

Stonehenge A303 improvement:

Assessment of aspects of the Preferred Route
as at 4th December 2017

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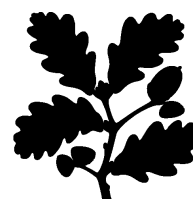
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Executive Summary

This is the latest of series of outline Heritage Impact Assessments on successive iterations of the proposals by Highways England for the improvement of the A303 which have been prepared to inform the comments of Historic England and the National Trust. On this occasion the report specifically assesses the western end of revised proposals (the **Preferred Route as of 4th December 2017**) – looking at the proposed section of new road from the western portal of the bored tunnel beneath the Stonehenge component of the World Heritage property to the western boundary of that property. The report also assesses proposals for creating a new Byway Open to All Traffic (BOAT) to link the existing Byways 12 and 11 once the existing A303 is no longer a highway.

We have examined seven options for the design approach to the road in the western part of the World Heritage property with different variations for the construction of the cutting and for mitigation measures. As a result, we have also proposed further mitigation measures to reduce unacceptable adverse impacts on the Outstanding Universal Value of the World Heritage property.

As in our previous reports ((Snashall, Young 2014, 2017a, 2017b), we have used the methodology for Heritage Impact Assessment recommended by ICOMOS (ICOMOS 2011). Also, as previously, we have assessed visual impacts of the road line separately (in Chapter 2) from direct physical impacts of road construction on archaeological features (Chapter 3). For the visual impacts, we have used the eighteen key groups of monuments that convey attributes of Outstanding Universal Value as a measure of the overall impact. Direct physical impacts have been assessed for all archaeological sites which might be impacted. The impact of the proposed new BOAT has been assessed separately (Chapter 4). Chapter 5 discusses potential overall impacts on the Outstanding Universal Value of the World Heritage property with brief conclusions in Chapter 6. We have not been able to consider the impacts of noise and light pollution as the necessary data was not available.

Based on the current information available the direct physical impact of the new proposed route appears to be negligible though the normal precautions will be needed for carrying out development in such a sensitive archaeological area. In addition to this, as a result of the new location of the Western Portal, significant visual impacts are confined to the three key monument groups closest to the road line. These are the Normanton Down, Winterbourne Stoke and the Diamond barrow cemeteries. This is clearly a key group of monuments that conveys attributes of OUV. Without mitigation, the proposed scheme would cause unacceptable damage to the links between Normanton Down (just to the east of the tunnel portal) more or less along the line of the new road to the Winterbourne Stoke and Diamond Groups close to the western boundary of the World Heritage property, and also to the links between the two latter groups which will be directly severed by the new road cutting.

Highways England have proposed mitigation measures (adding an additional 200m of cover to the cutting immediately west of the tunnel portal) which is likely to reduce satisfactorily the adverse impacts to the relationships between Normanton Down and the other two barrow groups. Highways England have demonstrated that it may be possible to mitigate the impact on the link between the Winterbourne Stoke and the Diamond groups but have not yet included sufficient mitigation proposals in their road proposals. Without adequate mitigation, the impact on these two key monument groups will be so severe as to outweigh the general benefits to the Outstanding Universal Value of the property as a whole.

The proposals for a new BOAT have a moderate adverse impact of large significance because it would introduce a new vehicle route in the middle of the World Heritage property which would

impact adversely, for example on the links between Stonehenge and the Normanton Down Barrow Group. There is also a possibility that the linking of the existing Byways 11 and 12 will increase vehicular use of the two tracks with further adverse impacts on the Outstanding Universal Value of the World Heritage property. These would be unacceptable adverse impacts on the Outstanding Universal Value of the World Heritage property.

Overall, the impact of the proposed scheme for improvement of the A303 through Stonehenge is broadly positive. However, this particular option for the western surface stretch of the A303 from the tunnel mouth to the property boundary does have adverse impacts on three important barrow cemeteries (Normanton Down, Winterbourne Stoke and the Diamond). On the basis of the Highways England design as proposed, the adverse impacts on Normanton Down will be mitigated by 200m of additional cover west of the western tunnel portal. The adverse impacts on the link between the Winterbourne Stoke and Diamond groups will without mitigation be rated as major adverse changes of very large significance. Impacts on more distant attributes which are affected are minor and probably acceptable.

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1 Introduction

This report examines two specific proposed changes to the scheme for the improvement of the A303 Stonehenge, Amesbury to Berwick Down. These are:

- 1 - Revised proposals for the route from the western tunnel portal (itself in a new location) to the western boundary of the World Heritage property;
- 2 - Proposals to link Byways 11 and 12 by a new byway, also open to all traffic, either along the route of the existing A303, or along a new line taking advantage of lower ground immediately north of the Normanton Down Barrow Group.

This is the latest of four reports on the potential impacts of the proposed improvements to the A303 through the Stonehenge component of the Stonehenge, Avebury, and Associated Sites World Heritage property. As with its predecessors, this report focuses on the impact of the proposed scheme on the Outstanding Universal Value of the World Heritage property.

World Heritage status is the most significant international heritage designation and World Heritage properties are recognised in English planning guidance as being designations of the highest significance. By ratifying the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention), and by nominating properties to the World Heritage List, the UK government has accepted the terms of the World Heritage Convention. According to Article 4 of the Convention:

Each State Party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain. (UNESCO 1972, Article 4)

1 Revised proposals for the route from the western tunnel portal (itself in a new location) to the western boundary of the World Heritage property (see Fig. 3)

The previous reports (Snashall, Young 2014, 2017a, 2017b) have assessed successive iterations of the proposed route A303 and should be referred to for discussion of aspects of the proposals outside the scope of this report. In particular, this report should be read in conjunction with Snashall and Young 2017b which assessed an earlier variant of this particular route. It also re-assessed the 2.9kms hypothetical route assessed in Snashall and Young 2014, the western portal of which was located in almost the same position as is now proposed.

Historic England and the National Trust have asked us to assess seven options for this route. The visual impacts of the route are assessed in Chapter 2 of this report, and the potential for direct physical impacts on archaeological features is covered in Chapter 3. The impacts of light pollution and noise are also discussed briefly in Chapter 2, but the necessary data for evaluation was not available to us.

These seven options are:

- | | |
|----------|--|
| Option 1 | Sloped sides + bored tunnel; |
| Option 2 | Sloped sides + bored tunnel + 200m canopy; |

- Option 3 - Sloped sides + bored tunnel + 200m cut & cover extension;
- Option 4 - Abutment (vertical sides to cutting with top 2.5 m sloped) + bored tunnel;
- Option 5 - Abutment + bored tunnel + 200m canopy;
- Option 6 - Abutment + bored tunnel + 200m cut & cover extension;
- Option 7 - Abutment + bored tunnel + 200m cut & cover extension + landbridge between Winterbourne Stoke and Diamond Barrow Groups;

Additionally in our tables we have included for reference purposes the assessment of the impact of the present A303 and of the hypothetical 2.9kms tunnel from our 2014 report (the latter adjusted to take account of the changes in our understanding of the archaeology of this part of the World Heritage property since 2014). The removal of embankments of the present A303 may also have potential impacts on the visibility or otherwise of the road in cutting west of the western tunnel portal. We have dealt with these possibilities in our narrative.

2 Proposals to link Byways 11 and 12 by a new byway, open to all traffic, either along the route of the existing A303, or along a new line taking advantage of lower ground immediately north of the Normanton Down Barrow Group. (see Fig. 4)

This is a new proposal, the impact of which we have not previously evaluated. It is proposed that both Byways 11 and 12 should remain open to all traffic as is currently the case. Byway 11 runs south from the A303 opposite Stonehenge itself to join a public highway in Lake village in the south-east corner of the World Heritage property. Byway 12 runs from Larkhill, passes by Stonehenge to the west, crosses the A303 and exits the World Heritage property at its south-west corner to join the A360 opposite Druid's Lodge.

Two possible routes for linking the Byways have been proposed. The first would be a new route leaving Byway 12 at the low point just north of the National Trust land boundary running along the Normanton Down Group. It would then run roughly north-east through the dry valley to join Byway 11 midway between the present A303 and the National Trust southern boundary, gaining the maximum cover possible from this depression. The second route would link the two Byways along the present line of the A303.

Changes in the context of our assessments

During our work on the impact of proposed changes to the A303 on the Outstanding Universal Value of the World Heritage property, the context in which we are working has changed in several respects. Considerable work has been carried out to improve understanding of the archaeology of the World Heritage property in order to inform the design process for the road scheme (see Snashall, Young 2017a, 3-4, and b, 2-3). The key finding is that of a previously undefined barrow group (now known as the Diamond Group) north of The Diamond wood and south of the Winterbourne Stoke barrow group. This is clearly a key group of monuments that conveys attributes of Outstanding Universal Value of the World Heritage property and was added to the key groups which had to be assessed (see Fig.1). We also recognised that the Normanton Down Barrow Group had been drawn too tightly and included barrows to the north of the A303 as well as more barrows to the south of the main group. (see pp 6-7 below for further discussion of attributes of Outstanding Universal Value).

