

A303 Amesbury to Berwick Down

TR010025

Deadline 4

**8.30.4 - Written summaries of oral submissions put at
Flood risk, Groundwater, Geology and Waste
hearing on 11th June 2019**

APFP Regulation 5(2)(q)

Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

June 2019



Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Examination Procedure)

Rules 2010

A303 Amesbury to Berwick Down

Development Consent Order 20[**]

Written summaries of oral submissions put at Flood risk, Groundwater, Geology and Waste hearing on 11th June 2019

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1 Introduction

- 1.1.1 This document summarises the oral submissions made by the Applicant at the Issue Specific Hearing on Cultural Heritage held on Tuesday 11th June 2019.
- 1.1.2 Where the Examining Authority requested further information from the Applicant on particular matters, or the Applicant undertook to provide further information during the hearing, the Applicant's response is set out in or appended to this document.
- 1.1.3 This document does not purport to summarise the oral submissions of parties other than the Applicant, and summaries of submissions made by other parties are only included where necessary in order to give context to the Applicant's submissions in response, or where the Applicant agreed with the submissions of another party and so made no further submissions itself (this document notes where that is the case).
- 1.1.4 The structure of this document follows the order of items as set out in the agenda for the issue specific hearing on flood risk, groundwater protection, geology, land contamination, waste and materials management ("Agenda"). Numbered agenda items referred to are references to the numbered items in the Agenda.

Written summary of the Applicant's oral submissions

3 POLICY AND GUIDANCE	
<u>Agenda Item</u>	<u>Highways England response</u>
<i>i. The National Policy Statement for National Networks.</i>	<p>Reuben Taylor QC, on behalf of the Highways England (the Applicant) explained that the policy aspects for geology, land contamination and waste are set out in Chapter 10 and 11 of the Environmental Statement (“ES”) [APP-048 and 049] and also the Case for the Scheme [APP-294]. Mr Taylor QC referred specifically to sections 10.2 and 11.2 of the ES, which identify the relevant policies in the National Policy Statement for National Networks (“NPSNN”) and the local authority development plan. The accordance of the Scheme with these NPSNN policies is set out in the Case for the Scheme at Appendix A, whilst accordance with the development plan policies is set out in Appendix B.</p> <p>Mr Taylor QC noted that Wiltshire Council’s LIR [REP1-057] concludes that on balance the scheme complies with all the relevant local development plan policies (CS 50,67,68 and 69).</p>
<i>ii. Wiltshire Council Core Strategy.</i>	See above comments.
<i>iii. Planning Practice Guidance (flood risk, land affected by contamination, land stability, waste).</i>	See above comments.
4 PRESENTATION BY DR REEVES	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p><u>Presentation</u></p> <p>Dr George Reeves gave a presentation raising concern regarding tunnelling problems as a result of the presence of phosphatic chalk, referring to previous drilling in 2016/17 and core samples, mentioning that one core sample disintegrated after eight days above ground.</p>

	<p>A further comment was added on a flaw in data (e.g. Blick Mead needs multi-seasonal data) and a suggestion that it would be preferable to have multi-year and multi-seasonal records.</p> <p>Dr George Reeves also mentioned 3D modelling should have been done to predict ground conditions because it shows different properties and data together. An example of the Dounreay Shaft, North Scotland was shown, which included a 3D model. Dr George Reeves commented that the scheme will impact on groundwater quality, flow and sources for farming, and the interpretation of site investigation data is inadequate.</p> <p>In addition, Dr George Reeves expressed concern over deep penetration of grout in the Stonehenge Bottom area and fracture flows which control groundwater movement. He stated that calculations should be done.</p>
<h2 style="text-align: center;">5 GEOLOGY, GROUND CONDITIONS AND GROUNDWATER FLOWS</h2>	
<h3>5.1 Methodology and modelling</h3>	
<p style="text-align: center;"><u>Agenda Item</u></p>	<p style="text-align: center;"><u>Highways England response</u></p>
<p><i>i. Adequacy of ground water testing, monitoring and modelling.</i></p> <p><i>ii. Geophysical survey work.</i></p> <p><i>iii. Availability of data.</i></p>	<p>Mr Taylor QC, responding to comments made by Dr George Reeves in relation to the need for 3D models, commented that the Applicant is of the view that the information presented in the ES is more than adequate at this stage of the process to identify and assess impacts. Mr Taylor QC pointed out that 3D modelling has not been used at the consents stage on other tunnelling projects through chalk geology such as Crossrail, the Northern Line Extension or Thames Tideway Tunnel. He continued, stating that tunnel boring techniques are set out in ES Chapter 2, paragraph 2.4.30 and that the closed face technique would be used. Mr Taylor confirmed that in the next Outline Environmental Management Plan (“OEMP”) draft the Applicant will make it clear that this technique will be used.</p> <p>Dr Jane Sladen (for the Applicant) responding to comments on multi-year records and highs and lows in monitoring referring to drawings in the ES Figure 2.8 [APP-040]. Dr Sladen commented that even with high groundwater levels, water will still be able to flow over and above the tunnel. She referred to Chapter 11 of the ES (APP-049), Figure 11.4 [APP-178] to demonstrate the regional nature of the chalk flow. Dr Sladen stated that the Applicant had considered the fractures in the chalk aquifer and detail on a local level, but the chalk is a large principal aquifer and this figure demonstrates its scale and the influence of abstraction from a long distance away.</p> <p>Dr Sladen confirmed that all abstractions had been considered including local farming water supplies in the ES water features survey. Dr Sladen confirmed in response to comments from Phillip Sawkill that the Applicant had visited his boreholes to understand how they operate. She advised that these are abstracting around 10,000 cubic metres per year which is approximately 1/180th of the Wessex Water abstractions. Dr Sladen showed ES figure 11.4 of groundwater source protection zones to demonstrate this [APP-178].</p> <p>Dr Sladen advised that a groundwater model was used to model groundwater flow using an Environment Agency model, and was used to look at peak and drought periods. Dr Sladen advised that this is an accepted method of simulating flow at a regional scale.</p>

