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STRUCTURAL APPRAISAL REPORT ON THE EXISTING BUILDING OF 6 WEDDERBURN ROAD, LONDON NW3 5QE

1.1 Introduction

6 Wedderburn Road, NW3 comprises of five storey building as part of a block forming two semi-detached properties. It appears that no 6 is divided into 3 self-contained flats which are accessed at the front for the basement and ground floor flat, and to the side for the flats above. At the front there is a two storey half round bay and a gablet roof running into the main roof. The main roof is constructed as a crown roof with dormer and forms the fifth storey of the building.

The building is located on and accessed from Wedderburn Road. Side access is available to the rear of the demise.

1.2 Brief

The client is an owner-occupier of the flat being part basement and ground floor. The intention is to extend the basement to the full foot print of the ground floor to the rear and also create a side light well. There is no proposal to structurally alter the existing building.

Our brief is to carry an appraisal of the building to determine whether the current structure is suitable in strength and stability to sustain the proposed alterations during and after the excavations have been carried out. The existing structure should take account of such requirements as durability, serviceability, hydrology, acoustic and thermal performance, derived from the proposed new scheme.

1.3 Methodology in Appraisal Procedure

The aim of this report is to set out logical procedure in appraising the existing building in order to determine the structural feasibility of whether the existing structure is suitable for carrying out the proposed scheme. Or, alternatively what structural alterations are necessary to strengthen the existing structure to sustain it's adaptation for the new proposed scheme. Or, in the final analysis, whether the building is unsuitable for extending the basement as proposed.

Our investigative procedure is outlined as follows: -

1. Carry out an initial inspection and appraisal
2. Carry out documentary search and review
3. Carry out any necessary investigations of the building
4. Prepare report on appraisal

Initial Inspection and Appraisal

It was determined from the initial inspection that the building is of traditional construction comprises of load bearing internal and external masonry walls; upper suspended timber floors with a converted roof forming habitable rooms. Although this could not be accessed, we anticipate that the conversion utilised additional steel beams bearing upon the existing load bearing masonry walls. There is a rear extension which appears to be of recent origin and is likely to be constructed in cavity blockwork with flat roof over.

Our inspection identified the structure of the building as described above. Our inspection revealed no major structural defects in the building, in terms of structural cracking to the masonry walls, bowing of the external brickwork, deflection of the columns and beams, and structural cracking to the floors.

Our initial inspection of the exposed building fabric concluded that given the nature of construction the building is largely robust to permit the extension of the existing basement. However, in view of the nature of the ground works ground investigations are considered necessary in order to determine foundation type, sub soil bearing capacity and environmental watershed sustainability.

Documentary Search

No documentary information has been made available for our due consideration and comment. However, from our inspection it appears that the building was constructed circa 1900s, built as part of the estate of similar properties. In view of the existing basement no adverse effects are expected consequent to the new works and use.

Site Investigations

Given the nature and scope of the works, detailed site investigations is considered necessary in order to determine an appropriate design that will not have an adverse impact upon the building.

Following our initial investigations, it is noted that the building was constructed around the 1900's with substantial masonry and therefore the masonry are of a high quality which concurs with our conclusion of the robustness of the existing structure.

There are no evidences of deleterious materials.

Hydrology

In view of the Council's requirements a hydrology screening report has been commissioned which is appended to this report. The conclusions drawn may be summarised as follows:

- The proposed construction project of extending the existing basement is not anticipated to impact upon surface water drainage of the existing and neighbouring sites, though further considerations will me made following site investigations and outline design.
- Site investigations will be conducted as part of the design process. This will establish the water table which will enable necessary measures to be taken during and after construction as part of the overall design.
- The proposed extended basement is expected to be constructed by traditional underpinning scheme on a hit-and-miss basis. This method will prevent any impact upon the existing building and neighbouring buildings.

Conclusion

Following our inspection, investigations and assessment we consider that there being no apparent defects to the building of any structural significance, no indication of subsidence of the site noted, no evidences of deleterious materials, together with the nature of construction, we consider that the building is sufficiently robust to allow for sub-terrairan works.

Site investigation and analysis of the sub-terrain will be required as part of the design process. This will enable design considerations to be determined as part of the design process for during and post construction. The hydrology screening process will enable consideration for environmental watershed sustainability.

