A303 Amesbury to Berwick Down

Secretary of State letter 20 June 2022

Applicant's response to the request for comments
Q2 - Conclusion on alternative routes – Overarching response

Document reference: Re-determination 4.2

Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

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1 Introduction

1.1 The request for comments from the Applicant

1.1.1 In the letter dated 20 June 2022 requesting comments from National Highways as the Applicant, the Secretary of State notes that a number of consultees have raised the issue that it is not clear how National Highways has arrived at the conclusion that the alternative tunnel routes would only have minimal additional heritage benefits over the Development.

1.1.2 National Highways was asked to:

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

1.1.3 National Highways was also asked to confirm whether the assessment of the heritage impact of alternative routes has been updated to take into account the 7 additional monuments that were added to the heritage baseline and provide any additional documents that are relevant.

1.2 Context for the Applicant's response

1.2.1 National Highways has provided information on options assessment and the consideration of alternatives at various points in the development of the DCO Scheme, including the consideration of heritage benefits of alternatives. We have provided information on options and alternatives in public consultation material, DCO application documents, submissions to the examination of the DCO and in response to the Secretary of State's Statement of Matters, demonstrating the consideration of heritage benefits of alternatives at each of these stages of the DCO Scheme's development.

1.2.2 Question AL.1.29 (ii) of the Examining Authority's First Written Questions on alternatives asked us to "*identify and explain the heritage benefits to the OUV of the WHS that the extended tunnel options were considered to provide*". Our response document - Deadline 2 - 8.10.4 - Alternatives (AL.1) [REP2-024] – covered two extended tunnel options: a cut and cover tunnel extension and a bored tunnel extension. In our response document, we used the same wording to confirm for each option that "*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" (see paragraph 37 on the cut and cover tunnel extension and paragraph 43 on bored tunnel extension). As confirmed in our response to Question AL.1.29 (i) of the Examining Authority's First Written Questions on alternatives, the reason for rejecting the cut and cover tunnel extension and the bored tunnel extension alternatives was the same for each alternative: that the "*consideration of the balance of benefits and disbenefits would not justify the significant additional cost … over and above the cost of the Proposed Scheme*" (see paragraph 17 on the cut and cover tunnel extension and paragraph 26 on the bored tunnel extension). In our summary response to question AL.1.29 we concluded that "*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*" (paragraph 1).

1.2.3 For both the cut and cover tunnel extension and the bored tunnel extension alternatives, in our response to the Examining Authority's First Written Questions, we stated that, in respect of heritage benefits, they were "*assessed as slightly more beneficial than the Scheme*", noting for each alternative that impacts would still remain on certain Attributes that convey the Outstanding Universal Value (OUV) of the World Heritage Site (WHS) (see paragraph 42 on the cut and cover tunnel extension and paragraph 47 on the bored tunnel extension).

1.2.4 In heritage terms alone, our response to AL.1.29 concluded that each alternative would be slightly more beneficial than the DCO Scheme for the following reasons:

- **Cut and cover tunnel extension**: The heritage benefit of this alternative was assessed as slightly more beneficial than the DCO Scheme overall. The reinstated ground above the new A303 would provide connectivity between some of the key assets. This was assessed as having a slightly more beneficial impact when compared to the DCO Scheme. However, adverse impacts would still remain on certain attributes that convey the OUV of the WHS. As this alternative would involve construction of an open cutting similar to the DCO Scheme, the overall construction footprint and hence the direct physical impact on heritage assets would therefore be the same as for the DCO Scheme. The adverse impacts that would still remain would be on Attribute 2 (the physical remains of the Neolithic and Bronze Age ceremonial and funerary monuments and associated sites) in the western and eastern portal approaches, and on Attribute 5 (the siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in, relation to each other), at the eastern portal, as the cutting and approach to the eastern portal entrance remain the same as the DCO Scheme. Its slight adverse impacts on the AG31 Countess Farm Barrows would remain.

- **Bored tunnel extension**: The heritage benefit of this alternative was assessed as slightly more beneficial than the DCO Scheme overall. 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 in its existing location was assumed in this appraisal during examination, to avoid rat running on inappropriate local roads. Retaining the A360 on its current line 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, tempering the benefits of this alternative. The eastern portal and its approaches would be the same as the DCO Scheme, and its slight adverse impacts on the AG31 Countess Farm Barrows would remain.

1.2.5 Our response to the Examining Authority's Question AL.1.29 considered the Attributes of the OUV of the WHS, and the changes that the alternatives would bring on those Attributes in comparison to the DCO Scheme. The heritage appraisal was undertaken by professional archaeologists (Chris Moore and Neil Macnab) with considerable experience of working within the Stonehenge, Avebury and Associated Sites WHS landscape and undertaking Heritage Impact Assessments within this WHS and other World Heritage Sites. Following Heritage Impact Assessment guidance (ICOMOS 2011), the appraisal considered assets and asset groups that contribute to the OUV of the WHS that would be affected by the change, the Attributes of OUV and then the WHS as a whole. As stated above, a full Heritage Impact Assessment (HIA) was not considered necessary.

1.2.6 In response to the Secretary of State's 20 June 2022 letter, this submission provides further detail relating to two tunnel extension alternatives to the DCO Scheme that build on those alternatives appraised and presented during examination and which respond to comments made to the Secretary of State as part of the re-determination process.

1.2.7 To fully explain the basis for our conclusion and to '*provide an explanation including full detail of reasoning, the matters considered and any methodology that was used*', this submission provides greater detail on these alternatives. This further detail is to be considered alongside the information already provided to the Secretary of State (which National Highways considers remains sufficient information), to appraise their environmental, including heritage, impacts, alongside information relating to their projected cost and construction programmes.

1.2.8 The sections on programme (1.6) and cost (1.7) have been included so that the Secretary of State can re-determine the DCO Scheme based on a consideration of all important and relevant matters; programme and cost implications are part of those important and relevant matters.

1.2.9 This submission presents information on more than heritage considerations, consistent with the 'balanced appraisal' of important and relevant matters presented in our response to Question AL.1.29 of the Examining Authority's First Written Questions. This submission therefore provides the Secretary of State with sufficient information to allow for a re-determination of the DCO Scheme taking into account all important and relevant matters.

1.2.10 In this document we refer to "tunnel extension alternatives", rather than alternative tunnel routes, noting that the alternatives follow the same horizontal alignment of the A303 as the DCO Scheme.

1.3 Tunnel extension alternatives

1.3.1 Two tunnel extension alternatives to the west were presented during the DCO examination. These two alternatives are referred to in the Environmental Statement Chapter 3: Assessment of alternatives [APP-041], in paragraph 3.3.61. These alternatives are covered further in our response to Question AL.1.29 of the Examining Authority's First Written Questions on alternatives, and in our response to the Statement of Matters Bullet Point One – Alternatives [Re-determination 1.1].

1.3.2 Since the DCO examination National Highways has revisited both these tunnel extension alternatives for the purposes of responding directly to questions raised during the re-determination process. The tunnel extension alternatives considered in this document have been refined from those considered in the responses to the Examining Authority's First Written Questions on alternatives. The reasons for this are explained below. The refined tunnel extension alternatives are referred to throughout this document as:

- Cut and Cover Tunnel Extension
- Bored Tunnel Extension

Key considerations for the revised tunnel extension alternatives

1.3.3 The key considerations for the layout of a scheme with a tunnel extension to or beyond the western boundary of the WHS are listed below. The balance of these considerations has been used to determine the optimum solutions to take forward for heritage, as well as environmental and traffic, appraisals for both the Bored Tunnel Extension and for the Cut and Cover Tunnel Extension. The alternatives have been developed to optimise the heritage benefits whilst retaining the operational requirements of the DCO Scheme. Our response to the Examining Authority's First Written Questions on alternatives confirmed that heritage, environmental, traffic and

operational considerations had been considered. These considerations have been revisited for this response to the Secretary of State's 20 June 2022 letter, to produce alternatives that are best case in terms of heritage benefits being delivered compared with those previously presented.

1.3.4 The key considerations are:

- Minimising disruption in the WHS, by locating the western portal west of the WHS boundary
- Minimising landscape impact by locating the tunnel portal and Longbarrow Junction to make best use of the existing topography
- Minimising traffic impacts on local roads by locating Longbarrow Junction as close as possible to the point where the new A303 crosses the line of the A360
- Ensuring that the form of Longbarrow Junction is suitable for the forecast traffic flows
- Minimising the impact on Winterbourne Stoke and on the River Till Valley by ensuring that the western slip roads of Longbarrow Junction terminate to the east of the River Till Viaduct
- Facilitating safe operation of the tunnel by leaving the required safe distance between junction slip road tapers and the tunnel portal for crossovers and associated traffic management
- Minimising traffic disruption during construction by positioning the western portal at least 50m away from the existing A360
- Realigning the A360 to maximise the heritage benefit of moving the A360 away from the Winterbourne Stoke Crossroads Barrow Group asset group (AG12)

Refinement of tunnel extension alternatives – Cut and Cover Tunnel Extension

1.3.5 Our response to the Examining Authority's First Written Questions on alternatives considered a further 1.0km cut and cover tunnel extension to that included in the DCO Scheme. This would put the western tunnel portal just outside the WHS to the west of its boundary and to the west of the A360. This alternative would bring the total length of the tunnel to 4.285km. The Cut and Cover Tunnel Extension alternative considered for our response to the Secretary of State's 20 June 2022 letter aligns closely with that considered in examination in respect of the length of tunnel extension, only an additional 50m has been added to the tunnel length to facilitate temporary traffic management and safe construction. The portal would be located at Chainage 6+150.

1.3.6 Our response to the Examining Authority's First Written Questions on alternatives considered a design that had limited impact on the location of the Longbarrow Junction from its location in the DCO Scheme (at Chainage 5+600). However, this response highlighted the traffic and operational issues with maintaining the location of the Longbarrow Junction in the same location as that for the DCO Scheme. Our response clarified that: "*Reducing the distance between the tunnel portal and the junction would result in disruption to smooth traffic flow close to the portal and increase the risk of collisions and incidents in the area*".

1.3.7 For this response to the Secretary of State's 20 June 2022 letter, we have based our appraisals on designs that can be operated safely, in the same manner as the DCO Scheme. A junction for the Cut and Cover Tunnel Extension alternative at the same location as that for the DCO Scheme would leave insufficient distance between the junction and the extended western portal for safe operation of the proposed A303. A junction located further west at Chainage 4+900 in combination with a portal at Chainage 6+150 would provide the desirable minimum distance between slip-roads and tunnel for both normal tunnel operation and for operation of the crossover (across the central reserve) during periods when one of the tunnel bores would be closed for maintenance. The location of Longbarrow Junction at Chainage 4+900 therefore has been considered in the appraisal of this revised Cut and Cover Extension alternative.

1.3.8 Whilst our response to AL.1.29 did not refer to the alignment of the A360 in relation to the cut and cover tunnel extension alternative, the A360 has been realigned for this Cut and Cover Tunnel Extension alternative to follow a similar line to that proposed for the DCO Scheme.