	<p>She confirmed that it is not unusual to have a relatively short record of groundwater level data local to a scheme and extend this with longer records from boreholes across the catchment.</p> <p>Using this model, Dr Sladen advised that the tunnel would cause a damming effect leading to a rise in groundwater level upgradient of the tunnel and a reduction downgradient. Dr Sladen presented figure 4.1 and 4.11 from Appendix 11.4 of the ES [APP-282] and advised the effect is 0.02 metres in the outer area rise, with a rise of 0.5 metres nearer the tunnel. Under drought conditions, Dr Sladen advised that there would be a lowering downgradient of 0.02 metres local to the tunnel area.</p> <p>Responding to comments on information being provided, Dr Sladen referred to more recent reports issued at Deadline 3, references REP3-017 to 022, which provide more data at regular intervals. She advised that although the ES had adequate data, more data is being collected on water levels at 15-minute intervals. Dr Sladen advised that pumping tests had also been undertaken, and the reports conclude that the ES conclusions stay as they are. She advised that the ES approach was precautionary, but the further testing has supported the findings.</p> <p>Dr Gerald Conn on behalf of the Applicant responded to comments from Dr Reeves, stating that he agreed chalk is a variable material that is fractured in nature. Dr Conn mentioned that he had spoken to Professor Mortimer, a consultant for the Applicant, about logging of boreholes. Professor Mortimer had advised that Borehole 501, the example used by Dr Reeves in his presentation, was more damaged for the reason that, in order to improve the quality of recovered samples the contractor had experimented with a different type of drilling bit. Unfortunately, the bit had caused more damage to the samples and so its use was discontinued following completion of Borehole 501 and the investigation continued using a less disruptive drill bit. Turning to 3D modelling, Dr Conn explained that to do justice to the ground conditions this would require more boreholes than currently permitted, and he stated concerns over getting land access to do this. Dr Conn advised that a proportional approach had to be taken for this at the consent stage of the Scheme.</p> <p>Marie Ayliffe on behalf of the Applicant responded to points made on grout penetration, reiterating that guesswork is not used for tunnelling but the contractor would use a risk management approach and strategy, employing further investigation as required as part of standard approach set out by the Institution of Civil Engineers, the British Tunnelling Society and Association of British Insurers.</p> <p>Ms Ayliffe responded to the grouting concerns over the development of voids from Dr Reeves, confirming that an integral part of the tunnel boring machine design is the ability to backfill, as there would be a small annular gap around the tunnel that would need to be backfilled to support the lining and limit the settlement from the ground closing around the lining. Ms Ayliffe advised that this operation would be governed by best practice including the recommendations of the International Tunnelling and Underground Space Association ITA-AITES Report no.4.</p> <p>Ms Ayliffe advised that grouting would be undertaken in a controlled manner at the rear of the tunnel boring machine as the completed rings are built in conjunction with the bentonite pressure system at the front of the machine. She confirmed that the pressure would be continually monitored and updated for fluctuations in groundwater variations, as undertaken for the tunnelling projects in progress in London which deal with daily tidal changes causing different pressures.</p> <p>The Examining Authority asked what controls are in place to prevent grouting from escape, and whether this could reach depths Dr Reeves talked about.</p>
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Ms Ayliffe explained that the grouting process includes development of the materials specification, the use of the set accelerators and the viscosity of the grout itself. Ms Ayliffe advised that injection pressures and volumes are controlled and monitored as part of the whole operation of grouting, and doing otherwise would be uneconomic. Targeted grouting would be used to deal with ground stabilisation.

Ms Ayliffe stated that the properties and characteristics of the grout will be carefully selected to limit the issue of grout migration and dilution and other effects from groundwater and fissures in the chalk.

Responding to an Examining Authority question, Ms Ayliffe advised that the Grout is a 2-part component mix of 80% water, with some cement and PFA and a gelling agent / accelerator. She confirmed that the grout would gel in a matter of tens of seconds. Ms Ayliffe added that the OEMP MW-W18-9 [REP3-006] notes the contractor will seek approval for components of grout from the Environment Agency. Addressing concerns over the depth that grout may reach raised by Dr Reeves, Ms Ayliffe stated that if grout is being lost this would be assessed on site, although the whole design is predicated on not losing that much and also monitoring as tunnelling proceeds. She highlighted a technical paper prepared for the Lee Tunnel where tunnelling was successfully undertaken in chalk up to grade D with all of the grouting in the tunnel horizon itself.

Post Hearing Note:

Lee Tunnel: tunnel constructed using a slurry pressure balance full face TBM of 8.9m diameter at a depth of approximately 80m. The 200mm void between the excavated surface and extrados of the tunnel was filled with rapid setting grout to reduce surface settlements which were generally less than 2mm. The tunnel was constructed mainly through the Seaford Chalk Formation except a short section of some 900m through Thanet Sand. Lower and upper aquifers existed in the Seaford Chalk and River Terrace Gravels respectively with intermediate London Clay and Lambeth Group strata generally providing hydraulic separation of the two aquifers. However where the latter deposits were absent, the aquifers were in direct hydraulic continuity with additional tidal influences from the River Thames. Further information is available via the technical paper 'TBM Performance through the engineering geology of the Lee Tunnel' Newman, Bellhouse, Corcoran, Sutherden and Karaouzene: Proceedings of the Institution of Civil Engineers: Geotechnical Engineering 169: June 2016 Issue GE3 Pages 299-313.

Ms Ayliffe responded to an Examining Authority question stating that the projects mentioned in London were comparable in terms of variance in geology as those for the Scheme.

The Examining Authority asked if ground stabilisation is required in the tunnel, what type of grouting would be required, and whether it would cause any more problems than normal grouting described. Ms Ayliffe confirmed grouting is similar for ground stabilisation, as the area is targeted, so although the mix may differ, it is aimed at the geology and hydrogeology expected in the area so the mix is made according to those parameters.

Marie Ayliffe responding to a question from the Examining Authority, advised that the projects in London were not in rural locations so did not involve farmer's borehole water supplies, but the same principle applied as these projects involved tunnelling in drinking water chalk aquifers, meaning that there had to be no adverse effects on them. Ms Ayliffe advised that this demonstrated the use of an appropriate tunnel boring machine through complex geology without needing dewatering for the TBM.

The Examining Authority asked whether the next OEMP would confirm that there would be no dewatering. **Mr Taylor QC** explained that the detail on the dewatering question is in the Applicant's comments on the written representations submitted at Deadline 3 at paragraph 22.5.24. [REP3-013] and following. Mr Taylor QC also highlighted that the implications of de-watering were set out in the ES at 2.4.3.4 [APP-040], 11.8.3 (i) and 11.9.7(b) [APP-049] and highlighted the explanation is in the OEMP NWWAT 8 [REP3-006] which states that the need for groundwater control will be minimised as far as possible in the project. He clarified that it could not be ruled out, as depending on groundwater levels at the time works are undertaken, it may be required for construction of the tunnel portal slab to launch the tunnel boring machine. Mr Taylor QC also highlighted the need for cross tunnels for mechanical and electrical services at Stonehenge bottom.

Philip Sawkill asked what happens south of the A303 where he farms. **Jane Sladen** explained that at peak levels there would be a rise upgradient and a fall downgradient of the tunnel. She highlighted that because there were already high levels, the fall downgradient at Mr Sawkill's boreholes does not make water levels lower than their lowest levels.

The Examining Authority sought clarity on tunnel boring methods, which are confirmed as closed face, and that there are three methods within that type and why flexibility was needed.

