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

Scheme Reference: TR010025

Written Representation

Transport Planning and Economics Issues

for

The Stonehenge Alliance (Reference No. 2001870)

By Dr. Simon Temple

Summary

S.1. Weak Case for Intervention

S1.1. The National Policy Statement for National Networks and Highways England's Road Investment Strategy are clear that projects need to be justified on their individual merits. Stonehenge Alliance considers that the case for intervention in this case is weak.

S1.2. Highways England's assertion that traffic flows exceed capacity depends on old Department for Transport (DfT) guidance that has not been applied correctly. Their evidence does not demonstrate significant congestion, except at weekends in summer. The level of Transport Economic Efficiency and Reliability benefits reported in the economic case are consistent with this.

S1.3. The preceding feasibility study found that journey times between London and Exeter via A303 were typically 2 hours 30 minutes to 2 hours 45 minutes for most of the year and only exceeded 3 hours on Summer Fridays. From the viewpoint of long distance traffic, a majority of journeys on the route, this is more relevant than any specific delay on this route section.

S1.4. Highways England state that reliability is particularly poor on the 2.9 kilometre route section past Stonehenge. However, a large proportional variation in time on this section would have a relatively small impact on the overall time for longer journeys and is only a summer problem. Highways England exaggerate the effect by selective quotation from the original source.

S1.5. The significance of these issues should be seen in the context that traffic flows on the route have shown little change since the early 2000s.

S1.6. There is no evidence that accident rates are particularly high on the scheme route section, and there are potential methods of reducing them at very much lower cost than the proposed scheme.

S1.7. Highways England claim that the limited number of routes into the South West Peninsula create network resilience problems. In reality there are other corridors where the number of realistic alternatives is no greater. The resilience of the A303 itself could be enhanced through more active route management.

S1.8. The evidence that economic growth is being held back is weak. It partly relies on survey work which is subject to bias in the selection of respondents and strategic bias in their answers. A study of factors holding back economic productivity is also cited. This found that local skill levels or capital stock (depending on the type of business) had a greater impact on productivity than transport. In any case, this relates to *transport* connectivity in general, not specifically to *road* connectivity.

S.2. Inadequate Assessment of Alternatives

S2.1. The assessment process was fundamentally flawed because it was wholly focussed on delivering a fully grade separated dual carriageway Expressway without any examination of alternative solutions, despite Highways England having failed to make a convincing case of the need for the project. In itself, this should be sufficient for the Planning Inspectorate to recommend refusal of the Application.

S2.2. Irrespective of this, the assessment of the Expressway Options is fundamentally flawed. In particular, options that avoided any direct impact on the Stonehenge World Heritage Site, either by tunnelling beneath the whole width of it or adopting a surface route outside it, were not included in the public consultation. The public was presented with a single partially tunnelled option, only varying in whether it passed to the north or south of Winterbourne Stoke. The fully tunnelled option was dismissed on the grounds of cost, though the partially tunnelled options are already very expensive relative to other dual carriageway projects. The route round the southern perimeter was rejected despite its indicative Cost: Benefit Ratio being somewhat better. Both options would perform as well as the selected options in eliminating congestion, which Highways England claim to be a key benefit of the project. Accordingly, the choices offered in the public consultation provided little opportunity to influence the specification of the project significantly, contrary to government guidance.

S.3. Weak Economic Case and Traffic Appraisal

S3.1. The economic case is extremely weak, with each pound of expenditure only generating £1.08 in benefits. In an environment in which the public finances are constrained, it is not logical to fund a project with such a low Benefit: Cost Ratio. Given the uncertainties associated with forecasting both costs and benefits, we cannot be confident that the benefits exceed the costs.

S3.2. According to Highways England, the project will create a negative economic impact from increased pollution. Given that the United Kingdom has failed to reduce Carbon Dioxide emissions from transport since 2000 and the need to combat global warming, it is clearly inappropriate to be implementing projects which are forecast to increase emissions.

S3.3. The Wider Economic Impacts heading generates a modest benefit of £35 million, demonstrating that the project would not have a significant impact on the economy of the South west.

S3.4. “Removing the A303 from the WHS” accounts for over 70% of the alleged benefits of the scheme. Without it, the NPV would be -£854 million and the Benefit: Cost Ratio would be only 0.29. The value used is based on the value people say they place on an environmental improvement, which may not reflect how they would behave if asked to pay for it. The estimate may have been affected by strategic bias, where respondents shape their answers to achieve the outcome that they consider desirable. As a result, there may be a significant over-estimate of the benefits. The estimated benefits are 5.6 times higher than shown by a previous study in 1998 (after allowing for inflation) using a similar technique. This suggests that the methodology cannot be relied upon to produce consistent results across repeated studies, and that the results cannot be depended on.

S3.5. In relation to the transport modelling, which underpins the economic case, we are particularly concerned that the forecasting has made use of a core growth scenario, which assumes that the historic patterns of traffic growth, which have not applied over the past 15 years, will broadly re-assert themselves. This is accompanied by “low” and “high” growth scenarios within a very narrow range. This is inconsistent with the scenario-based approach used in the latest Road Traffic Forecasts, and ignores a DfT scenario where recent trends continue. This is not an extreme case, it is one of a series of “equally likely” scenarios generated by DfT, and reflects the recent behaviour of the travel

market. Accordingly, we consider that it is likely that growth in traffic will be below the “low” forecast. This could significantly reduce the economic benefits of the project.

S3.6. Other areas of concern relate to:

1. The project location is towards the eastern edge of the simulation area of the SATURN traffic model. This may result in the effect of congestion outside the simulation area not being adequately reflected in drivers’ choice of whether to use A303 or an alternative route.

2. The details of the calibration of the DIADEM Variable Demand Model have not been supplied, so we cannot be confident that the extent of the behavioural responses that it predicts are reliable.

3. The assessment assumes that two other schemes on the corridor are implemented, which prejudges the outcome of the DCO process for these projects.

S.4. Failure to Assess Programme Level Impacts

S4.1. Apart from including the A303 Sparkford to Ilchester and A358 Taunton to Southfields schemes in the Without Project scenario, there does not seem to have been any assessment of the cumulative effects of the programme in terms of increased traffic and emissions.

S4.2. Forecast congestion outside the area modelled by Highways England may affect the ability of the programme to achieve its objective of providing “mile a minute” journeys to the West Country. Congestion on the M5 may lead to traffic diverting back to the shorter route from Ilchester to Exeter via A303/A30.

1. Introduction

1.1. This Written Representation on transport planning and economic issues has been prepared by Dr. Simon Temple on behalf of the Stonehenge Alliance. Dr. Temple holds the degrees of Bachelor of Science, Master of Science (with Distinction) in Transportation Planning and Management, and Doctor of Philosophy for research in the transportation field. He is a Fellow of the Chartered Institute of Logistics and Transport. He spent the majority of his professional career working for consulting companies in the transportation field. From 2000 to 2013 he was a Director at AECOM Ltd. and its predecessor companies in the UK. In this role he was latterly Head of the firm's European Strategic Transport Advisory practice and was responsible for major transportation assignments including the national transport strategy for Bulgaria and development of a transportation strategy for Mecca.

1.2. Stonehenge Alliance is opposed to the current proposal to create a dual carriageway "Expressway" replacing the existing A303 between Amesbury and Berwick Down for a number of reasons and the Development Consent Order Application for the project should be rejected. We welcome the opportunity to make representations on the project.

1.3. In this document we consider the transport planning and economic aspects of the project. We will be making separate representations about the flawed processes used by Highways England during the development of the project, together with its archaeological and environmental impacts, including the effect on the Stonehenge World Heritage Site.

2. Scope of the Submission

2.1. In this document, Stonehenge Alliance sets out our representations relating to the transport planning and economics aspects of the A303 Amesbury to Berwick Down project. In summary our submission demonstrates that Highways England have:

- Not provided a robust case to support the need for intervention;
- Failed to assess an adequate range of alternative options to address the problems that they claim to have identified;
- Prepared an economic case that is so weak that it would – in itself – be sufficient grounds to reject the Application, and additionally is subject to very significant uncertainty;
- Not properly assessed the impacts of the programme, of which this project forms part.

These issues are discussed in turn in the sections below.

3. Weak Case for Intervention

3.1. Summary of Highways England's Case

3.1.1. Highways England's Case for the Scheme[1] lists the following problems, under the economic growth and transport headings, that the project is supposed to address:

- Productivity in the South West is restricted by poor connectivity;
- Economic growth is constrained by traffic congestion, delay and unreliable journey times;
- Tourism and the visitor economy are harmed by congestion and unreliable journey times;
- Lack of capacity on the single carriageway section leads to congestion and delay, single level junctions lead to increased journey times;
- Poor journey time reliability makes it difficult to plan journeys;
- On average there are 15 accidents involving personal injury annually on the scheme section of the A303;
- Lack of wider network resilience as the A303 is one of only a limited number of major transport routes into the South West.

3.1.2. Under the Community and Environment heading, the impact of traffic in Winterbourne Stoke and rat-running at busy times through other villages are highlighted.

[1] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, Table 2-1, pages 2-1 and 2-2

3.1.3. It is important to note that there is no automatic presumption that all trunk roads should be upgraded to Expressway standard. The Road Investment Strategy for 2015/16 to 2019/20[2] states "Not all trunk roads need to be upgraded to Expressway standard….to provide a good service to users. This could be because a road is not subject to serious congestion, because of environmental or engineering constraints upon a route, or because an upgrade would not offer good value for public money." This is consistent with the National Policy Statement for National Networks, which states that "The Government's policy on development of the Strategic Road Network is not that of predicting traffic growth and then providing for that growth regardless. Individual schemes will be brought forward to tackle specific issues, including those of safety, rather than to meet unconstrained traffic growth."[3] Accordingly, the Department for Transport expects that each project should be justified on its own merits. As we set out below, Highways England has failed to provide adequate justification for this project.

3.2. Volume and Capacity

3.2.1. The Case for the Scheme[4] states that traffic flows exceed the Reference Capacity of 22,000 vehicles per day (Annual Average Daily Total – AADT) for a single carriageway road and quotes the route section east of Longbarrow roundabout as below.

