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

## Scheme Reference: TR010025

## Written Representation

## Cultural Heritage Value: Valuing Heritage Impacts Appraisal of Arup/ Atkins/ Simetrica Report to Highways England

for

## The Stonehenge Alliance (Reference No. 2001870)

by Alan James

**Summary**

1. The Simetrica report attempts to put a monetary value on the heritage benefits of the A303 short tunnel proposal, by a questionnaire survey methodology that seeks to elicit respondents' Willingness To Pay (WTP) or otherwise for the removal of the road and traffic from the immediate vicinity of Stonehenge.  Three groups of people are surveyed – visitors, road users, and the general adult population of the UK.  The report comes up with a heritage value of £955 million (discounted to 2010, to be comparable with the transport economic assessment), which combined with the transport value results in a Benefit-Cost Ratio (BCR) of 1.08.

2. There are numerous reasons why the study is not credible and should not be used as a basis for justifying the scheme, especially since the heritage value is a very high proportion of total monetised benefits (around three times the value of transport benefits) yet still barely results in a positive BCR:

    a) The heritage value accounts for almost 75% of the Present Value of Benefits (PVB), and without them the road scheme would not be economically viable by a large margin

    b) Of the £955 million, no less than 94.2% of the benefit is attributed to the 'general population' group, who by definition are unlikely to have experienced the site as it is and are unlikely to have a stake in how it might appear in future with the scheme in place.

    c) Only £55 million of benefit is attributed to visitors or road users, who at least have a direct interest in the potential changes.  This would be nowhere near enough additional benefit to produce a positive BCR.

    d) There are numerous areas of potential bias in the survey, the most significant of which are the bias inevitably introduced by asking questions about the subject; the use of potentially misleading photographs and photomontages, particularly important with the large general population group for whom it is the main information; and the hypothetical bias of asking people what they would be prepared to pay when they know they will never have to pay it.

    e) There is a large question mark over whether the general population survey sample is actually representative of the UK population as a whole, since it is reported that almost 25% of the survey sample had used the A303 at Stonehenge in the previous 12 months, which is not only implausible as a proportion of the total UK population but also incompatible with data on traffic volumes on this stretch of road.

    f) There is no scenario testing, such as is common in highway scheme assessments, to identify the potential effects of changes in baseline assumptions, and whether the

outcome is sensitive or otherwise to small variations in assumptions. Since the general population accounts for such a dominant proportion of claimed heritage value benefits, small changes in the values derived result in large changes in overall PVB for the scheme. It is estimated that only a 1.5% reduction in the mean value of WTP would result in a negative BCR.

g) There is a fivefold disparity between the results of this study (discounted to 2010) and those of a similar study carried out in 2001 (uprated to 2010). Simetrica claims that these figures are comparable, but it is difficult to see how they can be.

h) The Simetrica study has not considered options that remove the A303 entirely from the World Heritage Site, so cannot provide any comparative evidence to support the proposed scheme or to reject the alternatives.

i) It is an unbalanced approach, and contrary to good practice, to monetise one single aspect of heritage value to include in the PVB/ BCR, but not the intrinsic values that make up the OUV of a World Heritage Site. This unacceptable, especially when as here the scheme is unjustifiable without the massive injection of 'heritage value'.

**Glossary of acronyms**

BCR     Benefit Cost Ratio

CV      Contingent Valuation

HE      Highways England

MLI     Member of the Landscape Institute

NPV     Net Present Value

POPE    Post Opening Project Evaluation

PVB     Present Value of Benefits

WTA     Willingness to Accept

WTP     Willingness to Pay

WHS     World Heritage Site

**Biographical information**

My name is Alan James.  I have a BSc in geography from University College London, and an MA in landscape architecture from the University of Sheffield.  I am a retired landscape architect and former MLI, and worked for over 20 years as a consultant in sustainable transport until my recent retirement.

I have a background in stated preference in landscape, having written my MA degree dissertation on 'Landscape Perception and Behavioural Response in Countryside Recreation'. This has obvious resonance with the Simetrica study, though at the time there was little if any interest in the fraught field of attempting to monetise perceptual preferences.  In my work as a transport consultant I took part in around 20 public inquiries into road schemes or other developments with large road or transport components, both as a transport and a landscape witness.  Through this work I am conversant with transport economics, modelling, and the relationship between traffic flows and highway standards.