Marie Ayliffe explained the different types of tunnel boring methods, the basic choice is a closed face tunnelling machine, but the final selection depends on geology and logistics of how the contractor deals with arisings. She outlined that at one end of the scale is a Slurry machine, which deals with hard rock. At the other is an Earth Pressure Balance machine which deals with more cohesive ground. In between the two extremes is the more sophisticated Variable Density machine, which uses fundamental parts of both to deal with a wide range of geology. Ms Ayliffe confirmed that all could deal with the hydrogeology, but the geology would dictate which would be used, adding that Slurry tunnel boring machines are most common in the UK for tunnelling in chalk although Variable Density machines are gaining a reputation for dealing with the more complicated chalks.

Ms Ayliffe advised that added flexibility in the choice of methods is required because of the quality of arisings produced by the different methods. She advised that all deal with differences in the geology and hydrogeology in much the same way, but which is used depends on the logistics as well as the geology. Ms Ayliffe stated that the Applicant was leaning towards a slurry machine approach; this is the more conservative TBM for consideration due to the need for land for a slurry treatment plant. She stated that logistics of moving excavated material from the tunnel face to the compound also dictate it might be better for a slurry process as this can be pumped rather than for the other processes which produce a dryer mix to be moved. **Mr Taylor QC** explained that the Applicant wrote a letter dated 12 November 2018 to the Planning Inspectorate, which addresses flexibility within the DCO. He confirmed that section 4 of the letter sets out the reason for flexibility in the project as a whole and this reasoning applies to the choice of tunnel boring machine. Mr Taylor QC elaborated that there are several factors for the choice of machine, but at this stage, the

assessment is for the whole range of machines which is necessary as the stage has not been reached for value engineering to have been finalised. He stated that as matters progress, and more information comes to light, and aspects of the design crystallise, these will affect the method of tunnel boring.

Louise Staples for the National Farmers Union asked for clarification that land requirements have covered all types of machine e.g. slurry. **Marie Ayliffe** explained the volume of arisings will not change with the method of tunnel boring.

Charles Hedges asked about the tunnelling examples in London, including whether there was potable water resources down gradient, what is the overburden pressure or depth of the tunnels, what is the actual width and roughness of the fissures, and flow velocities in the fissures and flow rates. He also asked for the shear strength, water content and plastic content of the slurry. **Mr Taylor** confirmed this information could be provided at Deadline 4.

Post Hearing Note:

The specific details of the slurry to be used on the scheme will be agreed at detailed design following the completion of subsequent site investigation and TBM design activities. However further details have been provided below of the principles applied in the grouting and ground stabilisation operations.

Backfill Grouting - The backfill grouting process is effectively a mass balance exercise and the material specification; use of setting accelerators; viscosity; injection pressures, and injection volume are all tightly controlled and monitored to ensure voids are completely filled and with minimal grout migration beyond the excavated profile. Grout migration is minimised by the Setting/Gel time; the grout mix begins to solidify rapidly once the sodium silica (Component B) mixes with the Component A grout and this change in physical composition from a liquid to solid state prevents the grout from flowing beyond the annular gap.

Face Pressure - Face stability at the cutting head is controlled by the Bentonite / chalk slurry caking effect. The excavation action of the TBM produces a slurry of water, chalk and bentonite. This slurry mix displaces the groundwater in the immediate vicinity of the TBM and the solid particles in the slurry form a 'cake' which fills the fissures and voids in the chalk. This cake filter build-up effectively blocks the movement of solids further into the rock mass.

Ground Stabilisation - Grout mix compositions are developed to suit the specific ground conditions encountered so there is no standard mix design. Generally, it is based on contractor's experience, dealing with similar ground types and conditions, supported where necessary by grout trials to determine the most appropriate mix and injection pressures. The basis for most grouts is a combination of PFA/cement and water. Additives can be added to vary the viscosity of the grout and/or increase or decrease the setting or gel time. This allows various ground conditions to be treated ranging from fine sand/gravels to fissured rock. It may be necessary to carry out a staged approach to grouting operations for example dealing with water bearing fissures and voids may require the initial injection of a fast acting viscose grout to form a plug or create a boundary within the ground matrix, followed by a less viscose secondary grout pass to fill the void.

Dr Reeves suggested that the comparison with London examples and the scheme is invalid, because of chalk aquifer differences, they do not have significant archaeological artefacts and do not affect public water supply. He also noted that on one of the projects referenced, 3D modelling had been used. **Mr Taylor QC** responded that the modelling for that project was done post-consent. **Ms**

