## Barry Garwood

A303 Stonehenge Examination TR010025

**Reply to Highways England's Response to Deadline 3 Representations**

Ref: TR010025 – 001126 Section 8

## Regarding Climate Change and the Climate Emergency

**I wrote:**

While building Winterbourne Stoke bypass alone would not fulfil the Government objective, the policy itself is questionable in the light of the Climate Emergency.

**Highways England said in Section 8.2.1 of their Comments on Deadline 3 Submissions**

*Highways England notes that a climate emergency was declared by the UK Parliament in the House of Commons on 01 May 2019, and that the UK Government has this month committed to introducing legislation that would require the UK to achieve net zero carbon emissions by 2050. A similar declaration was also made by Wiltshire Council in February 2019. As these specific statements followed the preparation and submission of the Scheme proposal in October 2018, Highways England welcomes the opportunity to comment on these specific climate change statements now.*

*Whilst "climate emergency" is not itself defined in the declarations, a common theme of the declarations is to seek to reduce UK carbon emissions. Whilst the declarations do not of themselves create binding obligations, the UK is committed to achieving existing national and international commitments to reducing carbon emissions. In order to ensure compliance with these targets, Highways England has thoroughly and robustly assessed the Scheme's effect on climate change.*

*For instance, this assessment established that even during the period when carbon emissions from the project will be at their highest level, the project will only contribute to 0.023% of the UK's carbon budget for the relevant carbon budget period (the 4th carbon budget period). During Scheme operation, the Scheme's carbon emissions will equate to an extremely marginal 0.008% of the UK's carbon budget for the 5th carbon budget period (please see response to item CC.1.6 in the Examining Authority's Written Questions [REP2-028]). Highways England also notes paragraph 5.17 of the National Policy Statement for National Networks (NPSNN) which states that it is "very unlikely that a road project will in isolation affect the ability of Government to meet its carbon reduction plans". In the context of the Scheme, we agree with that statement and that this Scheme is assessed and demonstrated to be such a policy compliant case.*

*Highways England considers climate change to be a very important issue, and as such has conducted a thorough assessment of the impact of the Scheme on climate change. The recent declarations made by the UK Parliament and Wiltshire Council do not give cause to alter the conclusions of the ES assessment and the Scheme will make an extremely limited contribution to the UK's carbon targets.*

The response by Highways England appears to be a copy of their Section 8.2.1 response to Chris Gillham, who also mentioned the Climate Emergency.

**My Reply:**

I am glad that Highways England considers climate change to be a very important issue. I assume that as part of their review they have read the IPCC report of 2018 which sets out the kind of changes necessary to achieve zero net carbon dioxide emissions by 2050 and limit global warming to 1.5°C.

The government has committed to zero net carbon by 2050. Although many people think even this doesn't go far enough, it should be seen as a minimum standard.

**The IPCC Report 2018**

The IPCC report is available at: https://www.ipcc.ch/sr15/

**Chapter 1** of the IPCC report informs us that the global temperature rise, along with other man made changes, has led to scientists declaring a new geological epoch, the Anthropocene. This is recognised as beginning in the mid-twentieth century and follows the Holocene which began 11,700 years ago at the end of the last Ice Age.

It notes: "*The rise in global CO2 concentration since 2000 is about 20 ppm per decade, which is up to 10 times faster than any sustained rise in CO2 during the past 800,000 years"*. (p. 54)

**Chapter 2** informs us: "*This assessment suggests a remaining budget of about 420 GtCO2 for a two thirds chance of limiting warming to 1.5°C, and of about 580 GtCO2 for an even chance (medium confidence). The remaining carbon budget is defined here as cumulative CO2 emissions from the start of 2018 until the time of net zero global emissions*".

"*Remaining budgets applicable to 2100 would be approximately 100 GtCO2 lower than this to account for permafrost thawing and potential methane release from wetlands in the future, and more thereafter.*" (p. 96)

In other words, the total net global carbon dioxide emissions that could occur while limiting global warming to 1.5°C are set out as around 4 – 500 Gigatons of carbon dioxide ( 1 Gigaton = 1 billion tons). At the upper end of this figure, targets are less likely to be met, with potentially catastrophic consequences.

The report notes that Carbon Dioxide Removal is unproven at scale and reliance on such technology is a major risk in the ability to limit warming to 1.5°C.