**Introduction**

This Written Representation covers the report presented in DCO APP-302, Document 7.5, Appendix D: Combined Modelling and Appraisal Report, as Appendix H: 'Valuing Heritage Impacts'. Appendix I of DCO APP-302: 'Willingness to Pay study and quality assurance' is also referred to. The research report (Appendix H) was conducted by Simetrica and commissioned by Arup Atkins Joint Venture on behalf of Highways England.  This report will be referred to as Simetrica, and all references to paragraphs, tables etc are from the Appendix H version of the report unless otherwise stated.

The Examining Authority has asked for the following matters to be addressed under the Principal Issues, Annex C 9, 'Heritage and historic environment' of their Rules 8, 13 and 16 letter dated 11 April 2019:

- *Assessment of the significance of affected heritage assets and their settings including any contribution that they make to the Outstanding Universal Value (OUV) of the WHS.*

- *The positive and negative effects on heritage and the historic environment of alternative approaches, including longer tunnel options and different routes such as Route F010.*

**1    Simetrica report summary**

1.1    In principle, Simetrica attempt to derive a monetary value for the cultural benefits/ disbenefits of the short tunnel option for the A303 through the World Heritage Site (WHS), using a methodology termed 'Contingent Valuation' (CV).  People are asked to put a monetary value on their Willingness to Pay (WTP) for a perceived benefit in removing the road and its traffic from the immediate vicinity of Stonehenge; or to put a monetary value on their Willingness to Accept (WTA) a payment in compensation for a perceived disbenefit.  The latter is almost exclusively defined as a loss of amenity to travellers along the A303 who would no longer see Stonehenge from the road (eg para 6.6.3): as discussed below, this is one of the failings of the report, as it does not properly evaluate other reasons for people to perceive the scheme as harmful.

1.2    The survey is conducted among three groups of people:

- Visitors to Stonehenge

- Road users

- General population

The last of these is defined as UK residents who are 'non-users' in the sense of not having visited Stonehenge or used that section of the A303, and not all that likely to do so in future.  Their motives for possibly having a WTP are a mixture of altruism - they are willing to pay to enhance the enjoyment of Stonehenge by others, both now and for future generations; and 'existence value', a recognised element in landscape perception, where there is a value in knowing that something or somewhere exists, even if it is unlikely ever to be experienced directly by the individual.

1.3    The Simetrica report boils down to a heritage value of the scheme of £955 million in the Present Value of Benefits (PVB) discounted to 2010 prices as part of the Net Present Value (NPV) and Benefit Cost Ratio (BCR) calculations for the overall scheme.  It should be noted that the heritage value alone accounts for **74%** of PVB, around three times as much as the value of transport benefits, and that the BCR is only 1.08 even with this massive addition of heritage value benefits.  It should further be noted that no less than **94.2%** of the monetised heritage value (69.7% of total PVB) is attributed to the 'general population' survey group.

**2    Overall BCR**

2.1    As above, heritage value assigned to the tunnel scheme comprises 74% of all scheme benefits in the PVB, and still results in a fragile BCR which would be very low Value for Money in standard highway assessments, and is extremely vulnerable to minor changes in costs or benefits.  The Simetrica assessment is an abstract academic economic

exercise in hypothetical values which by their own admission (2.2.7 and Figure 1) is far less easily quantified than other elements of transport economic assessment, which in my view is nowhere near robust enough to carry 74% of the value of benefits.

**3    Assignment of cultural heritage values**

3.1    Also as above, 94% of the heritage value of £955 million is attributed to the general population who by and large will never experience Stonehenge but who are said to attach heritage value to the proposed scheme (Table 10 in para 7.3.9: NPV values presumed though not stated to be at 2016 prices, so not the same as PVB at 2010 prices). This valuation depends on ***59.2% (7.2.2) of the adult population of the UK being willing to pay an average of just over £43 for the Stonehenge tunnel even though they are unlikely to experience it personally***, an assertion that I find literally incredible if not preposterous. Only around £55 million of the benefit is gained by people actually experiencing Stonehenge as a visitor or passer-by on the A303. But for the supposed generosity of spirit of the altruistically minded general populace of the UK, the scheme would be nowhere near a positive BCR, and even with it the BCR is extremely fragile and poor value for money. This is based on an online sample size of 0.003% of the general population of the UK, so the results of the sample are multiplied by over 33,000 to extrapolate to the population as a whole.

