

10 November 2023

Jason Hawkes
Principal Planning Officer
Horsham District Council
Parkside
Chart Way
Horsham
West Sussex
RH12 1RL

Reference: 20231012P1

Dear Jason,

HYDROGEOLOGICAL REVIEW OF WATER NEUTRALITY STATEMENT FOR DC/23/1178

Please find below my review of the outline planning application for the development of the land at the Horsham Golf & Fitness Club for up to 800 homes including other uses such as sporting and leisure facilities (reference DC/23/1178).

My comments are based solely on the Water Neutrality components of the application and the following documents have been reviewed:

1. Application details;
2. Horsham Golf & Fitness Village, Water Neutrality Report, Quantum CE, Ref: 5782080/TG, V11, 5 May 2023, Annexes A to F;
3. Environment Agency comments on the application, 17 July 2023;
4. Nicholls Licensing and Consulting letter dated 30 August 2023; and
5. Hydrogeological Assessment: Water Neutrality Statement for the Horsham Management Co One Ltd Development, Stephen Buss Environmental Consulting Ltd, Ref: 2023-095-010-003, 7 September 2023.

Proposed Water Neutrality Scheme

The scheme proposed to achieve water neutrality consists of abstracting 423m³/day of groundwater from the Secondary A Upper Tunbridge Wells Sands aquifer. This will undergo treatment and then be put into supply.

The geological setting of the UTWS aquifer means it is not in hydraulic continuity with the Greensand aquifer abstracted at Hardham in the Arun Valley.

Runoff from the proposed site will pass via SuDS to deep bore soakaways along with excess treated grey water generated by the development. This will be recharged into the underlying aquifer as part of a Managed Aquifer Recharge (MAR) scheme.

My comments are ordered using each document's nomenclature for ease of reference and presented below:

Horsham Golf & Fitness Village, Water Neutrality Report, Quantum CE, Ref: 5782080/TG, V11, 5 May 2023, Annexes A to F;

Page/Section	Comment
Table 1.1	<p>The occupancy rates are based on extrapolation of census data and, this is an acceptable approach to estimating occupancy.</p> <p>There are rounding errors in the data resulting in slightly lower Total Annual Water Consumption figures by 15.8m³/year. (15,800 Litres)</p>
1.2 and Appendix B	<p>The British Water Code of Practice for Flows and Loads – 4 Sizing Criteria, Treatment Capacity for Sewage Treatment Systems has been used to estimate the commercial daily water demand including the Nursery, Café, Restaurant, Hockey facilities, Gym and Golf college.</p> <p>This document is intended to provide the loadings, which allows the total daily sewage load from properties/premises to be calculated and not the consumption of mains water on a site.</p> <p>It is not considered appropriate for use in assessing Water Neutrality. An alternative method for calculating the mains water consumption in the commercial premises and activities should be used such as BREEAM UK NC 2018 WAT 01.</p> <p>It is not clear where consumptive figures for Nurseries, Co-Working, Conference, Committee and Golf activities have been derived from. They are either not present within the Table of Loadings for Sewage Treatment Systems within the Flows and Loads document or prescribed a different value.</p> <p>Table 1.2 presents a value of 50,000 Litres/Day for landscape with no evidence of how this has been calculated.</p> <p>The water demand values need to be reworked and presented with evidence of how they have been derived.</p>
2.0 Existing Site Water Use	<p>The report makes reference to one climate centre to obtain rainfall data.</p> <p>Rainfall is variable across the region and the closest (11km west of the site) is North Heath that has an annual average rainfall of 806mm/year compared to the reported Charlwood station that has 833.69 mm/year.</p> <p>The closest rain gauge, monitored and reported by the Environment Agency, is located in Itchingfield (Station ID (WISKI) 314866) 4km west of the site with an annual average record of 836mm/year (excluding outliers).</p>
2.3 Historical Water Demand	<p>The existing golf course is irrigated by rainfall and, in drier months, groundwater from the existing licensed borehole on site.</p>
3.0 Residential Water Demand	<p>The domestic water consumption is broken down into the different uses. This does not include any allowance for outside taps used for gardening and/or washing of vehicles. The Part G Calculator typically assigns 5 litres/person/day to this use.</p>
3.1 Residential Daily Water Demand	<p>The numbers presented in Tables 3.1 and 3.2 do not match the numbers reported in the following text (i.e. Bath Spec and Shower Spec).</p> <p>The section describing the Part G inputs and results needs clarification.</p> <p>The section needs further explanation to account for where these numbers/standards have come from and to explain how each volume of excess greywater has been derived.</p>
3.1 Greywater Available for Aquifer Recharge	<p>It is not clear how the Bath and Shower grey water values have been derived.</p> <p>The daily recharge using the 20,478,690 Litres/Year figure would be 56,106 Litres/Day rather than 58,000 litres/Day. This whole section requires clarification and updating. It would be useful to include the calculations in the document.</p>
4.0 Water Offsetting Opportunities	<p>To clarify, the site is underlain by Horsham Stone within the Weald Clay that overlies the Upper Tunbridge Wells Sand.</p> <p><i>“The Tunbridge Wells Sand Formation is considered a suitable strata to abstract significant yields, with local borehole logs recording yields of up to 1800 m³/d.”</i> the source of this information should be referenced as there are no local borehole logs recording these types of yields.</p> <p>In addition to hydraulic continuity between aquifer units it will be necessary to understand the contribution groundwater from the Tunbridge Wells Sands makes to the River Arun and, how any abstraction from the TWS may impede this contribution. This</p>