Refinement of tunnel extension alternatives – Bored Tunnel Extension

1.3.9 Our response to the Examining Authority's First Written Questions on alternatives considered a design that located the western tunnel portal at Chainage 5+600, approximately 600m outside the WHS. This alternative would bring the total length of the tunnel to 4.885km. This was the location that best suited the existing topography such that ground levels slope upwards where the bored tunnel would exit, as is normal for bored tunnel construction. Our response highlighted that this would require the relocation of the Longbarrow Junction further west closer towards Winterbourne Stoke, and that the space available up to the River Till Viaduct 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[1]. A full standard junction would leave a shorter distance between the Longbarrow Junction and the western portal, which would result in disruption to smooth traffic flow close to the portal in periods of tunnel maintenance, where traffic

[1] Design Manual for Roads and Bridges: CD 122: Geometric design of grade separated junctions, clause 2.4.1 "*Compact grade separated junctions should not be used on dual- and single-carriageway roads when mainline flows are above 30,000 AADT* [Annual average daily traffic]", which is below that forecast for the A303.

would need to cross the central reserve; this would increase the risk of collisions and incidents in this area. We considered this arrangement unacceptable.

1.3.10 Since providing the examination response, National Highways teams responsible for safety standards and operational safety have confirmed that National Highways cannot support a design where the tunnel portal and junction would be in as close proximity as that considered in our response to the Examining Authority's First Written Questions on alternatives. Therefore, we have refined our design to facilitate an operationally viable arrangement that locates the western tunnel portal just outside the WHS to the west of its boundary and to the west of the A360, that is at Chainage 6+150. This western portal location would be the same as that adopted for the Cut and Cover Tunnel Extension.

1.3.11 The Longbarrow Junction proposed for the Bored Tunnel Extension alternative considered in our response to the Secretary of State's 20 June 2022 letter is the one most suited to the topography of the dry valley in which it is located: a skewed dumbbell junction to the northwest of Oatlands Hill (at Chainage 4+900). A junction in this location, in combination with a portal at chainage 6+150, provides the desirable minimum distance between junction slip road tapers and the portal, including for periods of crossovers and associated traffic management.

1.3.12 In our response to Question AL.1.29 of the Examining Authority's First Written Questions on alternatives, we considered that the A360 would need to be retained in its current position to avoid traffic rat running via unsuitable local roads through nearby communities but noted that this would remove the benefit to the WHS of removing traffic immediately beside the Winterbourne Stoke Crossroads Barrow Group asset group (AG12).

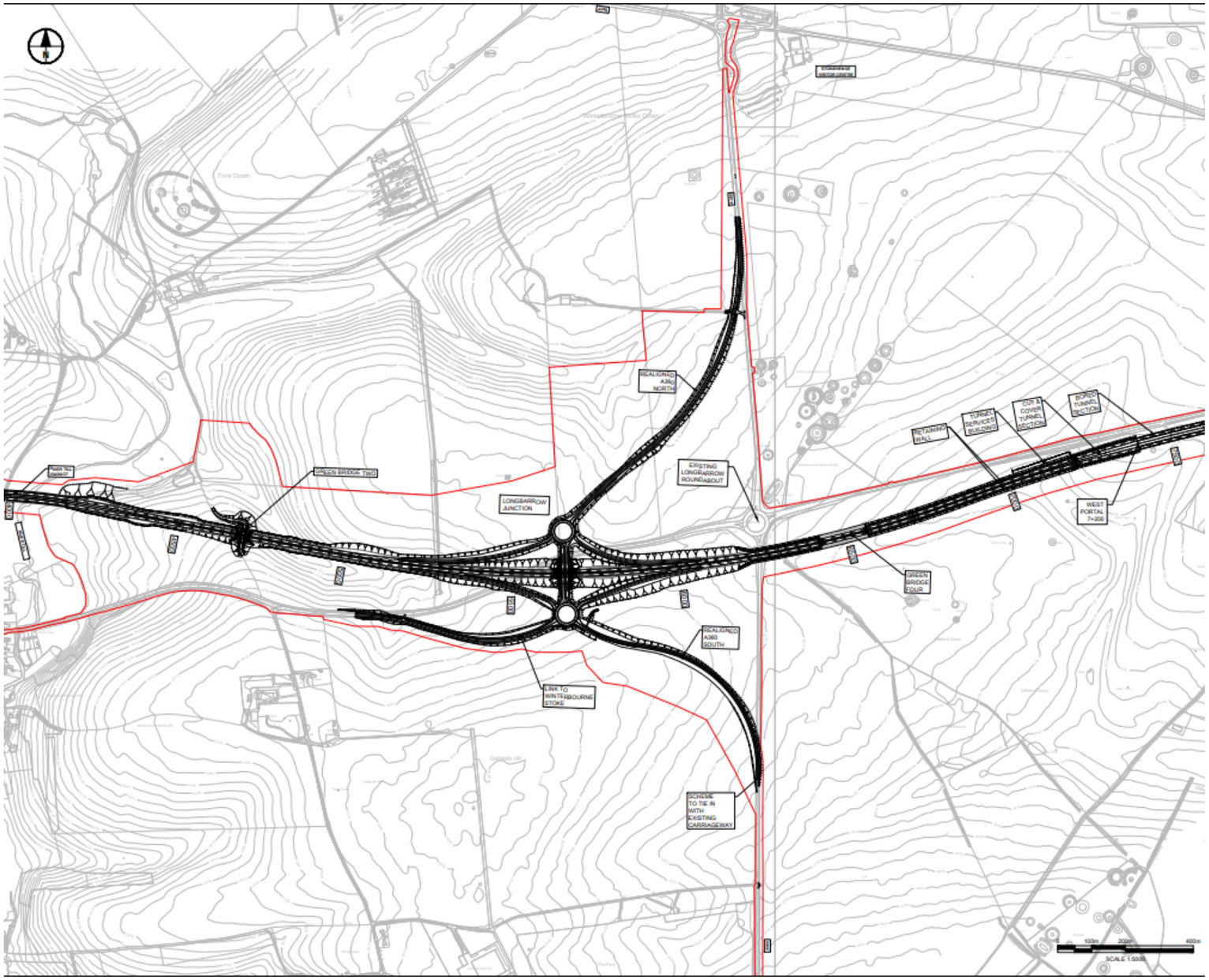
1.3.13 In responding to the Secretary of State's 20 June 2022 letter, we have considered a design where the A360 is realigned, following a similar line to that proposed for the DCO Scheme. Whilst this alignment maximises the heritage benefits to asset group AG12, it would lead to some increases of traffic diverted onto local roads, which we have set out in the Traffic Appraisal (see section 8 of this submission).

The DCO Scheme and the tunnel extension alternatives

1.3.14 The following three plans of the DCO Scheme and the two tunnel extension alternatives all show the red line boundary extent for the DCO Scheme to provide a comparison between their overall extents.

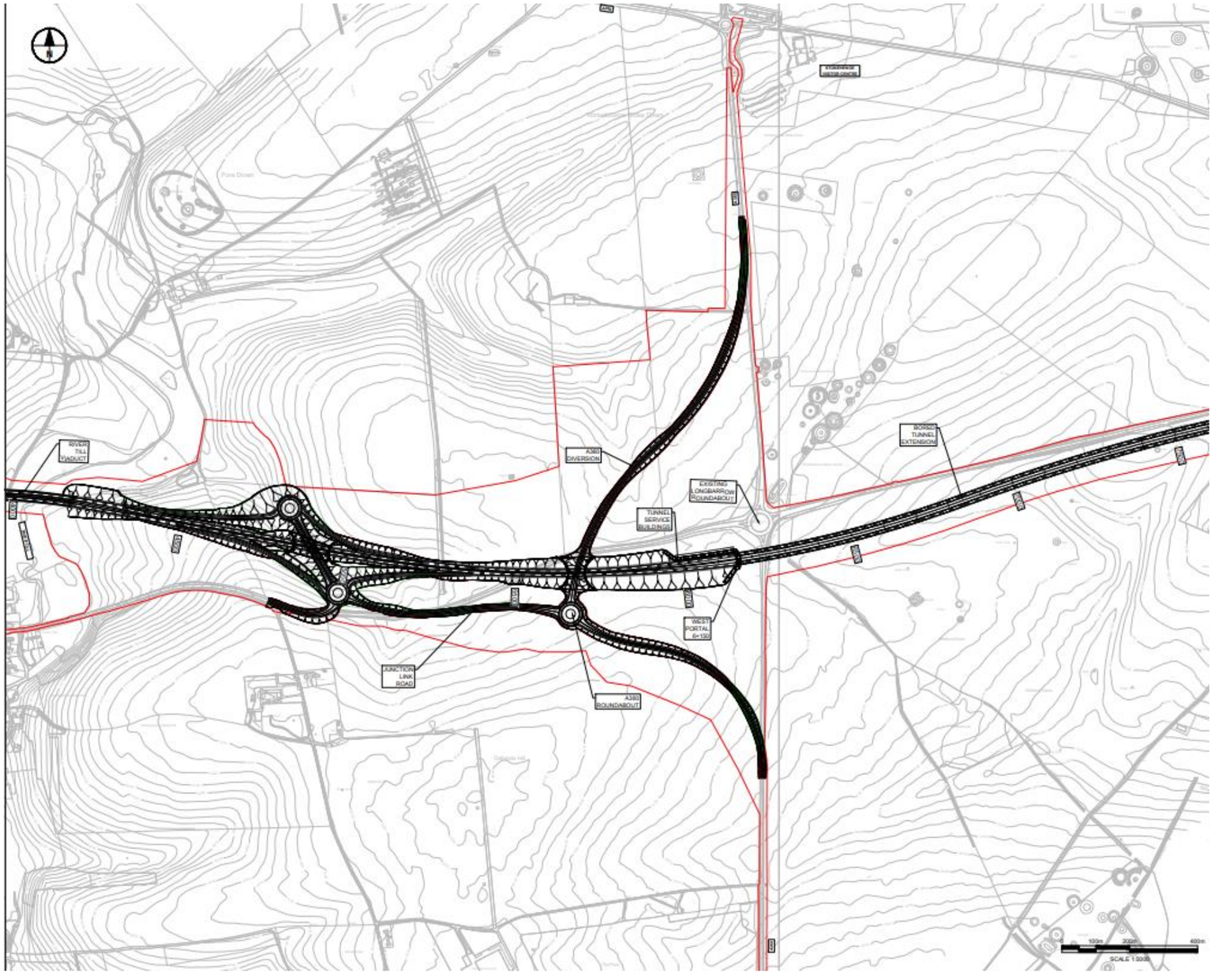
1.3.15 The general arrangement of the western end of the DCO Scheme is shown in Figure 1.

Figure 1: General arrangement of the western end of the DCO Scheme



1.3.16 The general arrangement of the western end of the Bored Tunnel Extension is shown in Figure 2.

Figure 2: General arrangement of the western end of the Bored Tunnel Extension alternative



1.3.17 The general arrangement of the western end of the Cut and Cover Tunnel Extension is shown in Figure 3.

Figure 3: General arrangement of the western end of the Cut and Cover Tunnel Extension alternative

Key features of the Bored Tunnel Extension

1.3.18 The eastern end of the tunnel would remain as proposed for the DCO Scheme. At the western end, the bored tunnel would be extended under the WHS to emerge at a portal to the west of the existing A360. There would be no surface level ground disturbance above the bored tunnel in the WHS. The western portal would be located approximately 80m outside the WHS boundary.

1.3.19 The horizontal alignment of the A303 would be as the DCO Scheme. All highway cross section widths and the structural form of the tunnel, the portals and green bridges would be as the DCO Scheme.

