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National Infrastructure Planning
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Our ref: SV/2021/111161/01-L01
Your ref: TR010056
Date: 14 December 2021

Dear Ken

A417 MISSING LINK DCO – ‘RULE 8 LETTER’ - EXAMINING AUTHORITY’S QUESTIONS (EXQ1) – ENVIRONMENT AGENCY RESPONSES

Thank you for your letter dated 16 November 2021 (‘Rule 8 letter’). We have set out below our responses to your questions.

For completeness, we have not submitted any further Written Representation (WR) at this stage as our Relevant Representation made at the ‘Rule 6’ stage contained our WR and we do not consider there have been any material changes that would necessitate a further WR from the Environment Agency.

Examining Authority’s Question	Environment Agency’s response
1.4.20: Watercourse Rights What are the current positions of the Applicant and the Environment Agency in terms of its rights relating to watercourses?	The Environment Agency (EA) has rights in relation to Main Rivers. There are no designated Main Rivers within the red line boundary.
1.4.22: Other Consents The ES notes that the contractor appointed to undertake the construction works would need to apply for various environmental permits, discharge and other consents once detailed design is complete. Given that such applications have not been made, the Examining Authority and Secretary of State cannot be sure from the information provided if adequate avoidance or mitigation of environmental effects are possible, and therefore if all of these consents are achievable.	We are still in the process of discussing Other Consents and Licenses with National Highways (NH) and considering whether we are content for some of these to be determined through the DCO process or the normal Environmental Permitting route. <i>Can we provide an opinion on the likelihood of all such permits and consents being achieved?</i> Yes. For an Abstraction Licence: The Hydrogeological Impact Assessment (HIA) undertaken by NH has already considered de-watering. Much of the site will be worked dry. For the areas where an abstraction Licence/ Permit will be needed i.e. where it is to be dewatered, NH has already undertaken some assessment of

<p>Could the Environment Agency and the relevant local authorities with responsibilities in this area please provide an opinion on the likelihood of all such permits and consents being achieved?</p>	<p>drawdown effects in the HIA and we agree in principle with the risk assessment approach adopted.</p> <p>For a Discharge Consent: We would be assessing the risk to receiving watercourses from the activity, and ensuring appropriate mitigation is put in place. Much of this will be standard practice e.g. discharging from the lagoons after sediments have settled out to reduce turbidity; chemical sampling of the water before discharge.</p> <p>For Flood Risk Activity Permits: We do not anticipate that the EA will be required to determine any Flood Risk Activity Permits for the proposed development given the lack of Main Rivers within the red line boundary.</p> <p>In summary: Essentially, from the information we have seen to date, we are satisfied that there will be no showstopper issues in terms of environmental impacts within our remit as a result of the development.</p> <p>The principles of the various Consents have already been included/established in the Environmental Statement. The detail is still outstanding. So, whilst we cannot absolutely pre-determine the Permit situation, we have confidence that it will be possible to secure the necessary Permits and Licences. This should not be seen as pre-determining such Permits, Consents and/or Licences, and does not fetter our discretion.</p>
<p>1.6.1: Hydrology</p> <p>a) With reference to paragraph 9.7.24 in ES Chapter 9 [APP-040], can any more certainty be given as to the relationship between the stream south of the Birdlip junction and the Churn valley?</p> <p>b) What conditions exist that makes its hydrological relationship difficult to ascertain?</p>	<p>If necessary, further clarification as to the location of <i>'the stream south of Birdlip junction'</i> as referred to in paragraph 9.7.24 in ES Chapter 9, might assist with this question.</p> <p>a)</p> <p>We believe this query relates to what is now referred to as the 'Shab Hill Junction' rather than the 'Birdlip Junction'. The Shab Hill junction is located at the top headwaters of a naturally dry valley feature which has an ephemeral stream (a temporary stream which only tends to flow after rainfall) which doesn't flow all of the time in the upper half of the valley. This valley feature is referred to as 'Coldwell Bottom'. So the stream still flows partly down the bottom end of the</p>