3.2    The defence in the report is that 95% confidence intervals indicate that the mean value for the general population is 95% certain to lie within about 10% + or - £130 million of the £1.277 billion mean (Table 12, para 8.1.1, and footnote 37). I would have expected confidence intervals to be wider than that, given that the report itself admits that monetising heritage benefits is rife with uncertainties, the representativeness of such a small sample to the total population is fraught with assumptions (see 4 below), and the degree of extrapolation is very large. The calculations are not presented, but even at that, a figure within the lower 95% confidence limit could still result in a negative BCR (see also below).

**4    Aggregation**

4.1    Simetrica claim that a simple extrapolation process from the sample size to the total population will give reliable results within the stated confidence intervals. However, this only works if the sample group is representative of the total population. In this case the sample group is not representative of the total population, because it was asked to think about Stonehenge. The general population of the UK has not been asked to think specifically about Stonehenge, and by and large will not be asked to focus on it (though they may be made aware that something is going on). Simetrica refer to this as 'focusing bias' (4.2.12) and discuss the problems of bias introduction in the survey situation – especially when using photographs or photomontages as was inevitably used for the

general population sample – but the attempt to counteract the bias by reminding respondents what they are actually doing (4.2.21) is decidedly weak.

4.2 A further explicit doubt that the survey sample is representative of the general (adult) population of the UK is the finding that the original 'general population' group (Survey C) included 467 people who had been on the A303 past Stonehenge in the previous year, out of a total of 1967 in Survey C (6.1.4 and Figure 2). This was identified in order to transfer these respondents to the 'road user' group, but also reveals that 467 out of 1967 (**24%**) of the survey sample of the adult population of the UK (excluding visitors and local people) were said to have used the A303 in the past year. This is not in my view remotely plausible, and is not supported by other data: it equates to 12.3 million people per annum (24% of 51.4 million, see 6.5.9 final bullet before Table 7), which is incompatible with the AADT of approximately 8.8 million vehicle trips per annum, many of which will be repeat daily/ weekly trips and return trips (ie the same person twice).

4.3 These and other examples call into serious question the extent to which the study sample of the 'general population' is truly representative of the general population. These problems could be addressed by sensitivity testing (see Section 6, below), but instead Simetrica seem to suggest that they have gone as far as possible to minimise the various bias effects so the data are as robust as they can be. This is not good enough, when so much hangs on the outcome and 'as good as it can be' is still not very good.

4.4 I contend that the 'general population' aggregation exercise is deeply flawed, and given its crucial contribution to PVB (it alone contributes 69% of overall PVB) it needs to be far more rigorous.

## 5 Previous study

5.1 The only CV study for a road scheme to date in Britain was in 2001, was led by one of the members of the current Simetrica team, and was also about the elimination of road impacts around Stonehenge (3.1.1). In an extensive literature review, only one other road scheme was cited, in the Czech Republic. For a methodology that has been around for 30 years there is very little case history, and next to no independent information against which to benchmark the current study. As far as I can tell, there have been no CV studies where the findings have been tested against real outcomes (for example, WTP for admission to a museum compared with visitor numbers following the introduction of charges – analogous to POPE studies for traffic forecasts on new roads).

5.2 The 2001 study (based on 1998 data) arrived at a WTP of £149 million for the removal of the A303 from the vicinity of Stonehenge and closure of the A344 (3.1.1). It is claimed rather remarkably by Simetrica (1.1.19) that the values in the 2001 study are comparable with the present study *"once inflation, growth, and factors specific to the studies … are accounted for"*. Later (3.3.2) the report rows back somewhat, stating that

*"it is not possible to simply 'uprate' these (1998) values to 2016 prices"*, but the reasons why it is not possible are unconvincing. It is fairly simple to uprate the 1998 figure to 2010 prices using the Treasury discount rate, which at the current 3.5% per annum would give a figure of £225 million for comparison with the current £955 million figure, and for action on two roads not just one. Simetrica need to explain why there is a more than fourfold disparity in these figures, and why one should be regarded as more valid than the other (doubtless the figure from the 2001 study was pronounced 'valid'). At the very least, the two studies demonstrate the range of variability inherent in such a theoretical methodology.