1.3.20 At the western end of the WHS, the vertical alignment would need to be lowered by up to 5m to accommodate the ground cover required for the Bored Tunnel Extension. Consequently, at the western end of the tunnel, the A303 finished road level would need to be at some 15m below existing ground.

1.3.21 The A360, which currently runs along the western boundary of the WHS, would be diverted to the west to pass over the realigned A303 on a new green bridge located about 450m from the tunnel portal. The diverted alignment of the A360 would be similar to that of the DCO Scheme.

1.3.22 Longbarrow Junction would take the form of a skewed dumbbell junction located in the valley north of the existing A303 and to the east of Winterbourne Stoke. The southern roundabout of the dumbbell would be connected by a new link road to a third roundabout positioned on the diverted A360. Another link from the southern roundabout of the dumbbell would tie into the existing road to Winterbourne Stoke.

1.3.23 The design of the eastern portal and its tunnel service building would be as per the DCO Scheme.

1.3.24 The western portal would be in a deeper cutting than the DCO Scheme. The combined general arrangement of the portal and of the tunnel service building would remain as per the DCO Scheme. The tunnel service building would be built into the northern slope of the approach cutting immediately outside the tunnel portal.

1.3.25 Rights of Way diversions would be similar to those proposed for the DCO Scheme except that byway open to all traffic (BOAT) WST06B would be diverted under the River Till viaduct. This is because Longbarrow Junction slip roads preclude the positioning of a bridge on the line of the existing BOAT; it is not possible to retain Green Bridge 2 as per the DCO Scheme.

1.3.26 All other elements of the alternative remain as per the DCO Scheme.

Key features of the Cut and Cover Tunnel Extension

1.3.27 The key features of the Cut and Cover Tunnel Extension are similar to the Bored Tunnel Extension except as follows.

1.3.28 The tunnel extension through the western section of the WHS would be constructed using a cut and cover technique rather than with a tunnel boring machine. This means that construction would start with excavation of a vertical sided cutting similar to the approach cutting required for the DCO Scheme. This cutting would then be roofed over and the landscape returned to match existing levels as far as practicable.

1.3.29 Cut and cover tunnels roof levels can be shallower than bored tunnels and so the vertical alignment of the A303 would not need to be lowered to the same extent as for the Bored Tunnel Extension. At the western portal the new road would need to be about 10m below existing ground level which would put it at about the same level as proposed for the DCO Scheme.

1.3.30 All other elements of the alternative remain as per the DCO Scheme.

1.4 Limitations of design and assessment

1.4.1 These tunnel extension alternatives have not been developed to the same level of design detail and assessment as that which was carried out for the DCO Scheme. For example, neither landscape nor drainage features have been designed, nor has land for temporary use during construction or for operational maintenance been identified. This means that the full construction and operational footprints that would be required for these tunnel extension alternatives, that would need to be identified to base statutory environmental impact assessment and heritage impact assessment for the purposes of a DCO application, have not been appraised or assessed. It would not be proportionate, practical or necessary to complete this level of design and statutory assessment for an alternative for which development consent is not being sought, or for multiple options. This is due to the degree of time and resource that would be required for each (i.e. the DCO Scheme and the alternatives). The Environmental Statement prepared for the October 2018 DCO application for the DCO Scheme was produced over the course of 2017 and 2018 and involved multiple teams including those required to prepare the 10 topic assessments as well as consultation with statutory bodies. It would not be proportionate to complete this level of work for alternatives as well. The level of appraisal provided in this response to the Secretary of State's letter is therefore not the same as that provided for the DCO Scheme. However, the level of appraisal detail is sufficient for the Secretary of State to understand how National Highways came to the conclusions on alternatives.

1.4.2 The Environmental Appraisals submitted (see Table 1 below) for each tunnel extension alternative assume that applicable mitigation committed to in the

environmental information for the DCO Scheme would be applied to the tunnel extension alternatives as appropriate, including implementation of relevant measures detailed in the Outline Environmental Management Plan (OEMP), and for heritage the Detailed Archaeological Mitigation Strategy (DAMS). The appraisal also assumes that where bespoke mitigation for the tunnel extension alternative would be required, this would be provided to the same level as the DCO Scheme (see paragraph 3.2.3 of documents Re-determination 4.5 and 4.6 and paragraph 1.1.9 of documents Re-determination 4.7 and 4.8).

1.5 Approach to the Applicant's response

1.5.1 The documents submitted in support of this response and their location, whether embedded in this response document or as a separate response document, are listed in the table below:

Table 1: Additional documents provided

Section / Document reference	Document
Re-determination 4.3	Outline Heritage Impact Assessment – Bored Tunnel Extension
Re-determination 4.4	Outline Heritage Impact Assessment – Cut and Cover Tunnel Extension
Re-determination 4.5	Environmental Appraisal (Heritage) – Bored Tunnel Extension
Re-determination 4.6	Environmental Appraisal (Heritage) – Cut and Cover Tunnel Extension
Re-determination 4.7	Environmental Appraisal – Bored Tunnel Extension
Re-determination 4.8	Environmental Appraisal – Cut and Cover Tunnel Extension
Section 8 of this document	Traffic Appraisal – Bored Tunnel Extension and Cut and Cover Tunnel Extension

1.5.2 In particular, in response to the final paragraph of question 2 of the Secretary of State's 20 June 2022 letter, we confirm that the Outline Heritage Impact Assessments provided for the tunnel extension alternatives confirm that the assessment of the heritage impact of alternatives has been updated to take into account the additional monuments that were added to the heritage baseline. This is confirmed in paragraph 3.9.4 of each of the Outline Heritage Impact Assessment documents. The way in which the additional assets are covered in material supplied to the Secretary of State in the re-determination process is covered in our response to question 5 of the Secretary of State's 20 June 2022 letter.

1.5.3 The methodology for the Outline Heritage Impact Assessments is set out in section 3 of documents Re-determination 4.3 and 4.4.

1.5.4 The methodology for the Environmental Appraisals (Heritage) is set out in section 3 of documents Re-determination 4.5 and 4.6.

1.5.5 The methodology for the Environmental Appraisals is set out in paragraph 3.1.2 and section 5.1 of documents Re-determination 4.7 and 4.8.

1.5.6 The methodology for the Traffic Appraisal for the tunnel extension alternatives is set out in section 8.2 of this document.

1.6 Programme implications

DCO consenting delays

1.6.1 The development of a tunnel extension alternative would involve the time required to design, assess, and consult on the proposals, before the preparation of an application for development consent. This would lead to the statutory process of examining and making a decision on the proposal, followed by, upon grant of development consent preparations for land access and construction. Whilst the tunnel extension alternatives follow the same line as the DCO Scheme, the scale of work and required process to develop either of them to the point of starting construction would take a minimum of two more years and possibly as long as four more years depending on what consenting process would be adopted. The DCO consent delay figures in the section on cost (in paragraph 1.7.5) have been included so that the Secretary of State can re-determine the DCO Scheme based on a consideration of all important and relevant matters; programme and cost are part of those important and relevant matters. They reflect the possible range of options for seeking consent for the alternatives, whether that would be by a full application resubmission (which it is considered could take approximately three - four years to prepare and consent) or by any other, untested, process (which may take less time, approximately two years).

1.6.2 Both tunnel extension alternatives also would require a longer construction period (see below) before benefits could start to be realised for cultural heritage, including dealing with the large adverse effect of the existing A303 on the WHS, biodiversity, nearby communities, the travelling public, and for regional and national economic growth.

Bored Tunnel Extension construction programme

1.6.3 The programme for tunnel construction goes through the following stages: construction of each bore, the mechanical and electrical fit-out, and testing and commissioning. Each stage is sequential, and each will require an extended duration for a longer bore.

1.6.4 Our response to Question AL.1.30 of the Examining Authority's First Written Questions on alternatives estimated that the bored tunnel extension alternative considered then would require approximately 24 more months in terms of the construction period alone. Since then, National Highways has revised its assessment of the programme implications using the understanding of the construction sequence and methodology obtained from the recent procurement of the main works contractor. This understanding and the fact that the tunnel is now shorter means that

we have been able to revise our assessment of how much longer it would take to construct the Bored Tunnel Extension.

1.6.5 The Bored Tunnel Extension would require approximately an additional 12 months to build compared to the DCO Scheme, broken down as follows:

- An additional 1.25km of twin bored tunnel, at a rate of 15-18m per day, would take approximately an additional 5 months to construct
- The mechanical and electrical fit out period would also increase proportionately, extending the construction period by approximately 5 more months
- The additional equipment required for the longer tunnel will take additional time to test and commission for which a further 2 months would be needed

Cut and Cover Tunnel Extension construction programme

1.6.6 The civil engineering work associated with the additional 1.05 km Cut and Cover Tunnel Extension would involve an additional 6 months of construction. This is 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 by 5 months and the testing and commissioning by approximately 2 months.

1.6.7 It is possible however that some of these activities could be scheduled to run concurrently. Applying a best-case construction sequence it is estimated that the Cut and Cover Tunnel Extension would require approximately an additional 12 months compared to the DCO Scheme to build.

1.7 Cost implications

1.7.1 In response to the Examining Authority's First Written Questions AL.1.29 and AL.1.30, National Highways provided estimates of the additional costs to extend the tunnel. These estimates have since been revised to align with the tunnel extension alternatives described in section 1.3 of this document, i.e. the Bored Tunnel Extension is shorter than the bored tunnel extension considered in the examination response. Moreover, as explained in section 1.6, the additional construction period for the Bored Tunnel Extension is also shorter, i.e. an additional 12 months, instead of 24 months, and is the same additional 12 months as for the Cut and Cover Tunnel Extension. We have also updated the estimates using latest market backed cost rates collected in 2021.

1.7.2 The additional direct construction costs for the Bored Tunnel Extension and Cut and Cover Tunnel Extension alternatives over the DCO Scheme are estimated as:

- Bored Tunnel Extension £340 million
- Cut and Cover Tunnel Extension £266 million

1.7.3 The additional costs of operation and maintenance for either tunnel extension alternative are estimated at £2 million per km per year. Over 60 years this would amount to another £126 million, compared to the DCO Scheme, for both tunnel extension alternatives as they are of similar length.

1.7.4 The additional costs relating to construction, operation and maintenance for the two tunnel extension alternatives described in this document compared with the DCO Scheme are summarised below.

Table 2: Summary of additional construction, operational and maintenance costs for the tunnel extension alternatives over and above that for the DCO Scheme

Scheme / alternative	Extra outturn cost over the DCO Scheme		
	Construction	Operation and Maintenance	Total
DCO Scheme	N/A	N/A	N/A
Bored Tunnel Extension	£340m	£126m	£466m
Cut and Cover Tunnel Extension	£266m	£126m	£392m

1.7.5 The additional costs of the delay required to apply for and consent the tunnel extension alternatives, as referred to in paragraph 1.6.1, also need to be taken into account. There is a possible range of options for seeking consent for the alternatives, whether that would be by a full application resubmission (which it is considered could take approximately three – four years to prepare and consent) or by any other, untested, process (which may take less time, approximately two years). DCO consent delay also would inflate the costs of the components in Table 2. The combined effect of this is that the additional costs of the DCO consent delay are estimated at between £100m (two years scenario) and £271m (four years scenario) for the Bored Tunnel Extension, and between £92m (two years scenario) and £257m (four years scenario) for the Cut and Cover Tunnel Extension.