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31st March 2011

Ref : 1020

RE: Geo-hydrology Screening Assessment, 6 Wedderburn Rd, Belsize Park, North London, NW3 5QE

1. Introduction

Toxic Land Check (TLC) Limited was engaged by Neil Hawes & Associates Ltd to conduct a Geo-hydrology screening assessment for a proposed residential basement extension at 6 Wedderburn Rd, Belsize Park, North London, NW3 5QE (Enclosure 1). The aim of the screening assessment is to determine geo-hydrology issues that require further research or investigation to inform the basement design process. A basement design has not been submitted to the local planning authority as yet and this report will inform outline proposals.

The screening assessment work involved (i) review of the relevant Council policy documents, (ii) a geo-hydrology description of the site (iii) answering the BIA screening flowchart questions as indicated in Arup Ove (2010) Camden geological, hydrogeological and hydrological study : *Guidance for subterranean development* (iv) reporting the results of the screening assessment and where needed making recommendations in respect to scoping further research and/or investigation.

Please refer to Section 4 'Concluding Remarks and Recommendations' for a summary of the findings.

The screening assessment and relevant background information are presented in the enclosures and the results are discussed in Sections 2 and 3 and Enclosure 4 below.

2. Information and Guidance Used in Preparing this Report

The following information was used in order to prepare this letter report :

- Site location plan (Enclosure 1);
- Arup Ove (2010) Camden geological, hydrogeological and hydrological study : Guidance for subterranean development;
- Planning Policy Statement 25: Development and Flood Risk (March 2010);
- The British Geological Survey North London 1:50,000 Geological Map Sheet EW256 (Enclosure 2);
- Photographs of the Site (Enclosure 3);
- BIA Screening Assessment (Enclosure 4).

3. Background and Geo-hydrology Description

The red line boundary of the property is presented on Figure 1 (Enclosure 1). The site consists of a single residential c. 1900 mansion building (containing two units) in a residential area.

A basement is proposed for the property however the outline plans have not yet been detailed.

The site is rectangular shaped and has an approximate area of 800 m^2 or approximately 0.08 ha.

The building is three stories (plus a loft) and is surrounded by paved areas in both the front and rear yards. Both the building and surrounding paved areas make up approximately 50 degrees of the site with the remainder of the site consisting of green areas (lawn and trees).

Reference to the British Geological Survey map (1:50,000 scale North London) indicates that the site is located on near surface geology of the Claygate Member consisting of silt and fine sand. This geological unit rests on the London Clay, low permeability clay of more than 70 m thickness at this location. The boundary between the two formations is located approximately 50 m south of the site indicating the Claygate member to pinch out towards the south. It is therefore likely that the Claygate member is relatively thin at the site and because groundwater tends to rest on the low permeability London Clay there is potential for springs in the area.

Environment Agency information indicates the Claygate Member is considered a secondary (or minor) aquifer. The Environment Agency web site indicates the site is not within a source protection zone of a public water supply. Review of BGS data did not identify any licensed groundwater abstractors within 500 m of the site. The nearest abstractor was located at the

Hospital east of Roslyn Hill Road. The BGS data base indicates the borehole at the Hospital is greater than 30 m deep and so is likely to be abstracting groundwater from the deeper geological units below the London Clay.

Council maps indicate that approximately 100 m north and south of the site are railway tunnels, major infrastructure easements, potentially affecting drainage in the area. The approximate locations of the tunnels are presented in Enclosure 2.

Reference to the Environment Agency web site indicates the site is not located on a Zone 2 or 3 flood risk area, indicating the site has a low risk of flooding (return frequency of less than 1:1,000 years).

4. Site Walkover

In addition to information provided above, the following observations and additional information relating to the site setting were noted during a site walkover completed on the 15th March 2011 :