<p>Ayliffe explained that the examples quoted are tunnelling in sensitive locations, in the proximity of significant heritage assets, with complicated geology.</p> <p>Dr Sladen added Thames Tideway passes through confined and unconfined aquifers and chalk in different states. She confirmed that there are abstractors in central London, and tunnelling goes close to those. Dr Sladen added that there is monitoring of those abstractors, and monitoring boreholes in use as used on the scheme. She continued outlining that tracers were a good method of tracking fractures, but there was no evidence of continuous fractures on this Scheme, only fractured zones. There would be further ground investigations, and if such fractures were found, this would be taken into account. Dr Sladen advised that pumping tests were preferred as these tests show the bulk aquifer properties accounting for the fractures and changes in properties across the aquifer.</p> <p>Dr Sladen replied to comments from Mr Hedges and Howard Smith that three pumping tests in different chalk type areas carried out in 2018, added to previous pumping tests as outlined in REP3-017 which shows the findings of pumping test. She clarified that these did not affect the results of the ES.</p> <p>Mr Taylor QC responding to comments from Mr Hedges, confirmed that the Applicant takes the protection of farms and businesses very seriously. He mentioned matters relating to abstraction within the vicinity of the Scheme are assessed within the ES in the appendices, encompassing abstractions as far away as the Hosier's abstractions 2-3 kilometres away. Mr Taylor QC advised that the result of this assessment is that the Applicant has not identified any likely significant effects on abstraction as a result of the Scheme. However, due to it taking this issue so seriously, the Applicant has included in the OEMP a number of controls to ensure that the access to water and safety of the abstraction boreholes continues in the future. Further, the Groundwater Management Plan (OEMP MW-WAT10) to be produced in consultation with the Environment Agency has to address a number of matters including the potential effects of the Scheme on groundwater, an update to the groundwater risk assessment for final design and construction plan, groundwater level and quality monitoring and reporting and has to develop baseline groundwater conditions and the derivation of trigger and action levels and mitigation and action levels. Further, Mr Taylor QC highlighted MW-WAT11 requires the main contractor to recognise rights of existing abstractors and take measures to avoid or minimise as far as reasonably practicable loss or interruption of supply or provide alternative supplies, including consultation with existing abstractors. In relation to water quality monitoring, Mr Taylor noted MW-WAT11(c) requires the main works contractor to put in place emergency measures to overcome adverse impacts from construction works. Therefore, the Applicant considers that there are a number of detailed controls already in place to protect supplies for a number of farms notwithstanding the assessment of no likely significant effects.</p> <p>Responding to other comments from Mr Hedges, Dr Sladen mentioned there is no evidence of rapid fissure flow. She noted that Source Protection Zones for public water supplies are outside the zone of influence of the Scheme. Regarding concerns over grout infiltration, Dr Sladen noted that grout is designed to have certain viscosity to set rapidly and hence local to the tunnel and not to flow through fractures.</p> <p>In regard to concerns of pathogens entering the water table, Dr Sladen stated that she was unsure where source of pathogens would come from, noting that it is unlikely to come from a road scheme, but more likely to derive from farming practice. Dr Sladen advised that the Hosier's boreholes are undergoing assessments for monitoring following a request from the farm owner.</p> <p>In reply to comments from Mr Hedges, Dr Sladen confirmed that the Applicant had not carried out analysis using Drinking Water Inspectorate ("DWI") lists analysis, but a general suite of groundwater analysis because the Hosiers water supply already has a</p>
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	drinking water analysis undertaken regularly from the local authority. Dr Sladen stated that it is not the Applicant's role to assess potability. The role of the general analysis around the catchment is to establish a baseline chemistry, in parallel with measuring water levels in boreholes for a baseline of groundwater levels pre-construction.
5.2 Construction	
<u>Agenda Item</u>	<u>Highways England response</u>
<p><i>i. Vibration and land stability.</i></p> <p><i>ii. Voids.</i></p> <p><i>iii. Subsidence.</i></p> <p><i>iv. Slope failure at cuttings.</i></p> <p><i>v. Settlement and compaction of rock.</i></p> <p><i>vii. Monitoring and remediation.</i></p>	<p>Mr Taylor QC responding to comments on monitoring from Paul Brown QC for Wiltshire Council mentioned that the OEMP e.g. NM-WAT10 requires a groundwater management plan and refers to the potential for ongoing monitoring, as does WAT15 and MW-COMM4. He advised that the period of monitoring is a matter for discussion with stakeholders. Responding to comments from Mr Hedges, Mr Taylor QC advised that the Applicant has not seen any scientific proof of fissures in the ground along the line of the tunnel but highlighted the comments of the Environment Agency and Dr Sladen.</p> <p>Mr Taylor QC mentioned in response to comments from Barry Garwood on vibration matters that these are carefully assessed in Chapter 9 of the ES. He noted that an explanation on the process undertaken is set out in the comments on written representations provided at Deadline 3 [REP3-013], in particular those at and following paragraph 15.2.29 which explain methods used following BS5228 (2009) and A1 2014 the Code of Practice, which is relevant to the construction of tunnels. This methodology assumes tunnelling in rock with a hydrologic hammer. Mr Taylor QC advised that even on that basis, the results show a PPV of 0.16 millimetres per second at Stonehenge, whilst for context, the criteria for protection of listed buildings on the Crossrail project was 3 millimetres per second.</p> <p>Regarding settlement, Mr Taylor QC advised that these issues were assessed in the Land Instability Risk Assessment Report at Appendix 10.6 [APP-278], of the ES. He noted that this assessment demonstrated a conservative and precautionary approach and even on that basis at most the settlement identified is 20 to 30mm above the line of the tunnel and spreading to the edge no more than 55 metres from the line of the tunnel itself.</p> <p>Ms Ayliffe explained that the typical surface monitoring will be complemented by vibration monitoring. She noted that these are commitments in the Heritage Management Plan and the Ground Movement Monitoring Strategy. Mr Taylor QC added that monitoring of ground movement in the OEMP is covered by MW-G7, setting out strategies to be covered, MW-CH1 relating to the Heritage Monitoring Plan, specifically requiring monitoring in a heritage context, and MW-CH8.</p> <p>Mr Taylor QC replied to comments from Kate Fielden on behalf of Stonehenge Alliance that construction of tunnel portals was addressed in the Land Instability Risk Assessment Report. He noted that section 5 set out the potential sources of movement and section 6 sets out the results of the assessment. In regard to retaining walls related to tunnel portal construction, Mr Taylor QC stated the conclusion reached is that 8mm of settlement would result.</p>

6 FLOOD RISK AND DRAINAGE	
6.1 Updated Flood Risk Assessment and finalised hydrogeological reports (submitted at Deadline 3) [REP-TBC]	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>Will Rogers on behalf of the Applicant, in response to a question from the Examining Authority confirmed that the updated Flood Risk Assessment (“FRA”) [REP3-008] follows work undertaken with the Environment Agency and Wiltshire Council on the fluvial and pluvial models respectively which has allowed the Applicant to add more detail into these. He confirmed that these changes do not affect the conclusions of the ES, and in fact there was a benefit to a B road to the north of Stoke Winterbourne, which now has a reduced flood risk as a result of a change to the Road Drainage Strategy submitted at Deadline 2 [REP2-009].</p> <p>Mr Rogers added in response to a question from Mr Hedges that the flood events of 1841 and 2000 have been considered as part of the FRA.</p>
6.2 Drainage strategy during construction.	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>Mr Rogers advised that the updated FRA [REP3-008] outlined effects on the River Avon floodplain. He confirmed that the OEMP sets out a number of conditions on the contractor, and that the Road Drainage Strategy [REP2-009] provides that there will be no increased flood risk. Mr Rogers advised that during construction there would be monitoring to ensure there would be no increased runoff.</p> <p>Turning to the impact on the Rivers Avon and Till, Mr Rogers highlighted that the Applicant was conscious that it would be working in a sensitive area, so there would be requirements on the contractor to ensure the rivers are protected, as set out in the OEMP. Mr Rogers stated that these were not only protection for the control of pollution but also from flood risk, so that the contractor would have to ensure that any floods during construction would be managed to ensure there is no increase in flood risk due to construction.</p> <p>Responding to a question from the Examining Authority, Mr Taylor QC set out the OEMP references as MWWA2, MWWAT6 and MWWAT7 relating to protection of watercourses during construction.</p> <p>Following comments from Carli Van Niekerk of Wiltshire Council noting that MWWAT3 does not require consultation with Wiltshire Council for site drainage, Mr Taylor QC confirmed that the Applicant would take this point into account in the next draft of the OEMP.</p> <p>Responding to comments from Dr Reeves, Mr Taylor QC advised that the documents are not final as can be seen from the commitments in the OEMP relating to groundwater set out at MWWAT10, the Groundwater Management Plan, at b, which requires the contractor to update the groundwater risk assessment for the final design and construction plan. He clarified that fitness for</p>