1.8 Summary of appraisal conclusions - Bored Tunnel Extension

Outline Heritage Impact Assessment – Bored Tunnel Extension

1.8.1 The Bored Tunnel Extension offers some benefits for heritage assets and Asset Groups, above those offered by the DCO Scheme.

1.8.2 Overall, it is assessed that the effects of the Bored Tunnel Extension on OUV, Integrity and Authenticity of the WHS would be Moderate Beneficial. The effects of the DCO Scheme are assessed as Slight Beneficial.

1.8.3 Table 3 overleaf, taken from the Outline Heritage Impact Assessment, provides a summary comparison of assessment of the significance of effect of the existing A303, the DCO Scheme, and the Bored Tunnel Extension on Attributes of OUV, Integrity and Authenticity. This table considers long-term permanent change to OUV.

1.8.4 The results of the appraisal are provided in more detail in document Re-determination 4.3.

Table 3: Summary comparison from the Outline Heritage Impact Assessment of the significance of effects of the existing A303, the DCO Scheme, and the Bored Tunnel Extension on Attributes of OUV, Integrity and Authenticity

Attributes of Outstanding Universal Value	Impact of DCO Scheme	Effect of DCO Scheme	Impact of the Bored Tunnel Extension	Effect of the Bored Tunnel Extension	Impact of existing A303	Effect of existing A303
1. Stonehenge itself as a globally famous and iconic monument	Major positive change	Very Large beneficial	Major positive change	Very Large beneficial	Moderate negative	Large adverse
2. The physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites	Negligible negative change	Slight adverse	Negligible negative change	Slight adverse*	Moderate negative	Large adverse
3. The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape	Negligible negative change	Slight adverse	Negligible positive change	Slight beneficial	Minor negative	moderate adverse
4. The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy	Moderate positive change	Large beneficial	Moderate positive change	Large beneficial	Minor negative	moderate adverse
5. The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Moderate negative	Large adverse
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	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Moderate negative	Large adverse
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	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Negligible negative	Slight adverse
Integrity	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Major negative	Large adverse
Authenticity	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Negligible negative	Slight adverse
Overall assessment	**DCO Scheme**	**Slight beneficial**	**The Bored Tunnel Extension**	**Moderate beneficial**	**Existing A303**	**Large adverse**

*** slight adverse effects persist for the Bored Tunnel Extension in relation to Attribute 2 due to the impacts of the Eastern Portal**

Environmental Appraisal (Heritage) – Bored Tunnel Extension

1.8.5 The Environmental Appraisal (Heritage) for the Bored Tunnel Extension sets out the likely temporary construction, permanent construction and permanent operational effects of the construction of this tunnel extension alternative.

1.8.6 Compared to the DCO Scheme, the temporary construction activities for the Bored Tunnel Extension alternative would move further to the west, resulting in reduced adverse effects in the western part of the WHS. However, as with the DCO Scheme, there would be significant temporary adverse effects on Asset Groups AG12 Winterbourne Stoke Crossroads Barrows and AG13 Diamond Group and discrete asset NHLE 1011048, a Bronze Age enclosure and bowl barrow 100m west of Longbarrow Cross Roads on Winterbourne Stoke Down, which contribute to the OUV of the WHS; as well as AG05 Winterbourne Stoke Hill Ring Ditches.

1.8.7 With regards to permanent construction effects, the Bored Tunnel Extension would result in significant adverse effects on AG05 Winterbourne Stoke Hill Ring Ditches, due to the proximity of the skewed Longbarrow Junction adjacent to the Asset Group. This compares to the DCO Scheme, for which the Main EIA reported a non-significant adverse effect on Asset Group AG05.

1.8.8 In comparison to the DCO Scheme, construction of the Bored Tunnel Extension would remove severance in the western part of the WHS. There would be increased beneficial effects on Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 Diamond Group and the northern end of AG19 Normanton Down Barrows (AG19A Normanton Down Barrows (north)), as well as discrete assets close to the western approach cutting (NHLE 1010831, 1010832, 1010833, 1013812 and UID 2177/7092). Due to the proximity of the Bored Tunnel Extension western portal to asset NHLE 1011045, there would be Slight adverse effects on this western most asset in AG13 Diamond Group, as with the DCO Scheme. The extended tunnel would also benefit the setting of Scheduled linear boundary NHLE 1010837, in the western part of the WHS, compared to the DCO Scheme.

1.8.9 The Bored Tunnel Extension would avoid archaeological impacts along the length of the longer tunnel alignment, the archaeological remains would be retained and not impacted by construction, and the area returned to agricultural use, resulting in beneficial effects in comparison to the DCO Scheme.

1.8.10 Operationally, the effects of the Bored Tunnel Extension would be similar to those of the DCO Scheme, the principal differences being improved positive changes for Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 Diamond Group and AG19 Normanton Down Barrows (in particular AG19A Normanton Down Barrows (north). The longer tunnel would also benefit the setting of Scheduled linear boundaries 1010837 and 1010838 in the western part of the WHS.

There would be Slight adverse effects on asset NHLE 1011045 in the westernmost extent of AG13 The Diamond Group, due to the proximity of the extended tunnel western portal and the funnelling of traffic noise and exhaust fumes as traffic exits the tunnel mouth.

1.8.11 The Bored Tunnel Extension alternative would therefore offer potential benefits for cultural heritage assets and Asset Groups above those of the DCO Scheme. The longer bored tunnel would extend c. 80m beyond the western boundary of the WHS, reducing severance and impacts on archaeological remains within the WHS compared to the DCO Scheme, helping to maintain the integrity and authenticity of the WHS. Compared to the current baseline conditions the Bored Tunnel Extension would improve the physical, visual, topographical and landscape relationships between Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 The Diamond Group and AG19 Normanton Down Barrows, along with other isolated and discrete barrows in the western part of the WHS that contribute to its OUV.

1.8.12 The results of the appraisal are provided in more detail in document Re-determination 4.5.

Environmental Appraisal – Bored Tunnel Extension

1.8.13 In a comparison between the DCO Scheme and the Bored Tunnel Extension alternative, while there would be some construction and operational stage benefits for some topics, new significant adverse effects have been identified for the following topics: Visual, Noise & Vibration, People & Communities and Cumulative Effects Assessment. These are discussed in paragraphs 5.2.10; 5.2.24 and 5.2.28; 5.2.42; and 5.2.51, 5.2.55, and 5.2.56 of document Re-determination 4.7. The aspects of the design where these would occur are shown in the table overleaf.

1.8.14 Table 4 overleaf provides a summary comparison between the effects of the DCO Scheme and the Bored Tunnel Extension.

1.8.15 The results of the appraisal are provided in more detail in document Re-determination 4.7.

Table 4: Summary comparison of the DCO Scheme and the Bored Tunnel Extension

Aspect Compared	Air Quality	Landscape	Visual	Biodiversity	Noise and Vibration	Geology and Soils	Road Drainage and the Water Environment	Materials and Waste	People and Communities	Climate	Cumulative Effects Assessment
Construction											
Retention of the A360 western re-alignment with reduced infrastructure											
Extended tunnel											
More western location of Longbarrow Junction											
Changes to journeys on local roads		n/a	n/a	n/a		n/a	n/a	n/a	n/a		
Public Rights of Way	n/a	n/a		n/a		n/a	n/a	n/a		n/a	
Operation											
Retention of the A360 western re-alignment with reduced infrastructure											
Extended tunnel											
More western location of Longbarrow Junction											
Changes to journeys on local roads		n/a	n/a	n/a		n/a	n/a	n/a	n/a		
Public Rights of Way	n/a	n/a		n/a		n/a	n/a	n/a		n/a	

Key	
	The impacts of the Bored Tunnel Extension are likely to result in new adverse significant effects when compared to the DCO Scheme
	The impacts of the Bored Tunnel Extension are likely to provide new non-significant adverse effects, increase the level of adverse effects when compared to the DCO Scheme, or reduce the level of beneficial effects when compared to the DCO Scheme. For example: ○ where the Bored Tunnel Extension results in an adverse effect of slight significance, where previously there was no adverse effect, for the DCO Scheme, this is not deemed a significant effect in accordance with the methodology set out in the environmental information and confirmed in the Scoping Opinion; or ○ where an effect of the DCO Scheme has been identified as of moderate (beneficial or adverse) significance, it is deemed to be significant, so if the effect of the Bored Tunnel Extension is of large significance, while the level of effect has been increased, it remains a significant effect.
	The impacts of the Bored Tunnel Extension are likely to provide equivalent effects when compared to the DCO Scheme.
	The impacts of the Bored Tunnel Extension are likely to result in new beneficial effects, increase the level of significant and non-significant beneficial effects, or reduce adverse effects while not removing significant effects, when compared to the DCO Scheme.
n/a	Aspect not applicable to the topic.

Traffic Appraisal – Bored Tunnel Extension

1.8.16 By relocating Longbarrow Junction further west, some local routes become more appealing to drivers in terms of travel time and distance. Compared to the DCO Scheme, the Bored Tunnel Extension results in an increase in traffic on the B3083 to/from Shrewton and on The Packway, and a corresponding decrease on the A360 north and south of the A303 compared to the DCO Scheme.

1.9 Summary of appraisal conclusions - Cut and Cover Tunnel Extension

Outline Heritage Impact Assessment – Cut and Cover Tunnel Extension

1.9.1 The Cut and Cover Tunnel Extension would offer some benefits for heritage assets and Asset Groups, in addition to those offered by the DCO Scheme, but there would be similar slight adverse effects as for the DCO scheme, upon the physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites (Attribute 2), due to the removal of any archaeological remains within the footprint of the cut and cover tunnel.

1.9.2 Overall, it is assessed that the effects of the Cut and Cover Tunnel Extension on OUV, Integrity and Authenticity of the WHS would be Slight to Moderate Beneficial. The effects of the DCO Scheme are assessed as Slight Beneficial.

1.9.3 Table 5 overleaf, taken from the Outline Heritage Impact Assessment, provides a summary comparison of assessment of the significance of effect of the existing A303, the DCO Scheme, and the Cut and Cover Tunnel Extension on Attributes of OUV, Integrity and Authenticity. This table considers long-term permanent change to OUV.

1.9.4 The results of the appraisal are provided in more detail in document Re-determination 4.4.

Table 5: Summary comparison from the Outline Heritage Impact Assessment of the significance of effects of the existing A303, the DCO Scheme, and the Cut and Cover Tunnel Extension on Attributes of OUV, Integrity and Authenticity

Attributes of Outstanding Universal Value	Impact of DCO Scheme	Effect of DCO Scheme	Impact of Cut and Cover Tunnel Extension	Effect of Cut and Cover Tunnel Extension	Impact of existing A303	Effect of existing A303
1. Stonehenge itself as a globally famous and iconic monument	Major positive change	Very large beneficial	Major positive	Very large beneficial	Moderate negative	Large adverse
2. The physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites	Negligible negative change	Slight adverse	Negligible negative change	Slight adverse	Moderate negative	Large adverse
3. The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape	Negligible negative change	Slight adverse	Negligible positive change	Slight beneficial	Minor negative	Moderate adverse
4. The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy	Moderate positive change	Large beneficial	Moderate positive change	Large beneficial	Minor negative	Moderate adverse
5. The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Moderate negative	Large adverse
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	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Moderate negative	Large adverse
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	Negligible positive change	Slight beneficial	Slight positive change	Moderate beneficial	Negligible negative	Slight adverse
Integrity	Negligible positive change	Slight beneficial	Negligible positive change	Slight beneficial	Major negative	Large adverse
Authenticity	Negligible positive change	Slight beneficial	Negligible positive change	Slight beneficial	Negligible negative	Slight adverse
Overall assessment	**DCO Scheme**	**Slight beneficial**	**Cut and Cover Tunnel Extension**	**Slight/moderate beneficial**	**Existing A303**	**Large adverse**

Environmental Appraisal (Heritage) – Cut and Cover Tunnel Extension

1.9.5 The Environmental Appraisal (Heritage) for the Cut and Cover Tunnel Extension sets out the likely temporary construction, permanent construction and permanent operational effects of the construction of this tunnel extension alternative.

