

**A303 Amesbury to Berwick Down  
(Stonehenge) Wiltshire  
TR010025**

**Wiltshire Council Written  
Representation**

## Table of Contents

I.	Executive Summary.....	3
II.	Introduction .....	7
III.	Highways and Transport Considerations .....	8
IV.	Archaeology and World Heritage Considerations.....	18
V.	Flood and Drainage Considerations.....	26
VI.	Public Protection Considerations.....	31
VII.	Ecology Considerations .....	34
VIII.	Landscape Considerations .....	34
IX.	Public Rights of Way Considerations .....	35
X.	Conclusions .....	42
	Appendices.....	43
	Appendix A – Flood and Drainage.....	44
	Appendix A.1 – Groundwater Risk Assessment .....	44
	Appendix A.2 – Review of Drainage Strategy .....	53
	Appendix A.3 – Parsonage Down Pluvial Model Review .....	61
	Appendix A.4 – Integrated Review of Water Assessments.....	76
	Appendix B – Public Protection.....	82
	Air Quality and Noise Review .....	82
	Appendix C – Public Rights of Way .....	133
	Appendix C.1 – Plan of Byways within Stonehenge WHS .....	133
	Appendix C.2 – Extract of 2008 Traffic Surveys .....	135
	Appendix C.3 – Extract of June 2018 Traffic Count.....	148

## **I. Executive Summary**

1. Wiltshire Council is the host authority for the A303 Amesbury to Berwick Down Scheme and statutory consultee within the Development Consent Order (DCO) process.
2. The Council wishes to reiterate its support for the Scheme and corridor-wide improvement in principle, subject to the resolution of the issues raised herein. However, as the DCO represents the outline design for the Scheme, additional details will emerge during the Examination and development of detailed design. Therefore, the Council reserves the right to amend its position as further information and clarity becomes available.
3. The Council will seek appropriate payment of the costs of administering the Scheme through a Planning Performance Agreement or the DCO.
4. The issues identified within this response are based on the Council's assessment of the information currently available. This response should be read in conjunction with the Council's Local Impact Report and Statement of Common Ground.

### Highways and Transport

5. As Highways Authority, further clarity and consideration is required on the proposed operation and responsibilities for specific elements of the scheme. These include:
  - a) Traffic controls at Countess and Longbarrow roundabouts
  - b) Maintenance responsibility for carriageways and signal controls
  - c) De-trunking proposals
  - d) Road (re)classifications
  - e) Precise boundaries to the new highway for which it is the vesting authority along with details for the associated support infrastructure
  - f) Speed limits and weight restrictions
  - g) Provision of commuted payments.
6. Identified inconsistencies within the documentation will also need to be addressed i.e. the description of the length of the new and improved A303 trunk road and contradictions between the core working hours stated within the REAC tables and those used within TA assumptions.
7. Changes to the draft DCO and the OEMP will be sought to adequately address the need for consultation and approvals of matters which affect the local road network. This includes further detail within the REAC tables to address areas of concern, i.e. traffic management, a pre and post works condition survey and for regional diversion measures to be provided. The Council also requires enforceable measures to be included to deter haulage sub-contractors using unsuitable routes.
8. The Council considers that a TRO should be provided for in the DCO to limit parking on defined roads for a period either side of summer and winter equinoxes and solstices.
9. Agreement is being sought with HE, through a separate legal agreement, to cover a number of transport related issues as outlined above. Mitigation measures to address traffic impacts in the centre of Amesbury are also under discussion for inclusion.

### Archaeology and World Heritage

10. Overall, the Council welcomes the benefits and opportunities offered by the proposed Scheme to permanently remove the existing A303 through central part of the WHS landscape, thereby benefiting the setting of Stonehenge and many groups of monuments which contribute to its OUV. Wiltshire Council is content that the extensive programme of archaeological evaluation has been completed comprehensively and the Council has the confidence that the results can be successfully used to determine the appropriate mitigation required should the Scheme go forward.
11. However, the Council does have some concerns, the most significant of which is the potential adverse impact of the Scheme on the setting of monuments in the western part of the WHS. The Council is concerned at the impact the proposed Scheme has on the relationship both visual and physical between monument groups and to the integrity of the WHS landscape, impacting on OUV attributes 3, 5 and 6, and considers further mitigation is required. Where adverse impacts are identified, these should be either avoided or mitigated in line with the policy framework.
12. The proposed green bridge no. 4 may not be sufficient, subject to further submissions, to mitigate potential adverse visual impacts on key monument groups with attributes of OUV, i.e. the Winterbourne Stoke, Diamond Group and Normanton Down Group. Further detailed information has been requested that clearly demonstrates where the dual carriageway will be visible from in the WHS landscape and beyond.
13. The Council is in discussions about further design details to ensure the Scheme design minimises the direct impact on archaeological remains, and adverse impacts on setting of monuments and OUV. This includes the consideration of further options to minimise impact on Oatlands Hill by the southern dumbbell of the proposed Longbarrow junction.
14. Wiltshire Council is also concerned to ensure that when the DAMS is agreed and approved as part of the Examination process, that it is robust and comprehensive. Whilst preliminary comments have been provided, there are further detailed comments and requirements that need to be incorporated.
15. The Council also has concerns regarding the imposition of restrictive covenants on ground works on land above the tunnel and the proposed limits of deviation for the eastern and western tunnel portals. Further clarification, discussion and agreement on these aspects is required before the end of the Examination process.

### Flood and Drainage

16. The design of the revised culvert and modelling outputs for the surface water (pluvial) model is required. Information on ownership, maintenance regime and responsibility for the culvert, including the risk of blockage, is also required. The remaining actions from the peer review will need to be addressed.
17. Whilst the modelling study has shown that the Scheme is unlikely to have any significant impacts on groundwater, a number of points from the Council's peer review require resolution. These include the combined effect of several minor changes on the system, model re-runs, the consistency of application of climate change allowances and use of data

comparisons for caveats on absolute levels for flood levels. The additional reports provided by HE are being considered and further comments will be provided at Deadline 2a.

18. There has been significant progress in addressing the issues raised in relation to the road drainage strategy. However, there are remaining points to be addressed to give confidence in the approach and outputs. These include flood risk posed to drainage treatment areas, confirmation of exceedance routes, modelling outputs for land drainage system (and culvert) and justification of the climate change allowances.
19. The Council is considering its position on the protective provisions including within the draft DCO. Wiltshire Council will be liaising with HE on these issues to reach agreement on the form of protective provisions and associated fees.
20. The tunnel construction method, and associated dewatering requirements, are not confirmed. The Council proposes that a tunnel construction method that minimises the need for dewatering is specified. Any dewatering method must have the facility to be stopped during periods of high rainfall or flood risk and have a full risk assessment approved by the EA and Wiltshire Council.
21. Confirmation of the extent and scope of the Scheme elements for which Wiltshire Council will be maintenance authority, will be confirmed alongside the DCO process.

#### Public Protection

22. It is concluded that HE has considered the relevant policy and guidance for the noise assessment, and the study conclusions are generally supported by the evidence provided. A procedure akin to the Control of Pollution Act 1974 prior consent process for the evaluation of the impacts and methodology should be followed, but with no formal submission. Clarification is required on the hours of work for the construction phase, and on the definition of "summer" for summer earthworks outside the specific chainages.
23. An assessment of the air quality implications of transportation of tunnel arising (if required) should be conducted prior to any off-site disposal. This should identify any potential impacts on residents in proximity to the proposed haulage routes, including locations within AQMAS, and identify appropriate measures to mitigate any potentially significant impacts.
24. Further details from HE are required on measures to divert the Esso pipeline, contaminated land and the potential impact of artificial light from floodlights on the local amenity.

#### Ecology

25. The Scheme's design will result in overall benefits for biodiversity, since permeability through the landscape, particularly north to south, will be increased through the construction of green bridges and the greening of the section of current road that will be closed as a result of the proposal. Habitat creation and enhancement in the form of new chalk grassland and additional tree and hedge planting will benefit a wide range of wildlife species including insects, birds, bats and mammals. Additionally, some new features such as bat roosts will be constructed within the footprint of the Scheme. Direct mitigation for European Protected Species, Schedule 1 Birds and Annex II bats has been robustly designed.

26. The Scheme proposal has undergone an Appropriate Assessment under the Habitats Regulations. Natural England has agreed with the conclusion.

#### Landscape

27. Overall the Scheme delivers beneficial effects through the reconnection of the landscape within the WHS and avoiding the severance of communities. There is scope for the development of best practice in the creation of chalk grassland from the tunnel spoil. Significant adverse landscape and visual residual effects remain in the River Till Valley, Byway WST04 and at Countess Farm. There may be opportunities to reduce the time of the efficacy of mitigation through advance planting or using larger nursery stock at these locations and at Lord's Walk.

#### Public Rights of Way

28. The Council must approve the design, construction details and specification for all diverted and new sections of PROW maintainable by the Highway Authority prior to commencement of works (along with any commuted sums).
29. Where temporary diversions or closures of PROW become necessary, construction details of alternative routes must be agreed in advance with the Council.
30. Detailed proposals for the rights of way and access changes are required including surfacing, width, signage and waymarking, structures to provide access to non-motorised users and motorised vehicles, private means of access, boundary fencing / hedging, fencing of Green Bridges against drops, and verge treatment. Further information on junction layouts, proposed routes and stopping-up proposals is also required.
31. The Council wishes for a prohibition of driving order to be placed on certain public rights of way within the Stonehenge part of the WHS to restrict motorised vehicles, other than motorcycles, to preserve the maintainable surface against what the Council sees as the inevitable increase in traffic when the existing A303 is downgraded. It will be necessary to also make a Traffic Regulation Order to permit the driving of motorcycles by the public on the section of the former A303 between the entrances to Byways 11 and 12, in order to retain an unbroken route.

## **II. Introduction**

1. Wiltshire Council is the host authority for the A303 Amesbury to Berwick Down (Stonehenge) Scheme and statutory consultee within the Development Consent Order (DCO) process.
2. As a Unitary Authority, Wiltshire Council provides a single tier of local government functions. It is the Highways Authority for all roads and public rights of way which are not trunk roads. It also is the responsible authority for the implementation of a broad range of Government Regulation related to public protection and is the Local Planning Authority for the area. The Council has regulatory responsibility for managing impacts on Wiltshire's natural environment, heritage assets and landscape. As the Lead Local Flood Authority (LLFA), Wiltshire Council has a number of duties and powers to control and minimise flood risk. Furthermore, the Wiltshire Council Archaeology Service (WCAS) has a statutory duty to advise the Local Planning Authority on the impact of development proposals on archaeological remains in the County, both within and outside of the Stonehenge, Avebury and Associated Sites World Heritage Site (WHS).
3. The Council wishes to reiterate its support for the Scheme and corridor-wide improvement in principle, subject to the resolution of issues raised herein. However, it is important to note that the DCO represents the preliminary / outline design for the Scheme and further detail will emerge during the Examination process and once the detailed design is developed. Information is still awaited from Highways England (HE); therefore, the Council's detailed assessment of the Scheme is still on-going.
4. The Council has committed significant resources to date to engage in the development of the Scheme. Considerable input is still required during the Examination process, development of detailed design and (if approved) during implementation through monitoring and the discharging of conditions. The Council is in the process of negotiating a Planning Performance Agreement (PPA) with HE. However, if this proves unsuccessful, the Council will wish the DCO to make provision for appropriate payment by HE to the Council of the costs of administering the Scheme.
5. The issues identified within this response are based on the Council's assessment of the information currently available. Further information / detail will emerge during the Examination. Therefore, this response is without prejudice to any further representations the Council will make throughout the examination process, including within our Statement of Common Ground with HE.
6. The Council has made a number of comments relating to the process of consultation, discharging of requirements and undertaking of monitoring activities within the various sections of this report. These should be considered as principals for how HE should engage with the Council and the Council's responsibilities for the Scheme in general. These principles are not limited to the particular service area in which, they are first described.
7. This Written Representation is made in accordance with the Infrastructure Planning (Examination Procedure) Rules 2010 rule 10. It should be read in conjunction with the April 2019 Local Impact Report (submitted on 18<sup>th</sup> April 2019) and Statement of Common Ground, once it has been submitted to the Examining Authority.

### **III. Highways and Transport Considerations**

8. The Council, in its Relevant Representation, included issues of concern in relation to highways and transport related matters. This Written Representation seeks to provide further detail on those concerns in order for the ExA to better understand the Council's position. It also introduces some further details of matters remaining to be resolved with HE.
9. The Council reserves its position in relation to any change which might come forward for consideration at the Examination, and appreciates that there will be a considerable degree of additional output on which it will need to comment further as detailed design is eventually moved forward.

#### **Countess and Longbarrow Roundabouts**

10. There are existing traffic signals at the Countess junction, and these traffic signals were provided by and controlled by Highways England (HE). The circulatory part of the roundabout is currently vested with HE. Parts of the signals controls are within highway vested in the Council. It is proposed in the submission that signals will be retained at the junction, and supplemented by additional traffic signals which will provide for pedestrian and cycle crossing movements at the ends of the four merge and diverge slip roads. The Council has no objections to these traffic signals, and their on-going maintenance being vested with HE, regardless of whether parts of the control apparatus falls within highway vested in the Council.
11. From records held by the Council it is evident that the only highway existing in the immediate area of the Countess junction prior to the A303 improvement was the north-south A345, which ran approximately along the west side of the roundabout. The Department of Transport (DoT) bought the land required for the Scheme, and the available evidence indicates that the whole junction lies within the control of HE. The circulatory roundabout is therefore currently classed as trunk road.
12. The de-trunking drawings for the Scheme (TR010025-000167-2-12-DetrunkingPlans.pdf) indicate that it is not proposed that the existing circulatory part of the roundabout is to be de-trunked. This would represent, in the Authority's view, an unusual circumstance, because the circulatory carriageway will effectively become part of the A345 route. It is normal practice, at similar grade separated junctions, for HE controlled highway to have a boundary at a point near the roundabout end of the slip roads. Wiltshire Council does not object to the circulatory part of Countess junction being retained as vested with HE. However, the position is required to be explicit rather than implicit, as does the future responsibility for the control of the traffic signals. In relation to the Longbarrow junction, the Roads Classifications drawings (TR010025-000168-2-13-ClassificationOfRoadPlans.pdf) shows the roundabouts and overbridge highways between the two roundabouts coloured blue; part of the A360. It appears there is some inconsistency between the two junctions, hence the need for clarification, and possible amendment of the de-trunking drawing and the roads classification drawing in relation to Countess junction.
13. At the proposed Longbarrow roundabout junction, it is proposed that there be no street lighting provided. It is normal practice for roundabouts to be provided with street lighting. It is a mandatory requirement (see para 8.23, Department for Transport (DfT) TD16/07) for roundabouts in Northern Ireland, Scotland and Wales for street lighting to be provided at



roundabouts, but not in England (where provision must be considered in accordance with DMRB 8.3). The Council has expressed concerns about this. The Council accepts that advice in TD34/07 para 3.14 (i) indicates that where the mainline is unlit, a grade separated junction may remain unlit. Para 3.15 states: 'Grade-separated junction situated at the end of a lit section of mainline may either: i) be partially lit, with mainline lighting terminated just beyond the back of nose of the slip roads connecting to the lit section, lighting continuing along the full length of those slip roads, and the slip roads connecting to the unlit side of the junction remaining unlit; or ii) be fully lit, with lighting on the mainline extended through the junction and on the slip roads'.

14. However, the Longbarrow junction will be very close to the end of the lit cut and cover section of the A303, and assuming the tunnel lighting will be operational during hours of darkness as well as during daylight hours, drivers' eyes may not have fully adjusted to dark conditions when approaching the junction (westbound).
15. HE have indicated that lighting will not be provided because of concerns about light pollution in the vicinity of the WHS; HE provide in their design proposals for traffic signals to control this junction to address safety concerns as a result of no night-time lighting. It is not clear whether these are to be night time only signals or full-time, or, indeed part time during daylight hours. The Panel will need to consider whether the provision of traffic signals, with constantly changing coloured lights (with a horizontal aspect, as opposed to a downward vertical aspect for street lighting, and therefore visible from a material distance, and necessarily visible from at least the design speed stopping sight distance, in this case 295m for the trunk road approaches and 215m for the A360 and the road connecting with Winterbourne Stoke), represent an acceptable alternative to street lighting. Current standards for street lighting, and the use of flat glass cut-off lanterns, which can preclude light above the horizontal plane, has little impact remote of its immediate location. (For the record, street lighting is provided at the nearby Airmans Corner roundabout, immediately adjacent to the WHS, and which has not, apparently, been the cause of any material concerns since its provision in 2012).
16. It is further understood that the traffic signals at the Countess and Longbarrow junctions might also be used in connection with the closure of the westbound merge slip road at Countess and the eastbound merge slip road at Longbarrow during such times as the tunnel(s) need to be closed. It is unclear how these might work, together with the need to divert A303 traffic onto Countess or Longbarrow junctions in order to effect tunnel closures. The Countess roundabout includes a new pedestrian and cycle route between Countess Road North and Countess Road (South). It is unclear whether or not the merge slip road closures (for tunnel events) will affect the crossing near the nose of the slip road.

### Highway Boundaries

17. There have been issues for the Council at several sites in the county where previous schemes have been undertaken by DoT / DfT or their agents, and parts of those schemes then handed over to the local highway authority for onward responsibility. These have resulted in a lack of detailed information as to the precise extent of the highway which, having perhaps had the status of 'side road' in accompanying scheme Orders, has not been shown to full extent of proposed handover to the local highway authority. Indeed, when works were undertaken by the Highways Agency (HA) in circa 2012 to Countess Roundabout, there was uncertainty on the sides of both the HA and Wiltshire Council as to the exact boundaries and responsibilities. It is very important that land acquired by HE for the provision of roads

intended to be transferred to the Council are transferred in full by way of a formal process, so that the Council is fully aware of exactly the boundary of the asset for which it will take responsibility under the provisions of the DCO, as well as full information on the design of the asset, including all structural detail, street lighting (if applicable), road drainage and associated easements (if applicable), street furniture etc., and all underground and above ground apparatus (energy supply lines, drainage etc.). Handover drawings will be required, which can be held for future reference within the Council's Highway Records.

18. It is very important that areas of highway should be clearly identified and that responsibility for any particular part of the highway can be determined in relation to the authority responsible. For example, where personal injury claims might arise as a result of a defect on the highway, the proper authority must be identifiable to the claimant and in the interests of justice to the claimant. Where works are required to be undertaken by statutory undertakers, it is important that the correct vesting authority knows of the proposals, and so that appropriate management and overseeing of works can be provided, or actions pursued.
19. The Council proposes that a covenant be included within a legal agreement with HE to secure the provision of full details, including 'as constructed' drawings, so that its Highway Records, and asset register can be properly updated for maintenance and budgeting purposes. It is understood that HE concur on this point.

#### **Speed Limits and Weight Restrictions**

20. Decisions on the application of speed limits should not be taken on an arbitrary basis. In past years, many speed limits have been introduced on purely political or other considerations. Where the speed limit is inappropriate for the nature of the road to which the limit is applied, a significant proportion of drivers tend not to observe the speed limit, whilst others do. This can lead to adverse safety conditions on the road, with anticipation of drivers' behaviour being misinterpreted.
21. The police, who are responsible for the enforcement of speed limits are placed in an uncomfortable position if inappropriate speed limits are imposed, for example where the speed limit is exceeded by a material percentage of traffic using the road.
22. In recognition of the need to avoid the making of inappropriate speed limits, the Government offers advice to highway authorities in the form of national speed limit criteria. DfT publication 'Circular 01/2013 – Setting of Local Speed Limits', set out advice / guidance for local authorities to determine appropriate and safe speed limits, with reference to various parameters. Traffic authorities set local speed limits in situations where local needs and conditions suggest a speed limit which is lower than the national speed limit.
23. Section 3 of Circular 01/13 sets out key points, including:

*The Highways Agency is responsible for determining speed limits on the trunk road network. Local traffic authorities are responsible for determining speed limits on the local road network.*

*It is important that traffic authorities and police forces work closely together in determining, or considering, any changes to speed limits.*

24. Paragraph 128 of DfT Circular 01/2013 offers guidance on the application of speed limits on C and unclassified roads:

*128. For C and Unclassified roads with important access and recreational function, the following speed limits are deemed appropriate and traffic authorities should use these as guidance when reviewing the speed limits on these roads:*

- *The national speed limit of 60 mph is only appropriate for the best quality C and Unclassified roads with a mixed (i.e. partial traffic flow) function with few bends, junctions or accesses. In the longer term, these roads should be assessed against through-traffic criteria. For lower quality C and Unclassified roads with a mixed function and high numbers of bends, junctions or accesses, 50 mph may be appropriate.*
  - *A speed limit of 40 mph may be considered for roads with a predominantly local, access of recreational function, for example in national parks or areas of outstanding natural beauty (AONB), or across, or adjacent to, unenclosed common land; or if they form part of a recommended route for vulnerable road users. It may also be appropriate if there is a particular collision problem.*
25. The existing Allington Track is subject to the national speed limit. Traffic collision data indicates that there have been 4 slight and 1 serious personal injury collisions during the years 2014-2018. This is not considered to be unusual for the type of road. However, the road is forecast to be subject to higher levels of traffic as a result of the Scheme, and the speed limit should be reviewed for the existing road in due course, as and when changes in the use of the road are better understood.
26. It is considered that the new length of road connecting with Equinox Drive should be subject to a speed limit consistent with the existing road. It is considered that a speed limit of 30 mph on the road does not match with the standard of road to be provided or the parameters used as limit criteria.
27. The Council accepts that the Scheme will introduce a near 90 degree bend at the eastern end of the proposed new route, but considers that appropriate signage here would be more effective than seeking to impose a speed limit likely to be inconsistent with traffic behaviour on the road.
28. The view of the Council, at this preliminary stage, is that the road should be left subject to the national speed limit.
29. Because the Allington Track becomes a more attractive route between the A338 and the Solstice Park area of Amesbury, it is concerned that it might, as a consequence, attract a greater number of large vehicles (e.g. those seeking access from the A338 to Solstice Park), who are those which would currently perhaps be reluctant to use the existing A303 junction at its northern end rather than travelling via Parkhouse junction. The Council therefore seeks to address this uncertainty by making provision within a legal agreement for payment to be made to the Council to make a weight restriction and / or speed limit order in the event use of the road by large vehicles becomes an issue requiring intervention, or a speed limit is deemed appropriate.

30. The Council also wishes to have some traffic calming measures imposed on the road to address perceived issues with additional traffic, by introducing increased travel times for users, thereby helping to discourage its use as a short cut.
31. Similar issues around the setting of local speed limits apply to the proposed works to re-prioritise traffic movement at the Rollestone Crossroads (where a 40 mph speed limit is considered by the Council to be inappropriate; rather the bend should be managed by way of local warning signs) and on the de-trunked A303 between its western and the Longbarrow Crossroads (where Wiltshire Council considered that the proposed speed limits are partially inappropriate). Here it is considered that the proposed 30 mph speed limit within the village is correct, subject to its adjustment to terminate the 30 mph limits at the extremity of the continuous built frontage; but the 40 mph speed limit between the village 30 mph speed limit and the Longbarrow junction is considered to be too low, given the nature of the alignment, lack of frontage development, accesses and side road junctions, as well as the carriageway width, which will encourage higher speeds.

#### **Draft DCO Inconsistencies**

32. There appear to be some inconsistencies within the Draft DCO at Schedule 9 Part 1 in relation to the description of the length of the new and improved A303 trunk road. The length is described as 11.7km and 11.6km, and the cumulative length of the descriptive parts appears to be 11.51km.
33. Whilst the issue is not of immediate concern to the Council, it does pose questions as to the accuracy of the measures given in the schedules of the draft DCO where regulations and restrictions are to apply. It is important that transgressions by drivers do not lead to significant risks associated with the avoidance of police prosecution on the grounds that technical errors are found in the DCO measurements. The concern is raised by the Council because the discrepancies were noticed, and in the knowledge that many legal defences seek to spot such possible technical issues.

#### **Road Classifications**

34. The Classification of Roads Plan (TR010025-000168-2-13-ClassificationOfRoadPlans.pdf) shows, inter alia, proposals to classify those parts of the de-trunked A303 between Longbarrow junction and its western extremity west of Scotland Lodge Farm. The Council agrees that the plan properly shows the length of road between the Longbarrow junction and the eastern (north side) arm of the B3083 as a classified unnumbered road, a 'C' road. (For information this has now been provisionally allocated a reference number of C507 by the Council). It also agrees that the length of the de-trunked road between the north side and south side junction with the B3083, should logically be numbered as shown. However, the plan shows the de-trunked section to the west of the south side B3083 junction as classified unnumbered road. The Council does not agree that this length of road has a material significance in relation to its function, and should be shown on the plan as an unclassified road (a 'D' road).
35. There are implications resulting from the classification of roads. For example, new access proposals on unclassified roads do not require planning permission; a rational approach to numbering in this circumstance might avoid unnecessary future complications.

### **Layby on A303 to West of Scotland Lodge Farm**

36. The Highway Records of the Council indicate that the layby on the north side of the A303 just west of Scotland Lodge Farm is vested in HE. It was formerly on the alignment of the previous carriageway line, and has been used as a layby since its use was superseded by an improved A303.
37. The Council has expressed concern, and this have been noted by others, that the retention of a layby at this location would be a potential attractor for unwanted illegal camping, especially bearing in mind its proximity to Stonehenge.
38. The Council has agreed with HE that, as the successor authority responsible for this part of the A303 (but see below in relation to the De-trunking drawings) it would prefer the area to revert to highway verge and be mounded so as to discourage use as a parking area. The Council envisages no operational needs for the retention of the land as carriageway.
39. The layby is part of the existing highway, and is not proposed to be downgraded to a lower form of highway, such as a public right of way. Under the provisions of Highways Act 1980, s96, a highway authority is allowed to lay out verges for planting trees etc. It is envisaged that this is what will be done with the layby. However, the layby is not included on drawing 01 of the de-trunking plans referred to in the draft DCO (see TR010025-000167-2-12-DetrunkingPlans.pdf. – Plan 1 of 2). It is clear that the highway is not intended to be retained as trunk road, so the Council believes the area of the layby should be shown hatched for the complete width of the highway to the east of Point A (to the west of which the A303 is proposed to be stopped up and replaced with a byway open to all traffic). It is clearly not the intention that the byway should run on the line of the existing layby.

### **Working Hours**

40. There is some concern as to the adequacy of the coverage of the 6.3 Environmental Statement Appendices 2.2 Outline Environmental Management Plan in relation to some areas of Record of Environmental Actions and Commitments (REAC) tables at 3.2a and 3.2b. For example, the Core Working Hours are set at 07:30 – 18:00 Monday to Friday and 07:30 – 13:00 Saturday, which appear to be inconsistent with TR010025 7.4 Transport Assessment assumption in relation to normal working hours for establishing hourly construction traffic impacts, which states at 9.3.3, it is assumed that deliveries will be scheduled during a 12-hour period (7am to 7pm) 6 days a week.
41. It is axiomatic that the DCO stipulations, having legal force, will prevail. Given there are discrepancies between the draft DCO and the Transport Assessment, it is important that a clear understanding on the matter of site working hours is established before the DCO is finalised. The assumptions are important because they could impact on overall Scheme programme, especially where surplus material from the necessary portal excavations at the eastern end of the tunnels is to be transported by road to the proposed spoil holding area near Longbarrow.
42. The Council draws this issue to the attention of the Panel with a view to ensuring that there are not downstream issues arising from misunderstandings, and to confirm that the hours stated in the final DCO are, indeed, as intended by HE.

## Traffic Management Plan

43. The Council understand that the TMP is a document (one of many) to be produced by the works contractor(s) responsible for the Scheme. The Council is seeking changes to the OEMP which will secure a position for the Council to be consulted on the various Plans to be prepared by the contractor(s). If such consultation is secured by changes to the OEMP, then there will be opportunities for the Council to bring matters of concern to the attention of HE before such Plans are approved by them or by any other approving body. The REAC Tables should include, for example, a requirement for pre and post works condition surveys and for the regional diversion measures to be provided to advise at a distance of Stonehenge area delays.
44. The Council would expect any consultation to be meaningful and proportionate in the context of the matters upon which it is consulted. The Council also expects that any comments made by the Council in consultation on this Scheme will be fully and conscientiously considered in line with the Supreme Court case of *R (on the application of Moseley (in substitution of Stirling Deceased)) (AP) (Appellant) v London Borough of Haringey (Respondent) [2014] UKSC 56*, where Lord Wilson endorses the requirements of procedural fairness which will inform the manner in which consultation is undertaken; one of the criteria includes that the product of consultation must be conscientiously taken into account.
45. An example of the Council's concerns is in relation to the B3083, in particular the section between the A303 and Shrewton. This road offers a direct access to an area of the proposed works involving a secondary works compound to serve the construction of one of the Scheme's significant structures – the River Till bridge. For works associated traffic with a trip end to the north of the area, the obvious shortest route to the site might be via Shrewton, likewise from the A303 the Winterbourne Stoke junction would offer the obvious link to the site.
46. The Council, through other representations, will seek to have the OEMP amended at Table 3.2b – MWTRA5 (Site Travel Plan to be included in the TMP, provided for at draft DCO Requirement 9), such that reference to the use of 'main' roads (para 2 of MW TRA5) be changed to read 'principal'. It is considered that this change will have the effect of being able to enforce against use of Class 2 roads or below, thereby addressing concerns about use of e.g. the B3083 by construction related traffic.
47. Whilst at this time the source of site materials (and thus the potential delivery routes to the site) remains an unknown, it is likely that some sources to the south of the site might point to construction traffic being attracted to the A36 which would then involve movement through Salisbury and therefrom north along either the A345 or the A360. The Council considers that the use of the A36 through Salisbury is inappropriate, notwithstanding its classification as a trunk road, because existing conditions on the A36 include regular congestion delays from the Tesco roundabout on Southampton Road, through to the College, St. Marks, Castle and St. Pauls roundabouts on the Salisbury Ring Road. Any of the routes northwards from Salisbury (A345, A360, or A36) involve the need to pass very close to residential frontages, with the consequential negative impacts on amenity.
48. The Council would wish for construction traffic to avoid Salisbury whenever this is a reasonable restriction to be imposed. The Council suggests that alternative trunk road routes, e.g. the M27/M3/A34 routes should be used unless such an alternative route involves additional distance to be travelled to exceed 40km. This, for example, would ensure

that any traffic with a trip end in Southampton / Portsmouth areas would not be permitted to travel via Salisbury; trip ends from e.g. Poole would be permitted to use the A36.

49. For traffic permitted to use the A36 through Salisbury, the A345 and A360 should be barred routes, to help mitigate impacts on their residential frontagers. Use of the A36 north of Salisbury to the A303 at Stapleford would also cause negative impacts on frontagers within Salisbury and the villages to the north, but the degree of impact, in terms of percentage increase of HGV's would be the lowest compared with the A345 and A360.

### Construction Traffic

50. Because the A303 is regularly congested, journey times along the route between Countess and Longbarrow junctions can be significantly higher than under free-flow conditions. During construction it may be the case that the taper/ merge from two lanes to one lane is effected to the east side of Countess (as opposed to the current position, about 2km to the west of Countess junction), in which case lorry construction traffic joining at Countess Roundabout may not be subject to such serious delays; however, the link between Countess and Longbarrow is often very slow as a result, inter alia, of drivers slowing to allow themselves and / or passengers to view the Stones and likely take images on mobile devices.
51. The Transport Assessment indicates that a substantial amount of spoil will need to be transported from the eastern portal area to Longbarrow. The route for haulage lorries has been assumed, as far as the Council is aware, by HE, to be along the A303.
52. Work undertaken in 2014 by Atkins for the Council showed that journey times along the A303 through the study area could be around 60 minutes at the busiest times, compared with about 9-10 minutes under free-flow journey times. (See Atkins report 'Stonehenge Traffic Routeing Study Data Analysis Report 10<sup>th</sup> November 2014').
53. The obvious consequence for construction traffic is that, within the DCO working hours' restrictions, many of the lorry movements would be during times of day when congestion occurs. There would be a clear incentive for sub-contractors engaged on the Scheme to seek to take an alternative i.e. through Amesbury centre or along The Packway, to maximise the efficiency of their operations in terms of tonnage moved per day. It would be perverse to agree to such routes being used for construction traffic, not least because the point of the Scheme is to provide capacity on the A303 and to relieve other routes from being used by trunk road traffic.
54. Whilst a Traffic Management Plan is a requirement (Requirement 9) of the draft DCO, there is nothing in the draft DCO or the OEMP to say where responsibility lies to ensure unapproved routes are avoided. In Table 2.1 of the OEMP (TR010025-000340-6.3\_ES-Appendix\_2.2\_OEMP.pdf), there is no reference in the responsibilities of the Traffic Control Officer to ensure approved routes only are used by construction traffic. Table 3.2b, MW-TRA2 sets out those measures to be included in the TMP. There is no specific reference to the need to avoid use by construction traffic of The Packway or other alternative routes between the east and Longbarrow areas of the site. The closest reference is at g), which states the TMP shall include '*measures to be implemented to reduce construction traffic impacts or impacts associated with over-parking on residential streets*'; the Council takes the view that an additional point is to be added to require that the TMP shall include '*measures to ensure that the A303 is the only public road used for all site construction movements between Countess and Longbarrow junctions and vice versa, and that no such construction*

*traffic uses The Packway or Stonehenge Road'*. The draft Statement of Common Ground (SoCG) notes that HE is willing to consider changes to the OEMP at the appropriate time during the examination; accordingly this specific change can be raised at that time.

### **Solstice and Equinox Events**

55. The Council has to engage with English Heritage and the police four times a year (solstices and equinoxes) to deal with issues arising from use of local public roads, including for parking of vehicles. English Heritage has the principal responsibility for accommodating visitors to the Stones; the Council plays no part in promoting activities during these periods. On-highway parking is considered likely to occur, not least as a result of English Heritage not providing adequate free parking to meet the traffic demands for these events. The Council and police have, of necessity, to engage in the process to ensure, inter alia, the safety of the local road network. The numbers of visitors for these events is increasing year on year, including at the equinoxes. Some years ago, the only issues occurred at the summer solstice, but it is clear that the winter solstice and both equinoxes now attract more visitors each year, and active management of local roads is considered necessary to ensure local road safety.
56. During construction of the Scheme, the TA forecasts that the inevitable additional delays on the A303, particularly at the Countess junction area, will cause additional diverting traffic onto other routes both to the north and south of the A303. This diverted traffic must not be locally obstructed by on-highway parking associated with solstice and equinox events, or pedestrian movements associated with parked vehicles put in jeopardy by passing traffic. This is a particular concern on most of the local roads where pedestrian provision is not available (no footways, and sometimes unusable verges) e.g. A360, B3086, Packway (part).
57. It is the Council's view that a Traffic Regulation Order (TRO) should be provided for in the DCO having the effect of limiting parking on defined roads over a period extending to about a week either side of both equinoxes and both solstices (about two months per year). At the time of preparation of these written representations, the view of HE on this matter has not been fully explored, and the Council is developing its position on the matter.
58. Many Relevant Representations have been submitted objecting to the loss of the existing public view of the Stones from the A303, and it is thought likely that some motorists, knowingly approaching the WHS will seek to park on some public roads in the general vicinity of the WHS, and walk. Such activity may take place at any time of the year, but, outside of the periods of equinox and solstice, is considered unlikely to be a problem needing to be specifically addressed, and occasional parking by limited numbers might not present any particular problems.

### **Separate Legal Agreement**

59. The Council will seek agreement with HE, through a legal agreement, for a number of transport related issues (which in this section of the written representation exclude references to public rights of way affected or added to by the Scheme). These include:
  - A commuted sum for the maintenance of new assets for which it will be forced to become responsible as a result of the Scheme, principally the de-trunked section of the A303.



- An undertaking to meet costs associated with the need for TRO interventions following Scheme completion e.g. works in Winterbourne Stoke, additional local parking restrictions, weight / speed restriction / calming works on Allington Track and parking restrictions on Stonehenge Road.
- Responsibility for maintenance of all diversion signage on the non-strategic road network.
- Responsibility to rest with HE for traffic signals at Countess and Longbarrow junctions (including any Non Motorised User (NMU) controlled crossing provided).
- Provision of full asset details for new and altered roads to be vested in Wiltshire Council, including specification details for all electrical equipment.
- Works at Amesbury town centre A345 / London Road junction.

60. It is unclear at this stage exactly what will be provided for in a legal agreement, but at the time of writing, Wiltshire Council is actively conversing with HE representatives with a view to establishing a draft agreement covering transport and highway related issues and what might be provided for in other side agreements between HE and Wiltshire Council. The agreement should be concluded before the close of the Examination.

### **The Amesbury Town Centre Impacts**

61. At the request of Wiltshire Council, who expressed concerns about the traffic impacts in the centre of Amesbury, HE have undertaken additional traffic modelling work which includes an assessment of the Scheme's impact within Amesbury. The analysis and assessment undertaken by HE indicates that the Scheme will itself cause unacceptable additional demand on the A345 / London Road traffic signals controlled junction, which is forecast to operate over-capacity in the design year; the impact resulting from the Scheme is caused principally as a result of the necessary closure of the A303 / Stonehenge junction, which means that all previous westbound movement passing through the junction arising from the town and the Woodford Valley areas will now have to join the A303 to travel (westbound) via Countess Roundabout, via the A345 / London Road junction.

62. HE's report identifies two option schemes which offer a degree of mitigation. At this stage, the option schemes are very much in outline, and not fully tested. Option 2 appears to be impractical insofar as implementation is concerned, because of local topographical issues. Option 1 appears to be a buildable option. However, Option 1 does not offer the same degree of mitigation as Option 2, and does not fully mitigate impacts in the AM peak period. Further work is required to establish an agreed mitigation scheme, but Wiltshire Council would accept the limited mitigation of Option 1 if Option 2 is, indeed, not capable of being constructed owing to differential level issues or other constraints to delivery. Both options are preliminarily designed to be accommodated within the boundary of the existing highway. It is envisaged that the works should be undertaken by HE, probably following completion of the Scheme, when traffic pressures at Countess Roundabout will have been relieved, and there will be less potential for unacceptable interaction between town centre works and the Countess junction. The works could be undertaken through the provisions of a Highway Act 1980 s8 agreement (following s278 agreement principles) between the parties. The matter is noted in the draft SoCG as a matter under discussion.

### **Detailed Design Issues**

63. It is understood that the appointed works contractor(s) will be responsible for the detailed design of the works. Wiltshire Council will wish to be satisfied that all works to be

undertaken on its existing network, as well as works on the de-trunked part of the A303 and new roads to be vested in the Council are designed in a manner acceptable to the Council, especially in relation to the construction details.

64. It is acknowledged that the DCO will make provision for the Council to be consulted on such matters; the requirement for both HE and the Council to act reasonably in these circumstances is considered to be likely to result in acceptable outcomes. Whilst the submitted drawings will form the structure for the detailed design, from a local roads perspective, it will be necessary to ensure that routine design matters, such as the provision of turning facilities, effective road drainage and surface water disposal facilities, together with access for maintenance of the assets, is properly included in the contractor's detailed design.

#### **Changes Sought to the Draft DCO and OEMP**

65. The Council, as the local highway authority, is concerned that certain aspects of the draft DCO and the OEMP do not adequately address the need for consultation and approval of matters which will affect the local road network, particularly during the construction period. For example, the traffic management arrangements during the works will need to have regard to other planned roadworks in the area materially affected by temporary diversions, local alternative routes and so on. The Council's Streetworks Team will need to be fully appraised of the A303 Scheme operational stages, insofar as traffic management is concerned, in order to reach a judgement on the acceptability of allowing other proposed roadworks on local roads in the vicinity. A requirement can be incorporated in the OEMP to secure the need for consultation by the works contractor(s) directly with the Council. There are further changes required to the documents which the Council would request the ExA to consider in the context of the deliberations on the identified Principal Issues. HE has indicated a willingness to consider (within the draft SoCG) any specific comments on the OEMP and address the matters at the appropriate time during the Examination.

## **IV. Archaeology and World Heritage Considerations**

### **Overview and Commentary**

66. Wiltshire Council's archaeology service has a statutory duty to advise the Local Planning Authority (LPA) on the impact of development proposals on archaeological remains in the County, both within and outside of the Stonehenge and Avebury WHS. Officers take into consideration direct physical impacts on known and potential designated and undesignated heritage assets, issues of setting and visual impact, and in the case of the WHS, possible impact on the attributes of Outstanding Universal Value (OUV). In relation to the Scheme, Wiltshire Council officers will also have a responsibility for the monitoring of what will be an extensive archaeological mitigation programme and discharge of archaeological requirements imposed as part of the DCO. In addition to its formal statutory role, Wiltshire Council has been engaged with the proposed Scheme's development via a number of working groups associated with the project, such as the Heritage Monitoring and Advisory Group (HMAG) and Scientific Committee.
67. The Council co-funds (with Historic England) and hosts the WHS Coordination Unit within its archaeology service. The Unit currently consists of a WHS Partnership Manager and a WHS Partnership Officer tasked with implementing the policies and objectives in the WHS Management Plan.

