in terms of removing the existing adverse impacts of the A303 and A360 on the setting of the barrow group and on Attributes 2-3 and 5-6 that convey the OUV of the WHS. The junction in this location would also be situated to the west of the crest of Oatlands Hill, rather than on top of the crest in Option 1.

## Question AL.1.24

The ES, Chapter 3 Assessment of alternatives, Table 3.12: Longbarrow junction layout options, compares the two options considered for the layout of the proposed new Longbarrow junction.

Please explain in further detail why Option 1 was considered to offer greater benefits to the OUV of the WHS in comparison to Option 2.

## Response

1. The Option 1 design included roundabouts and connecting bridge at grade, and the A303 being sunk in cutting beneath the at-grade roundabout, requiring a reduced extent of earthworks associated with the A360 north and south link roads. This was preferred as it would place the A303 within cutting at the boundary of the WHS which would result in greater benefits to the OUV by reducing impacts on asset groups from the sight and sound of moving traffic within the WHS over a wide area, including the Winterbourne Stoke Crossroads Barrows. This would be a substantial benefit in terms of removing the existing adverse impacts of the A303 and A360 on the setting of the barrow group and on Attributes 2-3 and 5-6 that convey the OUV of the WHS.
2. Option 2 was the reverse of Option 1 in terms of its design, with the A303 running at grade with the roundabouts and the connecting link roads being situated in cutting underneath. This would result in substantially increased earthworks associated with the larger cutting for the roundabout and the A360 north and south link roads. From a heritage perspective this was less preferred as keeping the A303 at grade would have a greater visual impact to key receptors within the WHS over a wide area, including the Winterbourne Stoke Crossroads Barrows. The higher position of the main line would also maintain existing intrusion from moving traffic in the landscape during the day and car headlights at night. The larger earthworks for the junction would also be more visually intrusive and visible from key asset groups in the western part of the WHS. All of these factors had the potential for substantial adverse impacts on Attributes 2-3 and 5-6 that convey the OUV of the WHS.

## Question AL.1.25

The ES, Chapter 3 Assessment of alternatives, Table 3.13: Western portal location options, compares the three options considered for the location of the proposed western portal.

Please explain in further detail the perceived impact that Option 3 would have on the siting of monuments in relation to each other and that the physical impact that the cutting emerging from the western portal would have on a schedule monument and hence the OUV of the WHS.

## Response

1. Table 3.13, in 6.1 Environmental Statement Chapter 3 - Assessment of Alternatives [APP-041], describes a point-in-time optioneering process undertaken before statutory consultation in February to April 2018. Option 3 was located immediately south of the existing A303, approximately 500m east of the existing Longbarrow Junction. The option was considered less preferable, as although there would be less land take from within the WHS, the portal would be located between the Winterbourne Stoke Crossroads Barrows and the Diamond Group, adversely affecting Attribute 5 that conveys the OUV of the WHS.
2. At the time of the option sift there was no proposed land bridge or canopy and so the Winterbourne Stoke Crossroads Barrows and the Diamond Group would have been completely severed from each other by the Scheme with no physical or landscape connectivity between the two groups (see response to CH.1.60 for further detail in this respect). The large portal structure, which had no proposed canopy at that point, would also have resulted in a large piece of visible infrastructure being imposed between the two Asset Groups.
3. Additionally, the cutting emerging from the Western Portal, in the option that was tabled at the optioneering, would have physically impacted the northern end of the scheduled prehistoric linear boundary (NHLE 1010837) of late Bronze Age date on the western side of the WHS in this option.

## Question AL.1.26

The ES, Chapter 3 Assessment of alternatives, Table 3.14: Western portal approach options compares the three options considered for the approach to the western portal.

- i. For Option 1, please identify the heritage assets that would benefit from the provision of a 5m cutting in this location.
- ii. Please explain further the reduction in noise levels that a 5 m cutting would provide in comparison to the 2m cuttings proposed for Options 2 and 4.