**Chapter 3** informs us that the global temperature has risen by around 0.87°C since the 1850 – 1900 period and that: "*There is high confidence that sea level rise will continue beyond 2100. Instabilities exist for both the Greenland and Antarctic ice sheets, which could result in multi-meter rises in sea level on time scales of century to millennia. There is medium confidence that these instabilities could be triggered at around 1.5°C to 2°C of global warming.*" (p. 178)

**Chapter 4** points out that "*The long-lived urban transport, water and energy systems that will be constructed in the next three decades to support urban populations in developing countries and to retrofit cities in developed countries will have to be different to those built in Europe and North America in the 20th century, if they are to support the required transitions*". Section 4.3.3 (p. 331)

"*Some industries, in particular cement, emit CO2 as inherent process emissions and can therefore not reduce emissions to zero*" Section 4.3.4.5 (p.336)

**Commentary**

It is interesting that the Holocene neatly describes the Stonehenge landscape from its earliest days and that its modern reconstruction as a tourist attraction coincides with the commencement of the Anthropocene.

Highways England have pointed out a NPSNN remark that a single road scheme in isolation is unlikely to prevent the government meeting its target.

However, the A303 Stonehenge scheme is not isolated, it is part of a wider scheme to dual the A303 route between the M3 and M5, creating an extra lane between London and the South-West.

Numerous other schemes are also planned by Highways England, as a look at the Planning Inspectorate website will reveal, any of which in isolation might be possible while still allowing targets to be met. Taken as a whole, something has to change.

There are currently 3 lanes of the M4/M5 route and a single lane of A303, so adding an extra lane will add an extra 25% capacity to these routes, with a likely 25% increase in traffic as a result.

Although there may be a move towards electric vehicles and renewable energy, as much as half of the energy consumed by a vehicle goes into the manufacturing process and this is unlikely to change very much.

Electric vehicles powered by non-renewable generation simply move the emissions from road to power station.

Many renewable energy sources have high demand on land use. Biofuels take vast areas of agricultural land out of food production, as do solar farms. The likely result is more intensive agriculture, with higher emissions and increased use of chemicals.

As such, building more road capacity, while talking about limiting global warming, does seem rather cynical. This is particularly so in the case of such a large tunnel scheme.

**The Tunnels**

The IPCC report notes cement production, a key part of concrete, results in high carbon dioxide emissions.

Let us consider how much concrete would be needed to construct twin bore tunnels, each 2.9 km long and 13m wide. It is understood that a minimum 5.2m height is required, with dual width roads being at least 7m wide.

Pythagoras' theorem confirms an internal bore of close to 9m.

An overall tunnel bore of 13m is specified, giving internal and external radii of 4.5m and 6.5m respectively, indicating walls around 2m thick..

Hence the tunnel lining will have a volume, $V = (6.5^2 - 4.5^2) \times \pi \times 2900 \times 2 = 400{,}000m^3$.

The tunnels alone will require around $400{,}000m^3$ of lining, with what will presumably be reinforced concrete.

Typical densities for concrete are around 2400 kg per $m^3$. Carbon dioxide emissions from concrete production can be up to 0.5 kg per kg of reinforced concrete made, largely because of the high cement content, although steel is also significant.

For more information on the carbon footprint of concrete, see:
https://www.researchgate.net/profile/Phil_Purnell/publication/274767152_The_carbon_footprint_of_reinforced_concrete/links/55d30b1408ae0b8f3ef92048/The-carbon-footprint-of-reinforced-concrete.pdf?origin=publication_detail

The carbon footprint of building the tunnels could be around of 400,000 tons of carbon dioxide emissions, or close to this, depending on the grade of concrete used.

This is in addition to any other concrete used for bridges, flyovers, slip roads, cuttings, portals and any other infrastructure.

This seems an extraordinary high amount for a few kilometres of road and takes no account of the increase in operational emissions from a higher road capacity.

**Conclusion**

Highways England's claim, that a single road scheme in isolation will be unlikely to prevent the government reaching its targets, starts to look rather dubious when we consider the A303 scheme as a whole. It looks even more doubtful when we consider all on-going road schemes alongside one another.

The total carbon footprint of the scheme may seem much smaller than the total carbon budget set by the IPCC, but let us remember that it is the total carbon budget for all mankind for all time.

The obvious conclusion is that we can't continue building more and bigger roads, with ever increasing traffic volumes, without negatively impacting on climate change to the point that global warming will be out of control within a few decades..

We need to start changing our ways.

Government policy needs to move away from building ever more roads. Continuing as at present will have a catastrophic and irreversible effect on the environment within a small number of years.

I submit that the adverse effect on climate change is grounds for rejecting these proposals.

## Regarding the Winterbourne Stoke Barrow Group

**I wrote:**

The Western Tunnel Portal and approach will seriously impede on the setting of this unique asset, detracting from the Outstanding Universal Value (OUV) of the World Heritage Site (WHS).

The constructional compound to the west would be likely to destroy the archaeology rich area and the adjoining slurry treatment plant for tunnel excavation material would surely destroy any archaeological evidence.