	<p>valley all year (as a perennial stream), but increased rainfall in the winter time can reactivate the upper areas of the stream up the valley as more rainfall and groundwater recharges the watercourse which then flows eastwards into the River Churn. We believe that the ground investigations undertaken, the Hydrogeological Impact Assessment (HIA) and the ongoing groundwater and surface water monitoring have all provided more certainty as to the hydrogeological flow regime operating here. We understand that the Shab Hill dumbbell junction will be constructed as such to still allow for rainfall runoff and springs to still flow into the upper reaches of the Coldwell Bottom valley when the water is available to do so and these flows will not be obstructed from flowing into the watercourse channel.</p> <p>b)</p> <p>As discussed above, this stream is ephemeral in nature meaning it doesn't flow all year round especially in the upper reaches of the valley. The consultants acting on behalf of NH have been collecting 'on the ground' geological/ hydrogeological data in order to understand this relationship so the road scheme can consider these water features and the road will be designed to still allow water to flow into valleys as they naturally would have. A comprehensive water features survey has been undertaken by NH via their consultants and we are satisfied that all the relevant water features have been located on the ground. Many water features are not flowing all of the time which has been factored into ongoing risk assessments undertaken.</p>
<p>1.6.3: Contamination</p> <p>a) Are there any areas of outstanding disagreement regarding the identification, management and mitigation of contamination?</p> <p>b) If so, what are these and what is needed to reassure that adequate protection is in place</p>	<p>a)</p> <p>There are no outstanding issues on contamination. All the appropriate assessments have been undertaken regarding the identification and mitigation (where required) for land contamination matters. We are satisfied that this has been adequately addressed.</p> <p>b)</p> <p>n/a</p>
<p>1.12.1: Hydrology</p> <p>a) Explain fully the concerns</p>	<p>a)</p> <p>The Cotswold Jurassic Limestone principal</p>

regarding hydrology in relation to the crossover of the principal aquifers of the Cotswold Jurassic Limestone.

b) What potential effects on the Bushley Buzzard SSSI could occur?

c) Should different modelling have been used to evidence the Applicant's conclusion and why would such modelling be more appropriate than that carried out to date?

aquifers regionally dip to the south-east at a fairly shallow dip, but they are broken up by steep vertical faulting compartmentalising the rocks into blocks. Valley features have become incised into the limestone plateau and they usually relate to spring discharge features which emerge from geologic contacts mainly between the limestone and lower permeability mudstones and clays within the Jurassic sequence of rocks. Streams originate from spring discharges then generally flow off east and west from these valleys across the principal aquifers.

On the east steep escarpment slope these springs are issuing all over the escarpment and eventually flow as small tributary streams into the brooks such as the Normans Brook. On the plateau top, the valleys are much shallower and some are dry valleys e.g. the upper parts of Coldwell Bottom, but they still have spring discharges at certain times of the year which flow into them and these flow as streams into the headwaters of the River Frome to the south and the River Churn to the east.

So groundwater within the Cotswold Jurassic Limestone principal aquifers has a hydraulic relationship with surface watercourses in the area where groundwater in the aquifers is often connected to these spring discharges as a natural groundwater discharge into streams in higher groundwater table conditions i.e. the winter/spring time of recharge, but there are also times of the year in the lower flow periods i.e. the summer where groundwater levels are much lower and these springs do not flow at all.

The activity of building a new road on the surface across these principal Cotswold Jurassic Limestone aquifers could have an influence on these hydrogeological mechanisms, but the Hydrogeological Impact Assessment combined with a sound conceptual understanding of the groundwater regime in the underlying aquifers and ongoing groundwater and surface water monitoring will provide the necessary protection to all of these important water features.

b)

Bushley Muzzard SSSI is an important wetland feature (also called a GWDTE or Groundwater Dependent Terrestrial Ecosystem) which relies on groundwater discharging from springs out of

	<p>the local rocks which then support the flows into the local streams which head directly into the headwaters of the River Frome which flows towards Stroud in the south. These springs emanate mainly from more shallow Cotswold Jurassic Limestone aquifers (at the contact between the Great Oolite and Fullers Earth) to the west of the SSSI. It has been identified that the proposed new road is off to the north east from this location. So it is therefore unlikely that the road will have any influence over this important wetland feature due to the distance and being outside of the catchment zone supporting the recharge to the Bushley Muzzard springs. Continued groundwater and surface water monitoring is required to verify that this will be the case.</p> <p>The consultants acting on behalf of NH have undertaken an assessment of the Bushley Muzzard SSSI wetland in relation to the road scheme (ES Appendix 13.8 GWDTEs Assessment) and concluded that it is considered that the scheme does not pose a risk to the identified or potential GWDTEs and no further assessment is required. The conceptual model demonstrates there is no linkage between the potential impacts from the road to groundwater levels and the GWDTE and the Hydrogeological Impact Assessment also supported this conclusion.</p> <p>Surface and groundwater monitoring will still be used to validate the conclusions of this assessment and we are satisfied with this approach.</p> <p>c)</p> <p>We are satisfied with the modelling approach undertaken and after full consultation with NH and their consultants we all agreed to the approach adopted as detailed within the Hydrogeological Impact Assessment.</p>
<p>1.12.3: Scope of Assessment</p> <p>a) Provide an overview of the 'complexities' of the hydrogeological regime in the study area and why these complexities present conditions that are 'beyond the scope' of the EIA, as referred</p>	<p>a)</p> <p>The Jurassic rock sequence within the proposed DCO area is multi-layered with alternating sequences of two major limestone aquifer units (the Great Oolite limestone [where present] and the Inferior Oolite limestone) separated by clay layers of the Fullers Earth and then other underlying layers of mudstones/ siltstones and</p>

to by the Applicant in paragraph 13.4.49 of ES Chapter 13 [APP-044] .