## Response

- i. **For Option 1, please identify the heritage assets that would benefit from the provision of a 5m cutting in this location.**
  1. There are multiple heritage assets in the vicinity of the cutting, both designated and non-designated, that would benefit from the provision of a 5m cutting.
  2. Numerous Neolithic and Bronze Age monuments are located within Stonehenge Down and Normanton Down, many of which fall within the 'asset groups' defined in the Environmental Statement (ES), Chapter 6 [APP-044], paragraphs 6.6.59 – 6.6.66; ES Figure 6.6 [APP-072]; and, ES Appendix 6.7 [APP-216]. These include the Winterbourne Stoke Barrow Group (Asset Group AG12), the Diamond Group (Asset Group AG13), a barrow west of Stonehenge (Asset Group AG17), and the Normanton Down Barrow Group (Asset Group AG19, including the Wilsford G1 bowl barrow which lies approximately 25m east of the proposed western tunnel portal location). These asset groups include Neolithic long barrows and Early Bronze Age round barrows, many of which survive as upstanding earthworks and form extensive cemeteries. The inter-relationships between these monuments and also their relationship to the landscape, skies and astronomy, are attributes of the OUV of the WHS, as outlined within the ES Chapter 6, paragraph 6.6.69 [APP-044].
  3. In addition to these asset groups, discrete assets in the vicinity of the cutting include the barrows scheduled as NHLE 1010831 (UID 2015, upstanding), 1010832 (UID 2018, levelled), 1010833 (UID 2016, known as the Wilsford Shaft) and 1013812 (UID 2017, levelled) (refer to ES Figure 6.8 [APP-074], and ES Figure 6.8B Gazetteer of heritage assets [APP-212]).
  4. The 5m cutting option benefits these asset groups and discrete assets for the following reasons:
    - a. Improving or re-creating sightlines between them. These sightlines are currently disrupted by the existing surface A303 and the traffic using it.
    - b. Placing the road in a deep cutting would conceal the sight and sound of traffic, including car head and tail lights, from key sightlines between these asset groups.

- ii. **Please explain further the reduction in noise levels that a 5 m cutting would provide in comparison to the 2m cuttings proposed for Options 2 and 4.**
5. There are three options considered within Table 3.14, with the 2m cutting proposed for Option 3 only, therefore this response considers a comparison between Option 1 (5m cutting) and Option 3 (2m cutting).
  6. At the optioneering stage it was not viable to quantitatively assess all options. The qualitative assessment, based on technical expertise, was that the 5m cutting would be more effective than a 2m cutting in retaining sound within the cutting. This is due to the comparatively greater height of the retained walls more effectively preventing noise associated with the highway from propagating into the surrounding landscape.



## Question AL.1.27

The ES, Chapter 3 Assessment of alternatives, Table 3.15: Eastern portal location options, compares the two options considered for the location of the proposed eastern portal.

Please provide further details and explain the perceived benefits associated with Option 2 in terms of impact on the OUV of the WHS.

## Response

1. Option 2 was positioned approximately 200m east of the proposed location for Option 1 and it therefore required less land-take from the WHS than Option 1. The portal entrance and surface road for Option 2 would be situated at a greater distance from several scheduled monuments (including the Avenue), thereby allowing a greater number of assets to be physically and visually reconnected (particularly in association with the Avenue Barrows) in comparison to Option 1. Option 2 would therefore enhance Attributes 3, 5 and 6 that convey the OUV of the WHS slightly more than Option 1. Siting the Eastern Portal at a greater distance from the Avenue would allow greater physical landscape connectivity to be maintained and move the visual intrusion of surface traffic further to the east away from the monument.

## Question AL.1.28

The ES, Chapter 3 Assessment of alternatives, Table 3.15: Countess junction structural form options compares the four options considered for the structural form of the Countess junction.

Please explain in greater detail why Option 1 was considered to provide a more 'natural' setting for the listed Countess farm buildings compared to Option 4?

## Response

1. The Countess junction structural form options are presented in Table 3.17 of Chapter 3 of the ES [APP-041], which has been taken to be the basis of this question, whereas Table 3.15 outlines the eastern portal location options.
2. Option 1 is the “two span with vertical abutments and filled embankment” option, and Option 4 is the “open plan” option.
3. The more 'natural setting' for Countess Farm is provided by Option 1 because the filled section of the embankment could be planted with trees. This would increase the extent of tree cover adjacent to Countess Farm, aid in softening views of the flyover and screen views of the highway on the southside of Countess roundabout.
4. In contrast, Option 4 would not have planting beneath the flyover, as trees would not grow in this setting. The ability to retain a vegetated surface beneath the flyover would be unrealistic due to low light levels and would likely result in a degraded condition over time. The surface treatment below the flyover would most likely be paved. Without the embankment and planting of Option 1, the flyover would be more apparent and form a more intrusive engineered setting as set out in Table 3.17.
5. In summary, the ability to implement tree planting and avoid the 'dead-space' below the flyover are the reasons that Option 1 was considered to provide a more 'natural' setting than Option 4.