Year	Neutral Month - October (Average Daily Total)	Summer Month - August (Average Daily total)	% Increase in Summer
2013	24,000	28,800	20
2017	28,600	30,300	6

3.2.2. This is said to show the road is already over-capacity. The lower percentage increase in summer 2017 is said to be caused by the road reaching the maximum achievable level and further growth being constrained as a result. A problem with this assertion is that the quoted Reference Capacity appears to have been drawn from a table in the Design Manual of Roads and Bridges[5]. This clearly states that it is illustrative and states (in heavy type) that local values should always be used, based on the specific parameters for the road and traffic flow composition. The illustrative example relates to 1995 and we might expect that improved vehicle technology means that capacities would have increased. Secondly, no evidence is provided to support the assertion that the reduction in the summer uplift relative to a neutral month is due to congestion. It could be due to higher growth in neutral months or to non-transport factors reducing the volume of extra traffic in August.

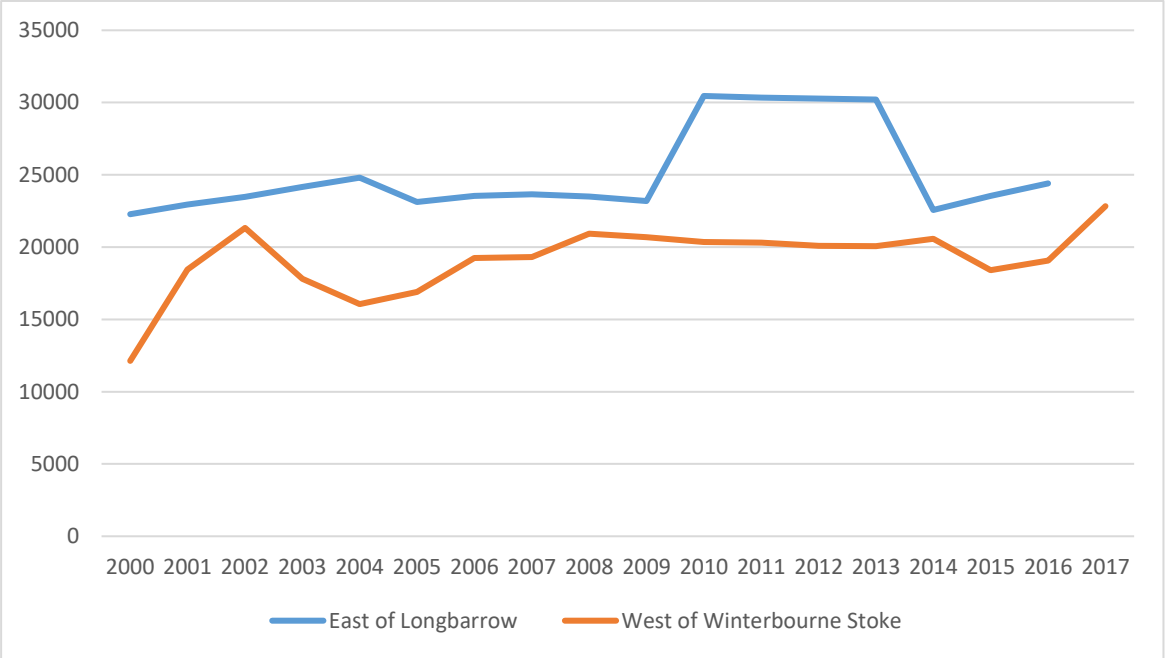
[2] Department for Transport "Road Investment Strategy for the 2015/16 – 2019/20 Road Period", 2015, page 49
[3] Department for Transport, "National Policy Statement for National Networks", 2014, paragraph 2.24.
[4] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, Tables 2-2 and 2-3, pages 2-3 and 2-4
[5] Design Manual for Roads and Bridges, Volume 5 Assessment and Preparation of Road Schemes, Section 1 Preparation of Road Schemes, Part 3 TA46/97 Traffic Flow Ranges for Use in the Assessment of New Rural Roads, Annex D Table D-2

Interestingly traffic on the adjacent section of A303, between A360 and A36 showed significantly lower growth in a neutral month between 2013 and 2017 than the section east of Longbarrow roundabout[6], suggesting that higher neutral month growth on this section may be at least part of the explanation.

3.3. Traffic Trends

3.3.1. The table above implicitly suggests that significant traffic growth is occurring. Figure 1 below shows results reported by the Department for Transport[7] from traffic counts at sites east of Longbarrow roundabout and west of Winterbourne Stoke.

Figure 1: Traffic Trends on A303 near Stonehenge (AADT)



3.3.2. We acknowledge that the Department of Transport recognises that there are issues with the accuracy of these data at an individual site level and this may explain some of the year to year variation. However, they do not show sustained growth after the early years of this century. For example, west of Winterbourne Stoke, the 2002 traffic level was not exceeded until 2017; east of Longbarrow roundabout, the 2016 flow was slightly below that in 2004. The A303 Corridor Feasibility Study showed growth on relevant sections of the route between 2008 and 2013 as follows:

- A36 to A360 -4.2%
- A360 to A344 +1.6%
- A344 to A345 -14.8%

[6] ADT growth from 21,171 in October 2013 (CH2M Hill "A303/A30/A358 Feasibility Study", Vol.1, Table 3-3) to 23,486 in October 2017 (HE's WebTRIS database, accessed 12th March 2019), an increase of 11% relative to 19% east of Longbarrow roundabout

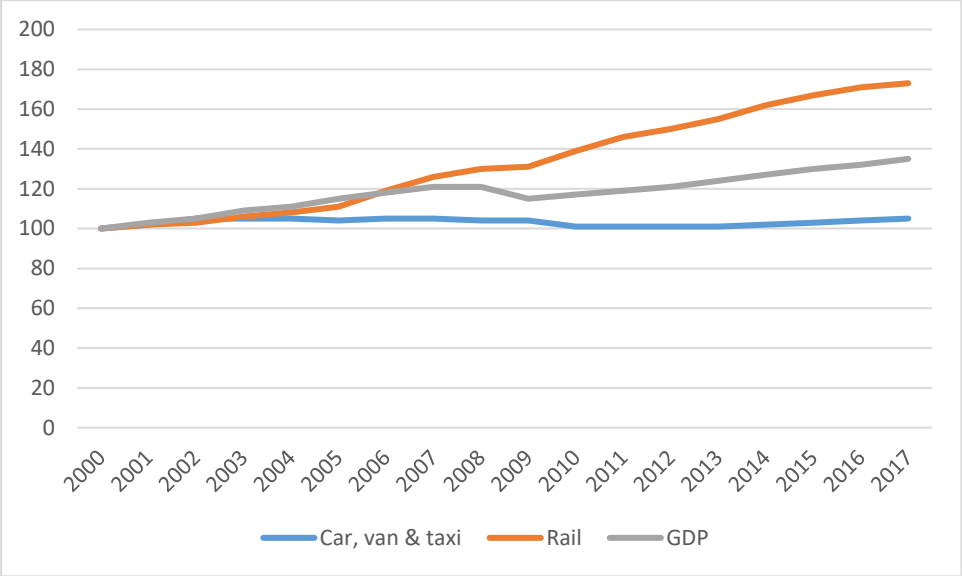
[7] www.dft.gov.uk/traffic-counts

3.3.3. Over the longer 2004 to 2013 period the change in travel on selected sections of the route varied between -3.6% to +3.2%[8]. Unfortunately, data is not reported for the vicinity of Stonehenge.

3.3.4. This is consistent with national trends, which show that total car, van and taxi traffic peaked at 673 billion passenger kilometres in 2004[9] – a level that has not been reached in any subsequent year. This compares with 59% growth in passenger rail use over the same period.

3.3.5. Figure 2 shows trends in car, van and motorcycle use, rail ridership, and Gross Domestic Product growth over the slightly longer period since 2000. It shows that the longstanding assumption of a close relationship between traffic growth and economic growth has not been valid over this period. Traffic growth is also significantly lower than the growth in population over the period.[10]

Figure 2: Passenger Travel Trends and Economic Growth since 2000[11]



3.3.6. Although there has been a small growth in car use in the last few years, this may be due to government policy, which has not increased excise duty on car fuel since 2010, while raising regulated rail fares by more than the Consumer Price Index each year.

3.3.7. Recent research by the Commission on Travel Demand, an independent group which has been assembled as part of the Research Council UK funded DEMAND Centre, has sought to explain these trends. It states that "there is now evidence stretching back 25 years which shows that we are travelling less today than we used to. On average, we:

- make 16% fewer trips than we did in 1996;

[8] CH2M Hill "A303/A30/A358 Corridor Feasibility Study: Stage 1 Report", February 2015, pages 29 and 30
[9] Department for Transport," Passenger Statistics Great Britain", December 2018, Table TSGB 0101
[10] Office for National Statistics, population estimates time series dataset, release 28th June 2018
[11] Department for Transport," Passenger Statistics Great Britain", December 2018, Table TSGB 0101 and Office for National Statistics, Gross Domestic Product: Chained Volume Measures: Seasonally Adjusted, release 11th February 2019

- use motorised transport for almost 100 (14%) fewer trips per year than in 2002;
- travel 10% fewer miles than we did in 2002 (now 6,396 miles/ person/ year); and
- spend 22 hours less travelling than in 2005 and less than at the start of the 1990s

3.3.8. These trends are reflective of patterns seen in a range of other countries that we received evidence on. They are not a blip in the data. For example, they pre-date the recession and the advent of broadband and mobile internet."[12] The report also notes that trip rates have been falling for longer in London – an important origin for trips on the A303 – than elsewhere.

3.3.9. The implications of this for forecasting future traffic trends are considered in Section 5.7 below.

3.4. Journey Times

3.4.1. Highways England's documents present a range of data, which purport to show that there are severe congestion problems on the route section affected by the project.

3.4.2. The Case for the Scheme[13] quotes journey times from surveys in August and October 2017 for the 13 mile section of road between A338 in the east and A36 in the west, including the project section. In the eastbound direction it indicates average journey times of about 18 minutes all day on a normal weekday. In the westbound direction average journey times are also about 18 minutes for most of the day, rising to about 22 minutes in the evening peak. A journey time of 18 minutes equates to an average speed of about 43mph. Given the route section includes passing through Winterbourne Stoke and negotiating two roundabouts, this does not indicate significant congestion. The survey also includes results for a Friday, Saturday and Sunday in August when journey times are much longer, indicating significant congestion. However, from the evidence provided, this seems to be a summer weekend issue not an all year problem.