The effect of this work has been to increase our understanding of the sensitivity of the area through which the new A303 will pass after it leaves the western tunnel portal. This was recognised in our assessments in Snashall and Young (2017a, 2017b). While our methodology selected key monument

groups conveying attributes of Outstanding Universal Value as proxies for assessing the overall impact on the Outstanding Universal Value of the World Heritage property, it is also necessary to take a broader view of the overall impact. This we have attempted to do in previous reports by assessing the impact of the proposals on each of the seven overall attributes of Outstanding Universal Value identified since 2009 in the successive Management Plans for the World Heritage property (Simmonds, Thomas, 2015, 32). It should also be noted that three of the key monument groups affected by these latest proposals for the western part of the World Heritage property are very large so that views from/ to them will vary greatly as the viewer moves through the landscape.

Within the wider planning context it has been recognised that all attributes of the Outstanding Universal Value of a World Heritage property must be regarded as equally significant when carrying out an impact assessment. This point was stressed by the Planning Inspector for the inquiry into development proposals at Chacewater in the Cornwall and West Devon Mining Industry World Heritage property (Planning Inspectorate 2016, para 18). It is not acceptable, therefore, for spatial planning purposes in England, to say that some attributes of Outstanding Universal Value are less important than others.

This ties in with international guidance on the protection of Outstanding Universal Value since the attributes are derived from the Statement of Outstanding Universal Value for each property, which is agreed by the UNESCO World Heritage Committee and which is the basis for the future protection and management of the property:

- 49. *Outstanding Universal Value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole. The Committee defines the criteria for the inscription of properties on the World Heritage List.*
- 96. *Protection and management of World Heritage properties should ensure that their Outstanding Universal Value, including the conditions of integrity and/or authenticity at the time of inscription, are sustained or enhanced over time.*
- 154. *When deciding to inscribe a property on the World Heritage List, the Committee, guided by the Advisory Bodies, adopts a Statement of Outstanding Universal Value for the property.*
- 155. *The Statement of Outstanding Universal Value should include a summary of the Committee's determination that the property has Outstanding Universal Value, identifying the criteria under which the property was inscribed, including the assessments of the conditions of integrity, and, for cultural and mixed properties, authenticity. It should also include a statement on the protection and management in force and the requirements for protection and management for the future. The Statement of Outstanding Universal Value shall be the basis for the future protection and management of the property. (Operational Guidelines for the Implementation of the World Heritage Convention, UNESCO 2017)*

However, within a large World Heritage property, the ICOMOS guidance on Heritage Impact Assessment makes clear that assessment of a development proposal affecting many attributes has to come to an overall evaluation of the impact on the Outstanding Universal Value of the World Heritage property as a whole:

7 Assessment and evaluation of overall impact of the proposed changes

This part should set out an assessment of specific changes and impacts on the attributes of OUV and other heritage assets. It should include a description and assessment of the direct or indirect impacts, including physical impacts, visual, or noise, on individual heritage attributes, assets or elements and associations, and on the whole. Impact on OUV should be evaluated through assessment of impact on the attributes which convey the OUV of the site. It should consider all impacts on all attributes; professional judgement is required in presenting the information in an appropriate form to assist decision-making.

It should also include an evaluation of the overall significance of effect – overall impact -of the proposals for development or change on individual attributes and the whole WH property. This may also need to include an assessment of how the changes may impact on the perception of the site locally, nationally and internationally. (ICOMOS 2011, Appendix 4, para 7).

The process of reaching an evaluation of the overall impact on the whole World Heritage property may lead to some balancing out of negative and positive impacts across the whole property to reach an overall judgement, unless the impact on any negatively affected attribute is so great as to render a proposed development totally unacceptable.

Methodology

The methodology used is that recommended by ICOMOS (ICOMOS 2011) used in our previous reports (Snashall and Young 2014, 2017a and b). Visual impacts of the new proposed route from the western tunnel portal to the western boundary of the World Heritage property are assessed in Chapter 2 and direct impacts on archaeological features in Chapter 3. Assessment of the impact of the proposals for Byways 11 and 12 is set out in Chapter 4. Our overall assessment is set out in Chapter 5. As previously, it is important to note that this is not a full Heritage Impact Assessment of the proposed works. It is a preliminary outline assessment based on available information and carried out within the very tight time limits set for us. A full Heritage Impact Assessment will still need to be carried out by Highways England.

This methodology was developed by ICOMOS (ICOMOS 2011). The scale of impact of proposed changes has been ranked as:

- No change
- Negligible change
- Minor change
- Moderate change
- Major change

Change can be adverse or beneficial. This gives a nine-point scale with 'neutral' as its central point. The significance of the impact of the change is scored as a function of the importance of the attribute and the scale of change. For any feature of international significance (i.e. World Heritage properties and their attributes of Outstanding Universal Value) the result of this scoring is as follows:

VALUE OF HERITAGE ASSET	SCALE & SEVERITY OF CHANGE/IMPACT				
	No change	Negligible change	Minor change	Moderate change	Major change
For WH properties Very High	SIGNIFICANCE OF EFFECT OR OVERALL IMPACT (EITHER ADVERSE OR BENEFICIAL)				
– attributes which convey OUV	Neutral	Slight	Moderate/ Large	Large/very Large	Very Large

Fig 1: significance of impacts on World Heritage properties and their attributes (ICOMOS 2011, 9)

According to the ICOMOS HIA Guidance, therefore, any moderate or major impact on an attribute of OUV is of large/ very large significance.

The scale of assessment used for visual impacts in the 2014 assessment (Snashall and Young 2014, 39) has been used for this report also to ensure as far as possible consistency of approach:

- Impact has been assessed as major of very large significance when the A303 severs a visual connection or is very prominent in a view of one (e.g. the view from Stonehenge to Old and New King Barrows).
- Impact has been assessed as moderate of large/ very large significance where the A303 is visible but does not sever the viewline and is not central in the view.
- Impact is assessed as minor of moderate/ large significance when the A303 is barely visible or a distant backdrop in a view (e.g. the view from Durrington Walls to Woodhenge).
- Where there is no impact, the value has been given as none.

This ICOMOS methodology is robust and now widely recognised. However, we have identified some systemic issues in using it. It is difficult to use it to recognise that an impact can have both negative and positive effects. The scoring system assesses the significance of impacts according to the importance of the asset affected. Since all the attributes of Outstanding Universal Value affected by the proposals are of the highest significance by definition, the significance of any impacts of moderate or major change is therefore rated as large/ very large (ICOMOS 2011, para 5.8). This tends to bunch together a range of differing impacts under that one score. This can make it difficult to differentiate the varying impacts using just the scoring system. We have attempted to deal with this within the narrative in subsequent chapters.

The methodology has been applied primarily to the relationships between selected key monument groups. Attributes of Outstanding Universal Value are an increasingly important aspect of World Heritage management. Attributes are the features or relationships which express the Outstanding Universal Value of a particular property. Attributes are derived from the Statement of Outstanding Universal Value agreed by the World Heritage Committee. For Stonehenge and Avebury, seven overall attributes have been set out in the 2009 and 2015 World Heritage property management plans (Young, Chadburn, Bedu, 2009; Simmonds, Thompson 2015). These are:

1. Stonehenge itself as a globally famous and iconic monument.

2. - The physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites.
3. - The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape.
4. - The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy.
5. - The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other.
6. - The disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other monuments and sites of the period, which together form a landscape without parallel.
7. - The influence of the remains of Neolithic and Bronze Age funerary and ceremonial monuments and their landscape settings on architects, artists, historians, archaeologists and others.

The overall impact of the proposed road line on these seven attributes is evaluated in Chapter 5 of this report.

However, a number of these attributes are represented in the property by a large number of different archaeological features and the relationships between them and the landscape. There are many hundreds of known archaeological sites and find-spots within the Stonehenge component of the World Heritage property. The 180 Scheduled Ancient Monuments within this part of the property in 2009 included 415 individual archaeological items or features (Young, Chadburn, Bedu 2009, 22), most of which are the physical remains of the Neolithic and Bronze Age funerary monuments included within Attribute 2 above. All of these express the Outstanding Universal Value of the property.

Chapter 3, examining the potential physical impact of the proposed road on archaeological features, considers all known sites which might be affected. The same level of evaluation has not been possible in these reports for the visual impacts of the route in what is intended only as an initial outline assessment to inform the National Trust and Historic England response to the Highways England proposals. As noted above, it is for Highways England, as the proponent of the road scheme, to commission a full Heritage Impact Assessment. For our reports, 18 key monument groups conveying attributes of Outstanding Universal Value were selected for assessment in 2014 and slightly modified in 2017 (see Fig 2). Each of these groups is either a major extant archaeological site (eg Stonehenge itself, Durrington Walls, Woodhenge, the Cursus) or a large barrow cemetery. The impact of proposed road schemes on these monument groups has been used as a measure for assessing the overall impact of the proposals. This approach appears to have been generally acceptable to the ICOMOS/ UNESCO reactive monitoring missions to the property.

Chapter 2 assesses the visual impact of the proposed **Preferred Route of 4th December 2017**. No details are yet available on the aural impacts of the route or of potential light pollution from it.