## Question AL.1.29

The ES, Chapter 3 Assessment of alternatives, paragraph 3.3.61, explains that in response to feedback from ICOMOS, consideration has been given to extending the tunnel (longer than 3km) in a westerly direction to or beyond the western boundary of the WHS.

- i. Please explain and provide full details of the reasoning behind the decision to reject both the extended tunnel options that were considered.
- ii. Please identify and explain the heritage benefits to the OUV of the WHS that the extended tunnel options were considered to provide.
- iii. Please provide full details of the anticipated increase in the construction period for each of the extended tunnel options that were considered and explain how that was calculated.
- iv. Please provide full details of the anticipated 'significant' increase in scheme cost for each of the extended tunnel options under consideration.

## Response

### Summary Response

1. The locations of the eastern and western portals in the proposed Scheme have been identified as the optimum locations when all environmental, technical and economic considerations are taken into account. There is no evidence that the additional investment required to extend the tunnel length would deliver meaningful additional benefits to the WHS that would justify the additional cost.
2. Paragraph 3.3.61 of the Environmental Statement (ES) chapter 3 [APP-041] identified the options considered in response to ICOMOS feedback to consider extending the tunnel westwards "*Options considered included a cut and cover tunnel extending from the current western end of the bored tunnel to the western perimeter of the WHS; and continuing the bored tunnel to an appropriate portal location beyond the western boundary of the WHS.*" This response will therefore discuss the two options, being a cut and cover extension of the tunnel to the western boundary of the WHS which would add 1.0km to the length of the proposed tunnel, and an extension of the bored tunnel to a point beyond the western boundary of the WHS which would add 1.6km to the length of the proposed tunnel. These options are explained further below.

### Description of the two options referred to in the Environmental Statement

3. The proposed tunnel length and length of any alternative tunnel design is dictated by the need to identify optimum portal locations having regard to a range of matters including environmental, technical and economic considerations.
4. Tunnel boring can only commence and finish when the depth of ground cover above the crown of the tunnel bore is a minimum of half the diameter of the bore or approximately 7m. For this reason, it is necessary to commence and finish the

bores at the upward /downward faces of hills and to maintain a minimum depth of cover of 7m along the entire length of the tunnel.

5. A minimum depth to crown level of 7m requires a depth to road level, or depth of approach cut, of minimum 16m. Locating the portal on suitable slopes has the benefit of minimising the length and depth of this approach cut to the portal. The depth of the cut can be further reduced by extending the tunnel using cut and cover construction. This enables the depth of the cut at the tunnel mouth to be reduced to 10-11 metres.
6. The portal locations relevant to the Proposed Scheme and to the alternatives described in the Environmental Statement are described below.

### **The Proposed Scheme**

7. The location of each portal within the Proposed Scheme has been optimised to suit the topography, heritage and other environmental and technical constraints as informed by ICOMOS recommendations.
8. At Preferred Route Announcement (PRA) the east portal location was determined to avoid the Scheduled Monument known as the Avenue (NHLE 1010140). This location has been retained as the eastern end of the bored tunnel and a further 85m of cut and cover tunnel has been added to better suit existing topography for the reasons explained in paragraphs 4 and 5 above.
9. At PRA the west portal was located north west of Normanton Gorse at a position which gave a 2.9km tunnel length. During design development the following changes were identified as beneficial to reflect ICOMOS recommendations.
  - A 100m bored extension westwards to avoid a scheduled monument: a Bowl barrow south of the A303 and north west of Normanton Gorse (NHLE 1010832).
  - A cut and cover extension of 200m at the western portal to better suit the topography, enable shallower approach cuttings to the tunnel entrance (see paragraphs 4 and 5 above) and to aid landscape integration.
  - A 150m long land bridge was included in the Proposed Scheme to provide physical and visual connectivity between the Winterbourne Stoke Crossroads Barrows and the Diamond Group.
10. The combined effect of the changes set out in paragraphs 8 and 9 was to increase the tunnel length from 2.90km to 3.285km, an increase of 385m or nearly ¼ mile. Further description of these portal locations is included in Chapter 2 of the ES chapter 2 [APP-040], paragraphs 2.3.15 (West Portal) and 2.3.20 (East Portal).