## 6    Sensitivity testing

6.1    There is a so-called sensitivity test to establish the 95% confidence intervals (Table 12, 8.1.1). This purports to establish the degree of confidence that the sample population is representative of the population as a whole. Given the hypothetical nature of the exercise and the very low sample size as a percentage of total population, I find Table 12 questionable in its confidence that the total population mean is 95% likely to be within 10% either side of the sample mean.

6.2    There are so many assumptions and issues surrounding the heritage valuation that it cannot be regarded as robust, yet the entire viability of the scheme rests on it. Examples of assumptions and unresolved issues include:

- Rejected responses: a fairly high 6% of all respondents were rejected for various reasons (6.1.1 and Table 1): what effect does varying the thresholds for rejection have on results?

- There is a specific issue with 6.1.1b, where a blanket £250 WTP/ WTA threshold is set for rejecting responses from all three groups as probably being an attempt by the respondent to influence the outcome of the study: however, it is stated elsewhere that income levels affect WTP judgements, and average incomes for the general population are almost half those of visitors and road users. On the same basis, it can be argued that lower income respondents would regard a lower figure as a 'try-on' to attempt to influence the outcome, so the threshold for rejection should be lower, say £125 or even less, which would lead to some reduction in the mean WTP of the general population, which however small has a disproportionate effect on the overall PVB because the general population accounts for so much of the heritage value.

- Bias: in most of the areas of potential bias, Simetrica acknowledge the difficulties and claim best practice methods to minimise the effect. As discussed in 4.1 above with focusing bias and below with hypothetical bias, this approach is very

dependent on how much the bias is eliminated, and 'minimised' may not be enough when so much hangs on the outcome.

6.3     There is no attempt at scenario testing to provide what would be more generally regarded as sensitivity tests for road schemes: in effect, what happens if assumptions are varied, and do small variations in baseline data result in large variations in outcomes or vice versa.  This is specifically raised in the HE analysis and quality assurance of the Simetrica report (DCO App-302, Appendix I, p. I-8, point 13), and the reason given for accepting this shortcoming is extremely lame.

6.4     As a telling example of the sensitivity of the results, I have calculated that a 1p change in the mean WTP of the 'general population' (£14.41, see Table 10 in para 7.3.9) results in a change of £4.85 million in the PVB figure of £955 million: an error of 0.07% in the mean results in a change of 0.5% in the heritage value PVB, a sevenfold multiplier.  The PVB is therefore highly sensitive to small changes in the mean WTP of the 'general population', and a reduction of only 1.5% in the mean WTP of the 'general population' (£0.21/£14.41 = 1.5%) would bring the overall BCR to below 1.

## 7     Treatment of zero WTP/ WTA

7.1     The Simetrica report states (6.3.5) that it is standard practice to include zero values in mean and median calculations of WTP, but this study is not doing so.  The Simetrica justification for this is that people who are unwilling to pay for the tunnel have the opportunity to state a WTA for compensation, which acts as a 'negative WTP' and even allows a respondent to indicate the degree of non-acceptance of the tunnel (see footnote to Table 9).  A zero response is only recorded where a respondent gives neither a positive WTP nor a positive WTA.  This is assumed to occur either when the respondent is indifferent to the outcome or when the 'utility gains' exactly offset 'utility losses' (see 6.3.5 for full details).

7.2     This is unacceptable.  It assumes that all people who are against the scheme so have zero WTP are fully aware that the WTA is an expression of negative WTP as opposed to a form of bribe to compensate their perceived loss.   WTA is largely considered by Simetrica as compensation to road users who would regret the loss of the view from the A303, but there are any number of other reasons to oppose the tunnel and have zero WTP, which would be most unlikely to be satisfied by WTA compensation.  Objectors to the impact of the scheme on the WHS have zero WTP but are extremely unlikely to say that they would be appeased by a sum of money to sweeten their loss.

7.3     Looking at the numbers of WTA respondents, it is clear that the theoretical use of WTA as a negative WTP has not worked.  There were only 67 WTA respondents, compared with 1176 zero WTP/ WTA respondents (Table 8): over seventeen times more respondents were zero than were WTA.  The very low number of WTA respondents,

even amongst road users who were supposedly the most likely group to express disbenefit by being unable to see Stonehenge from the road, is most likely to reflect disdain for the suggestion that the loss involved could be satisfied by mere money[1].