3.4.3. The Case for the Scheme[14] quotes evidence that reliability is particularly poor for the route section past Stonehenge. This was assessed by calculating a Reference Time which is the journey time within which a journey would normally be expected to be completed, allowing for normal variation. The percentage of journeys completed within this time is then calculated. A low percentage indicates a lot of journey time variability. The 55% figure quoted is for the A303 between A360 and A344 westbound in the PM peak. Examining the CH2M Hill report quoted above shows that the overall figures are 58.8% westbound and 67.0% eastbound. These are the lowest percentages on the entire corridor, but it should be remembered that this section is only 2.9 kilometres in length and therefore even a relatively small absolute increase in travel time could take a journey beyond the Reference Time. This may not be significant in the context of a long journey.

[12] Marsden G et al "All Change? The Future of Travel Demand and the Implications for Policy and Planning", Commission on Travel Demand, 2018, Section 4.2, p.16
[13] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, Figures 2.1 and 2.2, pages 2-4 and 2-5
[14] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, pages 2-5 and 2-6

Indeed, the Case for the Scheme notes that one reason could be drivers slowing down to look at Stonehenge, which can be seen as providing a benefit to them. The statement that journey times are unreliable to a significant extent is inconsistent with the evidence from the 2017 journey time surveys, which shows little variation through the day, except at summer weekends. If there was significant journey time unreliability, this could be expected to be reflected in the average journey time as well as the variation in it.

3.4.4. Other evidence provided by Highways England undermines the assertion that congestion and journey time unreliability are significant problems, except at summer weekends. The Scheme Assessment Report quotes vehicle tracking data for Exeter – London journeys in the AM and PM peak periods[15]. For longer distance journeys, this is a more relevant measure than journey times on the section affected by the project. This is shown graphically for the eastbound and westbound directions with Monday to Thursday, Friday and weekends & public holidays shown separately. The data indicate that AM peak journeys typically take between 2 hours 30 minutes and 2 hours 45 minutes in most months in all three day groupings, with weekend trips tending to be slightly quicker. In the PM peak, Monday to Thursday journeys generally take between 2 hours 30 minutes and 2 hours 45 minutes, as do eastbound weekend trips. Journey times on Fridays exceed 3 hours between June and September in the westbound direction and from May to September in the eastbound direction (though the highest average time is less than westbound). Westbound weekend trips exceed 2 hours 45 minutes in May, July and August but never average more than 3 hours. The source and year for these data are not reported, so we cannot comment on their reliability. The definition of an AM and PM peak is also problematic for a journey of this length, as most journeys that start in a peak period will finish after the end of it, while those completed during the peak will have begun before it started. However, if accurate, they clearly show that congestion problems in the corridor mostly occur on Summer Friday afternoons and, to a lesser extent westbound at weekends in May, July and August.

3.4.5. In view of this it is slightly surprising that the A303/A30/A358 Feasibility Study found relatively little variation in journey times between days of the week and seasons for the A303 between the M3 and the A358 at Ilminster. The table below summarises data from that report.

3.4.6. The view that congestion on the project section of the A303 is seasonal is further confirmed by the A303/A30/A358 Feasibility Study which stated “In terms of congestion parts of the A303 perform well on average through the year but perform badly through the summer months. Indeed, the sections either side of Stonehenge are among the best performing 15% of the SRN [Strategic Road Network] nationally when considered on an annual average basis. In the summer months, however the A303 at Stonehenge is the worst performing section of the entire SWP [South West peninsula] network, performing as badly as the 2nd worst performing section nationally”[16]. This statement appears to have been sourced from Highways England’s 2014 document “South West Peninsula Strategy: Evidence Report” but the quotation above omits the final six words of the sentence “…when considered on an annual basis”[17]. In other words, the A303 at Stonehenge would equal the

[15] Highways England “A303 Amesbury to Berwick Down: Scheme Assessment Report”, September 2017, Figures 2-10 and 2-11, page 36
[16] CH2M Hill “A303/A30/A358 Corridor Feasibility Study: Stage 1 Report”, February 2015, p.31
[17] Highways England “South West Peninsula Route-based Study: Evidence Report”, 2014, paragraph 4.7.11

second worst route section nationally if summer conditions existed year round. However, they do not, and the section performs very well on an annual basis, as the rest of the quotation makes clear. There may be many other sections of the Strategic Route Network that perform worse than this part of A303 at their busiest time of year or day.

Table 1: Results from Feasibility Study Journey Time Surveys[18]

Day of Week	Eastbound: Neutral Month	Eastbound: Summer Month	Westbound: Neutral Month	Westbound: Summer Month
A303 between M3 and A358				
Weekday	84	89	85	89
Saturday	81	93	82	88
Sunday	86	85	83	82
A303 between A338 and A36 (including Scheme Section)				
Weekday	16	18	17	19
Saturday	15	19	17	18
Sunday	18	18	17	17

Note: rounded to nearest minute

3.4.7. We discuss the weak overall economic case for the project below, but it is worth noting the journey time and reliability benefits that Highways England predict from the implementation of the project:

- transport economic efficiency (primarily reductions in average journey time): £252 million; and
- improved reliability: £61 million[19].

3.4.8. This is consistent with the evidence above; that congestion problems mainly occur at summer weekends and especially on summer Fridays. Summer weekend congestion is a problem on all routes to the West Country (and other holiday destinations). It is highly questionable whether it would be good value to try to resolve it and – if so – whether providing extra highway capacity is the right solution.

[18] Summarised from CH2M Hill "A303/A30/A358 Corridor Feasibility Study: Stage 1 Report", February 2015, Tables 3-9 and 3-10, page 37

[19] Highways England, "A303 Amesbury to Berwick Down: 7.1 Case for the Scheme and NPS Accordance", Tables 5-5, page 5-24

3.5. Accidents

3.5.1. The Case for the Scheme[20] notes that there were 68 fatal or personal injury accidents on the route section covered by the project between 2014 and 2017, an average of 17 per year (note that this inconsistent with the average of 15 per year quoted on page 2-1 of the same document). Highways England envisage that grade separating the Countess and Longbarrow roundabouts and eliminating the single carriageway section would reduce this. To place this in context, the A303/A30/A358 Feasibility Study found that the A303's "accident record is comparable with other roads of a similar standard"[21] and that the worst section of the route – east of the (now eliminated) A344 junction – had an accident record in line with expectations. Of course, all parties would wish to improve road safety, but it should be recognised that induced traffic generated as a result of the project would tend to lead to additional accidents across the road network as a whole, counter-acting any specific improvement on the project route section.

3.5.2. In any event, it is very doubtful if dualling is a cost effective method of improving road safety. Recent research for the RAC Foundation found that, on average, the installation of average speed cameras has resulted in a 36% reduction in the number of fatal and serious collisions.[22] The study noted that the cost of introducing cameras is currently around £100,000/ mile (£60,000/ kilometre). Clearly a specific assessment would be required of the likely impact on this route section and how the introduction of cameras might be combined with other measures such as signalising Longbarrow roundabout (the site of 14 accidents in the dataset reported by Highways England), real time driver information and minor traffic management works to create a comprehensive safety package.

3.6. Network Resilience

3.6.1. The lack of network resilience is highlighted[23]. This arises partly from accidents on a single carriageway being likely to result in complete closure, whereas one carriageway of a dual carriageway can often be kept open with a contraflow in place. It is also a consequence of the limited number of strategic routes to the South West, any of which could be closed due to environmental events, such as flooding.

3.6.2. Superficially, this might appear to be an attractive argument. But it has some significant weaknesses. Firstly, an accident reduction scheme such as that suggested above could significantly reduce the number of accidents, especially the more serious ones likely to result in significant road closures. Secondly, the deployment of Traffic Officers on the route would assist in clearing damaged vehicles and debris from the road more quickly. Thirdly improved driver information systems – both on-line and through roadside signage – would assist drivers to avoid any blockages. Improved information systems would also give drivers greater certainty and might assist in reducing rat-running.

[20] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, pages 2-6 and 2-7
[21] CH2M Hill "A303/A30/A358 Corridor Feasibility Study: Stage 1 Report", February 2015, page 43
[22] Owen R, Ursachi G and Allsop R, "The Effectiveness of Average Speed cameras in Great Britain", RAC Foundation, 2016
[23] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, pages 2-8

3.6.3. At first sight the limited number of trunk roads into the South West peninsula might appear to be a specific regional problem. However similar issues exist elsewhere. For example, the M6/ M74 is the only major trunk route from the West Midlands to North West England, and from both to West Central Scotland. As traffic flows on this route are much higher than on the A303, the impact on parallel local roads of closures is much greater. At a strategic level the South West benefits from having the M4/ M5 corridor as an alternative route.

3.7. Wider Economic Impacts

3.7.1. As noted above, Highways England argues that economic growth in the South West is held back by traffic congestion, delay and unreliable journey times; while productivity is held back by poor connectivity. We do not consider that the evidence supports the contention that congestion is sufficient to have a significant impact on economic growth.

3.7.2. As evidence for their position, Highways England quote a study[24] that found that 89% of more than 650 businesses thought that unreliability on the A303 was harming their business. The survey was carried out by Parsons Brinckerhoff for Somerset County Council[25]. The report quotes the 89% figure in a bullet point which states "journey time reliability is a problem for many businesses, and disruption to business travel was a particular issue, affecting 89% of businesses that responded". However, there are a number of potential areas of bias in the survey, which mean its results are not reliable. Firstly, the response rate was low with 685 out of 23,000 organisations responding, a response rate of less than 3%. Secondly, certain sectors, including transportation businesses, were over-represented in the sample. Clearly these companies have a particular incentive to encourage investment in the network. Thirdly the survey was explained as being about improving the A30/A303/A358 corridor, thereby encouraging businesses who would be affected to respond and, in most cases, respond favourably. Finally, the survey was entirely about potential improvements to the corridor. It did not seek to identify whether other transport investments, or non-transport interventions would be regarded as more important. Accordingly, it is subject to both respondent bias and to policy response bias among the respondents.

