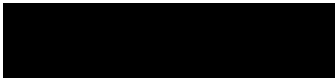


Robert Boyce
Hampton Quay Holdings Ltd
Rope House
Rope Walk
Littlehampton
West Sussex
BN17 5DH

10 April 2025

Email 

Reference: 20241127P1

Dear Robert,

HYDROGEOLOGICAL ASSESSMENT AND GROUNDWATER MONITORING AT LAND WEST OF THE BRIDGE ROAD ROUNDABOUT, LITTLEHAMPTON, BN17 5DF.

H2Ogeo was contacted by the Client and requested to prepare a proposal for Winter groundwater monitoring to establish highest annual ground water levels at the site near Littlehampton.

This report presents the data collected. A Statement of Limitations is presented at the end of this letter report.

Scope of Work

The Local Planning Authority (LPA) have requested the monitoring of Winter groundwater levels at the proposed development site.

H2Ogeo was commissioned to carry out a hydrogeological desk study including a Hydrogeological Conceptual Site Model (HCSM). This included the design, installation and monitoring of three groundwater monitoring boreholes between 26 November 2024 and the 3 April 2024.

This report provides a summary of that work for Client submission.

Site Location

The site is located at Land West of the Bridge Road Roundabout, Littlehampton, West Sussex, BN17 5DF.

It is centred on National Grid Reference: TQ01573 02602 (Easting: 501573, Northing: 102602) and presented in Figure 1.

Environmental Setting

Topography

The site is relatively flat and ground level sits at an elevation of approximately 2 metres Above Ordnance Datum (mAOD). Figure 2 presents the topography extracted from the LiDAR tiles for this area (TQ00SW DTM 1m).

Soils

Soils on site are described as loamy and clayey soils of coastal flats with naturally high groundwater¹.

Geology

The British Geological Survey's (BGS) 1:50,000 bedrock geology map indicates the site lies on the Raised Marine Deposits overlying the Chalk Formation.

Raised Marine Deposits consist of isostatically uplifted marine and coastal zone deposits which crop out in part above high-water mark. They have a variable lithology with gravel (shingle), sand, silt and clay and commonly charged with organic debris (plant and shell)².

The underlying Chalk Formation, part of the White Chalk Sub Group consists of Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout³.

Hydrogeology

The Raised Marine Deposits are classified as a Secondary A Aquifer and the underlying Chalk as a Principal Aquifer, these aquifer definitions are presented below:

- Principal Aquifers are strategically important rock units that have high permeability and water storage capacity;
- Secondary A Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers;
- Secondary B Aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers; and
- Secondary Undifferentiated Aquifers are where it has not been possible to attribute either category A or B to a rock type.

The site is not located in a Source Protection Zone (SPZ).

Hydrology

The site lies in the Arun Lower Operational Catchment on the banks of the River Arun.

The Lower Arun operational catchment stretches from Littlehampton to Pulborough. It includes the tidal river Arun, a transitional waterbody and its freshwater tributaries. The sub-catchment is mix of urban concentrations and open agricultural land. The biggest pressure on the environment in this area is water quality, with impacts from Sewage Treatment Works and diffuse pollution from urban and rural sources. Furthermore, many of the waterbodies within this sub-catchment are small with many being field drains and not suited to WFD classification⁴.

The operational catchment is presented in Figure 3.

Rainfall

Rainfall data from the Angmering Rainfall Gauge (Station Ref: E9720, Station ID: 319528), located at TQ06717 07296, is presented in Figure 4 for the past five years.

The Seasonal Annual Average Rainfall (SAAR) is 718mm.

¹ LandIS - Land Information System - Soilscales soil types viewer

² <https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=RMD>

³ <https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=WHCK>

⁴ [Arun Lower Operational Catchment | Catchment Data Explorer](#)

Groundwater Monitoring

Following consultation with the Local Planning Authority three boreholes were commissioned by the Client and H2Ogeo attended site with AB Site Investigation on the 26 November 2024.

A 1.2m hand-dug pit was excavated to check for services/utilities at each location, none were encountered. A windowless sampling rig was used to progress each borehole to 5.0mbgl that were then installed with 2 metres of 50mm slotted casing and up to three metres of plain casing.

BH01 collapsed to 4.3mbgl and was installed with 2.3m plain casing and 2m slotted whilst Borehole 2 and 3 collapsed to 4.7mbgl so only 2.7m of plain casing installed with 2m slotted at the toe.

A gravel filter pack was poured in the bottom 2m with the top section backfilled with bentonite pellets and a cemented headworks installed.