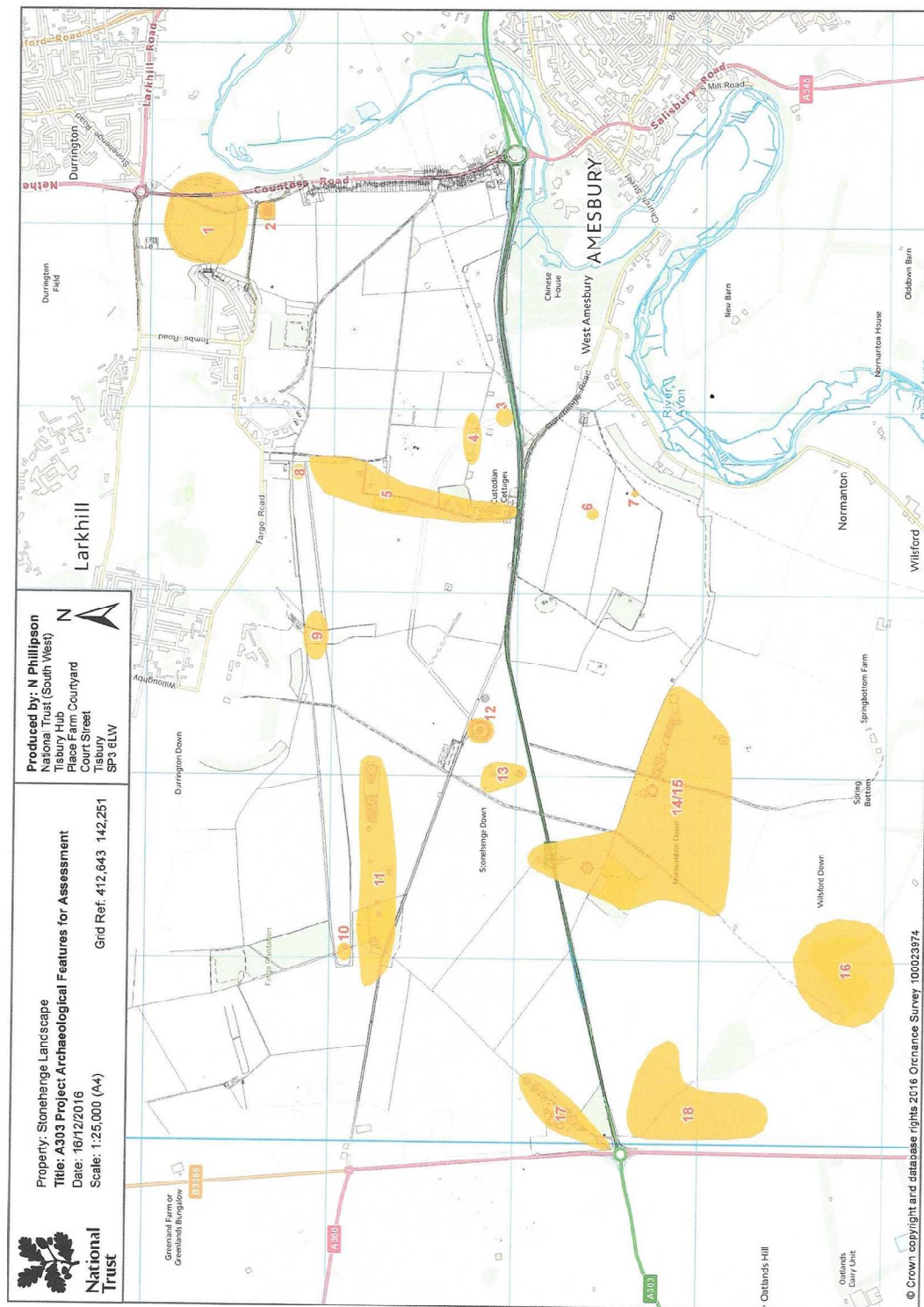


Fig. 2 Key groups of monuments that convey attributes of Outstanding Universal Value in the Stonehenge Word Heritage property

2 Visual impacts of the Preferred Route as at 4th December 2017 from the western tunnel portal to the western boundary of the World Heritage property

Highways England has proposed a new route from the western portal of the bored tunnel to the western boundary of the World Heritage property. This is a development of route option D081C, which was assessed in our previous report (2017b). One significant change is that the portal has been moved c.300m further west so that it is further from the Normanton Down Group. The route then follows much the same line just to the south of the present A303, passes under the existing A360 c.100m south of the present Longbarrow junction to a new junction with the realigned A360 c.400m west of the boundary of the World Heritage property (Fig.3).

The second significant change is that the new road now runs entirely in cutting in the western part of the World Heritage property, with a minimum depth of 7.3m. Given that double-decker buses do not normally exceed 4.5m in height and that advice is that the maximum height of Heavy Goods Vehicles should be 4.95m (House of Commons 2009), it is very unlikely that high vehicles will be visible above the cutting sides in most views, though there would obviously be some light pollution at night from vehicle lights.

Without any mitigation, the length of cutting between the western tunnel portal and the western boundary of the World Heritage property would be 1,150m. Highways England are considering two different approaches to the cutting (open and abutment) that would contain the new road. The cutting would be at its widest at the tunnel portal because of the need to separate the two bores of the tunnel.

An open cutting is one with naturally sloping sides. The maximum width at the top of the cut would be 131m. The minimum width for the open cut would be around 65m. The alternative is an abutment. With this version, the top 2.5m of the cutting would be a grassed slope to minimise the impact of a hard edge in the landscape, and beneath that depth the cutting would have vertical retaining walls. The minimum width, for about 800m of the cutting, would be 41m. For the last 350m, leading to the tunnel portal, the cutting would gradually taper out to a maximum width of 63m at the tunnel mouth. The land-take for the abutment version is therefore considerably less than for the open cutting. The vertical sides are likely also to make traffic and the road itself less visible at least from views from the sides of the highway, particularly at a little distance. In views along the highway, for example from the south-west end of the Winterbourne Stoke or the northern end of Normanton Down barrow groups, the road will be highly obtrusive.

Highways England have considered mitigating these impacts by providing either a 200m canopy or a 200m length of cut and cover tunnel at the tunnel portal to extend its visual effect. A small landbridge, c.45m wide, has been proposed for the former line of the A360 on the western boundary of the World Heritage property. Highways England also proposes to retain the existing embankment of the A303 in the dry valley in front of the tunnel entrance.

Annex 1 shows the results of an assessment of its visual impact on all the key monument groups (see Fig 2) using the same criteria for assessing impact as were used for other route options in 2014 and 2017. In addition to the seven options set out by this current proposal, the table also shows the impacts of the present A303 and the assessment made of the 2.9kms online routes in 2014. The 2014 assessments of the impact of the A303 and of the 2.9kms online route have been adjusted to take account of the changes, outlined above, in our understanding of the archaeology of this part of the World Heritage property [Snashall and Young, 2014, 2017a and b]).

The Annex includes only those key monument groups affected by this western part of the proposed route. In addition to the Winterbourne Stoke, Normanton, and Diamond groups, to which the new line is very close, and the Lake group (some 1.3km distant), this section of road is likely to be visible from a small number of comparatively distant attributes (the east end of the Cursus, the King Barrows, Coneybury Henge and Coneybury Barrow) along the north-south ridge which divides the eastern part of the World Heritage property from the rest. These are over 2km from the new road, which is screened from Stonehenge and other attributes close to it by intervening high ground.

The relationships most affected are those between the Winterbourne Stoke, Normanton Down and Diamond barrow groups and these are shown separately also on Table 1. It has become clear over the last three years that it is difficult to establish a route from the western tunnel portal to the western boundary of the World Heritage property which has minimal adverse impact on its Outstanding Universal Value. The existence of the four barrow groups of Winterbourne Stoke, the Diamond, Normanton Down and Lake make it very difficult to design a satisfactory route in conservation terms. Our last report (Snashall, Young, 2017b) recommended some ways in which the previous proposal (Route D081C) could be improved through mitigation measures. We suggested that lengthening the tunnel and lowering the road out of the tunnel might mitigate some of the adverse impacts.

Some of the changes made by Highways England since our last impact assessment have reduced the adverse impact of the proposed route considerably. The western portal of the tunnel has been moved a further 300m to the west. This has moved it further from the Normanton Down barrow group. It also emerges at a lower elevation above sea level which has made it possible for Highways England to place the road in a deep cutting while it is in the World Heritage property. The effects of this are positive in that the road will be less visible from a distance, particularly from views to north or south of the A303.

This is more the case for a vertical abutment than for an open cut with sloping sides. The latter will be more visible and it will be more possible to see traffic from within the World Heritage property. It will also take around half as much land again as the abutment solution, so has a much bigger physical impact on the World Heritage property with the possibility of impacting on unknown archaeology. We recommend therefore that the vertical abutments with sloping tops should be the preferred option. The advantage of the sloping tops in our view is that the cuttings will have a less hard edge in the landscape.

It appears that the impact of the **Preferred Route of 4th December 2017** on distant monument groups, including Lake, will be minor, and certainly will be positive in contrast to the current situation. Probably, now, the adverse impact on Lake barrow group will only be minor of moderate/large significance, since the road will be sunk entirely in cutting in the views between Lake and the barrow groups of Normanton Down, the Diamond and Winterbourne Stoke. Sinking the road will also greatly improve the experience of those walking or otherwise moving around the World Heritage property, since traffic will largely be invisible from much of the property.