### **Cut and cover tunnel extension to the western boundary of the WHS**

11. The ICOMOS suggestion of a further 1,000m cut and cover tunnel extension to that included in the Proposed Scheme would put the west portal just outside the WHS to the west of its boundary and to the west of the A360. This option would have limited impact on the layout of the proposed Longbarrow junction but would require the western tunnel service buildings to be relocated either to a location within the junction or to a location accessed off the A360.
12. This option would bring the total length of the tunnel to 4.285km.
13. Further extension in cut and cover construction beyond the WHS boundary would impact on the layout and location of Longbarrow Junction and would offer no additional benefit.

### **Bored tunnel extension to beyond the WHS boundary**

14. The option to extend the bored tunnel beyond the WHS boundary would position the western portal at the first viable location for commencement of the tunnel. This location can be seen on the longitudinal section on sheet 5 of the Engineering Section Drawings Plan and Profiles [APP-010] where, at chainage 5+600, the existing ground levels begin to come down to meet the proposed A303 road level. This would place the western portal immediately west of the current proposed location of Green Bridge Three.
15. This option would have a major impact on the location and layout of Longbarrow Junction which would require a total redesign in a location further from the existing A360 and closer to Winterbourne Stoke.
16. This option would result in a total tunnel length of 4.885km.
  - i. **Please explain and provide full details of the reasoning behind the decision to reject both the extended tunnel options that were considered.**

### **Reasons for rejection of the cut and cover tunnel extension to the WHS boundary**

17. The option to extend the cut and cover of the tunnel was rejected because consideration of the balance of benefits and disbenefits would not justify the significant additional cost, estimated at £264 million, over and above the cost of the Proposed Scheme.
18. The benefits and disbenefits are discussed below.

### **Traffic and operational issues**

19. Extending the tunnel to the western perimeter of the WHS would result in a much shorter distance between the tunnel portal and Longbarrow junction. In the Proposed Scheme, the maintenance cross-over points (where traffic would be able to cross the central reserve of the dual carriageway to use one bore of the tunnel as single carriageway while the other bore is closed for maintenance) are

located within the junction outside the WHS. This allows the traffic to undertake the crossover manoeuvre in advance of the tunnel approach and portal area. Reducing the distance between the tunnel portal and the junction would result in disruption to smooth traffic flow close to the tunnel portal and increase the risk of collisions and incidents in this area.

### **Construction and Civil Engineering Issues**

20. The additional tunnel length would require inclusion of lay-bys and would likely include a vehicular cross-over in the tunnel, in addition to increasing the number of emergency evacuation cross-passages within the tunnel. Construction of these features would require a long break-out from the bored tunnel's primary lining. Construction of these features is a high safety risk operation for construction workers.

### **Mechanical and Electrical Issues**

21. The additional tunnel length would require a proportional increase in mechanical and electrical plant to enable safe operation. Additional tunnel plant rooms would be required. These would be located at the eastern end of the cut and cover section. The western tunnel service buildings would need to be relocated out of the tunnel. The location for these buildings would need to be either within the limits of Longbarrow junction or accessed from the A360.

### **Heritage Issues**

22. The heritage impact of this option is discussed below in response to part (ii) of the question, under the heading "Heritage Benefits of cut and cover extension to WHS boundary".

### **Environmental Issues**

23. Construction stage impacts would be largely similar to the Proposed Scheme.
24. The overall beneficial operational stage impacts compared to the Proposed Scheme would be minor and be limited to:
  - Landscape and Visual: improvement in connectivity and tranquillity within the western section of the WHS.
  - Biodiversity: reduced severance within the western section of the WHS leading to increased wildlife movement; better habitat connectivity; some increase in chalk grassland habitat creation on cut and cover section.
  - Public Amenity: increased appreciation of the western section of the WHS as a result of reduced severance.