3.7.3. These problems may also apply to a survey by Salisbury Chamber of Commerce which found that over 50% of its members said the A303 was a problem.

3.7.4. Swindon and Wiltshire Local Economic Partnership has identified a "Salisbury A303 Growth Zone" centred on Salisbury, Amesbury and garrison towns such as Bulford. However, these communities all lie to the east of the project and it is not clear how important good access to the west will be, relative to access to London, the South Coast and The Midlands, which would not be affected.

3.7.5. The Case for the Scheme sets out several pieces of evidence to support the contention that the current A303 is holding back the economic potential of the region. Firstly, it shows that economic productivity in Devon and Cornwall is less than 80% of the national average. In Dorset and the southern part of Somerset, it is between 80 and 90%. However, it should be noted that the national

[24] Highways England "A303 Amesbury to Berwick Down: Volume 7.1 Case for the Scheme and NPS Accordance", October 2018, pages 2-9 to 2-12
[25] Parsons Brinckerhoff "A30/A303/A358 Wider Economic Impacts Survey"

average is very skewed by high productivity in some areas including parts of London and the Thames Valley. It asserts that there is a well-established link between productivity, distance to market and the effectiveness of transport links. There is evidence that this is the case, but it is important to recognise that this relates to transport links in general, not road links specifically. For example, it has been used to assess the much greater connectivity impact of HS2[26]. It is also important to note that there are often other factors, for example skill levels, that hold back productivity and it is not necessarily the case that transport interventions alone can close the productivity gap. The Case for the Scheme quotes a study[27] which found that peripheral levels of Britain have lower productivity. This study modelled four factors that were considered to be potentially significant, both for businesses with a single plant and those with multiple plants. The factors considered were:

- 10% increase in capital stock;
- 10% increase in local population qualified to NVQ4 level or above;
- 10% increase in journey time to London and the four largest cities outside London; and
- 10% increase in population density.

3.7.6. As expected, an increase in journey time had a negative impact on productivity, while the other changes modelled were positive (except population density for multi-plant businesses). However, it was found that skill levels were more important than journey time for single plant businesses, while capital stock was more important for multi-plant ones. It should also be noted that the journey time measure included the four largest cities outside London, none of which are served by the A303.

3.7.7. Tourism is reported to contribute £8.9 billion to the economy of the South West region, comprising 7.6% of the region's economy. It is stated that 85% of trips are by car. It should be noted that this data is based on a 2014 survey by Visit England[28]. The 85% figure relates to all overnight trips and it is possible that trips from London and the South East are more likely to be by public transport, reflecting public transport's generally higher share for London-based journeys. Visit England's study reported that 29% of visits were from London and the South East. However, 30% of these (c.9% of all visits) were to parts of the South West Region outside the South West Peninsula. In addition, the A303 is not the most suitable road route from many parts of the South East. Visitors from Berkshire, Buckinghamshire and Oxfordshire are more likely to travel via the M4/ M5; while visitors from South Coast origins including Southampton and Portsmouth would be likely to either use the A35 or possibly join the A303 further west[29].

3.7.8. The Parsons Brinckerhoff study quoted above found that 60% of respondents reported that negative experiences would affect their future use of the corridor. However, the original study, conducted at a peak holiday weekend, found that most of these people would either try a different

[26] KPMG, "HS2 Regional Economic Impacts", High Speed 2, 2013
[27] D. J. Webber, A. Plumridge and M. Horswell (2016) "Understanding productivity variations between Wales and England," Report to the Government of Wales, Table 3, page 7
[28] Visit England, "South West England and Domestic Tourism", 2014
[29] Based on fastest road routes from www.google.com/maps for selected origins to Plymouth, 16th April 2019

route or travel at a different time. Only a minority said they would not visit the region in future (and this may have been an immediate reaction which would not feed through into future behaviour).

3.8. Summary

3.8.1. In summary, there is strong evidence that there are significant congestion problems on the route at summer weekends – especially on Friday afternoons - but little evidence of major problems at other times. There is little evidence of significant traffic growth over the past 15 years. There are also some safety issues. However, these problems are not, in themselves, sufficient to justify an intervention on the scale proposed. The evidence that the A303 is holding back the economy of the South West is weak.

4. Inadequate Assessment of Alternatives

4.1. Overview

4.1.1. In this section we set out the inadequacy of the assessment of alternatives from a transportation planning perspective. The Stonehenge Alliance is submitting a separate Written Representation, prepared by Dr. Fielden and Mr. McDonic, setting out its gross inadequacy from a policy and procedural perspective.

4.1.2. The starting point for Highways England's option assessment appears to have been the Client Scheme Requirements specified by the Department for Transport[30]. Those relevant to the Transport Case are:

- *"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.*

- *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."*

4.1.3. The document then refines the requirements and includes the statement that "The road will be designed to modern standards and, in addition, to perform as an Expressway." These requirements pre-date the analysis of alleged need set out in the submission documents, although they may take account of the CH2M Hill Feasibility Study.[31]

4.1.4. Given these requirements, it is not surprising that the range of options considered were restricted to alternative alignments for a dual carriageway between Amesbury and Berwick Down with full grade separation at junctions. There was no consideration of public transport alternatives or of a lower cost road alternative that could address issues such as safety, rat running and

[30] Highways England, "A303 Stonehenge: Amesbury to Berwick Down: Technical Appraisal Report", 2017, Section 2.2, page 30
[31] CH2M Hill "A303/A30/A358 Corridor Feasibility Study: Stage 1 Report", February 2015,

environmental conditions in Winterbourne Stoke through smaller scale interventions. Nor was some combination of these examined.

4.1.5. The Department for Transport's Transport Analysis Guidance sets out key principles to be followed through the appraisal process[32], including:

- *"There must be consideration of genuine, discrete options, and not an assessment of a previously selected option against some clearly inferior alternatives. A range of solutions should be considered across networks and modes.*

- *There should be an appropriate level of public and stakeholder participation and engagement at suitable points in the process. In most cases this should inform the evidence-base which establishes the 'need' for an intervention, guide the option generation, sifting and assessment steps, as well as informing further appraisal…."*

4.1.6. Stonehenge Alliance considers that the option identification and assessment process has been fundamentally flawed because it is wholly focussed on delivering a specific outcome – a fully grade separated dual carriageway Expressway – without any examination of alternatives. In itself, this should be sufficient for the Planning Inspectorate to recommend refusal of the Application.

4.2. Public Transport Alternatives

4.2.1. The CH2M Hill Study advocated the construction of a continuous high capacity dual carriageway along the length of the A303/ A358 corridor from the M3 to the M5. It acknowledged that the benefits of highway and public transport interventions in the corridor between London and Exeter have not been considered together since the London to the South West and South Wales Multi-modal Study (SWARMMS) report[33] in 2002. However, it dismissed public transport alternatives on the basis that "the SWARMMS study concluded that whilst there is a degree of interaction between rail and road within the corridor, the extent to which they 'compete' for the same travellers is quite small. The vast majority of travellers are effectively captive to one mode or the other."[34] CH2M Hill acknowledged that the SWARMMS Study also suggested measures to encourage a change in visitor behaviour to reduce the peak in road traffic demand at weekends in summer (the primary issue that does exist on A303), but dismissed this on the basis that experience of these types of measure is limited.

4.2.2. In relation to the London to Exeter corridor the SWARMMS report did support dualling of the A303, but it also proposed:

- Restoring double track on the rail line between Salisbury and Exeter;

- Increasing rail service frequencies on the Berks and Hants Line from London to Exeter via Taunton;

[32] Department for Transport "Transport Analysis Guidance: The Transport Appraisal Process", May 2018, paragraph 1.1.5, page 3
[33] Halcrow "London to South West and South Wales Multi-modal Study: SWARMMS Final Report", May 2002
[34] CH2M Hill "A303/A30/A358 Corridor Feasibility Study: Stage 1 Report", February 2015, page 13

- Creating a strategic rail freight corridor from London to Cornwall via Bristol;
- Improving coach and express bus services;
- Providing multi-modal interchanges with bus services providing links to communities not directly served by rail.

4.2.3. Very little progress has been made on any of these interventions, although a small increase in frequency on the rail line via Taunton may result from the currently occurring train replacement programme for this corridor. Clearly, a new study of public transport options might propose additional or different interventions.

4.2.4. In relation to the argument that road and rail are complementary and that improving one has little impact on the other, the SWARMMS Report states "Road and rail operations were found to be strongly complementary with rail serving longer distance centre to centre movements and commuter journeys into large urban areas and road catering most effectively for more dispersed patterns of journeys, especially of shorter and medium lengths. Consequently, well-designed improvements to road and rail abstracted relatively little traffic from each other[35]", indeed the last sentence of this paragraph is referenced in the CH2M Hill feasibility study quoted above. However, Highways England's own evidence states "that nearly half (48%) of journeys past Stonehenge are long distance with both origin and destination being more than 30 miles (48 km) away with an additional 33% having either an origin or destination further than 30 miles (48 km). In contrast, only 11% of journeys on this section of the A303 are wholly within 10 miles (16 km) of Stonehenge."[36] Catering for long distance strategic traffic is a key role of the route at present – the type of trip for which rail caters well.

4.2.5. CH2M Hill also ignore the experience of the period since SWARMMS. This study had a 15 year time horizon from 2002 to 2016. As noted above, there was virtually no growth in road traffic and a substantial increase in rail use over this period.

4.2.6. Highways England's consultants subsequently prepared a Technical Note[37] that dismisses the potential of public transport options as an alternative to the scheme. This would appear to post-date the decision to proceed with an Expressway option, so cannot be considered to be an open-minded consideration of alternatives.

4.2.7. The Technical Note claims that the impact of the project would be to reduce the stress factor on the busiest section of A303 within the scheme boundary to 0.53 and then asserts that 36,000 trips/ day would have to transfer to rail to achieve this in the absence of the road project. This is an unreasonably high requirement as it would leave substantial spare capacity on A303.