- Refer to the attached hand annotated sketches in Enclosure 1 of the current building and rear garden area drainage and trees.
- Refer to the photographs in Enclosure 2 for selected shots of the site during the site walkover.
- The rear garden raises 4.16m to a terrace lawn area which gradually rises to the rear of the garden. The angle of this land gradient is greater than 7 degrees.
- Paved areas in the rear yard were measured totalling approximately 80 m2.
- No evidence of ponds/wells were identified within 50m of the site boundary.
- No evidence of subsidence to the property or adjoining properties was observed.
- Refer to the sketches (Enclosure 1) for hand annotated notes of the current site drainage. Storm water drainage is by pipe down the western side of the property and foul drainage runs from the bathroom to the utilities room at the rear of the property and then from the utilities room to a manhole in the light well area at the front of the house.
- At the front, the entrance level is 1.8m from street level, a slope greater than 7 degrees.
- There are street trees (deciduous- possible Alders pollard), of which the nearest one is some 10m away and the tree height is around 20m.
- In the backyard there was a magnolia of approximately 3 m height (approximately 5 m from the current building footprint) and an ash of approximately 20 m height (approximately 30 m from the building).
- Near the neighbouring western boundary was a prunus of approximately 6 m height (approximately 3 m from the building) and on the eastern abutting garden was eucalyptus of 20 m height approximately 20 m from the building.

5. Concluding Remarks and Recommendations

A screening assessment has been completed for the 6 Wedderburn Rd site and the results of the assessment are presented in Enclosure 4. The conclusions and recommendations presented in Enclosure 4 and should be distributed amongst the design team for consideration as some of the unanswered screening assessment questions may be resolved readily by the basement design team.

Please do not hesitate to contact me on 0787 568 6617 if you require further information or clarification.