68. In assessing the potential development impacts of the proposals from an archaeological and World Heritage perspective, Wiltshire Council is obliged to assess the Scheme in relation to a number of policy documents including:
- The 2015 Stonehenge and Avebury WHS Management Plan with its key policies for the protection and enhancement of the OUV of the WHS. This plan has been formally endorsed and adopted by Wiltshire Council in 2015.
  - The Wiltshire Council Core Strategy (2015) includes a specific robust policy (Policy 59) to ensure the protection of the WHS and its setting from inappropriate development to sustain its OUV<sup>1</sup>.
  - National Planning Policy Framework (2018) paras 193-196 and 200-202 and Practice Guidance on World Heritage Sites (2014). These documents set out that substantial harm to or loss of designated heritage assets of the highest significance should be wholly exceptional. They also state that where a development proposal will lead to less than substantial harm, the harm should be weighed against the public benefits of the proposal.
  - National Policy Statement National Networks (2014) paragraphs 5.120-142.
  - The International Council on Monuments and Sites (ICOMOS) Guidance on Heritage Impact Assessments (HIA) for Cultural Properties (2011). This is designed to inform the assessment of possible development impacts in relation to OUV.

### Summary

69. Wiltshire Council has assessed the DCO submission, mainly focusing on the Environmental Impact Assessment (EIA) Chapter on Cultural Heritage and associated documents such as the Heritage Impact Assessment (HIA), Outline Environmental Management Plan (OEMP) and Outline Archaeological Mitigation Strategy (OAMS). Very recently the Council has also now been able to see the final archaeological evaluation reports and the draft Detailed Archaeological Mitigation Strategy (DAMS).
70. Overall, the Council welcomes the benefits and opportunities offered by the proposed Scheme to permanently remove the existing A303 through the central part of the WHS landscape, thereby benefitting the setting of Stonehenge and many groups of monuments which contribute to its OUV. Wiltshire Council is content that the extensive programme of archaeological evaluation has been completed comprehensively and the Council has confidence that the results can be successfully used to determine the appropriate mitigation required should the Scheme go forward.
71. However, the Council does have some concerns, the most significant of which is the potential adverse impact of the Scheme on the setting of monuments in the western part of the WHS. Wiltshire Council is also concerned to ensure that when the DAMS is agreed and approved as part of the Examination process, that it is robust and comprehensive. The nature and level of mitigation measures it contains must meet all of the Council's requirements and be appropriate in relation of the significance of known and potential archaeological features both inside and outside the WHS. The process adopted for securing the archaeological requirements and to the discharging of the requirements must be robust.

---

<sup>1</sup> Wiltshire Core Strategy, January 2011, page 291. <http://www.wiltshire.gov.uk/wiltshirecorestrategy.htm>

## Key Issues

### Archaeological Evaluation

72. An extensive and detailed programme of archaeological evaluation fieldwork has been undertaken, both inside and outside the WHS. The extent and nature of the fieldwork has been agreed and approved by Wiltshire Council, HMAG and the A303 Scientific Committee for areas within the WHS.
73. Most of the land within the Scheme boundary has been evaluated by recent detailed archaeological geophysical surveys, either as part of academic projects or in support of the Scheme. Additional evaluation fieldwork has been completed for sections of the Scheme within and adjacent to the WHS (eastern portal and approaches, western portal and approaches, new Longbarrow Junction and approaches, and the Rollestone Corner improvement). Much of the Winterbourne Stoke bypass alignment was archaeologically evaluated for previous A303 improvement schemes (see ES Appendix 6.10); further fieldwork to supplement and confirm the results of this previous fieldwork outside the WHS was completed during 2018. The eastern section of the Scheme beyond the WHS has limited land take outside the existing highway boundary; archaeological geophysical survey at Countess East and Amesbury Road has been undertaken here to supplement and confirm the results of previous fieldwork.
74. All fieldwork was designed to have minimum impact and has been conducted with full consideration of the Research Framework for the Stonehenge, Avebury and Associated Sites WHS (2016).
75. The following techniques were employed across the Scheme area:
- Detailed geophysical survey;
  - Ploughzone artefact collection (fieldwalking, test pitting, sieving)
  - Trial trenching and geoarchaeological investigations.
76. Wiltshire Council officers (County Archaeologist and Assistant County Archaeologist) undertook a series of site monitoring visits to each area and each phase of the work, checking the extent and standard of the fieldwork and that all work complied with standards set out in the agreed and approved Archaeological Evaluation Strategy Report (AESR; ES Ref 6.26), Overarching Written Scheme of Investigation (OWSI; Ref 6.27) and Site Specific Written Scheme of Investigation (SSWSI) for each area.
77. Final reports of the evaluation results have now been circulated, approved and submitted to the ExA. They comprise six volumes for archaeological fieldwork, including trial trenching:
- Winterbourne Stoke Bypass (west);
  - Winterbourne Stoke Bypass (east);
  - Longbarrow Junction;
  - Western Tunnel Approaches and Portal;
  - Eastern Tunnel Approaches and Portal;
  - Rollestone Corner.
78. Additionally, there are four volumes of geophysical survey reports, plus borehole and ground investigation survey reports.

79. The Council can confirm that the programme of evaluation was carried out to the standards and expectations set out in the Evaluation Strategy and the site specific WSIs and that the reports are satisfactory. The fieldwork sets out an acceptable basis on which to accurately assess the nature and significance of archaeological remains, the scale of the impact from the Scheme, and the necessary mitigation measures required.
80. Blick Mead, on the eastern side of the Scheme, outside of the red line area, has been subject to archaeological investigation since 2005 and contains some important archaeological deposits mainly of Mesolithic date. However, there is still some uncertainty about the significance and nature of the remains and the extent to which they may have been waterlogged in the prehistory.
81. This area is not proposed to be subject to any direct impacts from the Scheme. Therefore, no archaeological evaluation has been required in this area.
82. During the development of the Scheme, concerns have been raised about potential adverse impacts on the site from changes in water levels. HE have undertaken a tiered assessment in line with advice from Historic England and ground water modelling for the Scheme predicts that there will be negligible changes in ground water in the Blick Mead area (ES 11.9.7). Groundwater and surface water levels are being recorded across the Blick Mead site, as part of HE's commitment to ongoing monitoring at this location (as noted at paragraph 11.3.14 of the ES). This data is not required to inform the EIA. Levels have been recorded both manually using a dip meter or gauge board and automatically recorded using a data logger. Initial results of this ongoing work will be submitted to the ExA in due course.
83. Wiltshire Council does not have any concerns that the archaeological deposits at Blick Mead will be adversely impacted either directly or by changes in water levels resulting from the Scheme.

#### Archaeological Mitigation

84. An OAMS was submitted with the DCO as part of the EIA, appendix 6.11. In Wiltshire Council's Relevant Representation, it was stated that the DAMS should be agreed before consent for the Scheme is given.
85. The Council is pleased to see that a draft DAMS for consultation has now been submitted to the ExA. Although still in development, it is a thorough approach which uses the results of the archaeological evaluation programme to target key areas of the Scheme for either preservation in situ or further fieldwork and excavation. Alongside the DAMS is an OWSI which sets out the methodologies to be used in the implementation of the mitigation strategy, including the approach to archiving, reporting, publication and dissemination of the results. The Council is particularly pleased to see a strategy for public archaeology and community engagement detailed as part of this.
86. Wiltshire Council has given some initial preliminary comments on the draft DAMS. However, there are many further detailed comments and requirements that need to be incorporated into the document before it can be approved. There are many outstanding issues, which need to be addressed:

- Currently mitigation measures are not extensive enough and, for example they should include the whole of the road line both inside and outside the WHS;
- That there is an agreed robust strategy for the preservation in situ or full excavation of archaeological features prior to deposition of tunnel arisings on Parsonage Down East;
- That a robust methodology is agreed for further assessment and mitigation of artefacts in the topsoil in areas to be excavated;
- That a robust strategy for sampling natural features such as tree throws is agreed;
- That the strategy includes all impacts of the Scheme including drainage, services, landscaping, haul roads, spoil storage areas, compounds, as well as portals and the main road line;
- That there is a robust contingency policy in place to deal with unexpected discoveries which are significant and will require further mitigation;
- That the Council agrees and approves all the detailed mitigation measures for the areas set out in Appendix C and D.

87. It is essential that the Council is fully engaged with the further development of the DAMS and that the document is secured as part of any consent given to the Scheme, meets all of the Council's requirements and applies the highest standards of mitigation possible in this internationally significant landscape.

#### Archaeological and Cultural Heritage Assessments

##### Environmental Impact Assessment

88. The Council's archaeologists have reviewed the EIA chapter on Cultural Heritage (Chapter 6) and associated appendices. It is understood that the Scheme has been carefully designed to minimise direct impacts on areas of known archaeological features. Overall the EIA is detailed and comprehensive.
89. An outstanding concern is that the archaeological field evaluation was only completed after this document was submitted to the ExA. Since then, the fieldwork has been finished and the reports published. Consequently, some of this chapter and the associated figures and plans will need to be amended (e.g. 6.6 which does not include findings from the latest phases of evaluation of the western bypass). The Council's view is that an Addendum to the cultural heritage chapters is required, which considers the more recent findings from the evaluation fieldwork and reports.
90. There is also high potential for further archaeological remains to be present in the Scheme area than identified during the evaluation programme. This is especially true of smaller discreet earlier prehistoric remains, which do not show up well in geophysical survey results and are difficult to find in trial trenching, such as cremation burials and pits. This situation is not adequately reflected in the relevant paragraphs on assumptions and limitations (6.4.1 f). Therefore, the mitigation programme needs to focus not just on the areas of known assets but also areas of further potential remains. The Council's professional judgement is that the whole of the road cutting and area for the proposed new Longbarrow Junction falls into this category.

## Heritage Impact Assessment

91. A detailed and comprehensive HIA has been prepared in accordance with the agreed scoping report. In accordance with the ICOMOS HIA Guidance (2011), the HIA specifically assesses the impact of the Scheme on the OUV. The assessment clearly demonstrates the large benefits of the removal of the A303 from the central part of the WHS.
92. Overall the Scheme is assessed as having a Slight Beneficial effect on the OUV of the WHS. However, the Council has concerns that the HIA does identify adverse impacts of the proposed dual carriageway in cutting on the asset groups in the western part of the WHS, especially on the Winterbourne Stoke and Diamond Group.
93. Looking at the summary of anticipated impacts in Table 1, the Council is especially concerned with the *potential slight adverse impact* on Asset Group (AG) 13, the Diamond Group. Additionally, there is concern about the adverse impact on AG 12, the Winterbourne Stoke Group and AG 19, Normanton Down. These groups have highly significant Neolithic long barrows all of which display attributes of OUV. The impact of the Scheme on the Winterbourne Stoke Group is shown as being *moderate beneficial*. The Council's view is that this should be assessed as *slight adverse* as in the Diamond Group. This is backed up by our interpretation of the relevant photo montages and figures in the Landscape Chapter.
94. The Council is concerned at the impact the proposed Scheme has on the relationship both visual and physical between monument groups and to the integrity of the WHS landscape, impacting on OUV attributes 3, 5 and 6, and considers further mitigation is required.
95. Where adverse impacts are identified, these should be either avoided or mitigated in line with the policy framework.

### Western Cutting and Green Bridge No. 4

96. Although the proposed removal of the A303 from the surface will bring many benefits to the centre of the WHS, the western portal and dual carriageway in cutting will harm the setting of key monuments and their interrelationship in the western part of the WHS. With the current Scheme, an opportunity has been missed to extend the tunnel within the WHS thereby minimising the impact on the OUV. A longer tunnel would be better aligned with Policy 3c in the WHS Management Plan.
97. Whilst the proposed green bridge (150m in width) east of the current Longbarrow Junction and its proposed location does afford some mitigation, it may not be sufficient, subject to further submissions, to mitigate potential adverse visual impacts caused by the cutting on key monument groups with attributes of OUV, most notably the Winterbourne Stoke, Diamond Group and Normanton Down Group. The Council has requested further detailed information in the form of plans and maps that clearly demonstrate where the dual carriageway will be visible in the WHS landscape and beyond. This information is essential to inform the necessary required mitigation.

### Oatlands Hill and Western Bypass

98. Oatlands Hill, on the west part of the Scheme just outside the WHS, is a sensitive part of the Scheme in terms of buried archaeology and potential landscape impacts. The EIA acknowledges the Scheme is likely to have a moderate adverse impact on the landscape

here. This is the location of the proposed new junction and dumbbell roundabout. The archaeological evaluation identified evidence of Bronze Age and Iron Age settlement including a C-shaped enclosure. Currently the double roundabout infrastructure is proposed to be located on top of this. Although the archaeological remains here are outside the WHS and likely not to be of national significance, the Council would like to have seen, a slight redesign in the layout of the new infrastructure here to minimise impact on these remains, preserving as much of them as possible.

99. It is understood that since our Relevant Representation, HE have considered three options for moving the position of the southern dumbbell of the proposed new junction but have found that these compromise other issues such as cost and projected traffic flows. Whilst the Council does not object to the Scheme on the ground of direct impact on these archaeological remains, further options should be explored with HE.

#### Design Details

100. It is understood that the DCO is presented as an indicative design scheme (7.2 Design and Access Statement 1.2.1), and that design and visual representations will be developed through the detailed design process. Since the submission of the DCO, Wiltshire Council has been in discussions with HE about the development of further design details. The Council is keen to ensure that the design of the Scheme minimises the direct impact on archaeological remains, and adverse impact on setting of monuments and OUV. It is hoped that this position will be established by the end of the Examination period.
101. The Council is concerned to ensure that there is agreement on a treatment for the decommissioned A303. The currently proposed 4m wide bound surface would not be compatible with the aims and policies of the WHS Management Plan nor its vision of a tranquil, rural landscape. The same issues apply to any new access routes or rights of way within the WHS established as part of the Scheme. The same careful design approach is required for the green bridges, tunnel portals and for road signage and fencing within the WHS.
102. The Council requires that conditions for approval by the Local Planning Authority (LPA) are in place for all design details.

#### Restrictions of Activities Above Tunnel

103. This is referred to in the draft DCO, 4.3 the Book of Reference and the Land Plans (2.2), the imposition of restrictive covenants on ground works on land above the tunnel.
104. The Council has concerns over this and needs to have detailed agreement drawn up as it may restrict the ability to undertake archaeological investigations in a core part of the WHS. An alternative approach to this restriction should be agreed before the end of the Examination process.

#### Limits of Deviation

105. Under DCO Article 7, the limits of deviation of the tunnel are set out as a deviation of up to 200m westwards. This is a matter of concern as it is a significant variation in terms of the very careful location of the eastern and western portals in relation to topography and



significant archaeological remains. The Council seeks clarification of this issue and requires further consultation in the case that the deviation is invoked.

Alignment of Scheme to Key Cultural Heritage Policies

106. The recently submitted Local Impact Report (LIR) from Wiltshire Council contains an assessment of the extent to which the Scheme conforms to individual policies of the Council’s Development Plan. This is referred to in Section 3 and detailed in Appendix A of that report.
107. It is worth noting that the Scheme is not fully aligned with some of Wiltshire’s core strategy policies relating to cultural heritage, including:
- Core Policy 58 Ensuring the conservation of the historic environment;
  - Core Policy 59 The Stonehenge, Avebury and associated sites World Heritage Site.
108. At present, the Council considers that the Scheme is not wholly compliant with all the policies contained within the WHS Management Plan (2015).
109. Policy 1a of the Stonehenge and Avebury WHS Management Plan 2015 states the *‘Government departments, agencies and other statutory bodies responsible for making and implementing national policies and for undertaking activities that may impact on the WHS and its environs should recognise the importance of the WHS and its need for special treatment and a unified approach to sustain its OUV’*.
110. Additionally, Policy 3c states the priority to “Maintain and enhance the setting of monuments and sites in the landscape and other interrelationships and astronomical alignments with particular attention given to achieving an appropriate landscape setting for the monuments and the WHS itself”.

Securing and Discharge of Archaeological Requirements

111. Wiltshire Council’s LIR Appendix B contains a list of suggested requirements (in summary form, final wording to be agreed). For archaeology and cultural heritage, it details three requirements that it views as essential to be attached to any grant of consent for the Scheme to be adequately mitigated. Wiltshire Council will need to be involved in monitoring and assessing the quality of the archaeological mitigation works. It is advised that, as is the case with planning applications, the local authority is charged with approving and authorising the discharge of the archaeological / cultural heritage requirements.

112. Suggested requirements for archaeology and cultural heritage:

<b>Archaeology and World Heritage Site Considerations</b>		<b>Requirement discharged by:</b>	
Requirement	Reason	Secretary of State	Wiltshire Council
No development shall commence (including preliminary works) within Scheme area until:  a) A detailed archaeological mitigation	To enable the mitigation of areas of archaeological significance.		x

<p>strategy, which should include on-site work and off-site work such as the analysis, publishing and archiving of the results and land use management plans, has been submitted to and approved by the Local Planning Authority; and</p> <p>b) The approved programme of archaeological work has been carried out in accordance with the approved details.</p>			
<p>No development shall commence within Scheme area until:</p> <p>a) A detailed programme for archaeology and heritage outreach (education and community), which should include educational / school's activities, talks and site visits, interpretation materials, community engagement, has been submitted to and approved by the Local Planning Authority; and</p> <p>b) The approved programme of archaeology and heritage education and community outreach work has commenced in accordance with the approved details.</p>	<p>To enable the local communities to be kept up to date which archaeological discoveries and to maximise the public benefit from the Scheme</p>		<p>x</p>
<p>The Scheme must be reviewed in relation to its fit with other major development in the area such as army rebasing, developments at Boscombe Down and additional housing development locally. This will ensure that cumulative and consequential impacts on the WHS and its OUV are avoided or at least minimised and mitigated.</p>	<p>To avoid, minimise and mitigate cumulative impacts on the WHS and its OUV.</p>		<p>X</p>

## V. Flood and Drainage Considerations

113. As a unitary authority, Wiltshire Council represents several Risk Management Authorities (RMAs) under the Flood and Water Management Act 2010. The main functions of each role are outlined in the table below:

RMA	Role
<p>Lead Local Flood Authority</p>	<ul style="list-style-type: none"> <li>• Lead role in managing local flood risks i.e. from surface water, groundwater and ordinary (smaller) watercourses.</li> <li>• Ensuring cooperation between RMAs in our area.</li> </ul>

Land Drainage Authority <sup>2</sup>	<ul style="list-style-type: none"> <li>• Land drainage consenting for discharges into ordinary watercourses.</li> <li>• Powers to require works for maintaining flow in a watercourse.</li> </ul>
Highway Authority	<ul style="list-style-type: none"> <li>• Providing and managing highway drainage and roadside ditches for local roads.</li> <li>• Must ensure that road projects do not increase flood risk.</li> </ul>

114. Wiltshire Council works with the Environment Agency (EA), who is the RMA responsible for managing flood risk from main rivers, such as the River Till and the River Avon, to align our approach to this DCO.
115. As a highway authority, HE has similar flood risk management duties to Wiltshire Council, but pertaining to the strategic road network.

### Peer Review Findings

116. In order to fulfil the flood risk management functions described above, Wiltshire Council commissioned Atkins to review HE's approach to the three different aspects of flood risk: surface water (pluvial) including ordinary watercourses, groundwater and the road drainage strategy. The review focused on the impact of the permanent works. These reports are appended to this submission within Appendix A for information. The findings and recommendations were discussed in Wiltshire Council's Local Impact Report, which was submitted in April 2019. Wiltshire Council has been working with HE to resolve the issues raised, however certain issues remain. These have been detailed within the following sections and discussions are ongoing to address these.

### Surface Water (Pluvial) including Ordinary Watercourses

117. The model includes a 539m long, 5m deep culvert as part of the design. This is contrary to the EA's policy on culverting<sup>3</sup>, which is also the approach adopted by Wiltshire Council, both from a maintenance liability and biodiversity standpoint. Since submission of the DCO, HE have consulted Wiltshire Council on an alternative culvert design, which addresses the issues raised. Wiltshire Council is awaiting the final revised culvert design and modelling outputs.
118. The current model results for the Scheme show that the modelled water levels are still rising at the end of the model run. The model results therefore may not capture flood risk accurately.
119. There is an increase in flood risk due to the proposed Scheme.
120. In order to generate confidence in the approach and outputs, the following points should be addressed:

<sup>2</sup> Wiltshire is not covered by an Internal Drainage Board

<sup>3</sup> <http://evidence.environment-agency.gov.uk/FCERN/en/FluvialDesignGuide/Chapter8.aspx?pagenum=6>

- a) Sensibility / verification check of Depth-Duration-Frequency (DDF) modelling from Flood Estimation Handbook (FEH) with local rainfall data (15-minute data should be available) which could affect design inputs to the model.
  - b) Further discussion and sensitivity testing of the initial soil moisture content (Cini) value to be utilised in the project is required as the value is based on baseline catchment descriptors only.
121. Furthermore, there are several queries and items that are required to be answered or addressed from the hydraulics study:
- a) The Triangular Irregular Networks (TINS) utilised to define the option topography should be better integrated with the underlying Light Detection and Ranging (LIDAR). There appears to be a 1m difference / step at the interface of the baseline Digital Terrain Model (DTM) and the Scheme.
  - b) The model should be run for a longer simulation time as water levels are still rising at the current end-time of 10 hours. It will be important to test other storm durations, culvert sizes (and model simulation length), to optimise the Scheme.
  - c) The study does not consider the risk of blockage of the proposed culvert.
  - d) The proposals need to confirm who will own the culvert, who will be responsible for maintenance, and what the maintenance regime will be.
  - e) The proposals need to evaluate the resulting depth of flooding and flood hazard adjacent / across / downstream of the B3083 post Scheme.

#### Groundwater

122. The groundwater modelling study has shown that the Scheme is unlikely to have any significant impacts on groundwater. However, there is no discussion of the combined effect of several minor or insignificant changes on the system.
123. There is little in the way of cross referencing to the surface water (pluvial) study or road drainage strategy within the documentation, the findings of the groundwater study will have a direct impact on the other two studies.
124. In order to focus the approach and outputs, the following points should be addressed:
- a) The model would preferably be run for the full 1965-2016 run time for each of the revised baseline runs (the baseline runs with the revised calibration, the wet climate change run and the dry climate change run) and thorough comparisons made with the original Wessex basin model output and with observation / gauge data. The short period runs would be checked against these and output from the full runs used as starting heads for the short runs.
  - b) Provide clarification of how the climate change approach is consistent with that used in other flood risk assessments (and ensure they are consistent).

- c) Use monitoring data comparisons to inform caveats to be applied to the use of absolute levels for flood levels or in Scheme design. The model is likely to be more reliable to predicting changes in heads (and flows) rather than absolute levels. Modelling absolute levels in extreme events would particularly hold uncertainty. The predicted position of the water table in terms of depth below ground should be used with a degree of caution.

125. HE have submitted additional groundwater reports<sup>4</sup> following the preliminary meeting. Wiltshire Council has instructed Atkins to review these and will provide comments to the ExA by 10<sup>th</sup> May at Deadline 2a. The additional reports may address the points raised above.

#### Road Drainage Strategy

126. There has been significant progress in addressing the issues raised in relation to the road drainage strategy

127. The following remaining points should be addressed to give confidence in the approach and outputs:

- a) There is no confirmation to flood risk posed to the proposed drainage treatment areas (DTAs). This should be checked for both impact on the Scheme and impact on surrounding land etc. It is likely that detailed design will impact on existing overland flow routes.
- b) It is unclear what happens when the pond base blinds with sediment and infiltration is restricted, or where the design event is exceeded. Confirmation of the exceedance routes is required.
- c) Provision of modelling outputs for the land drainage system (and culvert) demonstrating no detriment post development.
- d) Justification of the climate change allowances.

#### **Land Drainage Consenting**

128. The draft DCO includes provisions for the disapplication of the following sections of the Land Drainage Act 1991, and by implication, the Wiltshire Council Land Drainage Byelaws 2014:

- Section 23 (prohibition of obstructions etc. in watercourses)
- Section 32 (variation of awards)
- Section 66 (powers to make byelaws).

129. Section 150 of the Planning Act 2008 provides that such disapplication can only take place with Wiltshire Council's consent. The Council is currently considering its position in relation to the protective provisions included in the draft DCO. Wiltshire Council will be liaising with

---

<sup>4</sup> Stonehenge Area Pumping Test 2018 Interpretative Report  
Stage 4 – Implications of 2018 Ground Investigations to the Groundwater Risk Assessment  
Stage 4 – Supplementary Groundwater Model Runs to Annex 1 Numerical Model Report  
Stage 4 – Groundwater Monitoring 2018-19 Conceptual Model Review  
Blick Mead Monitoring Technical Note

HE on these issues to reach agreement on the form of protective provisions and associated fees.

130. The draft DCO also includes provisions for the disapplication of the requirement for an environmental permit in respect of flood risk activity. HE has yet to agree the associated protective provisions with the EA. It should be noted that the EA issues environmental permits, however, as Wiltshire Council has the lead responsibility for surface water management, the proposed discharge rate must be agreed with the Council.

### **Construction and Dewatering**

131. The tunnel construction method, and associated dewatering requirements, are not confirmed at this stage. Chapter 2 of the Environmental Statement (ES) states that a tunnel boring machine (TBM) is “likely to be used”, however the choice of method would be left to the appointed contractor. Chapter 2 further states that it is normal practice to tunnel through water-bearing chalk using a closed-face slurry TBM. This method would minimise the need for dewatering / groundwater control, and hence minimise the accompanying risks to people and the environment.
132. The tunnel will be constructed almost entirely through chalk, which acts like a large underground reservoir in this location. In order to mitigate flood risks that dewatering could introduce in an area with past flooding issues, the Council proposes that HE specify a tunnel construction method that minimises the need for dewatering. Furthermore, any dewatering method must have the facility to be stopped during periods of high rainfall or flood risk and have a full risk assessment approved by the EA and Wiltshire Council.
133. There will be a requirement to closely monitor the River Avon around Amesbury as it may quickly react to construction activity. There is an existing gauge, however there may be a requirement to add additional telemetry upstream and downstream to assess the flows reaching the River Avon during and post construction.
134. Over the past decades, there have been numerous major chalk construction projects in Southern England, and more internationally, that can provide valuable lessons for the construction of the tunnels. The Council therefore suggests that lessons learned and best practice from past schemes be incorporated into the design, construction, operation and maintenance of this Scheme.
135. The Scheme will take 6 years to complete (2020-2026), therefore the impact on flood risk could be significant. At this stage, the OEMP is light on detail and only high-level. The detailed Construction Environmental Management Plans (CEMPs) will be prepared by the preliminary and main works contractors once appointed. It is essential that the Council is consulted, and given sufficient time, for the preparation of the detailed CEMPs, to ensure that flood risk is managed adequately during the construction period. This would include all activities including vehicle movements, the location of construction roads, the placement of arisings and exceedance flow paths.

### **Maintenance**

136. Powers to construct, operate and maintain the Scheme are being sought by HE through the DCO. Once completed, the new road would form part of the strategic road network managed by HE. However, certain elements of the scheme would reside with Wiltshire

Council, who would be the maintenance authority responsible for the long-term management.

137. HE have indicated that the extent and scope of the Scheme elements for which Wiltshire Council will be responsible as the maintenance authority, will be confirmed alongside the DCO process.
138. Once that is confirmed, the Council will be able to assess the implications with regards to the detailed CEMPs and Handover Environmental Management Plans (HEMPs).

#### **Ongoing Groundwater Monitoring**

139. Although the overarching strategy is now in place, HE will still need to supply further details on ground investigations. Ongoing monitoring of boreholes is being undertaken by HE and their consultants to allow a greater understanding of the catchment issues within the Scheme's catchment. Appendix 11.4 of the ES, Groundwater Risk Assessment, states that monitoring will be undertaken during a baseline period, construction and minimum of 5 years' post construction. This information will be invaluable to confirm that the design is functioning as intended and any required mitigation works. The Council suggests that the EA administer all groundwater monitoring to help with the validation of the groundwater model for the area.

## **VI. Public Protection Considerations**

140. Wiltshire Council is the responsible authority for the implementation of a broad range of Government regulation related to public protection issues. Legislation such as the Environmental Protection Act 1990 and the Environment Act 1995 means Wiltshire Council must consider a number of factors in determining whether sufficient mitigation measures are in place with respect to any development. The Council must have regard to a wide range of issues such as:

- Noise and vibration
- Air quality
- Contaminated land
- Artificial lighting
- Odour
- Contamination of local private water supplies.

141. Part III of the Environmental Protection Act 1990 establishes a number of statutory nuisances including noise, dust, odours and artificial light. Section 158 of the Planning Act 2008 provides a defence of statutory authority in civil or criminal proceedings for nuisance in respect of anything else authorised by an order granting development consent. The defence does not remove the local authority's duties under Part III of the Environmental Protection Act 1990 to inspect its area and take reasonable steps to investigate complaints of statutory nuisance and to serve an abatement notice where satisfied of its existence, likely occurrence or recurrence.
142. The Council recognises the importance of adherence to the OEMP and CEMP to mitigate and reduce the likelihood of nuisance occurring. Additional controls on construction noise beyond statutory nuisance contained in the Control of Pollution Act 1974 may also be appropriate.

143. A peer review of HE's modelling relating to air quality impacts on human health and noise and vibration has been carried out, which also included a review of the policy basis for their assessments. This report has been attached to this submission at Appendix B.

### **Noise and Vibration**

144. The ES has addressed requirements of the National Policy Statement for National Networks (NPSNN) and other planning policy so as to ensure that statutory requirements for noise and local circumstances are taken into account. The approach has been to ensure impact assessment makes provision to ensure compliance with Noise Policy Statement for England, National Planning Policy Framework 2018 and the Government's associated planning guidance on noise. The ES has reflected the concepts of Lowest Observed measures Advert Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) and has defined those terms in the context for the Scheme. This is considered to be in line with policy requirements and addressed the broader requirements of the NPSNN.
145. The existing noise levels in the Scheme area have been verified using an extensive monitoring and sampling regime. 10 fixed monitoring locations were selected in March and April of 2018 and are considered appropriate to characterise the current ambient noise levels in the areas, and to help verify the outputs from the constructed models. This approach is considered to be in line with policy.
146. Road noise levels for the Scheme, with respect to human receptors, have been assessed using a Soundplan noise model. The model uses the Calculation for Road Traffic Noise (CRTN), and the Design Manual for Roads and Bridges (DMRB) methodologies to help determine impact. This is considered to be in line with policy requirements. Construction noise has been evaluated using Computer Aided Noise Abatement (CADNA) noise modelling software. The basic approach is to calculate potential impacts at sensitive receptors based on predicted levels of construction activity, and likely scheduling. As the contractor has yet to be selected, final decisions on plant and activity levels have not been decided, so the model is a prediction using BS5228:2009+A1(2014). This is considered to be in line with policy requirements. The Scheme includes the installation of 3 construction depots.
147. In respect of mitigation for the Scheme, key locations and sensitive receptors have been identified and a suite of mitigation measures have been proposed. These include the full range suggested in the NPSNN guidance:
- Engineering: containment of noise generated;
  - Low noise road surfaces;
  - Distance separation between source and noise-sensitive receptors;
  - Barriers;
  - Provision for noise insulation at key receptors is acknowledged but implementation of this is likely to depend on the success of other measures.
148. The OEMP advises that the responsibility for implementing the environmental controls for noise will be via a site-specific Noise and Vibration Management Plan (NVMP), prepared as part of the wider CEMP. The principal contractor will be responsible for ensuring compliance with the OEMP and CEMP's (see Section 9.8 of ES). The principal contractor is also responsible for monitoring the work to ensure compliance with the targets.



149. The CEMP's and the NVMP's produced are anticipated to address the local conditions, and properly evaluate potential impacts once details of the construction are known. Any CEMP produced should by definition address the following:
- A list of tasks to be completed;
  - Task method statements including plant lists;
  - Durations of tasks;
  - Identify local receptors (based on potential impact of tasks);
  - Assessment of impact using agreed and recognised standards;
  - Identification of mitigation measures;
  - Compliance monitoring.
150. A complaint management system is included as part of the OEMP. Complaint management is a necessary part of contract management. The complaint management procedure anticipates that non-compliances with the CEMPs are addressed promptly. There should also be an escalation procedure to ensure that urgent action can be taken.
151. It is recommended that a procedure akin to the Control of Pollution Act 1974 prior consent process for evaluation of the impacts and methodology should be followed, but no formal submission should take place.
152. It was concluded that HE has considered the relevant policy and guidance for the noise assessment, and the study conclusions are generally supported by the evidence provided.
153. Clarification is being sought on the hours of work detailed for the construction phase, and on the definition of "summer" in relation to summer earthworks outside the specific chainages.

### **Air Quality**

154. The review identified one potential issue of moderate significance associated with the transport off-site of tunnel arisings.
155. It is proposed to dispose of tunnel arisings by treatment followed by use in "*essential landscaping*" and "*new habitat creation*" (ES Chapter 2, paragraph 2.4.54). However, the new habitat creation proposal is not a confirmed option. No assessment was provided in the ES of the potential impacts on air quality (including dust) from transportation of up to 900,000 m<sup>3</sup> of material should it be necessary to dispose of this material off site. This assessment should identify the transportation route for vehicles carrying any arisings which cannot be re-used on site, and should assess the impact of any such vehicle movements on air quality.
156. Agents acting for HE confirmed that a preliminary assessment of potential impacts associated with off-site disposal has been carried out. This found that there would be the potential for impacts within the Salisbury Air Quality Management Area (AQMA), and consequently further analysis and potential mitigation would be required if tunnel arisings require off-site transportation. This should consider both vehicle exhaust emissions and potential impacts associated with transportation of dusty materials.
157. An assessment of the air quality implications of transportation of tunnel arisings (if this is required) should be carried out prior to any off-site disposal. This should identify any potential impacts on residents in proximity to the proposed haulage routes, including

locations within AQMAs, and identify appropriate measures to mitigate any potentially significant impacts.

#### **Other Issues**

158. Further details from HE relating to the following issues are still required:

- Measures to divert the Esso pipeline;
- Details relating to contaminated land, and;
- Details relating to the potential impact of artificial light from floodlights on the local amenity.

### **VII. Ecology Considerations**

159. A robust suite of surveys of all protected habitats and species within the footprint of the Scheme and within a calculated zone of influence, have been conducted and the results have informed the design process for the Scheme, including design of appropriate and sufficient mitigation to ensure no residual adverse impacts on ecologically sensitive habitats, species and species assemblages. The methodology and survey scope was agreed in principle with Wiltshire Council ecologists and other relevant consultees, including Natural England and the RSPB.

160. Survey work has been undertaken in accordance with best practice guidelines, including searches of existing data held at the Wiltshire and Swindon Biological Records Centre, field surveys conducted at suitable times for the species targeted and comprehensive analysis and evaluation of results. All ecologically sensitive issues have been identified.

161. The design of the Scheme will result in overall benefits for biodiversity, since permeability through the landscape, particularly north to south, will be increased through the construction of green bridges and the greening of the section of current road that will be closed as a result of the proposal. Habitat creation and enhancement will result in the form of new chalk grassland and additional tree and hedge planting, which will benefit a wide range of wildlife species including insects, birds, bats and mammals. In addition, some new features such as bat roosts will be constructed within the footprint of the Scheme. Direct mitigation for European Protected Species, Schedule 1 Birds and Annex II bats has been robustly designed.

162. HE has sought to engage Wiltshire Council's ecologists throughout the period of survey and design.

163. The Scheme proposal has undergone an Appropriate Assessment under the Habitats Regulations (which implement the Habitats Directive and other European legislation in UK law) and Natural England (the organisation with the responsibility for the protection of European Sites in the UK) has agreed with the conclusion.

### **VIII. Landscape Considerations**

164. The methodology and scope for the assessment of landscape and visual effects was agreed with Wiltshire Council and other relevant consultees e.g. Area of Outstanding Natural Beauty (AONB), Natural England. The Landscape Visual Impact Assessment (LVIA) follows current

best practice guidance, GLIVA3 and IAN13510, establishing the baseline for landscape and visual receptors, identifying, describing and assessing the significance of the effects.

165. The Scheme's design principles have been guided by local landscape characteristics to achieve a natural fit, e.g. rolling downland topography, and maximise the opportunities for habitat creations, e.g. calcareous grassland. This theme is also embedded within the mitigation strategy to help reduce landscape and visual effects.
166. Overall the Scheme delivers beneficial effects through the reconnection of the landscape within the WHS and avoiding the severance of communities. There is scope for the development of best practice in the creation of chalk grassland from the tunnel spoil. Significant adverse landscape and visual residual effects will remain in the River Till Valley, Byway WST04 and at Countess Farm. There may be opportunities to reduce the time of the efficacy of mitigation through advance planting or using larger nursery stock at these locations and at Lord's Walk. For further comment, please refer to the Local Impact Report.

## **IX. Public Rights of Way Considerations**

### **Creations of New and Alterations of Existing Public Rights of Way**

167. Where the diversion and creation of new sections of public rights of way will lead to the new routes becoming maintainable at public expense by the Council as Highway Authority, design and construction details and specification must be agreed by the authority prior to the commencement of works, and to be certified by the authority on completion as having been provided to the standard required before the authority accepts responsibility. Any requirements for the payment to the Council of commuted sums to cover / assist with the costs of maintenance of the new routes must also be agreed before the Council accepts responsibility.
168. Furthermore, where temporary diversions or closures of public rights of way are necessary during the construction phase, the construction details of alternative routes to be provided must be agreed in advance with the Council as Highways Authority.
169. As specified within the Council's Relevant Representation, further information is required on the following public rights of way:
  - a) New Restricted Byway and Byway Open to All Traffic between Steeple Langford BOAT3 and Green Bridge No. 1: Further detail is required of the surface to be provided, width, signage and waymarking, structures to provide access for non-motorised users and private means of access whilst excluding motorised users, boundary fencing / hedging, and fencing of Green Bridge against drops.
  - b) Stopping-up of BOAT Berwick St. James 3A and Creation of BOAT over Existing Bridleway Berwick St. James 3A: Detailed proposals for physical closure of BOAT3A and proposals for signage, surface improvements and boundary fencing / hedging alongside upgraded BOAT3.
  - c) Realignment of Northern End of Winterbourne Stoke BOAT3 onto B3093: Detailed proposals for the new junction, signage, surfacing, and boundary fencing / hedging are required.

- d) Diversion of Winterbourne Stoke BOAT6 over Green Bridge No. 2: Detailed proposals for surfacing, width, signage, boundary fencing / hedging, and fencing of Green Bridge against drop required.
- e) Bridleway Link between Winterbourne Stoke and New Longbarrow Roundabout: It is unclear from the plans, which side of the road this is intended to be situated (north or south). Detailed proposals for surfacing, width, signage, and boundary fencing / hedging are also required.
- f) New Restricted Byway North from Existing Longbarrow Roundabout / Old A303 to Stonehenge Visitor Centre, Old A344 and A360: Wiltshire Council is aware that discussions are taking place between HE, English Heritage and adjacent landowners in an effort to find an acceptable route for this non-motorised user link in the public rights of way network to the north and south of the WHS. The Council appreciates that the extent of land take in the vicinity of the Visitor Centre car park, together with the provision of a safe route for both path users and car park users and managers is a material consideration, and for that reason there are suggestions that the link may be provided only for walkers and cyclists. The Council retains the aspiration that the link needs to provide for equestrians and carriage drivers, who are particularly vulnerable users of main vehicular highways. The Council's Rights of Way Improvement Plan, itself a statutory requirement of the Rights of Way and Countryside Act 2000, is required to consider the present and likely future needs of the public; there is a present lack of safe connecting routes across the WHS for equestrian users to obtain maximum use of the extensive byways and bridleways in the Till and Wylde Valleys and on Salisbury Plain. Once the legal status and the precise route of this link have been agreed, detailed proposals for surfacing, width, signage, and boundary fencing / hedging will be required.
- g) New Restricted Byway South from Longbarrow Roundabout to Berwick St. James Restricted Byway 9 then New Bridleway Link to Woodford BOAT16 North of Druids Lodge: Detailed proposals for surfacing, width, signage, and boundary fencing / hedging required.
- h) Restricted Byway Link over Green Bridge No. 3: Detailed proposals for surfacing, width, signage, boundary fencing / hedging, and fencing against drop required.
- i) New Restricted Byway Replacing Existing Surface Route of A303 between Longbarrow Roundabout and Stonehenge Road: Details of overall width and surfaced width, surfacing materials, verge treatment, signage and boundary fencing / hedging require finalisation.
- j) Crossing of Old A303 New Restricted Byway with Amesbury BOAT12: Detailed proposals for surfacing, width, signage, structures to control motorised and non-motorised user, and private means of access required.
- k) Junction of Old A303 New Restricted Byway Junction with Amesbury BOAT11: Detailed proposals for surfacing, turning area, signage, structures to control motorised and non-motorised users, and management of motorised user traffic on BOAT11 at junction with new Restricted Byway required.