[35] Halcrow "London to South West and South Wales Multi-modal Study: SWARMMS Final Report", May 2002, paragraph 3.2.4
[36] Highways England "A303 Amesbury to Berwick Down: Scheme Assessment Report", September 2017, Figures 2-10 and 2-11, page 36
[37] Arup Atkins, "Assessment of Alternative Modes (PCF Stage 2), 2 June 2017, included as Appendix 8.5 to Highways England "A303 Amesbury to Berwick Down, Transport Assessment", October 2018

4.2.8. The consultants assess the origins and destinations of trips using the A303 and assume that only people with both origin and destination within 5 kilometres of a station would potentially switch to rail. They then use potential transfer factors from a 2003 Transport Research Laboratory Report[38] and claim that this shows that insufficient trips could transfer to come close to removing the need for the project. We consider this conclusion is flawed for the following reasons:

i. We do not accept the traffic forecasts or volume: capacity ratios used by Arup and Atkins for reasons set out elsewhere in this submission;

ii. The methodology adopted is very broad brush and no multi-modal modelling has been undertaken.

iii. The Transport Research Laboratory Report is 16 years old and does not take account of recent changes in travel behaviour which demonstrate a substantially increased propensity to use rail;

iv. An arbitrary station catchment area of 5 kilometres has been used. This takes no account of people's willingness to travel further to access rail for long distance trips either by car or local public transport;

v. Public transport investment can be expected to result in changes to journey destinations as well as modal transfer, with some travellers changing their destination to one better served by public transport. In the longer term, the pattern of land development could be expected to change with development focussed on places well served by public transport.

4.2.9. The Note sets out some limitations of the existing rail network and the very limited committed investment in it. In our view, this suggests that there are significant opportunities to increase rail share through investment. It may be that there is no single intervention that would radically reduce road traffic, but an overall strategy combining the types of measures advocated in the SWARMMS Study could well have this effect. A strategy of this type would have many benefits to existing rail users and car users not travelling on the Amesbury to Berwick Down section of A303 and these benefits would help support the case for it.

4.3. Expressway Options

4.3.1. There are also some issues with the alternatives assessment that was undertaken, which are alleged to have sought to find options that provided an appropriate balance between meeting the transport, economy, cultural heritage and community requirements of Department for Transport. This started by reviewing all previous proposals for A303 Stonehenge (more than 60 suggested routes)[39]. It grouped them into a series of corridors and assessed these against the Department for Transport's requirements. It quickly rejected wholly surface routes through the World Heritage Site as being unacceptable in cultural heritage terms and the majority of corridors outside the World Heritage Site as either being too indirect and/or having a serious impact on other protected

[38] Transport Research Laboratory, "TRL568, Factors Affecting Trip Mode Choice", 2003
[39] Highways England, "A303 Amesbury to Berwick Down, 6.1 Environmental Statement, Chapter 3 Assessment of alternatives", October 2018

landscapes. Apart from transport considerations, it is argued that the more indirect routes have the potential to damage additional environmentally sensitive areas. Highways England's consultants concluded that the best options were either a tunnelled option through the World Heritage Site or a route round its Southern perimeter. We have not reviewed this exercise in detail and do not wish to comment on the validity of its conclusions at this stage.

4.3.2. During the second stage of option sifting they developed 2 options for a partially tunnelled route through the World Heritage Site, Corridor D, with alignments to the north and south of Winterbourne Stoke respectively. They also developed options which passed to the south of Amesbury and skirted the World Heritage Site thereby avoiding direct impacts on it. At this stage, they rejected an option which tunnelled under the whole of the World Heritage Site – thereby removing any direct impact on it - on the grounds of cost. Given that the partial tunnel options were underground for 2.9 kilometres, just over half the width of the World Heritage Site, and the costs for the partial tunnel options are already extremely high compared to other dual carriageway schemes of similar length, we consider that this was rejected too easily. We also note that the final proposal, which is the subject of this Development Consent Order Application, has extended the tunnel to a length of 3.3 kilometres.

4.3.3. Three options for a route to the South of the World Heritage Site, Corridor F, were assessed and a preferred alignment in this corridor was developed (Option F010). This has clear benefits in that it avoids the World Heritage Site entirely and it also produced a somewhat better indicative Benefit: Cost Ratio than the partial tunnel options[40], primarily because of its lower cost. Although it is longer it would perform as well as the other options in eliminating congestion, which Highways England claim to be a key benefit of the project. Highways England claim that the existing A303 would probably need to be retained in this option to cater for local traffic, but have not provided traffic modelling evidence to support this assertion. They do not appear to have considered how complementary traffic management measures and minor highway works could eliminate this possible need. Even if retention was necessary, the volume of traffic and therefore the claimed impact on the World Heritage site would be greatly reduced. While they may have other drawbacks, it seems illogical that both options that avoid the World Heritage Site entirely were rejected, although one was cheaper than the partial tunnel options, especially given the importance that Highways England claim to have given to removing the A303 from the World Heritage site. Over 70% of the benefits presented in the economic appraisal relate to the partial removal of the road from the World Heritage Site. If these are valid – and we raise concerns about them below – the benefits of total removal of the road should logically be greater.

4.3.4. The consequence of this was that the public consultation offered only two options, which differ only in whether they pass north or south of Winterbourne Stoke. In practice, these options were very similar in terms of cost and performance against the Department for Transport's requirements. Clearly the choice between a route to the North or South of Winterbourne Stoke may be of great significance to some residents of the village, but are of little importance to others. As a

[40] Highways England "A303 Amesbury to Berwick Down: Scheme Assessment Report", September 2017, page 88

result, the choices offered in the public consultation provided little opportunity to influence the specification of the project significantly.

4.4. Summary

4.4.1. Stonehenge Alliance considers that the range of options that were considered was too narrow and focussed entirely on delivering a particular solution – a fully grade separated dual carriageway Expressway – rather than examining a proper range of alternative solutions. This is not consistent with the Department for Transport's own guidance. The alternatives could include public transport enhancements, behavioural change initiatives and smaller scale road safety and traffic management measures. No assessment was made of how these – individually or in combination – might address the problems the project is allegedly needed to address. Even within the Expressway project, the public consultation provided little choice as all options with the least impact on the World Heritage Site were excluded, despite the importance that Highways England claim to ascribe to this.

5. Weak Economic Case and Traffic Appraisal

5.1 Introduction

5.1.1. In this section, we first consider the overall economic case. We then discuss the implications of the various sources of benefit claimed by Highways England. Finally, we discuss the modelling approach and assumptions, which are used to generate the claimed benefits.

5.1.2. A key aspect of the case for the road is the evaluation of the heritage benefits of the proposals. This is discussed within this paper but is gone into in more depth in a separate Written Representation: Cultural Heritage Value: Valuing Heritage Impacts, Appraisal of Arup/ Atkins/ Simetrica Report to Highways England, prepared by Mr Alan James on behalf of The Stonehenge Alliance.

5.1.3. Some further comments on the economic case are contained in a recent article in Local Transport Today by Professor Phil Goodwin, which is reproduced in Appendix 1 to this representation.

5.2. Overall Economic Case

5.2.1. The economic case set out by Highways England is summarised in Table 2 below.

Table 2: Summary of Highways England's Economic Case[41]

Heading	Present Value (£ million)
Benefits	
Economic Efficiency of Transport System	252
Indirect Tax Revenues	87
Accidents	4
Increased Pollution	(86)
Journey Time Reliability	61
Wider Economic Impacts	35
Value of Removing A303 from WHS	955
Total Benefits	*1,307*
Costs	
Investment Costs	(970)
Operating Costs	(235)
Total Costs	*(1,206)*
Appraisal Metrics	
Net Present Value (benefits minus costs)	101
Benefit Cost Ratio (benefits divided by costs)	1.08

Benefits and costs discounted to 2010, in 2010 prices, negative impacts in brackets

5.2.2. Before discussing the detail, the overarching point is that the economic case is quite extraordinarily weak. According to the promoter's case each pound of expenditure only generates £1.08 in benefits. In Road Investment Strategy 1, the Department for Transport provide an infographic which asserts that the benefit to cost ratio of schemes on the Strategic Road Network is

[41] Highways England, "A303 Amesbury to Berwick Down: 7.1 Case for the Scheme and NPS Accordance", Tables 5-5 and 5-6, page 5-24. It should be noted that a slightly better case was produced assuming the scheme is procured using private finance, but this was specifically rejected by the Chancellor in the 2018 budget statement.

typically in excess of 4[42]. We note that Highways England has a Benefit: Cost Ratio threshold of 1.5 and 10 Road Investment Strategy 1 projects have been paused because they do not meet it[43] In an environment in which the public finances are constrained, it is not logical to fund a project with such a low Benefit: Cost Ratio. To do so makes a mockery of evidence-led decision making. It would only require a reduction of benefits or increase in costs of £102 million for the costs to exceed the benefits. Given the uncertainties associated with forecasting both costs and benefits, we cannot be confident that the benefits exceed the costs.

5.2.3. Highways England may argue that normal rules do not apply given the additional cost of reducing the impact of the road on the World Heritage Site. However, this is not valid, as this is already accounted for by including the estimated benefit of "removing the A303 from WHS". In a hypothetical situation where the proposed project was not within the World Heritage Site, the benefits would be £352 million. To achieve a Benefit: Cost Ratio of 4 or more (in line with a "typical" trunk road project), the Present Value of total capital and operating costs would need to be less than £88 million, a reduction of more than 90%. This is clearly unrealistic.

5.3. Transport Impacts

5.3.1. Taken together the economic efficiency and journey time reliability benefits amount to £313 million. This is consistent with the evidence that significant delay occurs mainly on a relatively small number of weekends annually.

5.3.2. We note that traffic flows on the various sections of the A303 most affected by the project are forecast to increase by 15-29% as a result of it by 2026 and 23-42% by 2041[44]. A north – south screenline analysis for 2026, which examined forecast flows on A303 and other roads illustrates changes in east-west trip patterns. It shows 7,800 more trips on A303, 900 less on M4, 700 less on A30, 400 less on other "A" roads and a net increase in journeys of 3,000[45]. Almost two-thirds of the predicted increase in traffic on A303 is either diverted from other main roads or is induced by the project.