1.9.6 The temporary construction activities for the Cut and Cover Tunnel Extension would be very similar to the DCO Scheme, with significant adverse effects on a number of Asset Groups that contribute to the OUV of the WHS, including Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 Diamond Group and AG19 Normanton Down Barrows. Discrete and isolated assets that contribute to the OUV of the WHS, close to the construction cutting for the cut and cover tunnel, would also experience significant temporary adverse effects (NHLE 1010831, 1010832, 1010833, 1013812, 1011048 and UID 2177 / 7092). Several heritage assets and Asset Groups that do not contribute to the OUV of the WHS would also experience significant adverse effects during construction of the Cut and Cover Tunnel Extension, including AG05 Winterbourne Stoke Hill Ring Ditches and a scheduled linear boundary (NHLE 1010837).

1.9.7 With regards to permanent construction effects, the Cut and Cover Tunnel Extension would result in significant adverse effects on AG05 Winterbourne Stoke Hill Ring Ditches, due to the proximity of the skewed Longbarrow Junction adjacent to the Asset Group. This is in contrast to the DCO Scheme, for which the Main EIA reported a non-significant adverse effect on Asset Group AG05.

1.9.8 As with the DCO Scheme, the Cut and Cover Tunnel Extension would entail the removal of archaeological remains within its footprint along its alignment, from chainage 6+150 to the western portal at chainage 7+400.

1.9.9 Compared to the DCO Scheme, construction of the Cut and Cover Tunnel Extension would remove severance in the western part of the WHS. There would be increased beneficial effects on Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 Diamond Group and the northern end of AG19 Normanton Down Barrows (AG19A Normanton Down Barrows (north)), as well as discrete assets close to the western approach cutting (NHLE 1010831, 1010832, 1010833, 1013812 and UID 2177/7092. Due to the proximity of the Cut and Cover Tunnel Extension western portal to asset NHLE 1011045, there would be Slight adverse effects on this westernmost asset in AG13 The Diamond Group, as with the DCO Scheme. The Cut and Cover Tunnel Extension would also benefit the setting of Scheduled linear boundary NHLE 1010837, in the western part of the WHS, compared to the DCO Scheme.

1.9.10 Construction of the Cut and Cover Tunnel Extension would require the removal of archaeological remains within the WHS over the same footprint as for the DCO Scheme, with the area returned to agricultural use once constructed rather than reverting to chalk grassland.

1.9.11 Operationally, the effects of the Cut and Cover Tunnel Extension would be similar to those of the DCO Scheme, the principal differences being improved positive changes for Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 The Diamond Group and AG19 Normanton Down Barrows (in particular AG19A Normanton Down Barrows (north)), due to the covering over of the cutting in the western part of the WHS. This would also benefit the setting of Scheduled linear boundaries 1010837 and 1010838 in the western part of the WHS. There would be Slight adverse effects on asset NHLE 1011045 in the westernmost extent of AG13 The Diamond Group, due to the proximity of the extended cut and cover tunnel western portal and the funnelling of traffic noise and exhaust fumes as traffic exits the tunnel mouth.

1.9.12 The Cut and Cover Tunnel Extension would therefore offer potential benefits for cultural heritage assets and Asset Groups, above those of the DCO Scheme. The cut and cover tunnel would extend c. 80m beyond the western boundary of the WHS, reducing severance and helping to maintain the integrity of the WHS once constructed. Compared to the current baseline conditions, the Cut and Cover Tunnel Extension would improve the physical, visual, topographical and landscape relationships between Asset Groups AG12 Winterbourne Stoke Crossroads Barrows, AG13 The Diamond Group and AG19 Normanton Down Barrows, along with other isolated and discrete barrows in the western part of the WHS that contribute to its OUV. However, the benefits of the Cut and Cover Tunnel Extension would be tempered due to the removal of archaeological remains within the cut and cover tunnel footprint and the presence during construction of a cutting in the western part of the WHS, as with the DCO Scheme.

1.9.13 The results of the appraisal are provided in more detail in document Re-determination 4.6.

Environmental Appraisal – Cut and Cover Tunnel Extension

1.9.14 In a comparison between the DCO Scheme and the Cut and Cover Tunnel Extension alternative, while there would be some operational stage benefits for some topics, new significant adverse effects have been identified for the following topics: Visual, Noise & Vibration, People & Communities and Cumulative Effects Assessment. These are discussed in paragraphs 5.2.16; 5.2.24 and 5.2.28; 5.2.41; and 5.2.50, 5.2.54, and 5.2.55 of document Re-determination 4.8. The aspects of the design where these would occur are shown in the table overleaf.

1.9.15 Table 6 overleaf provides a summary comparison between the effects of the DCO Scheme and the Cut and Cover Tunnel Extension.

1.9.16 The results of the appraisal are provided in more detail in document Re-determination 4.8.

Table 6: Summary comparison of the DCO Scheme and the Cut and Cover Tunnel Extension

Aspect Compared	Air Quality	Landscape	Visual	Biodiversity	Noise and Vibration	Geology and Soils	Road Drainage and the Water Environment	Materials and Waste	People and Communities	Climate	Cumulative Effects Assessment
Construction											
Retention of the A360 western re-alignment with reduced infrastructure											
Extended tunnel											
More western location of Longbarrow Junction											
Changes to journeys on local roads		n/a	n/a	n/a		n/a	n/a	n/a	n/a		
Public Rights of Way	n/a	n/a		n/a		n/a	n/a	n/a		n/a	
Operation											
Retention of the A360 western re-alignment with reduced infrastructure											
Extended tunnel											
More western location of Longbarrow Junction											
Changes to journeys on local roads		n/a	n/a	n/a		n/a	n/a	n/a	n/a		
Public Rights of Way	n/a	n/a		n/a		n/a	n/a	n/a		n/a	

Key	
	The impacts of the Cut and Cover Tunnel Extension are likely to result in new adverse significant effects when compared to the DCO Scheme
	The impacts of the Cut and Cover Tunnel Extension are likely to provide new non-significant adverse effects, increase the level of adverse effects when compared to the DCO Scheme, or reduce the level of beneficial effects when compared to the DCO Scheme. For example: ○ where the Cut and Cover Tunnel Extension results in an adverse effect of slight significance, where previously there was no adverse effect, for the DCO Scheme, this is not deemed a significant effect in accordance with the methodology set out in the environmental information and confirmed in the Scoping Opinion; or ○ where an effect of the DCO Scheme has been identified as of moderate (beneficial or adverse) significance, it is deemed to be significant, so if the effect of the Cut and Cover Tunnel Extension is of large significance, while the level of effect has been increased, it remains a significant effect.
	The impacts of the Cut and Cover Tunnel Extension are likely to provide equivalent effects when compared to the DCO Scheme.
	The impacts of the Cut and Cover Tunnel Extension are likely to result in new beneficial effects, increase the level of significant and non-significant beneficial effects, or reduce adverse effects while not removing significant effects, when compared to the DCO Scheme.
n/a	Aspect not applicable to the topic.

Traffic Appraisal – Cut and Cover Tunnel Extension

1.9.17 By relocating Longbarrow Junction further west, some local routes become more appealing to drivers in terms of travel time and distance. Compared to the DCO Scheme, the Cut and Cover Extension results in an increase in traffic on the B3083 to/from Shrewton and on The Packway, and a corresponding decrease on the A360 north and south of the A303 compared to the DCO Scheme.

1.10 Overall conclusion

1.10.1 As set out in section 1.2 of this document, in our response to the Examining Authority's First Written Questions on alternatives, National Highways concluded that:

- The cut and cover tunnel extension and the bored tunnel extension alternatives have been "*assessed as slightly more beneficial than the Scheme*" in heritage terms alone

- The reason for rejecting the cut and cover tunnel extension and the bored tunnel extension alternatives was the same for each alternative: that the "*consideration of the balance of benefits and disbenefits would not justify the significant additional cost … over and above the cost of the Proposed Scheme*"

- "*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*"

1.10.2 The information supplied in response to question 2 of the Secretary of State's 20 June 2022 letter supports the conclusions we presented at examination.

1.10.3 We have revisited the tunnel extension alternatives and developed them to optimise the heritage benefits whilst retaining the operational requirements of the DCO Scheme. Given the time that has elapsed since examination, we have validated through balanced appraisal that our previous conclusions remain robust.

1.10.4 The DCO application Heritage Impact Assessment [APP-195] for the DCO Scheme concluded that "*Overall, the Scheme is assessed to have a Slight Beneficial effect on the OUV of the WHS as a whole*" (paragraph 12.4.5). Compared to the DCO Scheme, the Bored Tunnel Extension and the Cut and Cover Tunnel Extension alternatives would offer potential additional benefits for cultural heritage assets and Asset Groups (see the Environmental Appraisal (Heritage) for each alternative, Re-determination 4.5 and 4.6). The overall assessment of the Outline Heritage Impact Assessment for the Bored Tunnel Extension (Re-determination 4.3) is that its impacts would be Moderate beneficial. The overall assessment of the Outline Heritage Impact Assessment for the Cut and Cover Tunnel Extension (Re-determination 4.4) is that its impacts would be Slight/moderate beneficial. Therefore, the difference in impact between the DCO Scheme and each of the tunnel extension alternatives, in heritage terms, remains that the alternatives are slightly more beneficial than the DCO Scheme.

1.10.5 The Bored Tunnel Extension and the Cut and Cover Tunnel Extension Environmental Appraisals (Re-determination 4.7 and 4.8) identify new adverse significant effects in some topics – Noise and Vibration, Visual, People and Communities, and Cumulative Effects - for each alternative when compared to the DCO Scheme. No new significant beneficial effects have been identified for either tunnel extension alternative.

1.10.6 The Traffic Appraisal covering the tunnel extension alternatives (section 8 of this document) demonstrates that, by relocating Longbarrow Junction further west, as required by the design of the alternatives, the B3083 (a more minor road) sometimes would become a shorter and in some instances faster route than the A360. This would result in an increase in traffic on the minor B3083 to/from Shrewton and on The Packway, and a corresponding decrease on the A360 north and south of the A303 compared to the DCO Scheme.

1.10.7 The additional cost of bringing forward and implementing either of the tunnel extension alternatives would remain significant. To achieve the slight increase in heritage benefits, above the level of beneficial impact that already would be achieved by the DCO Scheme, an additional £466m would be needed for the Bored Tunnel Extension and an additional £392m for the Cut and Cover Tunnel Extension to cover the cost of constructing, operating and maintaining the tunnel extension alternatives.

