

26 Christchurch Hill

London NW3 1LG

Structural Engineer's Report for Planning Application

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Prepared by: **Eddy Battman MEng**
Peter Dash MEng CEng MStructE

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1 Introduction

Price & Myers have been appointed by Mr R. Pascalovici to assist his architect, Erica Jong Architects, in the preparation of proposals for the extension of the property at 26 Christchurch Hill in Hampstead, London.

This report outlines the progress of the design at Planning Application stage and has been undertaken in accordance with Camden Planning Guidance - Basement and lightwells (CPG4).

The information in this report is based on a visual survey of the existing property, desk study searches of the area, and ground investigation findings completed by GEA.

2 The Site

The site is located on the northeast side of Christchurch Hill, immediately to the southeast of the crossroads junction with Well Road. The main house is a detached 2-storey structure and a Grade II listed building positioned in the centre of the site. The original house was built circa 1812, and there have been several extensions carried out over the years. There is also a single-storey structure fronting Well Road and annexed to the main house used as a studio but previously a garage.

The main house is surrounded by front and rear gardens. The north-western end is laid with lawn, whilst the central portion is covered in concrete paving and the south eastern half is covered in artificial grass. The gardens have a number of large mature trees and shrubs surrounding the perimeter of the property.

The site slopes down to the southeast, in keeping with the general topography of the surrounding area. The site has however been terraced to form two relatively level areas. The lawn at the north-western end of the site is raised above the remainder of the site by approximately 1m supported by a small brick retaining wall, whilst the north-western boundary is elevated above the ground floor of the house by approximately 2m, forming a gradient down to the retaining wall of approximately 5°.

Historical maps included in Appendix A show that the majority of the surrounding properties existed as far back as 1879.

3 Ground Conditions and Hydrogeology

The published geological maps of the area are included in Appendix A and indicate the site will be underlain by the Claygate Member of the London Clay below Made Ground. As the ground rises away from the house to the West, the more sandy Bagshot formation, which overlies Hampstead Heath, starts to be encountered.

Rainwater falling on the Heath soaks through the permeable sands and forms into springs where it meets the impermeable clay layers. Many of London's Lost Rivers have their sources at this junction, and one of the tributaries of the River Fleet is recorded passing near the site – refer to the Lost Rivers of London map in Appendix A.

A full geotechnical investigation has been carried out by GEA, which confirms the above and suggests there are no significant hydrological issues associated with the proposals. Groundwater is likely to be encountered during the excavation of the lowest levels of the new basement but this will be dealt with as part of the construction sequencing.

4 Existing Building

As described in section 2, it appears that the original parts of the existing building may date from 1806. WWII Bomb damage maps (Refer to Map 8 in Appendix A) suggest the building did not suffer any damage although nearby No. 22 did suffer some blast damage, but only minor in nature. Preliminary research into past Planning Applications and listed building consent applications suggests that the following alterations have occurred over recent years:

- | | |
|-------------------|--|
| 1806/7
or 1812 | Newton's map of 1814 shows a house corresponding to 26 Christchurch Hill, also known as "Sunnybank", in its present position. Documentary research suggests that the property was constructed either around 1806/7 or 1812. The property comprised a simple one bay deep rectangular plan when first built. |
| By 1842 | An additional bay had been added to the rear with a projecting half moon bay window. |
| By 1866 | The property had become physically linked with 5 Well Road, "Crossways cottage". It was assumed to provide additional service accommodation to the main house. Land Registry records indicate that the link was later bricked up around 1956, once again separating Crossways cottage from 26 Christchurch Hill. |
| 1973 | A 2-storey extension was added to the rear. In addition at some point between 1972 and 1984, possibly as part of the 1973 works, the later canted bays to the south elevation were removed. |
| 2005 | A single-storey utility room was added as an annex to the existing family room and toilet in ground floor. |

From a visual inspection of the building it appears to consist primarily of loadbearing brick walls, and timber joisted floors. The layout of the existing structure is shown on structural design sketches in Appendix B.

5 Proposed Structure

5.1 Substructure

The project involves creating a lower ground level at the front of the house and a double level portion directly beneath the existing studio. The garden perimeter walls to Number 5 Well Road and two of the external walls of the existing house will require underpinning (Refer to typical underpinning sequence in the structural design sketches – Appendix B). Permeation grouting may be necessary to control the inflow of groundwater. Grouting would proceed prior to underpinning pumped in to locally plug the route of water between the Claygate Member and the groundwater level. This is a common procedure adopted in conditions where the excavation is carried out beneath the water table. Due to raised neighbouring concerns it is recommended that during excavation specialists remain on site to carry out additional grouting as required to limit water flows if they are higher than expected.