- l) Connection of Amesbury Footpath 13 into Stonehenge Road: Due to proposals currently being considered / developed by HE as to whether Stonehenge Road becomes a Restricted Byway at this location, further information is required relating to any proposed changes at this junction.
  - m) Stopping-up of Amesbury BOAT1 and Connection to A303: Detail of physical works to effect stopping-up required.
  - n) Stopping-up of Amesbury BOAT2 and Connection to A303: Detail of physical works to effect stopping-up required.
170. Design and construction details for the new sections of public rights of way have yet to be made available by HE. The Council notes that the ExA requires HE to have provided design details for public rights of way by Deadline 2, on 3<sup>rd</sup> May 2019. The Council will wait until it has received this information before expressing its view on whether HE's expressed proposal within the SoCG, to resolve matters relating to the highways that Wiltshire Council would become liable to maintain as a result of the Scheme, are capable of being resolved through the terms of a legal agreement between HE and the Council; the agreement to be concluded before the close of the Examination. Such an agreement will need to provide for the payment to the Council of agreed commuted sums.

#### **Severance of Link between Amesbury BOATs 11 and 12 for Motorised Vehicles**

171. An unresolved matter is the severed link between BOAT AMES11 and AMES12 for motorised users. This creates a breach of Wiltshire Council's statutory duty under s.130 Highways Act 1980 to prevent, as far as possible, the stopping-up of highway rights, with the lack of any mitigation measures. The Council considers the effects of the severance of the link for motorised vehicles to require the making of a traffic regulation order to prohibit driving of motorised vehicles to be included within the DCO.
172. The requirement for an order to be made, and the reasons why the Council considers it to be necessary are detailed in the following paragraphs.

#### The Requirement

173. The Council wishes for a prohibition of driving order to be placed on certain public rights of way within the Stonehenge part of the Stonehenge and Avebury WHS to restrict motorised vehicles, other than motorcycles, to preserve the maintainable surface against what the Council sees as the inevitable increase in traffic when the existing surface of the A303 is downgraded.
174. This applies to the following public rights of way (PROW) within the WHS and listed below:
- a) Amesbury Byway Open to All Traffic 11
  - b) Wilsford cum Lake Byway Open to All Traffic 2
  - c) Wilsford cum Lake Public Footpath 3
  - d) Durrington Byway Open to All Traffic 10
  - e) Amesbury Byway Open to All Traffic 12
  - f) Wilsford cum Lake Byway Open to All Traffic 1
  - g) Berwick St. James Byway Open to All Traffic 11
  - h) Woodford Byway Open to All Traffic 16.

NB: a) and b) together form a single continuous route and are commonly, for convenience, collectively referred to as 'Byway 11'. d), e), f), g) and h) together form a single continuous route and are commonly, for convenience, collectively referred to as 'Byway 12'.

175. A Plan showing the above byways within the Stonehenge WHS is attached at Appendix C.1 and marked 2019/RB1.
176. The reasons for placing a prohibition of driving order on these highways are to:
- a) Avoid danger to persons or traffic using the road;
  - b) To prevent damage to the road;
  - c) To prevent use of the road by traffic which is unsuitable having regard to the existing character of the road and the adjoining property, which in this case is the WHS; and
  - d) To preserve the amenities of the area (the WHS) through which the road runs.
177. The Byway Open to All Traffic which is collectively known as 'Byway 11' runs in a generally southerly direction from the A303 to the village of Wilsford cum Lake. Whilst Byway 11 does not run directly past Stonehenge, it does provide a highway link to the A303 in the immediate vicinity of Stonehenge. Users wishing to connect to Amesbury Byway Open to All Traffic 12 can currently do so by using the A303. However, with the stopping up of the existing public rights of way for motor-vehicles when this section of the present A303 is decommissioned and re-created as a Restricted Byway, A303, this connection will no longer be possible (if the DCO is confirmed). Byway 11 will effectively become a cul-de-sac for all motorised vehicles.
178. The byway open to all traffic which is collectively known as 'Byway 12', commences in the civil parish of Durrington and terminated on the A360 close to Druids Lodge. As shown in the Definitive Maps and Statements of Public Rights of Way, Byway 12 is identified from north to south as Byway Open to All Traffic Durrington 10, Byway Open to All Traffic Amesbury 12, Byway Open to All Traffic Wilsford-cum-Lake 1, Byway Open to All Traffic Berwick St. James 11 and Byway Open to All Traffic Woodford 16. It runs directly past Stonehenge and is dissected by the C506 and the A303. This allows users of Byway 12 access onto and from the A303. Right turns onto the A303 from Byway 12 and from the A303 onto Byway 12 are prohibited by traffic order due to safety concerns.
179. The WHS is a remote rural area and so far as traffic counts are concerned, the Council has encountered difficulties in undertaking traffic counts for the WHS byways as any traffic counting machinery or cameras are quickly removed or vandalised. Traffic counts would have to be undertaken manually (entailing officers being located in vehicles for a number of hours per day at the various byways within the WHS). Traffic counts on the WHS byways were undertaken for the Stonehenge Environmental Improvement Project (Stonehenge Visitors Centre) in 2008 and for the A303 Stonehenge (Amesbury to Berwick Down) Scheme in June 2018. After the approximately quadrupling of traffic using the WHS byways following closure of A344 (now known as the 'C506') and construction of the Stonehenge Visitors Centre, the Council is looking to plan ahead for managing the byways after the proposed closure of the A303 as part of HE's Scheme. As a result of the increase in traffic use of the WHS byways following the closure of the A344, the Council believes that the motorised traffic using the byways will significantly increase as a result, just as it did after the closure of the A344. An extract of the 2008 Traffic Surveys undertaken for the Stonehenge

Environmental Improvements Project referred to in the 2011 Inquiry is attached at Appendix C.2 and marked 2019/RB2 and an extract of the June 2018 traffic count undertaken by WSP for HE is attached at Appendix C.3 and marked 2019/RB3.

180. Since the closure of the A344 to motorised vehicles in October 2013, it has been found that increasing numbers of visitors are now using the byways to either avoid paying the entrance fee, avoid the queues at the Stonehenge Visitors Centre or to simply undertake a quicker visit. Photographic evidence shows numbers of parked vehicles, including vans, caravans and camper vans, on byways 11 and 12 and congestion on the byways arising from increased vehicle movements and parked vehicles.
181. Internet searches bring up a number of ways to access and view Stonehenge free of charge by using the byways within the WHS. The advice currently available online is heavily focused on the use of the byways within the WHS for accessing and parking purposes in order to undertake a visit to Stonehenge. Two links dealing with free access to Stonehenge by using the byways are set out below:
- <https://thirdeyetraveller.com/how-to-visit-stonehenge-for-free/>
  - <http://bodeswell.org/2018/05/08/camping-and-visitng-stonehenge-for-free/>
182. Up to October 2013, Byway 11 from the A303 to the byways leading to Springbottom Farm was usually found to be good, flat and level (i.e. in a reasonable condition) and repairs were not normally necessary. Following the closure of the A344 to motor vehicles in 2013, it was noted by officers that the number of motor vehicles using the WHS was increasing. Byway 12 was re-surfaced north of the C506 and the Wiltshire Council Duty Engineer familiar with the condition of the byways through regular walked and driven site visits, has found that since 2013 there has been an increase in vehicles using both byways 11 and 12 and beyond causing greater damage to the maintainable surface of the byways. Repairs were limited to a minimum acceptable standard as there was concern that a much improved surface could encourage greater vehicular use, ultimately causing more damage to the byway.
183. Officers undertaking inspections found that byway 12 was being used by cars, motorbikes, vans and on occasions heavy goods vehicles (a 44T HGV). The new granular stone surface of byway 12 was found to be degrading due to the increase in traffic using byway 12. Byway 12's condition has continued to deteriorate and there were concerns that the condition was becoming unsuitable for certain classes of non-motorised users such as equestrians and cyclists. In dry weather the deep rutting would cause the byways to be difficult for horses and cyclists to safely negotiate and in wet weather water pooling in the ruts makes it difficult for users to judge the depth of the rut. Byway 12 is now in a similar condition to that before the major repairs were undertaken in 2013. The large rutted area has also now begun to reappear in the dip towards Larkhill.
184. The prohibition order should exclude motorcycles as the Council considers that any damage that they may cause is likely to be significantly less than that which has been shown to be caused by four wheeled vehicles. There is less use of the byways by motorcycles and their lighter weight and additional manoeuvrability has a lesser impact on the surface.
185. Since the closure of the A344 to motorised vehicles in 2013, officers have also observed during site visits that the byways are now used far more frequently as a camp site for both travellers and tourists visiting the Stones. There are large numbers of taxis parking in the byways (it is assumed the taxis are providing visitors with an alternative to the bus service

from Salisbury). As visitors can no longer stop and walk across the C506 to visit the Stones, the only convenient access is now via byway 12 (or byway 11 if visitors are prepared to cross the A303). Officers have observed that in general visitors are not complying with the no right turn prohibitions onto and from the byways. Local landowners (farmers) have reported to the Duty Engineer that there is an increase in traffic using the byways both further north and south of the A303 during the summer months.

186. The sensitivity of the WHS severely restricts the options for materials than can be used to carry out surface repairs to the byways. The effect is that the materials used are less durable and need more frequent and costly repair than would otherwise be necessary.
187. Byway Open to All Traffic Amesbury 11, to the north of the A303, only has a granular stone covering laid directly on the sub-soil. All of the byways are wholly unsuitable for use by a large number of motorised vehicles and are not constructed to withstand the loads and frequent turning movements of wheels, which quickly lead to the deterioration of the surface.
188. The apparent increase in motorised traffic using the byways on a regular basis since 2013 is now causing damage to sections of the byways to an extent that some sections quickly become uneven in surface level developing ruts, are now more difficult for smaller vehicles to pass through. During wet weather these ruts become filled with water of variable depth, which is difficult for users to visually assess. The damaged sections can also be expected to cause significant difficulties for pedestrians, equestrian users and cyclists. The byways are unsealed and are not designed for the current levels of traffic use now occurring throughout the year.
189. Anecdotal evidence indicates the byways have become far more widely used since 2013 and there has been an apparent increase in motor vehicles using particular sections of the byways since the A344 was closed to motor vehicles in 2013. With the expected changes to the A303 through the Scheme, it is expected that the levels of motorised vehicles using the byways within the WHS will continue to increase to the potential detriment of non-motorised users of the byways and visitors to the WHS. There is now considered to be a potential danger to non-motorised highway users (pedestrians, equestrians and cyclists) who are now having to negotiate around increasing numbers of both moving and disordered parked vehicles (cars, motor homes and large vans) when using the byways where the public would normally expect levels of motorised traffic to be lower than that of other users and normal byway use.
190. The proposed prohibition of driving order on the byways is considered to assist in securing the safer movement of non-motorised highway users of the byways; will reduce instances of obstructive, dangerous and displaced parking; will reduce the ongoing damage to the byways arising from the increased levels of motorised traffic and reduce incidents of anti-social behaviour in the area. It is anticipated that the proposals will also result in increased levels of non-motorised access to the WHS and create a safer and more pleasant environment for non-motorised highway users of the byways and visitors to the WHS, therefore improving the amenities of the WHS. This will reduce the impact and volumes of traffic on the WHS as required in Aim 6 and Policy 6a of the 2015 Stonehenge Management Plan:

*'Aim 6: Reduce significantly the negative impacts of roads and traffic on the WHS and its attributes of OUV and increase sustainable access to the WHS.'*



*'Policy 6a – Identify and implement measures to reduce the negative impacts of roads, traffic and parking on the WHS and to improve road safety and the ease and confidence with which residents and visitors can explore the WHS.'*

However, please see paragraph 194 below.

191. Reference has been made to the 2011 Public Inquiry which resulted in the Inspector's Report to the Council dated 16 November 2011 and resulted in the Council implementing a permanent traffic order on the C506 in October 2013. The Inspector was concerned only with the purpose of the proposed prohibition of motor vehicles using the byways under s.(1)(1)(f) to preserve the amenities of the area (WHS). The Inspector's recommendation was referred to in the judgement arising from the Trail Riders Federation v Wiltshire Council case challenging an experimental traffic order made by the Council under s.9 of the Road Traffic Regulations Act 1984 to restrict motor vehicular use of the WHS byways. The judgment of Mr. Justice Swift in the High Court found (paragraph 31 of the Judgment [2018] EWHC 3600 dated 21 November 2018 as set out below) was clear that the Inspector's conclusions were only directed to that purpose:

***Paragraph 31:** 'The proposed 2010 Order was put forward on the basis that prohibiting use of the byways by motor vehicles was expedient to preserve or improve the amenities of the area around the byway (i.e., only for the purpose specified at section 1(1)(f) of the 1984 Act). The Inspector's conclusions were directed to that issue. He assessed that the proposed prohibition would result in a substantial loss of amenity to trail riders, and that that loss of amenity would not be outweighed by benefits arising from prevention of damage to archaeological sites, enhanced wildlife conservation, and improvement to the visual amenity of the area.'*

192. In officers' experience, motorists frequently disregard or fail to observe signs indicating road closures for maintenance activities or because of safety considerations. Regrettably, some motorists remain determined to travel their intended route where it is the most direct, particularly in situations that enable access to an attraction, place of interest or place of general public gathering. Often the most appropriate careful signage together with reinforcement with physical restraints is necessary in order to prevent infringement and misuse of a road closure. This is particularly necessary in remote rural locations away from general public observation and the presence of full time traffic management operatives or the Police. Vehicles that are temporarily abandoned at the point closest to the physical restraint and consequential chaotic parking on any available nearby roadside verges creates dangers to other non-vehicular highway users and cause safety issues which must be considered. One example is a road leading to a picturesque village in Wiltshire where there have been 'near misses' arising from pedestrians mixing with chaotic parking on yellow lines all struggling to visit the village. A car park at the top of the village is rarely used and there are no footways or verges to provide a refuge for pedestrians.
193. It is not a straightforward matter to place additional signage and physical restraints within the WHS due to design constraints on their appearance within such a visually and archaeologically sensitive landscape, so the Council wishes to ensure that the implementation of such measures is confined to the necessary minimum.
194. Should the proposed prohibition of driving order on byways 11 and 12 be made, but not to include the driving of motorcycles, it will be necessary to also make a Traffic Regulation

Order to permit the driving of motorcycles by the public on the section of the former A303 between the entrances to Byways 11 and 12, in order to retain an unbroken route.

## **X. Conclusions**

195. The Council's position on the Scheme and the issues which require resolution and / or clarification are outlined within this Written Representation.
196. Due to detailed information still emerging from HE, the Council reserves the right to make further comments on the DCO application throughout the Examination process and to modify its position in view of any additional information, which is presented to the Examination. This will be via additional representations, submissions at Issue Specific Hearings and through the Council's Statement of Common Ground with HE. It has therefore been submitted on a "without prejudice" basis.
197. Wiltshire Council's Written Representation should be read in conjunction with the Council's Local Impact Report submitted for Deadline 1 (18<sup>th</sup> April).

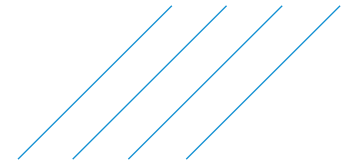
## **Appendices**

# **Appendix A**

## **Flood and Drainage**

### **Appendix A.1**

#### **Groundwater Risk Assessment**



## Memo

To: Danny Everett, Wiltshire Council

<b>From:</b> Lesley McWilliam	<b>Email:</b> lesley.mcwilliam@atkinsglobal.com
<b>Date:</b> 2 November 2018	<b>Phone:</b> 01372 756162
<b>Ref:</b> 5157973-ATK-ABD-ZZ-RP-EN-022	<b>cc:</b>

**Subject:** A303 Amesbury to Berwick Down  
Peer review of Groundwater Risk Assessment

## 1. Introduction

This note provides a review of the Environmental Statement (ES) for the A303 Amesbury to Berwick Down scheme, with regard to groundwater-related risks. These potential risks include groundwater flooding, changes to water levels around sub-surface structures, changes to water levels at abstraction boreholes or wells, changes in groundwater flows to rivers and springs and contamination. In order to quantitatively assess the impact of the scheme on groundwater flows and levels, a groundwater flow model of the aquifer system has been developed and a description of the modelling work is provided as an annex to the ES document. A qualitative risk assessment of each scheme element is provided as a spreadsheet annex.

This review has considered the risk assessment and groundwater modelling as presented in the documents provided; no separate investigation of the input data, model files and analysis of scenarios has been made. The model is based on the Environment Agency / Wessex Water's Wessex Basin model; the original model documentation has not been obtained.

The following documents have been reviewed:

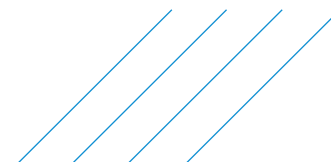
1. Aecom, mace, WSP (AmW), July 2018. A303 Amesbury to Berwick Down. Environmental Statement. Appendix 11.4: Groundwater Risk Assessment. HE551506-AMW-EWE-SW\_GN\_000\_EN-MS-0004 P02, S3. (Report for Highways England.)
2. Aecom, mace, WSP (AmW), July 2018. A303 Amesbury to Berwick Down. Numerical Model Report. Appendix 11.4: Annex 1. HE551506-AMW-EWE-SW\_GN\_000\_EN-MR-0002 P01, S3. (Report for Highways England.)
3. Aecom, mace, WSP (AmW), July 2018. A303 Amesbury to Berwick Down. Appendix 11.4: Annex 5 Qualitative Risk Assessment. (spreadsheet)

## 2. Summary of review findings

1. The overall approach to groundwater risk assessment appears reasonable. The risk of the scheme inducing groundwater flooding, interfering with abstractions or impacting on flows to environmental receptors appears to be low (i.e. risks relating to quantity of groundwater flow and heads).



2. The conceptual model of the groundwater system is presented clearly in Ref 1. Data collation has covered the usual expected data sources and reasonable interpretation and conclusions have been drawn.
3. Use of the Wessex Basin model for quantitative risk assessment is a sensible approach; this is the best available tool and has stakeholder acceptance. Refinements to the hydraulic conductivity (K) in the model in the study area, in keeping with local pumping test results, appears appropriate. Nevertheless, the groundwater levels and flows presented do not show a clear improvement in model calibration.
4. It would be useful to see further interrogation of the model calibration, both original and refined versions, in the study area and checks on the impact of refinements to the model (both the K changes and using short model runs). This would provide additional confidence in the results and a fuller understanding of limitations.
5. A more comprehensive description of the refinements made should be given e.g. the extent of the changes in K and what starting heads have been used for each run. A table of model runs (stating period, property changes, starting heads etc) with reference codes would be useful and each figure should state clearly which model run results are from.
6. The approach to modelling the tunnel structure below the water table by reducing K seems reasonable and assumptions appropriately conservative. Focusing presentation of results on changes in heads is correct: there would be more confidence in the model's ability to simulate changes in heads (and flows) than in modelling absolute levels.
7. Where the assessment relies on the modelling of absolute levels (e.g. presentation of flood risk as modelled groundwater levels compared to ground level) additional caution in use of the results should be stated. In the area north of the tunnel where the most significant rises in groundwater levels are predicted any additional information on model calibration in this area would be helpful (point 4 above).
8. Where specific previous groundwater flooding issues have been identified, or any other areas where flooding concerns are acute, it would be useful to clearly state the modelled impact from scheme on flood levels at these locations (even if zero).
9. It is not evident whether any consideration been given to what the critical level is for groundwater interfering with drainage infrastructure or flood storage. A level of 2 m below ground has been used as an indication of risk but no explanation provided for what this is based upon. No information is given in these reports about how peak predicted groundwater levels from the modelling have been used in design of the scheme drainage infrastructure.
10. The approach to considering climate change of increasing recharge by 20% (to consider peak groundwater levels) is very simple – no allowance is made for the effect of soil zone processes or changes in starting heads (it is assumed). Clarification of how this corresponds to the approach used in fluvial/pluvial flood risk assessment (where 30% and 40% increases appear to have been used) should be provided. A 20% increase in recharge will represent <20% increase in rainfall.
11. The modelling results inevitably contain uncertainty and this should be reflected in presenting / describing results of quantitative risk assessment. Groundwater level monitoring of areas upgradient and downgradient of the tunnel will be important and as new data become available the modelling and risk assessment should be reviewed and updated.
12. The qualitative risk assessment concludes that almost all groundwater risks are low or very low (following embedded mitigation). These mostly refer to the use of the Construction Environment Management Plan (CEMP). Construction and operation of a scheme on the unconfined Chalk aquifer, with elements at or below the water table, presents risks particularly to water quality and the underlying vulnerability should be kept in mind in later phases (e.g. detailed design, enforcement of the CEMP).
13. It is not clear whether the potential risk that the tunnel surface acts as a preferential groundwater flow path and potential link between fissure zones has been considered.



Specific comments on the main ES groundwater risk assessment chapter (Ref 1.) and the groundwater modelling annex (Ref 2.) are given in Section 0 and 0 respectively.

## 3. Recommendations

### To improve the approach and outputs:

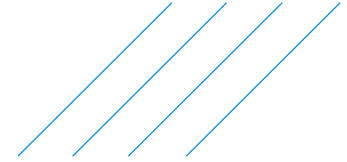
- Specific recommended edits to the report text and figures are listed in detail in Sections 0 and 0. These would improve clarity of communication of the assessment.
- The model would preferably be run for the full 1965-2016 run time for each of the revised baseline runs (the baseline run with revised calibration, the wet climate change run and the dry climate change run) and thorough comparisons made with the original Wessex basin model output and with observation/gauge data. The short period runs would be checked against these and output from the full runs used as starting heads for the short runs.

### To give sufficient confidence to support the approach and outputs:

- Provide an explicit list of the changes in the revised model compared to the original Wessex Basin model (e.g. as a table listing each model run).
- Provide graphs showing comparisons between
  - the modelled groundwater heads from the short investigation runs
  - the long runs of the original Wessex basin model (and other long model runs if these are carried out)
  - observed data

for all Environment Agency monitoring boreholes in the surrounding area and a good selection of site investigation boreholes covering the area of the scheme and areas to the north and south. This is a valuable check even where the time period of the short model does not overlap with the time period of the monitoring data.

- Check the sensitivity of the model with the tunnel included and the wet climate change model to use of higher starting heads.
- Provide clarification of how the climate change approach is consistent with that used in other flood risk assessments (and ensure they are consistent).
- Use monitoring data comparisons to inform caveats to be applied to the use of absolute levels for flood levels or in scheme design. The model is likely to be more reliable for predicting changes in heads (and flows) rather than absolute levels. Modelling absolute levels in extreme events would particularly hold uncertainty. The predicted position of the water table in terms of depth below ground should be used with a degree of caution.



## 4. Comments on Appendix 11.4: Groundwater Risk Assessment

Paragraph / figure number	Comment
Figures	Figure numbers do not match those used in the text.
Figure 3.2	Map extent includes New Pit and Holywell Nodular Chalks (along the Wylye valley) not included in the legend.
Figure 3.4, Figure 3.5	Groundwater hydrographs often show multiple short term peaks in a winter. Is this captured by the model or do these events tend to be smoothed. Are any records going back to the 1970s available, so that use of 1976 as a drought year can be set in context of longer record?
Figure 3.4	Would be useful to include all nearby OBH, even if no longer used e.g. Wiltshire Grain Silo, Manor Farm.
Figure 3.6	Some of the OBH names do not precisely match names on the map (Figure 11.4.2)
3.6.13, Figure 11.4.8	State what the time periods for the typical high and typical low groundwater levels are.
Table 3.2	This is a useful broad check on model calibration but it would be good to also see some example hydrographs plotted e.g. Berwick Down and Wiltshire Grain Silo EA OBHs but also some of the site data e.g. P2 even if the records are short.
3.6.21, 3.6.22	Contours suggest the groundwater is disconnected from the rivers / not contributing baseflow, rather than the rivers necessarily losing to the aquifer.
3.6.22	Not clear exactly which reach is referred to in this paragraph. The geological mapping does not indicate the river flows over the basal part of the Lewes Nodular Chalk.
3.6.23	Do the accretion data for the River Avon show the increased flow below Amesbury specifically joining near Stonehenge Bottom dry valley outflow – are there detailed enough data to see this?
Figure 11.4.10 (abstractions)	Numbers are shown only for boreholes included in the water features survey (WFS). Not clear why the area slightly further east (e.g. Durrington) was not included in the WFS. It would have been helpful if all abstraction points were given a unique ref number which was then used on this figure, in Tables 3.3, 3.4, 6.3, 6.4 and when boreholes are referred to in the text. (It is not easy to use grid references to find the points because eastings/northings are not given around the edge of the maps.) Clarify whether the 1976 contours shown are modelled groundwater level (and which model run), or interpolation of observed data (e.g. from hydrogeological map).
3.8.5	Tap sampling points are surely likely to be only tens of metres from the boreholes at private abstractions? Therefore unlikely to make a difference to the risk assessment. PWS normally means public water supply. There are 21 private supplies, 12 of licensed, therefore 9 others – why are there only four in Table 3.4?
3.8.8	Discharges to ground. Has any consideration been given to whether these could be affected by rise in groundwater level north of the tunnel (e.g. Larkhill area)? Would only potentially be an issue if these are discharges to a below ground structure with little clearance above the water table. Unlikely to be a concern.
Figure 11.4.11	This looks similar to Fig 4.2 of Annex 1. However, there is a different description of the blue shading – on this figure it includes above ground levels, whereas Fig 4.2 goes only up to zero. Presume 11.4.11 is correct? For both of these figures, state clearly which version of the model is used. 11.4.11 – text in paragraph 3.6.15 implies this is the original Wessex model. Fig 4.2 – this says it has the tunnel so presume must be the refined model.



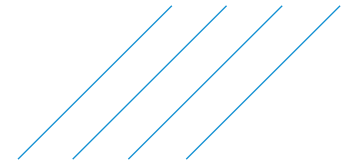


Paragraph / figure number	Comment
Table 3.5	Perhaps there are less locations affected by flooding in 2014 than would have been expected eg from Figure 11.4.11. Suggests using the model / blue shading is a pessimistic approach.
4.1.1.e	States that groundwater is known to rise to the surface in Stonehenge Bottom dry valley. What is the evidence? It is not listed as a place that has experienced flooding.
Table 5.2	Unlicensed private abstractions are listed as medium sensitivity. Not clear why these should be treated differently to licensed abstractions – they may be relied upon as the only water source for a property.
5.6 – 5.8	Format is confusing
5.8.2	The Construction Environment Management Plan (CEMP) is key to groundwater protection from pollution and referred to frequently in the risk assessment. This has not been obtained/reviewed.
5.9.10	In assessing tunnel, is the risk of the tunnel structure (and cross-passages) being a preferential flow path where it contacts the aquifer considered? Is there a risk it links fissure zones?
Annex 5	Most of the risks are classed as low and very low in Annex 5, following embedded mitigation, with reference to construction method and CEMP e.g. pile construction below water table. Cannot say whether this is correct without final designs and these documents. Construction and operation of a scheme on a major unconfined aquifer poses a risk to groundwater which needs to be borne in mind at all stages.
Table 6.1, 6.2	Say explicitly which version of the model these groundwater levels are based on. 6.2.1 says it is the Wessex Basin model – the original model? In which case does potential underestimate of peak groundwater levels need to be accounted for in screening which structures have potential impact.
Table 6.3	Does this include all of the abstractions upstream of the tunnel where the modelled impact is not zero? What about e.g. the abstraction at Durrington?
6.5.2	State the modelled additional risk at locations identified as suffering potential historical groundwater flooding (3.9.5, 3.9.8, Table 3.5) to close this loop (even though it is zero).
6.5.2	Vulnerability to groundwater flooding has been set at a level of 2 m below ground. Has any consideration been given to what the critical level is for groundwater interfering with drainage infrastructure or flood storage?

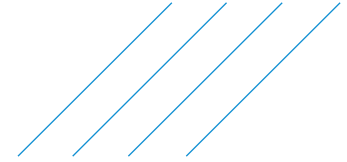


## 5. Comments on Annex 1: Numerical model report

Paragraph / figure number	Comment
Table 2.1	Locations of flooding reported by water companies: as previously suggested, it would be useful to state final assessment of additional risk due to tunnel at these locations, even if zero. Last three entries: water company does not report flooding here (nor does model) so why are these included?
2.4.4	The original model calibration in the study area is described. It would help understanding and lend confidence if the hydrographs of model vs observed groundwater levels were shown. Why is only Berwick Down OBH data used to check calibration? Include EA boreholes in a wider area, north and south of the scheme (e.g. Stoford Cross, Wiltshire Grain Silo, Manor Farm, Amesbury).
3.1	Give a fuller description of how the shortened models have been set up e.g. what the starting heads used for each run are. A table of model runs, giving each a reference number to be used in subsequent text and figures and stating details and changes each run would be helpful.
3.1	There is a risk with shortened runs that there is an initial warm up / equilibration, it would be preferable to have included several years prior to period of interest for each of the three short runs. Ideally would have run the full model period for the refined version of the model, with altered K distribution, and shown the calibration, compared to observed and original, for a selection of OBH and river flow hydrographs. Then compared the cut down models to the long run to demonstrate the run time does not influence. Potentially also a full run for the baseline climate change run. The shortened runs are likely reasonable where the starting heads applied are from a closely equivalent run. However, where scenario impacts heads e.g. the higher heads in peak period runs with the tunnel or with climate change, the starting heads from the baseline model may be too low and the heads build over the first few seasons of the model run. The short run-in may mean heads are underestimated. To a lesser extent, the adjusted K values in the refined model will have increased peak heads in some areas, meaning the starting head from the original model is low. In general it would have been helpful to have presented a more thorough check on the calibration of the refined model.
3.1.4	A fuller explanation of 1995 as an average climatic year would be helpful e.g. is this the average rainfall over the calendar year? Are the groundwater levels also average (at high, mid, low levels). The February peak may be a reflection of rainfall in late 1994.
3.3.9	Refers to the original model predicting groundwater level fluctuations at OBH on the interfluves in the study area that are too subdued – it would be helpful to show example hydrographs.
3.3.10	Clarify over what area VKD has been removed. Is it only in the interfluve zone in study area? If more widely, has the effect been thoroughly checked e.g. there may have been areas where the groundwater level was always above the inflexion point and removing VKD has lowered K. The text refers to this refined model calibrating well for the 2003 peak for Berwick Down OBH and site investigation boreholes and refers to Figure 3.2. This figure does not show 2003. Would be helpful to show the site investigation OBH calibration as well as Berwick Down and other EA boreholes.
Figure 3.2 and other figures	The points on the graph are too large and obscure the detail of fluctuations and time series behind.



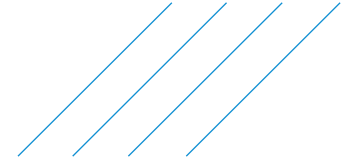
Paragraph / figure number	Comment
Figure 3.2	The refined model appears to have a much more substantial and slightly delayed peak compared to the original model and observed data. At this location the peak level is overestimated by a few metres in the refined model (which will give a precautionary indication of flood risk). It would be helpful to see similar plots for other locations.
Figure 3.3	Include a comment here that VKD has also been removed (and indicate where). The actual change in K has been more drastic than the figure suggests.
3.3.15	States that the refined model gives improved calibration at peak groundwater levels. Figure 3.2 does not show this clearly / convincingly.
3.3.16	States that the refined model gives improved calibration at typical high groundwater levels. Again, this is not clear from Figure 3.4. In both cases the peaks are now higher than observed, so will be cautious in considering flood risk.
Figure 3.5 and 3.6, 3.3.20	<p>Scatter plots of flow calibration. These are difficult to interpret without showing the 1:1 calibration line (see below, orange line).</p> <p>This analysis may not give a representative impression where (as here) the model slightly offsets the peak – calibration may appear worse than it is. Hydrographs in Figure 3.7 and 3.8 are more useful.</p> <p>The axis labels may have been switched? The observed flows in all cases have highest flows, which the model underestimates. These must be the outlier points, far right (see below), indicating that the x axis is observed flow.</p> <p>These plots show only the common dates between the models (3.3.20) but there appear to be different observed data shown on each of the Wylie plots.</p> <p>The text comments that the refined model calibration shows improvement if the full dataset is used. However, as the refined model is a truncated version of the original, the plots with only common dates should have used the full dataset for the refined model i.e. for the refined model there should be no difference between the plot with common dates and the plot with full datasets. Have there been other changes made in the refined model eg to stress period set up?</p> <p>For the River Avon plot, there should be a point shown at <math>1.5 \times 10^6</math> m<sup>3</sup>/d for the regional model (from examining Figure 3.7).</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="375 1310 853 1915"> </div> <div data-bbox="869 1310 1364 1915"> </div> </div>
3.5	Approach to representation of the tunnel through reducing K and consideration of flow horizons appears reasonable and conservative.



Paragraph / figure number	Comment
4.1.6, Figure 4.1	<p>Identifies 2000-01 and 2013-14 as peak flood risk events and February 1995 as next highest groundwater levels. Based on which hydrographs? Elsewhere 2003 is mentioned as a high groundwater level period (eg 2.4.4, 3.3.9, Berwick Down OBH).</p> <p>Modelled groundwater levels at P1 are referred to but the hydrograph shown on Figure 4.1 is for P2.</p> <p>Clarify which model has been used to simulate these (presume the original model).</p> <p>Show observed data for the borehole on the hydrograph.</p>
Figure 4.2	<p>See previous comments regarding legend of blue shading and clarifying which model run is used. Assume the blue areas include some where water levels are above ground.</p>
Figure 4.6, 4.7 and 4.8	<p>State clearly what time period these represent (presume autumn 1995?).</p> <p>Is the reason for the shape of the area of groundwater level reduction south of the tunnel understood (i.e. why it appears truncated on the west side)? (Figure 4.6)</p>
Figure 4.9 and 4.10, 4.1.8	<p>Show the hydrographs for the full model period to March 1996.</p> <p>Include a grid line at zero on the difference plot so that it is clear when switches between loss and gain.</p> <p>The initial sections of these could be affected by the starting heads used.</p> <p>There is a statement that the period selected shows the range of flow occurring most of the time – it would be helpful if this was demonstrated eg by highlighting this range on a full hydrograph.</p>
4.4.1	<p>Explain more fully how the approach (increase recharge by 20%) ties in with fluvial modelling approach and 2050 projections.</p> <p>Has the effect of changing rainfall been tested in the 4R model to see how recharge responds?</p> <p>If a 20% uplift in recharge was applied for the full model period, the general groundwater levels on which the peak event is imposed, may be much higher (i.e. using starting heads from the original model may lead to underestimate of peak heads).</p>
Figure 4.14	<p>Clarify that this is from the model runs without the tunnel.</p> <p>Include a legend for the shading.</p>
General	<p>The uncertainty in using the model outputs should be kept in mind in presenting the results, particularly in how the model responds during extreme high events as this would not have been a focus of the original build (and not well calibrated), the events are rare and not well understood, and near surface processes may not be fully captured.</p>

## **Appendix A.2**

### **Review of Drainage Strategy**



## Technical Note

Project:	A303 Amesbury to Berwick Down		
Subject:	Review of drainage strategy		
Author:	MJ Vaughan	Atkins No.:	5157973-ATK-ABD-ZZ-RP-EN-023
Date:	30/10/2018	Icepac No.:	
		Project No.:	5157973
Distribution:		Representing:	

These notes are from a review of the October 2018 published Road Drainage Strategy for the proposed A303 Amesbury to Berwick Down highway improvements. That document forms Appendix 11.3 of the environmental statement appendices. The review has been undertaken for Wiltshire Council, using documents published by Highways England.

### General drainage matters

Paragraph / figure number	Comment
Figure 2.1	Not clear in the report. Illegible
Figure 2.2	Not clear in the report. Illegible
2.3.3	Separate carriageway and earthwork drainage systems are proposed. This follows best practice.
2.4.3	Infiltration design is based upon site soakaway tests. The design applies the lowest recorded infiltration rate at each test point to the drainage features in the vicinity of those tests. It is unclear as to where such soakaway tests were taken in spatial relation to the scheme. This needs to be clarified.
2.4.3	All infiltration design is applied with 20x factor of safety. This is precautionary and should ensure a robust design.
2.4.4	It is proposed to set the drainage infiltration features a minimum of 1m above the highest recorded groundwater levels in the locality. However, it is unclear as to where such groundwater levels have been recorded in spatial relation to the scheme. This needs to be clarified.
Table 2.1	Indicates a minimum of 1.9m above the highest recorded groundwater levels (for drainage treatment area 4).



## Western approaches

The predominant drainage discharge strategy for the western approaches is by infiltration (to ground).

Paragraph / figure number	Comment
3.2.1	<p>The western approaches are drained using traditional kerb and gully systems, with carrier pipes collecting runoff and conveying away from the road.</p> <p>The infiltration systems are to be designed for 100yrs + 30% climate change. It is not explained whether the surface water runoff can be suitably conveyed to the discharge points ie to what return period the sizing of carrier pipes will be made.</p>
3.2.2	<p>Infiltration ponds are proposed to receive the carriage runoff and take flow to ground. These are described as Drainage Treatment Areas (DTAs). The ponds are located remote from the proposed highway alignment. It is unclear why the ponds are to be located so far from the road. Presumably this is driven by topography, but it will increase land-take for access and maintenance issues.</p> <p>There is no confirmation as to flood risk posed to the proposed DTAs. This should be checked for both impact on the scheme and impact on surrounding land etc. It is likely that detail design will impact on existing overland flow routes.</p>
3.2.3	<p>The ponds are intended to use a proprietary treatment system for treatment of water quality: it is unclear what systems might be employed here, where the full discharge is to ground. The details on how particulates (solids), hydrocarbons, and other chemical contaminants will be treated are not given. The proprietary treatment should attenuate all typical contaminants, giving sufficient residence time to achieve this.</p> <p>Specifically, the drainage strategy claims that the drainage scheme will enhance water quality through the specification of engineered infiltration systems. It is unclear how this will be implemented. It is unclear whether the proprietary treatment product will treat sediments, hydrocarbons, dissolved heavy metals, phosphates, or de-icing salts? Information on the maintenance proposals and residence time should be provided.</p>
3.2.4	<p>The proposed infiltration ponds are unlined except for small biodiversity areas by the piped outfall. These ponds infiltrate to ground. It is noted that the ponds are to be sized to hold runoff from the 1 in 100-year rainfall event, with a 30% allowance for climate change. Furthermore, a 300m freeboard is proposed. It is likely that such freeboard will accommodate a reasonable additional volume and it would be good to see this quantified. There is no specific attenuation proposed for the drainage with all runoff being drained to ground.</p> <p>It is unclear what happens when the pond base blinds with sediment and infiltration is restricted, or where the design event is exceeded. As no outfalls are proposed from the DTAs, ultimately these ponds may overtop: no evidence is provided to indicate where those flow might travel. However, the drainage strategy indicates that the predicted overland flow paths have been examined to minimise disruption. How that minimisation is effected is not described</p>
3.2.5	<p>The capacity of the network storage for pollution spills is not described. Pollution control is proposed by valves on the outlet of the pipework system, before the infiltration ponds. This holds any contaminated water in the pipework. It is not clear whether the piped system would have sufficient capacity to accommodate a pollution event of say 1 or 2 tankers full (25m<sup>3</sup> to</p>



Paragraph / figure number	Comment
	<p>50m<sup>3</sup>) , at the same time as a rainfall event with allowance for groundwater ingress.</p> <p>It is assumed from the design parameters that groundwater infiltration is not of concern for such storage capacity. However, it is unclear where any contaminated flows would arise or go if the pipe storage/capacity was exceeded. This needs to be explained.</p>
3.2.5	<p>The proposed infiltration basins provide no containment for contamination to be held in the basins and subsequently removed. Some polluted runoff may well infiltrate to ground. It is recommended that the DTAs are designed with a receiving forebay to be capable of hold such contaminated discharges before entering the infiltration zone. This might already be intended although the concept design drawing does not show this.</p>
3.2.6	<p>Runoff cannot be conveyed from the carriageway where it is placed in cutting (in the vertical cut). In these locations, the use of a buried crate system is proposed for infiltration, promoting infiltration below the scheme where is cannot be implemented in the natural topography. Such systems are not favoured by Wiltshire Council because of the maintenance liabilities and difficulties in accessing inside them. Wiltshire Council dissuade developers from using crate systems through their SuDS guide. Highways England should provide details of how such systems will be maintained, and make due consideration of risk to drainage whence they are not performing as per the design.</p>
3.2.7	<p>Where there is a groundwater risk, a pumped system is to be installed to capture the groundwater and discharge it away from the site. This impacts mainly the tunnel.</p>
3.2.8	<p>Near the entrance to the tunnel, it is inferred that groundwater levels are closest to the carriageway and may not always allow sufficient infiltration. The risk is recognised and a pumped drainage system is proposed supplement the basic infiltration. This pump would discharge water to a more favourable location for infiltration, where groundwater levels are at less risk of impeding the drainage.</p>
3.2.9	<p>Land Drainage for the highway embankment and natural catchments drainage into cuttings are to be kept separate from the carriageway drainage. Ditches along the top of cuttings or at the toe of embankments will be included to capture the runoff from those areas.</p>
3.2.11	<p>These would be graded to flow the natural topography and discharge towards the River Till. It appears possible that and exceedance flows, and/or contaminated discharges, could be intercepted by those ditches and hence discharged into the river. Further evidence of how contamination and exceedance flows are dealt with is required.</p>
3.2.12	<p>The capacity of the land drainage system is not described in the road drainage strategy document. It may be covered in the FRA report as Appendix 11.5 of the ES.</p>
3.2.14	<p>Changes to the alignments of the local roads will apply similar drainage systems to those already in place. It is unclear what the specification of any engineered infiltration systems may be that provides enhancements to the water quality of their discharges.</p>
Figure 3.1	<p>Not clear in the report. Illegible</p>







## Tunnel

The predominant drainage discharge strategy for the tunnel is by edge collection, carrier drain leading to a sump – then pumped to the surface and outfall to the surface water drainage network.