Yours sincerely,
for **Toxic Land Check (TLC) Limited**

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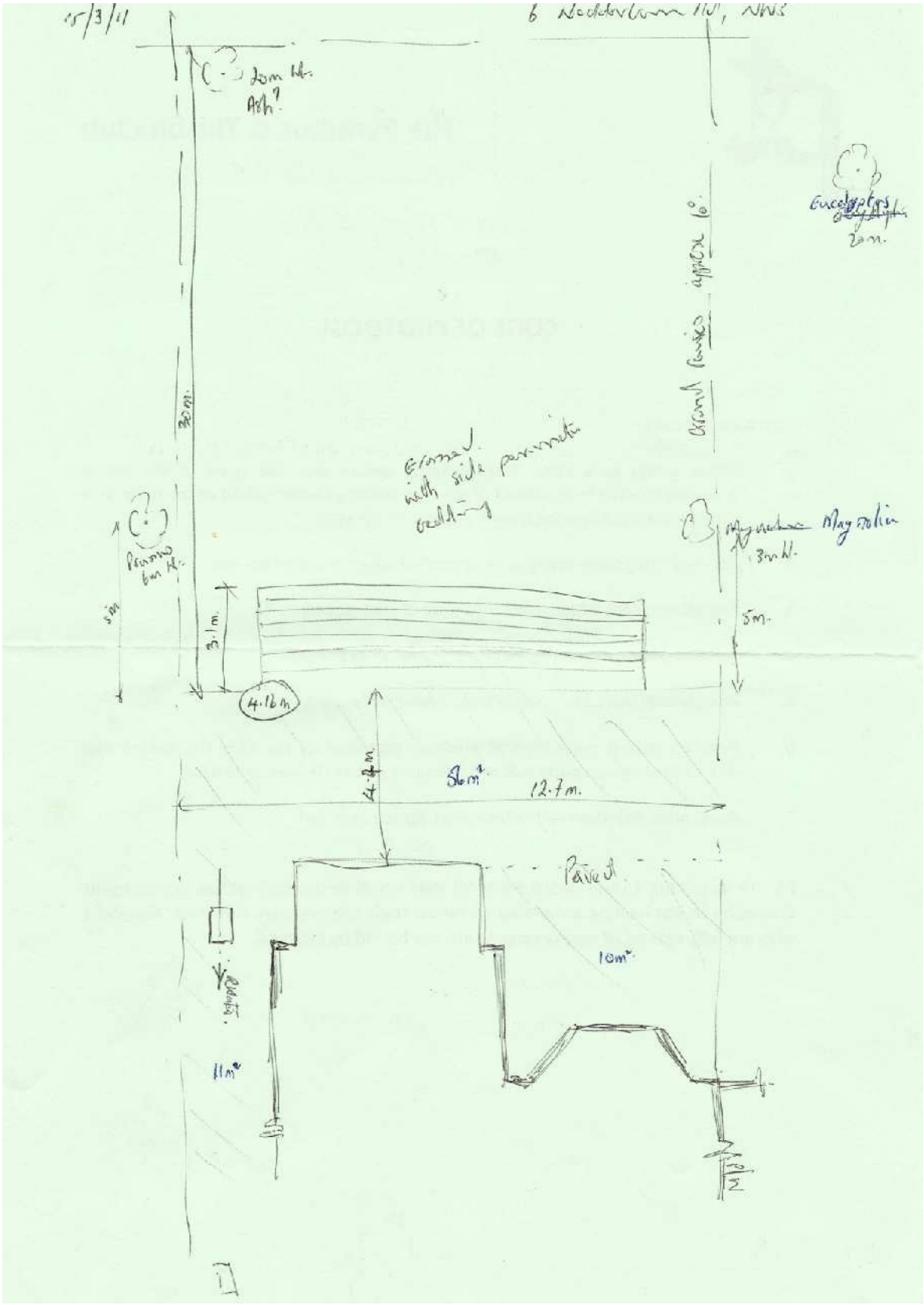
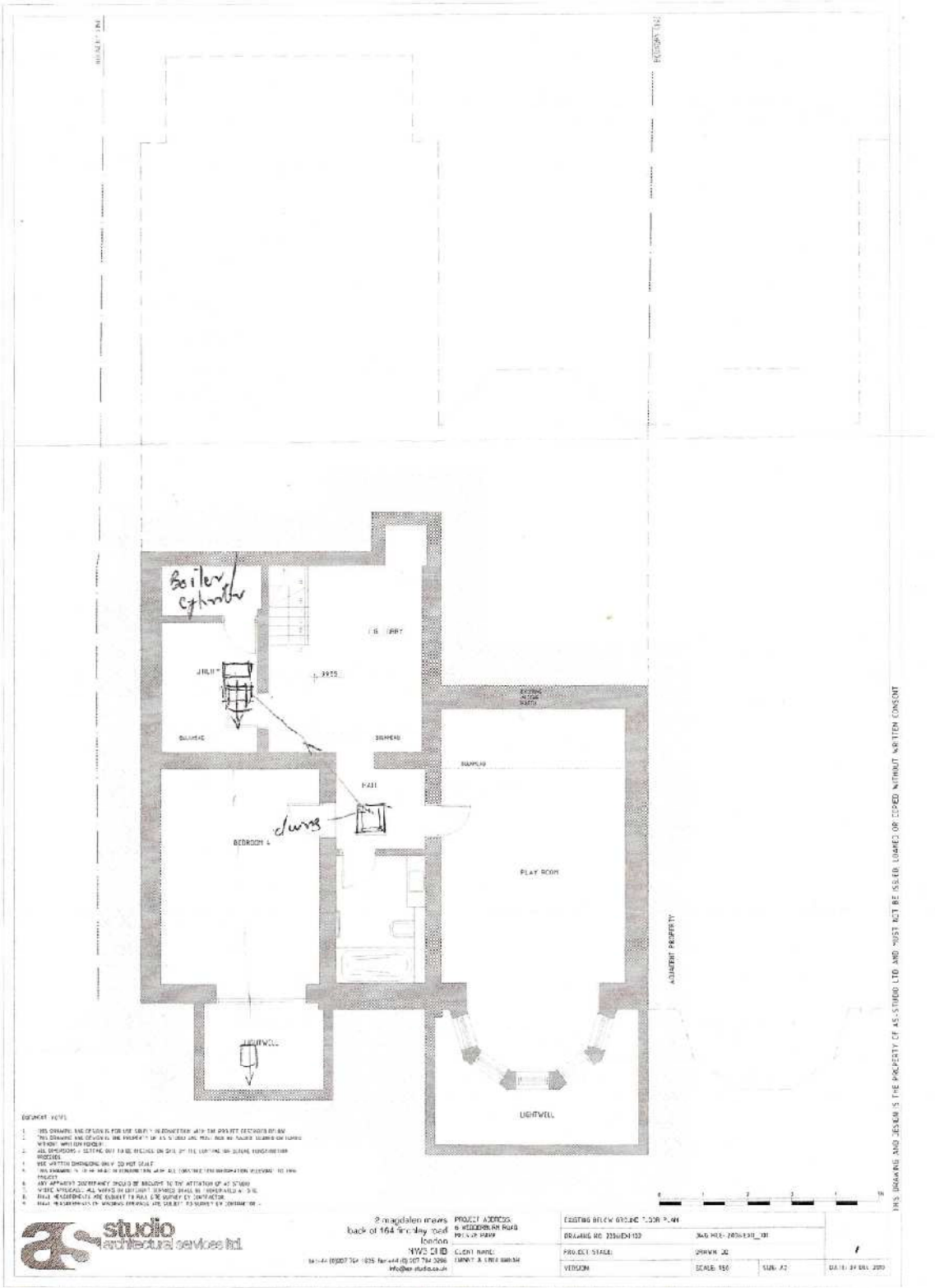
Enclosure 1 : Redline Boundary