Borehole details are presented in the following table and locations in Figure 5:

Table 1 Borehole Details

Borehole ID	Ground Elevation (mAOD) ⁵	Borehole Depth (mbgl)	National Grid Reference
BH01	1.832	4.3	TQ01559 02679
BH02	2.214	4.7	TQ01562 02609
BH03	1.909	4.7	TQ01576 02535

The drilling borehole logs are summarised in the table below:

Table 2 Borehole Description

BHID	Top (metres below ground level)	Bottom (mbgl)	Thickness (m)	Description
BH01	0	1.2	1.2	Hand-dug, 0.3m soils and turf, 0.7m orange brown silty fine sand.
	1.2	2	0.8	Fin silty orange sands at 1.5mbgl grey and wet between 1.5 and 2mbgl.
	2	3	1	Grey silty sand, 2.9mbgl top of Chalk, clastic and hard.
	3	4	1	Chalk clastic with gravel, white grey.
	4	5	1	Chalk, grey/white.
BH02	0	1.2	1.2	Topsoil/turf, some made ground, brick, Silty fine orange/brown sand at 1.0mbgl.
	1.2	2	0.8	Orange to grey fine sand, silty and wet.
	2	3	1	Grey Silty/Fine sand.
	3	4	1	Grey Silty/Fine sand.
	4	5	1	Grey silty/Fine sand. Water at 0.98mbgl on completion.
BH03	0	1.2	1.2	Topsoil, orange/brown, silty sandy soil.
	1.2	2	0.8	Grey Fine sand with orange lenses, 20mm silty.
	2	3	1	Grey Fine sand
	3	4	1	Grey Fine sand
	4	5	1	Grey Fine sand

Groundwater was encountered during drilling in all three boreholes between 1 and 2 metres below ground level.

Three Levelsout data loggers were installed, one in each borehole and one barometric logger to allow compensation of air pressure. The loggers were set to capture groundwater elevations every hour until the end of the monitoring period.

The following manual gauging took place during the monitoring period:

Table 3 Manual Groundwater Monitoring

Date	BH01 mbgl	BH02 mbgl	BH03 mbgl
26 November 2024	1.2	1.48	1.46

⁵ LIDAR TQ00 NW 1M

<i>Date</i>	<i>BH01 mbgl</i>	<i>BH02 mbgl</i>	<i>BH03 mbgl</i>
12 March 2025	1.25	1.28	0.40
3 April 2025	1.51	1.85	1.83

Data recovered from the loggers has been presented in Figure 6 and shows the daily average groundwater elevations and hourly elevation readings for BH01, BH02 and BH03 in Figures 7, 8 and 9.

The groundwater elevation profiles are plotted with the rainfall data from the Angmering Rainfall Gauge and the River Arun Tidal levels.

Results

The HCSM is presented in Figure 10 and discussed in the following section.

Summary of Groundwater Elevations

As anticipated based on the site's proximity to the River Arun the data presented indicates that groundwater elevations are broadly in line with tidal fluctuations.

The maximum elevations over the monitoring period were observed in BH03 (1.83mAOD) with the maximum flux also observed in BH03 of 1.87 metres between the maximum elevation and minimum elevation.

Groundwater elevations in BH01 and BH02 are more than 1mbgl during low tides and within 1m of the surface during high tide. BH03 groundwater elevations, in the south of the site, are typically within 1m of the surface.

Should you have any queries relating to the work please do not hesitate to get in touch.

Yours sincerely



Director & Hydrogeologist



W: www.h2ogeo.co.uk

Statement of Limitations

This report was prepared in accordance with the scope of work outlined within this report and is subject to the applicable cost, time and other constraints.

H2Ogeo performed the services on behalf of the Client in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. No warranties, expressed or implied, are made.

Except as otherwise stated, H2Ogeo's assessment is limited strictly to the scope of work outlined in above and does not evaluate structural or geotechnical conditions of any part of the Site (including any buildings, equipment or infrastructure) or outside the Site boundary.

All conclusions and recommendations made in the report are the professional opinions of H2Ogeo personnel involved with the project and, while normal checking of the accuracy of data has been conducted, H2Ogeo assumes no responsibility or liability for errors in data obtained from external sources, regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

H2Ogeo is not engaged in environmental consulting and reporting for the purpose of advertising, sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity or investment purposes.

This report has been prepared for the sole use of Client. The report may not be relied upon by any other party without the express written agreement of H2Ogeo. The provision of a copy of this report to any third party is provided for informational purposes only and any reliance on this report by a third party is done so at their own risk and H2Ogeo disclaim all liability to such third party to the extent permitted by law.

Any use of this report by a third party is deemed to constitute acceptance of this limitation.

This report does not constitute legal advice.