Together with the underpinned walls, secant piling is used to form the external walls of the basement (Refer to typical basement wall section in the structural design sketches – Appendix B). These will help form a barrier to the inflow of groundwater. A standard bottom up excavation sequence is proposed. The design of the piles (whether cantilever or propped) will impact on the extent of temporary propping needed. Temporary propping will be necessary for the double level portion and to restrain the external wall underpins that are unrestrained following removal of the ground floor. Later the completion of the ground floor slab forms the permanent restraint to the walls.

5.2 Superstructure

The existing superstructure of the main house will be entirely retained, supported off new reinforced concrete slabs and walls. The existing masonry Annex building will be carefully

demolished to allow the commencement of the underpinning and piling. Once the new basement structure is complete, up to the new garage slab, the annex building will be re-built with the existing materials and re-instated in the original design.

5.3 External Works

The structural design of elements within the external works will be developed in more detail in the next stages of the design.

Monitoring of ground movements will need to be carried out to ensure that any movement can be monitored and action taken if readings recorded exceed previously agreed levels. A typical movement monitoring specification is provided in Appendix E. We would expect marked up elevations of both No. 26 Christchurch Hill and No. 5 Well road showing the location for fixed targets to be positioned. Monitoring should then proceed prior to structural works commencing until after the basement structure and ground floor slab are completed. After which monitoring continues but at a lower frequency for another six visits.

6 Design Criteria

6.1 Codes and Standards

The design will be developed based on the current relevant British Standards.

6.2 Loadings

Typical domestic floor loads of 1.5kN/sqm and roofs 0.75kN/sqm will be used generally with additional allowances made for heavy floor finishes. Appropriate highways imposed surcharge loads will be used for piles along the Well Road boundary, and locally for a small width of the roof of the basement within the zone of influence of Well Road.

6.3 Design Fire Periods

Fire periods of one hour will typically be achieved through inherent concrete resistance or through intumescent coating of structural steel.

6.4 Disproportionate Collapse

As a 2 storey over basement single occupancy house the building falls under Class 1 under the Building Regulations Part A3 and therefore no special measures are required.

7 CPG4 Basement Impact Assessment Screening & Scoping

The screening below has been carried out in accordance with the procedure outlined in London Borough of Camden Planning Guidance CPG4 (September 2013), Section 2.12. The responses below relate to the Screening Charts in Figures 1, 2 and 3 of CPG4, which are included in Appendix C for reference.

Figure 1 Groundwater Flow Screening:

Question 1a: **YES** – The Claygate member is a designated Secondary ‘A’ aquifer. Beneath this is London Clay refer to geology map in Appendix A.

Question 1b: **Possibly** – Excavations will extend down to +99.56m whilst ground water has been recorded between +100.74m and +101.51m

Question 2: **YES** - A former well was present 55 m to the northwest of the site, however it is not shown on historical maps after 1896. A spring/well is shown on historical maps in Well Walk 95 m to the northeast of the site. The well is noted as disused from

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1954. It is nearly 600m away from a lost river - refer to Historical maps and copies of the Lost Rivers map in Appendix A

Question 3: NO – the site is over 150m away from the pond chains on Hampstead Heath

Question 4: Yes. A limited area of existing soft landscaping will be excavated, although this area equates to a very small proportion of the soft landscaping across the site as a whole. It will be replaced with a sunken courtyard at basement level, which will therefore be drained to the sewer system and will not increase surface run-off.

Question 5: NO – due to ground conditions soakaway is not likely to be feasible and is not proposed.

Question 6: NO

Screening summary

1a. There may be potential for the hydrogeological setting to be affected however the BIA being completed by GEA will assess these risks and outline any necessary measures to reduce/eliminate them.

1b. The BIA will more thoroughly assess the effect of the basement on ground water flows. However as the basement covers a relatively small proportion of the site as whole, and there is space either side of the structure, it will not form a cut-off to groundwater, as water will be able to flow around the basement.

Together with the secant piles a small number of tension piles are indicated that assist in dealing with the hydrostatic water pressures. It is anticipated that groundwater will be encountered at approximately 100.90m.