There are however remaining serious issues over the relationships between the three barrow groups in close proximity to this part of the road route, as set out in Table 1. The Winterbourne Stoke and Diamond groups are close together and will be very visibly divided by the road. According to the information provided by Highways England, the top of the cut and of the vertical abutment will be visible from the south-west end of the Winterbourne Stoke group (from the viewpoint chosen at the southern tip of the Long Barrow) and must have a severe adverse impact on the ability to appreciate the linkage between the two barrow groups. Our assessment is that it could be more visible than this.



Figure 3: Preferred Route as of 4th December 2017 between the western boundary of the World Heritage property and the western tunnel portal, including proposed mitigation to provide extra cover west of tunnel portal, and possible landbridge between Winterbourne Stoke and Diamond long barrows.

Table 1: Visual relationships of the Preferred Route as at 4th December, 2017, with the key monument groups of Normanton Down, Winterbourne Stoke and the Diamond Barrow Groups

This table measures the scale of the visual impact of the present A303 and of the 2014 2.9kms on-line bored tunnel, and of the Preferred Route as of 4th December 2017, and of selected options for mitigation.

The significance of these impacts is a function of their scale and of the importance of the asset affected. As attributes of Outstanding Universal Value, all the features and relationships here are of very high importance. This means that a current impact or future change of minor scale shown below is of moderate/ large significance, a moderate one is of large/ very large significance, and a major impact is of very large significance.

View from	To	Current A303	2014 2.9kms online tunnel	Option 1 Preferred route, open cut, bored tunnel	Option 2 As Option 1 + 200m canopy	Option 3 As Option 1 + 200m cut-and-cover extension	Option 4 Preferred route, abutment, bored tunnel	Option 5 As Option 4, + 200m canopy	Option 6 As Option 4, + 200m cut-and-cover extension	Option 7 As Option 6 + land bridge of appropriate length western end
Normanton Down Barrows										
1. Normanton Down Barrows	Winterbourne Stoke Barrows	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse
2. Normanton Down Barrows	The Diamond	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse
Winterbourne Stoke Barrows										
35. Winterbourne Stoke Barrows	Normanton Down Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
37. Winterbourne Stoke Barrows	The Diamond	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse
The Diamond Group										
42. The Diamond Group	Normanton Down Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse	Minor adverse
44. The Diamond Group	Winterbourne Stoke Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse

Similarly, near the Sun Barrow in the northern part of the Normanton Down group, the viewer will be looking straight down the line of the new road towards the Diamond and Winterbourne Stoke groups with a consequent severe adverse impact. Even the visualisation, taken from the north of the present A303 at the northern limit of the Normanton Barrows group and therefore not in the most sensitive point, which is immediately south of the A303, shows that the cutting will be visible from that part of Normanton Down. From immediately east of the portal, the impact will be much more severe.

We consider therefore that further mitigation is essential to reduce the level of adverse impact and to produce a result that might be acceptable in terms of impact on Outstanding Universal Value. Highways England has proposed installing a further 200m of cover beyond the western tunnel portal. This could be either a 200m canopy or a 200m cut-and-cover tunnel extension or a combination of the two. A 200m extension has the potential to mitigate the impact of the road on the views between the Winterbourne Stoke, Diamond and Normanton Down barrow groups to a minor adverse impact by removing the road from the immediate foreground of the views from Normanton Down.

The canopy proposal would require ventilation openings which Highways England have suggested can be camouflaged to some extent. It would be better if these openings were not located immediately west of the northern end of the Normanton Down group behind the tunnel portal, as they will be very visible from there. In contrast the cut-and-cover extension does not require such ventilation but may require tunnel service buildings to be located outside the tunnel mouth and partially in the open. With a canopy solution, the buildings could be under the canopy.

The hybrid option would be part cut-and-cover tunnel and part canopy (to the west). This would remove ventilation slots from the immediate vicinity of Normanton Down, but would still enable the tunnel service buildings to be under cover. Highways England have suggested that the canopy can also be accommodated to surrounding landforms while the cut and cover option could not. If this is the case it would appear that the hybrid option would most effectively mitigate the adverse impact of the road on the relationship between the three barrow groups¹. It is understood that Highways England are still considering these options.

There remains the impact of the road on the linkage between the south-western end of the Winterbourne Stoke barrow group and the Diamond group. The close proximity of the road line with the two barrow groups which it separates is now unique within this road scheme. Without mitigation, this will be a major adverse impact of very large significance because the A303 severs a visual and physical connection in close proximity to the two barrow groups. This impact exists primarily at the south-western end of the Winterbourne Stoke Group since the linear alignment of the group is to the north-east along the ridge and rapidly diverges from the Diamond group and the line of the A303.

A 45m wide landbridge on the line of the former A360 is included in the scheme physically linking the northern and southern parts of the World Heritage property at its western end. It does nothing to alleviate the impact of the road on the linkage between the two barrow groups since it is outside the main line of view between them. This adverse impact could only be mitigated to some extent by a landbridge of appropriate length between Winterbourne Stoke and the Diamond. In our previous

¹ This proposal was made after the main body of the assessment was completed and has not been included in Table 1

report, we suggested that such a cover might need to be as long as 400m, but this would need to be modelled as part of the design process and could perhaps be less.

Highways England has produced a map showing a possible design of a 150m landbridge between the Winterbourne Stoke Longbarrow and the visible long barrow in the Diamond group. These are two of the original burial mounds around which the rest of these groups developed over the next two millennia. Such a landbridge, modelled in line with existing contours might give an effective continuous landscape between the south-west end of the Winterbourne Stoke barrow group and part of the Diamond group and might be an acceptable mitigation, if sensitively designed and sited. However, it is likely that 150m would be the absolute minimum acceptable. Further modelling of possible designs will be needed before this could be resolved.

Highways England has also said that a landbridge with the same eastern boundary but extending to the western boundary of the World Heritage property would be technically feasible. This would give a continuous link between the south-west end of the Winterborne Stoke group and the whole of the Diamond Group. This would clearly be a more effective mitigation than the shorter 150m landbridge. Visually it would be a minor (or perhaps even a negligible) adverse impact on the visual relationship between the two groups.

However, creation of landbridges has technical consequences which need to be taken into consideration. There might need to be lighting under the landbridge, even for one of 150m length. There would also be a need to change the vertical alignment of the road to provide necessary clearance either side of the landbridge, and possible impact on the new Longbarrow interchange alignment though these probably would not affect the impacts of the scheme on the Outstanding Universal Value of the World Heritage property. The necessary construction works would require a landtake some 30-40m wider than planned for the abutment cutting over a length of some 200m for the 150m landbridge and proportionately greater for any longer alternative. While there is no known archaeology relating to the Outstanding Universal Value of the World Heritage property within this additional area, this runs counter to the intention to minimise the landtake within the World Heritage property as much as possible.

Anything longer than 150m would be reclassified as a road tunnel with a consequent need for the provision of ventilation, lighting and emergency facilities, with the specific requirements being dependent upon the length. The impact of this infrastructure would need to be assessed and any negative effect weighed against the positive benefits of a longer landbridge. Nonetheless, it is clear that some form of an appropriately positioned landbridge of at least 150m could mitigate the adverse impact on the relationship between the Winterbourne Stoke and Diamond groups, subject to the necessary assessment of the impact of any additional infrastructure.

With the inclusion of a correctly positioned landbridge of at least 150m as a component of the mitigation in the Highways England scheme, there would still inevitably be some, minor, adverse impact on the link between the Normanton Down group and the Diamond and Winterbourne Stoke groups. Without mitigation, there would be a major adverse impact on the visual linkages between the two latter groups.

Any adverse impact on the Outstanding Universal Value of any World Heritage property is regrettable. However, within a large World Heritage property, assessment of a development

proposal which affects many of its attributes has to come to an overall evaluation of the impact on the Outstanding Universal Value of the World Heritage property as a whole (ICOMOS 2011, Appendix 4, para 7). Provided that the impact on individual attributes is not severe, it is possible that overall beneficial impact could outweigh minor adverse impacts. If the impact on an individual attribute of Outstanding Universal Value is major or moderate adverse, then the scheme as a whole has to be judged to be unacceptable.

Because of the proximity of the new road to the Winterbourne Stoke and Diamond groups and because it cuts a key visual link between them, the impact of the scheme on these two attributes of Outstanding Universal Value, as currently proposed and without mitigation, is unacceptable. The adverse impact could of course be further mitigated by covering more of the length of the route that is in cutting in the vicinity of the Winterbourne Stoke and Diamond groups.

Because the necessary information is not yet to hand it is not possible to assess the impacts of noise and light pollution of the new route. Highways England has undertaken that there will be no road lighting within the World Heritage property outside the road tunnel. *Prima facie* it is likely that the impact of the proposed **Preferred Route of 4th December 2017** in both respects will be less severe than the present situation but this needs to be properly assessed once the necessary data is available.