1.10.8 Moreover, there would be a considerable delay in bringing forward either tunnel extension alternative, including at least another two more years to start of construction, with the construction period taking a further 12 months longer for each alternative than that required for the DCO Scheme. This would result in further delay in resolving the current economic growth, transport, cultural heritage, community and environmental problems that affect the existing A303 route, as set out in the Case for the Scheme and NPS Accordance DCO application document, and to deliver the much-needed benefits to the South West region.

1.10.9 In conclusion, this response to question 2 of the Secretary of State's 20 June 2022 letter demonstrates that the DCO Scheme remains the preferred scheme to deliver the benefits, and to resolve the large adverse effect of the existing A303 on the OUV of the WHS. In carrying out a balanced appraisal of the benefits and disbenefits relating to heritage, environment, traffic, programme and cost, we conclude that the additional cost of each alternative over and above the DCO Scheme would not deliver meaningful additional benefits to the WHS that would justify either alternative being taken forward.

2 Outline Heritage Impact Assessment – Bored Tunnel Extension

Presented as a separate document reference 4.3

3 Outline Heritage Impact Assessment – Cut and Cover Tunnel Extension

Presented as a separate document reference 4.4

4 Environmental Appraisal (Heritage) – Bored Tunnel Extension

Presented as a separate document reference 4.5

5 Environmental Appraisal (Heritage) – Cut and Cover Tunnel Extension

Presented as a separate document reference 4.6

6 Environmental Appraisal – Bored Tunnel Extension

Presented as a separate document reference 4.7

7 Environmental Appraisal – Cut and Cover Tunnel Extension

Presented as a separate document reference 4.8

8 Traffic Appraisal – Bored Tunnel and Cut and Cover Extension

8.1 Introduction

8.1.1 This appraisal presents analysis of the forecast traffic impact of both the Bored Tunnel Extension and the Cut and Cover Extension, both of which includes the same relocation of the Longbarrow junction further west when compared to the DCO Scheme.

8.1.2 The analysis focuses on the forecast changes in traffic flows and journey times for both alternatives compared to the DCO Scheme and the without scheme forecasts. The most recent traffic models developed at National Highways Project Control Framework (PCF) Stage 5 have been used as a basis for this assessment.

8.1.3 National Highways' response in January 2022 to the Secretary of State's Statement of Matters (Transport Assessment Review, re-determination 1.4.1) sets out the change in traffic forecasts resulting from moving from the DCO assessment to the PCF Stage 5 assessment. This concluded that there are no major substantive changes relating to the traffic impact of the scheme.

8.1.4 Following this introductory section, the remainder of this appraisal is structured as follows:

- Section 8.2 outlines the methodology used for this appraisal
- Section 8.3 presents analysis and potential impacts on traffic flows
- Section 8.4 presents analysis and potential impacts on journey times
- Section 8.5 summarises the potential impacts of the extensions

8.1.5 This note shows that relocating the Longbarrow junction further west has increased the distance and journey times for trips using the A360 compared to the DCO Scheme. For routes where the B3083 is a viable option, this has become a shorter and in some instances faster route than the A360, leading to increase in traffic on the B3083.

8.2 Methodology

8.2.1 The Bored Tunnel Extension and the Cut and Cover Tunnel Extension designs have been assessed in accordance with the A303 A2BD (Stonehenge) Coding Manual.

8.2.2 The new A360 roundabout to the east of the Longbarrow grade separated junction has been modelled as a signalised roundabout.

8.2.3 Four time periods have been appraised: AM, IP, PM and Busy Day.

8.3 Traffic Impact

8.3.1 Results show that there is some reassignment of vehicles from the A360 to the B3083 between the Longbarrow junction and Shrewton compared to the DCO Scheme. There is also a reduction in trips on the A303 east of Longbarrow, with corresponding increases in traffic flow dispersed between several other routes, includes The Packway, A343, A338, A342 and other local roads. The change in traffic flow on these routes is typically less than 100 vehicles per day per direction, with the exception of The Packway and A343.

8.3.2 Table 7 shows the difference in trips between the tunnel extension alternatives and the DCO Scheme models for the four modelled time periods:

- AM peak average hour (AM)
- Inter Peak average hour (IP)
- PM peak average hour (PM)
- Busy Day average hour (Busy Day)

8.3.3 The table also includes the 24 hour Average Annual Daily Traffic (AADT), which is calculated from the four time periods above as shown in a flow schematic diagram in Figure 4.

8.3.4 Table 8 shows the difference in trips between the alternatives and the without scheme models. All trips are shown to the nearest hundred vehicles. The changes in trips arise from the change in distance and time of the journeys as described below.

Table 7: Flow Difference between the tunnel extension alternatives and DCO Scheme

Traffic Flow Difference between the tunnel extension alternatives and DCO Scheme						
Section	**Direction**	**Time Period**				
		AM	**IP**	**PM**	**Busy Day**	**AADT**
A303 North of Wylye, East of A36 junction	EB	0	0	0	0	0
	WB	0	0	0	0	-300
A303 West of Amesbury	EB	-200	-100	-200	-200	-1700
	WB	-100	-100	-100	-100	-1600
A303 South of Bulford, East of Solstice Park	EB	-100	0	0	0	-500
	WB	0	0	0	0	-500
B3083, to/from Shrewton	NB	100	100	100	100	1000

	SB	200	100	100	100	1200
B3083 South of Winterbourne stoke	NB	0	0	0	0	-100
	SB	0	0	0	0	0
A360 Longbarrow Lane, North of A303	NB	-100	-100	-100	0	-900
	SB	-200	-100	-100	-100	-1400
A360 South of A303	NB	0	0	0	0	-600
	SB	0	0	0	-100	-500
B3086 between Shrewton and The Packway	EB	0	0	0	0	-200
	WB	0	0	0	0	0
The Packway, Larkhill	EB	100	0	100	100	700
	WB	0	0	0	0	500
A343 Lopcombe	EB	0	0	0	0	100
	WB	0	0	0	0	200

Figure 4: Total AADT tunnel extension alternatives minus DCO Scheme

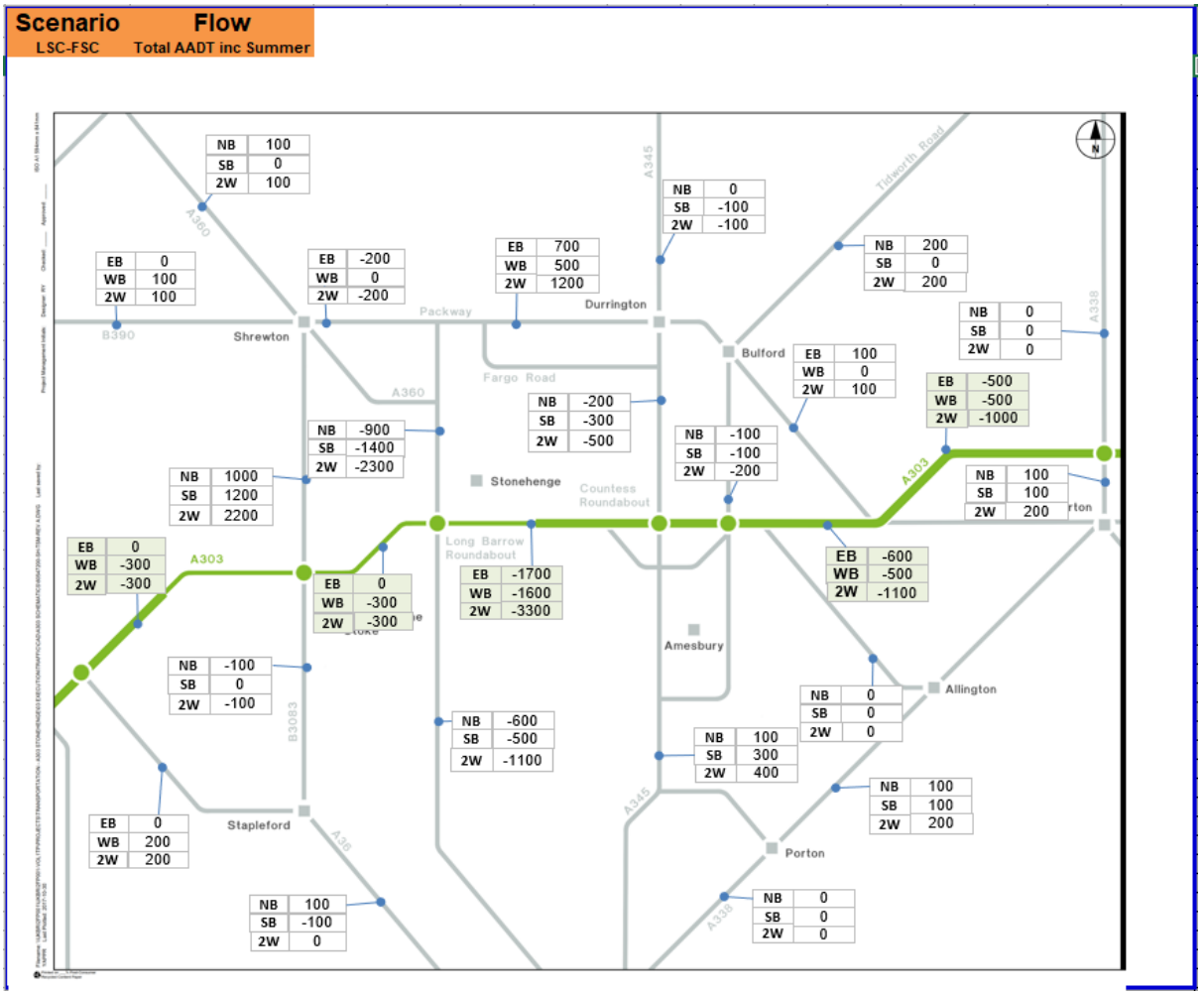


Table 8: Flow Difference between tunnel extension alternatives and without scheme

Traffic Flow Difference between tunnel extension alternatives and without scheme						
Section	**Direction**	**Time Period**				
		AM	**IP**	**PM**	**Busy Day**	**AADT**
A303 North of Wylye, East of A36 junction	EB	400	300	300	700	4900
	WB	300	400	400	800	6200
A303 West of Amesbury	EB	600	300	200	1400	6400
	WB	400	400	600	1600	7700
A303 South of Bulford, East of Solstice Park	EB	300	200	200	700	3900
	WB	100	200	200	500	3000
B3083, to/from Shrewton	NB	100	100	100	0	1000
	SB	200	100	100	100	1300
B3083 South of Winterbourne stoke	NB	0	0	0	100	200
	SB	0	0	0	0	100
A360 Longbarrow Lane, North of A303	NB	-200	-100	-100	-300	-2300
	SB	-200	-100	-200	-600	-2900
A360 South of A303	NB	0	0	0	0	-200
	SB	0	0	0	200	500
B3086 between Shrewton and The Packway	EB	-100	0	0	-400	-1000
	WB	0	0	-100	-100	-700
The Packway, Larkhill	EB	-100	0	0	-500	-1300
	WB	0	-100	-100	-600	-1700
A343 Lopcombe	EB	0	0	0	-100	-200
	WB	0	0	0	-100	-200

8.3.5 Table 9 summarises the differences in 4 hour AADT flows. Absolute and percentage differences are presented for the PCF Stage 3 DCO application forecasts, PCF Stage 5 post decision forecasts and tunnel extension alternatives assignments.