Horsham Golf & Fitness Village, Water Neutrality Report, Quantum CE, Ref: 5782080/TG, V11, 5 May 2023, Annexes A to F;	
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	point has been addressed in the Stephen Buss Consulting Ltd document (2023-095-010-003) where it refers to a recycling of water via the Horsham Waste Water Treatment Works and discharge back into the River Arun upstream of the Arun Valley SAC.
4.2 Water Offsetting Strategy 2 – Borehole Utilisation	It is proposed to maintain the existing mains water supply to provide an emergency backup supply to the commercial facilities. What are the anticipated volumes/flow rates anticipated and do these currently come from mains water? Has the existing commercial water consumption been catered for in the proposed mitigation – what is the existing mains water consumption? Residential Borehole Water Demand – It is not clear if the application to the Environment Agency for a combined yield of 423,000 Litres/Day includes the proposed increase of the existing borehole from 80,000 Litres/Day to 100,000 Litres/Day as well as the four new boreholes? Below Figure 4.1 reference is made to three boreholes, the strategy is not clear.
4.4 Borehole Mitigation Strategy – Managed Aquifer Recharge	Further details are required to understand the mitigation strategy – insufficient evidence of schemes on Weald Clay (or similar) recharging the Tunbridge Wells Sands at depth (or similar) should be provided.
4.5 Managed Aquifer Recharge Volumes	Section 2.2 refers to 36 days drought storage from rainwater whereas Section 4.5 refers to 54 days. What is the intended drought storage capacity?
Table 4.1 Daily and Annual Water Demand	Calculations for this table must be provided in the document.
Figure 5.1 Proposed Borehole Soakaway Locations	There are a total of six proposed borehole soakaways, three in the southern portion and three in the northern portion of the site. No further details such as depths, diameters, pollution prevention measures are provided.

Overall the details of the proposed mitigation scheme is not clear and there are details missing from the Water Neutrality Statement. Based on this information more data is required to provide assurance that this scheme is feasible and would provide the mitigation required.

Appendix F – Borehole Prognosis Report - Borehole and Soakaway Feasibility Assessment, December 2022	
Page/Section	Comment
Page 4 Summary	1800m ³ /day yield has not occurred from the Tunbridge Wells Sand at this location and reference should be made to the source that informs that abstraction rate.
Page 13	The details of the pumping test will be assessed as part of the GIC Consent Review.

The prognosis report is now out of date with lots of additional information provided by the new borehole logs (Drilled April to July 2023) that represent actual site conditions drilled on site.

Hydrogeological Assessment: Water Neutrality Statement for the Horsham Management Co One Ltd development, Horsham, Stephen Buss Environmental Consulting Ltd, Ref: 2023-095-010-003, 7 September 2023	
Page/Section	Comment
2 Geology	The report states that Upper Tunbridge Wells Sands (UTWS) encountered between 51 and 57mbgl in BH1, 2, 3 and 4. Two potential sources of aquifer recharge have been considered in this assessment: 1 – recharge up-dip through exposed UTWS north of the site; and 2 – Vertical recharge through the overlying Weald Clay.

The Stephen Buss Consultancy Hydrogeological Assessment summarises that it is “*appropriate to assess four boreholes to achieve the desired yield of 423 m³/day.*” This is based on literature data alone and the field testing proposed is essential to confirm the applicability and resilience of the proposed solution.

