Chord Environmental Ltd

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Your Ref:
Our Ref: 1109/LJE250314
Direct phone: 07595 023149

For the attention of: Hannah Dashfield

25 March 2014

99a Frognal, Hampstead, NW11 3DX – Assessment of Basement Accumulative Groundwater Effects

Dear Hannah,

Further to Camden's BIA review process, I have addressed the accumulative groundwater effects of the proposed basement at 99a Frognal together with the existing neighbouring basement developments on Frognal and Oak Hill Way. This assessment should be read in conjunction with GEA's site investigation and basement impact assessment[1] report and Chord Environmental's groundwater impact assessment report[2].

Regulatory Background

Assessment of the potential effects of proposed basement structures is required within the London Borough of Camden and detailed within their "Guidance for Subterranean Development"[3] document. The guidance states that where basement developments are adjacent or near-contiguous, potentially significant cumulative effects on groundwater flow can occur and that these potential effects should be assessed.

Proposed Basement Development

The proposed new basement will vary in depth but will generally include the deepening of the existing ground floor level by approximately 4.0 m to a level of approximately 116.20 m OD. The deepest part of the basement will be located beneath the northwestern corner of the proposed new house for a swimming pool. In this area the basement will extend by about 8.50 m below the existing rear garden level to a level of roughly 114.60 m OD. A contiguous and secant pile wall is proposed with the female piles and male piles extending to 112.6m OD and 110.0m OD respectively.

[1] Basement Impact Assessment Report – 99a Frognal, London NW3 6XR. J13053A. Geotechnical & Environmental Associates Ltd. February 2014

[2] 99a Frognal. Groundwater Impact Assessment. 1109/R11. Chord Environmental Ltd. February 2014.

[3] Camden Geological, Hydrogeological and Hydrological study - Guidance for Subterranean Development. Ove Arup & Partners Ltd., November 2010

Summary of Site Setting and Ground Conditions

The Site occupied by 99a Frognal, Hampstead, London (National Grid Reference TQ 261 859) is approximately rectangular in shape, measuring c.30m by 55m in area, and is located in a residential area roughly 350 m to the west of Hampstead London Underground station. The Site is accessed via a private road leading off Frognal and is bordered on all sides by residential properties.

Existing single level residential basement structures are present at the following properties in the vicinity and are shown on the attached plan:

- 1 Oak Hill Way, NW3 7LR -
- 3 Oak Hill Way, NW3 7LR
- 104 Frognal, NW3 6XU
- 113 Frognal, NW3 6XR

Site investigation findings at 99a Frognal established Bagshot Formation strata to depths of between 2.6m and 7m below ground level (bgl) comprising dense orange-brown fine to coarse silty sand as well as brown sand and gravel. The base of the Bagshot Formation beneath 99a Frognal is between 116.92 m OD and 113.89 m OD. Claygate Member strata were then proved to the full depth investigated of 20m bgl (99.18 m OD) comprising orange brown silty sandy clay.

Groundwater was encountered within the Claygate Member silty sandy clays and sands beneath the Site between 110.2 m and 108.6m OD. Groundwater level monitoring shows that the groundwater gradient within the Claygate Member strata beneath the Site follows topographic contours toward the southwest. No groundwater was encountered within the Bagshot Formation silty sands, which extends to depths of between 116.92 m OD and 113.89 m OD beneath the Site.

Summary of Groundwater Impact Assessment for 99a Frognal

The lithological logs of the site investigation encountered saturated Claygate Member clays and sands between 110.2 m and 108.6m OD. The male piles would extend to 110 m OD, at or above monitored groundwater levels (which included the exceptionally wet recent winter period) however female piles would only extend to 112.6m OD, at least 2m above monitored groundwater levels, and therefore the contiguous pile wall would not act as a barrier to groundwater flow beneath the site.

Assessment of Potential Cumulative Groundwater Effects

Potentially significant cumulative effects on groundwater flow can occur where basement structures are developed beneath rest groundwater levels and are in close proximity to each other, i.e. are adjacent to each other or are near-contiguous. In these instances, an otherwise small effect on groundwater levels and flows from an individual basement development can accumulate into a greater significant effect due to the presence of similar neighbouring structures.

The groundwater impact assessment for the proposed basement development at 99a Frognal has established that it would not act as a barrier to groundwater flow beneath the site. Additionally, the nearest basement structures on Oak Hill Way and Frognal are located in excess of 50m from the proposed development at 99a Frognal and cannot be considered as adjacent or near-contiguous (see

attached plan). Consequently there would be significant cross sectional area available for any groundwater present to flow around these basement structures.