Figures

Figure 1 Site Location

Figure 2 Topography

Figure 3 Surface Water Catchment

Figure 4 Rainfall

Figure 5 Borehole Locations

Figure 6 Daily Average Groundwater Elevations

Figure 7 Borehole 1 Groundwater Elevations

Figure 8 Borehole 2 Groundwater Elevations

Figure 9 Borehole 3 Groundwater Elevations

Figure 10 Hydrogeological Conceptual Site Model

Figure 1 Site Location

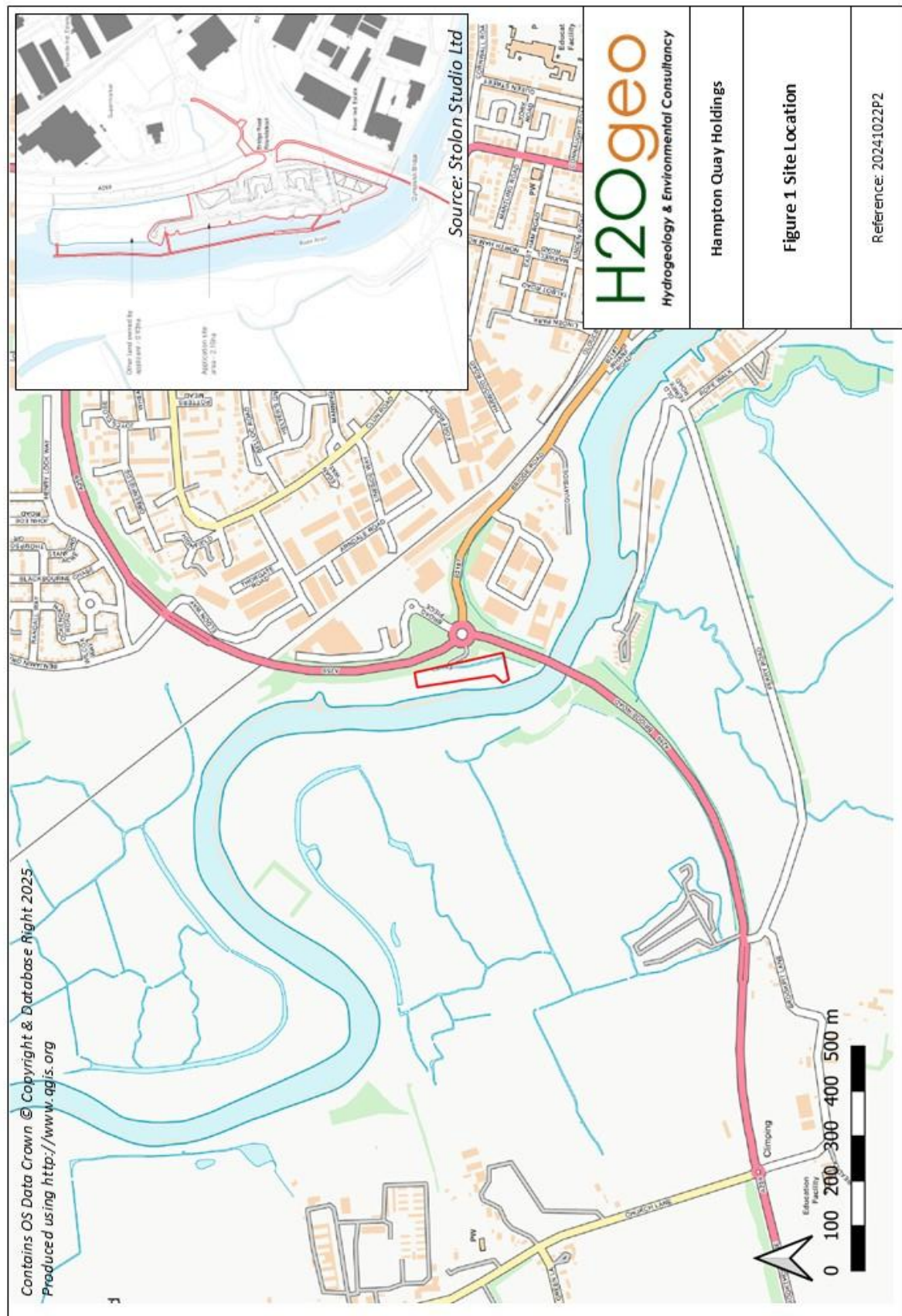


Figure 2 Topography

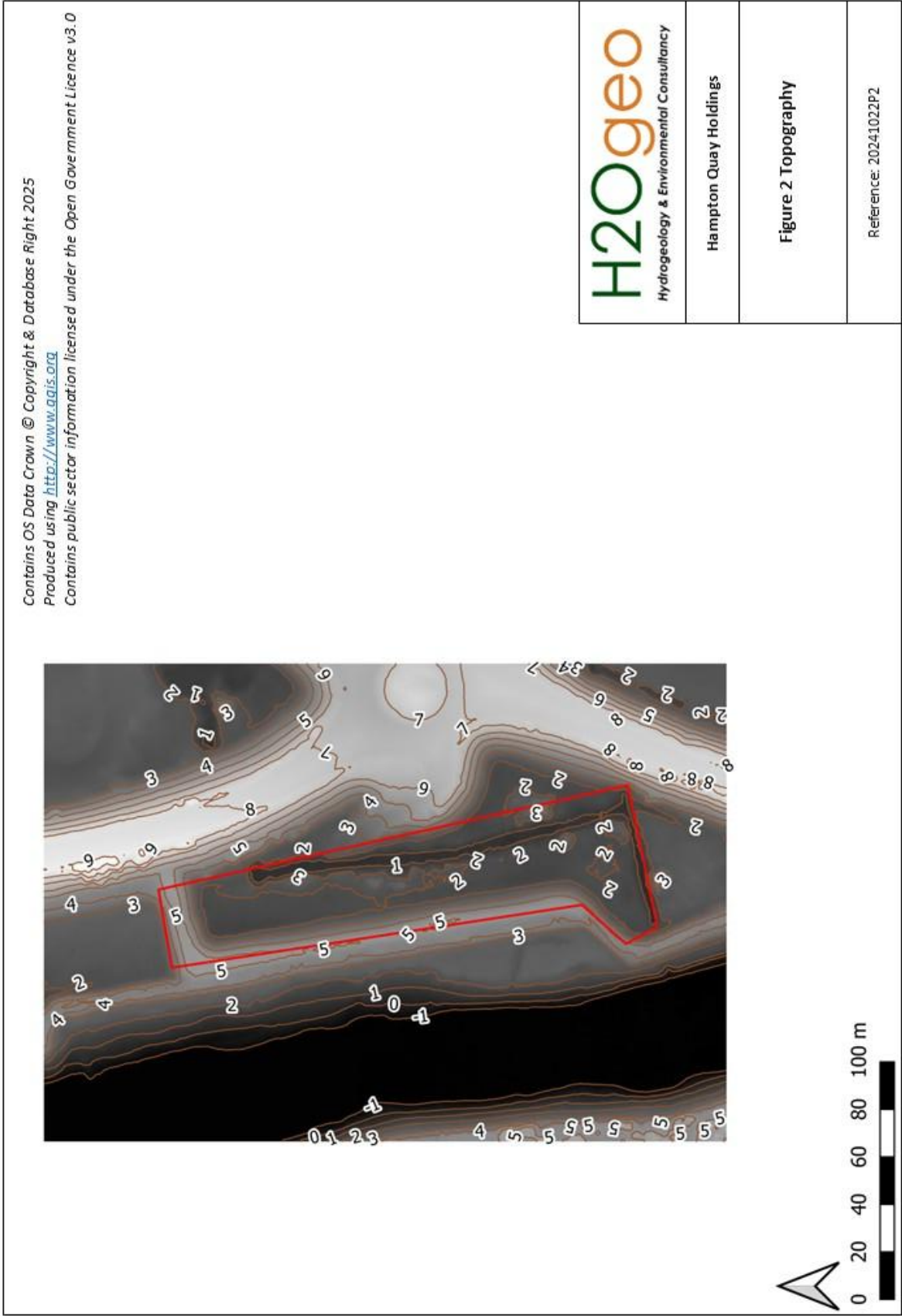


Figure 3 Surface Water Catchment