The tunnel drainage system is independent from the other drainage networks (approaches).

Paragraph / figure number	Comment
4.1.2	<p>The tunnel drainage conveyed to a low point sump in the tunnel and then pumped to a tank at high point in the alignment on the eastern approaches. From here it will either gravitate to the proposed highway network, or be retained for disposal by tanker as a contaminated waste. All wastewater from the impounding sump should be removed to an appropriate treatment works.</p> <p>The switch between discharge and retention is proposed to be automatically actuated automatically. Although the trigger mechanism is not described, it is understood to include operation of the fire-fighting system, incident signage, or maintenance switch.</p> <p>The capacity of low point sump or surface impounding tank is not known, although it is advised that the volume should be sufficient to contain all fire-fighting volumes and clean up.</p> <p>No resilience measures are described for the pumped system. Consideration should be made to the event of power or mechanical failure, as may be more so expected during extreme rainfall.</p>
4.1.3	<p>Groundwater seepages into the tunnel will be intercepted by the drainage and pumped to the surface drainage system towards the east. It is not known whether there is any need for drainage to control groundwater levels around tunnel as dewatering, as opposed to seepage.</p> <p>It is not specified whether there are any interceptors included in the tunnel drainage system. As such it is likely that some contaminants are pumped and conveyed to Countess roundabout before being discharged</p>

## Eastern approaches

The eastern approaches are limited to online improvements of the existing highway, with a small length of new carriage way, in cutting, at the eastern portal.

Paragraph / figure number	Comment
5.2.1	The eastern approaches are drained using road-edge channels on the new road, with kerb drains on the slip roads and flyover. The existing drainage system will be retained on the Countess roundabout.
5.2.2	These channels and kerb drains discharge into a carrier pipe system but is not described here where that outfalls.
5.2.3	<p>The strategy includes for eight new DTAs. These are located alongside the road. It is not clear why these are, yet those in the western approaches are remote from the road.</p> <p>The ponds (DTAs) are proposed to be lined and planted, to contain a permanent body of water for water treatment and biodiversity. It is not immediately obvious why these are lined and planted, yet those in the western approaches are not. It is likely that a permanent dilution volume is being retained in these systems as they receive pumped water from within the tunnel – although this is not described in the report.</p>



Paragraph / figure number	Comment
	<p>The ponds are also proposed to attenuate discharges to provide a 20% betterment on the existing discharge rates. It is not clear why the ponds are attenuating flows yet those in the western approaches are not, although the report indicates that the ponds drain to the River Avon. It is also suggested that the change in discharge be compared to greenfield runoff rates should the existing highway be causing detriment compared to the greenfield condition. The size of the ponds is not reported – neither as a volume nor as return period capacity. Consideration should be made of the retained volume and any obligations under the Reservoirs Act.</p> <p>The ponds are designed to not be inundated by the River Avon during its 1 in 100-year flood, with an allowance for climate change. The allowance applied is not described.</p>
5.2.4	<p>Runoff cannot be conveyed from the carriageway where it is in cutting at the eastern portal. The use of a buried crate system is proposed for infiltration, promoting infiltration below the scheme. Such systems are not favoured by Wiltshire Council because of the maintenance liabilities and difficulties in accessing inside them. Wiltshire Council dissuade developers from using crate systems through their SuDS guide. Highways England should provide details of how such systems will be maintained and make due consideration of risk to drainage whence they are not performing as per the design.</p> <p>In this location the groundwater levels are reported as being 2m below the invert of the proposed infiltration crates. To remain precautionary at this stage, the preliminary design proposals include for a pumped system.</p>
5.2.5	<p>The catchment adjacent to Blick Mead is reported to see an increase in runoff from 292l/s to 328l/s. The associated outfall is not attenuated via one of the DTAs. Whilst it is understood that the archaeology local to this catchment requires the ground to be saturated, there is no consideration in the strategy for any impact this increase in peak flow will cause on the River Avon.</p> <p>It is also reported that the ditch conveying runoff to the outfall will be lined with a filtration treatment system, and goes on to indicate that the ditches will infiltrate to ground. It is thus unclear whether this runoff is intended to outfall into the River Avon or discharge to ground.</p> <p>Any proprietary treatment should attenuate typical contaminants, promoting sufficient residence time.</p>
5.2.6	<p>Any spillage/contamination is intended to be contained within the pipe system, upstream of the linear lined ponds. It is not clear whether the piped system would have sufficient capacity to accommodate a pollution event of say 1 or 2 tankers full (25m<sup>3</sup> to 50m<sup>3</sup>), at the same time as a rainfall event with allowance for groundwater ingress.</p>
5.2.7	<p>The capacity of the land drainage system is not described. This should not be less than the carriageway drainage to prevent flooding.</p>
5.2.9	<p>With the carriageway being lowered in cut, the natural valley feature currently accommodated though an agricultural underpass will be intercepted by a ditch on the north side of the road. The drainage strategy suggests that this ditch will convey flow westwards towards the tunnel before draining into ditch which outfalls into a culvert to the west of Countess roundabout. Figure 5.2 does not indicate this flow route, and the outfall from this former overland flow route is unclear. A full set of drainage plans is required as an appendix to this drainage strategy.</p>
Figure 5.2	<p>Not clear in the report. Illegible</p>



## **Appendix A.3**

# **Parsonage Down Pluvial Model Review**

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

<b>Project</b>	A303 Parsonage Down Pluvial Model Review
<b>Project ref</b>	5199999
<b>Client</b>	Wiltshire CC
<b>Date</b>	24/10/2018

<b>Reviewer</b>	Lee Garratt
<b>Model originator</b>	AmW
<b>Model reference &amp; date</b>	StH_C01_P_059_Q0100CC40_180_Opt1.tcf 2018

Review document history		
Rev	Revision Date	Description / Summary of changes
001	16/10/2018	Original review document

Print report...?

- Control sheet
- Summary
- General items
- Survey data
- Hydrometric data
- Historic info
- Hydrology
- 1d model
- 2d model
- Calibration
- Accuracy
- Testing
- Recommendations

Item	Status
General items	Queries
Survey data	Queries
Hydrometric data	Queries
Historic information	Accepted
Hydrological assessment	Unacceptable
1d model build	Queries
2d model build	Unacceptable
Model calib, verify, sens	Queries
Results, Accuracy and stability	Unacceptable
Objectives	Unacceptable
Recommendations	Unacceptable

Print report...?

**Model review summary**

The review of the model and accompanying reporting is generally sound and the approach and discussion is easy to follow. There are however a small number of items/queries to be addressed. At face value the summary shows a number of Unacceptable statuses however there are no fundamental errors within the approach or model, only level of detail/accuracy/completeness. It is assessed that if the changes suggested are made, the findings for the scheme scenario are likely to remain similar, only depths and extents are expected to change slightly, however evidence is required to show this.

The current model results for the scheme show that the modelled water levels are still rising at the conclusion of the model run. This may be due to incorrect positioning of the proposed culvert which is part of the scheme, it may be due to the TIN Zpts utilised to modify the model topography or it may be due to the fact that the model is required to be run for longer.

If the location of the proposed culvert inlet and topography are correctly schematised, the results of the modelling indicate that the scheme model needs to be run for a longer storm duration (and for longer) to capture the change in flood risk due to the scheme.

Further sensitivity testing is required on several input criteria (Cini and Manning's n for example) to provide a greater understanding and confidence to the results obtained.

Results for all models should be published and reported to justify the approach taken (for example storm duration and shape) to give the reader confidence in the results/approach and provide an understanding of the scale of change in risk due to changes in parameters.

There is an increase in flood risk due to the proposed scheme however the area of land affected is within the proposal boundary.

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

General items	Comment	Status
Is the model a development of an Environment Agency model that has been previously accepted? (if so version control /metadata is needed).	The model is based on the same data utilised to build a hydraulic model of the River Till however it is a new model therefore it is not developed from a previous model.	Accepted
If the model or modelled water levels are based on a previous model supplied by the Environment Agency have checks been carried out at key locations to ensure that the model / levels provided is compatible with current conditions?	Model not based on previously supplied EA model. There is however overlap with River Till fluvial model created for this reach. Bank levels from the fluvial model have been utilised in the pluvial model which provides detailed info and a boundary condition for water to pass from the floodplain back into the river. The model contains a simplified representation of the River by utilising lowest bed levels from survey (supplied and checked) with simplified ESTRY representation of some key structures. The fluvial model contains structures modelled in Flood Modeller. There is no evidence supplied to show how the simplified representation of the channel and some of the structures on the River Till represent the hydraulic in the channel compared to the more detailed fluvial model for the boundary condition applied (1 in 2 year only in pluvial model). This evidence would show if the boundary condition of the Till to pluvial runoff from the western catchment was precaution a or under predicts any backwater effects. Given the nature of the catchment, this will probably only have an affect on levels proximal to the river, however evidence should be provided to explain if this is a suitable schematisation and set of assumptions. The fluvial model has not been supplied as it is being reviewed by a 3rd party (Environment Agency).	Queries
Does the report summarise what changes have been made to the Environment Agency model?	N/A	Accepted
If an existing model exists and it is Environment Agency owned has its use been licensed to this project If not its use may not be appropriate and it is being used without permission / relevant charge. Ensure the licence is included in the work.	N/A	Accepted
Are the objectives and the required outputs of the modelling exercise defined?	The objectives and requirements are discussed in the FRA and modelling documents supplied (Stonehenge SW Modelling Report_FINAL.pdf, Appendix 11.5 FRA.pdf). The objectives are listed in the Testing tab	Accepted

Approach to analyses	Comment	Status
Is the approach or modelling software chosen capable of producing the required output? Refer to available Environment Agency benchmarking (2D: summary and report) and relevant specification for the production of detailed hydraulic models to assess flood and coastal risk.	A 2D TUFLOW model has been utilised to undertake the study with 1D model elements implemented utilising ESTRY. The software is suitable for predicting surface water flooding of this catchment	Accepted
Is the approach acceptable (1D / 2D / unsteady / steady-state / backwater model / calculation) for the model?	Hydrodynamic 2D approach has been utilised to determine detailed flow paths and storage.	Accepted



Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Survey Data	Comment	Status
Is the analysis/model based on a topographic survey / LIDAR of the study area of an acceptable age (i.e. standards still fit for purpose)? If survey data was provided by the Environment Agency have checks been carried out at key locations to ensure it is compatible with current site conditions?	Data of LiDAR not stated in the report (Please state). Survey undertaken in February 2018	Queries
Does the survey comply with the Environment Agency survey specification or equivalent?	Full review not undertaken however data appears compliant.	Accepted
Are cross sections and other topographic survey (including LIDAR) information located in plan relative to the British National Grid and surveyed using GPS relative to Ordnance Datum? Ensure topographic and LIDAR are to the same datum.	Both sets of data are to BNG	Accepted
Are the extents of the survey suitably defined to include the entire site with sufficient distance to minimise the impacts of the boundaries on results? Note: rule of thumb for backwater length is $0.7D/S$ where D = channel bank full depth and S = mean bed slope (m/m)	Survey is sufficient for this hydraulic model. There are some gaps in the LiDAR which have been filled with a photogrammetry DTM.	Accepted
Is the extent of survey required informed by the extent of flooding from flood records and / or from the Flood Map? Is the lateral extent of the survey sufficient to include the full extent of 1000yr flooding.	N/A	Accepted
Are the cross sections surveyed representative of the channel and floodplain and is the spacing between cross sections appropriate? i.e. not less than any of:	Channel spacing appears appropriate, detailed check not undertaken for this review as channel sections are simplified in this model.	Accepted
· 20 x bank-full width [w], or		Accepted
· $1 / (2 \times \text{mean bed slope } S)$ , or		Accepted
· $0.2 \times (\text{depth of flow at bank-full } [h] / \text{mean bed slope } [S])$		Accepted
· no greater than 100m spacing between sections		Accepted
Is additional survey information available between channel cross sections where detailed flood depth or extent are needed? It is essential to have a detailed understanding of ground levels and flood levels in the location of the development in question. This will influence finished floor levels and flood resilience measures, as well as the safety around the development.	No additional information is required	Accepted
Is survey information on all structures, blockages/obstructions to the channel and channel roughness available?	All data appears to be available for the model reach however these features have been simplified appropriately in the model	Accepted

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Hydrometric data	Comment	Status
Has available hydrometric data such as river flow, river level and rainfall data relevant to the analysis been reported and used?	There is no flow/level data in the catchment, there is no discussion if there are any boreholes within the catchment and how this may affect runoff, this should be included in the report for completeness. Discussion regarding findings of the groundwater study should be cross referenced	Queries
Has the data been reviewed for potential errors (i.e. using HiFlow-UK database in the statistical method)? Where necessary has data been infilled or corrected?	Rainfall gauge data has not been utilised, online FEH rainfall data has been used for the study. It is advised that local rainfall gauges records should be checked against DDF modelling in FEH to ensure that the data utilised is suitable.	Queries
Have the ratings been reviewed and updated?	N/A	Accepted

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Historic information	Comment	Status
Has information on historic flooding (e.g. newspaper articles, photos, wrack marks, flood records) been collected and used to aid the modelling process?	Yes, there is a good commentary on flood history including snow melt events however snowmelt is not considered in the analysis as it is suggested to be >0.1% AEP event (although this is not fully justified as to how this AEP has been estimated)	Accepted
Are the effect on flood flow routes etc. of any alterations and additions to the watercourse and associated structures considered?	The design of the option does consider changes in flow routes with a proposed new culvert as part of the design.	Accepted

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Hydrological assessment	Comment	Status
If an existing hydrological model has been used has its quality been proven?	FEH updated rainfall has been utilised for the study which is an industry standard dataset. There is however no checking of the data against local rain gauge records as a cross check	Queries
Has a hydrological assessment of the flood flows been made using the Flood Estimation Handbook method (and/or Revitalised Flood Hydrograph (ReFH))? Are any reasons for not using FEH fully documented and the alternate method adequately described?	FEH updated rainfall has been utilised for the study which is an industry standard dataset. There is however no checking of the data against local rain gauge records as a cross check. The REFH units utilised to calculate the net rainfall inputs have not been supplied to check that the model inputs are correct.	Queries
Have the Environment Agency's Guidelines on use of the Flood Estimation Handbook been used? Has the method been followed correctly?	FEH catchment descriptors have been utilised, however the study did not need to calculate flood flows. The methods utilised are appropriate for the study.	Accepted
Does the hydrological assessment include local data where suitable to improve the estimation of flood flows?	No, local rainfall gauge records should be utilised to check the DDF in FEH gives a reliable prediction of rainfall.	Queries
If a hydrodynamic model is used, does the hydrological assessment include a consideration of peak flows, flood volumes and shape of the flood hydrograph?	<p>The baseline model has been tested with the 1 in 100 year rainfall to determine the 'critical duration' (presumed to mean the worst case flood) for both summer and winter profiles. The 180 minute storm hydrograph was reported to be the worst case, however there are no figures/tables to support this statement (it would be good to have the evidence to show by how much it changes the results).</p> <p>The results of the modelling for the 1%+CC event show that water levels upstream of the proposed culvert are still rising at 10 hours (end of the model run) as shown in the 2d model build tab. This would suggest that as storage is important, a range of storm durations need to be run for both baseline and scheme models to determine the worst case scenario. The study does not capture worst case with utilising just one storm duration for the scheme.</p> <p>Additionally, snow melt is discussed in its historic context however it has been assumed to be greater than a 0.1% AEP event. Further justification of this is required in the report as snow melt appears to be a factor in flood events in this catchment (even if only a small part of the flow in large events).</p> <p>There is no cross reference to the groundwater model findings to prove/disprove that water levels in the catchment would be high/low which may affect Cini results.</p> <p>There is sensitivity testing of Cini which was shown to be sensitive. It is agreed that a Cini of 675mm would be very high considering the default value is 50.51mm however there is little commentary or cross reference to the groundwater or fluvial study in determining if the default catchment descriptor is applicable/correct. Additional sensitivity testing should be performed on this value as it is unlikely that this figure would not be suitable for higher order events.</p> <p>Section 3.8 does not discuss any change in surface area of hardstanding materials (road surface) due to the new alignment, Is the new alignment of the same surface area as the existing? If there is an increase, the runoff from this additional area would be greater than that calculated for the rural catchment. Would this be significant in terms of additional volume if runoff from additional hardstanding areas was at 90% or a similarly high runoff rate?</p>	Unacceptable
Have stage-discharge equations been reviewed for gauging stations in the catchment?	N/A	Accepted
If statistical analysis has been used has the pooling group been reviewed for similarities / significant differences? Does the report include a suitable calculation record of this review?	N/A	Accepted
Has appropriate use of the HIFLOWS web page information been made?	N/A	Accepted

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

1D model build	Comment	Status
Does the model represent the key flood flow routes, flood storage and structures in the study area?	The baseline model is sufficient for modelling the structures on the River Till, given the topography of the catchment and the low flow used for the Till (correctly used) it is unlikely that approximations or assumptions will affect the results seen further up the valley when concerning direct rainfall flow routes.	Accepted
Have model settings / parameters / boundary conditions been provided in the report and justified?	The model boundary conditions have been given and calculations for the structures on the River Till have been supplied within the model log. The new culvert which is part of the scheme however is of a different size to that stated in the Stonehenge SW modelling Report (Final (002).pdf document . The model contains a 900mm diameter pipe while 3.8.7 of the report states it is 750mm diameter. There were no drawings or other information given to see which of the two is correct. Is the model correct?	Queries
Is the model adequately documented such that it can be run to repeat the reported findings, (including run type, initial conditions, start and finish times and any alterations to default parameters)?	1D elements are part of the 2D model. All run information was included in the ecf files supplied	Accepted
If there are any movable structures have they been modelled correctly? E.g. have control rules been agreed with the structure owner.	N/A	Accepted
Are there sufficient comments in the model (e.g. to clearly identify all structures, spills, junctions, reservoirs etc.)?	Yes there is satisfactory commentary on how the structures are modelled in the model log	Accepted
Is the defined study area sufficient to demonstrate the effects on neighbouring areas	N/A for 1D	Accepted
Is the upstream boundary or boundaries (inflow) based on a hydrological assessment?	Yes, the inflow is based on a 50% AEP design event calculated during the fluvial River Till study. A review of the fluvial model and the hydrology is being undertaken by a 3rd party and is not reviewed as part of this study.	Accepted
Is the downstream boundary (water level/rating curve) at a location where the relationship between level and flow is well defined or sufficiently distant from the study area such that uncertainties in the boundary condition do not influence flood levels at the site?	The DS boundary is located sufficiently far downstream as to not affect results in the study reach.	Accepted
Is maintenance / operation regime of any defences included in the model considered?	There are no flood defences however there is no mention of maintenance or blockage scenarios/probabilities of the proposed 537m long culvert. It is expected that there would be a high chance of blockage on such a long culvert (or the inlet for which no grill/trash screen is mentioned).	Queries
Do the cross sections and bed profiles look reasonable?	The bed levels utilised have been cross checked and agree with the survey bed levels supplied.	Accepted
Does the long section show any unusual head losses in the model (e.g.. at structures)?	N/A in 1D or 2D as mapping is only presented on the right bank of the River Till. It is expected that given the low flow being run through the watercourse, any errors in depicting head losses would not affect results from rainfall away from the river	Accepted
Has the model been geo-referenced? This is helpful to adequately interrogate the model (only needs a map showing the cross section / node point locations in the report).	Georeferenced in the 2D model	Accepted
Are Manning's n values appropriate and referenced in the report? Were sensitivity tests carried out?	Sensitivity tests have not been performed on either 1D or 2D model components. These should be performed. The roughness values utilised for the proposed culvert are appropriate for such a structure.	Queries
Are weir / spill coefficients appropriate and referenced in the report? Were sensitivity tests carried out (desirable for complex or borderline cases)	N/A	Accepted
Is the method of modelling floodplain flows detailed and thought to be appropriate e.g. extended sections, flood plain units / reservoir units and spills?	N/A	Accepted
Do channel conveyance values vary outside the ratios of 0.7 and 1.4 between adjacent river sections?	N/A	Accepted
Are structures modelled and located properly? Is there sufficient information around new structure locations to inform scour analysis?	1D Structures included in the River Till are located correctly. The upstream location of the proposed culvert in the model is different to that shown in the output diagrams in the report. The 2D model has high ground between the lowered land and the culvert outlet (approx. 0.5m high) above lowered ground and 2.5m higher than the outlet. It is not know if this is a correct schematisation as there is no detail of this high ground in the report, it is thought that the 2D topography in the model is therefore incorrect and requires updating. This will change model 1D results. See Figure 3 in the 2d model build tab. Although flagged as Queries this is possibly an unacceptable schematisation	Queries
Are river lengths, chainage, section lengths appropriate?	River length adjacent to the pluvial catchment is appropriate	Accepted

Control sheet
Summary
General notes
General items
Survey data
Hydrodynamic data
Historic info
Hydrology
1D model
2D model
Calibration
Accuracy
Testing
Recommendations

2D model build	Comment	Status
Check the general model setup	Check the 2D grid resolution (interpolation) of the 1D model. The software shows 75% a reduction through modifying bank level curves, which gives sufficient data for the numerical solution. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check grid appearance? Is it smooth and appropriate?	The 2D grid should be checked for smoothness. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check elevation general appearance?	The elevation data should be checked for accuracy. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check boundary values (elevation) for the grid lines? The 2D boundary should be checked for the 2D model	The boundary values should be checked for accuracy. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check the elevation data representation	The elevation data should be checked for accuracy. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check data has been used on the banks for the 2D?	The data has been used on the banks for the 2D model. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check elevation data has been used on the 2D?	The elevation data has been used on the 2D model. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check the roughness (Manning) parameters have been defined?	The Manning parameters have been defined for the 2D model. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check the boundary conditions have been defined?	The boundary conditions have been defined for the 2D model. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Check the 2D model	The 2D model has been set up for simulation. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Calibration	The 2D model has been calibrated against observed data. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Accuracy	The accuracy of the 2D model has been assessed. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Testing	The 2D model has been tested for various scenarios. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete
Recommendations	Recommendations for improving the 2D model. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m. The 2D grid should be checked. The model runs in the top and bottom of the grid (the highest elevation within the 2D grid) is 10.0m.	Complete

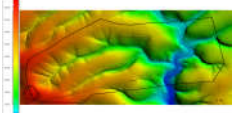


Figure 1  
2d grid (see below) shows that the extent of the model is as far as the highest elevation of the catchment and outside channel

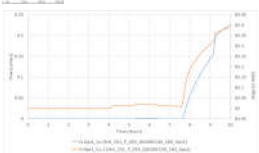


Figure 2  
Flow and stage time series from 1D/2D coupled model at the upstream end of the proposed culvert. Levels are still high at the conclusion of the model run (10 hours). See Figure 2 below for potential reason why this may occur

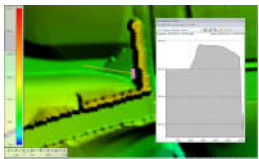


Figure 3  
3D view shows location of upstream end of the proposed culvert and headwall. A section line has been drawn through the model (2D) and is shown in the next. The positions are level upstream of the culvert is 8.6m AOD. There is a 1% rise slope at head of the headwall from level 8.6m to 1.5m into the culvert which is located in the grid program (10, 20, 30, check the 2D model). This high ground will cause water to pond upstream. There is no indication of this in the report and is therefore considered to be incorrect schematisation in the 2D model. Below is a section from the report showing the culvert inlet is further west than it is in the model. It is not known which is the correct schematisation. Possibly the 2D inlet needs to be moved or the model 2D may need modification.

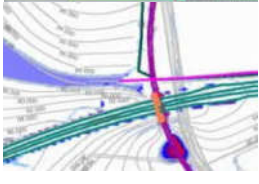


Figure 4  
Roughness map of the catch grid showing different roughness polygons. The red area to the south west is a stability patch to aid model stability

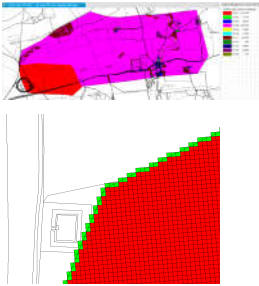


Figure 5  
2D check showing application of boundary cells (green) around the extent of the model

Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Model calibration, verification and sensitivity testing	Comment	Status
If calibration data is available and suitable for the hydrological assessment and the hydraulic model has calibration been carried out / attempted? If not has a sensitivity analysis been carried out?	Calibration data was not available as there are no flow/level gauges. There is no anecdotal evidence to know what extent of the catchment was flooded in any rainfall events. It would be sensible to run the highest recorded rainfall through the ReFH and hydraulic model to verify the design rainfall and model results. Sensitivity analyses has been undertaken on storm duration, storm profile and antecedent condition. Further justification/sensitivity of the Cini value utilised should be undertaken as it is thought that the value utilised may under estimate the conditions leading to a large flood event. There is no cross reference to the fluvial or groundwater studies in the report to prove/disprove approach adopted.	Accepted
If data is available has the model been calibrated appropriately using at least three separate events (including both in and out of bank flows). Are calibration events representative of – available reliable data, a range of high flows, preferably single peak well defined events, particular factors relating to the study.	N/A no data available to undertake calibration	Accepted
Has model been adjusted to represent catchment/watercourse hydraulics at time of calibration event	N/A no data available to undertake calibration	Accepted
Is the mean calibration error plus one standard deviation of the error at all calibration locations and over the whole time span of the events within reasonable bounds? Otherwise can differences be explained?	N/A no data available to undertake calibration	Accepted
Has a 'reality check' been carried out on the predicted levels and flows using photographs, historic information and anecdotal accounts of flood events?	No calibration data available however the model design results could be contextualised by running the model with local rainfall data (large event(s)). There is no historic evidence/recording in the vicinity of this catchment	Queries
Has an observed flood event been simulated with the model after calibration to verify the adjustment of parameters?	No calibration data available however the model design results could be contextualised by running the model with local rainfall data (large event(s))	Queries
Has the sensitivity of the model results been tested by adjusting key parameters within the model such as inflows, downstream boundary condition, channel roughness and key structure coefficients?	There is no channel/floodplain roughness sensitivity testing which should be performed. Further sensitivity testing of Cini (or runoff coefficient) should be undertaken to ensure that flood risk is better understood/predicted Sensitivity tests +/-20% in inflow/rainfall should be performed to test sensitivity There is no reference to blockage which is highly likely with a >500m long <1m diameter culvert proposed as part of the design	Queries
Are any limitations of the model or modelling technique discussed in the report?	Limitations are listed in the report with the input parameters having the greatest potential to vary and change model results	Accepted
Has a climate change design scenario been included as required in the relevant guidance	Yes, 40% increase in rainfall has been applied as per the latest EA guidance	Accepted

Control sheet
Summary
General items
Survey data
Hydrodynamic data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Model accuracy and stability	Comment	Status
Are the confidence levels for the model presented in your final report water flow evaluation?	Confidence levels have not been undertaken as part of the study	Accepted
Are data available and suitable for model validation (a selection of data available within table)?	There are no data available from the project for the project's model. There are no more data for the project to be placed in the shared folder with boundary conditions only a 10m AOD is available from the project for any potential changes to model and therefore no comparison is possible	Accepted
Do statistical tests give conclusive problems at the beginning of the simulation?	The model appears to be a time change in water profile at the beginning of the model simulation however this is not clear	Accepted
Does the model calibration appear acceptable?	Agreement is shown between model results from 1D hydrology and 2D model. There is some discrepancy between the two models in the early stages of the simulation. This is likely due to the fact that the 1D model does not account for the effects of the 2D model. Additionally, the work to improve the model is ongoing and will be completed in the future. The model is currently in a state of development and will be updated as more data is available.	Unacceptable
Do all water levels increase with storm period (A)?	The model appears to be a time change in water profile at the beginning of the model simulation however this is not clear	Accepted
Is the model of water levels has been validated with an external observation, figure a change being in the area of water in flow a decrease, it would be expected that water would increase as the flow enters the project area and decrease as it leaves it. Additionally, the model is currently in a state of development and will be updated as more data is available.	The model of water levels has been validated with an external observation, figure a change being in the area of water in flow a decrease, it would be expected that water would increase as the flow enters the project area and decrease as it leaves it. Additionally, the model is currently in a state of development and will be updated as more data is available.	Unacceptable
Does the model coverage appropriately? Are the inflow and outflow hydrographs that they are used?	Model calibration not complete, however model results have been used as a reference	Accepted
Hydrology		
1d model	There is no reference data for the hydrology model. The model is currently in a state of development and will be updated as more data is available.	Unacceptable
2d model	There is no reference data for the hydrology model. The model is currently in a state of development and will be updated as more data is available.	Unacceptable
Calibration	Model calibration not complete, however model results have been used as a reference	Accepted

Figure 1

Baseline topography taken from Check for Checks\_DSM\_2.tif

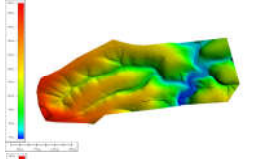


Figure 2

Proposed 10m topography taken from Check for Checks\_DSM\_2.tif

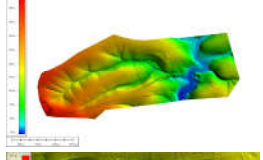


Figure 3

Plotting between baseline DEM and proposed change to topography appear to have a 'jump' at their extension. This will affect model results

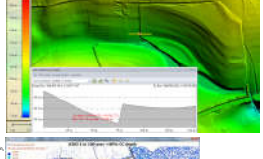


Figure 4

Annotation at 1 hour cumulative showing the boundaries of the region being from the elevation. There is no data for the area despite the contour being just below the assumed ground elevation



Figure 5

10-CC cumulative 10- Mass error

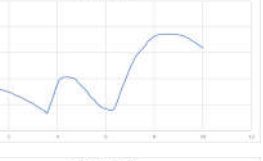
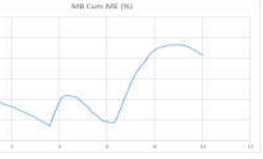


Figure 6

10-CC cumulative 10-20 Mass error



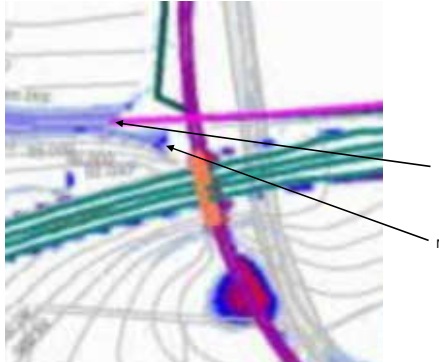




Control sheet
Summary
General items
Survey data
Hydrometric data
Historic info
Hydrology
1d model
2d model
Calibration
Accuracy
Testing
Recommendations

Recommendations	Details	Status
Survey requirements	There are no additional survey requirement a There are a number of queries and items that are required to be answered or addressed from the hydrological study:	Accepted
Hydrology	<ul style="list-style-type: none"> <li>- Sensibility/verification check of DDF modelling from FEH with local rainfall data (15 minute data should be available) which could affect design inputs to the model</li> <li>- Further discussion and sensitivity testing of the Cini value to be utilised in the project is required as the value is based on baseline catchment descriptors only.</li> <li>- Greater justification of assuming snow melt is &gt;0.1% AEP. Are snow melt/PR/antecedent condions all considered suitable? Cross reference to findings of the groundwater investigation is required to help this narrative and decision making.</li> <li>- Hydrographs of the various durations and profiles should be supplied to give better context to the reader, additional storm durations may be required due to potential storage upstream of the proposed outlet pipe</li> </ul>	Unacceptable
Hydraulic modelling	<p>There are a number of queries and items that are required to be answered or addressed from the hydraulics study:</p> <ul style="list-style-type: none"> <li>- The TINS utilised to define the option topography should be better integrated with the underlying LIDAR. There appears to be a 1m difference/step at the interface of the baseline DTM and the proposed scheme</li> <li>- There is conflicting information as to the design of the proposed culvert dimension which requires clarification/changes. There is no justification as to the dimension of pipe required and no sensitivity testing of results of difference sizes of culvert.</li> <li>- How will the shallow depression/landscaping on the south facing slope upstream of the B3083 drain? Is it assumed water will infiltrate back into the ground? What happens if there is high groundwater or this is already full/partially full of water when an event occurs?</li> <li>- The contouring of the TIN generates an extensive flat area, is this what the design intended? Should this be sloping as the invert of the culvert is over 2m below the ground elevation?</li> <li>- The option DTM has a 0.5m increase in elevation between the upstream valley and the proposed culvert. Is this part of the design to impound water or is this an error in the DTM?</li> <li>- If the design has been correctly modelled, the model is required to be run for longer as water levels are still rising at 10 hours. It may be important to test several other storm durations as well as culvert size and model run duration to optimise the scheme</li> <li>- Structure blockage has not been undertaken to establish residual risk upstream of the proposed culvert, this must be undertaken to understand risk more fully</li> </ul> <p>- Is a &gt;500m long culvert the best option? The study does not consider the risk of blockage of the proposed culvert. Blockage of the culvert would cause a greater extent of flooding compared to that published in the report. Culverting of watercourse is often opposed by councils and the Environment Agency as it is against many of the legal requirements set out in the Water Framework Directive (2003) that the quality of the watercourse should not be reduced. Although there is no permanent watercourse at his site, a watercourse can be defined as including all "rivers, streams, ditches, drains, cuts, dykes, culverts, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages through which water flows". At 539m long and buried to up to 5m deep, the maintenance of such an asset would be extremely difficult and expensive should a repair be required. The proposed option appears to have a number of shortfalls at face value without additional discussion as to its suitability.</p> <ul style="list-style-type: none"> <li>- Is there an overarching reason for the culvert direction used? Have other alignments been considered such as following the former valley route beneath the new A303 and B3083?</li> <li>- Is the feature upstream of the B3083 (immediately downstream of the inlet to the pipe) a quick fix in the model to stop flooding or is it included as part of the design? Can it phycially be engineered with the space constraints of the site?</li> <li>- Who will own the culvert, who will be responsible for maintenance? What are considered as self cleansing velocities as part of the design?</li> <li>- Is the depth of flooding and flood hazard adjacent/across the B3083 acceptable post scheme? Does this need to be mitigated or managed?</li> <li>- Following confirmation of the above culvert queries, a check should be performed (and reported) to test that the timing and magnitude of flow from the culvert is the same or less than of the baseline flow reaching the River Till (the baseline results show a lot of attenuation upstream of the B3083 however the scheme may reduce this if the pipe conveys all of this water). There is a risk that the culvert could increase the rate of runoff into the River Till and therefore this would have an implicatio on the fluvial system which should not be allowed.</li> </ul> <p>Although there are a number of queries to discuss/resolve, the proposed scheme should not affect 3rd parties and will/may cause additional flooding (depth/extent) of land (it is not known who owns the land). Should updates to the model cause more extensive (and/or greater depth) flooding upstream of the culvert, it should still not affect 3rd parties.</p>	Unacceptable
Reporting Conclusions	<p>The below lists the statements from the conclusions in the reporting and the findings of this review:</p> <p>6.2.1 Overall several key elements of the proposed permanent A303 scheme design, specifically the realignment of the A303, B3083 and land reprofiling, have an impact upon the location and conveyance of surface water flows through Parsonage Down - <b>the review agrees with this conclusion</b></p> <p>6.2.2 Inclusion of a pipe maintains connectivity between the surface water flow pathway and the River Till floodplain, with the pipe outfall discharging water north of the proposed A303 route - <b>the review agrees with this conclusion however there are questions regarding specific details of the design</b></p> <p>6.2.3 Overall, the proposed scheme leads to a slight change in the location where surface water is routed, and leads to a widening and deepening of the flow path through Parsonage Down. Within the proposed scenario, surface water joins the River Till north of its existing flow pathway as expected - <b>the review agrees with this conclusion however however there are questions regarding the scale of the increase</b></p> <p>6.2.4 Overall, the proposed scheme has an attenuating impact upon surface water flow into the River Till from Parsonage Down, reflected in the decreases in flood depth - <b>the review does not agree with this conclusion as changes are required to the model and the required comparison between flow in the baseline and flow from the pipe have not been undertaken to prove this is correct.</b></p>	

The A303 Amesbury to Berwick Down Environmental Statement, Appendix 11.5: Level 3 Flood Risk Assessment, Annex 1 Part B: Pluvial Hydraulic Modelling Report was supplied as supporting evidence to the pluvial hydraulic model. The following observations have been highlighted for further discussion or update

Paragraph	Discussion Point
2.3.1	Although there is merit in utilising data from the parallel fluvial study, why were catchment descriptors specific for Parsons Down catchment not derived and utilised? Have checks been undertaken to ensure that transfer of data is appropriate (for those characteristics other than shown in Table 2.1).
2.3.2	Figures showing these 18 sets of results would be useful to show how it varies for different events
2.3.3	The report states "Initial hydraulic testing was undertaken with the 1% AEP event in order to determine the critical storm duration". This should be clarified, does critical storm duration relate to the peak flow or the largest flood outline of the three durations assessed? If it is flood extent, this is not critical for the scheme if water is attenuated/stored as the results appears to suggest.
2.4.3 and 2.4.4	Has the Cini value been sensibility checked against any findings of the groundwater investigation. Have any other analyses been considered to specify this value rather than assume catchment descriptors are correct? Would this be different if 2.3.1 was addressed? Further testing should be undertaken in terms of the sensitivity of Cini as under extreme rainfall it is likely that the catchment will behave differently to this assumed figure (it is likely to be higher). Further sensitivity testing of this figure (at more refined increments) should be undertaken and more importantly reported to show the reader how the runoff is sensitive to this parameter. It is likely that flood risk would be different from the maps published in the report.
2.3 (general)	There appears to be no reference to the work undertaken in establishing groundwater flood risk. The groundwater investigation may help to refine the level of Cini and hence runoff used in the calculation.
3.3.2	What year was the LiDAR generated, how old is the data?
3.8.7	The report states a 750mm pipe however the model utilises a 900mm pipe. The report does not finish a statement The report A303 Amesbury to Berwick Down Environmental Statement – Appendix 11.3 was not made available to cross check the design/assumptions of the scheme.
Figures 4.2 to 4.3 and Appendix A	The flood maps in the report show the location of the upstream end of the proposed culvert to be to the west of the actual location of culvert inlet in the hydraulic model. Is the location at which the inlet in the model therefore incorrect but the DTM correct?   <div style="display: flex; justify-content: center; margin-top: 10px;"> <div style="margin-right: 50px;"> <p>Diagrams show inlet here</p> </div> <div> <p>Model places inlet here</p> </div> </div>
Figure 4.3	Page 13 Figure 4.3 named Figure 4.2
6.5.3 (FRA report)	The paragraph eludes to high groundwater coinciding with events in 2013-2014 (although the event magnitude is not stated it is believed these are not of the significance that are modelled). However, Section x.x.x. of the modelling report suggests that this is extremely unlikely to happen. This appears to be conflicting

## **Appendix A.4**

# **Integrated Review of Water Assessments**



## Technical Note

<b>Project:</b>	A303 Amesbury to Berwick Down		
<b>Subject:</b>	Integrated review of water assessments		
<b>Author:</b>	Mike Vaughan, Lee Garratt, Lesley McWilliam	<b>Atkins No.:</b>	5157973-ATK-ABD-ZZ-RP-EN-025
<b>Date:</b>	14/11/2018	<b>Icepac No.:</b>	
		<b>Project No.:</b>	5157973
<b>Distribution:</b>	D Everett, C van NieKerk, M	<b>Representing:</b>	Wiltshire Council

## 1. General

This document is a summary of findings following review of documents appertaining to flood risk from pluvial (surface) and groundwater sources and a drainage strategy in relation to the proposed A303 Amesbury to Berwick Down highway improvements. The review has been undertaken for Wiltshire Council, of documents published by Highways England. The following documents (and associated model data for the groundwater and pluvial studies) have been reviewed:

1. Environmental Statement, (July 2018) A303 Amesbury to Berwick Down Environmental Statement, Appendix 11.4: Groundwater Risk Assessment.
2. Numerical Model Report, (July 2018) A303 Amesbury to Berwick Down Numerical Model Report, Appendix 11.4: Annex 1.
3. Numerical Model Report, (July 2018) A303 Amesbury to Berwick Down (spreadsheet) Appendix 11.4: Annex 5 Qualitative Risk Assessment.
4. Road Drainage Strategy, (October 2018) A303 Amesbury to Berwick Down Environmental Statement, Appendix 11.3 of the environmental statement appendices 6.3.
5. Pluvial Hydraulic Modelling Report, (August 2018) A303 Amesbury to Berwick Down Environmental Statement, Appendix 11.5: Level 3 Flood Risk Assessment, Annex 1 Part B: Pluvial Hydraulic Modelling Report.
6. Environmental Statement, (August 2018) A303 Amesbury to Berwick Down Environmental Statement, Appendix 11.5: Level 3 Flood Risk Assessment.



## 2. Summary of findings

### 2.1. Groundwater modelling

The review of the groundwater study has found that the basis of the study is sound and appropriate methods have been adopted where possible. The review does however find a number of inconsistencies and omissions that require further detail/modelling to be reported/undertaken.