b) Are the effects of the Proposed Development on the hydrogeological regime unquantifiable or unknown as a result?

sandstones to depth underneath the Inferior Oolite limestone. The entire rock sequence is fractured and the limestones in particular demonstrate much fissuring and fracturing along bedding planes in all directions. This rock sequence also has large near vertical more regional faulting running west to east through them which separates these rocks up into large blocks and the groundwater table within the more permeable aquifer units (limestones and sandstones) is consequently at various levels within this very variable sequence.

So the geological, structural (tectonic) and hydrogeology of this rock sequence has many complexities which make it very hard to produce and make a reliable full numerical hydrogeological model especially with the western escarpment slope. You would need a large amount of borehole data across the area with enough hydrogeological data collected over many years at great expense to provide a groundwater model, but inevitably these natural systems can be difficult to model effectively and another approach was considered. So instead of undertaking a full numerical modelling approach, it was decided to use a more empirical field data and realistic conceptual modelling approach built using real on the ground geologic and hydrogeological data, using 2-D slices through key areas of the road scheme (design elements such as cuttings and embankments) where potential impacts could be modelled and understood with more certainty as presented within the Hydrogeological Impact Assessment (HIA).

Potential drawdown impacts from dewatering for example has been assessed using a numerical analytical calculation approach which assesses spatial zones of influence on the groundwater environment including proximity to water features which could be affected from drawdown by pumping during dewatering activities. The conceptual modelling approach taken in our view is sound and uses real on the ground data for this purpose to validate any assumptions made.

However, it is important that the scheme of monitoring of all water features (groundwater borehole levels, springs and river flows) continues to be undertaken during the construction of the road scheme and beyond post construction so any potential impacts from the

	<p>scheme can be detected early by this surveillance monitoring outside of the baseline monitoring data already undertaken to date which is why the collection of baseline data is so important as a reference point to refer back to. If there are changes during construction then appropriate mitigation action can be implemented as agreed within the HIA to protect the water environment. All of this assessment is detailed within the HIA and we are satisfied with this approach.</p> <p>b)</p> <p>The Hydrogeological Impact Assessment has utilised on the ground site investigation and monitoring data which has then been used in the modelling approach assessing for potential impacts of the road scheme design elements upon the water/ hydrogeological environment. As with any assessment and ground investigation there will always be limitations to that assessment as you can only drill so many vertical boreholes and collect so much data at so many site locations for measurements of the geology, groundwater level, flow and groundwater quality etc. But the HIA undertaken has enabled these impacts to be more fully understood and quantified in a more complex hydrogeological setting and it is therefore important that surveillance monitoring continues pre, during and post construction of the road scheme to understand if the road is having any effect and mitigation can be applied where appropriate.</p> <p>With any assessment of this nature on any scheme, there will always be some uncertainties, but these have been reduced here on this road scheme by undertaking a more conservative approach to the HIA and we are satisfied that the approach which has been adopted considers all of the risks appropriate to this road scheme and local hydrogeological setting.</p> <p>It is crucial, that surveillance monitoring continues to be undertaken by NH to measure any changes within the water environment during the construction of the road scheme and post construction which will continually validate the surface and groundwater environment for any possible changes attributed to the road.</p>
1.12.5: Assessment Limitations	Yes the EA's Pollution Prevention Guidance documents (PPGs) were previously withdrawn