Figure 1 : 6 Wedderburn Road Red Line Boundary



Sketch 1 : Hand Notes from Site Visit 15th March 2011



Sketch 2 : Existing Below Ground Floor Plan with Hand Annotated Notes from Site Visit 15th March 2011

Enclosure 2 : Extract from BGS 1:50,000 North London Geological Map Sheet.

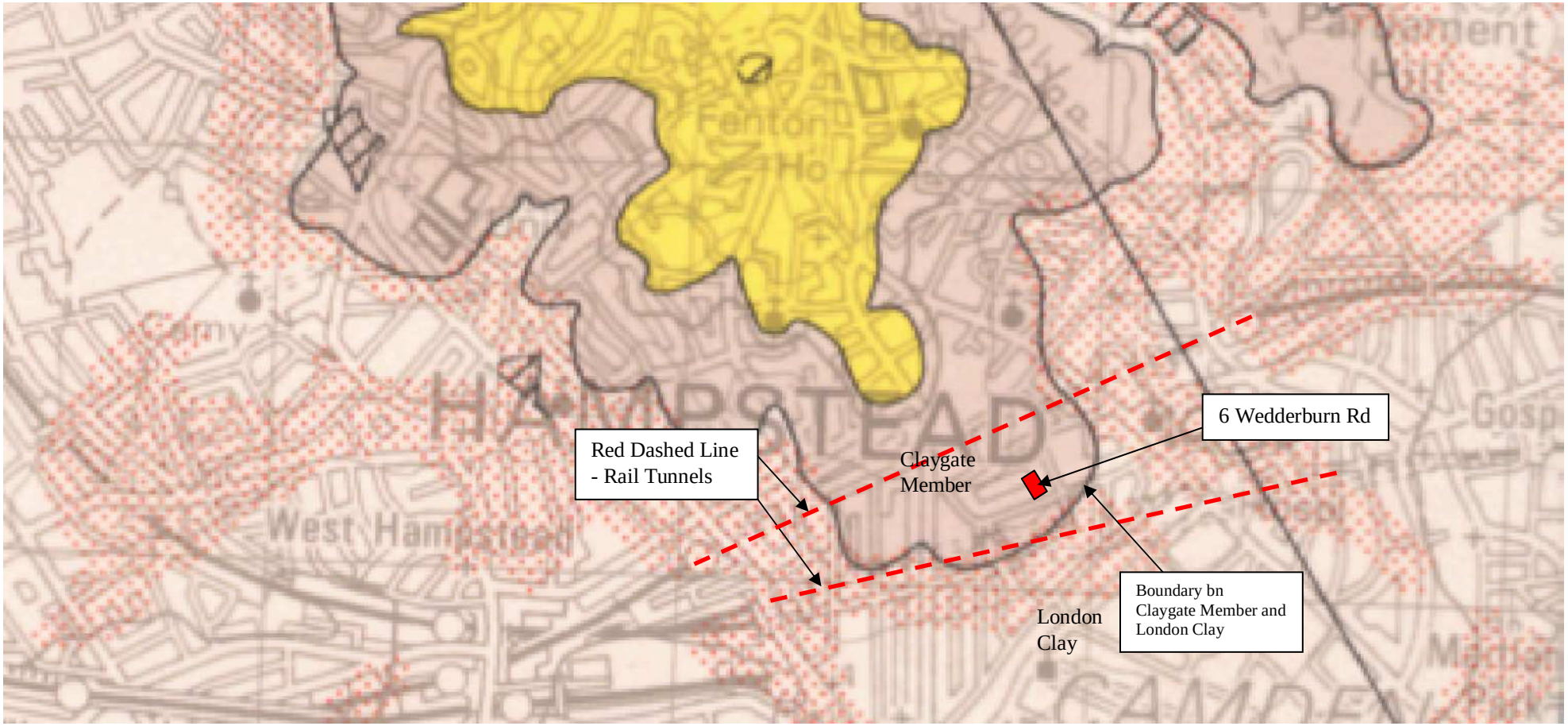


Figure 2 : BGS 1:50,000 North London Geological Map Sheet

Enclosure 3 : Photographs of Site

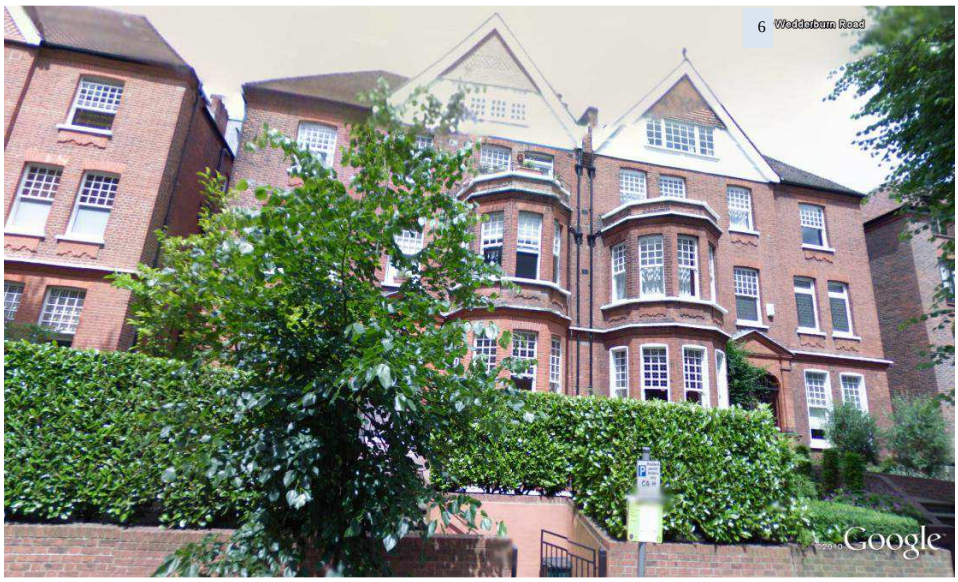


Photo 1 : 6 Wedderburn Rd.

Photo 2 : Terrace Lawn in Rear Garden (15th March 2011).

Photo 3 : Rear Elevation (15th March 2011).

Photo 4 : Front of House (15th March 2011).

Enclosure 4 : Basement Impact Assessment (BIA) Screening

Basement Impact Assessment (BIA) Screening

The basement impact assessment (BIA) screening assessment involves answering approximately 30 questions indicated in the Arup Ove (2010) Camden geological, hydrogeological and hydrological study : *Guidance for subterranean development*. The questions were copied into Table E4-1 below and answered in accordance with the guidance. Three areas of study are considered in the screening assessment and they include 1. Surface Flow and Flooding, 2. Groundwater Flow and 3. Slope Stability. Concluding remarks and recommendations are included against each question for consideration by the design team and if needed the regulators and informs the BIA scoping study.

Table E4-1. Answers to BIA Flowchart Questions and Conclusions & Recommendations

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
1. Surface Flow and Flooding Screening Assessment		
Question 1: Is the site within the catchment of the pond chains on Hampstead Heath?	No	Conclusions : • Not in the catchment. Refer to Figure 14 of the Arup Ove (2010) report. • No further actions required.