Horsham Management Co One Ltd – Horsham, Nicholls Licensing & Consulting Letter, 30 August 2023, Ref: AL091	
Page/Section	Comment
Background/Update	It is understood that three of the four new boreholes will be used for abstraction to meet the 423m ³ /day demand with the fourth as a standby.
	The Tunbridge Wells Sands are most likely not in hydraulic continuity with the Arun Valley aquifer however abstraction from them could restrict recharge into the River Arun which then passes through the Arun Valley. This is addressed in the in the Stephen Buss Consulting Ltd document (2023-095-010-003) that refers to a recycling of water via the Horsham Waste Water Treatment Works and discharge back into the River Arun upstream of the Arun Valley SAC.
	HDC will need to see the results of the pumping test, interpretation, water features survey and Hydrogeological Impact report prior to making a decision as the outcomes, in terms of water neutrality, are key. Please make sure HDC are consulted on these documents.
Sustainability Approach	<p>The conceptual scheme indicates that <i>“water will find its way back into the aquifer serving the site. Subject to infiltration tests and borehole strata it is proposed to install a series of recharge boreholes together with unlined attenuation ponds.”</i></p> <p>Details of these structures must be provided along with results from infiltration testing, modelling of vertical recharge into the borehole soakaways and assessment of any hydraulic mounding in the UTWS and increased water levels elsewhere in the catchment, i.e. increased spring flow, groundwater elevations.</p> <p>To date no assessment of the UTWS aquifer has taken place to understand hydraulic boundaries and its potential to contain and store the recharged rainwater. The chemistry of rapidly recharged rainwater should be assessed and considered when designing the water treatment scheme. As previously discussed, recharge to this confined aquifer on site is likely to be via the outcrop north of the site. This has taken place over a long time period. Recharging via deep bore soakaways has the potential to rapidly change saturated zone beneath the site and its chemistry.</p>

Conent to Investigate a Groundwater Source TEST PUMPING CONSENT, S/2023/311 WR32(3) Water Resources Act 1991	
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5	<p><i>“This consent authorizes the Consent Holder to individually test pump four boreholes. A separate consent will be issued in due course to cover the aggregate test pumping element of the groundwater investigation.”</i></p> <p>Has the aggregate test pumping consent ever been issued and, if so, it is important that HDC have the opportunity to review it prior to testing?</p> <p><i>“If water is found to be contaminated with silt or other pollutants such as oil or chemicals, this water must not be allowed to flow directly or indirectly into surface waters or groundwater without treatment. The work should stop, and the Consent Holder should contact the Environment Agency for advice.”</i></p> <p>There does not appear to be a chemical testing component to the pumping test therefore changes to water quality will not be detected with time. In theory a sample should be collected at the start of the test and at the end to identify any chemical impacts of pumping over the 24 hour period.</p> <p>Each individual test is consented for 24 hours. Longer testing, 48 hours+, would be recommended for the aggregate testing in addition to monitoring of surrounding boreholes and spring lines if possible.</p>

In addition to the above comments, there is no field data to support the feasibility of this proposal or design criteria included in the application. This will be needed prior to making a decision.

Water quality issues have not been considered in this review however the geochemistry of mixing treated greywater, rainwater and groundwater must be assessed in the application as well as the

resource components of managed aquifer recharge. Long term trends should be modelled in the underlying aquifer to understand the role of precipitates in the matrix and aquifer/borehole yields.

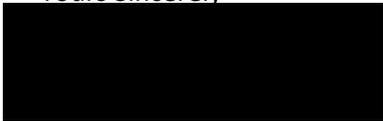
There are nearby potential sources of contamination including the Hop Oast Petrol Filling Station, an historic inert landfill located along the western side of the A24, north of the Hop Oast Roundabout operated by Wimpey Construction UK Ltd and the Hop Oast waste transfer station to name a few.

The Environment Agency have requested information on land contamination to be secured by a condition however this information will be needed to assess the potential risk to groundwater quality as part of a Hydrogeological Impact and Risk Assessment.

In summary, there is insufficient evidence to demonstrate that the scheme will be Water Neutral until investigation works have been completed and it's demonstrated that the Upper Tunbridge Wells Sands aquifer can provide the yield required, sustainably and in perpetuity.

Should you have any queries around these comments please do not hesitate to get in touch.

Yours Sincerely



Director & Hydrogeologist



W: www.h2ogeo.co.uk

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