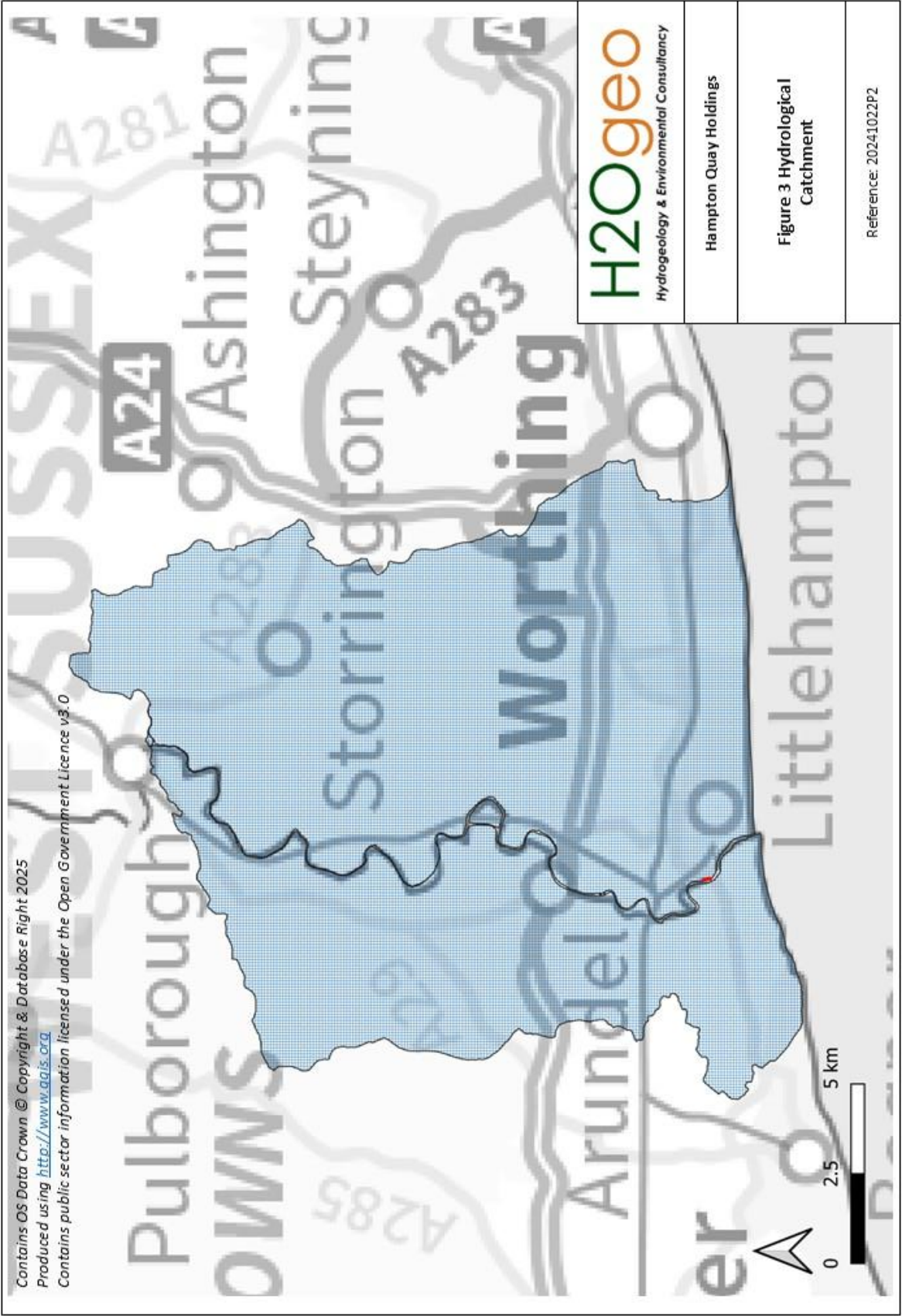


Figure 4 Rainfall

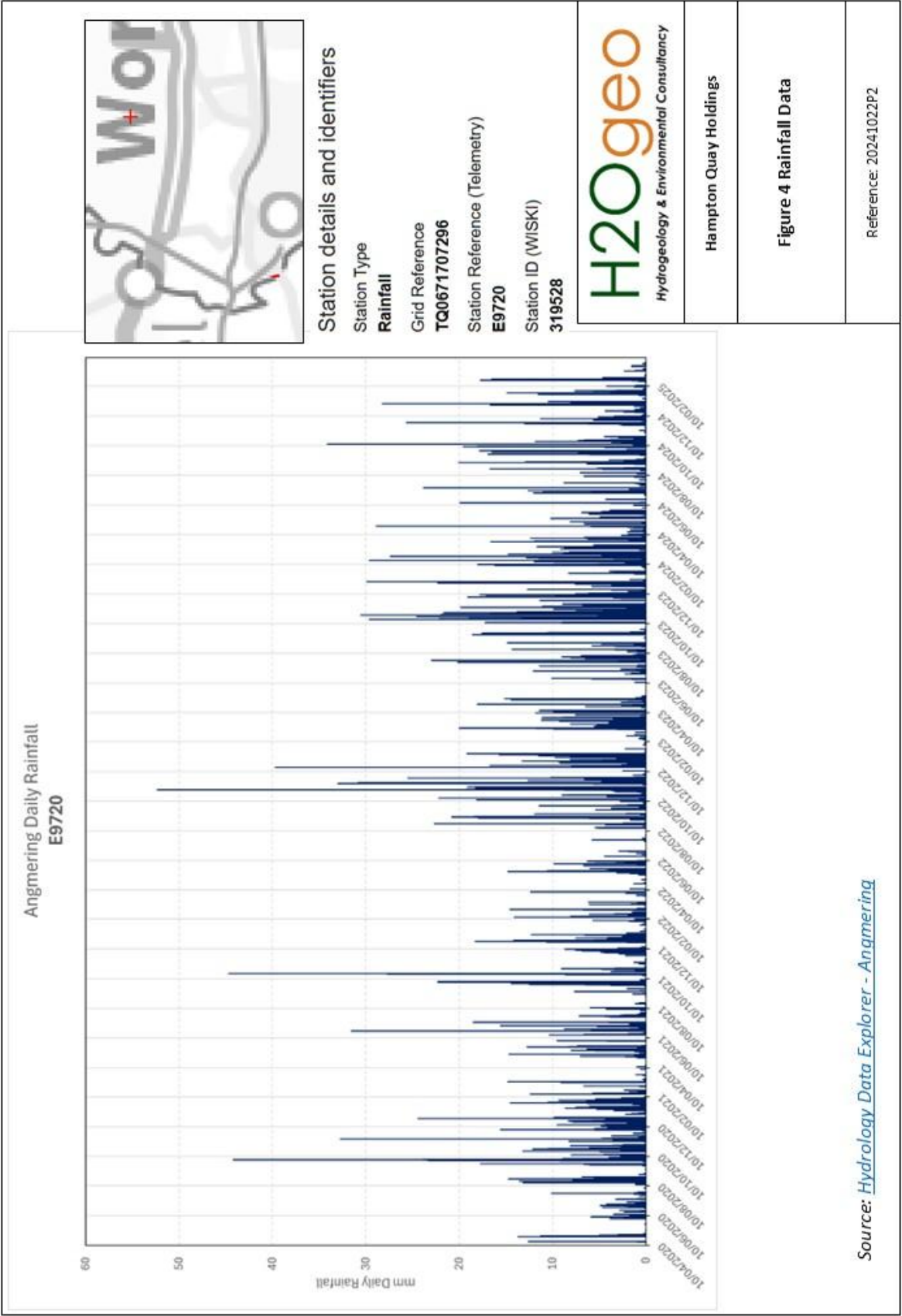


Figure 5 Borehole Locations



Figure 6 Daily Average Groundwater Elevations

