engineersHRW
incorporating Jane Wernick Associates

9 HARLEY ROAD
LONDON NW3 3BX

STRUCTURAL ENGINEER'S
DESIGN STATEMENT FOR PLANNING

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Signed [redacted] Date 14/12/15

Job Number: 1394

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This planning feasibility report has been prepared for and on behalf of our clients Antigone & George Polychronopoulos, based on the planning proposals by SHH Architects (drawing references listed in section 8.3.2). It is for the use of the client, the client's professional advisers and London Borough of Camden and is for their use only. The report should not be used for any purposes other than for which it was considered. The report should be read in conjunction with Engineers HRW Structural drawings (drawing references listed in section 8.3.1) and SAS Site Investigation Reports (reports listed in section 8.3.3).

1.0 Introduction

engineersHRW have been asked to consider the structural issues surrounding the proposed construction works to support the planning application.

The proposals comprise the relocation of the detached structure, full demolition of the lower ground floor and partial demolition of the ground floor (conservatory and rear extension) on the site to allow construction of a new single storey rear extension inclusive of a lower ground floor and ground floor.

This report has been prepared in compliance with the London Borough of Camden Planning Planning Guidance CPG4. It includes a construction methodology statement prepared and signed off by a Chartered Structural Engineer (MIStructE) and includes proposals for temporary supports and sequence of construction. A site specific soils investigation has been carried out and Basement Impact Assessment compiled. In addition, a Phase 1 Preliminary Risk Assessment has been completed.

2.0 Site Information

The site is located at 9 Harley Road, Hampstead NW3 3BX and covers an area of approximately 1000m^2. The property is bound by residential properties to the north-west, north-east and south-east, and is situated within the Elsworthy Conservation Area (Refer to Figure 2.1). The site slopes very gently to the north-east with levels of 49.17mOD recorded at the front of the site and 48.54mOD recorded in the far rear garden area. There are a number of significant number of mature trees.

Figure 2.1: Extract from Camden Borough Elsworthy Conservation Area Map

2.1 Existing Structure

The existing property contains a two-storey detached residential building, front paved driveway area (used for parking), rear terrace and garden area, and a detached sleep-out. Within the two-storey building is a lower ground floor, ground floor, first floor and second floor within the roof space. The building is a load-bearing masonry structure with suspended timber floors at first and second floors. The lower ground floor is also a reinforced concrete (RC) slab.

The existing structure appears to be well constructed, with the exception of the rear conservatory that has been subject to leaks. The internal load-bearing walls appear to be studwork at first and second floor level and masonry at ground floor level. The walls bear onto brick corbelled foundations founded approximately 1.2m below ground level (BGL). The roof (slate roof) structure is constructed of timber rafters supported on internal load-bearing stud walls.

2.2 Geotechnical Ground Conditions

A detailed Geotechnical Site Investigation has been carried out by Site Analytical Services Ltd. The factual findings are included in Appendix B (including site plan, exploratory borehole logs, groundwater monitoring and laboratory test results) of their full Basement Impacts Assessment Report, appended in Appendix A.

The onsite ground investigation included two rotary percussive boreholes (15m BGL) and one hand dug trial pit (1.5m BGL).

2.2.1 Geology

The survey of Great Britain (England and Wales) shows the site to be underlain by London Clay Formation. The British Geological Survey (BGS) online shows there is one BGS historical borehole within 150m to the south of the site. The borehole Reference TQ28SE293 details Made Ground to 3.0m underlain by London Clay Formation to 19.50m below sea level. The boreholes and trial pit revealed ground conditions that were consistent with the geological records and known history of the area, comprising Made Ground to 1.00m BGL underlain by London Clay.

2.2.2 Existing Foundations

As part of the Site Investigation Works a Trial Pit was carried out adjacent to the wall of the existing property to expose the foundations and founding soils. The Trial Pit showed the walls supported on outstepped brick foundations resting on the London Clay Formation at a depth of approximately 1.2m BGL (47.88mOD).

2.2.3 Groundwater

Ground water was not encountered within the boreholes and the trial pit. Following the drilling operations, groundwater monitoring piezometers were installed in both boreholes to approx. 8.00m depth. Groundwater was not subsequently encountered within these monitoring standpipes

after a period of approx. four weeks. Groundwater conditions could change due to seasonal effects and also changes in drainage conditions.

It should be noted that the speed of borehole excavation is such that there may bell be insufficient time for light seepages of groundwater to enter the boreholes and trial pit and hence be detected, particularly within more cohesive soils. In addition, isolated pockets of groundwater may be present, perched within any less permeable material, especially within any Made Ground.

