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Our ref: 30557L1

Dear Xristina

RE: HYDROGEOLOGICAL COMMENT ON CSD'S BIA FOR 29 STEELE'S ROAD, NW3 4RE

The London Borough of Camden (LBC) has requested that a Basement Impact Assessment (BIA), prepared by Constant Structural Design Ltd (CSD), is commented on by a qualified hydrogeologist. The BIA is for a proposed partial basement at 29 Steele's Road, London, NW3 4RE.

The purpose of this letter is to provide the required hydrogeological comment. I am a Chartered Geologist (CGeol) with 25 years' experience as a hydrogeologist and environmental consultant.

COMMENT

The hydrogeological aspects of the BIA are considered to be addressed adequately, although this letter contains the following additions:

- More detailed geological descriptions
- Revised groundwater screening and scoping
- Revised hydrogeological impact assessment
- Revised mitigation measures

GEOLOGY AND SITE INVESTIGATION

The mapped site geology¹ comprises London Clay with no overlying superficial deposits, but a propensity for Head deposits. Head is poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes.²

Site investigation comprised the drilling of a borehole to 7 m and excavation of a trial to 0.8 m. Made Ground was identified to c.0.6 m, underlain London Clay. The site investigation is in line with mapped geology, although Head deposits do not appear to be present on site. No groundwater strikes were encountered. However, groundwater

² https://webapps.bgs.ac.uk/lexicon/lexicon.cfm?pub=HEAD



¹ British Geological Survey, 1:50 000 series, England and Wales Sheet 256 North London



level does not appear to have been measured c. two weeks following drilling, therefore perched groundwater cannot be ruled out.

REVISED GROUNDWATER SCREENING AND SCOPING

Question	Response	Details
1a. Is the site located directly above an aquifer?	No	The London Clay is classified as unproductive. There is no superficial aquifer.
1b. Will the proposed basement extend beneath the water table surface?	Unknown	No groundwater strikes were encountered during site investigation, but groundwater level does not appear to have been measured subsequently (i.e. weeks later) therefore the presence of perched groundwater cannot be discounted.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	Unknown	There are no mapped watercourses (including 'lost' rivers) within 500 m of the site. Given the local geology (London Clay) it is highly unlikely that there are any wells within 100 m of the site. There is a propensity for Head deposits locally, which can give rise to localised springs, although no springs are mapped within 500 m of the site.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site lies over 1 km south, and downhill, of the Hampstead Heath ponds
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	The proposed work entails lowering the floor level within an existing rear conservatory by 300 mm.
5. As part of site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No	The proposed work does not alter the surface water discharge.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?	Unknown	There are no ponds mapped within 500 m. However, the propensity for Head deposits locally means that localised springs, although none are mapped within 500 m of the site.

The following issues were identified during the revised screening process:

- 1. Potential perched groundwater: No groundwater strikes were not encountered during site investigation, but groundwater level does not appear to have been measured subsequently (i.e. weeks later) therefore the presence of perched groundwater cannot be discounted.
- 2. Potential Head deposits: There is a propensity for Head deposits locally, which can give rise to localised springs, although no springs are mapped within 500 m of the site.



HYDROGEOLOGICAL IMPACT ASSESSMENT

Conceptual model

The proposals involve lowering the floor level of an existing rear conservatory by 300mm, with excavation below the existing slab of approximately 450mm. The proven geology comprises London Clay with overlying Made Ground to 0.6 m. There is a propensity for Head deposits locally although these were not identified during site investigation.

The London Clay is classified as unproductive. There is no superficial aquifer. No groundwater strikes were not encountered during site investigation, but the presence of perched groundwater cannot be discounted.

Impact assessment

HFCL concludes that there is a low risk of groundwater ingress. The basement should be waterproofed to Grade 3 (BS 8102) to protect against ingress of soil moisture and perched groundwater. NHBC requirements should be included in the detailed design.

The risk of backing up of groundwater is considered very low as the BIA did not identify any basements locally, nor were any groundwater strikes were identified during site investigation. The proposed basement has a permeable hardcore sub-base to 775 mm therefore any perched groundwater flow would flow through the sub-base

HFCL agree with the BIA's hydrogeology assessment (Section 11.3) that the proposed excavation is highly unlikely to adversely affect the flow of groundwater across the site and that the risk of backing up of groundwater around the excavation is also considered to be negligible.

There are no significant impacts predicted to the wider hydrogeological environment.

MITIGATION MEASURES

<u>BIA's recommendations</u> The proposed mitigation measures against any minor water ingress involves installation of a drained cavity and sump pit to allow any minor water ingress to be removed and pumped to the existing sewer. In addition, HFCL recommend the following mitigation measures:

- 1. <u>Construction</u> Provision should be made to keep the excavation dry, with potential groundwater flow to be encountered from Head deposits.
- 2. <u>Waterproofing</u> Given the potential for perched groundwater, HFCL recommends that the proposed basement be waterproofed, as described below.

There are well documented best-practice methods for waterproofing basement structures, to prevent ingress of groundwater to the built structure, and to counter the effects of soil moisture, as outlined in BS 8102:2009 'Code of practice for protection of below ground structures against water from the ground.' BS 8102 gives guidance on the construction of new basements, introducing three performance grades, as shown in Table 1. BS 8102 also specifies three types of waterproof protection, Types A, B and C; shown in Table 2.

Table 1 Level of performance of waterproofing system

Grade	Required level of performance
1	Some seepage and dampness is permitted
2	No water penetration, but dampness is permitted
3	No water penetration or dampness is permitted



Table 2 Types of waterproof protection

Туре	Waterproof protection
А	Internal or external tanking
В	Structurally integral protection
С	Internal drained cavity protection with a sump and pump for removal of water or its
	disposal by gravity

The National House Building Council (NHBC) requires basements which are to be used for habitable accommodation to be constructed to Grade 3, and those used for parking cars to be constructed to Grade 2. $_{3}$

NHBC also require that ground investigations should be undertaken to identify the most appropriate waterproofing options, in conjunction with the construction materials to be used⁴. In the absence of adequate ground investigations to establish the ground water regime and drainage characteristics, BS 8102 (Clause 6.1) requires that 'Waterproofing measures should be designed on the basis of water to the full height of the retained ground at some time during the structure's life'.

The basement should be waterproofed to Grade 3 (BS 8102) to protect against ingress of soil moisture and perched groundwater. NHBC requirements should be included in the detailed design.

Yours sincerely

Hannah Fraser Director

³ NHBC Standards 2017

⁴ NHBC Standards 2017