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 2: As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	Unknown	Conclusions : • The current site has approximately 50% of paved and roofed areas. Current drainage systems (refer to sketch 2) shows the storm water drainage runs down the western the side property in a pipe towards the road and drainage internally is foul, which runs from the bathroom to the utilities room at the rear and then to a manhole in the front of house light well area. • Volume of rainfall and peak run off is unlikely to change materially however this will not be known until the scheme outline design is completed. Actions : • Water balance calculations required to check rainfall flow changes. • The developer should provide documentation of discussion with Thames Water to confirm that the sewers have capacity to receive any increased wastewater flows. • Mitigation may involve including SUDS or similar in the drainage design.
Question 3: Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	Unknown	Conclusions & Actions : • Refer to sketch 1 : current paved areas total approximately 80 m2 • Refer to Question 2 above.
Question 4: Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	Unknown	Conclusions : • Profile of outflows to downstream properties and water courses will not be known until the outline design is completed. Actions : • Water balance calculations required to check rainfall flow changes. • The developer should provide documentation of discussion with Thames Water to confirm that the sewers have capacity to receive any increased wastewater flows. • Sustainable Urban Drainage Systems or soak away systems or similar will be required to compensate any increases in peak flow.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	Unknown	• Profile of outflows to downstream properties and watercourses will not be known until the outline design is completed. • Sediment loads may increase during construction phase. Actions • As per question 4 above. • Sediment loads during construction can be managed by use of best practice construction management.