2.3 Contamination

A Preliminary Site Assessment has been carried out by Site Analytical Services Ltd. A copy of their full report is appended to this report in Appendix B. The purpose of the Preliminary Assessment Report was to determine whether or not there were any potentially unacceptable risks arising from potential contamination at the site and to evaluate whether any remediation may be required for the protection of the end-user and other sensitive receptors.

The information from the Preliminary Risk Assessment and Site Conceptual Model did not identify any potential unacceptable risks relating to sensitive receptors onsite. Therefore no further investigation was recommended.

2.4 Trees

There are numerous mature trees located on the site, predominantly along the north and north-east site boundaries.

2.5 Preliminary Flood Risk

A preliminary desk top study of the sites flood risk has been carried out using the Environmental Agency Flood Risk Maps.

2.5.1 River and Sea (Tidal) Flood Risk

The sites risk of flooding from rivers and seas, as defined by the Environment Agencies Flood Risk Map is very low.

2.5.2 Surface Water Flood Risk

The sites risk of flooding from surface water, as defined by the Environment Agencies Flood Risk Map is very low.

2.5.3 Reservoir Flood Risk

The sites risk of flooding from reservoirs, as defined by the Environment Agencies Flood Risk Map is very low.

3.0 Proposed Structural Works

3.1 Introduction

The proposed development of the site involves the construction of a new lower ground floor below the proposed single storey extension and terrace, replacing the existing lower ground floor at the rear of the site. The line of the new lower ground floor will extent under the existing dwelling. The proposed basement will involve excavation to a general level of approx. 3.6m below upper ground floor level. The excavation will be formed within underpinned or contiguous bored-pile walls.

The existing conservatory/living and dining room and terrace are to be removed and replaced with a new single storey structure (containing family living and dining), while the existing detached single storey structure is to be relocated in accordance with architectural drawings. The front bay windows are to be

removed and replaced at both ground and first floor. Minor alterations are proposed for the internal layout.

The Party Wall Act will apply to this development because the neighbouring houses lie within the defined space around the proposed building works. The party wall process will be followed and adhered to during this development.

3.2 Demolition Works

It is proposed that all demolition works will be carried out in accordance with BS 6187 'Code of practice for demolition' and an appropriately skilled and experienced contractor is to be appointed. The works are to be carefully sequenced and undertaken and the contractor is to provide full temporary works and supervision to ensure that the stability of the remaining structure and surrounding structures are maintained at all times.

3.3 Lower Ground Floor Structure

The main temporary works structure at lower ground floor level is to be the contiguous bored pile wall. The wall is to be constructed using a mini pile rig (restrict site access), the proposed piles being 300mm diameter contiguous flight auger piles, where the concrete is pumped through the auger to fill the bore as the auger is removed. This system of temporary works has been proposed to suit the site conditions the construction of the pile causing practically no ground movement. Also as this is a residential area the piling creates minimal vibrations and very little noise compared to other options.

The lower ground floor structure is to consist of a reinforced concrete (RC) box, constructed within the contiguous pile wall and founded on pile foundations. The 300mm RC ground floor slab forms the box lid and is designed to act as a transfer structure, supporting the existing and proposed structures above. The slab will be externally supported on the perimeter contiguous pile wall with RC capping beams or RC perimeter wall (underpinning the existing structure) and transfer loads to the internal RC box walls. Loads will be taken down the internal RC walls and into the 300mm RC lower ground floor slab which forms the box base.

Due to the potential heave of the London clay formation underlying the site (not outlined in the Soil Investigation Report, but in the Ground Movement Assessment), the lower ground floor slab will be designed as two-way suspended, spanning between piled foundations with RC pile caps. Compressible void former will be installed below the basement slab to ensure that any long term clay heave resulting from the removal of overburden in forming the basement excavation will not impart any loads on the slab itself.

In both temporary and permanent condition, retaining walls in the form of RC walls and external contiguous piled walls, are designed as propped top and bottom. In the temporary condition, perimeter contiguous piled walls and RC walls will be propped using pre-loaded adjustable steel props installed between capping beams/piles. The temporary works must remain in place until the ground floor and lower ground floor slabs, designed for the transferred moments, have been cast and cured to achieve full design strength. Internal RC retaining walls are then constructed. In the permanent condition, full continuity reinforcement is provided at both ground floor level and lower ground floor level. Therefore have full continuity reinforcement at both lower ground floor and ground floor slab level with the slabs designed for the transferred moments.