2. As above the BIA will more thoroughly assess the effect of the basement on ground water flows.

4. Any increase in hard surfacing will be offset with permeable landscaping or other SUDS measures

Figure 2 Land Stability Screening:

Question 1: NO – there is a slope in the garden but this is approximately 5°

Question 2: NO – there is no re-profiling of existing slopes proposed within the works – refer to the Architects submitted plans

Question 3: NO – the neighbouring land slopes but this approximately 5°

Question 4: NO – the hill slopes up toward Queen Mary Hospital at about 6° on average

Question 5: NO – The Claygate member is the shallowest geology. Refer to geological map in Appendix C

Question 6: **YES** – refer to Architect and Arboriculturalist information

Question 7: NO – the house and adjoining buildings show no signs of significant or unusual historical damage due to shrink/swell activity

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Question 8: **YES** - A spring line/well is shown on historical maps in Well Walk 95 m to the northeast of the site. The well is noted as disused from 1954. It is shown to be nearly 600m from a lost river - refer to copies of the Lost Rivers map and the geology map in Appendix A

Question 9: NO – refer to geology and historical maps in Appendix A

Question 10: **YES** – A secondary ‘A’ aquifer.

Question 11: NO – refer to site location plan in Appendix A

Question 12: **YES** – the site is bounded by Christchurch Hill and Well Walk, refer to Architects plans.

Question 13: NO – The basement will not share a party wall with the neighbouring properties, which in any case both include single level basements.

Question 14: NO – the nearest railway lines is the Overground over 600m and the nearest tube line Northern line 370m away

Screening Summary

6. The tree being felled is a Culinary Apple tree labelled T1 in Wassell Arboricultural Services’ Tree Survey report. It has been assessed as being in poor condition. A replacement tree is being added as part of the landscaping scheme.

Whilst the studio/garage falls within the RPA of the Common Lime tree labelled T2, the existing foundations are deemed likely to have formed an obstacle to the root growth in the past and it is unlikely that excavation beneath the garage shall impact the rootzone of the tree.

Proposed works will also be within the typical RPA of Common Lime tree T6. Again foundations of the existing property are likely to have been an obstacle to roots from the Lime tree and it is probable that rooting will have taken place mainly in the grass areas of the garden that surround one side of this tree. The proposed secant piling that forms the outer edge of the basement will need to be undertaken with the minimizing of impact to any roots that may be present in the piling line. This shall be covered as an arboriculture method statement and as part of the construction management plan for the site.

8. The BIA will run through the potential impacts of nearby springs/waterways on the site

10. As discussed in the BIA the soil predominantly comprises a silty sandy clay and therefore behaves more hydraulically like the underlying London Clay

12. Traffic loadings will be incorporated into the design (see Section 6.2)

Figure 3 Surface Flow and Flooding Screening:

Question 1: NO – refer to location plan in Appendix A

Question 2: NO – surface water flows will not be materially changed from the existing drainage flow routes.

Question 3: **YES** - A very small area of existing soft landscaping will be excavated, although this area equates to a very small proportion of the soft landscaping across the site as a whole. It will be replaced with a sunken courtyard at basement level, which will therefore be drained to the sewer system and will not increase surface run-off

Question 4: NO – The proposed basement will not change the profile of inflows of surface water received by other properties. The surface will likely flow to the public sewer, where it is currently assumed to connect to

Question 5: **Unlikely** –The proposals are very unlikely to result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses as the surface water drainage regime will be unchanged.

Question 6: NO – the site is not in any of the streets flooded in 1975 or 2002 or identified as having the potential for flooding in Map 2 of Camden Policy DP23

Screening Summary

3. Any increase in hard surfacing will be offset with permeable landscaping or other SUDS measures.

8 Design Drawings

24496/SK1 - Basement/Ground Plan

24496/SK2 - Sections

24496/SK3 – Detail – Junction of proposed works to existing house (Retained underpinned wall)

24496/SK4 – Detail – Typical Basement wall section

24496/SK5 – Typical Underpinning Sequence

24496/SK6 – Suggested Sequence of works

Appendices

Appendix A: Desk Study Information

Appendix B: Structural Design Sketches

Appendix C: London Borough of Camden CPG4 Screening Flow Charts

Appendix D: Movement Monitoring Specification

Appendix E: Calculation for retaining wall

9 Response to Residents Consultation Comments

The available construction techniques available are fairly restricted on this site. Given that the excavation extends below groundwater, control of water ingress is a significant issue. An alternative way to omit the possible need for permeation grouting would be to add secant piles in front of the walls noted as underpins. The studio/garage cannot shift across due to the restrictions of the RPA of the tree so this option results in a loss of approximately 750mm width in an already narrow floor plate and also elsewhere along the perimeter underpin walls. Alternatively raising the slab up to bring the formation levels above the groundwater would result in unworkable floor/ceiling heights.

Provided specialists remain on site during excavation down to formation level and are on hand to plug any areas leaking excessively this should ensure water ingress is maintained to a workable level and mitigate these concerns. Control of any water ingress will need to be carefully managed adopting localised dug out wells that draw the water and allow efficient pumping out. This will be required continuously during the excavation works when below the groundwater level.