

Chiltern Society- For the attention of Simon
Kearey
via email: office@chilternsociety.org.uk

Our ref: HNL10774-14639

1 November 2021

Dear Simon

Thank you for your further correspondence of 6th October 2021 regarding HS2 Tunnelling Works.

Your letter contained a number of questions and statements. Please find our response below:

Q1: Has a Schedule 33 permit and Environmental Permit been applied for / granted to enable water to be abstracted from the Tunnels and vent shafts and returned to the aquifer?

Consents under Schedule 33 of the HS2 Act have been issued for dewatering abstractions, with associated discharge back to ground, during excavation within the diaphragm walls and setting of base slabs at Chalfont St Peter, Chalfont St Giles, Amersham and Little Missenden vent shafts. This water is returned to ground at the vent shaft sites.

Dewatering is currently being undertaken at Chalfont St Peter and Chalfont St Giles vent shafts.

The Chilterns Tunnel has been designed to limit the amount of groundwater ingress from seepage through the tunnel lining. However, it is not practicable to make the lining impermeable so some seepage will occur. The volume of ingress will vary with the depth of the tunnel beneath the water table and seasonal changes in groundwater levels. The tunnel seepage water and any water ingress due to defects identified in the tunnel lining (which will be rectified) will be recycled to the TBMs via the slurry treatment plant. Water from the slurry treatment plant that cannot be recycled will be removed from site or discharged back to the environment at the South Portal under Environmental Permit - **EPR/QB3092NR**.

Post construction, tunnel seepage water will be collected at tunnel low points at Chalfont St. Peter and Amersham vent shafts from where it will be abstracted and discharged back to ground. This dewatering abstraction and discharge activity at Chalfont St. Peter vent shaft has been consented under Schedule 33. Consent for Amersham vent shaft will be addressed once the discharge methodology is confirmed and the water will then be returned to the ground.

Q2: Why was it felt necessary to build a pipeline to move water from Chalfont St Giles (CSG) to the turbidity treatment plant at Amersham?

The pipeline has been constructed in order to allow water abstracted from Affinity Water's Chalfont St. Giles source to be transported to Amersham for turbidity treatment in the event

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that turbidity was to be found. A separate turbidity treatment plant was not constructed at Chalfont St. Giles due to building restrictions within the flood plain.

Q3: How much competent rock should there be above the tunnel to reduce the impact of vibration on structureless and weathered chalk?

As stated in our previous response of 14th September 2021, the tunnels will pass under the river through competent rock at a depth at which any vibration or cracks created by the tunnel boring machines (TBMs) will not spread to the base of the river. For our purposes, there is no minimum thickness of competent rock that is required to be present between the tunnel and weathered / structureless chalk. We are working closely with HS2 Ltd and Align JV to ensure that their activities do not affect watercourses, either through surface or underground construction.

Q4: What will be the impact of vibration on settlement on unstructured chalk exposed directly to the tunnel panels?

Align JV have demonstrated that the construction methodology used by the two Tunnel Boring Machines (TBMs) can mitigate for major settlement within the chalk. The contractor is monitoring settlement along the tunnelling route as part of the construction process.

Q5: Please confirm what EA considers to be a significant effect on water quality and river flows (from its regular monitoring), and that the remediation will be to reline the river to return the flow to its previous volumes?

Significant effects in this case are set out in the HS2 Phase One Environmental Statement – which also outlines likely mitigation in the event that such effects were experienced. We will be working with HS2 Ltd and Align JV to ensure any risks to water quality and river flows are mitigated throughout and post construction.

Q6: What is the potential for faults, fissures and karst system to be blocked as a result of tunnelling in the Misbourne Valley, and how likely is the water to be diverted away from Amersham public water supply (PWS) as a result of this?

Please see section 7 of the document ‘200504 - GW Assessment for Construction Tasks - Tunnel & Cross Passages 1MC05-ALJ-EV-NOT-CS02_CL04-400048_C04’ and sections 4.2 and 4.3 of ‘210428 - Chiltern Tunnel Construction Water Environment Assessment 1MC05-ALJ-EV-REP-CS02_CL04-000142_C02, 28.04.2021’.

Q7: We believe that there needs to be further assessments to ensure that water will not be directed away from an important PWS. Will EA recommend that work stops until these assessments are complete?

We believe that adequate assessments have been completed and that adequate monitoring is in place. Affinity Water Ltd have also been consulted by HS2 Ltd and Align JV in relation to tunnelling works, and have provided their own agreement to the works.

Q8: Will Bentonite reach the river?