	<p>purpose of the documents for the DCO application process was not the same as for construction, for which more work would be needed.</p> <p>Replying to a query from Ms Staples, regarding whether only MWWAT3 in the OEMP clarifies how drainage will be dealt with during construction, Mr Taylor QC advised that Requirement 10 of the draft DCO [REP3-002] also requires Wiltshire Council's consent. Mr Taylor QC requested that any redraft requests be put in writing, preferably with drafting.</p> <p>Mr Taylor QC advised the Examining Authority that discussions were continuing with Wiltshire Council regarding the employment of a full time drainage engineer during construction.</p>
6.3 Wiltshire Council's peer review of the approach to flood risk.	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>Responding to comments from Wiltshire Council on the outstanding points, including a need for the supporting model outputs, Mr Taylor QC advised that these models would be sent out this week.</p> <p>Post Meeting Note:</p> <p>The requested model outputs were issued the week of the hearing.</p> <p>Clarification was requested by the Environment Agency and Wiltshire Council's peer reviewers. This was provided in working drafts of groundwater reports [AS-016, AS-017, AS-018 and AS-019] which have been made available for interested parties on the A303 application page of the PINS website. Ground investigation and monitoring is ongoing as more data is being collected for design purposes. These reports confirm that the findings of the ES [APP-049] remain valid and the impact assessment is precautionary. The working draft groundwater reports have been reviewed by the Environment Agency, Wiltshire Council and their peer reviewers and the final versions are submitted at Deadline 3. For further detail please refer to responses to the Written Representations from the Environment Agency[REP2-094] and Wiltshire Council[REP2-045].</p> <p>Final Groundwater reports are REP3-017 to 022. The FRA is REP3-008.</p>
6.4 Climate Change Allowance	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>Ms Van Niekerk outlined that the outstanding climate change allowance is on road drainage. She advised that Wiltshire Council had recommended a 40% allowance, but the Applicant has suggested 30%, with a 10% increase undertaking sensitivity testing.</p> <p>Giles Bryan of the Environment Agency requested that requirement 10 of the DCO be amended to refer to a requirement that the drainage strategy does not result in flooding, as well as the current requirement on contamination.</p>

	<p>Regarding the strategic overview, the Environment Agency stated that it preferred the 40% allowance.</p> <p>Mr Taylor QC on the issue of climate change allowance for road drainage, referred to the Applicant's response to the Examining Authority's written question FG1.20, confirming that discussions were still ongoing. As the Environment Agency had advised, Mr Taylor QC confirmed that the options were for the Applicant to persuade Wiltshire Council and the Environment Agency of the case for the 30%, or alternatively for the Applicant to change its stance. He confirmed that discussions were ongoing and the Applicant would update the Examining Authority as these progressed.</p> <p>Regarding the Environment Agency's requirement 10 suggestion, Mr Taylor QC advised that the Applicant would take this point away and discuss with the Environment Agency.</p>
<h2>6.5 Road Drainage Strategy</h2>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
<p><i>i. Access, adoption and maintenance responsibilities for drainage infrastructure (including Wiltshire Council).</i></p>	<p>Mr Taylor QC highlighted that maintenance responsibilities are set out in the Road Drainage Strategy [REP2-009]. He advised that this strategy is compliant with the Design Manual for Roads and Bridges. Mr Taylor QC advised that long term maintenance and standards have been discussed and agreed with Wiltshire Council, as set out in paragraph 3.28.10 of the Statement of Common Ground [REP2-018].</p> <p>Ms Van Niekerk advised that maintenance will be covered in the Handover Environment Management Plan ("HEMP"). As Wiltshire Council is a maintenance authority, Ms Van Niekerk advised that the Council wished to be consulted on this document.</p> <p>Mr Taylor referred to paragraph MWG-11 of the OEMP that explains that the HEMP will be produced in consultation with Wiltshire Council, the Environment Agency, Natural England and Historic England.</p> <p>Barry Garwood expressed concern over flood water run-off from the tunnel and flyover to Blick Mead.</p> <p>The Examining Authority asked (1) what happens with road drainage currently; (2) what is proposed; and (3) what flows ultimately flow into Blick Mead in terms of quantity and quality.</p> <p>Dr Sladen confirmed that the drainage around Blick Mead is covered in Appendix 11.4 Annex 3 [APP-282]. She highlighted paragraph 2.5.4, and figure 2.11 show the A303 existing and proposed arrangements. The Applicant, Dr Sladen advised, has kept the Blick Mead drainage arrangements the same as the existing road.</p> <p>Will Rogers stated that betterment related purely to the quality of road runoff, which would be subject to improved pollution control arrangements. He emphasised that the quantity and flow would not however change. Mr Rogers confirmed this was secured in paragraph 5.2.5 of the Road Drainage Strategy. [REP2-009]</p> <p>The Examining Authority asked about confidence that the degree of flow would not change, and what monitoring and remediation would be required.</p>

	<p>Mr Taylor QC advised that due to there being no significant effects predicted in that area, no monitoring was assessed as required. However, he advised, the OEMP and the Road Drainage Strategy, there is a possibility of the strategy addressing monitoring in that location to verify the ES, albeit the Applicant does not consider it a necessity.</p> <p>Responding to an Examining Authority question, Mr Rogers advised that culverts downstream from Blick Mead may be amended, but water running past Blick Mead will not change in terms of quantity, only quality.</p> <p>Adding to this, Mr Evans on behalf of the Applicant confirmed that the volume and route of water would remain the same. He advised the ditch runs alongside the southern boundary of the highway, with the final discharge to the east into the Avon. Mr Evans stated that the existing discharge points will be maintained.</p> <p>Responding to comments from Ms Fielden, Mr Rhind-Tutt and Mr Hedges, Mr Taylor QC advised that the catchment for the drainage will be designed to reflect the current catchment. In terms of emergency response, Mr Taylor QC referred to the Water Management Plan required by MW-WAT2 of the OEMP, which explains that the emergency preparedness and response plan required by MW-G20 and the pollution incident control plan MW-WAT4 will include effects on water resources, and will follow Environment Agency guidance. He also pointed to MW-WAT5, relating to pollution monitoring, and MW-WAT6 regarding protection of watercourses, which requires the main works contractor to incorporate measures to protect watercourses within construction sites, and MW-WAT7 includes protection measures for water protection.</p> <p>Regarding changes to the surface area and traffic volumes, Mr Evans stated that the catchment areas, being the areas of the highway that are considered to contribute to the volume from the highway, has been selected such that it is on a similar scale to the existing catchment that discharges in the Blick Mead area. Responding to an Examining Authority question, Mr Evans referred to Figure 5.2 in Appendix 11.3, which shows the two areas contributing. He advised that there is a difference in linear size, but the area is the same. Other areas discharge further east.</p> <p>Mr Taylor QC responded to comments from Mr Hedges, in addition to comments previously made on emergency responses to spillages etc that an impounding sump was also proposed.</p>
<p>ii. Modification to strategy and model to remove 359m culvert.</p>	<p>Mr Brown QC and Ms Van Nieke confirmed that the changes to the culvert design had gone a long way to satisfying their concerns but Atkins were still reviewing the proposals on their behalf and they would provide details to the Examiner at Deadline 4</p> <p>Ms Van Niekerk confirmed that the proposal matches what was agreed, but the Council were reviewing the flood implications.</p>