5.3.3. Given the argument that the project will reduce delays and queuing, it is surprising that the table suggests a negative impact of £86 million from increased pollution, which is typically associated with emissions from queuing vehicles. This is likely to be a net figure from a combination of lower emissions from less queuing, extra pollution from vehicles travelling faster and an overall increase in vehicle kilometres. Again, this supports the view that queuing only occurs on relatively few days. The appraisal also includes a benefit of £87 million from increased indirect taxation. This will largely consist of taxation on the sale of additional motor fuel, further highlighting the emissions impact of the project.

[42] Department for Transport, "Road Investment Strategy: for the 2015/16 – 2019/20 Road Period", March 2015, page 14
[43] https://www.transport-network.co.uk/10-of-RIS-1-schemes-shelved-on-value-for-money-grounds/15817
[44] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix C: Transport Forecasting Package" Tables 5-14 and 5-15, page 5-16
[45] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix C: Transport Forecasting Package" Tables 5-16, page 5-18

5.3.4. Given that the United Kingdom has failed to reduce Carbon Dioxide emissions from transport since 2000 (transport emissions actually increased from 124.9 million tonnes in 2000 to 125.9 million tonnes in 2017[46]) and the need to combat global warming, it is clearly inappropriate to be implementing projects which are forecast to increase emissions. The need to reduce transport emissions was highlighted by the government-appointed Commission on Climate Change, which noted, in its latest report to parliament

> *"As emissions in other sectors have reduced, transport has grown as a share of overall emissions. Transport is now the largest-emitting sector of the UK economy at 126 MtCO2e, accounting for 28% of UK greenhouse gas (GHG) emissions in 2017."*[47]

5.3.5. The accident reduction benefit is small, showing the project would only have limited safety benefits once the effect of extra traffic is included. This indicates that a much smaller road safety project may be appropriate.

5.4. Wider Economic Impacts

5.4.1. The Wider Economic Impacts heading generates a modest benefit of £35 million, demonstrating that the project would not have a significant impact on the economy of the South West. Even this limited impact is questionable. A study for the Campaign to Protect Rural England[48] found evidence that economic benefits occurred in only 24% of projects that were examined, and even then it was not clear whether they were a consequence of the road, or due to other factors.

5.4.2. Highways England puts forward an alternative estimate of the effect of the project on Gross Domestic Product (GDP) amounting to £0.3 billion[49]. No source is quoted for the figures, so their validity cannot be reviewed. However, the Department for Transport generally regards these calculations as interesting additional information rather than a core element of the scheme assessment. It is also important to recognise that they cannot simply be added to the benefits in the table above, as this would introduce a lot of double counting. For example, a time saving for a business traveller allows him/her to work more productively and therefore contributes to GDP growth. It is more appropriate to see the GDP growth estimates as an alternative way of capturing the economic impacts of the scheme, rather than as an extra source of benefits. The economic benefits of the scheme are estimated to be £352 million (excluding the impact of "removing the A303 from the WHS"), which is broadly similar to the alternative estimate based on increase in GDP.

5.5. Cultural Heritage Benefits

5.5.1. As the table makes clear, what Highways England describe as "removing the A303 from the WHS" (in reality only partially removing it from the surface landscape) accounts for over 70% of the alleged benefits of the scheme and is therefore absolutely crucial to the case. Without it, the NPV would be -£854 million and the Benefit: Cost Ratio would be only 0.29. The value used is based on

[46] www.statista.com/statistics/311522/transport-co2-emissions-in-the-uk/, downloaded 26th March 2019
[47] Committee on Climate Change "Reducing UK Emissions: 2018 Progress Report to Parliament" June 2018
[48] CPRE "The End of the Road: Challenging the Road Building Consensus", CPRE, 2017, page 8
[49] Highways England, "A303 Amesbury to Berwick Down: 7.1 Case for the Scheme and NPS Accordance", Tables 5-54, page 5-22.

consumer research using a type of Stated Preference technique called Contingent Valuation. As such it is based on the value people say they place on an environmental improvement, which may not reflect how they would behave if asked to pay for it in reality.

5.5.2. A great deal of effort seems to have been expended by Highways England to develop their estimate of the transport benefits (27% of total benefits), while the impact of removing the A303 from the World Heritage Site landscape is based on a single study undertaken by Simetrica in 2017[50].

5.5.3. In essence the study involved surveys in which respondents were told about the proposed 2.9 km tunnel (the proposed length at the time of the survey), advised that it would remove the A303 from part of the WHS and it was explained that the approaches to the tunnel might impact on archaeology. The report states that respondents were shown a map of the proposed route and visualisations of the landscape without the road, but not of the tunnel portals or approaches. They were then asked if they thought the proposed changes would have a positive, negative or no impact on them. Those who said it would have a positive impact were shown a card with a range of values and were asked how much they would be willing to pay in the form of an annual tax for three years. The people who said it would have a negative impact were asked how much they would require to compensate them for this, as a one-off payment. These data were used to estimate the total Willingness to Pay for the proportion of the population who gave a positive value and the total compensation required by those who gave a negative one. The overall Net Present Value was calculated over the three year period when the tax would apply. Subsequently the results were re-based to the same 2010 base year as the rest of the transport case.

5.5.4. Data was collected, in September and October 2016, through face to face surveys with domestic visitors to Stonehenge and through an on-line survey presented to a sample of members of an on-line consumer panel provided by an agency called Toluna. Unfortunately, the survey forms have not been made available (though they are quoted in the report), so we cannot see how information was presented to respondents.

5.5.5. The on-line survey was split between people living within 50 miles of Stonehenge (and therefore thought more likely to use A303) and those living in the rest of the UK. In practice proximity to Stonehenge was not a very good proxy for use of A303 and the total on-line sample was then split between “road users” (those who use the A303 at least weekly) and non-users. It appears that the number of “road users” has been over-estimated. This is said to be 1.22 million people who use it at least weekly. Assuming that use is weekly (not more often) and an average vehicle occupancy of 2.0 this equates to about 87,000 vehicles per day passing Stonehenge, compared with an actual figure of around 24,000.

5.5.6. The on-line survey sample was weighted to match overall population characteristics and the proportions of the population estimated to have positive, negative and zero valuations of the change are shown in Table 3 below together with average amounts of tax/ compensation and the total estimated potential revenue.

[50] Highways England, “A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix D: Economic Appraisal Package” Appendix H, Valuing Cultural Heritage

Heading	Population Group		
	Visitors	**Road Users**	**General Population**
Willing to Pay Tax (%)	67.4	67.4	59.2
Requiring Compensation (%)	0.5	2.1	2.3
No Value (%)	32.2	30.5	38.5
Willingness to Pay Tax (*)	£70.17	£64.53	£43.23
Average Compensation	£187.50	£81.35	£57.90
Net Present Value(+)	£24.5m	£49.1m	£1,203.4m

Table 3: Summary of Simetrica Results
(*) sum of annual tax over 3 years
(+) Present Value of tax over 3 years minus compensation

5.5.7. As expected, visitors to Stonehenge are more likely to be willing to pay to remove the road from view and place a higher value on this. However, the difference between them and the general population is surprisingly small. Given general resistance to higher taxation, it seems implausible that almost 60% of the population would be willing to pay an average of over £40 to remove the A303 from being seen within the Stonehenge landscape.

5.5.8. The overall Present Value is £1,277.1 million with a 95% confidence range of £1,145.6 million to £1,408.6 million or +/- 10.3%. Once re-based to 2010, the Present Value is £955 million. At the lower confidence bound this would be £857 million, a reduction which would reduce the total net benefits of the project to £3 million.

5.5.9. Simetrica acknowledge a range of potential biases in the work, which they claim to have sought to guard against, where possible. Probably the most significant of these is Strategic (or Policy Response) bias where respondents give answers that are likely to result in the policy outcome they want. In this case, people who would like to see the road hidden from view may exaggerate the amount of tax they are willing to pay in the knowledge that there is no chance that government would levy a Stonehenge Tunnel Tax. Simetrica have eliminated people who claimed to be willing to pay very high amounts of tax (over £250) and have also checked that average propensity to pay increases with income and membership of heritage organisations, as would be expected. However, this does not eliminate the risk of strategic bias, it merely shows that – across the sample - any bias applies consistently across different groups. It is important to recognise that the confidence limits above assume no strategic bias. If this is present, the true benefits could be substantially lower.

5.5.10. A further problem is that the survey presented respondents with images of the Stonehenge landscape without the road, but not the tunnel portals. The portals and the dual carriageway approaches would be highly significant features in the landscape of the World Heritage Site. We have

not seen the survey instruments, but we are concerned that information may have been presented in a way that suggested that the road had been removed entirely from the landscape or downplayed its impact. If this is the case, the quoted benefit would be more representative of a situation where the road was in tunnel across the whole of the World Heritage Site. Conversely, if the approaches were given sufficient prominence in the survey instrument, we would expect the benefits from a full tunnel option to be significantly higher.

5.5.11. Simetrica's report refers to a previous study [51], which valued the Stonehenge Tunnel at £149 million. The fieldwork for this study - by Maddison and Mourato - was undertaken in 1998, although the findings were not reported until 2001. They explain the large difference, relative to the value of £1,203 million in the 2017 report, as being mainly due to inflation and the way that data aggregation was undertaken. They also suggest that improvements in methodology and a larger sample size may have contributed. They state that this is discussed in Appendix B to their report. Unfortunately, this has not been made available. However, the claimed benefits have increased by a factor of 8.1, compared to inflation of 42%[52] over the period 1998 to 2016 (the years the two surveys were undertaken). Expressed in 2016 prices, the 1998 study value would be £211 million. Accordingly, excluding the impact of inflation, the benefits have increased from £211 million to £1,203 million, a factor of 5.7. A larger sample size would have the effect of narrowing the confidence limits around the central estimate rather than increasing the latter. It therefore appears that data aggregation and methodology improvements are claimed to account for this very large increase. This seems implausible given that Contingent Valuation was already reasonably well established as a technique by 1998. It suggests that it is a methodology that cannot be relied upon to produce consistent results across repeated studies, and this means that the results cannot be depended on. We have also been unable to find any evidence which validates Contingent Valuation survey results against outturn behaviour.