Table 9: Comparison of 24hr AADT Traffic Flow Changes by Scenario

Section	**Direction**	**PCF Stage 5 Without Scheme**	**PCF Stage 5 DCO Scheme Impact**	**Tunnel extension alternative Impact**	**PCF Stage 5 DCO Scheme Impact (%)**	**Tunnel extension alternative Impact (%)**
A303 North of Wylye , East of A36 junction	EB	14,500	4900	4900	34%	34%
	WB	14,000	6500	6200	47%	44%
A303 West of Amesbury	EB	16,600	8100	6400	49%	38%
	WB	16,700	9300	7700	55%	46%

A303 South of Bulford , East of Solstice Park	EB	22,600	4500	3900	20%	17%
	WB	24,300	3500	3000	14%	12%
B3083, to/from Shrewton	NB	700	0	1000	-4%	150%
	SB	400	100	1300	21%	298%
B3083 South of Winterbourne stoke	NB	300	300	200	113%	77%
	SB	400	100	100	16%	13%
A360 Longbarrow Lane , North of A303	NB	7,900	-1400	-2300	-18%	-29%
	SB	9,200	-1500	-2900	-16%	-32%
A360 South of A303	NB	7,700	400	-200	6%	-2%
	SB	12,000	1000	500	13%	7%
B3086 between Shrewton and The Packway	EB	3,100	-1300	-1000	-44%	-32%
	WB	2,200	-700	-700	-34%	-32%
The Packway, Larkhill	EB	5,500	-2100	-1300	-38%	-25%
	WB	5,200	-2200	-1700	-43%	-33%
A343 Lopcombe	EB	5,100	-300	-200	-5%	-3%
	WB	5,500	-400	-200	-7%	-4%

8.4 Journey Route and Times Analysis

8.4.1 Journey times and distances of routes travelling to destinations using Longbarrow junction and potential tunnel extension alternative routes, for the AM, PM and the Busy Day periods, were analysed from the DCO Scheme and the tunnel extension alternative traffic models. Routes which are likely to use the Longbarrow junction have been analysed and the potential impacts on journey times are presented in this section.

8.4.2 Figure 5 and Figure 6 show the North to East movement from the A360 to the A303 through Longbarrow junction for the DCO scheme and the tunnel extension alternative respectively. These illustrate the reason for the Shrewton to Double Hedges movement being 2.5km longer for the tunnel extension alternative compared to the DCO scheme. Figure 7 and Figure 8 show the North to East movement from the B3083 to the A303 for the two schemes.

Figure 5: North to East movement on A360 to A303 through Longbarrow junction for DCO Scheme

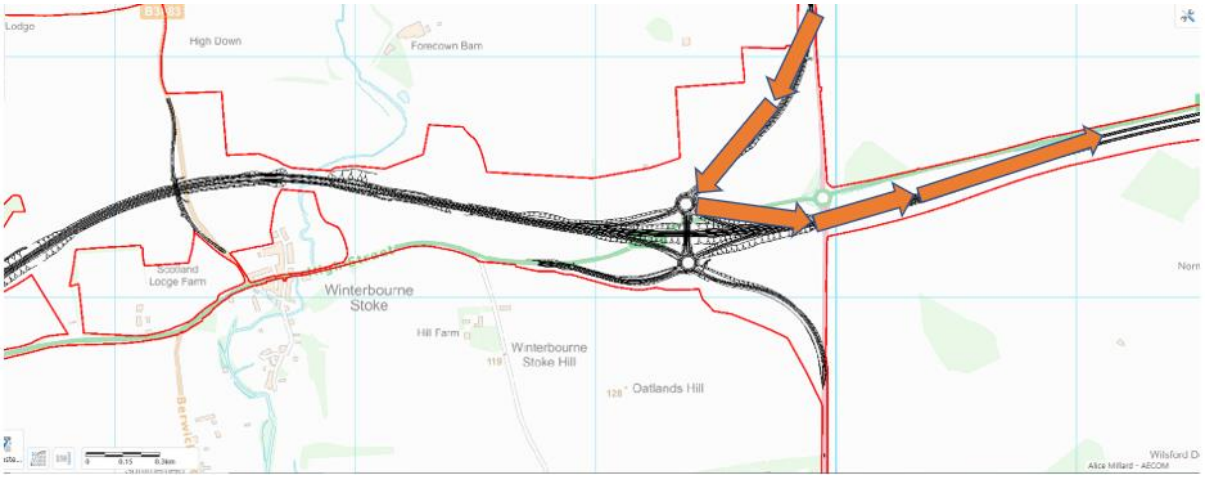


Figure 6: North to East movement on A360 to A303 through Longbarrow junction for the tunnel extension alternatives

Figure 7: North to East movement on B3083 to A303 through Longbarrow junction for DCO Scheme

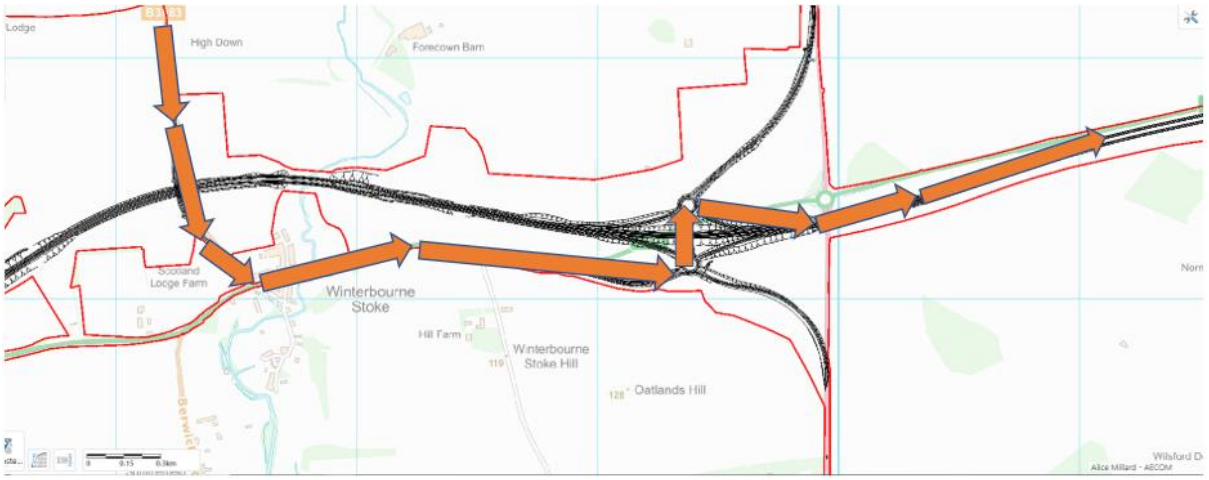
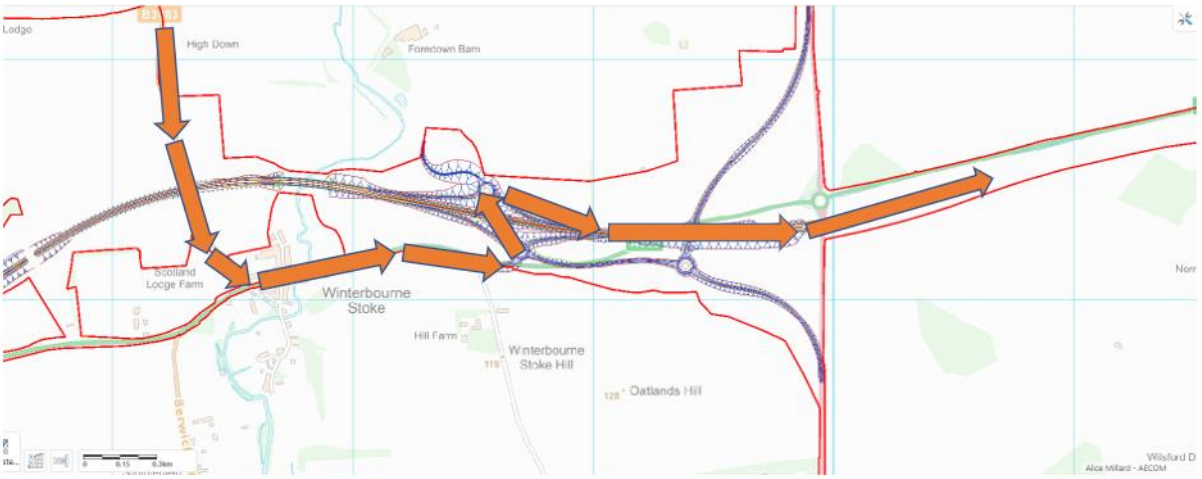


Figure 8: North to East movement on B3083 to A303 through Longbarrow junction for the tunnel extension alternatives



8.4.3 Table 10 shows that for trips traveling from Shrewton to Double Hedges eastbound, the route via the A303/A360 provides the fastest journey time in all time periods for the DCO Scheme model.

8.4.4 The A303/A360 route is 2.5km longer in the with scheme tunnel extension alternative design compared to the DCO Scheme which is creating an increase of approximately two minutes in journey times. The route via the B3083 provides the fastest journey time in all time periods for the with scheme tunnel extension alternative design. With the tunnel extension alternative design in place, journey times using the B3083 are on average 30-40 seconds quicker compared to the A360 route.

8.4.5 An increase in travel time for the A360 South to A303 East also results in additional rerouting of traffic. The increase in travel distance and resulting increase in travel time for trips travelling from Salisbury to Andover along the A360 and A303 means other routes become a more viable alternative, for example the A30/A343 route and other local roads between Salisbury and Andover.

Table 10: Shrewton to Double Hedges Route Journey Times (mm:ss – quickest routes highlighted in yellow)

Shrewton to Double Hedges								
Route	DCO Scheme				Tunnel extension alternatives			
	Distance (km)	Travel Time (mm:ss)			Distance (km)	Travel Time (mm:ss)		
		AM	PM	Busy Day		AM	PM	Busy Day
via A303/A360	16.0	11:09	10:46	11:23	18.5	13:11	12:59	13:31

via Packway/Countess roundabout	16.3	15:35	15:58	15:20	16.3	15:46	16:02	15:28
via B3083	16.1	12:57	12:40	13:12	16.7	12:40	12:21	12:48

8.4.6 Figure 9 and Figure 10 show the East to North movement from the A303 to the A360 through Longbarrow junction for the DCO scheme and the tunnel extension alternatives respectively. These indicate the reason for the tunnel extension alternatives being 1.6km longer than the DCO scheme. Figure 11 and Figure 12 show the East to North movement from the A303 to the B3083 for the two schemes.

