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Ground Investigation & Basement Impact Assessment – Non-Technical Summary

CLIENT	Mr & Mrs S Wilcke
SITE ADDRESS	6 Parsifal Road, West Hampstead, London NW6 1UH
REPORT REFERENCE	GWPR2280/GIR/November 2017
ENGINEER	Darina Jurovskaja BSc (Hons) MSc Francis Williams M.Geol. (Hons) C.Geol FGS Cgeol CEnv AGS
SITE DESCRIPTION	The site comprised a semi-detached four-storey residential building with paved off-street parking area and paved walkways. A thin side access down to the north-eastern side of the property led to the private rear garden. In accordance with FreeMapTools, the site elevation at the front of the property appeared to be 75.00m AOD and the elevation at the rear of the property was 76.3m AOD. Locally the site was noted to be sloping moderately in a south-easterly direction. The corner between Parsifal Road and Finchley Road, located ~130m north-east, appeared to be at 77.5m AOD. The junction between Fortune Green Road and Hillfield Road, located ~120m south-west, appeared to be 70.6m AOD. The sites environs were noted to be sloping gently to moderately in a southerly to south-westerly direction.
PROPOSED DEVELOPMENT	At the time of reporting, November 2017, the proposed development was understood to comprise the slight deepening of the existing basement (by 300mm) beneath the front of the building and extension of the basement/lower ground floor to the rear of the property. The basement is anticipated to be formed at ~2.30 – 2.50m below the rear garden level. An existing and proposed development plan can be seen in Figure 4 – 6. The proposed development fell within Geotechnical Design Category 2 in accordance with Eurocode 7. The proposed foundation loads were not known to Ground and Water Limited at the time of reporting but are likely to range from 75 – 150kN/m^2. The proposed development was understood not to involve any re-profiling of the site and its immediate environs. It is understood that no trees will be removed to facilitate the construction of the basement.
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: • Perched water within the Made Ground or silt bands of the London Clay Formation • 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; • London Clay Formation/Shrink and Swell • Differential Foundation Depths • Retaining walls • Trees and Bushes
FIELDWORK UNDERTAKEN	Site works were undertaken on the 29th September 2017 and comprised the drilling of 1No. Dart Windowless Sampler (BH1) to a depth of 10.00m bgl. Standard Penetration tests (SPTs) were undertaken at 1.00m intervals. A 50mm combined bio-gas and groundwater monitoring well was installed in BH1 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: Brown gravelly sandy clay. Sand was fine to coarse grained. Gravel was occasional, sub-angular, fine flint and brick fragments.	GL	0.65 – 1.00m >0.70m
LONDON CLAY FORMATION: The soils generally comprised orangish brown silty clay, becoming a dark grey brown silty clay at 8.00m bgl in BH1. Rare to occasional selenite crystals were noted in BH1 from a depth of 5.10m bgl.	0.65 - 1.00	>0.05 - >7.00

ROOTS

No roots were encountered in any trial holes.

GROUNDWATER

Depth of Groundwater Strikes/Standing Groundwater Within Trial Holes			
Trial Hole	**Date**	**Depth of Groundwater Strike/Standing after 20mins (m bgl)**	**Depth to Base of Trial Hole/Standpipe (m bgl)**
BH1	03.11.2017	1.07m bgl	5.00m bgl
	10.11.2016	Before bailing – 0.97m bgl After bailing – 1.25m bgl	5.00m bgl

STANDARD PENETRATION TESTING (SPT's)

London Clay Formation (cohesive): Medium to high undrained shear strength (45 – 110kPa).

VOLUME CHANGE POTENTIAL

The cohesive soils of the London Clay Formation were shown to have a **medium to high** potential for volume change in accordance both BRE240 and NHBC Standards Chapter 4.2.

A potential lithologically derived moisture deficit was noted in the London Clay Formation BH1/7.50m bgl due to the heavily overconsolidated nature of soils.

MOISTURE CONTENT PROFILING

A possible moisture deficit was noted in BH1 at a depth of ~7.50m bgl due to a lowering of the moisture content of the sample at that depth. Also, a slight potential moisture deficit was noted at ~2.00m bgl.. Roots were not noted within the borehole. The strata in the borehole was generally described as brown silty clay with rare fine selenite crystals. Geotechnical analysis has shown the soils to be heavily overconsolidated. Therefore, the apparent moisture deficit could be a result of the lithology of the soils (heavily overconsolidated) rather than the water demand from the roots.

FOUNDATION RECOMMENDATIONS

It was considered that 2.50m 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.

Limit State: Proposed Bearing Capacities Calculated (Based on BH1)			
Existing/ Proposed	**Depth (m BGL)**	**Foundation System**	**Limit Bearing Capacity (kN/m²) (EC2)**
Proposed	2.50	6.00m by 1.50m Strip	191.8
		6.00m by 2.30m Strip	183.75
		12.00 by 1.50m Strip	179.8
		8.00m by 2.30m Mat	188.71
	1.00	6.00m by 1.50m Strip	111.14
		6.00m by 2.30m Strip	120.68
		12.00 by 1.50m Strip	108.66

Serviceability State: Proposed Settlement Parameters Calculated (Based on BH1)				
Existing/ Proposed	**Depth (m BGL)**	**Foundation System**	**Limit Bearing Capacity (kN/m²)**	**Settlement (mm)**
Proposed	2.50	6.00m by 1.50m Strip	190	24.26
		6.00m by 2.30m Strip	180	24.29
		12.00 by 1.50m Strip	170	17.79
		8.00m by 2.30m Mat	10	-3.99*
	1.00	6.00m by 1.50m Strip	110	22.06
		6.00m by 2.30m Strip	110	23.71
		12.00 by 1.50m Strip	105	15.8

*It must be noted that a load of less than 10kN/m2 at 2.50m bgl could result in heave due to a reduction in effective stress at depth.

The structural engineer will be required to account for these settlements in the final design.

The basement slab, with a self - weight of ~10kN/m^2, may experience ~4mm of initial elastic heave at 2.50m bgl. It is estimated that 30-50% of the total heave will be immediate, indicating that between 12.00 – 20.00mm of total heave may occur beneath the slab.

HYDROGEOLOGICAL RISK ASSESSMENT

Water seepage was encountered at 6.30m bgl during the intrusive investigation. Two return visits to monitor the combined bio-gas and groundwater well installed in BH1 were undertaken by a Ground and Water Limited Engineer on the 3rd November 2017 and 10th November 2017. Water was noted to be resting at 1.07m bgl, 0.97m bgl (before bailing) and 1.25m bgl (after bailing) respectively in the 5.00m deep well installed. This groundwater was considered to represent seepages of perched water from within the Made Ground or silt bands of the London Clay Formation accumulating in a standpipe installed within impermeable soils of the London Clay Formation.

ASSESSMENT OF GROUND MOVEMENT

The proposed developed is assumed to significantly increase the differential depth of foundations relative to neighbouring properties as it is understood that the neighbouring structures do not have basement at the rear of the building. Ground movement assessment was carried out on the neighbouring properties within Section 7.7 of the full ground investigation report (GWPR2280/GIR/November 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 '1' Very Slight to '0' Negligible. Mitigation measures to minimise potential movements are provided in Section 7.7 7 of the full ground investigation report (GWPR2280/GIR/November 2017).

SUB-SURFACE CONCRETE

AC-4.

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