## Northstowe Town Council - Hydrology Working Party

### Background

Since development of Norhtstowe started there has been an observed reduction in the water levels within the River Terrace Deposit secondary aquifer, one of the most visible effects of this is the reduction in water in ground water fed features such as the Kingfisher Pond.

In September 2021, The Town Council resolved to setup a working party to identify key sources of information to better inform discussion and investigation with partners on the topic.

### Hypothesis

From the materials reviewed, it is suspected that water may be entering the phase 1 surface water drainage system at an intersection with the River Terrace Deposits which is then conveyed through the system towards the sustainable drainage lakes in the Water Park.

There are a number of indications that the eastern edge of housing parcel H9 may offer such an opportunity with a number of underground drainage features that reside at levels consistent with the post dewatering groundwater levels along with the seemingly unexpected requirement to pile drive in order to construct residential dwellings along the same seam.

#### **Initial testing**

The hydrology working party have identified the following actions that should be undertaken in order to test the hypothesis initially and are seeking the support of Greater Cambridge Planning in order to facilitate:

- 1. Rudimentary physical inspection of chamber S419 and/or S420 as marked in document 0481-D-246 Rev A, within a few days of sustained heavy rainfall, but not within a rainfall event, to identify if surface water is flowing unexpectedly.
- 2. Facilitate regular access to inspect S422H as marked in document 0481-D-246 Rev A, again within a few days of sustained heavy rainfall.
- 3. Any information on how S418ST as marked on document 0481-D-246 Rev A was sealed following its original installation.
- 4. Access to the raw data of the permanent monitoring solution noted as BH144 in the HR Wallingford report with regular updates.
- 5. Access to the raw data of the Homes England established borehole network in Phase 2 and Phase 3, again with regular updates.

## **Further Detail**

Comparisons of the groundwater levels between the 2015 Pits (October) and 2018 Pits (February) shows an average drop of 1mAOD. The levels presented in 2018 are at a point where seasonally groundwater levels would be expected to be at a higher point in an annual cycle so it is assumed the net drop is greater than this. A corrolation between the water levels in 2018 and the invert levels of a number of drainage features around the eastern edge of H9 is observed.

Representations made to the Town Council from BDW described the need for pile driving in the eastern edge of H9 as being attributed to the fact the site previously had a pond within and hedging damaging the ground structure. Inspections of historical aerieal footage shows that the pond that needed to be filled in was on the western edge as showin in Figure 1. There is also no significant hedgeline along the eastern edge that is in question that would seemingly explain the unstable ground conditions.



Image Dated Jan 2021.

Image Dated Sep 2008.

Figure 1: Aeral photography of the site of H9 (Source: Google Earth).

The HR Wallingford Report 2 shows groundwater elevations between 2017 and 2021 from continuous monitoring provided by Gallagher Estates. Whilst this appears to document an overall increase through the time period, the groundwater levels are still lower than the observed 6.91-7.55mAOD range recorded pre-dewatering (April-July 2014).

HR Wallingford justified the fluctuation of the groundwater levels around 1m as seasonal variation, inspecting data that was released by Homes England under Freedom of Information RFI3368 Annex C when converted to mAOD doesn't appear to demonstrate the same level of variation as what Wardell Armstrong presented HR Wallingford. Figure 2 shows the Wardell Armstrong recordings of BH144 and Figure 3 is a graph of the data from 16 of Homes England's borehole network between 2018 and 2019. In a number of boreholes the variation is as little as 0.5m.

A possible alternative explanation of the peaks and troughs in Figure 2 is that water could be draining at an almost constant rate through an ingress point into the phase 1 drainage

system, it is notable that the troughs of 2018 and 2019 almost make it to 6mAOD with the drainage features around the eastern edge of H9 being as low as 5.3mAOD.



Source: Gallagher Estates , 2021

Figure 2: BH144 groundwater elevation.



Figure 3: Graph of Homes England's borehole network from data in RFI3368

# References

WSP. Surface Water Drainage Plan document 0481-D-246.

HR Wallingford (2021b). Kingfisher Pond - Northstowe Hydroeological Assessment. Phase II

Homes England. RFI3368 - All information held on River Terrace Deposits, April 2021. Available Online [Accessed 10 September 2021]

Applied Geology. Report on Ground Investigation at Plots H7, H8 & H9, May 2018.