5.5.12. As Simetrica point out, the study was designed to estimate the value the public place on the amenity value of largely removing the road from the WHS landscape. They argue that non-specialists cannot quantify the value of the archaeology that would be lost in creating the tunnel approaches and portals. Therefore, this is specifically excluded from their results, but is important to the overall assessment of whether the Development Consent Order should be granted.

5.6. Transport Modelling

5.6.1. The modelling that underpins the assessment of transport benefits made use of the SATURN traffic modelling package to assess traffic flows, combined with DIADEM to assess variations in demand. Growth in car travel was assessed using the Department for Transport's National Trip End Model. While this is a standard approach to developing the case for road projects, it gives rise to a number of concerns, both in general and in this specific case. These are summarised in the paragraphs below.

5.6.2. The project team made use of Highways England's SATURN South West Region Traffic Model (SWRTM) for their assessment. This model has a simulation area within which traffic is simulated in

[51] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix D: Economic Appraisal Package" Appendix H, Valuing Cultural Heritage, paragraph 3.1.1, page 10
[52] Office for National Statistics, CPIH Inflation, February 2019 release

detail covers the whole of the South West Economic Region and includes all major roads in the region. Outside the South West, the model has buffer area, where the network is modelled in somewhat less detail and then an external area covering the rest of Britain which is basically there to give broadly realistic times, costs and numbers of journeys to and from the South West. However, changes in travel times and costs due to future changes in traffic are not modelled in detail outside the simulation area, so the effects of this on routeing to and from the South West are excluded from the assessment. This is potentially important as future congestion could affect the routeing of journeys to and from London and the South East. Appendix A to the National Policy Statement for National Networks[53] contains some interesting diagrams showing forecast weekday congestion on the Strategic Road Network for 2040. The diagrams identify four levels of congestion: occasional, moderate, regular and severe. The 2040 diagram shows regular congestion on short sections near Andover and Stonehenge and moderate congestion for the rest of the route between Andover and the M3. More significantly, the diagram shows severe congestion on the M3 between the M25 and Farnborough, with regular congestion past Junction 8, where the A303 diverges. This could be sufficient to affect routeing between London and the South West, and may not be adequately identified by SATURN, as it occurs outside the simulation area of the model. As a consequence, the model may over-estimate future demand on the project route section, because it assumes that traffic which, in reality, would be deterred from the route by congestion elsewhere would use it. This would result in the benefits being over-stated.

5.6.3. The DIADEM Variable Demand Model estimates:

- Change in time of travel (people who currently travel at the edge of the peak to avoid congestion may change the time of their journey if roads are less congested);
- Transfer from rail (bus is not included in the model); and
- Change in destination (if the road scheme makes a journey easier, some people will choose to travel further).

5.6.4. The total number of trips is generated from the National Trip End Model and is assumed to be largely fixed. Finally, SATURN considers possible re-routeing from other roads as A303 becomes quicker.

5.6.5. In principle, the modelling system takes account of most of the main short term behavioural changes that could occur as a result of the project. However, the assumption that the number of trips is not affected by the project may not be valid. For example, a business traveller may decide to visit a customer rather than phone them if the journey is easier, or a leisure traveller may decide to visit an attraction rather than sunbathing in their garden. In the longer term, new roads encourage development close to them, which generates traffic. This particularly problematic if it creates patterns of development that are hard to serve by public transport and are therefore car-dependant. We also note that work for the Campaign to Protect Rural England[54] has found that the number of trips on roads affected by enhancement projects tends to grow more rapidly than traffic on other

[53] Department for Transport, "National Policy Statement for Strategic Networks", December 2014
[54] CPRE "The End of the Road: Challenging the Road Building Consensus", CPRE, 2017, page 6

roads. This appears to be an ongoing effect and not a once only impact when a new project opens. It is not clear whether this longer term impact is included in the modelling.

5.6.6. Additionally, the fact that a behavioural response is included, does not necessarily mean that it is measured correctly. The Development Consent Order documents give a lot of detail on the refinement of the SATURN model, but no detail of the DIADEM component of the modelling framework. They simply state that the version of the model developed for SWRTM was applied and then provide some example responses to certain travel changes. These do not appear to be inherently implausible, but a better understanding of the model is needed to reach any conclusions about its reliability. We consider that the Model Calibration Reports for SWRTM should be made available to make this possible.

5.6.7. The standard SWRTM model assesses demand for the morning and evening peaks plus the inter peak. For A303 Amesbury to Berwick Down, an additional model was developed for a "busy day", taken as the average of Fridays, Saturdays and Sundays during the school summer holiday period. In principle, this is logical since congestion on A303 is primarily a summer weekend issue. However, there was less data available on travel patterns and it is not certain that people's behavioural responses would be the same as on a weekday (as the model assumes). Accordingly, there is greater uncertainty about this.

5.6.8. It appears that the assessment assumes that two other schemes on the corridor are implemented. These are A303 Sparkford to Ilchester, currently going through the Development Consent Order process, and A358 Taunton to Southfields[55], for which the preferred route is yet to be announced. These projects can be expected to increase traffic at Stonehenge, thereby adding to congestion and strengthening the case for the project. While it would be reasonable to include these as a sensitivity test, including them in the core scenario prejudges the outcome of the Development Consent Order process and contributes to the "benefits" that create the current Benefit: Cost Ratio of 1.08.

5.7. Traffic Growth

5.7.1. As noted above, the National Trip End Model has been used to calculate the total number of trips in future. This makes a series of assumptions about population trends, housing, employment, car ownership and trip making. Clearly there are uncertainties about all these inputs. In particular, Highways England's case sets out a core scenario, based on NTEM[56], which largely assumes that the historic trends of traffic growth will resume. It predicts an overall growth in trips of 10% between 2017 and 2026, before taking account of changes in traffic conditions[57]. This is higher than recent trends would indicate. Unfortunately, an equivalent figure for other forecasting years has not been provided but it appears that further significant growth is expected. Clearly, this is of great importance to the case for the scheme since it will affect future levels of congestion, which the project is

[55] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix C: Transport Forecasting Package", page 4-19
[56] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix C: Transport Forecasting Package", Section 4.7, pages 4-12 to 4-15
[57] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix C: Transport Forecasting Package", Table 5-6, page 5-9

intended to relieve. Highways England also consider high and low growth scenarios, in which flows on the A303 are 5% to 8% higher or lower than in the core scenario in 2041[58]. We consider that this is a very narrow range, given that it relates to a forecast 25 years into the future from the base year of 2017.

5.7.2. The Department for Transport (DfT) has recently published a report setting out updated road traffic forecasts[59]. This shows that previous modelling has significantly over-stated demand on non-motorway trunk roads over the past decade. While the base year for modelling has been updated to eliminate the effect of past errors, this does not eliminate the risk that they will occur in future. This confirms the conclusion of Nicolaisen and Naess[60], who studied 35 road projects in Britain and Denmark and found that "demand forecasts for do-nothing alternatives used in decision- making on transport infrastructure projects appear systematically overestimated, and that the trend is subject to considerably less variation than comparable ex-post studies of completed projects. As a result, the economic benefits of new road infrastructure are likely overestimated, since actual congestion levels in the absence of new capacity will not be as severe as portrayed in the traffic forecasts."

5.7.3. DfT highlights (paragraph 2.15) "the amount of uncertainty around road traffic demand (even over the relative short term)". They have sought to address this through the development of a range of alternative scenarios. These scenarios consider alternative assumptions about factors such as Gross Domestic Product growth, fuel prices, levels of migration, future levels of trip making and uptake of zero emission vehicles. There is no assumption that one scenario is more likely than another – each of them is considered to represent a realistic possible future situation. At a national level they indicate traffic growth of 17% to 51% between 2015 and 2050, a much wider range than used in the appraisal of this project. The lowest forecast assumes the extrapolation of recent travel trends, as discussed in Section 3.3. Patricia Hayes, DfT's Director for Roads, Devolution and Motoring has recently stated that more emphasis will be given to appraising schemes against different scenario tests, reflecting the DfT's move to scenario tests for road traffic[61].

5.7.4. Due to uncertainty about the impacts, DfT excluded the effects of the adoption of Connected Autonomous Vehicles (CAVs) from their scenarios. However, they undertook a series of sensitivity tests, based on a Reference scenario, which predicted growth of 35% by 2050. These tests produced a range of overall growth forecasts between 5% and 71%, compared to the starting assumption of 35%. If the scenario based on the extrapolation of recent trends had been used as a base, some of the sensitivity tests would have shown a decline in travel demand. It is important to recognise that these sensitivity tests relate to national travel demand and they could impact differently on particular types of road. For example, in a scenario where high levels of ride sharing occurs one might expect long distance strategic trips (a high proportion of trips on the A303) to be made either by public transport or in high occupancy vehicles, with other CAVs used for local travel at each end. This

[58] Highways England, "A303 Amesbury to Berwick Down: Combined Modelling and Appraisal Report – Appendix C: Transport Forecasting Package", page 5-35
[59] Department for Transport, "Road Traffic Forecasts 2018: Moving Britain Ahead"
[60] Nicolaisen M and Naess P "Roads to nowhere: the accuracy of travel demand forecasts for do-nothing alternatives", Transport Policy, 2015.
[61] Reported in Local Transport Today, 17 December, 2018

could further reduce demand on the route. It should be noted that government regards the development of CAVs as important.

5.7.5. In addition to the demand impacts, the report suggests that the adoption of CAVs could increase the capacity of a single carriageway rural road by up to 30%.

5.7.6. It is important to emphasise that the high degree of uncertainty about future traffic growth is based purely on forecast scenarios prepared by DfT and considered to be realistic by them. We anticipate that a forecast based on the recent trends scenario would provide a forecast significantly lower than the "low" growth forecast adopted. It is important to recognise that this is not an extreme case, it is one of a series of "equally likely" scenarios, and is the one which reflects recent changes in the travel market. Accordingly, we consider that there is a substantial likelihood that growth in traffic will be lower than the "Low Growth" forecast produced by Highways England. This could significantly reduce the economic benefits of the project.

5.8. Summary

5.8.1. The Stonehenge Alliance considers that the economic case for the project is so weak that, even if it is correct, the project does not represent good value for money in a situation where public finances are constrained. This is, by itself, sufficient for the Development Consent Order to be rejected.