**Highways England said in Section 8.1.3 of their Comments on Deadline 3 Submissions**

*For clarity, we note that the Winterbourne Stoke Barrow Group is adjacent to the existing Longbarrow roundabout. See response to items 44.2.3 and 44.3.1 in the Comments on Written Representations [REP3-013], pages 11-19 to 11-20, and 15-10 of the Relevant Representations Report [AS-026] and the Applicant's written summary of oral submissions made at ISH2 in relation to cultural heritage on 5 and 6 June 2019 (submitted at Deadline 4).*

*With reference to AG12 Winterbourne Stoke Crossroads Barrows, Highways England disagrees with Barry Garwood that the Western Tunnel Portal and approach will seriously impede on the setting of this unique asset, detracting from the Outstanding Universal Value (OUV) of the World Heritage Site (WHS). The Scheme will remove both the A303 and the A360, including the existing Longbarrow Roundabout, from immediately adjacent to the asset group; and the A303 will move 150m to the south and be built in cutting to remove the sight and sound of traffic from the group.*

*The Scheme has been sensitively designed with the use of a 2 mile long tunnel, retained deep road cuttings, essential chalk grassland mitigation to enable landscape integration, a 150m long Green Bridge No. 4 to enable visual and physical landscape connectivity and public access, canopies and hidden tunnel portals within the WHS landscape. The benefits of this are demonstrated by the photomontages and CGIs presented in the ES Chapter 6, Appendix 6.9 [APP-218] (Figure 4, Figure 5 and Figure 7).*

*2. See response to item 44.2.6 in the Comments on Written Representations [REP3-013].*
*With reference to the main compound, see paragraphs 4.2.16 and 4.2.17 of the draft DAMS submitted at Deadline 4. 'In these locations below-ground disturbance will be minimised with topsoil retained in situ and protected with imported stone to allow preservation in situ.*

*Provision is made in the Strategy for certain archaeological monuments to be excluded for fill areas fenced off and protected in situ (see Table 10.3 and Appendix D). Installation of utility connections will require targeted archaeological monitoring and recording (AMR) and/ or archaeological excavation and recording (AER) where topsoil is required to be stripped. In accordance with item MW-CH5 of the OEMP [APP-187], the MW contractor will prepare a Method Statement as described in 4.1 above, setting out how it intends to preserve in situ sensitive archaeological remains and prevent deformation of topsoil/ subsoil horizons (including no-dig solutions), and how the measures would be reversed following the end of construction (i.e., removal of compounds).'*

*Regarding the slurry treatment plant area, see Site 42, Appendix D, of the draft DAMS submitted at Deadline 4. This area will be archaeologically investigated and archaeologically recorded prior to construction.*

**My Reply**

The Winterbourne Stoke Barrow Group, adjacent to Longbarrow Cross roundabout, is the most important and extensive funerary monument of its kind known.

It comprises not just the visible assets, but many more barrows and features, including some that are have been newly discovered, which may be visible only to geophysics or archaeological excavation.

Highways England wants to bulldoze around the visible group as though it were a discrete asset, rather than a continuous landscape.

Invisible features count for little to Highways England, English Heritage and Historic England who all support this scheme. The exception seems to be where preserving an invisible feature makes a case for the scheme, such as the proposal to reconnect a short section of the Avenue.

The group is part of a three-dimensional landscape that needs to be preserved.

Removing the road by 150m will not remove it from the immediate setting. Rather, it will trash the landscape of the immediate setting, one of the most important historical landscapes in the world.

Nor will it remove the sound. A dual carriageway will have up to double the amount of traffic travelling at 70 mph through the landscape, rather than slowing right down to negotiate the roundabout.

Putting the road in a cutting will reduce the noise that carries across the landscape slightly, but from a starting point of a much greater volume.

The A360, which is already a noisy road, will remain as is at surface level for most of its length, with a slight diversion in the vicinity of the roundabout, which will result in another huge swathe of this important historical landscape being lost forever.

The repositioning of the roundabout to the south-west appears to be an attempt to place it outside the WHS. However there is talk of extending the WHS to the west as well as to the north.

As such the proposal is to destroy a large area of what is a unique and archaeologically rich landscape, more of which is likely to be adopted as part of the WHS, at some point.

The same can be said of the constructional compound and slurry treatment plant. Any mitigation here will be just that, a partial attempt to preserve part of the history that has lain here undisturbed for millennia.

Highways England saying the scheme has been sensitively designed with a tunnel, cuttings, landscape integration and a green bridge sounds more like a sales pitch from a landscaping company than a serious attempt to preserve one of the world's foremost historic sites.

The OUV of the WHS depends very much on the integrity of the landscape as a whole. The WHS is not a selection of discrete monuments, it is a continuous landscape that covers the whole area and which may one day be extended to include much more of the proposed construction area.

I submit that the proposal is insensitive to this unique, historic landscape and should be rejected.