Question 6: Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?	No	Conclusions :
		• PPS25 Guidance states that if the site is less than 1 Ha and in an area of low risk of flooding from rivers or sea then a Flood Risk Assessment is not required.
		• Information indicates Wedderburn Road did not flood in 1975 or 2002. Refer to Figure 15 of the Arup Ove (2010) Camden geological, hydrogeological and hydrological study : Guidance for subterranean development.
		Actions :
		• A flood risk assessment is not required however the following actions should be completed :
		  • Compare the flood peak levels in 2002 and 1975 to the basement invert levels.
		  • Flooding prevention may be required such as a one way flow valves to prevent water ingress into the proposed basement via drainage pipes during extreme flood events.
		  • A sump and pump may also be required in the basement design to manage emergency flooding from for example burst pipes.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
2. Groundwater Flow Screening Assessment		
Question 1a: Is the site located directly above an aquifer?	Yes	Conclusion : • The site is located on the Clay Gate beds, approximately 100 m from the geological boundary with the London Clay. The London Clay underlies the Claygate member. This indicates the Claygate member is relatively thin at the site as the 1:50,000 geological map shows it pinches out on the London Clay approximately 100 m to the south. Groundwater is likely to be resting on the London Clay and possibly above proposed basement levels. Therefore a geotechnical investigation should check for Claygate member thickness and the watertable. Actions : • The watertable level in the Claygate member will need to be identified and seasonal fluctuation understood. • If a watertable is identified water management during (eg. dewatering) and post construction (eg. basement drainage and/or sealing) may be required.
Question 1b: Will the proposed basement extend beneath the water table surface?	Yes	Refer to the text answering question 1a above.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	Yes	Conclusion • Because the Claygate member pinches out on London Clay 100 m to the south it is possible there are springs in the area. • The site walkover did not identify any surface water features such as ponds/wells or springs within 50m of the property boundary. Actions : • As per question 1a the watertable level in the Claygate member will need to be identified and seasonal fluctuation understood. • Information from the Local Authority should be obtained also to determine if there are nearby wells. • There is a requirement to check the following records : • Ordnance Survey maps (e.g. 1:25,000 or 1:10,000 scale). If features are marked (they are not always) the following symbols may be present: W; Spr; water is indicated by blue colouration. (check the key on the map being used). • "Lost Rivers of London" by Nicolas Barton, 1962. Shows the alignment of rivers in London and their tributaries. • The British Geological Survey (BGS) GeoIndex for wells (*this was checked by TLC and no wells were identified*). • Well inventory/catalogue publications such as "Records of London Wells" by G. Barrow and L. J. Wills (1913) and "The Water Supply of the County of London from Underground Sources" by S Buchan (1938). • LB Camden Environmental Health department may hold records of groundwater wells in the Borough.
Question 3: Is the site within the catchment of the pond chains on Hampstead Heath?	No	No actions required.
Question 4: Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	Unknown	Conclusions : • Volume of infiltration won't be known until the scheme outline design is completed. Actions : • Water balance calculations required to check hydrogeological flow changes.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 5: As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	Unknown	Conclusions : • Capacity for the Claygate member to receive soak away is unknown and will depend on its permeability of the aquifer and the depth to water table. Actions : • Geotechnical investigations need to check the thickness and permeability of the Claygate member and watertable. If the geology has capacity (ie the formation has sufficient permeability such as sands and / or gravels and the vadose zone is thick enough) then soak away tests should be undertaken to help appropriately design SUDS.
Question 6: Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.	Unknown	Conclusion • Because the Claygate member pinches out on London Clay 100 m to the south it is possible there are springs in the area. • The invert level of the basement is not yet determined however is likely to be in the order of 3 m to 4 m below the current ground level. Actions : • As per question 1a the watertable level in the Claygate member will need to be identified and seasonal fluctuation understood. Information from the Local Authority should be obtained also to determine if there are nearby ponds or spring lines and their water levels relative to the basement invert level. The location of nearby ponds, springs or wells will be checked during a site walkover and / or checks of publically available information.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Slope Stability Screening Assessment		
Question 1: Does the existing site include slopes, natural or manmade, greater than 7 degrees? (approximately 1 in 8)	Yes	Action • The angle of the ground at the front of the property and at the rear is greater than 7 degrees. See photo 2.
Question 2: Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7degrees?	Unknown	Action • Design team to advise.
Question 3: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7degrees? (approximately 1 in 8)	Yes	Conclusion • The land in the area slopes at greater than 7 degrees. Action • Structural or geotechnical engineer needs to assess the stability of the sloping ground based on the proposed design and results of the field investigation. • Building control may have foundation details for neighbouring properties. • If needed stabilisation or additional ground support may be required in the basement / building / landscaping designs.
Question 4: Is the site within a wider hillside setting in which the general slope is greater than 7 degrees? (approximately 1 in 8)	Unknown	Action • Refer to question 3 above.
Question 5: Is the London Clay the shallowest strata at the site?	No	Conclusion • The site is located in Claygate member 'silt and fine grained sand'. Action • Conduct a geotechnical assessment of the geology underlying the site. • Complete actions as outlined in the Groundwater Flow section.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 6: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	Unknown	Actions • Check with LB Camden if the site is within a tree protection zone. • The site walkover conducted on the 15th March identified street trees (deciduous- possible Alders, pollard) of which the nearest one is some 10m away from the building and the tree height approximately 20m. In the backyard there was a magnolia of approximately 3 m height (approximately 5 m from the current building footprint) and an ash of approximately 20 m height (approximately 30 m from the building). On the western boundary was a prunus of approximately 6 m height (approximately 3 m from the building) and on the eastern abutting garden was eucalyptus of 20 m height and approximately 20 m from the building. • (Note that consent is required from LB Camden to undertake work to any tree/s protected by a Tree Protection Order or to tree/s in a Conservation Area if the tree is over certain dimensions).
Question 7: Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	Unknown	Actions • The site walkover conducted on the 15th March did not identify evidence of subsidence / movement at the site or neighbouring properties. • Check with the BGS if the clay gate member in this area has seasonal shrink-swell or subsidence issues. • Incorporate shrink – swell assessment into the geotechnical investigation.
Question 8: Is the site within 100m of a watercourse or a potential spring line?	Yes	Action • Refer to actions in Groundwater Flow Screening Assessment section.
Question 9: Is the site within an area of previously worked ground?	No	No actions.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 10a: Is the site within an aquifer?	Yes	Conclusion • The site is located on the minor aquifer of the Claygate member. Action • Refer to actions in Groundwater Flow Screening Assessment section.
Question 10b: Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	Unknown	Conclusion • The site is located on the minor aquifer of the Claygate member resting on London Clay. There is likely to be groundwater present in the Claygate member and so it is possible dewatering may be required. Action • Refer to actions in Groundwater Flow Screening Assessment section.
Question 11: Is the site within 50m of the Hampstead Heath ponds?	No	No actions.
Question 12: Is the site within 5m of a highway or pedestrian right of way?	Unknown	Action • Design team to confirm extent of basement and report if it is within the zones indicated in question 12. Building control will need to be notified if the basement is proposed within the 5 m buffer.
Question 13: Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Unknown	Action • Structural or geotechnical engineer needs to assess this aspect based on the proposed design and results of the field investigation. • Building control may have foundation details for neighbouring properties. • If needed support to neighbouring foundations will be required in the new foundation design.

Question	Answer (Yes/No/ Unknown)	Conclusion / Likely Actions
Question 14: Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	Unknown	Conclusions • There are rail tunnels nearby. Proximity to other underground infrastructure such as sewers is unknown. Actions • A check with the relevant authorities / service providers needs to be completed to assess the significance of underground tunnels and infrastructure. Any works must not impact on critical infrastructure.