Finally, we have been asked to assess the impact of removing the existing embankment of the A303 in the dry valley next to the tunnel portal. It has been suggested that the existing embankments of the A303 should be removed in order to reduce the adverse impacts of the infrastructure associated with the current A303 within the World Heritage property. A field visit, and also the graphics (from the viewpoint at the northern end of the main portion of the Winterbourne Stoke barrow group) produced for this latest preferred route, suggest that the embankment will to some extent shield the view of the tunnel portal from the north-eastern part of the Winterbourne Stoke barrows. However this would not be required if, as recommended above for other reasons, the impact of the bored tunnel exit is mitigated by use of a 200m cut and cover and /or canopy extension (Options 5, 6 and 7), as the removal of the intrusive embankment upon which the current road is constructed would not result in any negative visual impacts with this additional extension in place at the western portal.

3 Direct physical impacts of new road construction on archaeological features of Outstanding Universal Value affected by the Preferred Route as at 4th December 2017 from the western tunnel portal to the western boundary of the World Heritage property

The assessment of the impact of physical damage to archaeological sites caused by new construction work was carried out according to the methodology set out in our earlier reports (Snashall and Young 2014, 2017a, 2017b). As this assessment considers only those direct physical impacts related to the elements of the present proposals forming part of the **Preferred Route as at 4th December 2017** at the western end of the World Heritage property it should be read in conjunction with both the methodology and the assessment set out in our January 2017 and March 2017 reports.

The results of the current assessment are set out on an option by option basis in Table 2. All of the impacts assessed are adverse as destruction of physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites that are themselves an attribute of Outstanding Universal Value can only be a negative impact. The assessment of whether the impact is negligible, minor, moderate or major is necessarily a matter of subjective professional judgement. Factors taken into consideration when making that assessment included:

- The proportion of the site or monument affected
- The degree to which the part of the site or monument would be affected; this could range between minor surface disturbance and wholesale destruction.
- The state of survival of the site or monument at present

In accordance with the ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (2011), as all of the archaeological features identified as subject to physical impacts are attributes of Outstanding Universal Value, and therefore of high importance, negligible impacts will be of slight significance; impacts of minor scale will be of moderate / large significance; impacts of moderate scale will be of large / very large significance and major impacts will be of very large significance.

In summary the number of archaeological attributes of Outstanding Universal Value that are impacted by Options 1-7 of the proposals at the western end is low for all options, with only two monuments that are attributes of OUV (both relating to an extremely rare Beaker cemetery) in such close proximity to them that it is considered that direct physical impacts from construction would be possible. One of these is known to have been wholly excavated, while archival evidence for fieldwork on the second strongly suggests that it has been wholly excavated.

In relation to the round barrow (and its associated Beaker cemetery) **SU14SW839** (Scheduled Monument HA list no. 1010832) all options would result in a negligible impact of slight significance.

It should be noted that for all options the bored tunnel face and/or the proposed canopy / cut and cover structure and associated cutting / infrastructure would be in close proximity to the component parts of the Normanton Down Barrow Group. Given the archaeological sensitivity of this area any proposed construction work would have to have special measures put in place to avoid any damage to any of the sites and monuments. Likewise any future requirements to access this area for

maintenance needs (for instance to any canopy or cut and cover or the infrastructure beneath it) would have to be assessed and the impacts fully understood and mitigated.

As set out above with any of these options there is some risk of direct physical impacts from construction. On advice received from Highways England and their consultants the assumption made in this assessment is that all construction work will take place from within the footprint of the cut of the new road. This approach if combined with rigorous and proactive monitoring during construction could mitigate and effectively negate this risk.

In addition it should be noted that although evaluation has been undertaken across some areas covered by these current proposals during a previous iteration of the road proposals (Leivers, Moore 2008) evaluation and assessment techniques have advanced considerably in the intervening period. And new and thorough evaluation, assessment and archaeological excavation - appropriate to an archaeological World Heritage property - will be required prior to any construction work.

Table 2 Physical Impacts of Preferred Route as at 4th December 2017 Options 1 -7 on archaeological sites and monuments that are attributes of OUV

Wilts. HER Pref. Ref. Heritage Asset No.	Site name / description	Summary Comments	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
			Sloped sides + bored tunnel	Sloped sides + bored tunnel + 200m canopy	Sloped sides + bored tunnel + 200m cut & cover	Abutment + bored tunnel	Abutment + bored tunnel + 200m canopy	Abutment + bored tunnel + 200m cut & cover	+ W. Stoke / Diamond Landbridge
SU14SW184	Two excavated Bronze Age burials	No longer extant, fully excavated but forms part of a wider, nationally rare, Beaker cemetery which also includes SU14SW839 below (Leivers & Moore 2008)	No change	No change	No change	No change	No change	No change	No change
SU14SW839 1010832	Round barrow	No surface expression of this monument survives. Gradiometer survey undertaken as part of this scheme shows that the two concentric ring- ditches	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the	Negligible Asset is within 25 metres of the bored tunnel exit. Some direct physical impact to any surviving elements of the

Stonehenge A303 improvement: assessment of aspects of **Preferred Route as at 4th December 2017**

		<p>surrounding a central pit are still extant below ground. But archival evidence suggests this monument has been fully excavated.</p> <p>Forms part of a wider, nationally rare, Beaker cemetery which also includes SU14SW184 above (Leivers & Moore 2008)</p>	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.	archaeological asset during construction is therefore assessed as possible unless appropriate mitigation is put in place.
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Stonehenge A303 improvement: assessment of aspects of **Preferred Route** as at 4th December 2017

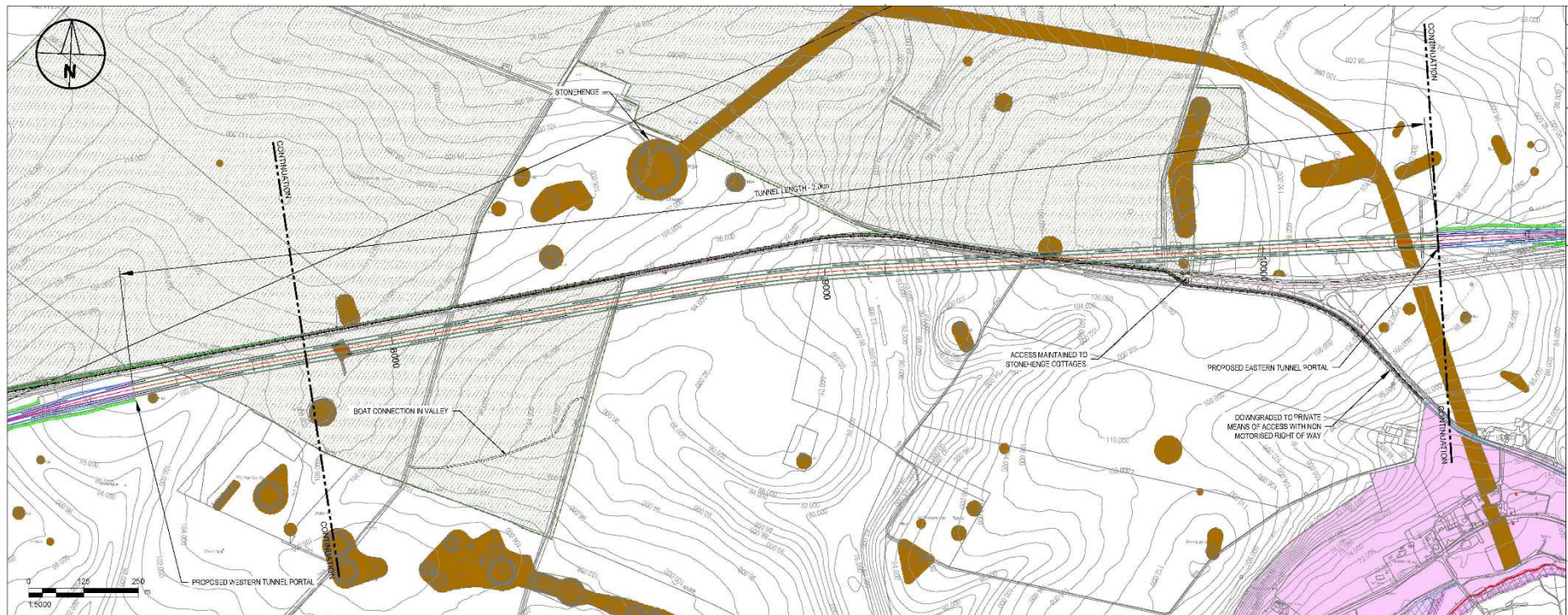


Figure 4: Preferred Route as of 4th December 2017 showing the location of potential new route to link Byways 11 and 12.

(from Highways England Drawing No. HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5004-P05 with permission; brown areas are scheduled ancient monuments)

4 Impacts of proposed changes to the Byways Open to All Traffic (BOAT) in the World Heritage property

There is a large number of public rights of way in the Stonehenge component of the World Heritage property. Two of these, Byways 11 and 12, are Byways Open to All Traffic (BOAT). As noted above (p.2), Byway 11 runs south from the A303 opposite Stonehenge itself to join a public highway in Lake village in the south-east corner of the World Heritage property. Byway 12 runs from Larkhill, passes by Stonehenge to the west, crosses the A303 and exits the World Heritage property at its south-west corner to join the A360 opposite Druid's Lodge. Byway 12 in particular is used by a fair number of vehicles, some of which park on it for considerable lengths of time. Byway 11 though less well-used, probably because it is not actually a through-way across the World Heritage property and does not pass Stonehenge itself, does still see significant use at its northern end.