## **Programme extension and Cost**

25. This cut and cover option would take an additional 12 months to construct and would cost an additional £264 million over the Proposed Scheme (for detail see the response to parts (iii) and (iv) of the question below).

## **Reasons for rejection of bored tunnel extension to beyond the WHS boundary**

26. The option to extend the bored tunnel was rejected because consideration of the balance of benefits and disbenefits would not justify the significant additional cost, estimated at £578 million, over and above the cost of the Proposed Scheme.
27. The benefits and disbenefits are discussed below.

## **Traffic and operational issues**

28. As described above, the location of the Longbarrow junction would have to be moved further west. There would also be similar operational issues with the maintenance cross-over points, as for the cut and cover extension option above. This relocated Longbarrow junction would need to fit between the western portal and the River Till Viaduct. The combination of these two constraints would require the use of a compact, and consequently lower capacity, junction which would not be compliant with standards for the volumes of traffic which would be using the A303.
29. The relocated junction would also lead to complications with connectivity to the existing A360, increasing journey times and likely displacing traffic on to the local road network. The A360 itself would be retained in its current position to avoid traffic rat running via unsuitable local roads through nearby communities. This would remove the benefit to the WHS of removing traffic immediately beside the Winterbourne Stoke Crossroads Barrow Group.

## **Construction and Civil Engineering Issues**

30. As with the cut and cover option, the additional tunnel length would require inclusion of lay-bys and would include a vehicular cross-over in the tunnel, in addition to increasing the number of emergency evacuation cross-passages within the tunnel. Construction of these features would require a long break-out from the bored tunnel's primary lining. Construction of these features is a high safety risk operation for construction workers.
31. The longer tunnel will generate additional volumes of tunnel arisings requiring processing and placement.

## **Mechanical and Electrical Issues**

32. The additional tunnel length would require a proportional increase in mechanical and electrical plant to enable safe operation. An additional set of tunnel mechanical and electrical cross passages would be required.

33. The western tunnel service buildings would need to be relocated out of the tunnel. These buildings would likely be located in the proximity of the existing A360.

### **Heritage Issues**

34. The heritage impact of this option is discussed below in response to part (ii) of the question, under the heading “Heritage Benefits of the bored tunnel extension to beyond the WHS boundary”.

### **Environmental Issues**

35. The overall impacts compared to the Proposed Scheme would be minor beneficial. Impacts would include:
- Landscape and Visual: improvement in connectivity and tranquillity within the western section of the WHS; potential for additional or worsened impacts associated with increased alteration to landform and vegetation patterns from additional tunnel arisings placement east of Parsonage Down and from re-positioning of Longbarrow junction.
  - Biodiversity: reduced severance/ better habitat connectivity, within the western section of the WHS and immediately to the west, leading to increased wildlife movement in WHS. Less disturbance of existing arable habitat, but no chalk habitat creation in WHS, except along old A303 leading to marginal reduction in habitat creation.
  - Public Amenity: increased appreciation of the western section of the WHS as a result of reduced severance.

### **Programme extension and Cost**

36. This option would take an additional 2 years to construct and would cost an additional £578 million over the Proposed Scheme (see the response to parts (iii) and (iv) of the question below).
- ii. **Please identify and explain the heritage benefits to the OUV of the WHS that the extended tunnel options were considered to provide.**

### **Heritage Benefits of the cut and cover tunnel extension to the WHS boundary**

37. This option was rejected on the basis of a balanced appraisal of operational performance, safety and maintenance, engineering and buildability, cost, environmental impacts and heritage impacts. Consequently, a full Heritage Impact Assessment was not undertaken for this option. Notwithstanding this, on the basis of the information available, the following with regards to heritage and the OUV of the WHS can be identified.
38. This option would construct an open cutting similar to the Proposed Scheme but then place a cover over the cutting. The overall construction footprint and hence the direct physical impact on heritage assets would therefore be the same as for



the Proposed Scheme. The impacts on Attribute 2 (the physical remains of the Neolithic and Bronze Age ceremonial and funerary monuments and associated sites) that conveys the OUV of the WHS would be the same as the Scheme.