Figure 9: East to North movement on A303 to A360 through Longbarrow junction for DCO Scheme

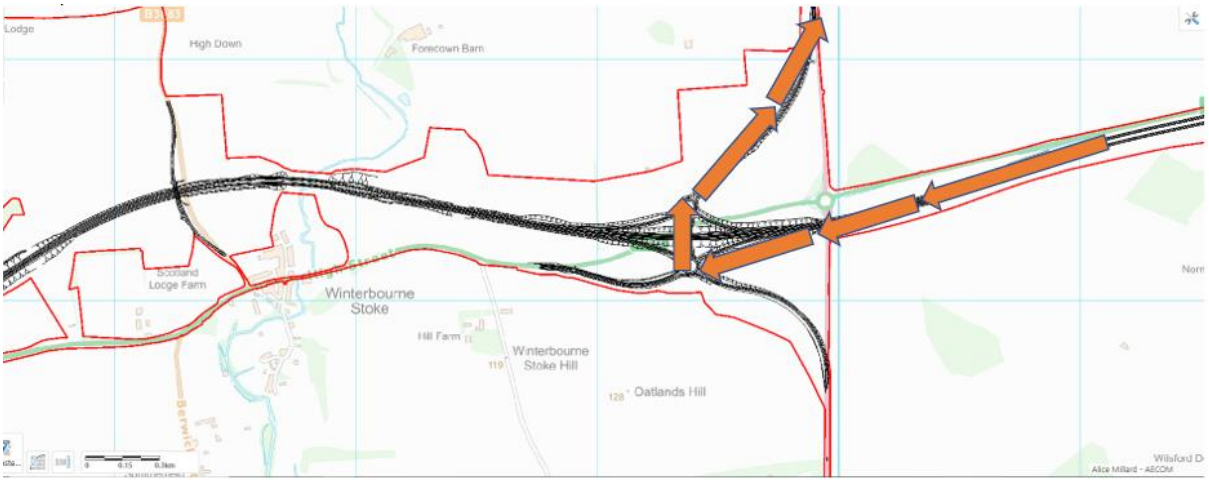


Figure 10: East to North movement on A303 to A360 through Longbarrow junction for tunnel extension alternatives

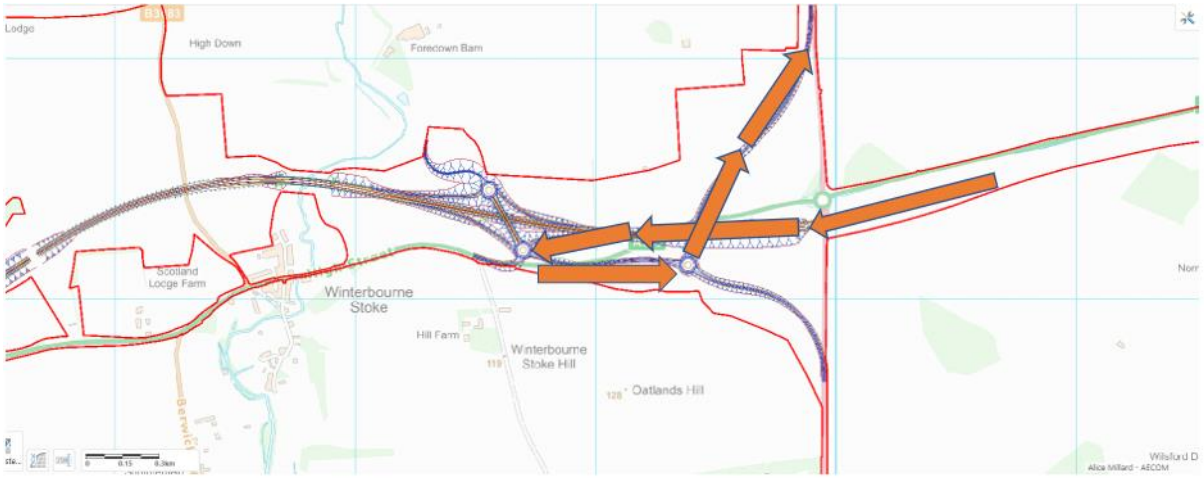


Figure 11: East to North movement on A303 to B3083 through Longbarrow junction for DCO Scheme

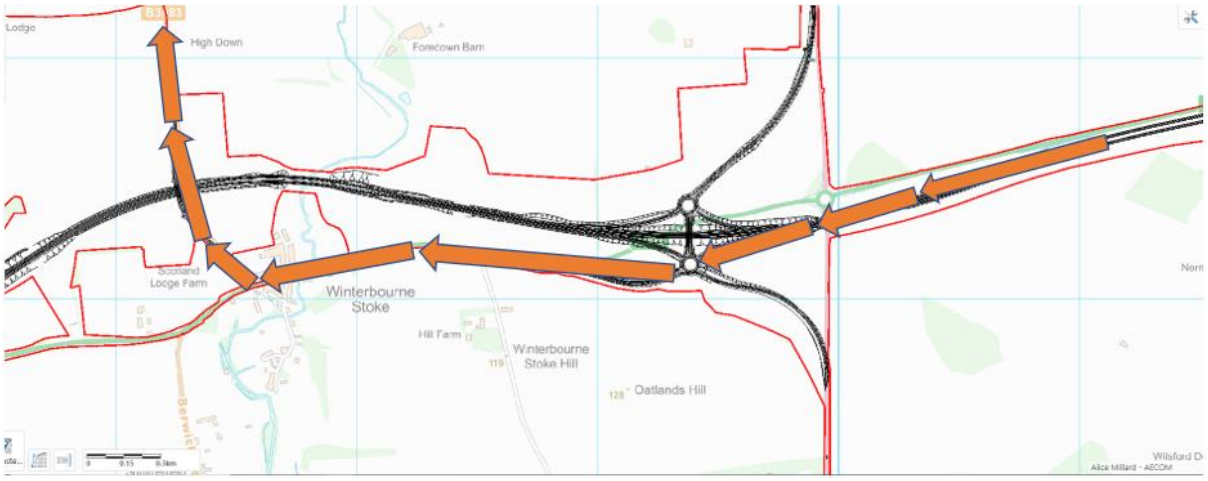


Figure 1: East to North movement on A303 to B3083 through Longbarrow junction for tunnel extension alternatives

8.4.7 Table 11 shows that for those traveling westbound from Double Hedges to Shrewton the route via the A303/A360 provides the fastest journey time for all time periods for the DCO scheme model.

8.4.8 The A303/A360 is 1.6km longer in the with scheme tunnel extension alternative design compared to the DCO Scheme. For the tunnel extension alternative design, the journey times via the A360 and B3083 from Double Hedges to Shrewton are similar. The B3083 journey times are marginally faster than the A360 route and would therefore offer a viable alternative to the A360 in terms of travel time. The journey distance via the B3083 compared to the A360 is considerably shorter, by 1.8km, making the B3083 route more appealing in terms of journey distance.

8.4.9 There is also an increase in travel time for the A303 East to A360 South, which results in some additional rerouting between Andover and Salisbury. Routes

such as the A30/A343 and local routes become a more viable alternative compared to the A303/A360, which results in a decrease in traffic on the A303 between Andover and Longbarrow.

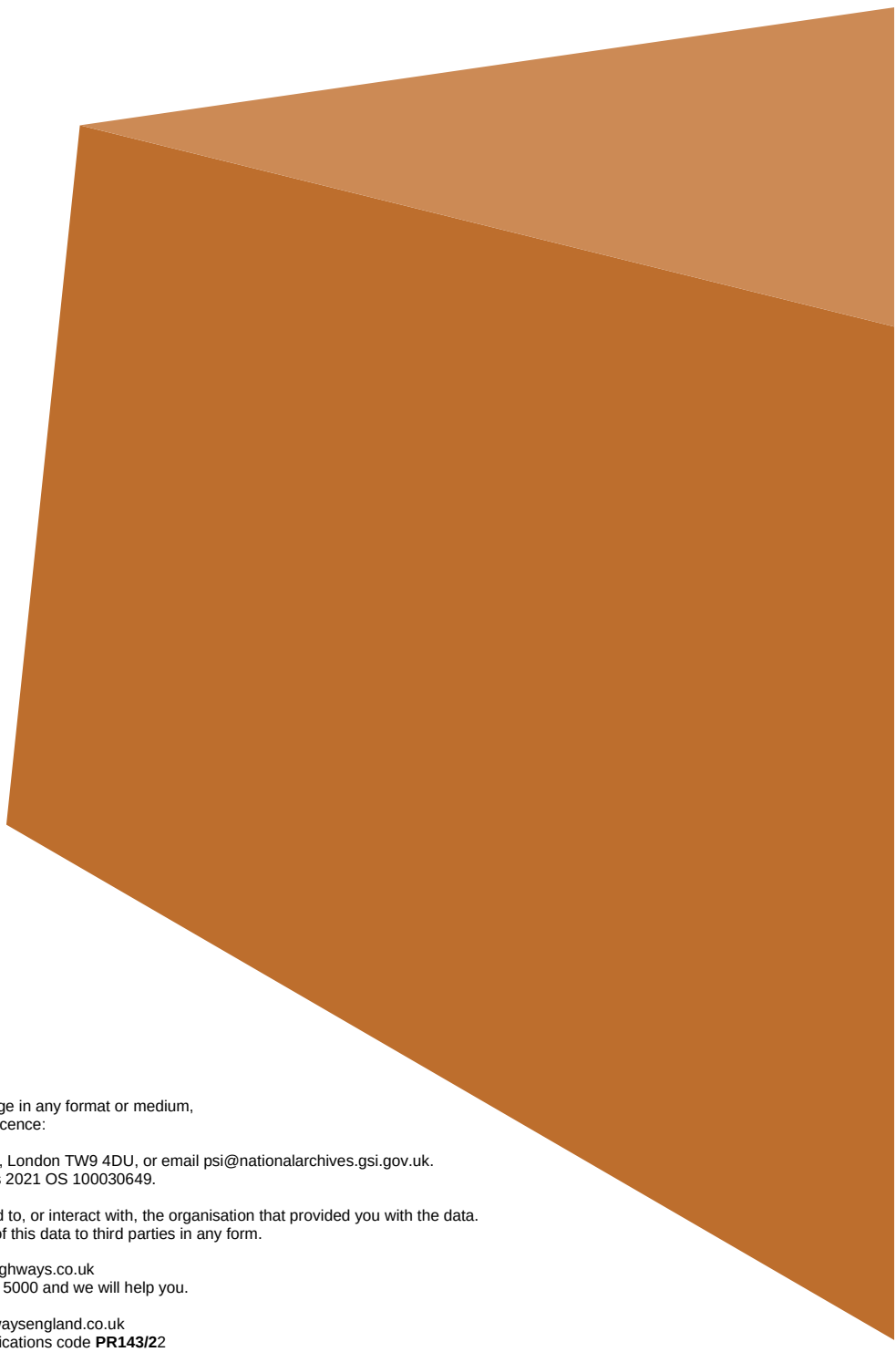
Table 11: Double Hedges to Shrewton Route Journey Times (mm:ss)

Double Hedges to Shrewton								
Route	DCO Scheme				Tunnel extension alternatives			
	Distance (km)	Travel Time			Distance (km)	Travel Time		
		AM	PM	Busy Day		AM	PM	Busy Day
via A303/A360	16.3	11:50	11:59	12:34	17.9	11:42	11:57	12:27
via Packway/Countess roundabout	16.5	17:28	16:17	15:48	16.5	17:27	16:20	15:47
via B3083	15.7	12:17	12:29	13:01	16.1	11:41	11:52	12:19

8.5 Conclusion for Traffic Appraisal

8.5.1 This appraisal shows that the tunnel extension alternatives have an impact on traffic flow and journey times on the A360 and B3083 compared to the DCO Scheme.

8.5.2 Relocating the Longbarrow further west as in the tunnel extension alternatives increases the distance and journey times of the routes tested that use the Longbarrow junction onto the A360 compared to the DCO Scheme. For routes where the B3083 is a viable option, this has become a shorter and in some instances faster route than the A360, leading to increase in traffic on the B3083 in the tunnel extension alternatives forecast.



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