<p><i>iii. Impounding sump.</i></p>	<p>The Examining Authority asked the Applicant how pollution incidents would be resolved, and whether this should be included as part of the Works Plans.</p> <p>Mr Evans outlined how the system works. He stated that the water in the tunnels is carried in by vehicles and seepage from groundwater, which would be collected at a low point in the drainage system where there is a sump. It is then pumped through the eastern portal area where, if it is deemed clean, i.e. there are no maintenance works or incidents ongoing, then it is carried on to join the highway drainage as would water from an open highway. Mr Evans stated that if there is an incident in the tunnel such as a fire, or normal maintenance, this water is automatically deemed contaminated. He stated that this water would be collected in the sump, then pumped to the eastern portal but at that point it can be changed in direction to the impounding sump, where it is collected and contained until it can be removed by tanker, treated, cleaned and disposed of in a safe manner.</p> <p>Responding to an Examining Authority question, Mr Evans stated that determination of whether water is clean or dirty would be part of the tunnel operational procedures. He advised that this would be a manual process based on whether any of the events causing dirty water had occurred, such as maintenance or an incident.</p> <p>Mr Taylor QC answered an Examining Authority question on how quickly a manual change could be made by confirming that the tunnel maintenance strategy forms part of the HEMP, to be developed under the OEMP, which is secured by Requirement 4 of the draft DCO. Mr Taylor QC also highlighted requirement 10, which requires details of the drainage for each part of the scheme to be approved by the Secretary of State, to be based on the mitigation including the strategy.</p> <p>Mr Brown QC stated that Wiltshire Council were of the view that if an automatic system was required this should be in the OEMP. Giles Bryan of the Environment Agency stated that he considered that it would be automatic, and was content for this to be at detailed design stage, noting this would add to uncertainty.</p> <p>Mr Taylor QC advised that by virtue of requirements 4 and 10 that the Secretary of State has the ultimate decision making power, therefore it is a matter with external scrutiny. Regarding automation, Mr Taylor QC advised that discussions would have to take place on this, particularly regarding issues such as what the trigger would be.</p> <p>Responding to comments from Mr Rhind-Tutt on decommissioning of the sump, Mr Taylor QC referred to the ES paragraph 2.6.1.</p>
<p>6.6 Mitigation and monitoring (effectiveness of Requirement 10 in the draft Development Consent Order (dDCO) and the OEMP).</p>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
	<p>No comments from the Applicant.</p>

6.7 Disapplication of legislative provisions and Protective Provisions.	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>Mr Brown QC confirmed that Wiltshire Council's concerns over disapplication of land drainage provisions were now eased if the OEMP would confirm the type of tunnel boring machine. He confirmed that protective provisions were still under negotiation, confirming these would be broadly similar to those for the Environment Agency.</p> <p>Kath Burt of the Environment Agency confirmed that they had agreed to disapplication of the requirement for flood risk activity permits and agreed protective provisions with the Applicant.</p>
7 CONTAMINATION (INCLUDING GROUNDWATER CONTAMINATION)	
7.1 Excavated materials and tunnel arising.	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>The Examining Authority asked the Applicant to address the concerns heard regarding arisings, and explain how this will be dealt with through mitigation.</p> <p>Mr Taylor QC referred to the response submitted at Deadline 2, Written Question AQ.1.20 [REP2-023] and the detailed response at Deadline 3, and section 6.1.4 and following. Also, he referred to the Public Health England ("PHE") Report on Radiation Impacts of Phosphatic Chalk report at Appendix G1 was submitted at Deadline 2[REP2-021].</p> <p>Mike Bains for the Applicant stated that with respect to phosphatic chalk and potential radiation hazards, PHE has prepared a report which analysed samples and estimated doses to users of the land and concluded there was little radiological risk. He advised that a meeting has been arranged with Dr Shuttleworth from Winterbourne Stoke Parish Council next week and further updates will be provided to the Examining Authority afterwards. Mr Bains advised that the Applicant will endeavour to submit this for Deadline 4.</p> <p>Post Hearing Note:</p> <p>The meeting with Dr Shuttleworth and Winterbourne Stoke Parish Council took place on 20/6/2019. Following this meeting Dr Shuttleworth confirmed that he will be recommending that Winterbourne Stoke Parish Council accept PHE assurances that the radiological hazards posed by radon and radon progeny in the phosphatic chalk are likely to be insignificant in the context of normal levels of background radiation in the UK.</p> <p>Dr Reeves commented on the leaching tests and concerns that groundwater flow patterns may change and that groundwater chemistry changes may occur.</p>

	<p>Mr Taylor QC sought clarification from Dr Reeves. What the precise change in quality is that he says will occur as a result of the scheme and why that will affect the leaching tests which have been done?</p> <p>Mr Taylor QC agreed to take away the point on the possible issues with PH balance raised by Dr Reeves and Mr Hedges.</p> <p>Post Meeting Note:</p> <p>Highways England are not clear on why Dr Reeves believes that a small change in groundwater flow direction and gradient near the tunnel would have a significant effect on the PH and are not aware of this issue being a problem on recent tunnels in London but will review the further details provided by Dr Reeves in his written summary.</p> <p>Mr Taylor QC to respond to Mr Barry Garwood on issues over permeability of deposited slurry, referred to the FRA document (REP3-008), submitted at Deadline 3, which has a sensitivity analysis that examines the consequences of assuming the material that is deposited is impermeable.</p>
<p>7.2 Potential implications of the tunnel boring and grout uptake on groundwater quality.</p>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
	<p>Mr Taylor QC responded to comments from Mr Hedges on the increased potential for roadkill to cause pathogens, stating that the risk would be no greater than present.</p> <p>Dr Sladen agreed with Mr Hedges that the cutting would mean that the road will be closer to the water table, but confirmed the risk to exposure to the groundwater is not increased because of the cutting. The 50 day travel time used by the EA in source protection zones for risk from pathogens means that the risk to private water supplies is from farm activities.</p>
<p>7.3 Containment and treatment of contaminants (including in the drainage treatment areas).</p>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
	<p>David Cragg on behalf of the Applicant advised that ES Chapter 10 (Geology and Soils) [APP-048] deals with potential for contaminants to be found at various locations along the route, and looks at them as source, pathway and receptor. He confirmed that the basis of risk assessment is that it follows CLR11, which is the statutory guidance on a phased assessment of risk, as site investigation data becomes available. Mr Cragg referred to Figure 10.6, which is the first stage in the assessment of the location of potential areas of contamination. He stated that at this stage the Applicant took the site investigation data and compared those with conservative (Tier 1) levels of risk (the most cautious levels of risk) for the use of the site as a highway. Mr Cragg advised that a whole host of exposure scenarios for human health had been taken into account, with the implications for impacts on human health being set out in Chapter 10.</p>