39. The reinstated ground above the new A303 would provide connectivity between some of the key assets. This has been assessed as having a slightly more beneficial impact when compared to the Scheme. The cut and cover extension would allow re-establishment of the existing landform, within the WHS, along the length of the Western Portal approach cutting benefiting Attribute 5 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other). This would increase landscape connectivity between monuments and monument groups, including the AG12 Winterbourne Stoke Crossroads Barrows; AG19 Normanton Down Barrows and the AG13 Diamond Group, as well as isolated heritage assets to the south and north of the main line that contribute to the OUV of the WHS.
40. The Eastern Portal and its approaches would be the same as the Scheme and its slight adverse impacts on the AG31 Countess Farm Barrows would remain.
41. The option would not avoid all impacts on Attributes that convey the OUV of the WHS as buried archaeological remains within the footprint of the cuttings would still be removed.
42. The heritage benefit of this option is assessed as slightly more beneficial than the Scheme as impacts still remain on Attribute 2 (in the western portal approaches and at the eastern portal) and on Attribute 5 (at the eastern portal as the cutting and approach to the portal entrance remain the same as the Scheme).

#### **Heritage Benefits of the bored tunnel extension to beyond the WHS boundary**

43. This option was rejected on the basis of a balanced appraisal of operational performance, safety and maintenance, engineering and buildability, cost, environmental impacts and heritage impacts. Consequently a full Heritage Impact Assessment was not undertaken for this option. Notwithstanding this, on the basis of the information available, the following with regards to heritage and the OUV of the WHS can be identified.
44. The construction of a bored tunnel would allow the preservation of archaeological remains above the tunnel within the WHS boundary benefiting Attribute 2 (the physical remains of the Neolithic and Bronze Age ceremonial and funerary monuments and associated sites) that conveys the OUV of the WHS. Archaeological remains would also be preserved in situ over a section of the main line stretching 600m west of the WHS boundary. It would also allow the retention of the existing landform, benefiting Attribute 5 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other) in the western portal approaches.
45. As explained above, the A360 would, however, need to be retained in its current location to avoid rat running on inappropriate local roads. Retaining the A360 on its current line would remove the benefit to the WHS of removing traffic

immediately beside the AG12 Winterbourne Stoke Crossroads Barrows. This would retain the existing adverse impacts from the surface A360 on the setting of the AG12 Winterbourne Stoke Crossroads Barrows, impacting Attribute 3 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape) and Attribute 5 (The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other) tempering the benefits of this scenario.

46. The Eastern Portal and its approaches would be the same as the Scheme and its slight adverse impacts on the AG31 Countess Farm Barrows would remain.
47. Overall, therefore, this option would not avoid all impacts on Attributes that convey the OUV of the WHS. Although archaeological remains would be preserved within the WHS in the western approaches (benefiting Attribute 2) and the landform would be retained in this location (benefiting Attribute 5), construction of the cutting would still remove archaeological remains at the eastern portal resulting in adverse impacts to Attributes 2 and 5 in this part of the WHS. The retention of the A360 on its existing alignment would also continue the adverse impacts of the surface A360 on AG12 Winterbourne Stoke Crossroads Barrows, retaining existing adverse impacts on Attributes 3 and 5 that convey the OUV of the WHS. Overall, therefore, this option is assessed as slightly more beneficial than the Scheme.
- iii. **Please provide full details of the anticipated increase in the construction period for each of the extended tunnel options that were considered and explain how that was calculated.**
48. For the cut and cover tunnel extension to the WHS boundary, the additional construction period above that of the Proposed Scheme is estimated at 12 months. This allows for construction of the cut and cover structure which would overlap in part with the bored tunnel works and for additional mechanical and electrical fit out work associated with the longer tunnel (for details refer to Highways England's response to AL.1.30).
49. For the bored tunnel extension to a location beyond the WHS boundary, the additional construction period above that of the Proposed Scheme is estimated at 24 months. This allows for the proportionate increases in the duration of the additional length of tunnel boring, additional cross passages, additional tunnel lining and road bed construction and additional mechanical and electrical fit out work associated with the longer tunnel (for detail refer to Highways England's response to AL.1.30).
- iv. **Please provide full details of the anticipated 'significant' increase in scheme cost for each of the extended tunnel options under consideration.**

### Cut and Cover Tunnel Extension to the WHS Boundary

50. The additional cost for construction for the 1.0km cut and cover tunnel extension to the WHS boundary would be £144 million (for detail refer to Highways England's response to AL.1.30).
51. Additional operation and maintenance costs, estimated at £2million per year per km over 60 years, would amount to £120 million.
52. The total additional cost of this option over the Proposed Scheme is therefore estimated at £264 million.