Use of the Byways by vehicles has led to damage to archaeological sites which abut them and can disturb the atmosphere and calm of parts of the World Heritage property. The presence of vehicles here also adversely impacts on visual relationships between monument groups, in particular between Stonehenge and the Normanton Down Barrow group. Since the publication of the first Stonehenge World Heritage Management Plan in 2000 (English Heritage 2000, para 3.3.34, para 4.6.4), it has been a policy to reduce or remove vehicular access from the two Byways apart from necessary access, for example for agricultural purposes. Implementation of this has been seen as needing to be part of a wider re-assessment of rights of way in the area. This policy has been repeated in the two subsequent World Heritage Management Plans (Young, Chadburn, Bedu 2009, 84, 111-2; Simmonds, Thomas 2015, 172-3).

As part of the A303 scheme, consideration is being given to creating a vehicular link between the two byways. As noted above, two possible routes are being considered. The first would leave Byway 12 at the low point just north of the National Trust land boundary running along the Normanton Down Group. It would then run roughly north-east through the dry valley to join Byway 11 midway between the present A303 and the National Trust southern boundary, gaining the maximum cover possible from this depression. This would be a totally new route through National Trust land. The second route would link the two Byways along the present line of the A303.

In terms of direct physical impact, it is unlikely that construction of a new byway open to all traffic along the line of the A303 would impact on known archaeology which is probably all well buried beneath make-up layers of the road. There are no known archaeological sites of Neolithic or Bronze Age date along the proposed new route but any area within the World Heritage property has the potential for new discoveries. Any works on either route would need to be preceded by appropriate archaeological survey and investigation.

A rapid assessment has shown that both routes would be visible from Stonehenge and from Normanton Down and also from along King Barrow Ridge, and possibly from elsewhere in that part of the World Heritage property. Traffic passing along the new route would impact on views between Stonehenge and Normanton Down barrow group and also between Normanton Down and King Barrow ridge (and possibly other attributes of Outstanding Universal Value. Since this would sever various visual connections between attributes of Outstanding Universal Value, this would constitute at least a moderate adverse impact of large significance. Use of the former A303 would also be a moderate adverse impact of large significance since all traffic would have been removed from it, only to be replaced by moving and parked vehicles in key view lines within the central part of the World Heritage property landscape.

A further risk of linking the two Byways open to all traffic is the promotion of a general increase of motorised traffic using the existing Byways, particularly Byway 11. This is less well-used at present because it is not a through route across the World Heritage property. Connecting it to Byway 12 which does cross the World Heritage property could encourage greater use of Byway 11 by motorised vehicles. Generally, the two byways will be the only means of public vehicular access into this area of the World Heritage property, which may also

lead to increased use. This would lead to a greater risk of damage to archaeological sites adjacent to (and in some instances located on) the byways throughout the World Heritage property and to adverse visual impacts on a considerable number of attributes of Outstanding Universal Value. Such a general increase would be exacerbated by linking the two Byways together.

Overall, therefore, our assessment is that linking the two BOATs would have direct and indirect moderate adverse impacts of large significance. We recommend that this work should not be carried out.

5 Discussion

This chapter sums up the impact of this particular option on the attributes of Outstanding Universal Value of the Stonehenge, Avebury and Associated Sites World Heritage property. It deals only with the impact of the **Preferred Route as at 4th December**, as described above.

The World Heritage property has seven identified general attributes, in addition to archaeological features. It is also necessary to consider any potential impacts on integrity and authenticity. The attributes are:

1. - Stonehenge itself as a globally famous and iconic monument.
2. - The physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites.
3. - The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape.
4. - The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy.
5. - The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other.
6. - The disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other monuments and sites of the period, which together form a landscape without parallel.
7. - The influence of the remains of Neolithic and Bronze Age funerary and ceremonial monuments and their landscape settings on architects, artists, historians, archaeologists and others.

This assessment focuses primarily on the three key monument groups of the Normanton Down, Diamond and Winterbourne Stoke barrow groups, and the contribution they make to the Outstanding Universal Value of the property as a whole. We have also taken into account the impacts on the barrow groups themselves. These impacts are considered below in relation to the seven attributes identified in the World Heritage Site Management Plan (Simmonds, Thomas 2015, 32). Impacts have been summarised in Table 3. In the discussion of the impacts below, we have also commented as appropriate on the proposal to create a new Byway Open to All Traffic between Byways 11 and 12, summarised in the last column of Table 3.

The assessment is focused on the impact of the western end of the **Preferred Route as at 4th December** on the Outstanding Universal Value of the World Heritage properties and not on other heritage values, be they cultural or natural, or on general landscape value. The parameters of the evaluation are set by the Statement of Outstanding Universal Value and by the attributes of Outstanding Universal Value derived from that statement. While these do include references to landscape values, these are very specific. Further information on this can be found in the 2015 Management Plan (Simmonds, Thomas 2015).

Attribute 3 refers to the siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape. This references the extent to which these structures were sited in relation to the landscape in order to be more, or less, visible from particular directions or viewpoints. It is important that those relationships should be maintained as far as possible.

Similarly, Attribute 5 refers to the relationship of these sites and monuments to each other. This refers primarily to visual linkages and site lines between them. It is important that these links should be maintained as far as possible and, if possible, restored where they no longer exist.

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Table 3: Overall assessment of the impacts of the current A303, the 2014 2.9kms online option, and the Preferred Route as at 4th December Options 1 - 7

The significance of these impacts is a function of their scale and of the importance of the asset affected. As attributes of Outstanding Universal Value, all the features and relationships here are of very high importance. This means that a current impact or future change of negligible scale is of slight significance, a minor one is of moderate/ large significance, a moderate one is of large/ very large significance, and a major impact is of very large significance.										
Attributes of Outstanding Universal Value	A303 now	2014 2.9km on line	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	BOAT extension
1 Stonehenge itself as a globally famous and iconic monument	Major adverse	None	None	None	None	None	None	None	None	Moderate adverse
2 The physical remains of Neolithic and Bronze Age funerary and ceremonial monuments and associated sites	Major adverse	None	None	None	None	None	None	None	None	None
4 The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy	Major adverse	Minor beneficial	Minor beneficial	Moderate beneficial	Moderate beneficial	Minor beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	None
3 The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape 5 The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other 6 The disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other sites of the period, forming a landscape without parallel	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse	Moderate adverse
7 The influence of the remains of Neolithic and Bronze Age funerary and ceremonial monuments and their landscape settings on architects,.... and others	Major adverse	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	None
Integrity	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Authenticity	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Overall assessment of the impact on the OUV of Stonehenge component of the WHS	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Overall assessment of the significance of the impact on the OUV of the Stonehenge component of the WHS	Very large negative	Large negative	Large negative	Large negative	Large negative	Large negative	Moderate negative	Moderate negative	Moderate negative	Moderate negative

Attribute 6 deals with the disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other monuments and sites of the period, which together form a landscape without parallel. This has to do with the identification of the linkages, visual and otherwise, between particular sites and monuments and the need to maintain such linkages and the overall disposition of the sites and monuments with each other and with significant landscape features.

1 Stonehenge itself as a globally famous and iconic monument.

This part of the road scheme is, on its own, unlikely to have any direct impact on the international renown of Stonehenge. The road scheme as a whole, if it removes the A303 as a visible feature from most of the World Heritage property without damage to its Outstanding Universal Value, will enhance this attribute. This could be adversely affected by the creation of a new byway open to all traffic linking Byways 11 and 12, with the potential for consequent adverse visual impacts at Stonehenge itself.

2 The physical remains of the Neolithic and Bronze Age funerary and ceremonial monuments and associated sites.

On the basis of research to the present date, the proposed **Preferred Route as at 4th December** should have no or limited impact on the physical remains of Neolithic and Bronze Age funerary and ceremonial and associated sites. As far as we can tell, the footprint of the road as currently proposed by Highways England avoids known archaeology. There is also no known potential direct impact from the proposals for the Byways on the physical remains of Neolithic and Bronze Age funerary and ceremonial monuments and associated sites.

Given the high sensitivity of the area as a whole it is essential that any proposed construction work is rigorously managed to minimise the risk of damage to archaeological assets, and that full archaeological evaluation and excavation is carried out before construction begins. This is especially true close to the Normanton Downs barrows close to the present A303.

3 The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape.

This attribute is discussed below with attributes 5 and 6.

4. The design of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the skies and astronomy.

Stonehenge is one of the best known prehistoric sites with astronomical associations. It is now generally recognised that it was aligned on the midwinter sunset – midsummer sunrise solstitial axis. This axis crosses the A303 just to the east of its junction with Byway 12 and then passes through the Sun Barrow, north of Normanton Gorse and part of the Normanton Down Barrow group. Unlike the previously proposed offline options for the western end of the A303 scheme (D061 and D062), the open part of the **Preferred Route as at 4th December 2017** lies to the north of the axis and should not interfere with it. At its closest point, the open road would be c.400m north of the axis and thereafter diverging from it. Placing the road in a deep cutting as is now proposed should minimise any light from vehicles. Extending cover over the cutting for 200m westwards from the tunnel portal as is now proposed, would further reduce any potential light pollution. Highways England has undertaken that the open parts of the road within the World Heritage property will not be lit. However, as noted above, no information is yet available on noise levels or on light pollution.

