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Ground Investigation & Basement Impact Assessment – Non-Technical Summary

CLIENT	Vincent and Rymill
SITE ADDRESS	20 Well Road, Hampstead, London NW3 1LH
REPORT REFERENCE	GWPR2241/GIR/October 2017
ENGINEER	Francis Williams M.Geol. (Hons) C.Geol FGS Cgeol CEnv AGS Trevor Vincent Bsc C.Eng M.I Struct E.
SITE DESCRIPTION	The site comprised a three-storey brick built residential dwelling, located as part of the south-west wing of a larger structure. Private gardens were noted to the rear of the dwelling with a ~2-3m high brick wall and overgrown vegetation along each site boundary. The site was accessed through a wooden gate of Well Road. It was understood that No. 1 and 2 Cannon Lane and 19 Well Road have existing basements. Well Road appeared to lie at 106.7m AOD. However, the garden level is understood to sit ~2.00m above the entrance from Well Road to the south-east, which leads up to the garden via stone steps. The existing property and small patio area is then understood to lie ~1.00m below the garden level. Based on data supplied by the structural engineer, the existing party wall between 20 and 19 Well Road is 2.90m bgl in depth and the party wall between 20 and 18 Well Road is founded at 1.20m bgl. Both walls were assumed to comprise brick corbel footings, 600mm wide. It was understood that the existing footings of 20 Well Road were 0.70m bgl in depth, comprising brick corbel footings that are 600mm wide.
PROPOSED DEVELOPMENT	At the time of reporting, October 2017, the proposed development was understood to comprise the construction of a basement below the entire footprint of the ground floor, including construction of lightwells. The floor level of the basement is to be formed at ~3.20m bgl, with the retaining wall foundation formed at 3.60m bgl. A proposed development plan can be seen in Figure 4. It is understood that the south-eastern and western walls (of the basement will be constructed utilising 7.00m deep contiguous piling, with an expected load of 40kN/m^2). The remainder of the basement will be constructed based on load bearing retaining wall underpins, with thickened edges and a semi-ground bearing slab. It is anticipated that the thickened edges will range between 2.00m – 2.60m, with loads implied by the retaining wall ranging between 76.60 – 92.00kN/m^2.
CONCEPTUAL SITE MODEL AND MATTERS OF CONCERN HIGHLIGHTED BY SCREENING	The following geotechnical concerns were formulated by a desk based review and should be analysed by intrusive investigation or adopted in final design: • Soils with the potential for volume change potential are likely to be encountered under the site. Soils volume change potential to be determined along with depth of root penetration with reference to proximity of nearby trees; • Potential for Made Ground due to construction activities in site history; • Basement excavation and land stability given neighbouring properties and roads; • Potential for shallow groundwater to be encountered perched within shallow Made Ground; • Presence of a Secondary Aquifer and whether basement will affect saturated Aquifer; • Temporary works whilst underpinning; • Surface Water Run-off;

- Heave of soils following overburden pressure release.

FIELDWORK UNDERTAKEN

Site works was undertaken on the 11th August 2017 and comprising the drilling of 2No. Cut Down Windowless Sampler Borehole (BH1 and BH2) to 6.00m - 6.45m bgl. Standard Penetration Tests (SPT's) were undertaken at 1.00m intervals in BH1. 1No. Dynamic Probe (DP1) was undertaken from the base of BH1 from 6.00m – 11.80 bgl. A groundwater monitoring well was installed to 5.00m bgl.

GROUND CONDITIONS ENCOUNTERED

Trial Hole Logs can be seen in Appendix A.

Summary of Strata Encountered

Strata	Depth Encountered (m bgl)	Thickness (m)
MADE GROUND: Dark to light brown silty gravelly sand to gravelly sandy silty clay. The sand was fine to medium grained. The gravel was occasional to abundant, fine to coarse, sub-rounded to angular flints, bricks and ceramic fragments. Carbonaceous material was noted in BH2 between 0.50m – 1.10m bgl and 1.50m – 1.80m bgl.	GL	1.80 - 2.60
HEAD DEPOSITS: Brown gravelly sandy clay to a light brown gravelly silty sand. The sand was fine to medium grained. The gravel was rare to abundant, fine to coarse, sub-angular to sub-rounded flints.	1.80 – 2.60	0.20 – 0.70
CLAYGATE MEMBER OF THE LONDON CLAY FORMATION (cohesive): Brown/light brown/grey gravelly silty sandy CLAY. The sand was fine to medium grained. The gravel was occasional to abundant, fine to coarse, sub-angular to sub-rounded flints. Bands of light brown/brown gravelly clayey silty sand noted 2.00m - 2.50m, 2.60m – 2.80m, 3.40m – 3.90m, 5.00m – 6.00m, 5.60m – 6.00m bgl. The sand was fine to medium grained. Gravel was rare, fine to medium, sub-angular to sub-rounded flints.	2.50 - 2.80	>3.50 – >3.65

ROOTS

Roots were noted to 0.30m bgl in BH1 and 1.60m bgl in BH2.