	<p>Alongside the human health risk assessment, Mr Cragg highlighted that there was a related assessment of risk to controlled waters, which was also a conservative Tier 1 assessment, comparing site data with drinking water standards. Mr Cragg confirmed that on the basis of the data so far, the areas of contamination that pose a significant risk are very small. He added that further data is being collected in order to substantiate the current position of there being a low level of risk to human health and controlled waters from the presence of site contamination. Mr Cragg noted that the OEMP follows that through and places restrictions on how soils are excavated, inspected, stockpiled, tested, and validated to meet the criteria based risk, and if not, to carry out remediation to bring the material to a suitable level for use.</p> <p>Mr Taylor QC provided the OEMP references: MW-GEO8, construction on or adjacent to land affected by contamination, sets out the control measures for dealing with material known or suspected to be contaminated. Materials will be stockpiled and tested, prior to re-use or disposal. Materials used in the scheme will be tested to show that they are suitable for use by complying with acceptance criteria. MW-GEO8 further confirms the measures required to prevent cross contamination from stockpiles, and to protect buried services, drainage runs and groundwater source protection zones from potential ingress of contaminants. MW-GEO6 (requires contractors to control potential hazardous substances in line with COSHH guidance), MW-WAT4 (spill response procedure requirement and pollution incident control plan), MW-WAT6 (requires the contractor to establish measures to prevent deposition of silt or other material in any watercourse, lake or aquifer, in accordance within industry guidelines), MW-WAT7 (requires contractors to carry out handling of contaminated material treatment processes and storage does not affect the chalk aquifer).</p>
<p>7.4 Effectiveness of measures to mitigate contamination within the OEMP.</p>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
	<p>Mr Taylor QC noted two matters to address in response to Mr Hedges questions raised, namely, related to unplanned buried munitions and the potential for increase in chlorides as a result of gritting roads and that the material in the drainage treatment areas would not deal with that. Mr Taylor QC confirmed that the Applicant would update the Examining Authority on this at a later stage.</p>
<p>7.5 Previously unidentified contaminated land and groundwater (effective of Requirement 7 in the dDCO and the OEMP).</p>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
	<p>Gary Tomsett of Wiltshire Council advised that one minor change to the opening to Requirement 7 had been proposed to state that “In the event that contamination of land or water is identified...”. Otherwise, Mr Tomsett confirmed that discussions had been ongoing. Generally, Wiltshire Council is content.</p> <p>The Environment Agency confirmed that it is happy subject to inclusion in the OEMP of provision for unexpected contamination.</p>

	<p>Mr Taylor QC advised that drafting points would be considered from both the Council and Environment Agency. He agreed to take away a comment from the Examining Authority on how the requirement deals with contamination if works stop in that particular area until the remediation method is discussed and agreed</p> <p>Post Meeting Note: The issues raised are addressed within item MW-GEO2 of the OEMP issued at Deadline 4.</p>
<p>8 WASTE AND MATERIALS MANAGEMENT</p>	
<p>8.1 Onsite depositing of tunnel arisings.</p>	
<p><u>Agenda Item</u></p>	<p><u>Highways England response</u></p>
	<p>The Examining Authority asked the Applicant to outline the justification for alternative means of dealing with those arisings on land to the east of Parsonage Down nature reserve.</p> <p>Mr Bains advised that the approach to managing tunnel arisings is set out in Appendix 12.1 of the ES (APP-285). He confirmed that the Applicant had looked at a staged approach on how best to manage tunnel arisings, the first stage of which was whether the best approach was to take them off site, or to deposit them in the vicinity of the site. Mr Bains stated that the Applicant engaged with a number of potential beneficial users of the tunnel arisings, but none were able to commit to using the arisings.</p> <p>Mr Bains advised that a site search exercise was undertaken, that located a number of quarries and landfills in the neighbouring region. He explained that a number of potential receptor sites were identified to take the arisings including a disused quarry in Westbury and another in Quidhampton. Mr Bains stated that assessment criteria from the NPSNN for assessing the impacts of either taking these to the receptor sites or remaining on site were used, including air quality and noise on the public highway. Mr Bains noted that the Applicant had modelled the increase of traffic as a result of this movement and identified potential significant noise and air quality impacts, and widespread noise and traffic impacts. Therefore, the Applicant concluded that onsite management of tunnel spoil is the preferred option.</p> <p>Mr Bains stated that the Applicant had looked at the preferred location of this onsite management (see Figure 4.2 of the Tunnel Arisings Management Strategy, which shows an area where deposition is required as part of essential landscape mitigation). Mr Bains outlined that to identify potential onsite options, the Applicant applied a number of high level screening criteria, and to avoid transporting through the World Heritage Site, looked only at potential deposition sites to the west of the World Heritage Site, and avoiding SSSI.</p> <p>Mr Bains confirmed that for both landscape and engineering reasons, the receptor site needed to be in a valley rather than a ridge site. This gave the Applicant nine potential locations. Mr Bains stated that the Applicant used six criteria for assessing the sites based</p>

on NPSNN criteria and operational viability, resulting in seven showing large adverse impacts. He confirmed that this left two sites, one to the south and one to the east of Parsonage Down.

Mr Bains stated that the two remaining sites were broadly comparable save in relation to biodiversity and operational viability. The eastern site would provide better connectivity between the habitats of the nature reserve and Till Valley, and would offer better operational viability, requiring fewer additional haul routes and confining disturbance to a single location; these factors in combination made the site to the east of Parsonage Down the preferred site. Part of the land to the east of Parsonage Down, Mr Bains noted, would in any event (if development consent for the Scheme was granted) be required to accept a volume of tunnel arisings for essential landscape integration mitigation and, accordingly, any further impacts would effectively be impacting an already impacted site.

The Examining Authority asked for clarification on two points – what the essential landscape mitigation for the site is, and why it is required.

Richard Hammond for the Applicant explained that at this point the proposed scheme is on embankment, crossing north of Scotland Lodge Farm, then crossing the realigned B3083. He stated that for landscape integration purposes it is required that the gradient of the landform which would create that embankment is slackened compared to a steep engineered embankment, with landscape integration being achieved through the slackening of the embankment to create a rolling land form replicating that of the dry valley to the east of Parsonage Down.

The Examining Authority asked approximately what percentage of the overall arisings which would be deposited in this location would form part of the essential landscape mitigation?

Mr Bains confirmed that there would be approximately 900,000m³ of arisings in total, with approximately 400,000m³ required for essential mitigation. He advised that approximately 500,000m³ would comprise surplus arisings.

The Examining Authority asked why the site to the east of Parsonage Down would provide better ecological connectivity and sought an explanation as to why this site compared favourably to the other site, and on what basis there would be a betterment from a biodiversity perspective?