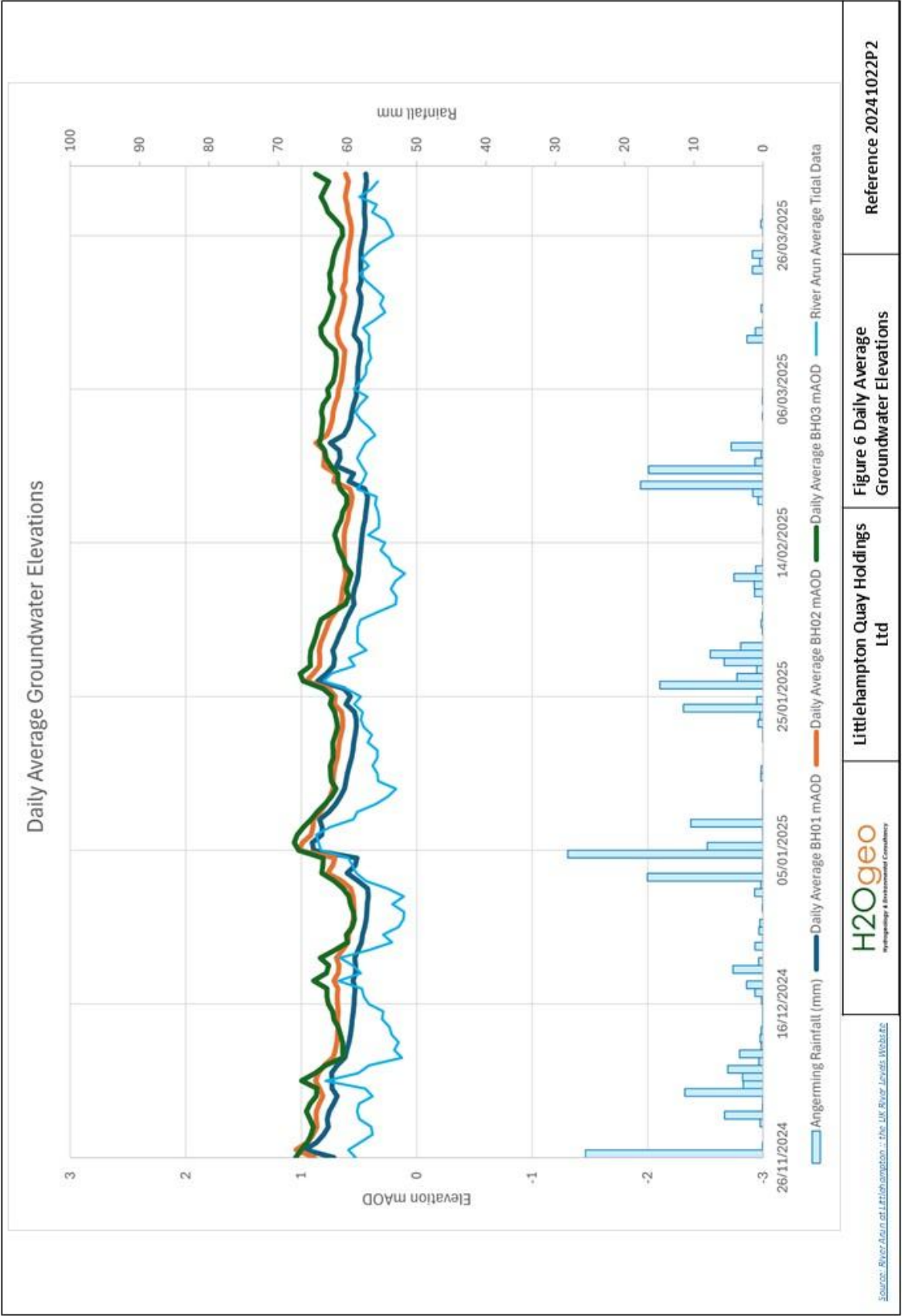


Figure 7 Borehole 1 Groundwater Elevations

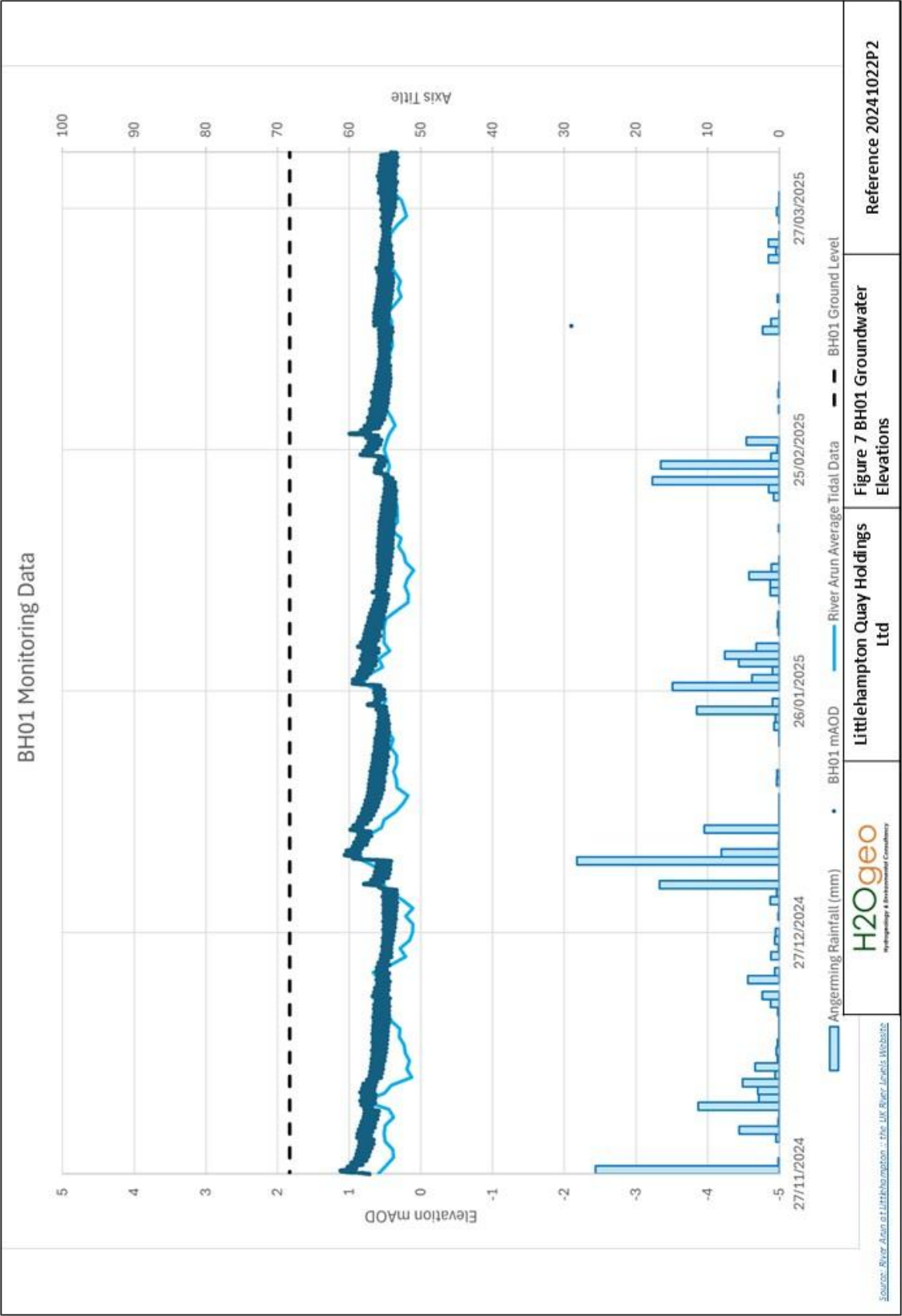


Figure 8 Borehole 2 Groundwater Elevations