The groundwater modelling study has shown that the scheme is unlikely to have any significant impacts on groundwater. However, there is no discussion of the combined effect of several minor or insignificant changes on the system.

There is little in the way of cross referencing to the pluvial study or drainage strategy within the documentation, the findings of the groundwater study will have a direct impact on the other two studies.

**It is recommended that the groundwater findings are approved by Wiltshire Council with the condition that the recommendations for further reporting detail and modelling are carried out, and that the subsequent do not then cause detrimental changes to the groundwater regime.**

The detailed findings of the groundwater modelling review can be found in the A303 Groundwater review (5157973-ATK-ABD-ZZ-RP-EN-022).

### 2.2. Road drainage strategy

The review of the road drainage strategy documentation suggests that the strategy is still at a high-level concept stage further explanation of the design in several areas is required. However, the report contains a cross references to the other two studies.

The study reach has been broken down into three main constituents (west/tunnel/east) which helps to differentiate the different concepts being proposed.

The predominant drainage discharge strategy for the tunnel is by edge collection, carrier drain leading to a sump, then to be pumped to the surface and outfall to the surface water drainage network. The tunnel drainage system is independent from the other drainage networks (on the highway approaches to the tunnel).

Drainage treatment areas are proposed to attenuate the flow and act as pollution control. The report provides little information on their design or maintenance regime in order to be able to comment on their suitability or effectiveness. Several of these are located at distance from the carriageway however, there are no details of how the water will reach these isolated areas.

A number of crate storage systems are proposed as part of the design. However, such SuDS features are actively discouraged by Wiltshire Council due to maintenance liabilities and difficulties in accessing inside them. Alternatives for these need to be considered and discussed with Wiltshire Council.

**The approach of the road drainage strategy appears to be sound if a little lacking in detail at this stage of the study. It is proposed that the road drainage strategy is approved with condition that a number of recommendations and requirements are carried out (to provide more detail and confidence that the scheme can be maintained, will not adversely affect groundwater quality, or flood risk).**

The detailed findings of the road drainage strategy review can be found in Review of A303 A2BD road drainage strategy (5157973-ATK-ABD-ZZ-RP-EN-023).



## 2.3. Pluvial modelling

The review of the model and accompanying reporting shows that the study is generally sound, and the approach and discussion are easy to follow. There are however some items/queries that require further information or additional model runs. It is considered that if the recommended improvements are undertaken, the findings for the scheme scenario are likely to remain broadly similar. However, evidence is required to confirm this.

The model includes a 539m long culvert as part of the design which is contrary to Council policy on culverting. There are several perceived issues with the design of the culvert. However, there is no supporting evidence as to how this design is the best/most appropriate option or why other options are not viable.

The current model results for the scheme show that the modelled water levels are still rising at the end of the model run. The model results therefore do not therefore capture flood risk accurately.

There is an increase in flood risk due to the proposed scheme. However, the area of land affected is within the proposal outline boundary.

**It is recommended the Council object to the scheme on the current findings of the pluvial study given the scheme includes a 539m culvert which is against Council policy (alternatives should be found/discussed or reasons why there is no other option to this should be included). There are several errors in the model and there are requirements of further testing of the inputs (hydrology and antecedent conditions) and outputs. Should the recommendations of the review be implemented to rectify the above, and assuming the findings of the updated study does not increase flood risk, it is likely that the objection can be removed, and the scheme approved.**

The detailed findings of the pluvial modelling review can be found in A303 Pluvial Model (Parsonage Down) Review (5157973-ATK-ABD-ZZ-RP-EN-024).

## 3. Matters of concern

### 3.1. General

Although the various reports that have been reviewed contain some cross referencing, there is a perception when reading the reports that they have been undertaken as standalone studies. There is little explanation as to how similar approaches/data sets are utilised across the studies or highlighting where there may be inconsistencies. To approve the scheme there needs to be greater consideration of the combined effects and shortfalls in each stage of the design to ensure risks are highlighted and designed out.

Each of the reports would benefit from a section outlining the overall scheme and key constraints, or issues, with respect to other detailed studies being reported so that specific study can be contextualised.

### 3.2. Climate Change

The drainage infiltration systems are to be designed for 100yrs + 30% climate change increase in rainfall. However, the pluvial modelling of general surface water runoff allows for some 40% increase in rainfall (as per Environment Agency guidance<sup>1</sup>) because of climate change; whilst the groundwater study allows for increased recharge by 20%.

---

<sup>1</sup> Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities, Environment Agency, 2016



Given the independency between the three constituents in terms of flood risk and design, the approaches are inconsistent and there is no mention in the reporting that one approach may under or overestimate inputs to one or more of the other studies. These inconsistencies are required to be addressed or as a minimum discussed further to provide evidence that under/over estimating in one study will not influence other parts of the study.

### 3.3. Maintenance

Section 8 and Figure 8.1 of the road drainage strategy (REF 4) discusses typical maintenance of SuDS and drainage features, however there is no recognition or similar items in the pluvial study report as to how the 539m culvert would be maintained.

### 3.4. Increase in runoff

The current proposed design may lead to increased runoff from the Blick Mead catchment and from the Parsonage Down culvert to receiving watercourses. It is recognised that this is beneficial for the local archaeology, but this is against Wiltshire Council and Environment Agency policy where increased runoff should be managed or mitigated. The documents received do not contain information to show how this will be addressed.

## 4. Recommendations and requirements

### 4.1. Groundwater

To focus the approach and outputs, the recommendations are made in the detailed review (5157973-ATK-ABD-ZZ-RP-EN-022). In particular the below points should be addressed:

- The model would preferably be run for the full 1965-2016 run time for each of the revised baseline runs (the baseline run with revised calibration, the wet climate change run and the dry climate change run) and thorough comparisons made with the original Wessex basin model output and with observation/gauge data. The short period runs would be checked against these and output from the full runs used as starting heads for the short runs.
- Provide clarification of how the climate change approach is consistent with that used in other flood risk assessments (and ensure they are consistent).
- Use monitoring data comparisons to inform caveats to be applied to the use of absolute levels for flood levels or in scheme design. The model is likely to be more reliable for predicting changes in heads (and flows) rather than absolute levels. Modelling absolute levels in extreme events would particularly hold uncertainty. The predicted position of the water table in terms of depth below ground should be used with a degree of caution.

### 4.2. Drainage Strategy

Recommendations are made in the detailed review (5157973-ATK-ABD-ZZ-RP-EN-023) on requirements to give confidence in the approach and outputs. In particular the below points should be addressed:

- The infiltration systems are to be designed for 100yrs + 30% climate change. It is not explained whether the surface water runoff can be suitably conveyed to the discharge points i.e. to what return period the sizing of carrier pipes will be made.
- There is no confirmation as to flood risk posed to the proposed DTAs. This should be checked for both impact on the scheme and impact on surrounding land etc. It is likely that detail design will impact on existing overland flow routes.





Technical Note

- The ponds are intended to use a proprietary treatment system for treatment of water quality: it is unclear what systems might be employed here, where the full discharge is to ground. The details on how particulates (solids), hydrocarbons, and other chemical contaminants will be treated are not given. The proprietary treatment should attenuate all typical contaminants, giving sufficient residence time to achieve this.
- It is unclear what happens when the pond base blinds with sediment and infiltration is restricted, or where the design event is exceeded.
- The capacity of the network storage for pollution spills is not described.
- It is recommended that the DTAs are designed with a receiving forebay to be capable of hold such contaminated discharges before entering the infiltration zone.
- The use of a buried crate system for infiltration is not favoured by Wiltshire Council because of the maintenance liabilities and difficulties in accessing inside them. Highways England should provide details of how such systems will be maintained and make due consideration of risk to drainage whence they are not performing as per the design.
- No resilience measures are described for the pumped system in the tunnel. Consideration should be made to the event of power or mechanical failure, as may be more so expected during extreme rainfall.
- It is not clear why the DTAs in the western approaches are remote from the road.

### 4.3. Pluvial modelling

Recommendations are made in the detailed pluvial modelling review (5157973-ATK-ABD-ZZ-RP-EN-024) on activities to generate confidence in the approach and outputs. In particular the below points should be addressed:

- Sensibility/verification check of DDF modelling from FEH with local rainfall data (15-minute data should be available) which could affect design inputs to the model
- Further discussion and sensitivity testing of the  $C_{ini}$  value to be utilised in the project is required as the value is based on baseline catchment descriptors only.

There are several queries and items that are required to be answered or addressed from the hydraulics study:

- The TINS utilised to define the option topography should be better integrated with the underlying LIDAR. There appears to be a 1m difference/step at the interface of the baseline DTM and the proposed scheme
- There is conflicting information as to the design of the proposed culvert dimension which requires clarification/changes. There is no justification as to the dimension of pipe required and no sensitivity testing of results of difference sizes of culvert.
- The model is should be run for a longer simulation time as water levels are still rising at the current end-time of 10 hours. It will be important to test other storm durations, culvert sizes, (and model simulation length) to optimise the scheme.
- The study does not consider the risk of blockage of the proposed culvert. Culverting of watercourse is often opposed by councils and the Environment Agency as it is against many of the legal requirements set out in the Water Framework Directive (2003) that the quality of the watercourse should not be reduced. At 539m long and buried to up to 5m deep, the maintenance of such an asset would be extremely difficult and expensive should a repair be required.
- The proposals need to confirm who will own the culvert, who will be responsible for maintenance, what the maintenance regime will be.
- The proposals need to evaluate the resulting depth of flooding and flood hazard adjacent/across/downstream of the B3083 post scheme.

## **Appendix B**

### **Public Protection**

## **Air Quality and Noise Review**



Ricardo  
Energy & Environment

## A303 Amesbury to Berwick Down: Air quality and noise review

---

Report for Wiltshire Council

**Customer:****Wiltshire Council****Customer reference:****Confidentiality, copyright & reproduction:**

This report is the Copyright of Wiltshire Council. It has been prepared by Ricardo Energy & Environment, a trading name of Ricardo-AEA Ltd, under contract to Wiltshire Council dated 28/01/2019. The contents of this report may not be reproduced in whole or in part, nor passed to any organisation or person without the specific prior written permission of Wiltshire Council. Ricardo Energy & Environment accepts no liability whatsoever to any third party for any loss or damage arising from any interpretation or use of the information contained in this report, or reliance on any views expressed therein.

**Contact:**

Robert Benney  
Ricardo Energy & Environment  
Gemini Building, Harwell, Didcot, OX11 0QR,  
United Kingdom

**t:** +44 (0) 1235 75 3731**e:** Robert.Benney@ricardo.com

Ricardo-AEA Ltd is certificated to ISO9001 and ISO14001

**Author:**

Mark Broomfield, Robert Benney

**Approved By:**

Dr Mark Broomfield

**Date:**

20 February 2019

**Ricardo Energy & Environment reference:**

Ref: ED11464117- Issue Number 3

---

## Executive summary

Ricardo Energy & Environment was commissioned by Wiltshire Council to carry out a critical review of the information relating to an air quality assessment, and a noise & vibration assessment undertaken in support of the A303 Amesbury to Berwick Down improvement.

### **Air quality**

The issues identified with regard to the air quality aspects of the planning application were tabulated and prioritised. A recommendation is provided in respect of each issue identified.

It was found that the consultant has considered relevant guidance for this air quality assessment, and the study conclusions are generally supported by the evidence provided. The key exception to this is that the Environmental Statement did not provide an adequate assessment of air quality impacts in the nearby Air Quality Management Areas (AQMAs). During the construction and operational phases AQMAs are at risk of adverse air quality impacts due to through traffic. Consequently, there was an apparent risk of significant adverse impacts on AQMAs, which would not comply with relevant national and local policy.

Further information provided by the Applicant includes; the information which was missing or inconclusive in the Environmental Statement, and has further clarified points which appeared to indicate potentially significant adverse impacts in Wiltshire's AQMAs.

One issue of "moderate" significance was identified, relating to the potential impact of vehicles carrying tunnel arisings if these materials cannot be reused at the proposed development site. It is recommended that Wiltshire Council should propose a DCO Requirement to ensure that no such impacts arise in practice. This DCO requirement could also include an obligation to reassess emissions from construction equipment, when details of the equipment to be used have been confirmed.

### **Noise and vibration**

A wide range of potentially relevant issues were reviewed and discussed with the Applicant's specialist consultant.

It is concluded that the consultant has considered the relevant policy and guidance for the noise assessment, and the study conclusions are generally supported by the evidence provided.

A number of matters which should be dealt with by setting requirements under the DCO process were identified. Suggested wording for requirements to deal with the following matters was provided.

- External road traffic noise
- Construction Environment Management Plan
- Limit on construction plant noise

Wiltshire Council may also wish to propose requirements relating to:

- Piling
- Floodlighting

## Table of contents

<b>1</b>	<b>Introduction</b> .....	<b>1</b>
1.1	Air quality.....	1
1.2	Noise and vibration.....	1
<b>2</b>	<b>Air Quality Review</b> .....	<b>2</b>
2.1	Documents Reviewed .....	2
2.2	Review of air quality issues .....	2
<b>3</b>	<b>Noise and vibration review</b> .....	<b>9</b>
3.1	Overview of scheme and layout .....	9
3.2	Policy review.....	9
3.3	Standards .....	12
3.4	Operation noise (road scheme).....	13
3.4.1	The Noise Model .....	13
3.4.2	Receptors .....	13
3.4.3	Mitigation Design.....	13
3.4.4	Cost-Benefit Analysis .....	14
3.4.5	Noise Barrier & Cladding Specification Requirements.....	14
3.4.6	Noise Barrier & Cladding Specification Requirements under CPR.....	14
3.5	BSEN 14388:2005: Specifications .....	15
3.5.1	Claddings under CPR.....	15
3.5.2	Noise Barriers under CPR.....	15
3.6	Timescales to produce detailed specifications .....	15
3.7	Outline Environment Management Plan .....	16
3.8	DCO Requirements .....	16
3.8.1	Road Traffic Noise External .....	17
3.8.2	Construction Environment Management Plan.....	17
3.8.3	Plant Noise – dBA Limit.....	17
3.8.4	Piling.....	17
3.8.5	Floodlighting (additional recommendation) .....	17
<b>4</b>	<b>Conclusions</b> .....	<b>18</b>
4.1	Air quality.....	18
4.2	Noise .....	18

### Appendices

Appendix 1: AECOM Infrastructure & Environment UK Limited, “Memo: A303 Amesbury to Berwick Down: Air Quality Peer Review”, 11 February 2019

Appendix 2: Critical questions addressed in the noise review

Appendix 3: AECOM Infrastructure & Environment UK Limited, “Memo: Wiltshire County Council Noise and Vibration Peer Review Response to Tony Higgins queries”, 5 February 2019

---

# 1 Introduction

Ricardo Energy & Environment was commissioned by Wiltshire Council to carry out a critical review of the information relating to an air quality assessment, and a noise & vibration assessment undertaken in support of the A303 Amesbury to Berwick Down improvement.

## 1.1 Air quality

In order to carry out the air quality review, the issues identified with regard to the air quality aspects of the planning application were tabulated and prioritised. A recommendation is provided in respect of each issue identified.

The findings of this review are set out in Chapter 3, with overall conclusions in Chapter 5. Comments are rated as follows:

- High significance: potentially important for understanding the impact of A303 on the conclusions of the air quality assessment;
- Medium significance: important to be addressed; unlikely to alter understanding of A303 air quality assessment;
- Low significance: May be required for completeness;
- Advisory: Comment to assist the decision-making authority
- Editorial: Correction to the text – e.g. typographical error

## 1.2 Noise and vibration

To carry out the noise and vibration review, a review of the policy basis for the assessments was necessary. The noise impact assessment methods are based on national policy, and this informs the approach and the standards against which the compliance and mitigation measures have been assessed.

Following this, the following tasks were carried out for the assessment of noise and vibration:

- Overview of scheme layout and reality check
- Review of noise monitoring locations and data
- High level review of Noise report to consider approach, methods and defensibility of standards used.
- Review of OEMP and CEMP documents (where provided)
- In conjunction with the applicant's consultant – Review of acoustic model and input data to
  - Check modelled area
  - Evaluate data sets
  - Evaluate inherent model accuracy (particularly for key locations)
- Scrutiny of model outputs, scenarios and uncertainty
- In liaison with the council, identify and evaluate key locations of concern
- Review mitigation measures specified
- Identify any critical short fall areas

---

## 2 Air Quality Review

### 2.1 Documents Reviewed

Wiltshire Council has not requested an exhaustive review of all air quality assessments undertaken for this scheme. Wiltshire Council was particularly concerned to ensure that potential air quality impacts upon human health within nearby Air Quality Management Areas (AQMAs) from both operational and construction traffic have been properly considered and, if necessary, mitigated. Dust nuisance from construction activities has been excluded from this assessment.

Consequently, the following documents were reviewed as part of this appraisal.

- 6.0 Environmental Statement Non-Technical Summary
- 6.1 Environmental Statement Chapter 2: The Scheme
- 6.1 Environmental Statement Chapter 5: Air Quality
- 6.2 Environmental Statement Figure 5.1: Air Quality Study Area
- 6.3 Environmental Statement Appendices Appendix 5.2 Air Quality Methodology
- 6.4 Environmental Statement Appendices Appendix 5.4 Construction air quality and mitigation
- 7.4 Transport Assessment

Following discussion with Highways England's consultant, a memorandum was produced with additional information on the assessment of air quality impacts.<sup>1</sup> This document was reviewed alongside the documents listed above, and is added as Appendix 1 to this report. We recommend that our report together with the Highways Agency memorandum should be forwarded to the Planning Inspectorate for consideration.

### 2.2 Review of air quality issues

The consultant has taken into account all the relevant DMRB sections and associated interim advisory notes (IANs) for this air quality assessment, and the study conclusions are generally supported by the evidence provided. The exceptions to this are set out in the table below.

---

<sup>1</sup> AECOM Infrastructure & Environment UK Limited, "Memo: A303 Amesbury to Berwick Down: Air Quality Peer Review", 8 February 2019



**Table 1: Comments on A303 Air Quality Assessment report**

Document	Section	Ref.	Description	Significance	Recommendation
6.1 Environmental Statement Chapter 2: The Scheme	2.4.54	AQ1	<p>It is proposed to dispose of tunnel arisings by treatment followed by use in “essential landscaping” and “new habitat creation” (ES Chapter 2, paragraph 2.4.54). However, the new habitat creation proposal is not a confirmed option. No assessment was provided in the ES of the potential impacts on air quality (including dust) from transportation of up to 900,000 m<sup>3</sup> of material if it is necessary to dispose of this material off site. This assessment should identify the transportation route for vehicles carrying any arisings which cannot be re-used on-site, and should assess the impact of any such vehicle movements on air quality.</p> <p>The February 2019 memo<sup>1</sup> confirmed that a preliminary assessment of potential impacts associated with offsite disposal has been carried out. This found that there would be the potential for impacts within the Salisbury AQMA, and consequently further analysis and potentially mitigation would be required if tunnel arisings require offsite transportation. This should consider both vehicle exhaust emissions and potential impacts associated with transportation of dusty materials.</p>	Moderate	It is recommended that Wiltshire Council should propose a DCO Requirement, that an assessment of the air quality implications of transportation of tunnel arisings should be carried out prior to any offsite disposal. This should identify any potential impacts on residents in proximity to the proposed haulage routes, including locations within AQMAs, and identify appropriate measures to mitigate any potentially significant impacts.
6.1 Environmental Statement Chapter 5: Air Quality	5.3.2	AQ2	<p>As to be expected with a Highways England scheme, the assessment has followed DMRB and associated IANs methodology. Whilst this is best practice, IAQM land use and development control has a more sensitive threshold in identifying roads for assessment e.g. DMRB specifies there must be a 1,000 AADT change in total vehicles, whilst IAQM specifies an assessment threshold of 100 AADT change in light duty vehicles within an AQMA. The risk of using DMRB assessment thresholds is that small changes in air quality within areas sensitive to air quality may have been overlooked.</p> <p>The February 2019 memo<sup>1</sup> confirms that the 1,000 AADT threshold would be protective for assessment of potential impacts in the scheme opening year of 2026 and later. This has been confirmed by Ricardo on the basis of illustrative calculations.</p>	Low	Following receipt of further information from the applicant, no further action required

Document	Section	Ref.	Description	Significance	Recommendation
6.1 Environmental Statement Chapter 5: Air Quality	5.3.25	AQ3	<p>During the scoping stage, several consultees made reference to the need to include an assessment of potential impacts of the proposed development on air quality within nearby Air Quality Management Areas (AQMAs). However, despite undertakings set out in Table 5.4 (in response to Wiltshire Council comments 3, 4, 9, 13, 15; Public Health England comment 1), there was no discussion or quantitative assessment of air quality impacts in any nearby AQMA.</p> <p>This may reflect the fact that the traffic model was set up such that the Area of Detailed Modelling (AoDM) did not include any nearby AQMAs. If the AoDM had included the nearby AQMAs, there would have been the opportunity to carry out a detailed assessment of air quality in these areas. While it is now too late for this omission to be rectified, it is understood that traffic modelling carried out in the area outside the AoDM does provide reliable information on impacts in this area, including the nearby AQMAs.</p> <p>Further information provided in the February 2019 memo<sup>1</sup> confirms that no road links within AQMAs in Wiltshire would exceed the screening criteria, and consequently the proposed development is not forecast to have any significant effects on air quality within these AQMAs.</p>	Low	Following receipt of further information from the applicant, no further action required
6.1 Environmental Statement Chapter 5: Air Quality	5.5.2	AQ4	<p>The applicant has not carried out any detailed assessment of air quality within nearby AQMAs because the AQMAs do not lie within the Air Quality Study Area.</p> <p>The Air Quality Study Area is defined as “the Scheme, and those routes where the Scheme is predicted to have an impact (i.e. affected road network (ARN)).” The test for an impact from the scheme is based on criteria specified in the DMRB: “a) road alignment will change by 5m or more; or b) annual average daily traffic (AADT) flows will change by 1,000 or more; or c) heavy duty vehicles (HDV) flows will change by 200 AADT or more; or d) daily average speeds will change by 10km/hr or more; or e) peak hour speed will change by 20km/hr or more.”</p>	Low	Following receipt of further information from the applicant, no further action required

Document	Section	Ref.	Description	Significance	Recommendation
			<p>No details were provided in the ES of the application of these criteria to road links potentially affected by the proposed development, including road links located in nearby AQMAs.</p> <p>The February 2019 memo<sup>1</sup> provides details of forecast traffic changes on all the major road links within all AQMAs in Wiltshire. This information confirms that the proposed development would not result in increased traffic flows which would exceed the screening criteria, and consequently the proposed development is not forecast to have any significant effects on air quality within these AQMAs.</p>		
6.1 Environmental Statement Chapter 5: Air Quality	5.5.6	AQ5	<p>The ES states that ‘any potentially affected links beyond [roads that cross or are close to the AoDM] these further away from the area of detailed modelling and outside the Region of Focus (RoF)... are not explicitly modelled ...’ This appears to imply that substantial changes in the number of vehicles, fleet mix and speed may not have been captured. It would have been preferable for the AoDM and RoF to include the nearby AQMAs, as consultees had highlighted the importance of considering air quality impacts in AQMAs to Highways England.</p> <p>However, as noted in respect of AQ5, the February 2019 memo<sup>1</sup> provides details of forecast traffic changes on all the major road links within all AQMAs in Wiltshire. This information confirms that the proposed development would not result in increased traffic flows which would exceed the screening criteria, and consequently the proposed development is not forecast to have any significant effects on air quality within these AQMAs.</p>	Low	Following receipt of further information from the applicant, no further action required
6.1 Environmental Statement Chapter 5: Air Quality	5.9.23, Figure 5.1	AQ6	<p>ES section 5.9.23 states that the increase in NO<sub>2</sub> in Great Wishford during Construction Phase 1 is “due to an increase in AADT of approximately 1,600 vehicles (including approximately 20 HDVs) along the A36.” In the absence of any other information, it appeared likely that the impact of these vehicles would extend beyond Great Wishford, into Salisbury, passing through the Salisbury AQMA, Wilton Road AQMA Extension and London Road AQMA. Furthermore, Figure 5.1 (left hand insert)</p>	Low	Following receipt of further information from the applicant, no further action required

Document	Section	Ref.	Description	Significance	Recommendation
			<p>shows that there would be a potentially significant increase in traffic on the A360 between Salisbury and the A303 during Construction Phase 1, which halts at the boundary of the Area of Detailed Modelling. It appeared likely that this abrupt transition could be the result of a change in modelling methodology, rather than an actual change in traffic patterns. It was subsequently clarified that the change in traffic volume on the A360 between Salisbury and the A303 during Construction Phases 2 and 3 shown in the Inserts to Figure 5.1 was a predicted <u>decrease</u> in traffic during the Construction phases.</p> <p>In respect of the A36, the February 2019 memo<sup>1</sup> confirmed that an increase of 1,600 vehicles per day is forecast to occur on the section of the A36 between Stoford and the A303, i.e. north and west of Stoford during Construction Phase 1. However, while this required assessment, it is not in an Air Quality Management Area, and no significant impacts were forecast to occur in this area because baseline levels are lower</p> <p>In respect of potential impacts in the AQMA, the February 2019 memo<sup>1</sup> went on to clarify that “<i>this change is dispersed to below significant levels at the junction with the road leading to Stoford, resulting in a change of &lt; 1000 AADT along the A36 south of this junction (less than 600 AADT).</i>” The reason for the less significant changes in traffic flows on the A36 south of Stoford into the AQMAs was that the predicted increase on the A36 north and west of this point, between Stoford and the A303, is due to “<i>residents in the north of Salisbury select[ing] an alternate route to the north from the A360.</i>”</p>		
<b>6.3 Environmental Statement Appendices, Appendix 5.2 Air Quality Methodology</b>	<b>Table 5.2.4</b>	<b>AQ7</b>	<p>Only monitoring locations in rural locations, which predominantly represent free flowing road traffic have been included within model verification, this is considered representative for assessment along the A303. However, these locations are less representative of routes which pass through more built-up environments with slower moving traffic, such as Shrewton (relevant to construction traffic) or the AQMAs (relevant to construction and operational phase traffic).</p>	Low	<p>Separate verification for construction assessment would lead to a more representative adjustment factor. This should include Salisbury’s continuous analyser and other diffusion tubes in urban environments. This is not likely to be significant for areas with low background concentrations or a lack of</p>

Document	Section	Ref.	Description	Significance	Recommendation
6.3 Environmental Statement Appendices, Appendix 5.2 Air Quality Methodology	Table 5.2.1	AQ8	It is understandable that IAN 185/15 speed band emission rates would be used for this assessment. This is considered robust for the operational phase assessment given that the mix of euro standards is not known. However, there can be greater certainty on Euro standards for construction vehicles. This provides uncertainty around how robust these emission datasets will be for the actual construction vehicles proposed.	Low	sensitive receptors, but could be significant if remodelling of impacts within AQMAs is required.  To ensure that emission rates assumed for the construction vehicles are reasonably conservative, it is recommended that emission rates used should be compared with emissions from the actual construction vehicles proposed, as part of the ongoing assessment and management of construction phase impacts.
6.3 Environmental Statement Appendices, Appendix 5.1 Air Quality monitoring Data	General comment	AQ9	The monitoring data used in verification is based upon a short term survey undertaken between December 2015 through to June 2016, then adjusted to represent annual concentrations for 2017. It is recognised that this monitoring survey has been undertaken in accordance with LAQM.TG(16), whereby the method of monitoring and adjustment is acceptable. In particular, diffusion tubes were co-located at a continuous analyser to gauge diffusion tube accuracy. As the monitoring was carried out using diffusion tubes only, it does not contain more accurate long term datasets from continuous analysers. However, as the continuous analyser is in Salisbury, verifying the model using this dataset would result in an adjustment factor representative of urban environments, which would be unsuitable for other rural areas.	Low	Based upon the existing operational assessment study area, the scheme specific monitoring data is considered suitable. Should it be extended it is recommended that the continuous analyser in Salisbury is included in model verification.
6.3 Environmental Statement Appendices, Appendix 5.2 Air Quality methodology	5.5.7	AQ10	The ES Section 5.5.7 states that: “A qualitative discussion of these potentially affected wider road links away from the AoDM is provided in Appendix 5.2.” From discussion with the applicant’s consultant, it appears that this refers only to the discussion of wider road links on the A303 itself, further east and west from the proposed development (Appendix 5.2 para 5.5.6). In the light of the importance of impacts in AQMAs highlighted during the scoping consultation, further discussion of impacts at	Low	Following receipt of further information from the applicant, no further action required

Document	Section	Ref.	Description	Significance	Recommendation
			wider road links away from the AoDM in AQMAs should also have been provided. Further discussion of potential impacts in the Wiltshire AQMAs is provided in the February 2019 memo <sup>1</sup>		
<b>7.4 Transport Assessment</b>	<b>Figure 6-3</b>	<b>AQ11</b>	Figure 6-3 in the Transport Assessment shows a Change in Daily Traffic during the operational phase resulting from the Scheme of 1,600 AADT on the A360 southbound to/from Salisbury. In the absence of any other information, it appeared likely that the impact of these vehicles would extend beyond the AoDM along the A360 southwards into the Wilton Road AQMA. The February 2019 memo <sup>1</sup> confirms that the data from Figure 6-3 are relevant to the design year of 2041. The scheme opening year 2026 is of greater concern in relation to air quality impacts, and in this year, the forecast increase in traffic flows on the A360 would be below the criterion of 1,000 AADT.	Low	Following receipt of further information from the applicant, no further action required
<b>6.3 Environmental Statement Appendices, Appendix 5.2 Air Quality Methodology</b>	<b>No section</b>	<b>AQ12</b>	The air quality impacts of Countess Roundabout as a flyover were requested. Whilst there was no reference to modelling the A303 as a flyover, or an elevated emission source within the appendix or ES chapter. The predicted concentrations at the closest sensitive receptor, R75 within Appendix 5.3, Table A5.3, has a predicted concentration of 9.9 µg/m <sup>3</sup> with the scheme operational. This is from the sensitivity test, which applies conservative assumptions on emission improvements to vehicles in the future. The scheme contributes an additional 0.3 µg/m <sup>3</sup> of NO <sub>2</sub> to these concentrations. Ricardo have carried out some analysis on the effect of Countess Roundabout being modelled as an elevated source and conclude that it is likely to reduce concentrations. As there is a headroom of 30.6 µg/m <sup>3</sup> to the NO <sub>2</sub> air quality objective. Whether the flyover has been modelled as an elevated source or not is unlikely to change the conclusions of this assessment.	Advisory	No further action required.

## 3 Noise and vibration review

### 3.1 Overview of scheme and layout

The proposed scheme improves the road network for the A303 as it passes west from Amesbury and provides a bypass to the north of Winterbourne Stoke. The scheme includes the construction of a flyover at Countess Roundabout, north of Amesbury, a tunnel between Amesbury and Longbarrow, and a bypass to the north of Winterbourne stoke which involves construction of bridges across local roads and cuttings. A cloverleaf road junction immediately to the east of Winterbourne stoke is also proposed.

It is also proposed to construct 3 temporary works depots. One main depot at would be constructed at Longbarrow, and two satellite depots would be constructed at Winterbourne Stoke and Countess Roundabout.

The impact of noise and air quality on the scheme have been assessed in the submitted Environmental Statement (ES).

### 3.2 Policy review

National Policy Statement for National Networks 2014 addresses noise in paragraphs 5.186 – 5.200. These policy requirements and approach have been followed by the applicant and determining the potential impacts for the scheme. The applicable policy is a key requirement as it helps structure the approach to environmental assessment, identification of environmental standards and potential for mitigation.

The ES applies the policy requirements as follows:

- The NPSNN advises that the Secretary of State should not grant development consent unless satisfied that the proposals will meet appropriate standards, these are:
  - avoid significant adverse impacts on health and quality of life from noise as a result of the new development;
  - mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and
  - contribute to improvements to health and quality of life through the effective management and control of noise, where possible.
- The ES has addressed requirements of the NPSNN and other planning policy so as to ensure that statutory requirements for noise and local circumstances are taken into account. The approach has been to ensure impact assessment makes provision to ensure compliance with Noise Policy Statement for England, National Planning Policy Framework 2018 and the Government's associated planning guidance on noise. The ES has reflected the concepts of LOAEL, and SOAEL and has defined those terms in the context for the scheme. This is considered to be in line with policy requirements and addresses the broader requirements of the NPSNN noted above.
- The existing noise levels in the scheme area have been verified using an extensive monitoring and sampling regime. 10 fixed monitoring locations were selected in March and April of 2018 and are considered appropriate to characterise the current ambient noise levels in the areas, and to help verify the outputs from the constructed models. This approach is considered to be in line with policy.
- Road noise levels for the scheme, with respect to human receptors, have been assessed using a Soundplan noise model. The model uses the Calculation for Road Traffic Noise CRTN, and the Design Manual for Roads and Bridges methodologies to help determine impact. This is considered to be in line with policy requirements.
- Construction noise has been evaluated using CADNA noise modelling software. The basic approach is to calculate potential impacts at sensitive receptors based on predicted levels of construction activity, and likely scheduling. As the contractor has yet to be selected, final decisions on plant and activity levels have not been decided, so the model is a prediction using

BS5228:2009+A1(2014). This is considered to be in line with policy requirements. The scheme includes the installation of 3 construction depots.

- In respect of mitigation for the scheme, key locations and sensitive receptors have been identified and a suite of mitigation measures have been proposed. These include the full range suggested in the NPSNN guidance.
  - engineering: containment of noise generated;
  - low noise road surfaces;
  - distance separation between source and noise-sensitive receptors;
  - Barriers
  - Provision for noise insulation at key receptors is acknowledged but implementation of this likely to depend on the success of other measures
- The National Planning Policy Framework 2018 and associated Planning Policy Guidance provide additional help in describing the potential impact and assessment of noise. Both documents reference the LOAEL and SOAEL standards. Of particular use is the table from the guidance that helps provide a description of impact in plain English that may assist in deterring LOAEL and SOAEL as follows:

**Table 2: Extract from planning policy guidance**

Perception	Examples of Outcomes	Increasing effect level	Action
<b>Not Noticeable</b>	No effect	No observed Effect	No specific measures
<b>Noticeable and not intrusive</b>	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed Adverse effect	No specific measures
		Lowest Observed Adverse Effect Level	
<b>Noticeable and Intrusive</b>	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
<b>Noticeable and disruptive</b>	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
<b>Noticeable and very disruptive</b>	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Attempts have been made in the ES noise sections to provide descriptions of the potential impact of noise on receptors. For those receptors identified as potentially exposed to adverse or significant adverse noise associated with the scheme, subjective descriptions of the impact have been used to help identify relevant mitigation. This is considered to comply with the policy requirements.



- The Control of Pollution Act 1974 s.60 and 61 provide a mechanism for managing noise from construction sites. The method involves prior consent, where the contractors provides details of the intended works, plant required, timeframes, and proposed mitigation schemes and formally submits the information to the local Authority within whose area the construction is taking place. A consent document is then issued, normally with conditions limiting the consent, that provides clarity for the contractor as to what constraints are necessary to avoid noise nuisance. The approach most commonly used is to produce detailed Gantt charts providing details of the construction phrases, and then match that to source data provided by BS8233:2009+A1(2014). The British standard provides both a method for evaluation of noise impact, and a standard against which the performance can be measured. This is considered to be in line with general policy requirements.
- Wiltshire Council Local Plan (policy 57) has been considered. The local plan, whilst not directly relevant to a major infrastructure scheme advises that the development should ensures that “appropriate levels of amenity are achievable” for existing residential occupiers. This is considered to be consistent with the national policies, but also provides for the additional comfort of those likely to be affected by the scheme.

The table below summarises the policy requirements and identifies where these have been addressed in the ES.

**Table 3: Summary of compliance with policy requirements**

Policy	ES section	Comments
<b>National Policy Statement for National Networks 2014</b>		
• Noise Monitoring (pre-commencement)	6.4	10 locations sampled over a period of 2 weeks Weather data provided from a co-located station. Sampling confirmed to be in accordance with CRTN requirements.
• Prediction of traffic noise before, during construction and after scheme implementation	9.3	CRTN and DMRB models used LOAEL/SOAEL levels defined. Noise Insulation Regulations
• Construction noise	9.2	CADNA noise model used for key locations to determine impact. Control of Pollution Act 1974 prior consent recommended in ES
<b>National Planning Policy Framework</b>		
• Operational (Road Noise)		Compliance with LOAEL/SOAEL
• Construction Noise		Compliance with LOAEL/SOAEL
<b>Wiltshire Council Local Plan Policy 57</b>		
• All development		Compliance with amenity standards for sensitive receptors.
• Planning Policy Guidance		
• All development		Compliance with LOAEL/SOAEL

There is a caveat in demonstrating compliance criteria for infrastructure projects. By their nature, infrastructure projects are large and have the potential for significant disturbance. Most infrastructure project are of national or local significance. There is a balance to be drawn from good compliance for environmental emissions and the overall benefit of the scheme. This is highlighted within the DMRB guidance. It is normal for infrastructure projects to demonstrate compliance but only in so far as they meet the requirements of sustainable development. The standards noted below take this into account.

There are no significant policy omissions related to noise.

### 3.3 Standards

Significant Adverse Impacts as defined in the Noise Policy Statement for England are noted to be derived from noise impact standards recommended by the World Health Organisation these being:

- NOEL – No Observed Effect Level – the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise
- LOAEL – Lowest Observed Adverse Effect Level – the level above which adverse effects on health and quality of life can be detected.

The NPSE extends these concepts to provide a definition for significant observed adverse effect level.

- SOAEL – Significant Observed Adverse Effect Level – the level above which significant adverse effects on health and quality of life occur.

Each of the actual numerical standards used to quantify noise are compared against these metrics. This is considered to comply with the policy requirements.

Noise prediction using the respective models for road noise and construction noise has been based on the use of nationally accepted standards, as shown in the table below:

**Table 4: Use of national standards for road noise and construction noise and vibration**

Standard	Applicability	Reference												
World Health Organisation (WHO) Guidelines on Community Noise WHO guidelines for Europe	General	WHO long term exposure levels WHO short duration event level (night)												
BS5228:2009+A1	Construction	ABC method. Average LAEQ over based on level increases over residual. Additional protection for night time.												
ISO4866:2010 BS7385-2:1993	Construction	Vibration standards for damage to human response and damage to buildings.												
Scheme specific guidelines	General	9.3.40 – 9.3.41												
<table border="1"> <thead> <tr> <th>Impact level</th> <th>Day</th> <th>Night</th> </tr> </thead> <tbody> <tr> <td><b>LOAEL:</b></td> <td>50dB LAEQ,<sub>16hour</sub></td> <td>40dB LAEQ,<sub>8hour</sub></td> </tr> <tr> <td><b>SOAEL:</b></td> <td>68dB LA<sub>10</sub>,<sub>18hour</sub></td> <td>55dB LAEQ,<sub>8hour</sub></td> </tr> <tr> <td><b>Event Noise*</b></td> <td></td> <td>60dB LA<sub>max</sub></td> </tr> </tbody> </table>	Impact level	Day	Night	<b>LOAEL:</b>	50dB LAEQ, <sub>16hour</sub>	40dB LAEQ, <sub>8hour</sub>	<b>SOAEL:</b>	68dB LA <sub>10</sub> , <sub>18hour</sub>	55dB LAEQ, <sub>8hour</sub>	<b>Event Noise*</b>		60dB LA <sub>max</sub>		
Impact level	Day	Night												
<b>LOAEL:</b>	50dB LAEQ, <sub>16hour</sub>	40dB LAEQ, <sub>8hour</sub>												
<b>SOAEL:</b>	68dB LA <sub>10</sub> , <sub>18hour</sub>	55dB LAEQ, <sub>8hour</sub>												
<b>Event Noise*</b>		60dB LA <sub>max</sub>												
<b>Vibration Construction</b> PPV 1mms <sup>-1</sup> as Lower action level PPV 6mms <sup>-1</sup> Trigger level	Construction	9.8												
<b>Vibration (annoyance)</b> PPV 0.3mms <sup>-1</sup> as lower action level] PPV 1mms <sup>-1</sup> trigger level.	General													

The final derived site-specific guideline levels for the scheme are based on appropriate standards and reference methods. The only method not mentioned that may be relevant for fixed plant and the semi-permanent compound/dept areas is British Standard 4142:2014, it is anticipated that this standard may be of assistance in predicting the impact of generators, batching plants, pumps etc.. For construction noise more generally the ABC method will provide a variable numerical limit for different locations within the scheme dependent on existing ambient noise levels.

Ideally the aim should be to meet the general requirements for noisy activities to ensure that noise levels do not exceed the nationally accepted standards, however, some activities will exceed these levels and potentially expose sensitive receptors to excessive noise. The assessments carried out identify those potentially at risk, and mitigation measures have been specified in these cases.

The specific assessment of impact and discussion of the mitigation measures are noted in the sections below for Operational (road noise) and OEMP (construction noise).

## 3.4 Operation noise (road scheme)

This assessment of the road traffic noise is based on the noise model. The model inputs and results have been reviewed and validated. Critical questions addressed in the operational noise review are set out in Appendix 2, with additional information provided by Highways England's noise consultant in Appendix 3.

The assessment of operational noise is summarised as follows:

### 3.4.1 The Noise Model

- Building of the Baseline Model used SoundPlan. This is an acceptable model.
- Building of the Do Minimum and Do Something Models for 2026 and 2041 has been confirmed.
- Assessment Methodology using DMRB for Operational Traffic which is acceptable.

