Minutes of Microsoft Teams meeting

Maple Cross technical update

2 February 2021, 15:00-17:00

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 Ashford (RA) from Ashford Developments

William Chambers (WC) from Barwood Capital

Philip Barlow (PB) from Tier Consult

Adrian Read (AR) from Tier Consult

Minutes by Emilie Roberts from HFCL

Agenda

1. Feedback on baseline hydrographs
2. Lake levels
3. Baseline chemistry sampling data
4. Trigger levels and action levels – proxy for manganese
5. Flow in the RTD aquifer – lake/chalk interactions
6. Next steps

Minutes

To be read in conjunction with presentation "Powerpoint AW 040221.pdf"

1. AW feedback on baseline hydrographs

- RS stated that in general the conclusions discussed in the last meeting seem reasonably well validated.
- Flooding can sustain high GWL at 102S and 202D
- AR confirmed that boreholes are bunged up so there is no contamination of the aquifer during flooding. 'Top hat' headworks will be installed in due course.

ACTION: IK to send dates to for GWL contour maps - DONE

ACTION: AR to check datum for 105S (strange GWL contour plots)

ACTION: HFCL to recreate GWL contour maps using lake levels (and possible revised 105S data) – DONE (not 105S)

2. Lake levels

Lake responses to signal tests:

- [redacted] Clubhouse and Marsh seem to respond.
- [redacted] no lake response

- [redacted]: RS stated that shallow aquifer and lake levels are unlikely to respond to the short timescale signal tests

IK stated that lakes are strongly influenced by river level

3. Baseline chemistry sampling data

Occasional DWS and/or freshwater EQS exceedences of cadmium, copper, nickel, zinc, fluoranthene, nitrite, ammonical nitrogen, manganese and iron were found in the shallow aquifer. Copper, manganese, zinc fluoranthene and Benzo(a)pyrene were identified in the surface water sampling (lakes) on occasion. HF stated that there is no particular signature of contamination in the shallow aquifer. IK commented that dilution is likely to occur in winter.

ACTION: HFCL to compare surface water sampling locations with landfill site to assess potential contamination of the lakes

ACTION: HFCL to consider dates/times of exceedences in order to comment on seasonal variation

4. Trigger levels and action levels – proxy for manganese

There is not a good correlation between Mn and EC, therefore EC cannot be used a proxy for Mn. However, there is a fairly good correlation between Mn and dissolved oxygen (DO) and also redox potential (ORP), which can probably be recorded on sondes (i.e. available on telemetry). HF proposed that if boreholes in the immediate vicinity of the piling exceeded trigger levels for DO and ORP (see powerpoint), Mn sampling would take place, with an action level of 50 ug/l.

ACTION: AR to confirm whether ORP and DO can be recorded via telemetry

ACTION: HF to confirm which boreholes should be part of the trigger level / action level network

In the deep aquifer Mn is likely to oxidise out, however IK commented that this rate must be considered as well as travel time – you cannot assume that oxidation (and deposition) will occur before groundwater has travelled to a PWS. For example, Mn is found in lakes, and does cause a problem for PWS. Hf responded that the Mn in PWS could come from upstream lakes.

5. Flow in the RTD aquifer – lake/chalk interactions

HF presented a basic numerical model of groundwater response to two abstraction points with a background hydraulic gradient. This was to demonstrate that groundwater at a particular point can only travel in one direction: groundwater level can be influenced by abstraction without the groundwater flowing to the abstraction. i.e. the southward hydraulic gradients on site indicate that groundwater will not flow to [redacted] o[redacted]

IK responded that that the Maple Cross study has been conducted in winter, but that during summer/drought conditions GW flow directions could change. During drought, Chalk GWL is lower therefore a downward hydraulic gradient is more likely (i.e. leakage is a function of recharge and abstraction and is more pronounced when GWLs are lower). The Chalk cone of depression is wider than that of the gravel, but in the winter the cones are subdued. However the AMP 5 study was conducted in drought conditions therefore cones of depression in the Chalk were much wider. The 2011 signal tests ([redacted]was off) showed that Clubhouse and Mark lake levels responded to [redacted]. HF suggested that downstream reduction in WL do not prove that water is contributing to PWS, but that less water is flowing to them.

To answer IK's concerns, HF has calculated the proportion of water diverted by the piling in the shallow RTD aquifer compared to that abstracted by the PWS. This is done by using lake level volume calculations from Amp5 and considering how much of this flows through the gravel aquifer in the proposed piled area to the PWS abstractions. This conservative approach suggests that even if site GW did flow towards [redacted], a maximum of 0.6 % of [redacted]s abstraction would be diverted by the piling.

IK suggested that increasing lake contributions (caused by piling) could increase manganese concentration in the PWS.

ACTION: HFCL to use lake Mn concentration to check whether the potential increased lake contribution from piling could have a significant impact on PWS WQ.

6. Next steps

- Finalise DQRA
- Finalise PMSRA
- Issue drafts to AW by 12 Feb
- AW to aim to review the draft by 19 Feb
- Make ready a fully redacted version for submission shortly thereafter