Overall the impact is beneficial because of the removal of light pollution, subject to the necessary evaluation once the necessary data is to hand. The greatest benefit will result from the maximum placing of the road underground.

3 The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape.

5. **The siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other.**
6. **The disposition, physical remains and settings of the key Neolithic and Bronze Age funerary, ceremonial and other monuments and sites of the period, which together form a landscape without parallel.**

The **Preferred Route as at 4th December 2017** will have less impact on these attributes than was the case for route D081C from which it has been developed. With a portal further to the west and the 'surface' section being wholly placed within a deep cutting, its adverse impact is considerably less. There are seven different options to be considered and these have different levels of impact. All seven options generally have a minor/ moderate beneficial impact, or only a minor adverse impact on the relationships of the three barrow groups (Winterbourne Stoke, Normanton Down, and the Diamond) with other key monument groups further away. In all cases there are substantial improvements over the present position. It will be easier to appreciate their siting in relation to the landscape and to each other, and the overall disposition of the key Neolithic and Bronze Age funerary, ceremonial and other monuments which together form a landscape without parallel.

Issues remain over the relationship of the three barrow groups closest to this new route. Without further mitigation, the road will obtrude into the key views along its length between Normanton Down and the Diamond and Winterbourne Stoke groups. It will also disrupt the relationship between the Diamond and Winterbourne Stoke groups. Options 1 and 4, and also Options 2 and 3, because of the width of the open cutting, would severely disrupt the ability to appreciate the relationship of the three barrow groups with the landscape (Attribute 3) and with each other (Attributes 4 and 5). The cumulative impact would be so severe as to cause a moderate adverse impact of large/ very large significance to these three monument groups despite positive benefits to the World Heritage property as a whole from the overall road scheme. This is not withstanding the undoubted positive benefits to the Winterbourne Stoke cemetery of moving the line of the A303 away from it, and to the same group and to the Diamond group of moving the A360 up to 400m away.

Provided that the road is built with vertical side walls to the cutting (the abutment options) to minimise landtake and visibility, the adverse impact on the relationship between the Normanton Down group and the Winterbourne Stoke and Diamond groups could be mitigated by adding 200m of additional cover, preferably a combination of cut-and-cover tunnel and canopy, if Highways England's assumptions about landforms are correct, west of the new portal location. Highways England have shown that the adverse impact on the relationship between the Diamond and Winterbourne Stoke could be mitigated by an appropriately located landbridge of sufficient width across the A303 to allow uninterrupted views between the most severely impacted parts of the two groups, but at present have indicated that it is unlikely to be included in their schemes.

Undertaking both sets of mitigation measures would mean that the overall impact on the siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to the landscape, siting of Neolithic and Bronze Age funerary and ceremonial sites and monuments in relation to each other, and their disposition, physical remains and settings, which together form a landscape without parallel would be a minor adverse impact of moderate significance. If the landbridge is not provided between the Winterbourne Stoke and Diamond groups, the scheme has a major adverse impact of very large significance on these two monument groups of Outstanding Universal Value because of the proximity of the new road to the Winterbourne Stoke and Diamond groups and because it cuts a key visual and physical link between them.

For the reasons described in Chapter 4, the BOAT proposals could have a moderate adverse impact on these overall attributes.

7. **The influence of the remains of Neolithic and Bronze Age funerary and ceremonial monuments and their landscape settings on architects, artists, historians, archaeologists and others.**

The proposed works in this part of the World Heritage property are unlikely to have much impact on the influence of the remains of Neolithic and Bronze Age funerary and ceremonial monuments and their landscape settings on architects, artists, historians, archaeologists and others. Such impact as there may be will be a minor beneficial change.

Integrity

The character of the integrity of the World Heritage property is discussed in our main report (Snashall, Young 2017a, 56-7). That discussion notes that new surface roads in the World Heritage property can have an adverse impact, although for the property as a whole the overall impact on integrity was evaluated as moderate to major beneficial change of large or very large significance. However, the impact on the specific monument groups mainly affected by the **Preferred Route as at 4th December 2017** could be a moderate adverse change of large/ very large significance if the basic proposal to extend the bored tunnel and to place the whole road in deep cutting is not mitigated. This could be mitigated by measures discussed above to put more of the road out of sight. This would mitigate not just visual impacts, but also adverse aural impacts and any remaining light pollution. It would also increase potential for improving access within the World Heritage property across the line of the A303.

The impact of the BOAT proposals could be minor adverse on the overall integrity of the World Heritage property.

Authenticity

Authenticity is about the truthfulness of the evidence for Outstanding Universal Value, and the ability to appreciate that evidence. The UNESCO Operational Guidelines (UNESCO 2015) list a series of tests for authenticity including form and design, materials and substance, location and setting and spirit of place (see UNESCO 2015 para 82 and also Young, Chadburn and Bedu 2009, 32-33). As for the A303 as a whole as it affects the World Heritage property, the impact of the **Preferred Route as at 4th December 2017** is greatest on the location and setting, and the spirit and feeling of the three main monument groups affected by the proposal. As proposed, the overall impact on authenticity would be negative. The mitigation strategies outlined above would minimise the negative impact.

6 Conclusion

The **Preferred Route as at 4th December, 2017**, is an improvement on the previous proposals. Highways England have done a great deal to mitigate the adverse impact of the previous D081 by lengthening the tunnel, and by adjusting the alignment of the road further north and placing the road in deep cutting through the west end of the World Heritage property. Moving the junction of the A303 with the A360 up to 400m west of the World Heritage property is also a significant improvement.

Issues do remain over the impact of the scheme as now proposed on the three key monument groups – the Normanton Down, Winterbourne Stoke and Diamond barrow cemeteries. The proposed route is close to all three of them and mitigation will be necessary to reduce adverse impacts to an acceptable level in the context of the overall scheme. Extending cover over the cutting a further 200m west of the western tunnel portal should effectively mitigate impacts on the Normanton Down Barrow Group. However the major adverse impacts on the Winterbourne Stoke and Diamond groups remain unless Highways England mitigate this aspect of the scheme by providing an appropriately located landbridge to protect the visual and physical link between the two groups. Without this mitigation this scheme would have an unacceptable impact on the OUV of the World Heritage property.

Proposals to create a new Byway Open to All Traffic (BOAT) linking Byway 12 to Byway 11, whether along the line of the existing A303, or in lower ground further south, would have a moderate adverse impact of large/ very large significance on the World Heritage property. Views between key monument groups such as Stonehenge and the Normanton Down barrow group would be adversely affected and the presence of traffic in the centre of the World Heritage property would also have an unacceptable adverse impact on the Outstanding Universal Value of the World Heritage property.

Overall, the impact of the proposed scheme for improvement of the A303 through Stonehenge is broadly positive. However, this particular option for the western surface stretch of the A303 from the tunnel mouth to the property boundary does have adverse impacts on three important barrow cemeteries (Normanton Down, Winterbourne Stoke and the Diamond). On the basis of the Highways England design as proposed, the adverse impacts on Normanton Down will be mitigated by 200m of additional cover west of the western tunnel portal. The adverse impacts on the link between the Winterbourne Stoke and Diamond groups will without mitigation be rated as major adverse changes of very large significance. Impacts on more distant attributes which are affected are minor and probably acceptable.

All impacts on attributes of Outstanding Universal Value need to be treated seriously. This is the view taken by the UK planning inspector in the Chacewater enquiry in the Cornwall and West Devon Mining Industry World Heritage property (Planning Inspectorate 2016, para 18). It is not acceptable to say that some attributes of Outstanding Universal Value are less important than others. However, within a large World Heritage property, assessment of a development proposal which affects many of its attributes has to come to an overall evaluation of the impact on the Outstanding Universal Value of the World Heritage property as a whole (ICOMOS 2011, Appendix 4, para 7). This in practice will lead to some balancing out of negative and positive impacts across the whole property to reach an overall judgement, unless the impact on negatively affected attributes is so great as to render a proposed development totally unacceptable.

The degree of change caused by the basic (Option 1) **Preferred Route as at 4th December 2017** without the proposed mitigation of potential impacts on the Normanton Down Group (Options 5 and 6), would be damaging to three key groups of attributes of Outstanding Universal Value. Despite the benefits to the World Heritage property as a whole, the harm caused to these three groups would be unacceptable. Options 5 and 6, or a hybrid version of them, would effectively mitigate the adverse impacts on the Normanton Down Group, but the adverse impact on the Winterbourne Stoke and Diamond Groups would still be unacceptable without further mitigation measures such as a landbridge of appropriate length, design and location.

Annex 1 Visual relationships of Preferred Route as at 4th December with key groups of monuments that convey attributes of the Outstanding Universal Value of the Stonehenge World Heritage property

This table measures the scale of the visual impact of the present A303 and of the 2014 2.9kms on-line bored tunnel, and of the Preferred Route as of 4th December 2017, and of selected options for mitigation.