The concrete structure will be designed to BS8110 with full top and bottom reinforcement to all sections. The concrete in itself is not a watertight / waterproof construction and in order to achieve a Grade 3 'habitable' basement in accordance with BS8102 a combination of external tanking system with an internal drained cavity system will be provided. However the final waterproofing system is yet to be agreed with the architect.

The proposed RC basement form is classified as a "robust" structure, and will be designed to accommodate any lateral loading that could develop.

3.3.1 Groundwater
Ground water is not expected to be encountered in the basement excavation, however, the chosen contractor will be required to have a contingency plan in place to deal with any perched groundwater inflows as a precautionary measure.

3.3.2 Control of Movement
The proposed basement scheme and method of construction are of a typical form for which we are confident that resulting ground movements can be controlled in both the temporary and permanent condition.

3.3.3 Vertical Movement
Vertical movement resulting from potential heave of the clay strata below the basement slab following excavation will be accommodated by the use of a proprietary compressible void former below the basement slab.

3.3.4 Horizontal Movement
Horizontal deflection to the perimeter of the basement void will be limited by propping of the contiguous piled wall / underpins in both the temporary and permanent conditions. In the temporary condition pre-loaded adjustable steel props will be installed between capping beams / piles / underpins as excavation progresses. Used in conjunction with strict movement monitoring the props can be adjusted if required to keep movement within allowable limits.

3.4 Superstructure

The proposed rear extension superstructure consists of steel roof beams supporting timber purlins overlaid by a green roof. The steel roof beams will transfer the roof loads to the external load-bearing masonry cavity walls that take the load down into the ground floor transfer slab and into the lower ground floor structure. Where openings are proposed for windows and doors, Catnic Lintel Beams (or equivalent) will be utilised to transfer loads to perimeter masonry cavity walls. The lateral stability of the building is provided by the external load-bearing cavity walls. The roof structure is braced with an 18mm ply deck acting as a deep beam and transferring loads to the end walls by diaphragm action of the deck.

3.5 Internal Alterations

3.5.1 Ground Floor
Bay windows at the front of the existing structure to be removed and replaced. Existing sidewall and window removed to allow for new secondary entrance. Additional openings created within internal walls, timber/steel lintels installed to provide vertical stability in absence of internal walls.

3.5.2 First Floor
Window joinery removed, window bay roof replaced to suit new design. Internal walls removed and relocated. Timber/steel beams and lintels to provide vertical stability in absence of internal walls.

3.5.3 Second Floor
Dormer roof to be replaced.

4.0 Basement Impact Assessment

A Basement Impact Assessment (BIA) has been carried out by Site Analytical Services Ltd. The full report is appended to this report in Appendix A. The report identified the potential impacts of the proposed basement. The purpose of the BIA is to consider the effects of the proposed basement construction on the local slope stability, surface water and groundwater regime at the existing residential property.

The BIA identified the following potential risks and issues:

- Slope Stability: the proposed basement will significantly increase the differential depth of the foundations relative to neighbouring properties,
- Subterranean (Groundwater): the site is within 100m of a watercourse, well or potential spring line and the lowest point of the proposed excavation is close to, or lower than, the mean water level in any local pond or spring line,
- Surface Water and Flooding: changes in paved surfacing and surface water run-off,
- Surface Water Flooding: the site is in an area known to be at risk from surface flooding.

4.1 Ground Movement Assessment

A Ground Movement Assessment was carried out at the site by Geo-Environmental Services Limited under the instruction of Site Analytical Services Ltd. The report is provided in Appendix C of Site Analytical Services Basement Impact Assessment Report. The report concludes that the predicted level of damage to 7 Harley Road and 3 Wadham Gardens, due to the excavation of the proposed lower ground floor at 9 Harley Road is predicted to be negligible. This conclusion assumes a high level of workmanship and adequate propping of the basement excavation.

The conclusions of the Ground Movement Assessment address the outstanding potential risks and issues identified in the Basement Impact Assessment. It provides justification that provided good workmanship, the proposed basement can be constructed imposing negligible damage to adjoining properties. Furthermore the proposed development would not cause significant changes to the groundwater flow regime in the vicinity of the proposal and given the limited increase in impermeable area, the scheme is also considered to be compliant with the surface water management and flood risk elements of NPFF and Camden policies.