Dr Stephanie Peay for the Applicant advised that the benefit of having all of the tunnel arisings together in one location is that it would enable a large block of habitat creation to be delivered adjacent to the existing National Nature Reserve and SSSI at Parsonage Down, so this is consistent with the Lawton approach of bigger, better and joined up.

Dr Peay advised that alternatives were considered but they would only accommodate part of the local habitat creation and it was considered to be more advantageous to have all habitat creation together here. Also, she noted that this would bring habitat creation closer to the River Till Valley, which would be important to Natural England's project aimed at connecting the plains between existing designated areas of chalk grassland habitat. Dr Peay advised that whilst all of the potential on-site locations identified by Mr Bains had been assessed, it was considered that none of those would achieve the benefits that could be created on the land to the of East Parsonage Down.

Mr Taylor QC referred to the responses given by the Applicant at Deadline 3, specifically section 41 of that document and the detailed explanation at paragraph 41.3.4.

Responding to comments from Mr Hedges and Ms Staples, Mr Taylor QC referred to a table in the Tunnel Arisings Management Strategy Appendix 12.1 of the ES [APP-285], which provides a detailed and exhaustive appraisal of the potential options for dealing with tunnel arisings. Mr Taylor QC noted that this contained a detailed comparison of the sites which were identified through the sifting process described by Mr Bains. Mr Taylor QC made reference to Table 4.6 which sets out a comparison of options. He confirmed that further responses have also been submitted at Deadline 3 (Highways England's Responses to Written Representations [REP3-013], at section 41, in relation to these issues). Mr Taylor QC dealt with a question on the use of arisings for highway embankments and landscaping, he confirmed that tunnel arisings would not be used for the structural highway embankments.

Lastly, in relation to gradient **Mr Hammond** referred to the Applicant's response provided for Written Question LV.1.13, which he advised looks at landform as indicated on the Environmental Masterplan. Mr Hammond stated that changes to landform and gradients on land to the east of Parsonage Down are based on the ability to fill the valley bottom where the majority of proposed material would result in level changes of 5 to 6 metres based on existing land levels. He confirmed that the remaining material would be deposited to a depth of approximately 2 metres and would then feather out to tie in with existing levels in the valley. In effect, he confirmed, this would replicate the undulating and rolling landform at gradients between 1 in 10 and 1 in 15.

In response to a point by Dr Reeves, **Mr Taylor QC** advised that he would take away the question of whether any slope stability analysis had been undertaken for the new landform.

Mr Bains, responding to a comment from Ms Staples, highlighted that assessment was made of the loss of Best and Most Versatile (BMV) agricultural land at Chapter 13 of the ES [APP-051], specifically table 13.21.

Mr Taylor QC noted in reply to comments from Mr Hedges and Mr Smith that there has been an assessment on agricultural holdings in Chapter 13 Table 13.23 of the ES.

The Examining Authority asked how disposal of tunnel arisings would be controlled and how it would be secured through the DCO.

Mr Taylor QC explained that because the amount of material available at any one time is determined by the progress of the tunnel boring machine and the material that it produces combined with the extent of the ability to store material within the slurry treatment works and process it that way, there is a steady stream of material which arises. He stated that the phasing, in effect, takes care of itself due to the particular construction process being used. In terms of how the treatment of the slurry from the TBM is addressed, and how it is dewatered and how it is transported to its location, Mr Taylor QC advised that those are all matters addressed through the OEMP. In particular he highlighted MW-GEO7, which regulates the management of excavated materials.

The CL:AIRE Code of Practice (CoP).	
Whether the CL:AIRE CoP and the functions of the Qualified Person need to be secured as part of the DCO.	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>The Examining Authority asked the Applicant if the functions of the Qualified Person need to be secured through the DCO.</p> <p>Mr Bains, confirmed that the Applicant proposes to manage the tunnel arisings in accordance with CL:AIRE Code of Practice and in consultation with Environment Agency, who have given agreement in principle, subject to the necessary submissions under the code of practice and the preparation of a Materials Management Plan. Mr Baines advised that this is required by the OEMP.</p> <p>Kath Burt of the Environment Agency confirmed it was not necessary to secure this within the DCO as long as the details in the OEMP are carried out.</p> <p>Mr Taylor QC noted that the OEMP MW-GEO7 and MW-WAT2 explains the reuse of tunnel arisings will be governed by Material Management Plan developed by the main works contractor in accordance with the CL:AIRE Code of Practice.</p>
8.2 Offsite disposal of tunnel arisings (under exceptional circumstances).	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>Mr Taylor QC, responded to a query from the Examining Authority on what the exceptional circumstances may be, highlighted these have been supplied in Written Questions responses WM.1.8 and 10 at Deadline II.</p> <p>Mr Bains stated that the only circumstances envisaged requiring offsite disposal were that localised areas of contamination were encountered during tunnel works, and it proved impossible that they could be treated to a standard that they could be retained on site. Mr Baines advised that the Applicant considered it unlikely that such contamination would be found, but if this were to happen, because it would be such a small quantity, it did not envisage significant implications for the Scheme itself, vehicle movements, or other environmental impacts.</p> <p>The Examining Authority asked how would that be secured to ensure that particularly small quantities, would be taken off site and would not result in any significant effects? Would any larger scale removal of arisings extend beyond the limits of the application?</p> <p>Mr Taylor QC, stated that this was covered in the OEMP, and the various strategies under it, such as the soil handling strategy, the excavated material management in MW-GEO7 and so on. Mr Taylor QC advised that these would require the contractor to adhere to</p>

	various strategies should the application be approved. There was, he said, a remote possibility that localised contamination could be identified and therefore the strategies needed to allow small quantities to be taken offsite if such material could not be treated onsite.
8.3 Use of materials (secondary or recycled aggregates).	
<u>Agenda Item</u>	<u>Highways England response</u>
	<p>The Examining Authority sought clarity on what will be achieved and the degree of confidence for this to be achieved?</p> <p>Mr Bains confirmed that this was set out in responses to written questions WM1.18 and 1.19. He advised that the Applicant has a moderate degree of confidence that stated targets relating to secondary and recycled aggregates can be achieved. Mr Bains confirmed that this was a self imposed target to contribute to national targets for incorporation of secondary and recycled aggregates. Therefore, if the target could not be achieved, there would be no impact on any sensitive receptor.</p> <p>The Examining Authority asked why the Applicant's degree of confidence was only at a moderate level and whether there was anything that could be done to increase it.</p> <p>Mr Bains advised that the confidence is moderate regarding these targets as secondary and recycled aggregates are readily available in urban areas, but not in this part of Wiltshire, which is more rural.</p> <p>Mr Bains confirmed agreement to a statement of Kath Burt of the Environment Agency that the use on site of any waste materials would be in accordance with the relevant regulations included, where necessary, materials testing.</p>

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