GROUNDWATER

Groundwater was not encountered within BH1 during both the intrusive investigation and the 2No. return visits to monitor the installed well on the 16th and 23rd August 2017.

STANDARD PENETRATION TESTING (SPT's)

Claygate Member of the London Clay Formation (cohesive): Medium to high undrained shear strength (70 – 90kPa).

Claygate Member of the London Clay Formation (granular): Medium dense (SPT "N" blow counts 17 – 20).

ASSUMED Claygate Member of the London Clay Formation (cohesive): Low to very high undrained shear strength (35 – 260kPa)

ASSUMED Claygate Member of the London Clay Formation based on dynamic probe (granular/cohesive): Extremely Dense (71 – 111).

VOLUME CHANGE POTENTIAL

The cohesive soils of the Head Deposits were shown to have a **low to medium** potential for volume change in accordance both BRE240 and NHBC Standards Chapter 4.2. No moisture deficits were noted in the two samples tested.

The cohesive soils of the Claygate Member of the London Clay Formation were shown to have a **medium** potential for volume change in accordance both BRE240 and NHBC Standards Chapter 4.2. No moisture deficits were noted in the two samples tested.

MOISTURE CONTENT PROFILING	Granular soils of the Claygate Member of the London Clay Formation: Assumed to have a **low** volume change potential in accordance with NHBC Standards Chapter 4.2 and BRE240. Geotechnical laboratory results can be seen in Appendix B. There was a possible moisture deficit in BH2 at the shallower depth of 1.80m due to the moisture content being relatively high for that sample. Given the depth of Made Ground in BH2 and the granular nature of the soils, it likely to be related to the lithology of the soils (presence of sand and silt). There was a possible moisture deficit in BH2 at a depth of 3.50m bgl due to the lowering of the moisture content. The strata in the borehole to that depth were generally described as a sandy silty clay. The sand was very fine grained. Roots were noted to 1.60m bgl in BH2. Therefore, the possible moisture content deficit was likely to be related to the lithology of the soils (presence of sand and silt) rather than the water demand of nearby trees.
FOUNDATION RECOMMENDATIONS	It was considered that 3.60m bgl was a suitably moisture stable depth for underpinning. Based on the loading regime provided the net change in effective stress at foundation depth may results in minimal to <10mm of settlement. The basement slab, with a self - weight of ~10kN/m^2, may experience ~3 – 4mm of initial elastic heave at 3.00m and 3.50m bgl. It is estimated that 30-50% of the total heave will be immediate, indicating that between 6.00 – 9.00mm of total heave may occur beneath the slab.
HYDROGEOLOGICAL RISK ASSESSMENT	Groundwater was not encountered during the intrusive investigation and BH1 was noted to be dry on both return visits. Therefore, it is considered unlikely that significant amounts of groundwater would be encountered during foundation excavation and the basement will not affect the saturated aquifer underlying the site. Perched water maybe encountered within the Made Ground or/and silty pockets of the Claygate Member of the London Clay Formation, especially after period of prolonged rainfall. The cumulative effects of basements in groundwater are not a consideration at this site.
ASSESSMENT OF GROUND MOVEMENT	Ground movement assessment was carried out on the neighbouring properties within Section 7.7 of the full ground investigation report (GWPR2241/GIR/October 2017). In terms of building damage assessment and with reference to Table 2.5 of C580 (after Burland et al, 1977), the 'Description of typical damage' given the calculated movements it is likely to fall within category of damage '0' Negligible. Given that the two party walls of 18 Well Road already have basements, it is likely that this will create a level of rigidity, meaning any ground movement caused by the addition of the basement below 20 Well Road will be further reduced. Mitigation measures to minimise potential movements are provided in Section 7.7 7 of the full ground investigation report (GWPR2241/GIR/October 2017).
SUB-SURFACE CONCRETE	AC-1.
SURFACE WATER/DRAINAGE	The basement includes the construction of a lightwell, which will only increase the amounts of hard-surfaces and paved areas by 12m^2. Information from the Architect indicates that rainwater discharges into a combined soil and surface water system within the grounds/garden area, which enters the main public sewer beneath Well Road. The foul drainage from the new Lower Ground floor and the surface drainage below the Delta system will be pumped into the existing system. No further actions considered necessary.

THIS EXECUTIVE SUMARY MUST BE READ IN CONJUNCTION WITH THE FULL REPORT.