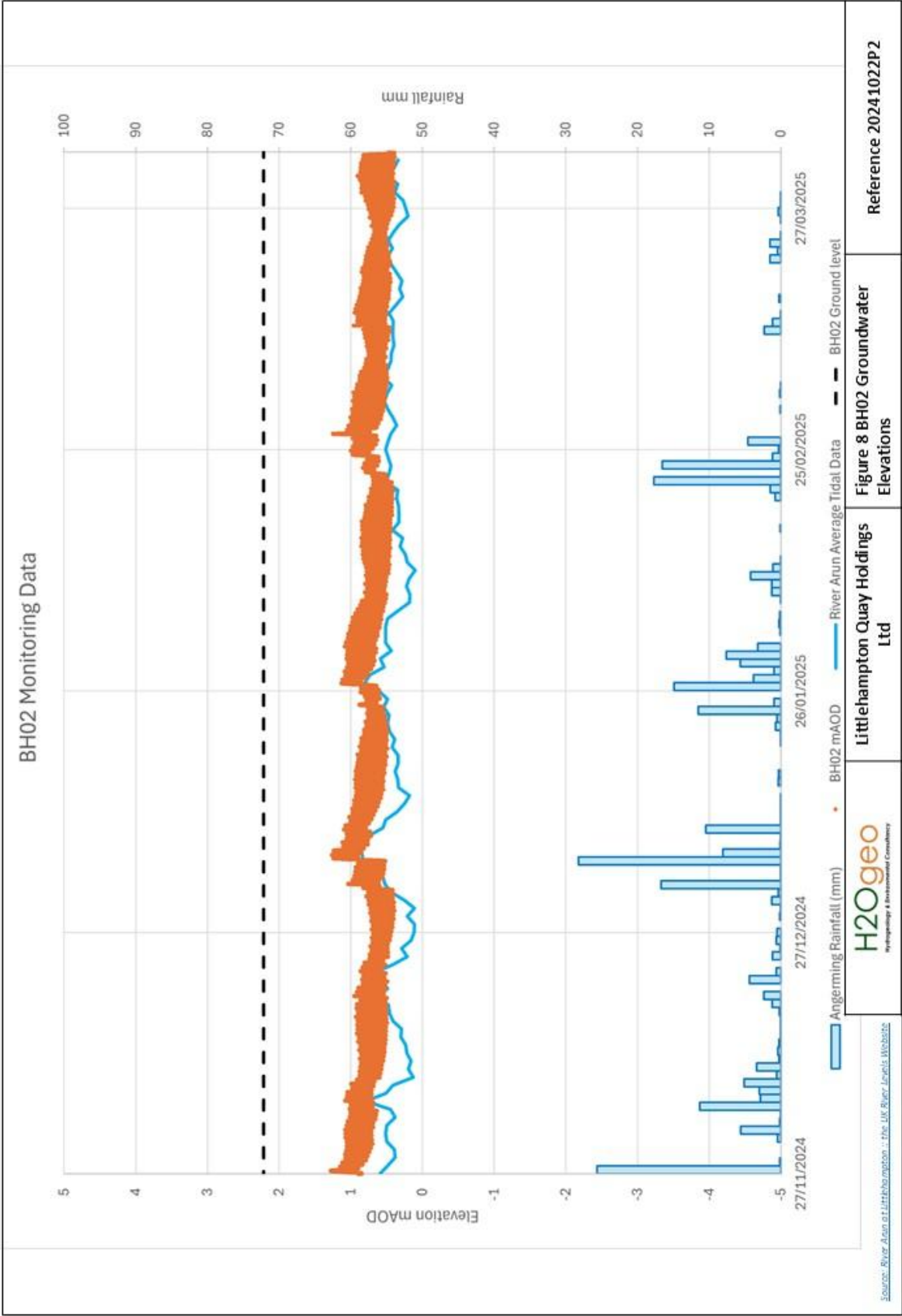


Figure 9 Borehole 3 Groundwater Elevations

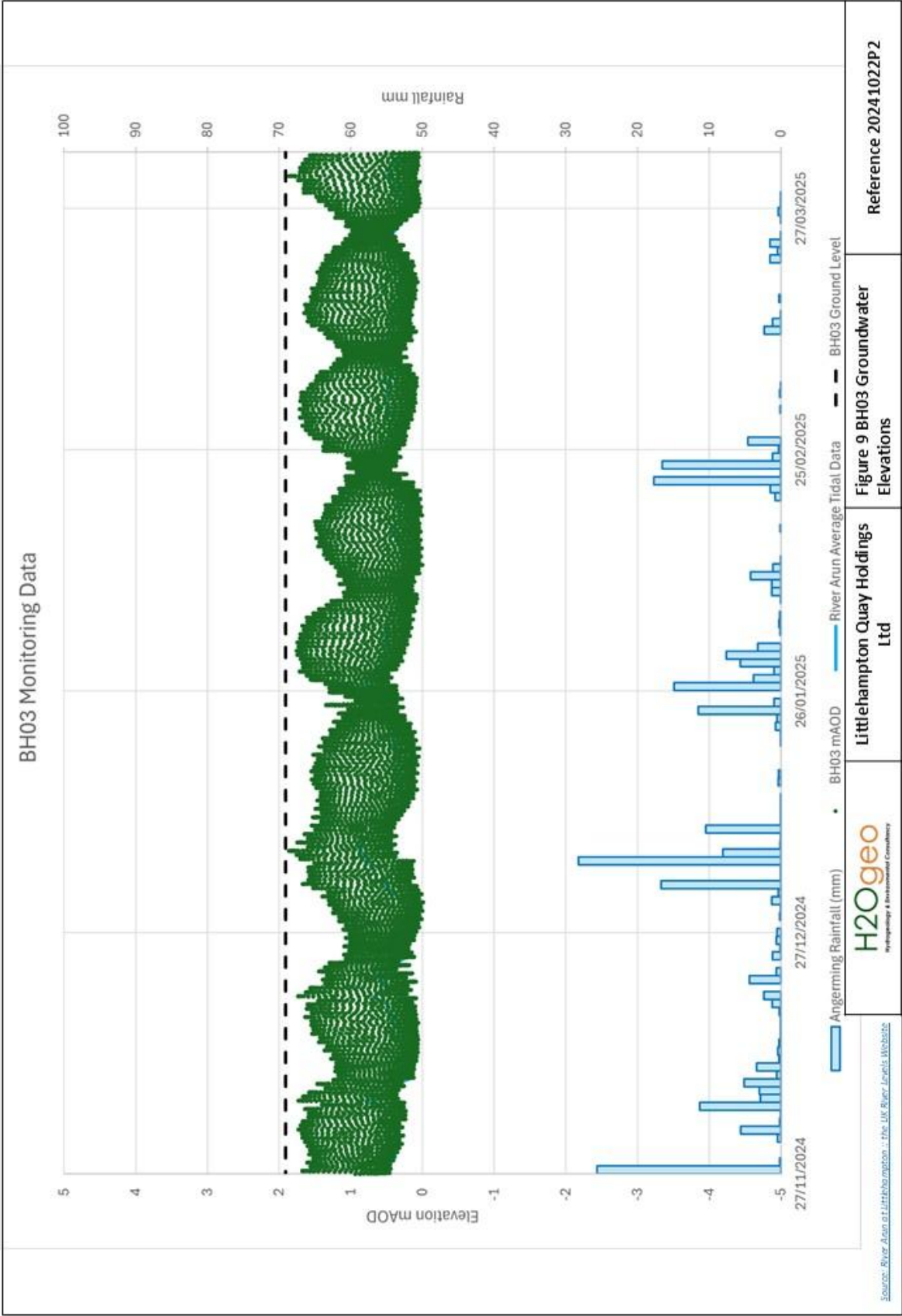


Figure 10 Hydrogeological Conceptual Site Model