5.0 Temporary Works

The contractor will be responsible for the design, erection and maintenance of all temporary works in accordance with all relevant British Standards. The contractor will be contractually obligated to appoint a qualified temporary works engineer to provide adequate temporary works and supervision to ensure that the stability of the existing structure, excavations and surrounding structures are maintained at all times.

The piling and associated temporary works are to be designed and detailed so that any potential movement to the adjoining structures is no worse than Category 1 as defined by Table 1 BRE Digest 251.

Piled retaining walls to be fully propped until the RC walls have been cast and cured to achieve full design strength. Propping through the wall is permissible but should be boxed out, reinforcement to be trimmed and displaced locally to suit and holes to be infilled using suitable 'letter box' construction incorporating the specialist waterproofing manufacturer's details. All cross propping to take into account any imbalance in prop loads.

5.2 Submissions

Proposed construction sequence and temporary works assumed in the design are detailed on drawings number SK 001 – SK 010, this information will be superseded by the contractor's proposals. The contractor will be required to submit full proposals, method statements and calculations to the engineer and all appropriate parties for approval prior to the start of any works onsite.

The contractor will also be required to appoint a Temporary Works Co-ordinator for the duration of the contract in accordance with the specification.

5.3 Monitouring

All items of temporary works and surrounding structures to be monitored in a manner and frequency commensurate with the construction activity taking place. Trigger levels on movements will need to be defined. Precise levelling or reflective survey targets should be installed at the garden walls and neighbouring buildings. The monitouring should take place in advance of the

proposed works as a baseline survey, during the works; daily full visual surveys of all temporary works and surrounding structures and a weekly measured survey using fixed survey points, and for a period following the completion of the works (to understand the long term effects).

5.4 Surface/Ground Water

Standpipe monitouring to be continued in order to determine equilibrium level and the extent of any seasonal variations.

The contractor is responsible for dealing with surface (ground) water run-off and is to provide a method statement detailing proposed arrangement to avoid excavations filling with surface water during construction. Excavations to be kept dry at all times to ensure the integrity of the bearing strata and to be blinded as soon as formation level is achieved.

6.0 Method statement / Sequence of Works

This method statement is to be read in conjunction with the Structural sketches appended to this report. Method statement to be superseded by contractor's proposals.

6.1 The existing detached single-storey structure to be carefully relocated, as per architectural drawings.

6.2 The existing single-storey rear extension and rear terrace will be broken out and carefully removed (the structure supporting the level two bay window is to remain intact until underpinning and propping is completed). Existing brickwork to be stored for possible reuse.

6.3 The existing rear foundation will be underpinned using a 1.0m hit and miss RC wall sequence, backfilling each pin on completion as the works progress.

6.4 The floorboards within the existing dwelling will be carefully lifted (to be placed back post construction), and a ground bearing beam will be cast inside the line of the external wall/foundation.

6.5 Steel beams will be installed above the ground bearing beam (above ground level). Timber plyboard or equivalent will be laid over temporary steel beams to provide landing for propping system.

6.6 Temporary props (designed by the contractor) shall be installed to support the upper level bay window.

6.7 When the temporary propping for the upper bay windows is in place, the remainder of the conservatory/dining room will be broken out and carefully removed.

6.8 The contiguous pile walls (to form the temporary works for construction and part of the permanent structure) will be set out. The contiguous pile walls will be bored and cast through the made ground from ground floor level (depth of piles TBC). Piles will be cut off below ground floor level and RC pile capping beams will be formed.

6.9 Internal tension/compression piles will be cast from ground floor level.

6.10 When all the temporary works are in place, excavation to basement floor formation level (allowing for layer of compressible fill and RC suspended slab) will commence. As excavation proceeds, the main temporary propping members (props and whaling) to the piles are to be installed.

6.11 Internal tension/compression piles to be cut off below basement room level. RC pile caps and ground beams will be cast from basement level.

6.12 Safe slopes will be used within the basement level to the underside of the plant room (allowing for layer of compressible fill and suspended slab).

6.13 Internal tension/compression piles within the plant room to be cut off below plant room level. RC ground beams will be cast from plant room level.

6.14 The 300mm RC two-way suspended plant room slab (underlain by suitable compressible fill), permanently tied in with the contiguous perimeter pile walls and ground beams, will then be cast.

6.15 The new RC retaining walls and the lower section of the RC roof slab (under the garden) in the plant room are to be constructed, each perminantly tied in with contiguous perimeter pile walls and ground beams.