### 3.4.2 Receptors

- As part of the demonstration all sensitive receptors were reviewed, and two sensitive receptors were examined in detail – M1 Ratfyn Road and C11 Bowles Henges. Both sensitive receptors were assessed for justification for the inclusion of noise mitigation. In both cases the mitigation design addressed the following:

### 3.4.3 Mitigation Design

- Where impact assessment determined that noise levels exceeded action level criteria, the determination of mitigation measures was addressed and the following mitigation measures identified:

#### 1. Road Resurfacing

All new road surfaces (both HRA and thin surfacing) are assumed to perform as typical values over the lifetime of the surface in accordance with DMRB guidelines for the design life of the scheme. DMRB does allow for a reduction for thin road surface performance based on age but the decision was taken not to include for this. As such there is a potential for long term under estimate of the potential adverse impacts at key receptors

#### 2. False Cutting

All false cutting have been maximised in terms of levels to ensure that landscape and noise benefits align.

#### 3. Noise Absorptive 'Finishes'

AECOM used a 'Tunnel' modelling simulation within SoundPlan which is European Standard based as a 'bolt-on' to the CRTN model. This optimised the model to determine the tunnel absorptive treatment length as 85m and provided an absorptive acoustic cladding finish characteristic which is given in Appendix 9.3.

#### 4. 1.8 High Noise Absorptive Barriers

The use of Transparent barriers as a means to raise the height of the barrier without being visually offensive can be considered at the detailed design stage. The barrier height is a compromise between acoustic benefit and visual design considerations. The use of barrier at on the flyover is noted to be of marginal acoustic benefit, but there is significant justification to include barriers at that location due to feedback from locals in a survey.

#### 5. Low Parapet

The low parapet wall is scheduled for inclusion on the South side of the River Till viaduct. The wall will have some beneficial effects by interrupting line of sight with the nominal sound sources, i.e. the road surface and engine noise. A higher barrier is not required to achieve

the desired sound level reductions and would be adversely intrusive in terms of visual impact.

### 3.4.4 Cost-Benefit Analysis

- Any mitigation measures are required to demonstrate value. The sustainable development aspect of new planning consent requires that the approach to mitigation is demonstrated to be cost effective. The cost benefit of the mitigation measures (in particular the noise barriers) is required to be robust. The applicant used a Smart Motorways Worksheet that incorporated aspects of WebTag. Webtag is an acceptable method for demonstration of the effectiveness of acoustic barriers. The Worksheet was comprehensive though the pricing per linm figures would have been based on standard Highways England figures and may not have been directly relevant to the barriers proposed for this scheme.
- The justification for the inclusion of barriers was not purely based on its acoustic benefit therefore the cost-benefit figures need to incorporate justifications derived from visual impact and social need. It was agreed that the barriers should be included at the request of locals polled in a survey. The cost benefit analysis was not referred to in the Appendix 9: Noise & Vibration report but the inclusion needs to reflect the desires of local people.

### 3.4.5 Noise Barrier & Cladding Specification Requirements

- DMRB does not require specification details for barriers and cladding at the outline stage, though it was felt worthwhile to discuss and provide guidance on the way forward as the scheme develops (see below). Barriers are a fundamental means of achieving sound level reductions and will only be effective where properly specified. The modelling outputs for both noise models provide a simplistic view of barrier performance and tend to over estimate barrier effects unless the specification is robust. The guidelines noted below are intended to provide comfort that the barriers specified will achieve the desired outcome

### 3.4.6 Noise Barrier & Cladding Specification Requirements under CPR

- The applicant has identified the location dimensions and type of noise barriers and noise cladding treatment on the A303 Amesbury to Berwick Down scheme. At the ES stage there is not a requirement under DMRB to detail the performance specification for the barriers or cladding. However, since budgets normally start to be formulated at a relatively early stage of a project, it is important that enough specification detail is provided to ensure that there is no confusion and no budgetary 'surprises' at a later contractual stage that might mean that budgets have to be changed. CPR is a legal requirement and contract specifications shall adhere to it completely and without ambiguity. With this in mind, the text below should be used to inform the specification of the proposed noise barriers and cladding going forward.
- In ES Chapter 06 Noise & Vibration Chapter 9.8 – Design, mitigation and enhancement measures, the proposed barriers and cladding to mitigate the noise of Operations are described in para 9.8.14 as follows:

9.8.14 d)

*The use of a noise absorbent finish at the entrance/exit of the tunnel and Green Bridge Four, further details are provided in Appendix 9.3: (Table 2.1) has been specified and acoustic enhancement is included in the modelled data based on:*

*Table 2-1 details the absorption coefficient assumed for the entrance/exit of the tunnel and green bridge 4. This is based on typical tunnel sound absorbing treatment contained within the noise modelling software*

**Table 2-1: Absorption coefficient assumed for the entrance/exit of the tunnel and green bridge 4**

Frequency range (Hz) absorption coefficient			
<160	160-400	500-1600	>1600
0.15	0.50	0.80	0.65

#### 9.8.14 g)

*Inclusion of 1.8m high absorptive noise barriers between the slip roads on both the north and south side of Countess flyover; and*

#### 9.8.14 h)

*Inclusion of a 1.5m high solid parapet on the south side of the River Till viaduct.*

*Also for Enhancement:*

#### 9.8.15

*The surface finish of the retaining wall at the approaches to the tunnel portals and at Countess flyover (above the earthworks) would be designed to reduce the reflection of noise (details to be agreed).*

## 3.5 BSEN 14388:2005: Specifications

BSEN 14388 is the harmonised standard addressing performance characteristics, test methods, evaluation of conformity and CE marking for 'road traffic noise reducing devices'. This includes for noise barriers and for cladding (in BSEN 14388:2005 'cladding' is defined as a noise-reducing device, which is attached to a wall or other structure and reduces the amount of sound reflected). This standard covers all the test standards for acoustic and non-acoustic performance and for durability of performance.

The current and only legally enforceable edition of the Standard in the UK is BSEN 14388:2005. This is the version referenced in the European Journal. (A further version was published as BSEN 14388:2015 in the UK, however this has been rejected by the European Commission's harmonisation assessment and cannot be used for CE Marking. It is also not referenced in the European Journal).

### 3.5.1 Claddings under CPR

Claddings in the applicant's report are described above as a noise absorbent finish at the entrance/exit of the tunnel and Green Bridge Four, and as a surface finish of the retaining wall at the approaches to the tunnel portals and at Countess flyover (above the earthworks).

There is a requirement under CPR (Construction Products Regulation) to ensure that claddings are correctly specified to be CE Marked with a DoP that confirms with the harmonised Specifications Standard (which is currently BSEN 14388:2005). Any detailed specification should comply with these requirements in order to validate predicted results in the Soundplan model.

### 3.5.2 Noise Barriers under CPR

Noise Barriers in the applicant's report are identified between the slip roads on both the north and south side of Countess flyover.

There is a requirement under CPR (Construction Products Regulation) to ensure that noise barriers are correctly specified to be CE Marked with a DoP that confirms with the harmonised Specifications Standard (which is currently BSEN 14388:2005). Any detailed specification should comply with these requirements in order to validate predicted results in the Soundplan model.

## 3.6 Timescales to produce detailed specifications

Detailed specifications for the noise barrier and cladding are likely to be produced in within the next few months. This is important because in that timescale it is highly unlikely the updated version of BSEN 14388 will be published and harmonized.

Work is at an advanced stage on a new version of BSEN 14388 which is now close to publication. This version will come with considerable modifications to the test standards it contains. It is likely that the specifications will be produced after summer of 2019, there is a growing possibility that a new version of BSEN 14388 will have been harmonized by then. It will then be immediately enforceable.

It is therefore important that when barrier are specified those involved will:

- Be familiar and experienced in using BSEN 14388:2005

- Be familiar with potential changes to BSEN 14388
- Keep track with the European Journal to ensure they are referring to the current version of BSEN 14388.

## 3.7 Outline Environment Management Plan

The Outline Environment Management Plan (OEMP) section 6.3, Appendix 2.2 has been reviewed.

The plan provides the strategic framework for environmental management of the project. Of necessity it is a strategic approach and the detailed compliance arrangements cannot be provided as these will need to be developed with contractors carrying out the work once plant, equipment and time frames are established.

The approach suggested is that the OEMP will be an overarching document that sets appropriate strategic aims which all contractors carrying out work will adopt.

The plan also puts in place a firm management structure that clearly outlines responsibility and management structures.

The OEMP advises that the responsibility for implementing the environmental controls for noise will be via a site-specific Noise and Vibration Management Plan (NVMP), prepared as part of the wider Construction Environment Management plan (CEMP). The principle contractor will be responsible for ensuring compliance with the OEMP and CEMP's (see section 9.8 of ES). The principal contractor is also responsible for monitoring the work to ensure compliance with the targets.

The CEMP's and the NVMP's produced are anticipated to address the local conditions, and properly evaluate potential impacts once details of the construction are known. Any CEMP produced should by definition address the following:

- A list of tasks to be completed
- Task method statements including plant lists
- Durations of tasks
- Identify local receptors (based on potential impact of tasks)
- Assessment of impact using standards identified above
- Identification of mitigation measures
- Compliance monitoring

A complaint management system is included as part of the OEMP. Complaint management is a necessary part of contract management. The complaint management procedure anticipates that non-compliances with the CEMP's are addressed promptly. There should also be an escalation procedure to ensure that urgent action can be taken.

The issuing of prior consent applications under section 60/61 Control of Pollution Act 1974 for noise and vibration control are a fundamentally a sensible approach toward ensuring appropriate standards are met, however, from a regulatory standpoint there are issues:

1. Prior consent requires a local authority to determine an application made by the contractor. The level of detail and the time taken to determine consents may be a constraint.
2. Issued consents normally struggle to address short duration events and evidence a lack of flexibility to change the method of control or update the consent in light unforeseen circumstances, adding to delay and potentially causing 'breaches' of the consent.

It is recommended that the paperwork for the prior consent process for evaluation of the impacts and methodology should be followed, but no formal submission should take place. The paperwork would equate to a BPM assessment that the local authority would take into account during the investigation of any complaint made.

## 3.8 DCO Requirements

Following review of the documents it is clear that some elements of the scheme will require additional evaluation prior to implementation.

---

The following DCO Requirements are recommended:

### 3.8.1 Road Traffic Noise External

A scheme of mitigation shall be submitted to and approved in writing by the Local Authority to provide that the maximum change in traffic noise level for sensitive receptors exposed to external road traffic noise shall not create a significant adverse impact as defined in 9.3.39 – 9.3.43, 9.3.51, 9.3.52 of the Chapter 9 of the Environmental Statement.

Any scheme of noise mitigation as approved shall be constructed in its entirety as soon as reasonably practicable in pursuance of the scheme and shall be retained thereafter in perpetuity.

Reason: To ensure that the amenities of future occupiers are protected.

### 3.8.2 Construction Environment Management Plan

No development, (including construction, land raising and demolition if required) shall be carried out other than in accordance with a Construction Environment Management Plan (CEMP) that is first submitted to, and approved by, the local authority.

Reason: In the interests of prevention of pollution and protection of residential amenity.

### 3.8.3 Plant Noise – dBA Limit

The rating level of the noise emitted from fixed plant located at the service buildings at the tunnel portals and the fixed plant at the compound areas the site shall not exceed 0 dBA at any residential property when measured and corrected in accordance with BS 4142: 2014.

Reason: In the interests of prevention of pollution and protection of residential amenity.

### 3.8.4 Piling

The following requirement may be useful in securing avoidance of complaint, but it may also be prohibitive. It might be that an informal agreement in respect of piling is more applicable.

Notwithstanding the requirements of the any submitted CEMP, construction work involving piling shall normally be carried out on the site between the hours of 10.00hrs and 16.00 Mondays to Fridays and no construction work involving piling shall be carried out on Saturdays, Sundays or Bank Holidays, unless otherwise first agreed in writing by the Local Authority.

Reason: In the interests of prevention of pollution and protection of residential amenity.

### 3.8.5 Floodlighting (additional recommendation)

*[Whilst not part of the noise review, construction sites often have lighting provision. The following requirement may be useful in ensuring that lighting is not intrusive or problematic.]*

Prior to the installation of the any floodlighting scheme for depot areas, full details shall be submitted to and approved in writing by the Local Authority, details to be provided shall be:

Light into neighbouring residential windows generated from the floodlights shall not exceed 5 Ev (lux) (vertical illuminance in lux) without the express consent of the local authority.

Each floodlight must be aligned to ensure that the upper limit of the main beam does not exceed 70 degrees from its downward vertical.

The floodlighting shall designed and operated to have full horizontal cut-off and such that the Upward Waste Light Ratio does not exceed 2.5%.

The submitted scheme shall include an isolux diagram showing the predicted illuminance in the vertical plane (in lux) at critical locations on the boundary of the site and at adjacent properties.

The approved scheme shall be implemented prior to first use of the lighting and be permanently maintained in that state thereafter.

Reason: In the interests of prevention of pollution and protection of residential amenity.

---

## 4 Conclusions

### 4.1 Air quality

It is concluded that the consultant has considered the relevant guidance for this air quality assessment, and the study conclusions are generally supported by the evidence provided. The key exception to this is that the Environmental Statement does not provide an adequate assessment of air quality impacts in the nearby Air Quality Management Areas which are at risk of adverse air quality impacts due to additional traffic passing through these AQMAs during the construction and operational phases. Consequently there was an apparent risk of significant adverse impacts on Air Quality Management Areas, which would not comply with relevant national and local policy.

Further information provided by the Applicant<sup>1</sup> now includes the information which was missing or inconclusive in the Environmental Statement, and has further clarified points which appeared to indicate potentially significant adverse impacts in AQMAs in Wiltshire.

One issue of “moderate” significance was identified (AQ1), relating to the potential impact of vehicles carrying tunnel arisings if these materials cannot be reused at the proposed development site. In order to address this issue, it is recommended that Wiltshire Council should propose a DCO Requirement, that an assessment of the air quality implications of transportation of tunnel arisings should be carried out prior to any offsite disposal. This should identify any potential impacts on residents in proximity to the proposed haulage routes, including locations within AQMAs, and identify appropriate measures to mitigate any potentially significant impacts. This DCO requirement could also include an obligation to reassess emissions from construction equipment when details of the equipment to be used have been confirmed (AQ8).

### 4.2 Noise

It is concluded that the consultant has considered the relevant policy and guidance for the noise assessment, and the study conclusions are generally supported by the evidence provided.

A number of matters which should be dealt with by setting requirements under the DCO process were identified. Suggested wording for requirements to deal with the following matters is provided in Section 3.8 of this report.

- Road Traffic Noise External
- Construction Environment Management Plan
- Plant Noise – dBA Limit

Wiltshire Council may also wish to propose requirements relating to:

- Piling
- Floodlighting



## Appendices

Appendix 1: AECOM Infrastructure & Environment UK Limited, "Memo: A303 Amesbury to Berwick Down: Air Quality Peer Review", 11 February 2019

Appendix 2: Critical questions addressed in the noise review

Appendix 3: AECOM Infrastructure & Environment UK Limited, "Memo: Wiltshire County Council Noise and Vibration Peer Review Response to Tony Higgins queries", 5 February 2019

---

Appendix 1: AECOM Infrastructure & Environment UK Limited, “Memo: A303 Amesbury to Berwick Down: Air Quality Peer Review”, 11 February 2019

**To: Mark Broomfield**  
A303 Amesbury to Berwick Down: Air Quality  
Peer Review

**CC: Rachel Perryman; Robert Benney**

# Memo

**Subject:** Air Quality Peer Review

This memo addresses the air quality queries raised by Dr Mark Broomfield of Ricardo acting on behalf of Wiltshire Council including:

1. Basis for identifying the Air Quality Study Area;
2. Construction Phase 1 impacts on the Salisbury AQMAs;
3. Operation phase impacts on the Wilton Road AQMA Extension;
4. Impacts on the wider area outside the AoDM; and
5. Construction traffic impacts, if spoil cannot be distributed on nearby fields.

An additional query concerning why the A360 is affected to the north of Salisbury during the construction phases, but not further south within the Salisbury AQMA was latterly raised. A secondary query as to why the length of affected route along the A360 differs slightly between the two construction scenarios was also raised. This memo also addresses these points in Section 6.

## 1 Air Quality Study Area Selection

The air quality study area was determined through reference to a set of traffic modelling data from the A303 Stonehenge DCO Model. From this model data was processed for two areas. The first is called the Area of Detailed Modelling (AoDM) - 'the area over which significant impacts of interventions are certain' and as such the traffic model within this area is at its most detailed and traffic flows have calculated using a set of factors specific to this geographical area using scheme specific and Wiltshire Council traffic count data. Beyond the AoDM, the approach taken has been to progressively reduce model detail with distance from the AoDM, retaining greater accuracy near the boundary of the AoDM where there may be impacts.

Outside the AoDM data was mainly sourced from an enhanced version of the South West Regional Transport Model (SWRTM), specifically from within a Region of Focus (RoF) for SWRTM extending from Cornwall broadly to the A34 through Berkshire and Hampshire, together with traffic count data provided by Wiltshire Council and accordingly a different set of factors have been utilised to calculate traffic flows. These data have been primarily used in the calculation of emissions for regional calculations and greenhouse gases outside the AoDM, but has also been used in the detailed local air quality modelling where necessary as described below.

The local air quality study area within the available traffic data was then based on Highways England's Air Quality Guidance (HA207/07) presented in the Design Manual for Roads and Bridges (DMRB). The criteria are as follows:

- Road alignment will change by 5 m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicles (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speeds will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

Roads that are above criteria apply whether the resultant effect is expected to be a worsening or a benefit in pollutant concentrations. For example, where AADT flows increase by 1,000+, and where AADT flows decrease by 1,000+, those links will be included in the study area (known as the Affected Road Network (ARN)).

Specifically, the change in traffic flows within the AoDM for traffic was tested against these criteria for the:

- Operational phase;
- Construction phase 1; and
- Construction phase 2.

Where a road link was identified to have exceeded these criteria and there was a receptor within 200 m then the receptor was included in the detailed air quality modelling undertaken for the Scheme. Additional routes within 200 m of the receptor were also modelled to calculate total pollutant concentrations.

Where a significant road link crosses the boundary of the AoDM, and the significance criteria was considered to be a logical increase associated with the Scheme, then further detailed assessment was undertaken adjacent to the AoDM. In the operational scenario, this applies to the east of the Scheme along the A303 corridor; and to the west of the Scheme along the A303 corridor and the A36 (north of the A303 and north of AoDM); and in the construction scenarios in these locations and also to the north of the Scheme along the A360 (See response to question 4).

The affected road network is shown in Figure 5.1 (Air Quality Study Area) of the Environmental Statement for the operational phase and the two construction phases. The Figure is also appended at the rear of this memo. The Figure shows there are no roads leaving the AoDM along routes leading to AQMA.

The distances of all Wiltshire AQMAs from the Scheme, and air quality study area are shown in Table 1. In relation to Wiltshire AQMAs, these are all located outside of the AoDM, with the closest around 10 kilometres (km) from the Scheme. The closest AQMA is over 2.5 km from the air quality study area in any scenario.

**Table 1: Wiltshire Council AQMA Location Details**

<b>Wiltshire AQMA</b>	<b>Approximate Distance and Direction from Scheme (km)</b>	<b>Approximate Distance from Operational ARN (km)</b>	<b>Approximate Distance from Construction Phase 1 ARN (km)</b>	<b>Approximate Distance from Construction Phase 2 ARN (km)</b>
City Centre AQMA	10.8 (S)	9.3 (S)	3.5 (S)	4.3 (S)
Salisbury Wilton Road (A36) AQMA	10.3 (S)	8.6 (S)	2.7 (S)	3.4 (S)

Wiltshire AQMA	Approximate Distance and Direction from Scheme (km)	Approximate Distance from Operational ARN (km)	Approximate Distance from Construction Phase 1 ARN (km)	Approximate Distance from Construction Phase 2 ARN (km)
London Road AQMA	11.0 (S)	9.6 (S)	4.0 (S)	4.7 (S)
Westbury AQMA	20.0 (NW)	10.7 (NW)	9.9 (NW)	9.9 (NW)
Devizes AQMA	18.5 (N)	17.1 (N)	8.3 (N)	8.3 (N)
Bradford-on-Avon AQMA	31.3 (NW)	21.4 (NW)	19.8 (NW)	19.8 (NW)
Marlborough AQMA	24.9 (N)	24.2 (N)	21.8 (N)	21.8 (N)
Calne AQMA	27.3 (N)	26.4 (N)	17.6 (N)	17.6 (N)

The changes in traffic flows along the key routes through these AQMAs are presented in Table 2 below. The table indicates that as would be expected generally small changes in traffic flows are expected with the operation of the Scheme and small increases and decreases are predicted during both construction phases.

**Table 2: Annual Average Daily Traffic (AADT) Traffic Changes from the A303 Stonehenge DCO Model in Wiltshire AQMAs**

Wiltshire AQMA	Traffic Changes Operational Phase (Opening Year (2026))	Traffic Changes Construction Phase 1 (2021)	Traffic Changes Construction Phase 2 (2024)
City Centre AQMA	-280 - A30 <10 - A345 -460 - A360 -100 - A36	+160 - A30 +260 - A345 -40 - A360 -70 - A36	+10 - A30 +150 - A345 -230 - A360 -90 - A36
Salisbury Wilton Road (A36) AQMA	-460 - A360 -100 - A36	-40 - A360 -70 - A36	-230 - A360 -90 - A36
London Road AQMA	-280 - A30 - 350 - A36	+160 - A30 + 290 - A36	+10 - A30 +20 - A36
Westbury AQMA	+60 – A350	+60 – A350	+50 – A350
Devizes AQMA	-140 – A360 -100 – A361	+60 – A360 -100 – A361	+20 – A360 +10 – A361
Bradford-on-Avon AQMA	-20 - A363 -70 - B3170	+10 - A363 - 40 - B3170	+10 - A363 - 80 - B3170
Marlborough AQMA	+100 – A345 -40 – A346	-10 – A345 -40 – A346	-20 – A345 -10 – A346
Calne AQMA	-10 – A4 -30 – A3102	+20 – A4 +20 – A3102	+10 – A4 -10 – A3102

Note: Flow changes rounded to the nearest 10 vehicles. AADT includes all vehicles (heavy and light). Phase durations currently anticipated are phase 1: 2021-2023 and phase 2: 2024-2026.

As all changes within the available traffic data for all Wiltshire AQMAs was well below the threshold, further consideration was not required.

In the later stages of the process once a principal contractor is appointed and further details are known of the construction phasing the likely changes in traffic in the wider area traffic changes will be reviewed to consider the risk of adverse effects on the Wiltshire AQMAs.

## **2 Construction Phase 1 impacts on the Salisbury AQMAs**

The construction phase traffic modelling captures a range of potential changes in traffic associated with additional worker trips to construct the scheme, deliveries and the traffic management, with the associated wider effects on traffic that this can cause.

An increase of approximately 1,600 vehicles along the A36 north of the junction leading to Stoford was predicted in Construction Phase 1. However, this change is dispersed to below significant levels at the junction with the road leading to Stoford, resulting in a change of < 1000 AADT along the A36 south of this junction (less than 600 AADT).

This change is primarily predicted in Phase 1 construction as residents in the north of Salisbury select an alternate route to the north from the A360, rather than heavy duty vehicles as much of the materials expected to be required at the site are expected to be transported along the A303 corridor. The above has been confirmed with the A303 traffic team in preparing this memo.

No other changes in traffic flows, composition in speeds above the DMRB criteria were predicted at any point further south along the A36, and therefore further consideration was not required in this area.

It is expected that any final transport arrangements for the construction phase, including consideration of AQMAs, will be dealt with through consultation with Wiltshire Council, as requested by Wiltshire Council in their relevant representation.

## **3 Operation phase impacts on the Wilton Road AQMA Extension**

Figure 6-3 in the Transport Assessment shows the changes in AADT resulting from the Scheme in the year 2041 (the design year). The air quality study area and detailed air quality modelling was carried out for 2026 (the opening year). This is because the opening year is considered to be the worst case and significant air quality effects would not be anticipated in 2041. Significant air quality effects would not be expected in 2041 because by then air quality is anticipated to have improved such that nitrogen dioxide concentrations are no longer above air quality objective values within Salisbury and AQMAs should not be required. This is due to improvements in vehicle emissions and background air quality. Improvements can already be seen from monitoring data (Wiltshire Council Annual Status Report, 2018) where within the Salisbury AQMA air quality is already within the air quality objective ( $40 \mu\text{g}/\text{m}^3$ ) in the vast majority of locations, including locations in the centre of the AQMA and some adjoining routes. In 2017 only 2 locations (P17/38 and P17/46) recorded concentrations of  $\text{NO}_2$  above the air quality objective for  $\text{NO}_2$ , with a maximum of  $46 \mu\text{g}/\text{m}^3$  recorded in a junction location.

Improvements over time can also be seen in the monitoring locations with the highest concentrations. For example at location P17/46 annual average  $\text{NO}_2$  concentrations were  $62 \mu\text{g}/\text{m}^3$  in 2013 with these having fallen to  $46 \mu\text{g}/\text{m}^3$  in 2017. This equates to a rate of reduction of  $4 \mu\text{g}/\text{m}^3$  per year. Whilst at the only other location exceeding the air quality objective (P17/38) the rate of improvement over this period is  $1 \mu\text{g}/\text{m}^3$  per year.

If the rate of improvement between the current situation continued into the future,  $\text{NO}_2$  concentrations will be well below the  $\text{NO}_2$  air quality objective. However, even allowing for a slower rate of improvement only a rate of improvement of  $0.3 \mu\text{g}/\text{m}^3$  per year would be required for concentrations of  $\text{NO}_2$  to be just below  $\text{NO}_2$  air quality objective in the design year of 2041, with a rate of reduction of  $0.4 \mu\text{g}/\text{m}^3$  to achieve a concentration well below the objective with  $36 \mu\text{g}/\text{m}^3$ .

Therefore, even if a change of more than 1% in NO<sub>2</sub> concentrations was caused by the change in traffic predicted for the design year this would be expected to occur at NO<sub>2</sub> concentrations below the NO<sub>2</sub> air quality objective. No significant effect would therefore occur.

In the opening year, changes in AADT along the A360 were well below 1000 vehicles, and no other changes in traffic flows, composition in speeds above the DMRB criteria were predicted at any point further south along the A360, and therefore further consideration was not required in this area.

#### **4 Impacts on the wider area outside the AoDM**

None of Wiltshire Council's AQMAs are predicted to experience changes in traffic greater than the DMRB air quality screening traffic criteria for any of the three scenarios considered in the ES (construction phase 1, 2 and opening year). Therefore no quantitative air quality assessment has been required in these AQMAs. This is discussed further in Section 1 and Table 2.

The only anticipated impacts outside of the AoDM that were not modelled were identified for the operational phase east and west of the AoDM (See Figure 5.1 (Air Quality Study Area) of the Environmental Statement) presented in Appendix A. This was based on both a logical extension of the ARN across the AoDM using traffic data from the AoDM and based on an indication of flow increase from the SWRTM occur along the A303 corridor and further north along the M3 Corridor.

The roads in the immediate area of the AoDM boundary were subject to an extension of detailed air quality modelling, as shown by the additional receptor points outside the AoDM. At these distances along a linear corridor this was considered to be appropriate as flows along this corridor of the strategic corridor performed well in the traffic model.

In the wider area traffic changes are less certain and so an additional risk based evaluation was undertaken to consider the risk of any wider air quality effects along this corridor.

This risk based assessment is presented in the ES Appendix 5.2, sub section 3.1, Paragraphs 3.1.5 to 3.1.14. This identified that at the year of opening that a significant air quality effect was unlikely in the opening year of 2026.

#### **5 Construction traffic impacts, if spoil cannot be distributed on nearby fields**

Off-site disposal of tunnel arisings is not planned and instead disposal is planned in the Parsonage Down area. See the A303 Amesbury to Berwick Down 6.3 Environmental Statement Appendices, Appendix 12.1 Tunnel Arisings Management Strategy, dated October 2018<sup>1</sup>.

To inform on the potential adverse impacts of an off-site disposal option a set of air quality predictions were undertaken using basic screening calculations for residential receptors. Potentially significant adverse effects are not anticipated to take place unless offsite disposal is undertaken for tunnel arisings taken to exclusively to Quidhampton Quarry. The specific receptor tested with a small change in air quality at concentrations above the NO<sub>2</sub> air quality objective was in the Salisbury AQMA at Grid Reference: 412604, 130663.

In the event that an off-site disposal option was selected further work would be undertaken to understand the potential air quality effects on sensitive receptors along the route. This would involve detailed air quality modelling techniques along worst case locations outside or within AQMAs.

#### **6 A360 Construction Phases 1 and 2**

The affected section along the A360 identified in Construction phases 1 and 2 relate to the route selection of vehicles making trips from the northern portion of Salisbury to avoid the potential delays associated with traffic management during these periods. As part of the traffic management

<sup>1</sup> This can be found at: [https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010025/TR010025-000438-6-3\\_ES-Appendix\\_12.1\\_TunnelArisingsStrategy.pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010025/TR010025-000438-6-3_ES-Appendix_12.1_TunnelArisingsStrategy.pdf).

in construction phase 1 vehicles will be diverted from the A360 to the A36. This contributes to the additional trips predicted along the A36 for Construction phase 1 (see Section 2). In Construction phase 2 this diversion will no longer be formally in place, but some vehicles are predicted to keep using this diversionary route as the A303 Winterbourne Stoke Bypass will only be a single lane at this point. These decreases in traffic flow are what makes these sections of road part of the ARN.

These reductions in traffic flows along the A360 are reflected in the modelled concentrations at R78 (Garage Cottage, Druids Lodge) in the construction phases. R78 is the receptor which was modelled as reflecting worst case exposure on the A360. In Construction phase 1, the concentration of NO<sub>2</sub> at this site is predicted to be 10.5 µg/m<sup>3</sup>, 0.6 µg/m<sup>3</sup> less than in the equivalent scenario without construction; and in Construction phase 2, the concentration of NO<sub>2</sub> at this site is predicted to be 10.1 µg/m<sup>3</sup>, 0.2 µg/m<sup>3</sup> less than in the equivalent scenario without construction.

Roads to the north of the centre of Salisbury are affected but not further south due to the differing routes that vehicles can take to reach the A36 diversion, and not due to the proximity of the centre of Salisbury from the AoDM.

In relation to the small variation in affected length of the A360 this variance reflects small variations in vehicle loading on to the traffic model network between the two construction scenarios, along with the differences in traffic diversions between the two scenarios (with more traffic diverted in phase 1).

The above has been confirmed with the A303 traffic team in preparing this memo.

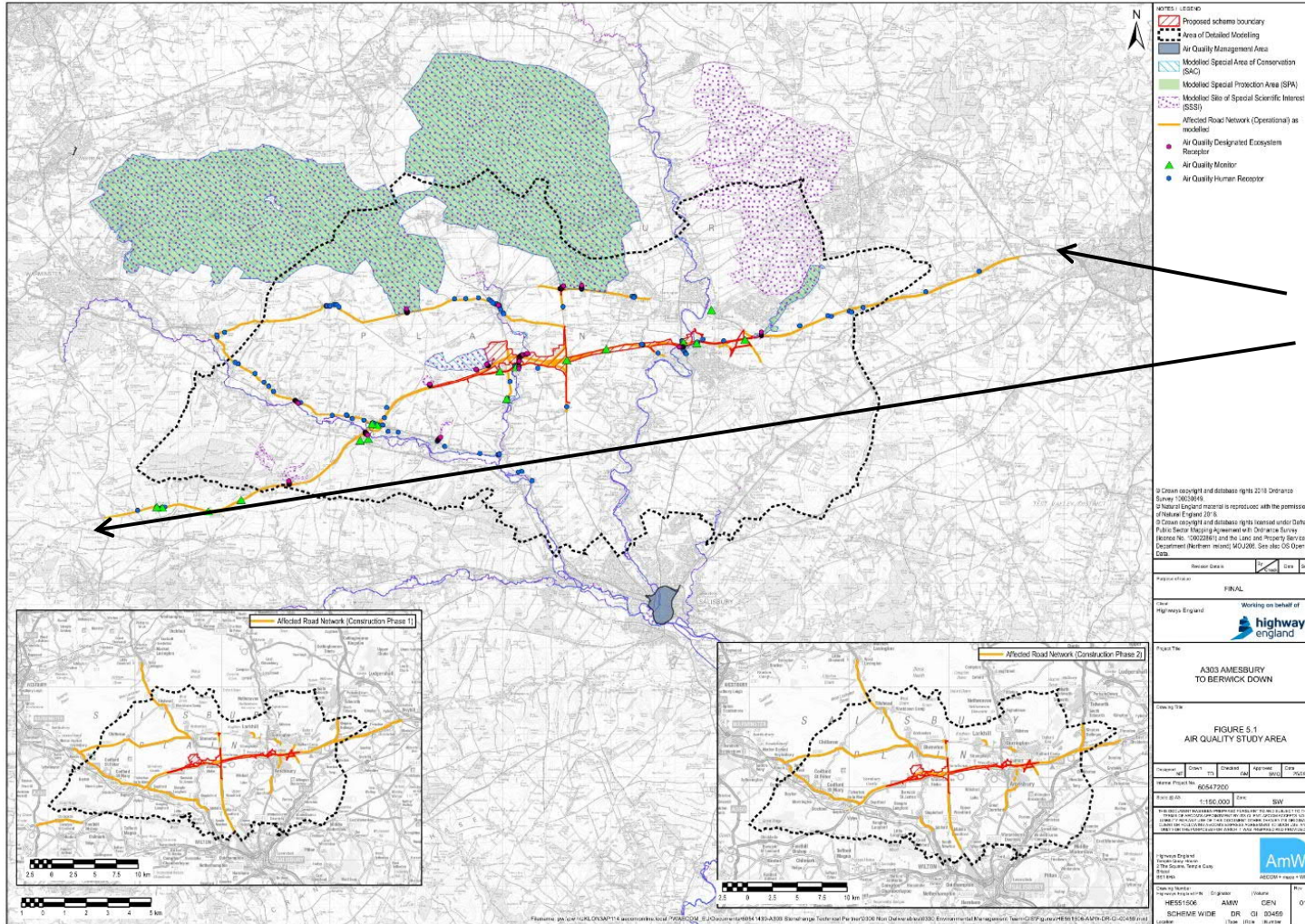
## **7 Summary**

In relation to Wiltshire Council AQMAs:

- No AQMA is anticipated to be affected by significant changes in traffic as no Wiltshire Council AQMA is within the Affected Road Network (see Figure 5.1, Appendix A) for either the operational or construction phase; and
- No off-site disposal is planned and if this did occur further assessment work would be undertaken.



## Appendix A: Air Quality Study Area Figure



The Orange layer shows the areas modelled with detailed air quality modelling. This includes affected routes meeting DMRB criteria and adjoining routes to calculate total pollutant concentrations.

The only exception to this is the A303 Corridor east and west of the AoDM which is affected beyond the extent modelled. This is discussed in the ES Appendix 5.2, sub section 3.1, Paragraphs 3.1.5 to 3.1.14.

No Wiltshire AQMAs are affected by the operational phase or the construction phases as shown by the absence of an orange route.

## Appendix 2: Critical questions addressed in the noise review

No.	Document	Reference	Question	Response
<b>N1</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.2.5 - Page 9-4	Have the NPSE - effect levels NOEL, LOAEL, SOAEL been used to assess the scheme as built and based on the design yr of the scheme - taken into account potential degradation of mitigation measures?	The noise modelling did not take into account any degradation of either structural mitigation measures (barriers, surface finishes or false cuttings) or road surfaces. They were all assumed to maintain as-new acoustic performance continuously.
<b>N2</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.3.1 - Table 92: 6.5.17 - Page 9-7	Figure 9.1 labels the 3 Noise Important Areas at M8 and nr M3, where is the 3rd?	All three Located in Figure 9.1
<b>N3</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.3.9 & 10 - Page 9-11 <u>Construction Noise</u>	The ambient noise levels are based on 2017 baseline traffic noise level and yet for phase 2, Winterbourne Stoke bypass, Longbarrow Interchange and Countess Roundabout flyover were operational, so were these also included in the ambient determination?	They were not included in the ambient determination for Phase 2. This was also based purely on the 2017 baseline traffic noise levels. However by doing this it was acknowledged that this does represent a worse case scenario.
<b>N4</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.4.3 - Page 9-21 <u>Assessment Assumptions</u> and Para 9.6.14 - Page 9-25 <u>Future Baseline</u>	Has the assessment included for the deterioration of road surface noise attenuation over the design life of the scheme? In other words is the analysis assuming that the noise difference in HRA to thin surfacing is continued unchanged to 2041?	All new road surfaces (both HRA and thin surfacing) are assumed to perform as new for the design life of the scheme. DMRB does allow for a reduction for thin road surface performance based on age but the decision was taken not to include for this.
<b>N5</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.6.2 - Page 9-23 <u>Baseline Conditions</u>	Has the age and condition and acoustic performance of the existing road surfacings - (inc thin surfacing) been taken into account?	Current existing road surfaces (both HRA and thin surfacing) are assumed to perform as new for the design life of the scheme. DMRB does allow for a reduction for thin road surface performance based on age but the decision was taken not to include for this.
<b>N6</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.8.1 - Page 9-32 <u>Design, Mitigation - Construction</u>	Has any predictive noise modelling been carried out in the calculation of the Construction process or is the being left entirely to the CEMP?	The work was split in the group between AECOM (Operational) and WSP (Construction). WSP used the software CadnaA to carry out the noise modelling for the Construction calculations. They have also produced the OEMP. One overlap: AECOM modelled the Construction Traffic using the BNL function in CRTN in their SoundPlan model.

No.	Document	Reference	Question	Response
<b>N7</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.8.14 (d) - Page 9-35 <u>Design, Mitigation - Operation</u>	(d) What would be the extent of the noise absorbent finish to the tunnel entrances and exits, how will this be specified? <i>There is a requirement under CPR (Construction Products Regulation) to ensure that noise claddings are correctly CE Marked with a DoP that confirms with the currently harmonised Specifications Standard (which is currently BSEN 14388:2005)</i>	AECOM used a 'Tunnel' modelling simulation within SoundPlan which is European Standard based as a 'bolt-on' to the CRTN model. This optimised the tunnel absorptive treatment length as 85m and provided an absorptive acoustic cladding finish characteristic which is given in Appendix 9.3. SBS Ltd will provide text regarding CE Marking and the Specification Standards requirements to BSEN 14388:2005 on the assumption that Specs will be finalised within the next few months.
<b>N8</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.8.14 (g) - Page 9-35 <u>Design, Mitigation - Operation</u>	(g) How will the 1.8m high absorptive noise barriers be specified? <i>There is a requirement under CPR (Construction Products Regulation) to ensure that noise barriers are correctly CE Marked with a DoP that confirms with the currently harmonised Specifications Standard (which is currently BSEN 14388:2005)</i>	SBS Ltd will provide text regarding CE Marking and the Specification Standards requirements to BSEN 14388:2005 on the assumption that Specs will be finalised within the next few months.
<b>N9</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.8.15 - Page 9-35 <u>Design, Mitigation - Enhancement</u>	(d) With regard to the noise absorbent finish to the portals to the tunnel approaches and at the Countess flyover, how will these be specified? <i>There is a requirement under CPR (Construction Products Regulation) to ensure that noise claddings are correctly CE Marked with a DoP that confirms with the currently harmonised Specifications Standard (which is currently BSEN 14388:2005)</i>	The absorptive acoustic cladding finish characteristic is given in Appendix 9.3. SBS Ltd will provide text regarding CE Marking and the Specification Standards requirements to BSEN 14388:2005 on the assumption that Specs will be finalised within the next few months.
<b>N10</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.9.30 - Page 9-41 <u>Assessment of Effects - Operations</u>	Are the Do-Something noise levels - AFTER the mitigation measures have been put in place?	Yes they are. In other words the Residual Significant Effects in Table 9.26 assumes all proposed mitigation measures are in place.
<b>N11</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.9.33 & 9.9.45 <u>Assessment of Effects - Operations</u>	Are the 22 properties - Foredown House, Church Street and High Street experiencing a significant adverse effect AFTER the mitigation measures have been put in place?	Yes they are. It reports that these properties will be subject to significant adverse effects with mitigation in place. This report openly concludes this stating that there is a potential to change residents response to traffic noise.

