

Minutes of Microsoft Teams meeting

Maple Cross technical update

20 January 2021, 11:00-12:20

Attendees

Chair: Hannah Fraser (HF) from H Fraser Consulting Ltd (HFCL)

Ilias Karapanos (IK) from Affinity Water (AW)

Roberts Sage (RS), Consultant to AW

Richard Asford (RA) from Ashford Developments

William Chambers (WC) from Barwood Capital

Philip Barlow (PB) from Tier Consult

Adrian Reed (AR) from Tier Consult

Minutes by Emilie Roberts from HFCL

Agenda

1. Signal tests and responses to pumping
2. Baseline data
3. [REDACTED] borehole discussion
4. Trigger and action levels during piling
5. Presentation of plots of top of the structured chalk
6. Mitigation
7. DQRA progress update
8. Feedback from AW
9. Further work

Minutes

To be read in conjunction with presentation "Powerpoint AW 200121.pdf"

Signal tests and responses to pumping

Signal tests indicate that Maple Cross (and Denham Way OBH) groundwater levels respond to PWS signal tests as the follows:

- [REDACTED] GWL response, but magnitude masked by heavy rainfall
- [REDACTED] no GWL response
- [REDACTED] slight GWL response in the south of the site

IK requested that the telemetry system remains in place until the end of January so that a further [REDACTED] signal test can potentially be undertaken.

ACTION: Tier to keep telemetry in place until end of January

Baseline data

Unusual temperature and EC data for 102S and 105S. IK suggested this may be caused by influence from lakes / rivers in response to recharge (previously identified in AMP5's temperature analysis section¹). Angling clubs open and close river gates which can mask the effect of rain on lake/river level.

borehole discussion

RS suggested that borehole 102S may respond to the [REDACTED] signal test. It was agreed that [REDACTED] PWS appears to have a shallow contribution. However IK thinks the contribution is from the gravel aquifer (itself in connection with the lake/river), rather than being directly fed by the river / lake. This is because the source of [REDACTED]'s high Mn is the gravel aquifer, not surface water.

Major ions: PWS and Maple Cross data have been plotted on Piper diagrams. The water is Ca-HCO₃ dominated water. All sources cluster together except [REDACTED] and S0102S. This is further evidence that [REDACTED] is not just fed by the deep Chalk aquifer. It was noted that at [REDACTED] spikes in turbidity and the River Colne's level correlate (inversely) with major ion concentration (i.e. during droughts, major ion concentration decreases)

Turbidity and manganese trigger and action levels during piling

Turbidity and manganese data were presented. HF proposed the following trigger and action levels for discussion:

Turbidity:

- Trigger: 0.5 NTU
 - Examine data
 - Increased daily scrutiny
 - Assessment of whether one-off or trend?
- Action level
 - Sustained Turbidity above 1 NTU (i.e. majority of samples in 1 day >1NTU, increasing trend)
 - Inform AW
 - Inform site, modify piling activity

Manganese:

- Trigger level – 30 ug/l Mn in Chalk. Equivalent EC yet to be determined
 - Sample for Mn
- Action level - Sustained Mn above 50 ug/l in Chalk.
 - Sample for Mn
 - Inform AW
 - Revise risk assessment

HF proposed using EC as a proxy for Mn concentration, to be further considered based on additional water quality data (4th sampling round). RS said that manganese can be a tracer for shallow aquifer input to the PWS, since manganese concentration is much higher in shallow boreholes than Chalk boreholes.

IK raised a 'worst case' concern, that piling may potentially cause a permanent increase in Mn concentration via new pathways from the shallow to deep aquifer. What mitigation is in place should this be observed during piling? HF said the modelling in the DQRA suggested negligible impact from piling to the PWS Mn concentration, and that this is a very conservative approach.

ACTION: HFCL / Tier to propose procedure to mitigate in case of sustained elevated Mn.

¹ Following rain, boreholes near lakes can get diluted (from direct connection with the lake- the unsaturated zone is bypassed), but boreholes away from lakes can get increased concentrations.

Presentation of plots of top of the structured chalk

HF is confident that the 10 m deep piles do not penetrate the structured chalk. In general there is a 4 m buffer.

Data confidence was discussed:

- The plots are based on two datasets: recent Tier Consult boreholes and old ESI boreholes. The ESI boreholes occasionally lack detail therefore HF has been conservative in compiling the contour plots.
- There is not much data in the west of the site.

Mitigation

The following measures were proposed

- Piling above 10 m bgl
- Densification of the piling zone – pile down-gradient first
- Piling method
 - Displacement piling – no fluids, densification
 - Rate of piling
- Monitoring
- Action and trigger levels

IK and RS requested that the piling commence by initially piling the perimeter to make a barrier

DQRA progress update

See powerpoint.

Feedback from AW

RS and IK agreed that the general approach is reasonable and have no significant objections.

RS and IK requested that the monitoring protocol for the time between submission of the planning application and the start of construction to be clarified. Future monitoring results would only need to be acted on should significant trends / outliers be identified.

RS praised HFCL's turbidity assessment, but questioned the porosity value (0.3).

Further work

See powerpoint.

Additional required data analysis was identified during the meeting, to be done by HFCL, as follows:

- Data presentation:
 - plot normalised groundwater levels
 - data gaps to be blank
 - add dips to GWL
- Shallow boreholes:
 - further assessment of the data required
 - plot groundwater levels of paired (deep and shallow boreholes) to assess vertical gradients
- Lake levels: plot these along with GWL
- Unusual temperature and EC data for 102S and 105S: further assessment required
- Turbidity: clean up data. Mark sampling events etc
- ██████████ water quality: assess correlation between groundwater level and major ion concentration
- EC as a proxy for Mn: further assessment required
- Turbidity assessment: Re-run calculations based on a porosity of 0.1.

ACTION: IK to send recent lake level data

ACTION: HFCL to complete the additional work above

ACTION: HFCL to distribute powerpoint presentations from this, and previous, meetings

Any other business

RA reported that Kim Harding (AW) and Alister Leggatt (AW) have established strategies for:

- Redacting confidential reports
- Maintaining dialogue once the planning application has been submitted.

Next meeting 28 January 2020, 2-4pm, MS Teams