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Bentonite forms approximately 1.5% of the grout mix used to fill the annulus between the cut tunnel bore and the concrete tunnel rings. This grout is very fast setting with a gel time of around 12 seconds and a cure time of around 30 minutes. There is therefore a low risk of migration even upon entry to any fissures.

In relation to the statements you make, please find further response and information below;

Statement 1: A change in hydraulic conductivity due to the tunnel traversing the valley needs to be assessed to see whether this will have a severe impact on Little Missenden. At Little Missenden, the water table is generally 1m below ground level. (You should be aware that there were a significant number of springs at Little Missenden, which mainly disappeared, with the construction of the main sewer to Maple Cross). At Chalfont St. Giles the water table has been stated to be 7 metres below ground level, it is very unlikely to be as low as 10 metres below ground level.

We believe that an answer to this was provided in our correspondence of 14th September 2021. Please see section 8 of the *document '200504 - GW Assessment for Construction Tasks - Tunnel & Cross Passages 1MC05-ALJ-EV-NOT-CS02_CL04-400048_C04'* and section 4.4 of *'210428 - Chiltern Tunnel Construction Water Environment Assessment 1MC05-ALJ-EV-REP-CS02_CL04-000142_C02, 28.04.2021'*.

Statement 2: Section 7 looks at potential impacts on ground water abstractions. Much of the assessment is about the impact of turbidity, rather than a careful assessment of the risk of diverting water away from PWS. Most of the assessments are based on assumptions rather than evidence.

We believe that adequate assessments have been undertaken and would refer you to Section 7 of the document *'200504 - GW Assessment for Construction Tasks - Tunnel & Cross Passages 1MC05-ALJ-EV-NOT-CS02_CL04-400048_C04'* considers the impact on groundwater flow paths in addition to groundwater quality. Risks to groundwater movement are also discussed in section 4.3 of *'210428 - Chiltern Tunnel Construction Water Environment Assessment 1MC05-ALJ-EV-REP-CS02_CL04-000142_C02, 28.04.2021'*.

Statement 3: The valley runs Northwest to Southeast not North. Thus, the tunnel north of the PWS is likely to have some impact on the flow of water to the PWS. This needs to be clarified to ensure that there is no impact on the PWS.

Both the Environment Agency and Affinity Water Ltd have been consulted by HS2 Ltd and Align JV in relation to the construction of the Chilterns tunnel. Neither organisation has flagged the future flow of water to Affinity Water Ltd abstractions as a major concern. The tunnel is not likely to have any major discernible impact upon water flows in the aquifer. Figure 15 (Chalfont St. Giles PWS and surrounding area) of the document *'200504 - GW Assessment for Construction Tasks - Tunnel & Cross Passages 1MC05-ALJ-EV-NOT-CS02_CL04-400048_C04'*, states that the Misbourne Valley immediately north of Chalfont St. Giles abstraction runs North to South.

Statement 4: There needs to be a full assessment of the risk of flooding in the Little Missenden area.

We are ensuring that flood risk assessments are being completed as part of the consenting process. This is in addition to our wider remit to manage flood risk from water bodies. Additionally, HS2 Ltd. have an agreement with Buckinghamshire County Council (in its role as Lead Local Flood Authority) to identify risks from groundwater flooding. They agree on any mitigation required if monitoring and assessment indicate that the scheme has resulted in a significant increase to groundwater flood risk.

Statement 5: Bentonite is considered hazardous when introduced to water.

Bentonite is a naturally occurring inorganic swelling clay that is not considered as hazardous to the water environment and has been widely used in the construction industry for many years.

Statement 6: There is a severe risk of grout being washed away in the high flow water zones of the valley, with a potential impact on both the Amersham PWS and the River Misbourne.

As discussed in section 4.2 of the document the document '200504 - GW Assessment for Construction Tasks - Tunnel & Cross Passages 1MC05-ALJ-EV-NOT-CS02_CL04-400048_C04' the grout used to fill the annulus between the cut tunnel bore and the concrete tunnel rings is very fast setting with a gel time of around 12 seconds and a cure time of around 30 minutes. There is therefore a low risk of migration even upon entry to any fissures.

Statement 7: We believe there are enough unanswered questions with regard to the risks to the Amersham PWS and the River Misbourne for the tunnelling to be stopped, until assessments have been made. This would give the opportunity for the tunnels to be taken deeper to eliminate / substantially reduce these risks.

HS2 Ltd and Align JV have presented detailed evidence to the Environment Agency demonstrating that environmental risks have been considered and that appropriate construction techniques have been selected to mitigate against these risks. Ongoing monitoring is taking place as part of the construction phase.

Yours sincerely



Sam Lumb

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Pronouns: she/her ([why is this here?](#))

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