Although no site investigation data is available for these basement developments, cross sections provided with their planning applications indicate that they are single level basements and not likely to extend beneath groundwater levels based on the site investigation findings for 99a Frognal.

Based on the above, no potential cumulative effects on groundwater flows or levels have been established by this assessment.

I hope this is sufficient for your requirements however please contact me should you need any clarification or further explanation.

Yours sincerely,

John Evans BSc MSc CGeol.

Director

cc Cliff Willis

Harrison Varma

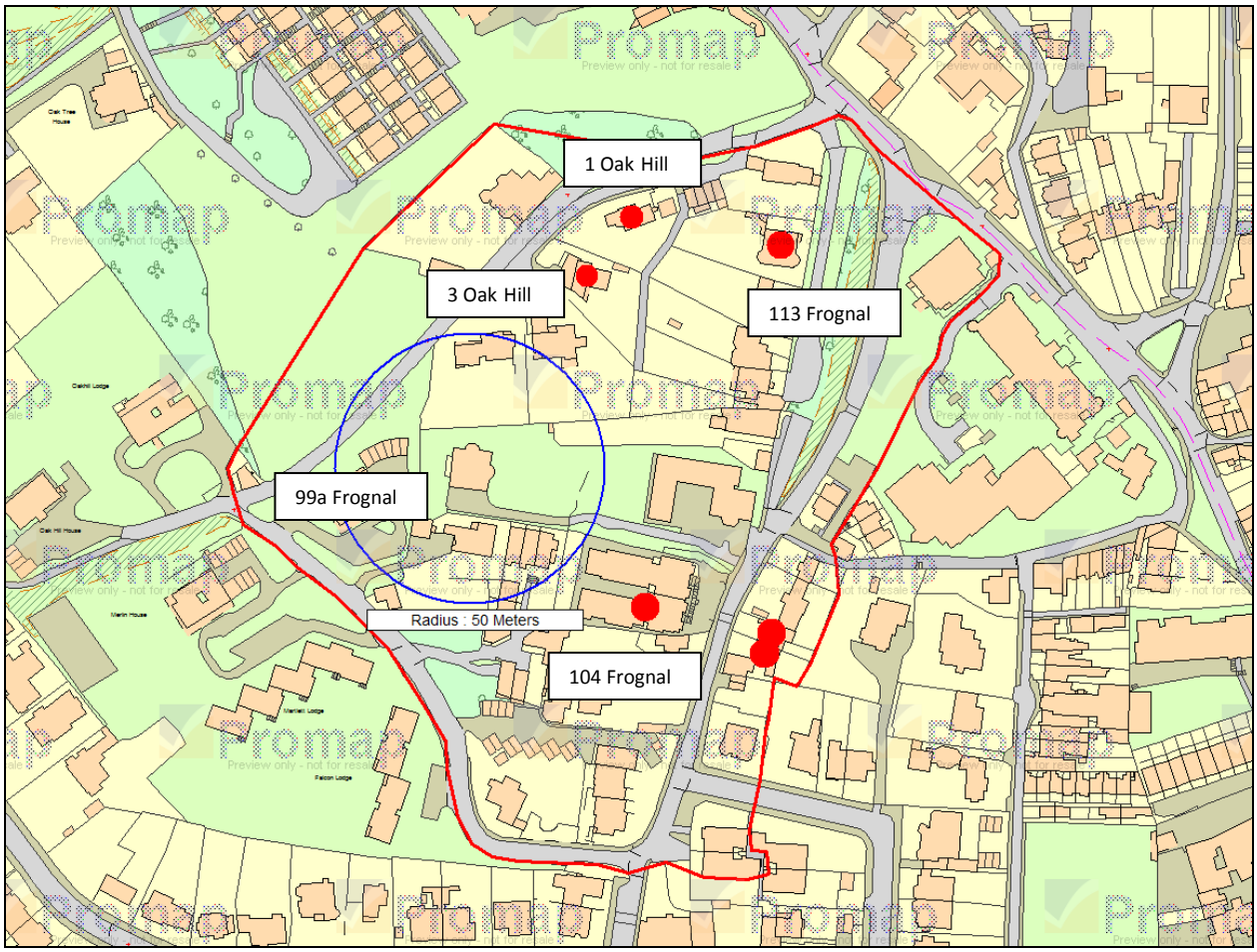

Figure 1: Basement structure developments within the vicinity of 99a Frognal, NW3.