5.8.2. We are also concerned that the evidence to support the value given to "removing the A303 from the World Heritage Site" is unreliable and may be significantly too high. There are also issues relating to the traffic forecasting, including the forecasting of travel growth, which create a serious risk that the benefits have been over-stated. These would further worsen the already very poor economic case.

6. Failure to Assess Programme Level Impacts

6.1. Apart from acknowledging that the project is part of an overall programme for the A303/A358 between the M3 and M5, the assessment appears to have been focussed on the Amesbury to Berwick Down section. The reference to the programme is helpful to the promoter in that it can deflect the potential criticism that dualling one section of the route would simply move queues to the next single carriageway section.

6.2. We note that we have seen no reference to a Strategic Environmental Assessment being undertaken for the A303 programme. If this had been undertaken, it should have resulted in a more comprehensive assessment of transport connections to the South west Peninsula. This would have supported a better consideration of non-highway, and lower cost road, options and of the wider impacts of the proposals.

6.3. Apart from including the A303 Sparkford to Ilchester and A358 Taunton to Southfields schemes in the Without Project scenario, there does not seem to have been any assessment of the cumulative effects of the programme in terms of increased traffic and emissions. While the promoter argues that the new dual carriageway at Stonehenge will have sufficient capacity to accommodate the forecast traffic with the project, this is not necessarily the case if other upgrades in the corridor lead to a

further increase in traffic. Even if capacity on this section is adequate, it does not follow that this will apply to other sections, especially those that carry more local traffic. From the assessment available, we do not know if or where these problems would occur.

6.4. However, as noted above, Appendix A to the National Policy Statement for National Networks contains some interesting diagrams showing weekday congestion on the Strategic Road Network in 2010 and forecast for 2040. The diagrams identify four levels of congestion: occasional, moderate, regular and severe. The 2010 diagram shows only occasional congestion on the A303, except for moderate congestion for a short section near Stonehenge and a longer section between Andover and the A34 (a dual carriageway section that does not form part of the programme). The 2040 baseline shows regular congestion on short sections near Andover and Stonehenge and moderate congestion for the rest of the route between Andover and the M3. More significantly, the diagrams show regular congestion in 2010 on the M3 between the M25 and Farnborough, with moderate congestion past Junction 8, where the A303 diverges. By 2040 these sections are forecast to experience severe and regular congestion respectively. The 2040 diagram also forecasts moderate congestion on the M5 west of Junction 25. The latter does not assume the A303 programme, which will increase traffic and divert it to the M5 south east of Taunton via the A358. As a result, the level of congestion on the M5 can be expected to be higher than in the baseline.

6.5. The implications are firstly that the A303 programme may not achieve its objective of providing "mile a minute" journeys to the West Country because of growing congestion on the connecting motorways at each end. Secondly the A358/M5 route between Ilminster (where it diverges from the A303) and Exeter is 10 miles longer than via the A303/A30. Congestion on the M5 may make this route slower and thus divert traffic back onto the single carriageway A303 through the Blackdown Hills Area of Outstanding Natural Beauty, undermining any claimed environmental benefits. Although the diagrams relate to weekdays, similar (though more severe) problems are likely to occur at summer weekends as both the M3 and M5 are key holiday routes for other journeys; London to the Hampshire and Dorset coasts for the M3 and Midlands to Devon and Cornwall for the M5.

6.6. If, despite these issues, the programme succeeds in encouraging more road traffic to Devon and Cornwall, this will result in more traffic pressure on coastal communities, some of which are under significant pressure in summer, thereby undermining the special qualities that cause people to visit.

6.7. While emissions modelling has been undertaken for the project in isolation, it does not appear that this has been done for the programme as a whole, or for the wider emissions impact of more car-based tourism to the West Country. This reinforces the argument that the emissions impacts are unacceptable and threaten the UK's compliance with the Paris Climate Change Agreement and our national Climate Change Act.

6.8. In summary, Highways England have not demonstrated the overall case for the A303 programme, of which this project is part, and have only made reference to the programme where it is advantageous to their case. No emissions modelling appears to have been undertaken for the overall programme and this is potentially significant in the light of the UK's climate change commitments. There are significant concerns that the programme would be unable to meet its objectives because of congestion elsewhere on the network.

Appendix 1

Article by Professor Phil Goodwin

published in

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Stonehenge and the Billion Pound Stated Preference Survey

It's not new, of course, for transport schemes to take account of wider effects. Health, quality of life, damage or destruction of buildings, air quality and climate change are increasingly recognised, quite rightly in my view. This is sometimes done by including hypothetical money values, and where such values are soundly based they can be helpful. But anybody who does this sort of work knows how very sensitive the answers are to exactly how such questions are worded, and who is asked, and how the information is analysed.

A road scheme near Stonehenge, promoted by Highways England and critiqued by the Stonehenge Alliance, may radically change the scale and direction of such methods.

The scheme includes a 2-mile twin bore tunnel. Its first listed objective is to "create a high quality reliable route between the South East and the South West that meets the future needs of traffic", and the third is to "help conserve and enhance the World Heritage Site and make it easier to reach and explore".

There are some very odd features of the appraisal. The first odd thing is that the 'Business Case' gives virtually no regard to all the important work that the DfT has done on forecasting and scenarios in the last four years. Readers of Local Transport Today (17.12.2018) may remember an important speech by Patricia Hayes, DfT Director of Roads, in which she said that 'more emphasis will be given to appraising schemes against different scenario tests, reflecting the DfT's move to scenario forecasts for road traffic'. Sadly, such results are not included. The old approach has been used, with a core or 'most probable' forecast and a narrow range of sensitivity tests, which hasn't been DfT practice since 2015. The result is an assumption of sustained traffic increases into the future, higher than the flat trends in the area since 2002 and with no recognition of recent falls in trip rates. Nor, conversely, is there any consideration of much higher traffic growth rates if low or zero energy costs or autonomous vehicles provide universal access to cheap car travel.

So if this was a normal scheme, my hypothesis is that 'meeting the future needs of traffic' would probably fail in both contexts, overestimating congestion benefits against a sensible low growth scenario such as DfT has included in the national forecasts, and unable to reduce congestion with a high growth scenario.

But in a way that doesn't matter, because if we assume that all the forecasts and methods are perfectly accurate, there is a robust conclusion that the scheme makes a net loss, in cost-benefit terms, of over £800m. In transport terms, the scheme is not remotely close to demonstrating good value for money.

The second odd thing is not that a 'heritage value' has been added to the conventional effects, but that it is so huge. The suggestion is that the tunnel, by removing traffic from the vicinity of Stonehenge, has a 'heritage value' of £1.3 billion, discounted to just under a billion pounds at 2010 prices, which is three times greater than **all** the other claimed benefits of 'meeting the future needs of traffic'. As far as I know this is the first case where the heritage benefits, as reported, are so overwhelmingly greater than the traditional costs and benefits.

The third odd thing, ironically, is that it's still not enough. Even with a billion pounds of heritage benefits, and the small transport benefits, the scheme still only just has a positive present value, with a benefit to cost ratio of 1.08 to 1.14, not nearly sufficient to be called good value for money. Maybe the scheme will get the go-ahead and maybe it won't, but if it does it won't be because all that technical work has shown it to be worthwhile. A go-ahead would have to depend on a judgement that both the transport and the heritage calculations are wrong.

And the fourth odd thing is that all that billion pounds worth of heritage value has been produced by one small piece of technical work, in a relatively short Appendix to an Appendix towards the end of the fifth volume of document 7.5. It is the single most influential report in the appraisal. It reports a survey of visitors to Stonehenge, and of the general public, asking them what increased amount of tax they would be prepared to pay, for three years, choosing from set values on a card, to 'remove the road' in an unspecific way which does not seem to correspond with the actual scheme. There is no countervailing estimate for any heritage damage done by tunnel entrances and highway cuttings.

This document, highly technical and academic in style, was written by a consultancy called Simetrica, in early 2017. It carries a caveat: 'The Arup Atkins Joint venture assumes no responsibility to any other party [ie other than the Highways England - PG] in respect of, arising out of or in connection with this document and/or its content'. There is an empty space for signing it off by the Highways England, which hasn't been done. Although peer review from two referees is mentioned, their reports are not included, and Highways England's own assurance of the data was apparently not completed. There is list of 65 published papers cited, but none of them is included in the documents in support (which strictly should have been done according to the examination rules). Only two of them seem to relate to roads, one from the Czech Republic, and the other - co-written by one of the authors of the Simetrica report – a 1998 study of the heritage value of removing roads from Stonehenge, using a similar method, which estimated a very much lower value of £150m for the heritage value. The difference is unresolved. Every paragraph of the report has a critically important judgement, assertion or assumption. It surely deserved the type of transparency and scrutiny that the DfT nowadays accords to technical methods – consultations, scrutiny, independent assessment, written and spoken discussions. It was written over two years ago: there was plenty of time to have enabled at least the DfT's network of experts and consultants to have understood and assessed the work. This is an important piece of work. It's simply not fair, I think, for such controversial, profound, pivotal, but highly technical work, to be treated in such a low key way.

I'm in two minds about the implications of including these results in transport appraisals. The problems – as ever – are that inclusion can provide a spurious air of precision, and encourage completely unlike 'prices' to be added together. Stonehenge itself is of course unique, but there are very many other things that people are not being offered which they might equally legitimately be asked to express their values on, in the same hypothetical way. How about a different way of spending money on Stonehenge – a billion pounds would provide some superb archaeology, and amazing virtual reality experiences? And why not restoring cuts to local bus services, or more for nurses, or children with special needs? That would produce a very interesting change to the way in which tax levels and spending are set.

Or global climate change. The fifth odd thing about the appraisal is that there are already other environmental elements included in the appraisal, with no particular attention: the extra road capacity is estimated to induce quite a lot of extra traffic, with consequent effects on air quality and on carbon dioxide emissions. They are also given a price, but not using this survey method. Over £900 million benefit for moving the traffic further from Stonehenge, but £90m loss for the additional C02 this would generate. Are we quite, quite sure that this is right? I just can't help thinking what sort of figures would be produced by an exactly similar survey of what people would hypothetically be prepared to pay in extra tax to meet the environmental policies we are committed to, or what compensation they would consider acceptable for failing to do so. Let's do it!