## 8 Hypothetical Bias

8.1 The Simetrica report covers the several possible areas of bias in its findings (4.2.12 onwards), but never really gets to grips with the most obvious area, which it terms hypothetical bias - the tendency to overstate values in a hypothetical situation where the respondent will never have to pay. The survey uses a 'certainty' question, asking how certain the respondent would be that they would pay the stated amount in real life (4.2.23), on a five point scale, and applies a test eliminating the two least certain classes from further study (6.4.14), which is presented as a sensitivity analysis in Table 13 (para 8.2.2). However, the report itself acknowledges that *"it is not possible to overcome this (hypothetical) bias"* (8.2.1), and the certainty **test** ducks the issue of whether the WTP is overstated by simultaneously ducking the issue of whether the **certainty** is overstated[2]. It seems odd that respondents who over-egg their WTP are rejected on suspicion of trying to influence the outcome, while those who over-egg their certainty of paying are lauded for their reliability in giving valid responses.

8.2 There are various validation tests to show that responses vary consistently with known variables such as income levels, but nothing to affirm that the levels of WTP are in the right ball park in the first place[3].

8.3 This could be done by applying something akin to the optimism bias in the Treasury Green Book, commonly applied to road schemes, in which a percentage reduction is made for BCR purposes to address systematic tendencies to overstate benefits or understate costs. An optimism bias adjustment of only 10.5% in the heritage value PVB would result in a negative BCR for the scheme (optimism bias adjustments are more typically over 30% at this stage of scheme development).

## 9 Questionnaire bias

9.1 For all the efforts to emphasise that survey respondents were given detailed instructions on what the survey was about, Simetrica introduced bias in their fundamental WTP

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[1] The proportion of WTA respondents is almost exactly the same (just over 2%) in the road user and general population groups: this would be most unlikely if the respondents were treating WTA as intended in the study, since the road users are faced with a tangible rather than a theoretical loss.

[2] This seems to me to be similar to the 'strategic' bias issues discussed in the report, in which some responses are eliminated if there is a suggestion that the respondent is making exaggerated responses to enhance the case they want to prevail for or against the tunnel. People who really want the tunnel are more likely to give high WTP values and to express more certainty that they would pay than is actually the case: and they remain comfortable in the knowledge that they will never have to pay the amount they state.

[3] Two quaint measures to minimise hypothetical bias are the inclusion of "cheap talk entreaties" and "oath scripts" (4.2.23). Given that the heritage value accounts for 74% of overall PVB, this is not good enough!

question (5.2.6): *"Please think for a moment about how much the proposed scenario to remove the A303 from the World Heritage Site would be worth to you …".* No matter what information is given elsewhere, at the moment of asking the key question about heritage value the impression is given that the scheme removes the A303 from the WHS, when it does not. The problem is compounded by not asking about WTP for other options that would actually remove the A303 from the WHS.

9.2 In relation to hypothetical bias, the report drops the bombshell in 4.2.22 that *"respondents had to compare the real situation with the existing road with a hypothetical situation of a tunnel with limited information on its position.* ***The information provided to respondents included photoshopped images of the site without the road but not of the potential tunnel portals"*** (my emphasis). It is well-known that landscape perception studies based on photographs and photomontages have a lot of scope to mislead results through selective location and/ or atmosphere of the scenes depicted, and 94.2% of the heritage value derives from responses by people unfamiliar with the location so entirely reliant on what they see in the photographs and photomontages. But in addition there is now the admission that the potential downside of the tunnel scheme was not adequately represented in the information given to respondents. The hypothetical scenario (1.1.11) acknowledges adverse impacts on other sites in the WHS, but there is no tangible visual evidence on the nature or significance of these impacts compared with the massively promoted effect of removing the road and its traffic from the vicinity of Stonehenge itself. In my view, this basic failure in provision of balanced information in the survey questionnaire invalidates any conclusions that might be drawn from it.