### **Bored Tunnel Extension to beyond the WHS Boundary**

53. The additional cost for construction for the option of a 1.6km bored tunnel extension to beyond the WHS boundary would be £386 million (for detail refer to Highways England's response to AL.1.30).
54. Additional operation and maintenance costs, estimated at £2million per year per km over 60 years, would amount to £192 million.
55. The total additional cost of this option over the Proposed Scheme is therefore estimated at £578 million.

## Question AL.1.30

The ES, Chapter 3 Assessment of alternatives, paragraph 3.3.61: Extended tunnel options: Please provide justification for the comments regarding increased costs and construction period in the form of quantitative breakdowns and cost-benefit analyses.

## Response

### Quantitative breakdown of costs for extended tunnel options

1. The extra over costs of the two scenarios referred to in paragraph 3.3.61 of chapter 3 of the ES were based on the following comparative unit rates:
 

a.	Twin bored tunnel:	£276m per km
b.	Cut and cover tunnel	£212m per km
c.	Cutting with retaining walls	£68m per km
  
2. The unit rates per kilometre quoted above are Highways England's current working estimates used to inform the Environmental Statement. These rates supersede the rates used to inform the response to ICOMOS 42COM7B.32 and which are quoted in Highways England's responses to questions AL.1.31 and AL.1.32.
  
3. The two options referred to in the Environmental Statement are a cut and cover tunnel extending from the western end of the tunnel to the western perimeter of the WHS; and continuing the bored tunnel to an appropriate portal location 600m beyond the western boundary of the WHS. The extra over construction costs of these two options were estimated at £144 million and £386 million as detailed in the table below.

Option	Extra over cost cf Proposed Scheme.			
	Twin Bored Tunnel	Cut and cover *	Retained Cut	Total
Proposed Scheme	3.00	0.285	1.00	£0.0m
Cut & Cover Extension to the western WHS boundary	3.00	1.285	0.00	£144m
Bored Tunnel Extension to 600m beyond the western WHS Boundary	4.80	0.085	0.00	£386m

\* includes the 85m cut and cover length at east portal common to all options

4. The above excludes the additional cost of operation and maintenance which for a twin bore dual carriageway tunnel is estimated at £2 million per km per year.

Over 60 years this would amount to £120 million for the cut and cover extension and £192 million for the longer bored tunnel extension.

5. The total additional costs for the two options compared to the Proposed Scheme are summarised below.

Option	Total Tunnel Length	Extra over cost of Proposed Scheme		
		Construction	Operation and Maintenance	Total
Proposed Scheme	3.285 km	£0.0m	£0.0m	0.0m
Cut & Cover Extension to the western WHS boundary	4.285 km	£144m	£120m	£264m
Bored Tunnel Extension to 600m beyond the western WHS Boundary	4.885 km	£386m	£192m	£578m

#### Construction period for cut and cover extension to WHS boundary

6. The civil engineering work associated with the 1.0km cut and cover extension would involve an additional 6 months of construction, required to complete the central wall and roof slab of the cut and cover section once the tunnel boring had been completed and the tunnel boring machine removed from the western cut section. An additional month would be required for finishing works above the cut and cover tunnel roof slab. The additional tunnel length would also extend the mechanical and electrical fit-out and testing by approximately 5 months due to the proportionate increase in the tunnel length. In total this option would require approximately an additional 12 months to build.

#### Construction Period for bored extension to beyond WHS boundary

7. The programme critical path for tunnel construction goes through the construction of each bore, construction of the secondary lining for each bore, and construction of the road deck in the second bore prior to mechanical and electrical fit-out; all of which are sequential construction operations.
8. The construction programme impact is estimated at 24 months, broken down as follows:
- i. An additional 1.6km of twin bored tunnel would take an additional 225 days or approximately 7.5 months at the rate of boring of 16m per day used in the proposed Scheme programme.
  - ii. Construction of the secondary lining for the 3km twin bore tunnel would take 12 months. This would increase proportionately and would take 19 months for a 4.8km twin bore, an increase of 7 months.

