MINUTES

Document number	**tbc**
Meeting date	Wednesday 6th December 2017, 9am to 11am
Meeting location	Room 2.22, Triton Square
Meeting title	Align-Affinity Water Liaison - Introduction
HS2 contact or group	Reg. 13 (Reg. 13), Reg. 13 (Reg. 13)
Stakeholder	Affinity Water
Topic keywords	Programme, Chalk, turbidity, asset protection

Attendees

Reg. 13 – HS2 Affinity Water Reg. 13

Reg. 13 – HS2 Phase One Reg. 13

Reg. 13 – HS2 Reg. 13

Reg. 13 – HS2 Reg. 13

Reg. 13 – Align Reg. 13

Reg. 13 – Align Reg. 13

Reg. 13 – Align Reg. 13

Reg. 13 – Affinity Water HS2 Reg. 13

Reg. 13 – Affinity Water HS2 Reg. 13

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Reg. 13 – Affinity Water Reg. 13

Reg. 13 – EA HS2 Core Team – Reg. 13

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Meeting notes (key topics)

The following records the main points of discussion. Much of the information is still in development so numerical values in particular are recorded with that caveat in mind.

- Introductions and aim of meeting plus brief visual overview of HS2 structures and Affinity Water assets.
- Initial statement of Affinity Water concerns, ahead of more detailed discussion of potential design and approaches to construction:
    - Reg. 13 – programme is key, particularly in respect of making decisions on equipment required as part of mitigation strategies. Affinity Water is basing its current programme on baseline 6.1 dates, which is very tight for certain activities, e.g. work at South Portal and Chalfont St Giles vent shaft.
    - Reg. 13 – gave a brief summary of data analysis and research that Affinity Water has been engaged in.
    - Reg. 13 – a review of monitoring data gathered in the course of the GI contracts is an important activity, and Affinity Water would like to see that as soon as possible. **Action: HS2 to collate and provide**. The HS2/AW Asset Protection Agreement (APA) indicates that monthly updates will be provided in the future, 24months baseline data is needed and post construction monitoring is agreed for up to 30years.
    - HS2/Align indicate that it is expected that Align will take over monitoring from Jan-Mar 2018.
- Reg. 13 gave brief introduction on Align JV
- Reg. 13 and Reg. 13 led discussion on current views of construction methods:
    - Temporary piling for jetty for CVV construction. Timing of this work in respect of Affinity Water mitigation is crucial. Essentially, process is to vibro-emplace hollow metal 'tubes' into the Chalk, maybe to around 20m depth. This could potentially commence ahead of the piling dates within the baseline 6.1 programme.
    - Pier diameter, depth, spacing and pile caps for the CVV. The weathered profile of the Chalk and the presence of voids are key issues – variability. Pier spacing may be a combination of 60 and 80m. Depths may be considerable (50-80m in places?) depending on ground conditions (with casing to 15-20m and open hole below that supported with bentonite), due to reliance on side friction, and spacing. **Action: Align to provide provisional pier spacings to Affinity Water**. Reg. 13 noted that a trunk main under Reg. 12(5)(a) would be a significant constraint on placement at that location.
    - About 5 test piles are expected to be drilled. Dates will be dependant upon consents and unlikely to be before 2019.
    - Recovery in water levels when Reg. 12(5)(a) is turned off – Reg. 13 described some of the interconnection and complexity between the chalk, superficial deposits and lakes of the valley bottom.
    - South Portal – the requirement for piling is a key consideration. If adopted it puts pressure on the Affinity Water programme at Reg. 12(5)(a). If not required, the programme of installation of protection there is more manageable. Align undertake a review of South Portal design on 8th December 2017 and feedback on 12th December.
    - Vent shafts – issues include the need for additional GI and pumping tests in the short-term, avoiding the May-Sep period where Affinity Water outages are required, but principal issue is the long-term (~6 months to 2 years) dewatering required during shaft construction. Drawdown impacts on Affinity Water, effects of layering in the Chalk, and treatment requirements to remove suspended solids in the water are all considerations. Discharge arrangements likely to be complex due to the risk to surface water or groundwater at the point of discharge and aquifer capacity if groundwater levels are high. Close liaison with Affinity Water and the EA is essential; local stakeholders are also very aware of the dewatering issue. Reg. 13 – programme for vent shafts is critical and Affinity Water must be kept informed. Reg. 13 – diaphragm walling with bentonite support is the

likely method of construction. Level of uncertainty of vent shaft design likely to be high until well after Mar 2018.
    - Bentonite – Reg. 13 stressed that currently Affinity Water cannot currently treat water for the presence of bentonite and that is a key concern wherever it is used.
    - General comment on GI – targeted GI and geophysical logging techniques are crucial to Align in the coming months. **Action**: **Align to provide GI locations and requirements to Affinity Water as they develop in order to identify risks to Affinity Water operations**.
    - Questions for Affinity Water – Reg. 13 requested source borehole information from Affinity Water, particularly information on borehole construction, observations of inflow horizons and voids, results from geophysical logging, etc. **Action**: Reg. 13 **and** Reg. 13 **to discuss and exchange relevant information.**
- Meeting ended with the following conclusions:
    - Communications going forward – phone call on 7th Dec to complete technical discussions around tunnelling and cross passages; phone call on 12th Dec to discuss design of the South Portal (particularly the requirement for piling) and evolving programme detail; next face to face meeting provisionally arranged for 19th Dec.

Follow on call to discuss tunnelling, 10am Thursday 7th December 2017

Reg. 13

Reg. 13 and Reg. 13 discussed the likely approach to tunnelling:

- Summary of parameters:
    - Likely to be 9.2m diameter
    - Potentially 2 month stagger between the two drives
    - TBM will be a slurry machine rather than earth pressure balance
    - Face pressure ~0.1 bar above hydrostatic pressure
    - 12-16m lead ahead of installation of segmental concrete lining
    - Grout (possibly MFC) will be injected behind the rings to seal the outside.
    - All designed to be watertight
    - 6-7m between tunnel drives is likely
    - Cross passages likely to be 3m diameter
    - Precise spacing guided principally by fire regulations, but some account of ground conditions may be accommodated where they are problematic
    - Cross passage construction may start at least 200m behind face
- Issues raised:
    - Method of cross passage excavation? Not confirmed, ground treatment via horizontal probe holes and grout injection (with critical volume and pressure monitoring) likely as a first step.
    - How is slurry managed? Slurry is pumped back out to the south portal area, cleaned via centrifuge and pumped back in.
    - What happens if a significant fissure or void is hit? There doesn't need to be a response whereby more slurry is injected, which would raise more concerns about contamination of the aquifer. Maintaining the alignment of the TBM would be the main issue for the engineers. The void would be treated once the TBM had passed it. Sensors in the TBM cutting head are designed to detect the presence of structural changes such as voids. The discovery of such features will be communicated to HS2 and Affinity Water as soon as possible.
    - Use of additional chemicals in slurry? It may be that small amounts of polymer are required, but the intention is to minimise this or do without wherever possible. It was noted that the use of any additives needs to be discussed with the EA and approved in good time ahead of their use. Some have been used during the HS2 GI programme with

EA approval. Affinity Water stated that the EA usually prohibits them from using polymers during borehole drilling.

Date of next meeting: **12:30,Tuesday 12th December 2017;**