

26 Christchurch Hill London NW3 1LG

Structural Engineer's Report for Planning Application

Contents

	Page
1. Introduction	2
2. The Site	2
3. Ground Conditions and Hydrogeology	2
4. Existing Building	3
5. Proposed Structure	
5.1 Substructure	3
5.2 Tunnel construction/pipe-jacking	3
5.3 Superstructure	4
5.4 External Works	4
6. Design Criteria	
7.1 Codes and Standards	4
7.2 Loadings	4
7.3 Design Fire Periods	4
7.4 Disproportionate Collapse	4
7. CPG4 Basement Impact Assessment Screening & Scoping	4
8. Design Drawings	7
Appendices	
A Desk Study Information	
B Structural Design sketches	
C London Borough of Camden CPG4 Screening Flow Charts	

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

Job Number: **24496**

Date	Version	Notes / Amendments / Issue Purpose
16.09.16	-	
21.09.16	1	Contents page numbers added
26.09.16	2	Arch comments added
25.10.16	3	Minor alterations
26.10.16	4	GEA comments

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 an 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 By 1866	An additional bay had been added to the rear with a projecting half moon bay window. 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 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. Permeation grouting may be necessary to control the inflow of groundwater. Elsewhere secant piling will be used to form the external walls of the basement. Tunnel construction/pipe-jacking directional boring techniques will be used to form the roof of the basement where it extends beneath the protected tree (Refer to Structural Design Sketches – Appendix B).

5.2 Tunnel construction/pipe-jacking

A full anticipated sequence of works is outlined in Appendix B. Essentially this involves digging a jacking pit in the region of the annex building. This allows working space for crane and pipe jacking hydraulic pumps to be lowered. Pipe jacking would then proceed laterally across the site sufficiently down vertically to be low impact on the trees. The process would not disturb the tree zone. Once complete excavation would proceed beneath the concrete filled pipes with propping inserted at regular centres. A steel central support frame would be installed forming the permanent structure. Lastly the reinforced concrete walls at the far end and basement slab would be cast.

5.3 Superstructure

The existing superstructure of the main house will be entirely retained, supported off new reinforced concrete slabs and walls. The annex building will be carefully demolished to allow the construction of an access shaft to install the directionally-bored roof of the basement under the

existing tree. Once the new basement structure is complete, the annex building will be re-built with the existing materials and re-instated in the original design.

5.4 External Works

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

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 site is located on an aquifer as it is underlain by the Claygate member, beneath this is London Clay refer to geology map in Appendix A

Question 1b: **YES** – excavations will extend down to +99.56m whilst ground water has been recorded between +101.03m and +101.50m

Question 2: **NO** – the site is nearly 600m away from a lost river - refer to copies of the Lost Rivers map and the geology map in Appendix A

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

Question 4: **NO** – Any increase in hard surfacing will be offset with permeable landscaping or other SUDS measures

Question 5: **NO** – due to ground conditions soakaway is not likely to be feasible

Question 6: **YES** – lowest formation level will be approximately +99.56m which is below the water level of Vale of Health Pond (approx. +111m) about 200m away

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.

6. The BIA will assess ground water flows and possible interactions the proposed works may have on nearby local ponds.

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

Question 8: **NO** – the site is nearly 600m away 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: **NO** – refer to geology map indicating that London Clay is the first stratum

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.

Directional boring is intended to construct the basement roof beneath the Common Lime tree labelled T2. This will ensure that the tree continues to have a minimum 1600mm zone of undisturbed soil beneath it. Whilst the studio/garage falls within the RPA of this tree the existing foundations are deemed likely to have formed an obstacle to the root growth from the Lime tree 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 contiguous piling that forms the outer edge of the basement shall 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 arboricultural method statement and as part of the construction management plan for the site.

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: NO – any increase in hard surfacing will be offset with permeable landscaping or other SUDS measures

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: NO – The proposed basement will not result in the changes to the quality of surface water received by adjacent properties

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

The BIA should demonstrate our summary above that there are no positive responses to the questions in Figure 3.

5 Design Drawings

24496/SK1 - Basement/Ground Plan

24496/SK2 - Sections

24496/SK3 – Detail – Junction of proposed works to existing house

24496/SK4 – Detail – Typical Basement wall section

24496/SK5-SK7 – Anticipated Sequence for Tunnel construction/Pipe-jacking

Appendices

Appendix A: Desk Study Information

Appendix B: Structural Design Sketches

Appendix C: London Borough of Camden CPG4 Screening Flow Charts