The significance of these impacts is a function of their scale and of the importance of the asset affected. As attributes of Outstanding Universal Value, all the features and relationships here are of very high importance. This means that a current impact or future change of minor scale shown below is of moderate/ large significance, a moderate one is of large/ very large significance, and a major impact is of very large significance.

View from	To	Current A303	2014 2.9kms on-line tunnel	Option 1 Preferred route, open cut,	Option 2 As Option 1 + 200m canopy	Option 3 As Option 1 + 200m cut-and-	Option 4 Preferred route, abutment,	Option 5 As Option 4, + 200m canopy	Option 6 As Option 4, + 200m cut-and-	Option 7 As Option 6 + land bridge
King Barrows (Old and New)										
3. King Barrows (Old and New)	Normanton Down Barrows	Major adverse	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Major beneficial
4. King Barrows (Old and New)	Lake Barrows	Major adverse	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial
5. King Barrows (Old and New)	Winterbourne Stoke Barrows	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
6. King Barrows (Old and New)	The Diamond	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Coneybury Henge										
7. Coneybury Henge	Normanton Down Barrows	Moderate adverse	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial
8. Coneybury Henge	Lake Barrows	Minor adverse	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial
9. Coneybury Henge	Winterbourne Stoke Barrows	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
10. Coneybury Henge	The Diamond	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Coneybury Barrow										
11. Coneybury Barrow	Normanton Down Barrows	Moderate adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
12. Coneybury	Lake Barrows	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor

Stonehenge A303 improvement: assessment of aspects of **Preferred Route as at 4th December 2017**

This table measures the scale of the visual impact of the present A303 and of the 2014 2.9kms on-line bored tunnel, and of the Preferred Route as of 4th December 2017, and of selected options for mitigation.

The significance of these impacts is a function of their scale and of the importance of the asset affected. As attributes of Outstanding Universal Value, all the features and relationships here are of very high importance. This means that a current impact or future change of minor scale shown below is of moderate/ large significance, a moderate one is of large/ very large significance, and a major impact is of very large significance.

View from	To	Current A303	2014 2.9kms on-line tunnel	Option 1 Preferred route, open cut,	Option 2 As Option 1 + 200m canopy	Option 3 As Option 1 + 200m cut-and-	Option 4 Preferred route, abutment,	Option 5 As Option 4, + 200m canopy	Option 6 As Option 4, + 200m cut-and-	Option 7 As Option 6 + land bridge
Barrow		adverse	beneficial	beneficial	beneficial	beneficial	beneficial	beneficial	beneficial	beneficial
13. Coneybury Barrow	Winterbourne Stoke Barrows	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
14. Coneybury Barrow	The Diamond	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Cursus East End										
15. Cursus E end	Normanton Down Barrows	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
16. Cursus E end	Lake Barrows	Major adverse	None	None	None	None	None	None	None	None
17. Cursus E end	Winterbourne Stoke Barrows	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
18. Cursus E end	The Diamond	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Normanton Down Barrows										
19. Normanton Down Barrows	King Barrows (Old & New)	Major adverse	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial
20. Normanton Down Barrows	Coneybury Henge	Moderate adverse	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
21. Normanton Down Barrows	Coneybury Barrow	Minor adverse	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial	Minor beneficial
22. Normanton Down Barrows	Cursus E end	Major adverse	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial
23. Normanton Down Barrows	Lake Barrows	Major adverse	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial
24. Normanton Down	Winterbourne	Major	Moderate	Moderate	Moderate	Moderate	Moderate	Minor	Minor	Minor

This table measures the scale of the visual impact of the present A303 and of the 2014 2.9kms on-line bored tunnel, and of the Preferred Route as of 4th December 2017, and of selected options for mitigation.

The significance of these impacts is a function of their scale and of the importance of the asset affected. As attributes of Outstanding Universal Value, all the features and relationships here are of very high importance. This means that a current impact or future change of minor scale shown below is of moderate/ large significance, a moderate one is of large/ very large significance, and a major impact is of very large significance.

View from	To	Current A303	2014 2.9kms on-line tunnel	Option 1 Preferred route, open cut,	Option 2 As Option 1 + 200m canopy	Option 3 As Option 1 + 200m cut-and-	Option 4 Preferred route, abutment,	Option 5 As Option 4, + 200m canopy	Option 6 As Option 4, + 200m cut-and-	Option 7 As Option 6 + land bridge
Barrows	Stoke Barrows	adverse	adverse	adverse	adverse	adverse	adverse	adverse	adverse	adverse
25. Normanton Down Barrows	The Diamond	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse
Lake Barrows										
26. Lake Barrows	King Barrows (Old & New)	Major adverse	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial
27. Lake Barrows	Coneybury Henge	Moderate adverse	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
28. Lake Barrows	Coneybury Barrow	Moderate adverse	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
29. Lake Barrows	Cursus E end	Major adverse	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial	Major beneficial
30. Lake Barrows	Normanton Down Barrows	Moderate adverse	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
31. Lake Barrows	Winterbourne Stoke Barrows	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse	Minor adverse
32. Lake Barrows	The Diamond	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Winterbourne Stoke Barrows										
33. Winterbourne Stoke Barrows	King Barrows (Old & New)	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
34. Winterbourne Stoke Barrows	Coneybury Henge	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
35. Winterbourne Stoke Barrows	Coneybury Barrow	Major adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
36. Winterbourne	Cursus E end	Moderate	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor

This table measures the scale of the visual impact of the present A303 and of the 2014 2.9kms on-line bored tunnel, and of the Preferred Route as of 4th December 2017, and of selected options for mitigation.

The significance of these impacts is a function of their scale and of the importance of the asset affected. As attributes of Outstanding Universal Value, all the features and relationships here are of very high importance. This means that a current impact or future change of minor scale shown below is of moderate/ large significance, a moderate one is of large/ very large significance, and a major impact is of very large significance.

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Stoke Barrows		adverse	adverse	adverse	adverse	adverse	adverse	adverse	adverse	adverse
37. Winterbourne Stoke Barrows	Normanton Down Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
38. Winterbourne Stoke Barrows	Lake Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
39. Winterbourne Stoke Barrows	The Diamond	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse
The Diamond Group										
40. The Diamond Group	King Barrows (Old and New)	Major adverse	Major adverse	Major adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
41. The Diamond Group	Coneybury Henge	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
42. The Diamond Group	Coneybury Barrow	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
43. The Diamond Group	Cursus E end	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Moderate adverse	Moderate adverse	Minor adverse	Minor adverse
44. The Diamond Group	Normanton Down Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse	Minor adverse
45. The Diamond Group	Lake Barrows	None	None	None	None	None	None	None	None	None
46. The Diamond Group	Winterbourne Stoke Barrows	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse

BIBLIOGRAPHY

- English Heritage 2000 *Stonehenge World Heritage Site Management Plan* English Heritage
- House of Commons 2009 *Lorry Sizes and Weights* file:///C:/Users/young_000/Downloads/SN00654.pdf
(accessed 11/12/17)
- ICOMOS 2011 *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* Paris
- Leivers, M, Moore, C 2008 *Archaeology on the A303 Stonehenge Improvement* Wessex Archaeology
Salisbury
- Planning Inspectorate 2016. Appeal Decision Ref APP/ D0840/ W/16/ 3153632 Land South of Chacewater Hill, Chacewater, Cornwall TR4 8JT
<http://docs.planning.cornwall.gov.uk/rpp/index.asp?caseref=PA15/10215>
- Simmonds, S. Thomas, B. 2015. *Stonehenge, Avebury and Associated Sites World Heritage Site Management Plan 2015* (ed. Nichols, E. and Tyson, R.). Published on behalf of the Stonehenge and Avebury WHS Steering Committees.
www.stonehengeandaveburywhs.org/management-of-whs/stonehenge-andavebury-whs-management-plan-2015
- Snashall N, Young C 2014 *Preliminary Outline Assessment of the impact of the A303 improvements on the Outstanding Universal Value of the Stonehenge Avebury and Associated Sites World Heritage property* report prepared for English Heritage and the National Trust
- Snashall, N, Young, C. 2017a *Stonehenge A303 Improvements: Outline assessment of the impacts on the Outstanding Universal Value of the World Heritage property of a bored tunnel of at least 2.9kms length* report prepared for Historic England and the National Trust
- Snashall, N, Young, C. 2017b *Stonehenge A303 Improvements: Addendum to outline assessments of the impacts on the Outstanding Universal Value of the World Heritage property of potential route options presented by Highways England for January 2017* Assessment of route option D081C
- UNESCO 1972 *Convention concerning the Protection of the World Cultural and Natural Heritage*
<http://whc.unesco.org/archive/convention-en.pdf>
- UNESCO 2017 *Operational Guidelines for the Implementation of the World Heritage Convention*
<http://whc.unesco.org/en/guidelines/>
- Young, C., Chadburn, A., Bedu, I. 2009. *Stonehenge WHS Management Plan 2009*. English Heritage, on behalf of the Stonehenge WHS Committee. www.stonehengeandaveburywhs.org/assets/Full-MP-2009-low-res-pdf.pdf