No.	Document	Reference	Question	Response
<b>N12</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.9.69 - Page 53 <u>Compliance with Policy</u>	Is NPSNN (a) complied with if there remain 22 properties that remain subject to significant adverse conditions?	S.Scott made reference to NPSNN para 5.195 which give the context of Government policy on sustainable development, as justification for the 22 properties that are still subject to significant adverse conditions.
<b>N13</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.9.81 - Page 55 <u>Compliance with Policy</u>	Transparent barriers are a common solution for elevated viaducts and flyovers. Were their use considered to minimise height. Also there could be a potential for combined absorptive transparent	The use of Transparent as a means to raise the height of the barrier without being visually adverse can be considered at the detailed design stage. Suffice to say the barrier height was a compromise between acoustic benefit and visual design considerations
<b>N14</b>	6.1 ES - Chapter 9 - Noise & Vibration - Oct 18	Para 9.9.85 - Table 9.26 - Page 57 <u>Residual Significant Effects</u>	Is the conclusion of the report that after the proposed mitigation measures have been put in place, there do remain properties with Significant Adverse Effects?	Yes they are. In other words the Residual Significant Effects in Table 9.26 assumes all proposed mitigation measures are in place. These properties are those likely to need insulation
<b>N15</b>	6.3 ES - Appendix 9.5 - Noise & Vibration Summary Effects - Oct 18	Table 1-2 - Page 1 <u>Operational Noise</u>	Is the conclusion of the report that after the proposed mitigation measures have been put in place, there do remain properties with Significant Adverse Effects?	Yes they are. In other words the Residual Significant Effects in Table 9.26 assumes all proposed mitigation measures are in place.
<b>N16</b>	6.3 ES - Appendix 9.3 - Noise Modelling - Oct 18	2 Modelling Assumptions : Table 2-1	Has the Absorption Coefficient for the entrance/exit of the tunnel included for cladding the tunnel entrance with absorptive cladding ? Typically this may be done for the first 50m.	Yes it has, this has been covered using the SoundPlan 'Tunnel' modelling simulation. This is discussed in (7) above, these properties are those likely to need insulation
<b>N17</b>	6.3 ES - Figure 9.1 - Noise Location Plan - Oct 18	Location M1 : Ratfyn Road	We examined the property on Ratfyn Road in closest proximity to the new carriageway. It was being considered for insulation measures. Were barriers or a false cutting considered as options here?	The primary limitation was that the scheme ends at exactly this point and there is no allowance for mitigation measures on land off the scheme.
<b>N18</b>	Chapter 9 9.1 – 9.2	<u>Compliance with Policy</u>	We examined the policy basis for the application. A critical challenge process was used to ensure all relevant policy has been considered.	No policy deficiencies were identified.

No.	Document	Reference	Question	Response
<b>N19</b>	Chapter 9 Standards 9.3	<u>Standards</u>	We examined the standards used to implant the policy. A critical challenge process was used to discuss the relevance of standards and review the possible uncertainty.	All standards agreed. It was noted that BS4142:2014 may be useful in supporting impact assessments for fixed plant and compound areas. It was noted the detailed CEMPs would address appropriate impact assessment.
<b>N20</b>	section 6.3, Appendix 2.2	<u>OEMP</u>	The OEMP has been assessed. Locations and activities in main and satellite compounds noted. It is accepted that there are significant unknowns.	The approach is agreed as sensible and realistic. Detailed assessments would be required once final determination of subcontractors is determined.  BS5228 approach has been accepted as appropriate. BS4142:2014 may enhance the assessment for semi-permanent activities such as pumps, fans, batching plants, movement of vehicles associated with overburden handling etc.
<b>N21</b>	Section 9.2	<u>Key locations (construction)</u>	Based on discussions with Wilshire Council, key locations for potential noise impact were identified. Based on discussions with WSP, worst case scenarios confirmed.	Results for closest receptors have been reviewed and validated based on CADNA model. Uncertainty noted. Detailed assessment required for locations adjacent to depot areas, and key activities such as piling. CEMP's to provide detail.
<b>N22</b>	N/A	Key locations (operational)	Based on discussions with AECOM, key locations were assessed against the reported compliance criteria	Properties identified to be at risk of noise exceedances.  Noted that those likely to be significantly affected are likely to be offered noise insulation or local barriers. E.g. Ratfyn Lane, local barriers unlikely to be effective, 1 property likely to need noise insulation. Detailed assessments may be required.

---

Appendix 3: AECOM Infrastructure & Environment UK Limited, “Memo: Wiltshire County Council Noise and Vibration Peer Review Response to Tony Higgins queries”, 5 February 2019

**To: Tony Higgins**

**CC: Alf Maneylaws**

# Memo


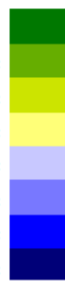
**Subject: Wiltshire County Council Noise and Vibration Peer Review Response to Tony Higgins quereis 05/02/19**

## General

Peer review query in black text, AECOM response in blue text. All construction related queries resolved through discussion and provision of compound location plan. Therefore, additional information below relates to traffic impacts only.

All provided results based on  $L_{A10,18h}$  façade at the top floor in the opening year 2024, DM (Do-Minimum) and DS (Do-Something).

Magnitude of impact of traffic noise changes based on DMRB criteria (see key below). Significance of effect and SOAEL/LOAEL based on approach detailed in Highways England MPI-71-07-2018 (and described in ES methodology).

Key for absolute noise levels	Key for noise levels change
 45 < <= 45 45 < <= 50 50 < <= 55 55 < <= 60 60 < <= 65 65 < <= 70 70 < <= 75 75 <	 < -4.9 Major decrease -4.9 <= < -2.9 Moderate decrease -2.9 <= < -0.9 Minor decrease -0.9 <= < 0.0 Negligible decrease 0.0 <= < 1.0 No change/Negligible increase 1.0 <= < 3.0 Minor increase 3.0 <= < 5.0 Moderate increase 5.0 <= Major increase

I am more interested in facades exposed to the proposed works, but we should identify any significant improvements on other facades. I note we discussed the **Amesbury High Street** and the slight increases for the front elevations. On reflection a selection of data from those affected properties (not many) would be appreciated so we can evidence that it is not significant and has been addressed.

Amesbury High Street (see extracts from noise model below)



Moderate/Major increases are predicted here at the front facades, and therefore a significant adverse EIA effect (though not a significant policy effect as below SOAEL). This is simply due to the closure of the existing access onto the A303 via Stonehenge Road and traffic therefore having to re-route. Obviously mitigation on Church St/High St itself is not feasible or practical therefore there is no sustainable mitigation for this effect. However, as discussed there are some factors which could be considered to reduce the significance of the effect, including the use of the  $L_{A10,18h}$  parameter and the 'low flow' correction in the CRTN method which amplifies the impact of small traffic changes at low flows. An  $L_{Aeq}$  based parameter would reduce the magnitude of the impact. As discussed given the level of concern/interest in the scheme a conservative approach which keeps the significant adverse effect in this location has been adopted. The sections below extracted from the ES discuss this in more detail:

9.9.35 *The impacts on Church Street/High Street in Amesbury are due to the closure of the existing access onto the A303 via Stonehenge Road, which occurs at the start of construction. This results in traffic from the South West in the Woodford Valley, which currently uses this access, rerouting via Church Street and High Street to the A345 to join the A303 at Countess Roundabout. Traffic originating on Stonehenge Road and Church Street, which currently accesses the A303 via Stonehenge Road, must also reroute to Countess. High Street is one way (northbound) and therefore traffic originating on High Street would continue to access the A303 via the A345 and Countess Roundabout as existing.*

9.9.36 *Traffic flows on Church Street/High Street are very low both with and without the Scheme. The greatest change is towards the north end of High Street where 18 hour weekday flows are just over 1000 in the 2026 Do-Minimum scenario rising to just under 1800 in the 2026 Do-Something scenario. The 'low flow' correction in the CRTN traffic noise prediction methodology amplifies the resulting magnitude of the noise change in such small flows, which combined with the slight increase in the percentage of HDVs and the very close proximity of the receptors to the road, results in a significant adverse effect.*

9.9.37 *The absolute traffic noise levels in this area are not unusual. In the 2026 Do-Minimum scenario traffic noise levels at the closest facades to the road are generally in the high 50 to low 60  $L_{A10,18h}$  dB range, rising to the low 60 to mid 60 dB range in the 2026 Do-Something scenario.*

9.9.38 *There is the potential for other noise sources associated with a High Street type environment such as shoppers, deliveries, pubs etc. to contribute to the overall ambient noise level, which would reduce the impact of the change in traffic noise levels. Some of the buildings on Church Street/High Street identified in the OS address base dataset as residential contain a mixture of uses e.g. pubs, hotels and shops. As a worst case approach the residential use is assumed to correspond to the façade experiencing the moderate/major increase in traffic noise.*

**Conclusion for Church Street/High Street**– worst affected façades moderate/major increases in traffic noise levels therefore identified as a significant adverse effect.

Comments noted and agreed. The absolute levels noted are not above triggers levels for NIR, although they are likely to be above WHO recommendations (noted the quoted figures are  $L_{A10}$ , the  $L_{Aeq}$  comparable figures will be lower). The existing levels in the area are high. the additional traffic is due to low traffic volumes and the noise level increase is therefore to be expected. Standard glazing already in place would likely reduce predicted levels sufficiently.



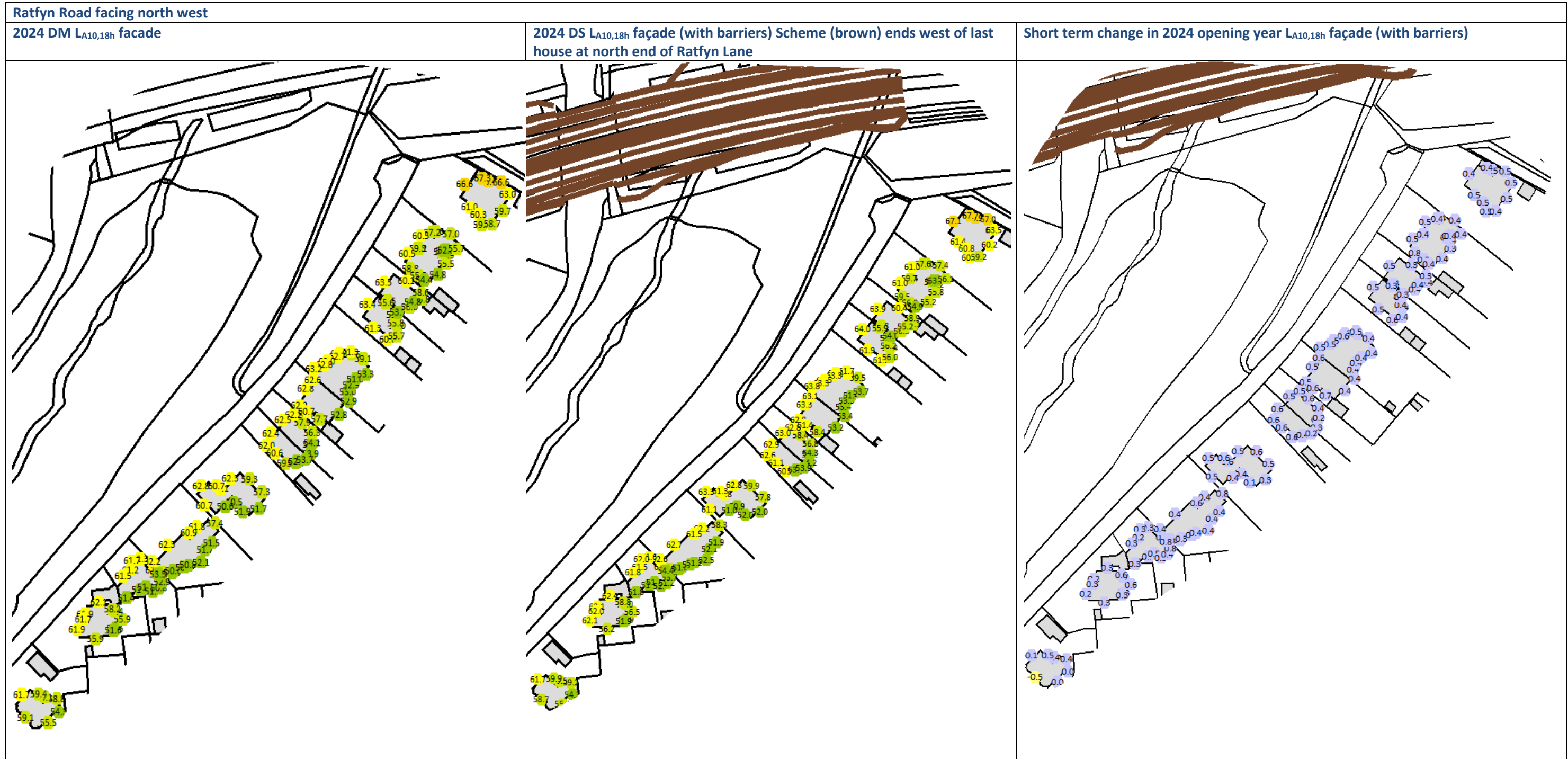
**M1 Ratfyn Lane, London Road,**

The primary property if the one closest to the highway, a selection of others heading towards London Road would be appreciated. The aim is to show which property is the worst case, and that the evaluation of impacts can be handled with key select locations

- All properties on Ratfyn Lane and those on London Road are a similar distance from the A303. The London Road properties are closer to the flyover, and may experience a greater level of impact. we need to confirm that impact level.
- The benefits of mitigation need to be clearly shown.
- Premises still exposed to significant adverse impact to be clearly identified.

As discussed, I anticipate that the output would be an excel table showing the data before the works, during (including construction) and after, as dB levels. This data to clearly reference appropriate standards (see comments later on standards). Any mitigation benefits or potential additional mitigation would be a useful inclusion.

**Ratfyn Road and London Road (see extracts from noise model below)**



Noted: the only significantly affected property is the first. All others show reducing levels of impact. and most show negligible change likely to be imperceptible.

**London Road and Lords Croft facing north-west**

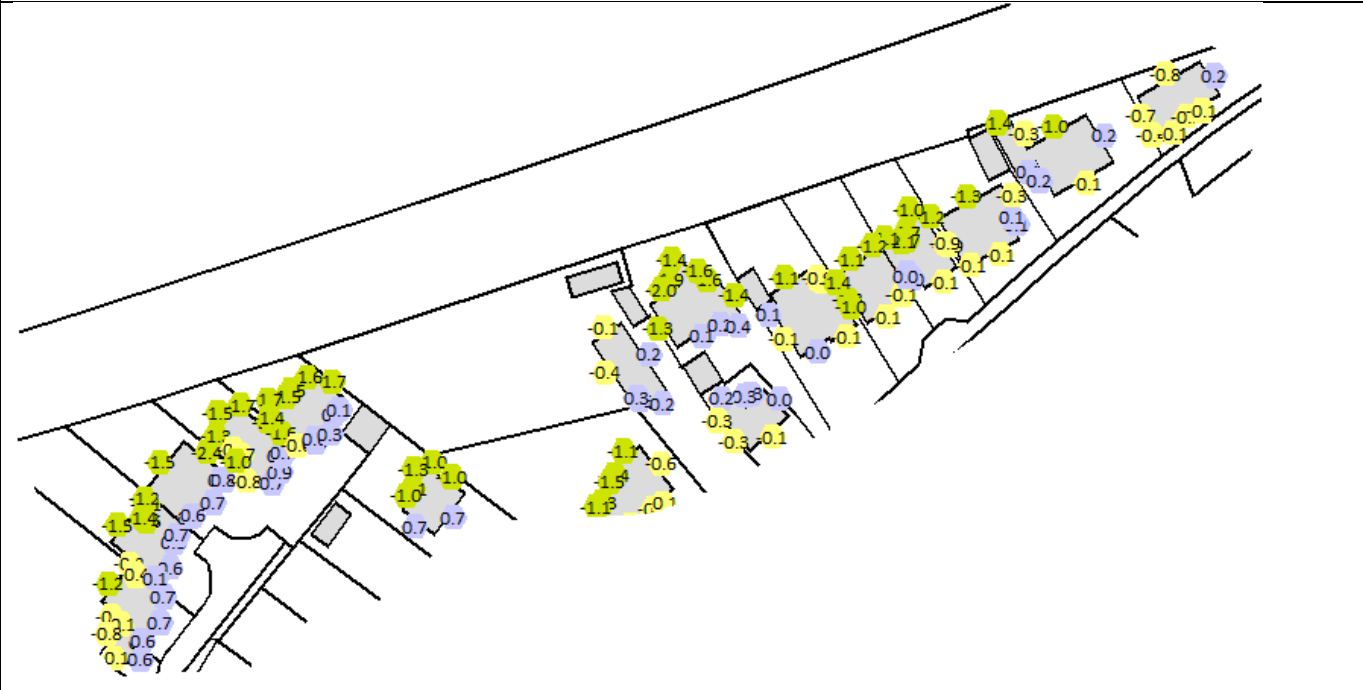
**2024 DM LA10,18h façade**



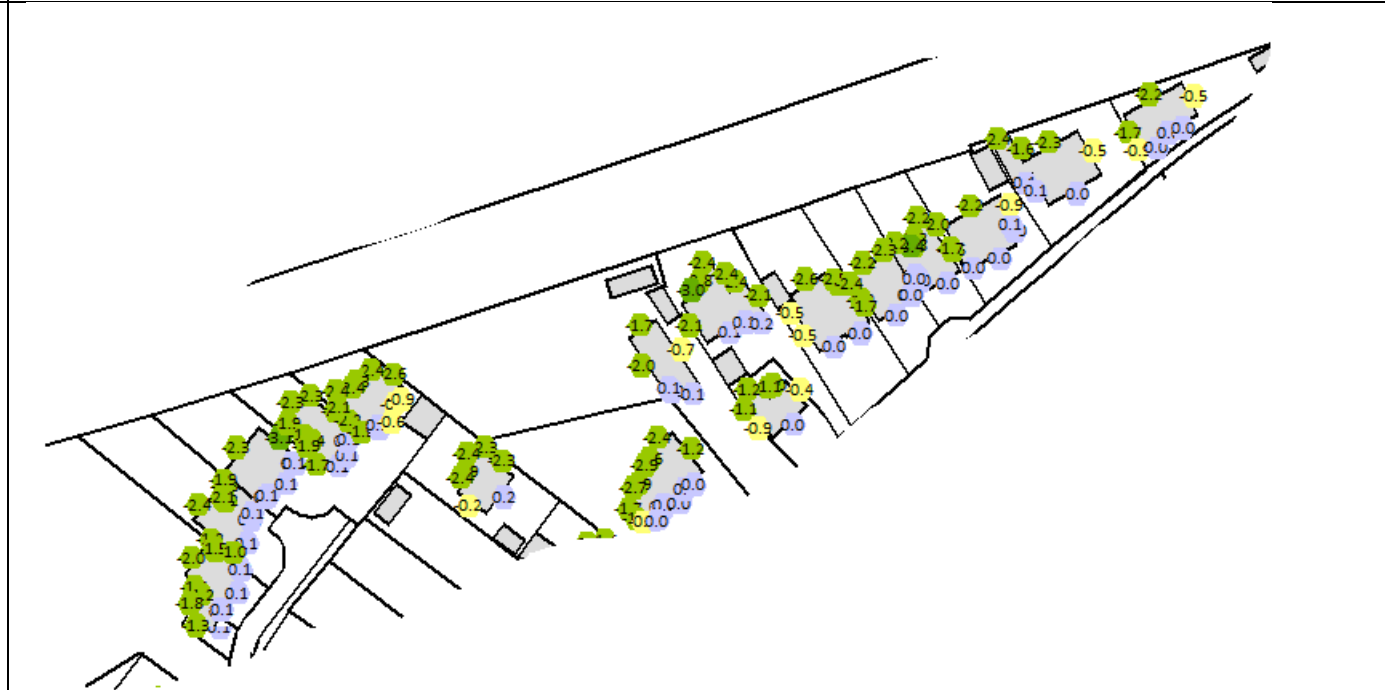
**2024 DS LA10,18h façade (with barriers)**



**Short term change in 2024 opening year LA10,18h façade (with barriers)**



**Benefit of Barrier (i.e. 2024DS with barriers minus 2024DS no barriers)**



**Ratfyn Road** - Negligible increases in traffic noise levels predicted on facades facing north-west towards the A303, due to slight increase in traffic on the A303 with the scheme in operation (one of the aims of the scheme is to reduce rat running on surrounding minor roads by resolving the congestion problems at Countess/past Stonehenge). Highest noise levels at north end closest to the A303 as would be expected. Note topography means these houses are considerably elevated above the A303 up a vegetated bank. Most northern house on Ratfyn Road identified at this stage as potentially qualifying for Noise Insulation (just meets criteria). Note house next door (to south) is a bungalow hence slightly lower noise levels as reported for ground floor not first floor. Benefit of flyover noise barriers minimal at northern end (0.1dB) at southern end just over 1dB. Investigations into a noise barrier on the mainline in this determined had virtually no effect due to topography, plus limited by the scheme extents.  
Agreed.

**London Road/Lords Croft** - At closest properties to the scheme negligible/minor decreases on facades facing directly towards scheme, with barriers on flyover in place. On opposite (south-east) facades in Lords Court generally negligible increases as shielding provided by the house itself dominant and therefore barriers on flyover have little effect. On south-east facades of properties facing onto London Road generally negligible reduction as slight reduction in traffic on this road which connects to Solstice junction to east (scheme removes need to avoid Countess junction and use Solstice junction instead). Benefit of barrier up to around 3 dB on facades facing scheme, on these facades reduces negligible/minor increases to negligible/minor decreases.

**Conclusion for Ratfyn Road and London Road/Lords Croft** – worst affected façade negligible increases in traffic noise levels therefore not identified as a significant adverse effect.

Agreed.

• **C4/5 C8, C7, C6**

In the vicinity of the Flyover the countess roundabout, and also at an elevated level above the proposed primary depot. Representative receptor locations for these locations would be request, the same basic data requirements as above. For the receptors closest to the depot, data will need to include a characterisation of sound sources (summary comments are sufficient on proposed activities), i.e. impact noise possible from crushing and size reduction activities, tonal noise from generators etc.

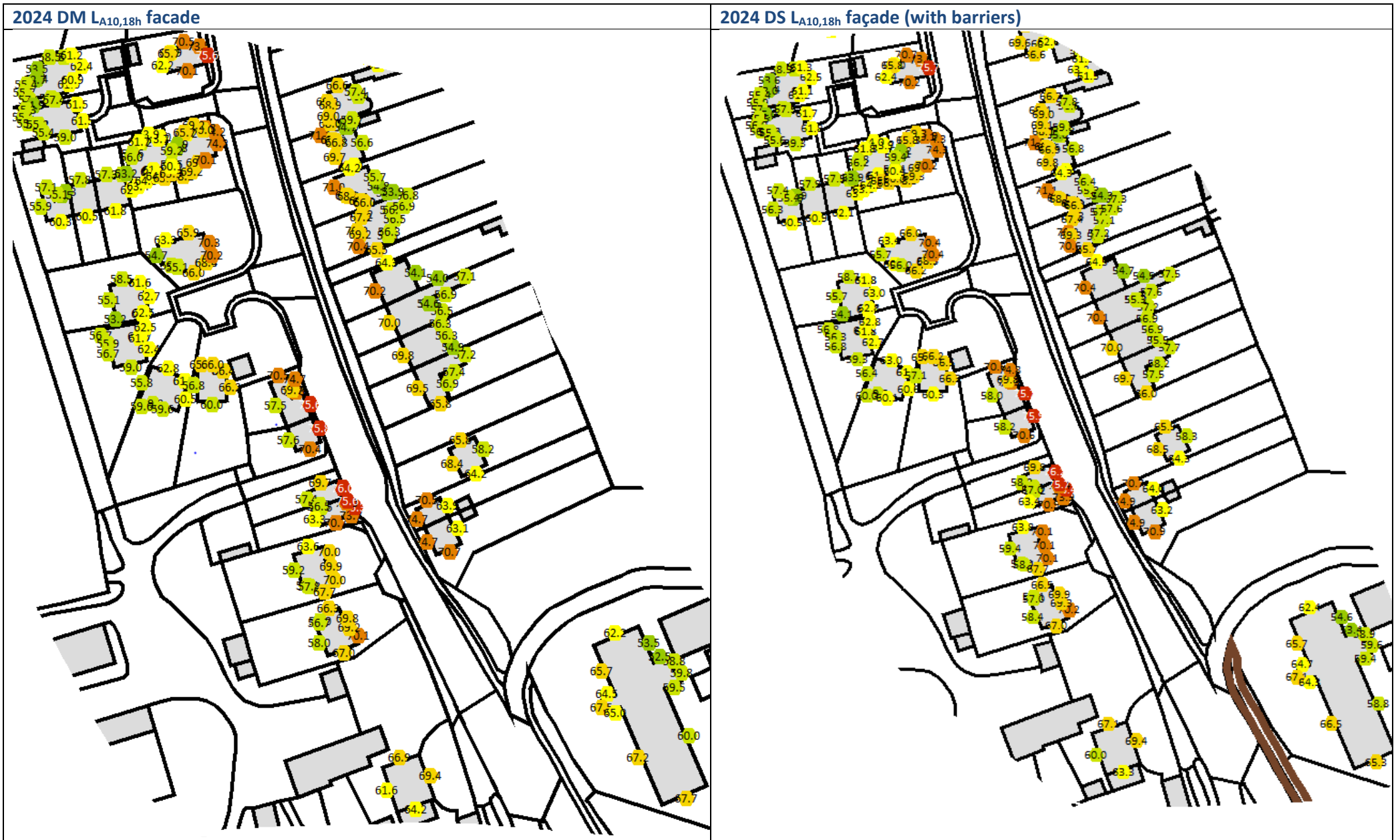
- Key properties likely to be closest to sources would be requested, it is anticipated that this data can be used to evidence selection of key receptors
- Mitigation benefit to be clearly shown.
- Spoil mounds to protect C4/5/6 from site works? Barrier effects
- Glazing to protect from the flyover noise?

Also directly adjacent to the main depot with a range of industrial operations. Suggested that controls might be a BS4142 style control/WHO for night time. Your views on this would be welcome.

**A345 north of Countess (see extracts from noise model below)**

**A345 north of Countess** – Mainly negligible increases in traffic noise levels, with some minor increases at the worst affected façades, and slight benefits at very closest façades to the mainline (Countess Farm and Travelodge) where existing mainline is reused as sliproads so new mainline through centre of the junction slightly further away. Slight increase in traffic on A345 with scheme in place as congestion problems at Countess resolved. Barriers on flyover reduce impact by up to around 2.5dB. Without barriers majority of receptors would experience a minor increase.

**Conclusion for A345 north of Countess** – worst affected façades negligible/minor increases in traffic noise levels therefore not identified as a significant adverse effect. Agreed. High levels of road traffic existing currently. The proposed scheme is noted to have little or no adverse impact in terms of increase in level.



Short term change in 2024 opening year LA10,18h façade (with barriers)



Benefit of Barrier (i.e. 2024DS with barriers minus 2024DS no barriers)



- **M3 Anchor Countess Court,**

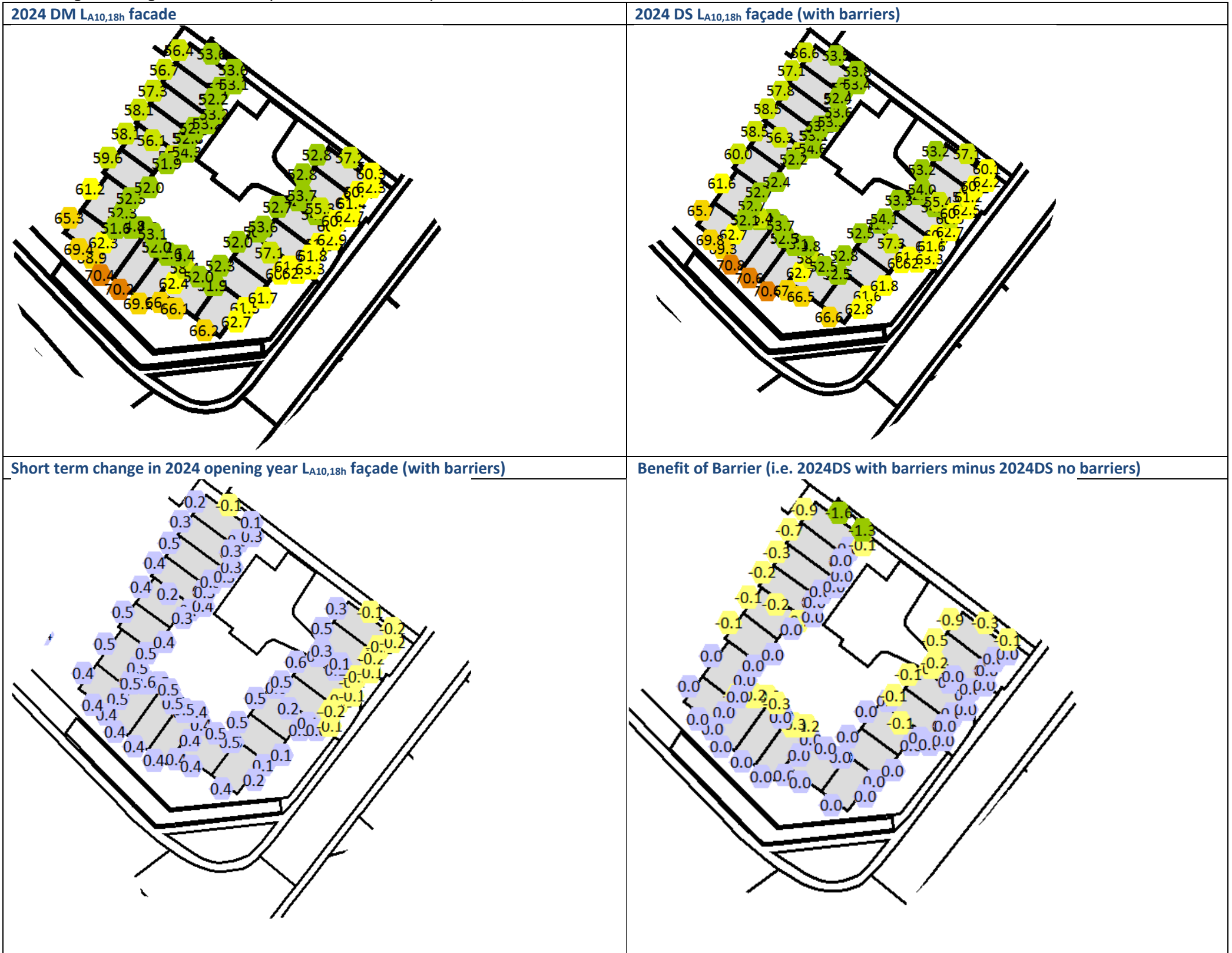
These properties may also be affected by the main construction depot due to be located opposite and are a similar distance from the flyover. The depot is likely to be dealing with spoil material from the tunnel, processing such material, General site works, batching plants etc. Suggested that controls might be a BS4142 style control/WHO for night time.

**Anchor Retirement Flats Countess Court**

Mainly negligible increases in traffic noise levels due to slight increase in traffic on A345. Some negligible decreases facing London Road as traffic reduces slightly on this road, as discussed above. Barriers on flyover have minimal impact except on north-east façade of most northern property which has most direct view of the scheme.

**Conclusion for Anchor Retirement Flats Countess Court** – worst affected façades negligible increases in traffic noise levels therefore not identified as a significant adverse effect.

Once again the high levels currently are made no worse by the scheme, and there are benefits in reductions on the North eastern elevations.



- **C11 Bowles Hatches**

Directly in line with tunnel entrance but distant. Potentially significantly effected by the flyover, slightly elevated position comparable to road. Noted that the River Avon has a weir adjacent that masks road noise. Confirm effect and levels, line of sight

- mitigation measures? You mentioned mitigation has little effect, evidence of this would be appreciated.

**Bowles Hatches**

Property not in line with eastern tunnel portal, approx. 160m south and over 1km to the east. Similar height to existing A303. Mainly negligible/minor decreases in traffic noise levels with barriers in place. Though negligible/minor increase at south facades where building itself is dominant source of shielding and addition of barriers has little effect. Benefit of barrier up to around 2.5dB.

Weir located to south-west of property, not a large contributor to ambient levels at the monitoring position during the day but does stop noise levels dropping at night as much as would expect.

**Conclusion for Bowles Hatches** – worst affected façades negligible/minor increases in traffic noise levels therefore not identified as a significant adverse effect.

Agreed, other façades show improvements.



- **C10 Amesbury Abbey care home**
- More elevated position than C11, further away than most properties should be an improvement, confirm.
  - Provide data for a representative sample
  - Provide indication of the impact of any mitigation measures if necessary.

**Amesbury Abbey Care Home**

Slightly higher than Bowles Hatches. Range of impacts from minor decrease to minor increase with barriers in place. Decreases mainly on north and east facades where barriers have a benefit. Increases mainly on south and west facades where building itself is the dominant source of shielding and where barriers have little effect. Benefit of barrier up to just over 2 dB. Without barriers almost all facades would experience negligible/minor increases.

**Conclusion for Amesbury Abbey Care Home**– worst affected façades negligible/minor increases in traffic noise levels therefore not identified as a significant adverse effect.

Agreed.



- **Stone Henge road**
- Will be the main access to Strone Henge cottages following removal of the main highway after completion of tunnel. Long term benefit will be to restore the ancient track accessing the henge. You mentioned slight increases for some properties locally
  - Key property? Requested as worst case impact unless this is anomalous. The idea is to show the impact is minimal and evidence that using a typical indicator premises

**Stonehenge Road**

Traffic on northern end of Stonehenge Road effectively reduces to zero as becomes access only, instead of access onto the A303. Also A303 to north in deep cutting/tunnel. Moderate/major reductions at individual property here (C12 for construction). Southern end experiences negligible/minor increases on facades facing onto Stonehenge Road due to re-routing of traffic following closure of A303 access.

**Conclusion for Stonehenge Road**– northern end moderate reductions at worst affected façade therefore identified as significant beneficial effect. Southern end negligible/minor increases in traffic noise levels at worst affected facades therefore not identified as a significant adverse effect.

Agreed significant long term benefits for northern end. No issues with the slight increases at the south.



- **C13 Stone Henge cottages**

Short term impacts, due to increased HGV flow for construction (noise)

Short term vibration, data set needed and discussion, rationale for standard on vibration needed

- Mitigation measures option analysis summary would be useful. Including those we discussed.
- Long term gains due to absence of main road to be clearly demonstrated through data

**Stonehenge Cottages**

Major reduction in operational traffic noise levels as currently very close to A303 and with scheme A303 in a tunnel. Construction traffic flows very similar to DM traffic, slight increase in % HGV, negligible change in CRTN Basic Noise Level.

**Conclusion for Stonehenge Cottages**– major reductions in operational traffic noise at worst affected façades therefore identified as significant beneficial effect.

Agreed



- **M10 Stone Henge**

Short term increases due to construction traffic (quantify), long term benefits in noise impact, long term benefit in restoring ancient path

Vibration unlikely to be significant due to distance and depth, need an agreed wording, please confirm

**Stonehenge**

Construction traffic flows very similar to DM traffic, slight increase in % HGV, negligible change in CRTN Basic Noise Level.

Agreed

- **M9 Scotland Lodge**

Section elevated compared to road.

- new road further away than existing and likely to be in cutting.
- Data for lodge required
- Mitigations measures impact effect should be clearly stated.
- 

- **M9 Stonehenge B&B**

Identified in the review with Wiltshire Council, Potential adverse impacts form construction Nosie associated with the depot?

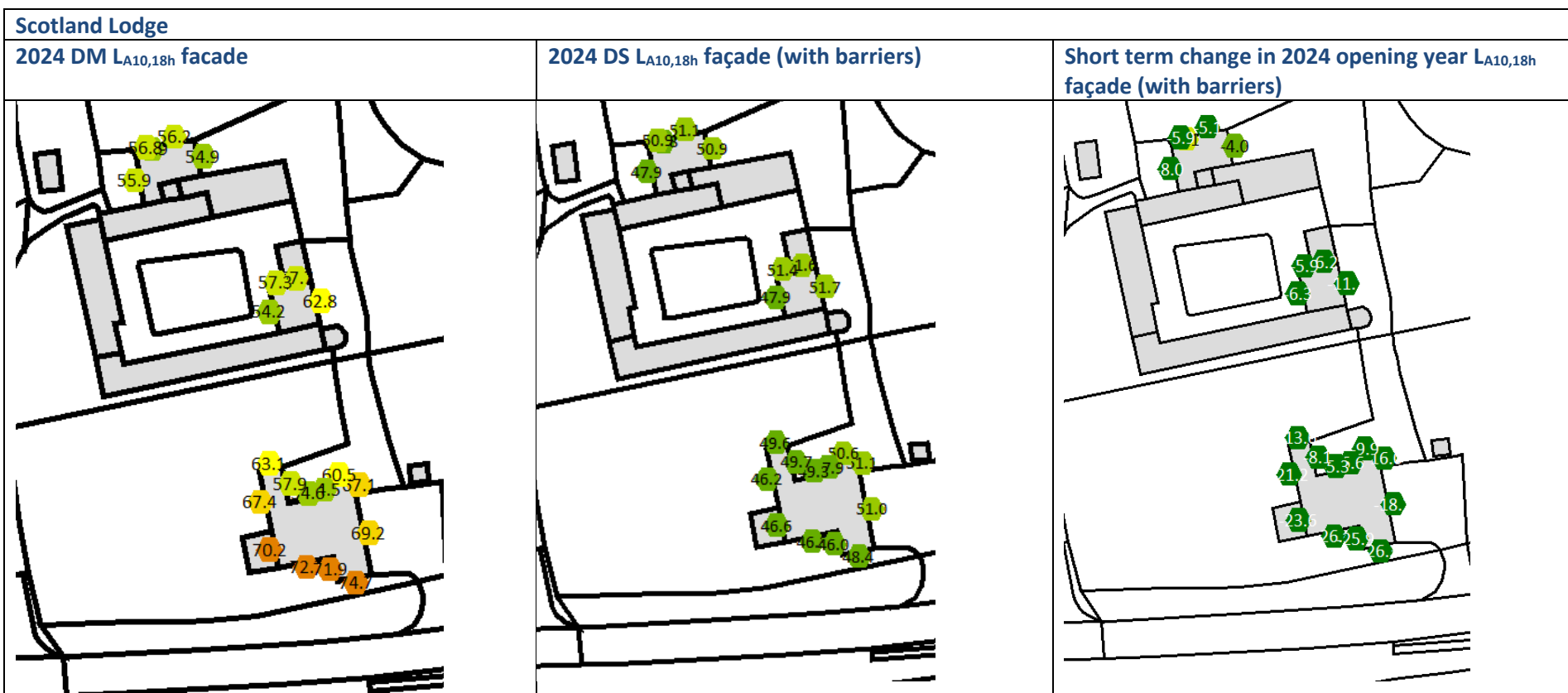
- Data required show improvement on elevations?

**Scotland Lodge/Stonehenge B&B**

Traffic flow on existing A303 in front of property to the south effectively reduces to zero with the scheme in place as become access to property only. New A303 to north approx. 450m away and in false cutting. Major reductions in traffic noise at the two southern buildings, minor reduction at worst affected façade of northern building.

**Conclusion for Scotland Lodge**– major reductions in operational traffic noise at worst affected façades of the two southern buildings therefore identified as significant beneficial effect. At northern building minor reduction in traffic noise therefore not identified as significant beneficial effect.

Agreed beneficial.

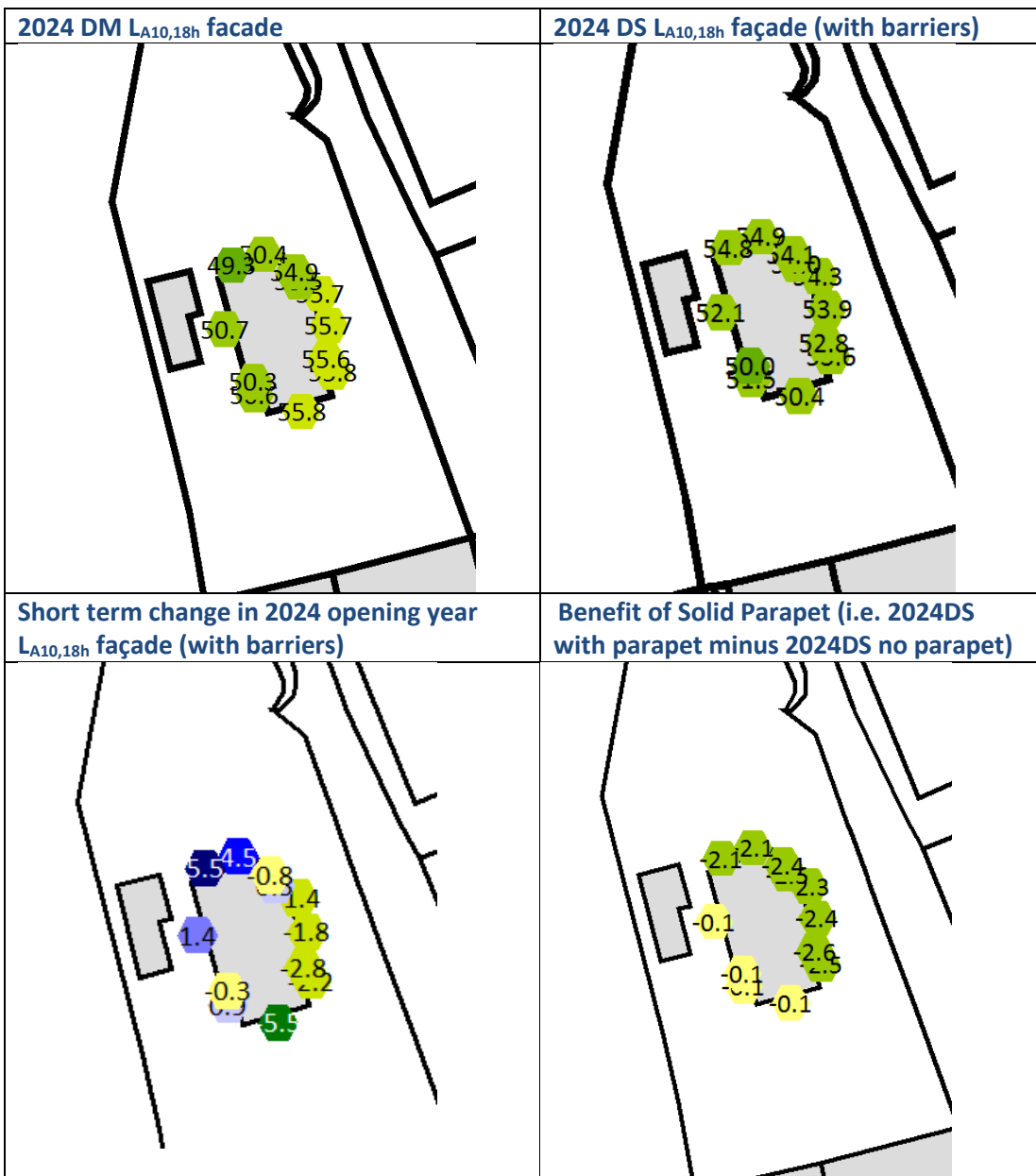


- C18 Foredown House**  
 Noted as possible worsening on one elevation, would be useful to show the context,  
 Noted that may be impacted by short term depot noise, (confirm) show data separately for this. May wish to provide data on both key elevations if this tells a better story.