6.16 Once the RC retaining walls and columns forming the plant room have achieved full strength, the 300mm RC two-way suspended basement slab (underlain by suitable compressible fill) will be cast.

6.17 Once the RC suspended slab has achieved full strength, the load bearing RC columns and internal RC walls will be constructed.

6.18 The formwork for the ground floor slab will then be constructed, sufficient propping provided.

6.19 When the RC columns and load bearing walls under the ground floor slab have reached the required design strength, the ground floor level beams and 300mm RC one-way and two-way suspended transfer slabs at ground level will be cast.

6.20 Once the ground floor suspended slabs have reached full design strength, the temporary whaling and propping are to be removed. Liaison required between contractor, pile designer and structural engineer to ensure no increase in lateral movement occurs at this stage.

6.21 Once the basement structure has achieved full design strength, construction of the superstructure can commence.

7.0 Design Loadings

7.1	**Pitched Roof -** Existing	**kN/m²**	
	Imposed Load	0.60	(BS 6399 Part 3 – maintenance access/snow)
	Imposed Load at ceiling level	0.25	(BS 6399 Part 1 – with access)
	Dead Loads		
	Tiles	0.40	
	Rafters/Board/Insul.	0.20	
	Ceiling/Services	0.40	
	Total Dead Load	**1.00**	
7.2	**Flat Roof -** New Extension	**kN/m²**	
	Imposed Load	0.60	(BS 6399 Part 3 – maintenance access/snow)

	Dead Loads		
	Green Roof	1.40	
	Rafters/Board/Insul.	0.20	
	Ceiling/Services	0.40	
	Total Dead Load	**2.00**	
7.3	**Existing Floor Loads -** Timber floor structure	**kN/m²**	
	Imposed Load	**1.50**	**(BS 6399 Part 1 Domestic Loading)**
	Dead Loads		
	Joists//Board	0.30	
	Ceiling/Services	0.25	
	Finishes	0.15	
	Internal Partitions	1.00	(Lightweight) – applied independently
	Total Dead Load	**1.65**	
7.4	**New Extension** - 300mm Slab (Ground floor ansd basement)	**kN/m²**	
	Imposed Load	**1.50**	**(BS 6399 Part 1 Domestic Loading)**
	Plant Load	**7.50**	
	Dead Loads		
	Slab 300mm	7.20	
	Services/ceiling	0.20	
	Finishes	0.20	
	Allowance for partition walls	1.00	
	Total Dead Load	**8.60**	
7.5	**Roof Slab** - 275 mm slab (Garden)	**kN/m²**	
	Imposed Load	**2.50**	**(BS 6399 Part 1 Domestic Loading plus additional 1.0kN/m2 allowance)**
	Dead Loads		
	Green Roof	12.5	(650mm soil / Insulation and waterproofing)
	Slab 275mm	6.60	
	Ceiling/Services	0.25	
	Total Dead Load	**19.35**	

8.0 List of relevant documents

8.1 engineersHRW Drawings

SK 001 (Preliminary Scheme) Basement Foundation Plan
SK 002 (Preliminary Scheme) Basement Level Plan
SK 003 (Preliminary Scheme) Ground Floor Level Plan
SK 004 (Preliminary Scheme) Basement Section
SK 005 (Construction Methodology) Demolition Plan
SK 006 (Construction Methodology) Underpinning & Bay Window Propping
SK 007 (Construction Methodology) Basement Construction from Ground Level
SK 008 (Construction Methodology) Basement Construction from Basement Level
SK 009 (Construction Methodology) Basement Construction from Basement Level
SK 010 (Construction Methodology) Basement Construction from Ground Level

8.2 Architects Drawings

(779)020_P02 Lower Ground Floor Plan
(779)021_P01 Ground Floor Plan
(779)023_P01 First Floor Plan
(779)204_P01 North Elevation
(779)205_P01 East Elevation
(779)206_P01 South Elevation
(779)207_P01 West Elevation
(779)300_P01 Proposed Section AA
(779)301_P01 Proposed Section BB
(779)311_P01 Existing Section BB
(779)313_P01 Existing Section DD

8.3 SAS Reports

Phase 1 Risk Assessment Report
Flood Risk Assessment Report
Basement Impact Assessment Report

9.0 Conclusion

A preliminary feasibility assessment of the proposed scheme has been undertaken. Further detailed calculation checks, investigations and full design will need to be completed. At this stage we are satisfied that the proposed scheme is viable and that if carried out in a carefully defined sequence such as noted above, it can be completed without compromising the structural stability of any adjacent properties or structures.