<p>Is it appropriate for the Applicant to have referred to the Environment Agency's "PPGs" that were withdrawn in 2015</p>	<p>and not replaced. However, the PPGs do still have a practical use and are well regarded in industry. The PPGs contained a mix of regulatory guidance and useful/practical advice. The advice therefore still has a purpose and we do not consider their use to be inappropriate in this instance, especially if there is no other new guidance available to the applicant for this purpose. Ultimately the PPGs are useful guidance documents; they are not policy or legislation.</p>
<p>1.12.7: Karst Features</p> <p>Are there any concerns regarding karstic features within the Order Land or adjacent land that are known to the EA, or any specific mitigation measures (other than grouting of voids and fissures) that should be employed by the Applicant?</p>	<p>Karstic features in limestone usually form in fissure zones and along rock bedding planes, where more open cavities and voids such as caves in some instances can form over time within the bedrock from circulating groundwater dissolving away rock minerals into solution. However, cave sized voids are probably very rare within the Cotswold Jurassic Limestone bedrocks when compared to other limestone bedrocks where it is much more common such as in the Carboniferous Limestone. The Cotswold Jurassic Limestone bedrocks are known to have some karstic features and we anticipate that these will be more bedding plane solutional voids and gaps which have opened up to possibly 1-10's cm along bedding planes, rather than large cave size voids. But the majority of the karstic features will form narrow voids along fissure and fractured bedding plane zones in a possibly random way within the bedrock as this is a natural phenomenon and the features won't actually be uncovered until the ground is excavated or drilled through exposing the formation. They cannot be predicted in terms of size nor location, other than in very general terms, however we do know that they will be inevitably uncovered during the road construction works.</p> <p>Traditionally the ground is stabilised with grout to fill such voids and we recognise this as a constraint which cannot be predicted as we don't necessarily know where these voids are located, but we understand without such stabilisation this could destabilise the road being built and surrounding infrastructure. Depending on the site issues actually encountered during construction, stabilisation with grout is one option for carrying this out. If voids are larger and more stability is required for large foundations, then piling could be employed to add more underlying stability into deeper bedrock which can bring risks to controlled waters, however a site specific piling</p>

	<p>risk assessment would make sure all water features are appropriately protected from such activities.</p> <p>Obviously anything injected into the ground including grout materials could potentially enter the aquifer and in order to protect the water environment, we would expect the grouting materials being utilised to have minimal environmental impact and to be agreed with the regulator as to the most appropriate grout to use in such a sensitive principal aquifer setting. More inert grout materials could be used to seal the ground which is one method to reduce and prevent groundwater contamination and employing the GIN (Grout Intensity Number) method of grouting could be used for minimizing the risk of hydro fracturing and hydro jacking in the grouting process as it is injected into the bedrock and to optimize its performance during construction so no more grout is used than necessary.</p>
<p>1.12.8: Nitrate Vulnerable Zones (NVZ)</p> <p>For clarity, is there any need for the Proposed Development to achieve 'nutrient neutrality' in respect of potential effects upon NVZ designations?</p>	<p>For context, Nitrate Vulnerable Zones (NVZs) are areas designated as being particularly at risk from agricultural nitrate pollution, so these are usually diffuse nitrate pollutants from the application of fertilisers which are applied to land for increased crop production. NVZs include about 55% of land in England.</p> <p>We understand that nutrient neutrality relates to not adding excess nutrients such as phosphate and nitrogen to the surrounding ecosystem, especially the water environment as this can lead to eutrophication and the disturbance of the natural mineral levels in the environment leading to ecological degradation. We would not anticipate that the road development will be adding any excess nutrients of phosphate and nitrogen during its development and operation.</p>
<p>1.12.9: Water Quality</p> <p>a) Are you satisfied that all measures to protect the Source Protection Zones for drinking water will be undertaken and that there is no risk to the water quality?</p> <p>b) Are there any abstraction companies operating in the area and have they been engaged?</p>	<p>a)</p> <p>The Environment Agency is the statutory body responsible for designating groundwater Source Protection Zones (SPZs) around important public drinking water supply boreholes. We are satisfied that the Hydrogeological Impact Assessment undertaken and the measures being adopted address any risks to Source Protection Zones as ultimately the groundwater resource is being protected from the road scheme and this is the same water used for drinking water supplies. It is</p>

<p>c) If not, why not?</p>	<p>crucial as we said previously, that surveillance monitoring will need to be undertaken by NH to measure any changes within the water environment (surface and groundwater receptors) during the construction and post construction of the road scheme.</p> <p>b)</p> <p>We note that this question has been posed to the EA and Severn Trent Water.</p> <p>We believe that this question is for National Highways to answer.</p> <p>Furthermore we are aware that Thames Water has an SPZ for the groundwater Baunton Public Water Supply Source with the boreholes located north of Cirencester. SPZ 3 comes within the DCO boundary.</p> <p>We have discussed this with NH in light of this question.</p> <p>We understand that NH has consulted with relevant stakeholders including Thames Water and Severn Trent Water.</p> <p>We understand that NH will likely be providing information on this question at deadline 2.</p> <p>c)</p> <p>We believe that this question is for National Highways to answer.</p>
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I trust the above will assist in the DCO process. Please do not hesitate to contact me if there are any queries.

Yours sincerely

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Planning Specialist – Sustainable Places

[Redacted contact information]