**Foredown House**

Very large reductions in traffic flows on existing A303 through the village to the south. New A303 to north over 200m away and in false cutting, solid parapet proposed on River Till viaduct and additional false cutting on eastern side of viaduct. Depth of false cutting increased through design process, though balanced against adverse landscape impacts. Barrier on River Till considered beneficial for noise but not essential mitigation, as only real benefit at a single property, cost benefit ratio very low. Similarly beneficial but not essential for landscape. Response from public consultation to question regarding a solid parapet on the River Till 75% in favour. Therefore solid parapet included in design. Major increase in traffic noise on north façade facing scheme and major reduction on south façade facing existing A303.

**Conclusion for Foredown House**– major increase on north façade facing scheme, therefore significant adverse effect identified.  
 Agreed – Note the level of noise is unlikely to breach WHO guidelines. Property may also have construction noise impacts.



- Bridges over the new carriageway**  
 3 bridges marked. I note that the road section is elevated compared to Winterborne Stoke. Better drawings of this section needed, you mentioned showing me the noise model for this section via a shared screen. That may be helpful.

Countess – mainline elevated on flyover. Longbarrow – mainline in cutting underneath new junction. River Till mainline on viaduct over floodplain.

- Standards for the road noise noted, advised that the aim should be to meet guidelines on WHO for Europe, we discussed a form of words in respect of standards and identification, would be useful if you could pen something to summarise that, alternately I will derive something from the section 9.9.96+ paragraphs (you mentioned something in section 6 as well?).

In common with other Highways England schemes the assessment methodology for the identification of significant operational traffic noise effects is based on the DMRB magnitude of impact criteria and Highways England MPI-71-07-2018. The MPI includes a range of factors, other than the magnitude of change, which could affect the significance decision. These include the absolute noise level, the specific circumstances of the receptor and public perception of the change. These additional factors were considered in the decision making process for the inclusion of mitigation measures, in particular the noise barriers at Countess and the solid parapet at River Till, where the magnitude of the impact alone may not be sufficient to warrant the inclusion of further mitigation. The MPI also sets the LOAEL/SOAEL for Highways England schemes based on the WHO Guidelines, for example, the daytime LOAEL is based on the onset of 'moderate community annoyance'. The assessment methodology was discussed and agreed with WCC before the submission of the ES.

The design of the scheme has been considered in accordance with demonstrating compliance with the requirements of the NPSNN:

*'The Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:*

- avoid significant adverse impacts on health and quality of life from noise as a result of the new development;*
- mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and*
- contribute to improvements to health and quality of life through the effective management and control of noise, where possible.'*

With regards to identifying sustainable mitigation measures, the following factors were considered in addition to the noise benefit achieved:-

- the cost versus the benefit;*
- engineering practicality;*
- any other impacts (such as landscape/visual); and*
- consultation /stakeholder engagement responses*

Mitigation measures have been incorporated into the Scheme design to demonstrate compliance with these aims, including reducing traffic noise levels where possible and sustainable:

- selecting a route alignment which takes the road away from residential receptors in Winterbourne Stoke;
- using a vertical alignment which uses a combination of natural landform and 'false cuttings' to integrate the Scheme into the landscape whilst at the same time, enclosing traffic and reducing noise in adjacent areas. In particular 2m false cuttings to the north of Winterbourne Stoke.
- setting the route within a tunnel and deep cutting within the WHS;
- use of a noise absorbent finish at the entrance/exit of the tunnel and Green Bridge Four;
- maximising the use of earthworks at Countess flyover and minimising the extent of retaining walls;
- the use of a thin surfacing system, which results in lower levels of noise generation than a standard hot rolled asphalt surface;
- inclusion of 1.8m high absorptive noise barriers between the slip roads on both the north and south side of Countess flyover; and
- inclusion of a 1.5m high solid parapet on the south side of the River Till viaduct.

The mitigation measures incorporated into the scheme design have reduced the absolute traffic noise levels, reduced the magnitude of increases in traffic noise and maximised the magnitude of reductions in traffic noise along the length of the scheme. The height of the noise barriers at Countess was determined as a balance between the noise benefit and adverse visual effect. In addition, public consultation responses requesting barriers on the flyover (and at the River Till) were a significant factor. No other areas along the A303 mainline where mitigation would be sustainable and beneficial have been identified.

With regards to policy effects, the majority of remaining residential buildings with high traffic noise levels (above the SOAEL) following the opening of the Scheme are in close proximity to main roads within Amesbury such as the A345. Such routes are already above the SOAEL without the Scheme and experience only a negligible change in traffic noise levels due to the Scheme. The purpose of the Scheme to improve traffic conditions on the A303 by grade separating Countess Roundabout results in small increases in traffic on roads connecting to the junction. The introduction of mitigation measures along existing roads which already experience high noise levels, to mitigate the negligible effect of the Scheme, is not sustainable. Such roads in built up areas have many residential and commercial buildings fronting onto the road, therefore mitigation measures such as barriers are not a practical engineering option and would have other adverse impacts including visual and access difficulties.

With regards to EIA effects, the residual significant adverse effects in the vicinity of the mainline are limited to a single façade of a single property on the northern edge of Winterbourne Stoke, where mitigation measures have significantly reduced the magnitude of this impact. A further significant adverse effect is predicted remote from the scheme on Church Street/High Street in Amesbury. Mitigation measures in this location are not feasible, and there are other factors to consider in this location which suggest assigning a significant adverse effect is a conservative approach. Conversely significant beneficial effects occur in Winterbourne Stoke which is bypassed by the scheme and along the tunnelled section through the WHS, and on more minor side roads to the north which are currently used to avoid the Stonehenge area.

Agreed. The explanations and commentary are helpful.



Ricardo  
Energy & Environment

The Gemini Building  
Fermi Avenue  
Harwell  
Didcot  
Oxfordshire  
OX11 0QR  
United Kingdom

t: +44 (0)1235 753000  
e: [enquiry@ricardo.com](mailto:enquiry@ricardo.com)


[ee.ricardo.com](http://ee.ricardo.com)


## **Appendix C Public Rights of Way**

### **Appendix C.1 Plan of Byways within Stonehenge WHS**

## Stonehenge WHS ETRO

**Key:**


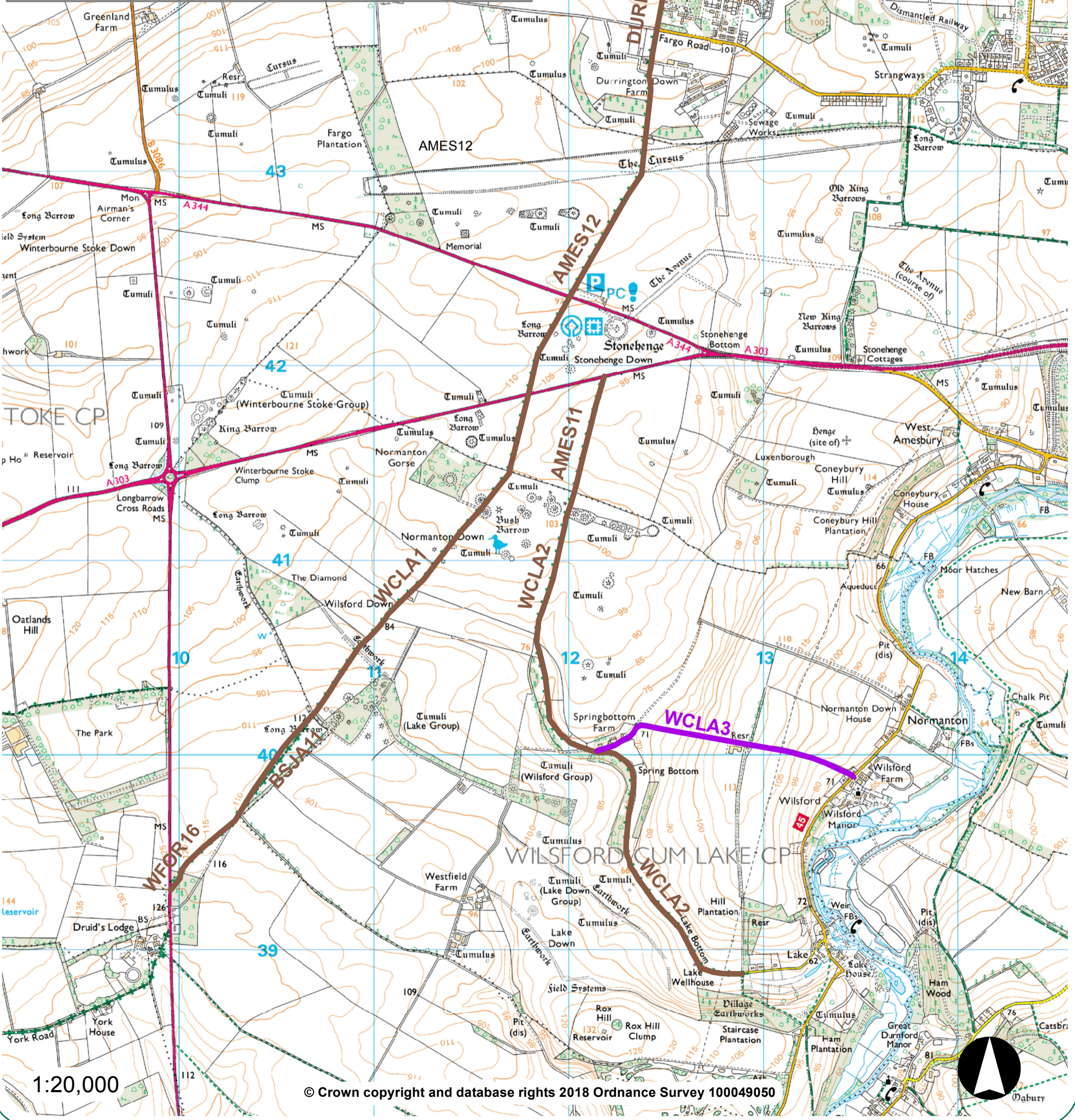
BOAT subject to ETRO: 

Footpath subject to ETRO: 

© Crown Copyright and Database Rights 2018 Ordnance Survey 100049050  
Tracy Carter – Director Waste and Environment

Prepared by: JEG Date: 20<sup>th</sup> June 2016 Scale: 1:20,000 Grid Ref: SU 116-408

**Wiltshire Council**  
Where everybody matters

1:20,000

© Crown copyright and database rights 2018 Ordnance Survey 100049050

## **Appendix C.2**

### **Extract of 2008 Traffic Surveys**

## **1.0 INTRODUCTION**

### **1.1 Purpose of the Study**

- 1.1.1 This report sets out the results of a survey of Byway 12 undertaken in August 2008 for the Stonehenge Environmental Improvements Project. The purpose of this survey is to inform the baseline against which the effects of development options and proposals on access routes for recreational purposes can be assessed in relation to changes in severance, fragmentation and amenity effects on rights of way users (including walkers, cyclists, trail bikes, four by four vehicles, carriage drivers and horse riders).



## **2.0 METHODOLOGY**

### **2.1 General**

2.1.1 'Amesbury Byway 12' is the only Public Right of Way in the general vicinity of the development options currently being considered as part of the Stonehenge Environmental Improvements Project. Byway 12 is shown on **Figure 2.1** within the context of other Rights of Way in and around the World Heritage Site.

### **2.2 Survey Locations**

2.2.1 The survey locations are shown on **Figure 2.1**. These are:

- 1- on Byway 12 north of the Cursus and south of Durrington Down Farm;
- 2- on Byway 12 at the junction with the A344, west of the current visitor facilities.

### **2.3 Timing of Surveys**

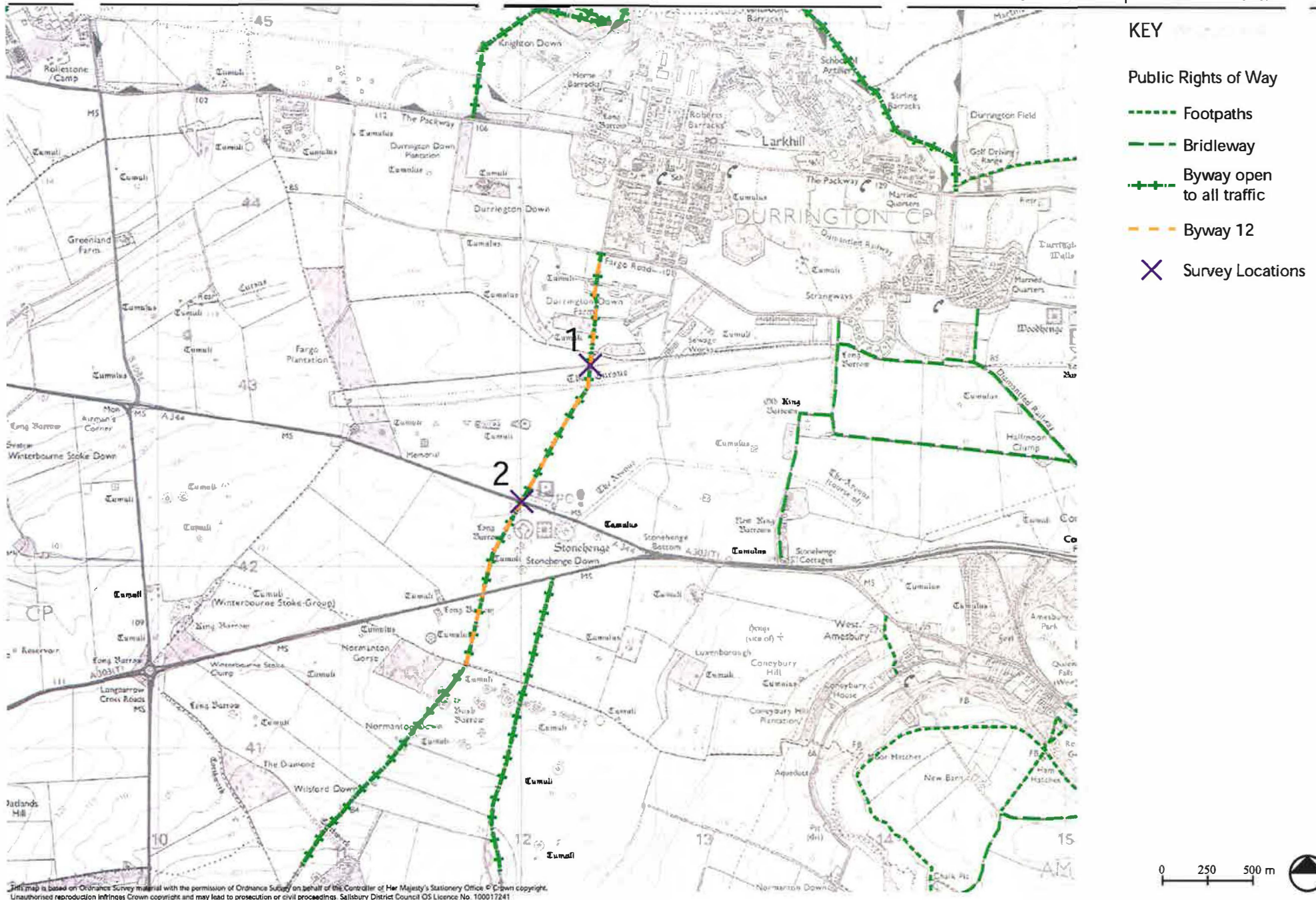
2.3.1 For consistency with previous survey methodologies, the survey method adopted corresponded with that used in the CBA Stonehenge Visitor Facilities and Access Scheme Right of Way Survey carried out in 2002 and the Mott MacDonald Stonehenge A303 Improvement Scheme Rights of Way surveys carried out in 2000.

2.3.2 Surveys were carried out on Saturday 23rd August 2008 and Wednesday 27th August 2008 in order to capture weekend and weekday use. The surveys on each day were undertaken between the hours of 06.00 and 20.00 for consistency with previous surveys. The weather on Saturday was sunny and dry all day. The weather on Wednesday was cloudy and dry in the morning, and windy and cold in the afternoon.

### **2.4 Survey Data**

2.4.1 All users of the Byway were counted, the direction of travel noted and the users classified into one of the following groups (names as shown in the results table are in brackets):

- Pedestrians (PED)
- Pedal Cycles (CYCLIST)
- Motor Cycles (MCL)
- Cars/Lights Goods Vehicles (CAR/LVG)
- Agricultural Vehicles (AGR VEH)



This map is based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Salisbury District Council OS Licence No. 100017241

S:\projects\11108601 Stonehenge EIP\GIS\Projects\11108606\_2-1\_PROW\_0908.mxd

Figure 2.1  
 Survey Locations

- Horses
- Other

2.4.2 Totals for each movement were recorded at sixty-minute intervals throughout the survey, and the results tabulated.

2.4.3 The survey was undertaken by Count-on-Us Ltd, and co-ordinated by CBA. The survey results are set out in Section 3.0.

**3.0 RESULTS**

**3.1 Survey Location 1: Saturday 23/08/2008**

TIME	DIRECTION	PED	CYCLIST	MCL	CAR/LGV	AGR VEH	HORSES	OTHER	TOT	COMMENT / DESCRIPTION
07:58	Northbound	-	-	-	1	-	-	-	1	SUZKI CAR - 4UDK
08:19	Southbound	-	-	-	1	-	-	-	1	SUZKI CAR - 4UDK
08:47	Southbound	-	-	-	1	-	-	-	1	FORD CAR - OOW0
08:54	Southbound	-	-	-	1	-	-	-	1	VAN - 7CRJ
08:55	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
08:57	Southbound	2	-	-	-	-	-	-	2	2 MALES JOGGING
08:58	Southbound	-	-	-	-	-	-	1	1	TWIN AXLE MINI BUS - 3GPE
08:59	Southbound	-	-	-	1	-	-	-	1	FORD - 7EUL
08:59	Southbound	-	-	-	-	-	-	1	1	TWIN AXLE MINI BUS - 6LDN
09:04	Southbound	-	-	-	1	-	-	-	1	CAR - 6WPO
09:05	Northbound	1	-	-	-	-	-	-	1	MALE JOGGING
09:07	Northbound	2	-	-	-	-	-	-	2	2 MALES JOGGING
09:07	Southbound	-	-	-	1	-	-	-	1	JEEP - S193
09:26	Southbound	-	-	-	1	-	-	-	1	SKODA CAR - 9YDL
09:27	Southbound	49	-	-	-	-	-	-	49	ALL MALES JOGGING
09:40	Northbound	-	-	-	1	-	-	-	1	SKODA CAR - 9YDL
09:52	Northbound	-	1	-	-	-	-	-	1	MALE
09:59	Southbound	1	-	-	-	-	-	-	1	MALE WITH DOG
10:07	Southbound	-	1	-	-	-	-	-	1	MALE
10:10	Northbound	2	-	-	-	-	-	-	2	MALE & FEMALE
10:12	Northbound	49	-	-	-	-	-	-	49	ALL MALES JOGGING
10:17	Northbound	-	-	1	-	-	-	-	1	MALE
10:36	Northbound	1	-	-	-	-	-	-	1	MALE
10:37	Southbound	1	-	-	-	-	-	-	1	MALE
10:37	Northbound	1	-	-	-	-	-	-	1	MALE WITH DOG

10:40	Southbound	1	-	-	-	-	-	-	1	FEMALE WITH DOG
10:41	Southbound	-	1	-	-	-	-	-	1	MALE
10:44	Southbound	-	-	-	1	-	-	-	1	CITROEN - FEMALE
10:50	Southbound	2	-	-	-	-	-	-	2	MALE & FEMALE
10:52	Northbound	1	-	-	-	-	-	-	1	FEMALE WITH DOG
11:03	Southbound	6	1	-	-	-	-	-	7	2 COUPLES. 3 CHILDREN & 3 DOGS
11:11	Southbound	-	-	3	-	-	-	-	3	3 MALES
11:22	Northbound	1	-	-	-	-	-	-	1	MALE
11:27	Southbound	-	-	-	1	-	-	-	1	RENAULT CLIO - 1BFA
11:31	Northbound	-	1	-	-	-	-	-	1	MALE
11:50	Northbound	-	-	1	-	-	-	-	1	MALE
11:50	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
11:52	Southbound	-	-	1	-	-	-	-	1	MALE
11:55	Northbound	1	-	-	-	-	-	-	1	MALE WITH DOG
11:57	Southbound	3	-	-	-	-	-	-	3	3 FEMALES
12:02	Southbound	-	-	2	-	-	-	1	3	2 MALES 1 ON QUAD BIKE
12:02	Northbound	4	-	-	-	-	-	-	4	COUPLE WITH 2 CHIDREN
12:05	Southbound	-	-	-	1	-	-	-	1	LAND ROVER - X99T - MALE
12:07	Southbound	4	-	-	-	-	-	-	4	SAME GROUP AS 12:02 NB
12:10	Northbound	6	1	-	-	-	-	-	7	SAME GROUP AS 11:03 SB
12:15	Southbound	1	-	-	-	-	-	-	1	SAME MAN AS 11:22 NB
12:33	Southbound	-	1	-	-	-	-	-	1	MALE
12:39	Southbound	-	-	-	-	1	-	-	1	RENAULT - XX06 (FOREIGN PLATE)
12:40	Southbound	-	-	-	-	1	-	-	1	OPEL CAR - WR06 (FOREIGN PLATE)
12:40	Southbound	-	-	-	-	1	-	-	1	THRIFTY RENTAL - 8TTV
12:51	Northbound	-	-	-	-	1	-	-	1	MITZUBISHI - 7CTR
12:55	Southbound	-	-	-	-	1	-	-	1	SKODA CAR - 9YDL
12:57	Northbound	-	-	-	-	1	-	-	1	THRIFTY RENTAL - 8TTV
13:15	Northbound	-	1	-	-	-	-	-	1	MALE
13:36	Northbound	3	-	-	-	-	-	-	3	SAME 3 LADIES AS 11:57 SB
14:15	Southbound	1	-	-	-	-	-	-	1	FEMALE WITH 2 DOGS
14:21	Northbound	1	-	-	-	-	-	-	1	MALE JOGGING
14:32	Southbound	-	-	-	-	1	-	-	1	RANGE ROVER - 1FFS

14:32	Southbound	-	-	-	1	-	-	-	1	RANGE ROVER - 7LWV
14:38	Northbound	-	2	-	-	-	-	-	2	MALE & FEMALE
14:42	Southbound	1	-	-	-	-	-	-	1	MALE WITH DOG
14:47	Southbound	1	-	-	-	-	-	-	1	MALE WITH DOG
14:58	Northbound	1	-	-	-	-	-	-	1	SAME MAN AS 14:47 SB
15:00	Northbound	1	-	-	-	-	-	-	1	SAME LADY AS 14:15 SB
15:04	Northbound	2	-	-	-	-	-	-	2	MALE & FEMALE
15:14	Northbound	-	-	-	1	-	-	-	1	LAND ROVER - 7XAA
15:17	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
15:24	Southbound	2	-	-	-	-	-	-	2	SAME COUPLE AS 15:04 NB
16:20	Southbound	2	-	-	-	-	-	-	2	FEMALE WITH DOG & 1 YOUTH
16:23	Northbound	2	-	-	-	-	-	-	2	2 FEMALES
16:27	Northbound	1	-	-	-	-	-	-	1	MALE WITH DOG
16:29	Southbound	-	1	-	-	-	-	-	1	SAME MAN AS 13:15
16:36	Southbound	2	-	-	-	-	-	-	2	SAME 2 FEMALES AS 16:23 NB
17:02	Southbound	-	-	-	1	-	-	-	1	SUZUKI - 2UGO
17:02	Southbound	-	-	-	1	-	-	-	1	JEEP - 9PJT
17:02	Southbound	-	-	-	1	-	-	-	1	JEEP - 3ENP
17:02	Southbound	-	-	-	1	-	-	-	1	JEEP - 6MUD
17:02	Southbound	-	-	-	1	-	-	-	1	JEEP - 1JHA
17:03	Northbound	2	-	-	-	-	-	-	2	MALE & FEMALE WITH DOG
17:12	Northbound	1	-	-	-	-	-	-	1	FEMALE JOGGING
17:41	Northbound	1	-	-	-	-	-	-	1	MALE WITH DOG
17:48	Northbound	-	-	-	1	-	-	-	1	SAME AS 11:27 SB
17:49	Northbound	-	-	-	1	-	-	-	1	SAME AS 12:05 SB
17:58	Northbound	-	-	-	1	-	-	-	1	CITROEN - 700J
18:02	Northbound	-	-	-	1	-	-	-	1	FORD - 7EUL
18:14	Southbound	2	-	-	-	-	-	-	2	2 MALES WITH 2 DOGS
18:27	Northbound	2	-	-	-	-	-	-	2	SAME AS ABOVE RETURN
19:46	Northbound	-	-	-	-	-	-	-	0	JEEP - OUWL
<b>P/TOT</b>		<b>170</b>	<b>11</b>	<b>8</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>222</b>	

**3.2 Survey Location 1: Wednesday 27/08/2008**

TIME	DIRECTION	PED	CYCLIST	MCL	CAR/LGV	AGR VEH	HORES	OTHER	TOT	COMMENT / DESCRIPTION
07:58	Southbound	1	-	-	-	-	-	-	1	MALE WALKING 2 DOGS
08:00	Southbound	-	-	-	1	-	-	-	1	ARNOLD CLARK RENTAL VAN
08:01	Southbound	1	-	-	-	-	-	-	1	MALE WALKING 2 DOGS
08:40	Southbound	1	-	-	-	-	-	-	1	MALE WALKING DOG
08:48	Southbound	1	-	-	-	-	-	-	1	FEMALE WALKING DOG
08:48	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
08:50	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
08:55	Northbound	1	-	-	-	-	-	-	1	MALE JOGGING
08:58	Southbound	-	-	-	1	-	-	-	1	THRIFTY VAN
08:59	Southbound	-	-	-	1	-	-	-	1	CITROEN
09:06	Northbound	1	-	-	-	-	-	-	1	MALE JOGGING
09:06	Northbound	-	-	-	1	-	-	-	1	THRIFTY VAN
09:17	Northbound	-	-	-	1	-	-	-	1	ARNOLD CLARK RENTAL VAN
09:22	Southbound	-	-	-	1	-	-	-	1	JEEP
09:24	Southbound	-	-	-	1	-	-	-	1	ARNOLD CLARK RENTAL VAN
09:34	Southbound	1	-	-	-	-	-	-	1	FEMALE WALKING DOG
09:39	Northbound	-	2	-	-	-	-	-	2	1 MALE & 1 CHILD
09:45	Southbound	-	-	-	1	-	-	-	1	JEEP
09:51	Northbound	-	-	-	1	-	-	-	1	JEEP
09:55	Northbound	1	-	-	-	-	-	-	1	FEMALE WALKING DOG
10:00	Southbound	-	-	-	1	-	-	-	1	JEEP
11:16	Southbound	-	3	-	-	-	-	-	3	3 MALE CYCLISTS
11:35	Northbound	-	3	-	-	-	-	-	3	3 MALE CYCLISTS (SAME AS ABOVE)
11:38	Southbound	-	-	-	1	-	-	-	1	THRIFTY VAN
12:11	Southbound	-	-	-	1	-	-	-	1	JEEP
12:18	Northbound	-	-	-	1	-	-	-	1	FORD FIESTA
12:47	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
12:52	Southbound	1	-	-	-	-	-	-	1	FEMALE JOGGING

12:52	Northbound	-	-	-	-	-	-	1	1	LEYLAND DAF
12:55	Southbound	-	-	-	-	-	-	1	1	SAME AS ABOVE
13:05	Northbound	1	-	-	-	-	-	-	1	SAME AS 12:52 SB
13:05	Southbound	-	-	-	1	-	-	-	1	THRIFTY VAN
13:20	Northbound	-	-	-	1	-	-	-	1	THRIFTY VAN
13:40	Southbound	-	-	-	1	-	-	-	1	THRIFTY VAN SAME AS ABOVE
14:17	Southbound	1	-	-	-	-	-	-	1	MALE
14:22	Northbound	-	-	-	1	-	-	-	1	THRIFTY VAN SAME AS AT 13:40
14:37	Northbound	-	-	-	1	-	-	-	1	JEEP
14:54	Northbound	1	-	-	-	-	-	-	1	MALE SAME AS AT 14:17
15:09	Southbound	-	3	-	-	-	-	-	3	3 MALE CYCLISTS
15:09	Northbound	1	-	-	-	-	-	-	1	MALE JOGGING
15:12	Southbound	-	-	-	1	-	-	-	1	JEEP SAME AS 14:37
15:12	Southbound	3	-	-	-	-	-	-	3	1 MALE, 1 FEMALE, 1 CHILD & 1 DOG
15:34	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING WITH DOG
15:35	Northbound	-	-	-	1	-	-	-	1	PEUGEOT 106
15:42	Southbound	1	-	-	-	-	-	-	1	MALE WITH DOG
15:49	Southbound	-	1	-	-	-	-	-	1	MALE CYCLIST
15:50	Northbound	-	-	2	-	-	-	-	2	2 SCRAMBLERS
15:54	Southbound	-	-	-	1	-	-	-	1	PEUGEOT 106 SAME AS AT 15:35
16:02	Southbound	-	1	-	-	-	-	-	1	MALE WITH DOG
16:10	Northbound	1	-	-	-	-	-	-	1	MALE
16:11	Southbound	-	1	-	-	-	-	-	1	MALE
16:32	Northbound	1	-	-	-	-	-	-	1	MALE & DOG SEE 15:42 SB
17:28	Southbound	2	-	-	-	-	-	-	2	1 MALE, 1 FEMALE, & 2 DOGS
17:36	Northbound	-	-	-	1	-	-	-	1	RENAULT MEGANE
17:38	Northbound	-	-	-	1	-	-	-	1	JEEP
17:59	Southbound	-	-	-	1	-	-	-	1	FORD FIESTA
18:06	Northbound	-	-	-	1	-	-	-	1	ARNOLD CLARK RENTAL VAN
18:07	Southbound	1	-	-	-	-	-	-	1	MALE JOGGING
18:34	Northbound	1	-	-	-	-	-	-	1	MALE JOGGING
18:35	Southbound	1	-	-	-	-	-	-	1	FEMALE WALKING DOG



18:40	Northbound	1	-	-	-	-	-	-	1	FEMALE WALKING DOG SEE ABOVE MALE JOGGING SEE 18:07 MALE WITH DOG 2 MALE JOGGERS 2 MALE JOGGERS SEE ABOVE MALE WITH DOG SEE 19:00
18:53	Northbound	1	-	-	-	-	-	-	1	
19:00	Southbound	1	-	-	-	-	-	-	1	
19:25	Southbound	2	-	-	-	-	-	-	2	
19:36	Northbound	2	-	-	-	-	-	-	2	
19:51	Northbound	1	-	-	-	-	-	-	1	
<b>P/TOT</b>		<b>36</b>	<b>14</b>	<b>2</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>79</b>	

**3.3 Survey Location 2: Saturday 23/08/2008**

TIME	DIRECTION	PED	CYCLIST	MCL	CAR/LGV	AGR VEH	HORES	OTHER	TOT	COMMENT / DESCRIPTION
09:48	NB	-	1	-	-	-	-	-	1	-
10:14	NB	-	-	1	-	-	-	-	1	-
10:25	SB	1	1	-	-	-	-	-	2	JOGGER
10:31	NB	1	-	-	-	-	-	-	1	JOGGER
11:13	SB	-	-	3	-	-	-	-	3	3 SCRAMBLERS
11:14	NB	1	-	-	-	-	-	-	1	MALE
11:47	NB	-	-	1	-	-	-	-	1	LEARNER DRIVER
11:53	SB	-	-	1	-	-	-	-	1	LEARNER DRIVER
12:03	SB	-	-	2	-	-	-	1	3	2 SCRAMBLERS, 1 QUAD BIKE
12:20	NB	2	-	-	-	-	-	-	2	MALE & FEMALE
12:28	SB	1	-	-	-	-	-	-	1	MALE
12:42	SB	-	-	-	1	-	-	-	1	THRIFTY CAR HIRE - VAN
12:49	NB	-	-	-	1	-	-	-	1	mitsubishi 4x4
12:58	SB	-	-	-	1	-	-	-	1	SKODA
15:08	SB	-	-	-	2	-	-	-	2	JEEP - FFS & CAR LWV
15:10	NB	-	-	-	1	-	-	-	1	JEEP - 7XXA
17:22	SB	-	-	-	1	-	-	-	1	SUZUKI - 2UGO
18:00	NB	-	-	-	1	-	-	-	1	FORD MINI BUS
19:44	NB	-	-	-	1	-	-	-	1	JEEP - 0UWL
<b>P/TOT</b>		<b>6</b>	<b>2</b>	<b>8</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>26</b>	

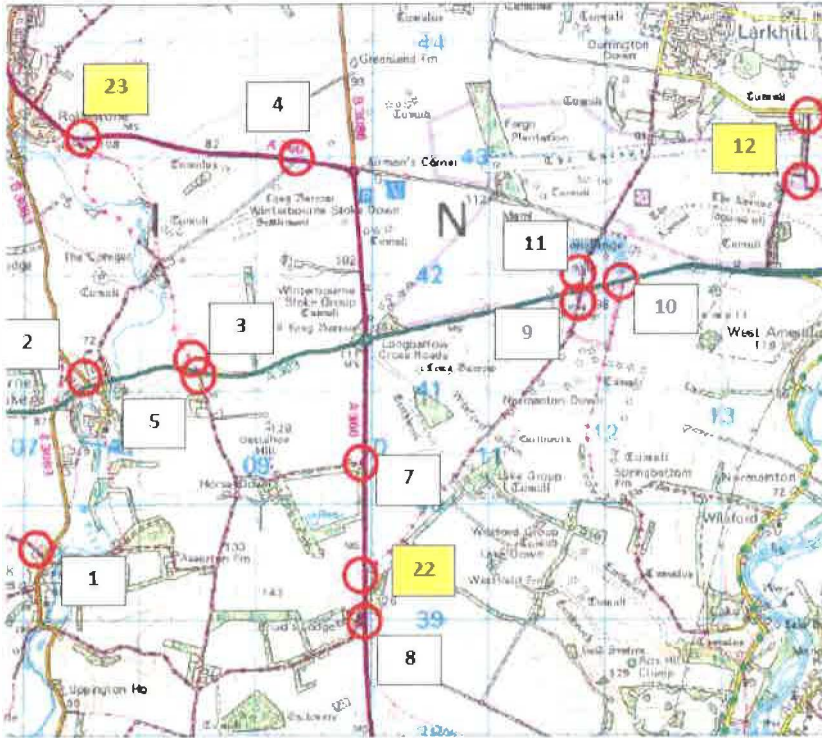
**3.4 Survey Location 2: Wednesday 27/08/2008**

TIME	DIRECTION	PED	CYCLIST	MCL	CAR/LGV	AGR VEH	HORES	OTHER	TOT	COMMENT / DESCRIPTION
08:54	SB	1	-	-	-	-	-	-	1	MALE JOGGING
08:56	NB	1	-	-	-	-	-	-	1	MALE JOGGING SAME AS ABOVE
12:19	SB	-	-	-	1	-	-	-	1	4X4 WITH 4 OCUPANTS
13:18	NB	-	-	-	1	-	-	-	1	VAN - 8TTV
14:27	SB	1	-	-	-	-	-	-	1	MALE WALKING
14:41	NB	1	-	-	-	-	-	-	1	MALE WALKING SAME AS ABOVE
15:49	NB	-	-	-	1	-	-	-	1	JEEP WITH 5 OCUPANTS - 7VFJ
15:56	SB	-	1	-	-	-	-	-	1	MALE CYCLING
17:05	SB	-	-	1	-	-	-	-	1	MALE WITH RED BIKE
17:31	NB	-	-	-	1	-	-	-	1	RENAULT MEGANE
18:12	SB	1	-	-	-	-	-	-	1	MALE JOGGING
18:51	NB	1	-	-	-	-	-	-	1	MALE JOGGING SAME AS ABOVE
<b>P/TOT</b>		<b>6</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	

## **Appendix C.3**

### **Extract of June 2018 Traffic Count**

Position of Traffic Count (Undertaken by WSP for Highways England) Points and Data June 2018



The locations of 9, 10 & 11 on byways 11 & 12 are relevant to Byways 11 and 12. The traffic count was undertaken in June 2018 and includes information of motorised vehicles, and users on foot (pedestrians), by horse and bicycles.

a. Traffic Count Location 9

Situated on Byway 12 counting traffic flows south of the A303

Picture below



**Total Daily Movements Summary**

Date	North to South			South to North		
	Car	Motor-cycle	Total	Car	Motor-cycle	Total
01-06-2018	9	2	11	8	1	9
02-06-2018	31	11	42	30	11	41
03-06-2018	16	2	18	19	11	30

All Movements Total
20
83
48

**b.Traffic Count Location 10**

Situated on Byway 11 counting traffic flows south of the A303



Date	North to South			South to North			All Movements Total
	Car	Motor-cycle	Total	Car	Motor-cycle	Total	
01-06-2018	11	0	11	7	0	7	18
02-06-2018	14	4	18	10	0	10	28
03-06-2018	15	4	19	16	4	20	39
04-06-2018	10	0	10	6	0	6	16
05-06-2018	12	0	12	11	0	11	23
06-06-2018	27	1	28	24	1	25	53
07-06-2018	11	1	12	13	1	14	26

08-06-2018	2	0	2	2	0	2	4
09-06-2018	15	4	19	11	6	17	36
10-06-2018	21	1	22	19	1	20	42
11-06-2018	17	9	26	23	11	34	60
12-06-2018	19	0	19	13	1	14	33
13-06-2018	20	2	22	15	2	17	39
14-06-2018	13	1	14	11	1	12	26

c. Traffic Count Location 11

Situated on Byway 12 counting traffic flows north of the A303

Picture below



d. Traffic Count Location 11

Site 11 Traffic flow info below



**Total Daily Movements Summary**

Date	North to South			South to North			All Movements Total
	Car	Motor-cycle	Total	Car	Motor-cycle	Total	
01-06-2018	50	8	58	51	8	59	117
02-06-2018	104	19	123	121	20	141	264
03-06-2018	99	10	109	98	20	118	227

Traffic Count Location Sites 9/10/11 to be compared with Traffic Count location Site 22 which joins A360 and leads to Byway 12 (byways Woodford 15, Berwick St James 11 and into Wilsford cum Lake 1)

E. Traffic Count Location Site 22



f. Traffic Count Location Site 22 Traffic info

Total Daily Movements Summary							
Date	North to South			South to North			All Movements Total
	Car	Motor-cycle	Total	Car	Motor-cycle	Total	
01-06-2018	1	2	3	0	1	1	4
02-06-2018	4	3	7	1	2	3	10
03-06-2018	2	0	2	5	5	10	12
04-06-2018	0	8	8	3	0	3	11
05-06-2018	2	0	2	4	0	4	6
06-06-2018	1	8	9	1	0	1	10
07-06-2018	5	0	5	4	0	4	9
08-06-2018	2	0	2	2	0	2	4
09-06-2018	5	3	8	6	0	6	14
10-06-2018	1	13	14	2	3	5	19
11-06-2018	1	0	1	2	0	2	3
12-06-2018	2	1	3	3	0	3	6
13-06-2018	1	0	1	4	0	4	5
14-06-2018	0	2	2	1	0	1	3

15-06-2018	1	1	2	2	5	7	9
16-06-2018	1	0	1	3	1	4	5
17-06-2018	3	2	5	2	0	2	7
18-06-2018	0	0	0	0	4	4	4
19-06-2018	0	0	0	1	0	1	1
20-06-2018	0	2	2	3	0	3	5
21-06-2018	0	0	0	0	0	0	0
22-06-2018	0	0	0	1	0	1	1
23-06-2018	0	2	2	2	1	3	5
24-06-2018	0	3	3	0	1	1	4
25-06-2018	1	0	1	1	0	1	2