- iii. Road bed construction for the second bore would similarly increase proportionately from 6 months to 9.5 months, an increase of 3.5 months.
- iv. The mechanical and electrical fit out period would also increase proportionately by approximately 6 months.

This would bring the total overall increase in construction programme duration to approximately (7.5 + 7 + 3.5 + 6) 24 months or 2 years.

### **Cost Benefit Analysis**

- 9. A quantitative analysis of the benefits of a longer tunnel has not been carried out as it is clear (as summarised in chapter 3 of the ES) that the significant increased costs of the longer tunnel options considered (together with the subsidiary considerations of the traffic, operational, construction engineering, safety, mechanical and electrical issues that they would cause) are not justified by the relatively minor heritage and environmental benefits that they would deliver. More detail on these matters is included in Highways England's response to question AL.1.29.

## Question AL.1.31

The 2019 response to ICOMOS 42COM7B.32 – As regards the additional construction cost of a longer bored tunnel, estimated at £540m, please provide a breakdown of costs and a cost-benefit analysis.

## Response

1. In respect of the cost breakdown for longer bored tunnel, the figure of £540 million provided by Highways England to inform the response to ICOMOS 42COM7B.32 was the extra over cost compared with the Preferred Route scheme (i.e. a 2.9km bored tunnel terminating in an open cut).
2. The extra-over cost for a twin-bored tunnel compared with construction of a dual carriageway in an open cut was, at that time, estimated at £289 million per km (this is currently estimated at £276m per km; see response to AL1.30). The length of an extended bored tunnel would be 4.8km (see response AL.1.29 for an explanation of tunnel length related to portal locations). The additional length of 1.9km compared with the Preferred Route scheme would result in an increased cost of (£289m x 1.9km) £549million. This was reduced to £540million to reflect the likely reduction in traffic management requirements at the existing Longbarrow junction.
3. In respect of the cost benefit analysis, a quantitative analysis of the benefits of a longer tunnel was not carried out as it was clear that the significant increased cost of this longer tunnel option considered (together with the subsidiary considerations of the traffic, operational, construction engineering, safety, mechanical and electrical issues that they would cause) was not justified by the relatively minor heritage and environmental benefits that they would deliver. More detail on these matters is included in Highways England's response to question AL.1.29.

## Question AL.1.32

In relation to the possibility of covering more of the open cutting, estimated at £126m, please provide access to a breakdown of costs and a cost-benefit analysis.

## Response

1. In respect of the cost breakdown for covering the open cut, the figure of £126 million provided by Highways England was the extra over cost for covering the vertical sided cut to create an additional 1.0km of cut and cover tunnel (additional to the 200m western cut and cover tunnel in the Proposed Scheme). This would extend the western cut and cover section of the proposed tunnel to the World Heritage Site boundary.
2. The extra-over cost for a cut and cover tunnel compared with construction of a dual carriageway in an open cut was, at that time, estimated at £201 million per km (this is currently estimated at £212m per km; see response to AL1.30). The cost of vertical sided cut over an open cut was, at that time, estimated at £70million per km (this is currently estimated at £68m per km; see response to AL1.30). This would result in an increased cost of (£(201-70)million x 1.0km) £131million. This was reduced to £126million to reflect an approximate £5m saving in Green Bridge 4 not having to be constructed (this total is currently estimated at £144m; see response to AL1.30).
3. In respect of a cost benefit analysis, a quantitative analysis of the benefits of a longer tunnel was not carried out as it was clear that the significant increased cost of this longer cut and cover option considered (together with the subsidiary considerations of the traffic, operational, construction engineering, safety, mechanical and electrical issues that they would cause) was not justified by the relatively minor heritage and environmental benefits that they would deliver. More detail on these matters is included in Highways England's response to question AL.1.29.



## Question AL.1.33

Please develop your RRs regarding alternatives including reference to the NPSNN, paragraphs 4.26 to 4.27, identifying any legal requirements and policy requirements set out in the NPSNN relating to the assessment of alternatives with which it is considered that the Applicant has failed to comply.

## Response

1. The Applicant acknowledges that this question is directed to Historic England, the National Trust and the Stonehenge Alliance. The Applicant's views on its assessment of alternatives with regard to paragraphs 4.26 and 4.27 of the NPSNN is set out in its response to question AL.1.1.

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