**10 Road users**

10.1 It seems odd that almost exactly the same proportion of road users as visitors (just over two-thirds) have a WTP for the Stonehenge tunnel. Unless it is assumed that the view of Stonehenge is a bit of a pain for road users and they would be glad not to have to look at it, the only other reason for WTP among road users would be the altruistic reasons that are inferred for the general population. Even if this were so, it is hard to understand why as large a proportion of road users have a WTP as the proportion of Stonehenge visitors actively enjoying the benefit of not seeing traffic on the A303.

10.2 In my view the clear implication of this result is that road users are assigning WTP for the Stonehenge tunnel for transport rather than heritage reasons. No matter how much they are exhorted not to do so, they are inevitably thinking about faster journey times and improved journey reliability. Since these are built into the transport economics of the scheme, there is almost certainly an element of double counting in the PVB: and it

should be emphasised once again that the overall BCR is very fragile and susceptible to small changes in PVB.

10.3 A further issue is that the estimated total number of road users (6.5.8) is extremely suspect. This states that in total 1.22 million people use the A303 about once a week as driver or passenger, based on survey data. The approximate weekly number of vehicle trips on the A303 at Stonehenge, based on an AADT of 24000, is around 168000. For the number of person trips to be compatible with the number of vehicle trips would require an average occupancy of at least 8 per vehicle (inevitably more, since people using the A303 at least once a year or more than once a week should be added to the 1.22 million total). This is clearly wrong.

10.4 It follows that the aggregate WTP for road users is considerably overstated. This may or may not be all that significant in itself - road users account for only 3.8% of the WTP total, but as discussed above the heritage value is extremely sensitive to small changes and the positive BCR of 1.08 is very susceptible to small changes in PVB. More importantly, it illustrates the extent to which false assumptions derived from the survey itself can distort the analysis and results of the study, which is not acceptable given the extent to which the overall BCR of the scheme depends on the heritage PVB.

## 11 Options

11.1 The CV exercise has only been performed on the HE preferred option of a short tunnel, which is assumed to be a proxy for other options by removing the A303 from the vicinity of Stonehenge. This is a weakness, acknowledged by HE (DCO APP-302, Appendix I, p. I-5, point 21), since all option analysis assumes the same level of WTP for heritage value. This is not a safe assumption, since other options remove the adverse impacts on the WHS, so (playing the game to CV rules) some people who have zero WTP because of the impacts on the WHS could be more willing to support options that avoided impacts on the WHS, and those with some WTP but tempered by adverse impacts on the WHS might have a higher WTP for such options.

11.2 Since heritage value accounts for so much of the PVB, the possibility cannot be excluded that, accepting for the moment the validity of the CV exercise is, a higher PVB heritage value for options that remove the A303 from the surface of the WHS altogether could have a higher BCR in spite of increased costs. The Simetrica study cannot provide evidence on this one way or the other.

## 12 Process

12.1 In HE DCO APP-302, Appendix I, Annex 1, p.I-8, point 14, it is stated that "*the historic environment category should not be included in an initial **or adjusted** BCR. The approach*

*… is to calculate the initial and adjusted BCRs and then add on the heritage benefit … for an alternative BCR"* (my emphasis).

12.2 By point 15 on p.1-8, the adjusted BCR has disappeared from the text and the approach taken, of not including the heritage value in the *initial* BCR, is pronounced correct. The following table then contradicts this by not including historic environment in 'adjusted metrics', but instead in a subsequent stage called 'considered after metric using switching values approach'. Whatever that means, it seems clear that the heritage value exercise should not be included in the adjusted BCR: but it is equally clear that the £955 million heritage value **has** been included in the adjusted PVB (Appendix D, Executive summary, Table ES-1).

12.3 The significance of this may seem a bit technical, but is really important. In several places (2.2.2, 5.1.11) Simetrica acknowledge that the study does not *"capture or seek to capture every aspect of the scheme's impacts on heritage and archaeology"* (5.1.11), which are assessed elsewhere. The problem with this is that whilst the Simetrica heritage value of £955 million **is** included in the BCR, the intrinsic value of the historic environment **is not**. The scheme would be most unlikely to proceed with a negative BCR, especially one as weak as the transport BCR, but is being promoted as a viable scheme solely due to one aspect of heritage value. In effect, the 'popular vote' is being used to trump the intrinsic OUV of the WHS, since without the CV exercise there would be no scheme to consider in relation to historic environment and indeed many other environmental impacts.

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