62 Avenue Road, NW8

Basement Impact Assessment

Prepared for

Regents Park Holdings.

Rev. A

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Alan Baxter

62 Avenue Road, NW8
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Contents

1.0 Introduction

The proposed redevelopment of 62 Avenue Road, London NW8 comprises the demolition of the existing 4 storey house (a raised ground floor level plus first, second and a lower ground floor) and the construction of a new 5 storey bespoke residential building on approximately the same footprint as the existing building. The proposed building is to have 3 storeys above ground, a lower ground floor and basement.

Back in 2011, Alan Baxter (ABA) were appointed as Consulting Structural Engineers to prepare a set of structural engineering notes and drawings in support of the planning application for a scheme similar to the one now proposed. The proposals were granted permission in 2012, with some variations also granted permission in 2013.

The planning permission has lapsed and ABA have now been appointed to prepare a Basement Impact Assessment (BIA) in support of a new planning application the Client intends to submit to Camden City Council for the same scheme. The Client has also appointed BB Partnership as Architect and Lead Consultant and Southern Testing as Geotechnical Consultant.

This report describes the basement structural scheme design, an overall sequence of construction and considers the impact of the basement construction on adjacent properties, surface and groundwater flows and slope stability.

This report has been based on the following information:

- Historical maps and in house desk study
- Geological survey maps and BGS borehole records
- Proposed layout drawings by BB Partnership
- What we have seen in our visits to site
- Trial pits carried out on site in 2011 (Appendix I)
- Geotechnical site investigations carried out by Southern Testing in November 2011 and August 2016 (Appendix F)

In preparing the BIA reference has been made to the following London Borough of Camden documents:

- Camden Local Development Framework (LDF) Policy DP27
- Camden Planning Guidance – Basements and Lightwells CPG4
- Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development prepared by ARUP

The BIA has been co-written and reviewed by the following persons, holding the stated qualifications:

Alan Baxter Ltd	David Probert	MEng
	Simon Bennett	MEng MICE MIStructE
Southern Testing	Jon Race	BSc(Hons) MSc CGeol FGS

2.0 General description of the site and site topography

The site is located at No.62 Avenue Road, St John's Wood London, NW8 6HT within the Swiss Cottage Ward (see drawing 1636/01/00 in Appendix A). The site is rectangular in shape, approximately 18.5m wide by 59.0m long and it is occupied by a 4-storey detached house (lower ground, ground, first and attic level) built in the 1930's. The building is not listed. The levels of the site fall from back to front approximately 2.8m. Refer to drawing 1636/01/01 in Appendix A for details of the existing topography and site levels.

The main building's footprint is approximately 16.0m wide by 17.0m long, with a 3-storey extension projecting to the back of the property. The structure of the building comprises loadbearing masonry and timber floors. The condition of the structure is average for a building of this age and type.

The building is set back from Avenue Road's back-of pavement line approximately 16m with a narrow alleyway along the boundary wall with No.64, leading to the rear garden of the property. On the side of No.60, the building is set against the boundary wall between the two properties.

3.0 Site history

Historical maps have been consulted as part of our desk study of the site, as summarised on drawing 1636/01/05 in Appendix B. The 1827 Greenwood Historic Map shows the southern side of Avenue Road being developed, with some buildings present on both sides of the road. The site of No.62 Avenue Road is shown as a green field. By 1894, Avenue Road appears to have fully developed up to Swiss Cottage and the site is now occupied by a large house with a rectangular footprint. The 1939-1945 LCC Bomb Damage Map shows the building in what appears to be its current footprint, which suffered minor blast damage. The 1991 OS Map shows the existing building in its current configuration.

4.0 Site geology

A summary of our initial understanding of the local geology and ground conditions is shown on drawing 1636/01/02 in Appendix B. A Local Area Borehole Study has also been carried out based on borehole records obtained from the British Geological Society (see drawing 1636/01/03). These show the site in an area of approximately 85-90 m thick stratum of brown and grey London Clay, over a 3.5-4.5 m thick layer of Thanet Sand layer overlaying the Chalk and Flint stratum.

Four trial pits were initially carried out in 2011 to confirm the presence of the London Clay on site (see Appendix I).

In order to confirm our initial understanding of the site geology from the desk study, three boreholes were specified as part of the geotechnical site investigation carried out by Southern Testing in 2011. For details of the scope and findings of the Southern Testing's investigation refer to the report given in Appendix F. See also drawing 1636/01/SK101 for an indicative section through the site with borehole logs.

5.0 Neighbouring buildings

No.60 Avenue Road is a 4-storey detached house comprising 3 stories above ground and a lower ground level to a similar depth as the lower ground of No.62. The building is not listed and is located approximately 6.5m away from the existing building on No.62. A single storey extension is present on the side of the house, 1.5m away from the boundary wall with No.62 (see drawing No. 1636/01/001 in Appendix A). From what can be seen from the site and from public areas, the structure of the building appears to be in good condition and comprises load bearing masonry with timber floors. The boundary wall between No.60 and No.62 is of brickwork construction and appears to be in good structural conditions.

No.64 Avenue Road is also not listed and comprises a 3 storey detached house approximately 18.0m wide by 14.5m long, with a rear extension projecting to the back of the property. From what can be seen from the site, it appears that the building comprises load bearing masonry with timber floors and does not have a lower ground level or basement. The building is built approximately 4.0m away from the existing building on No.62. The boundary wall between No.62 and N0.64 is of brickwork construction and generally of average to good structural condition.

6.0 The proposals

The proposed new building comprises the following:

- Construction of a 3 storey structure above ground.
- Construction of a lower ground and a basement level (approximately 28.0m x 14.0m on plan) with a general overall depth of 6.0m between ground level and SSL of the basement slab

This report relates to the proposed construction of the basement. The approach to the design of the new basement includes consideration of the following key items:

- Ground conditions
- Groundwater regime
- Surface flow and flooding
- Slope and ground stability
- The structure of the existing adjacent construction
- The effects on surrounding and adjoining properties
- An appropriate design and construction methodology

7.0 Characteristics of the Project

The existing 1930s building on site is to be completely demolished and replaced with the proposed new 5 storey building. The structural form of the proposed basement will be reinforced concrete retaining walls and a contiguous piled wall. The basement and ground floor will be formed with reinforced concrete slabs propping the walls. The upper storeys will be formed of loadbearing cavity walls with precast concrete plank floors.

8.0 Screening (stage 1)

The purpose of the screening stage of the BIA is to identify any matters of concern which should be investigated further through the BIA process. The screening process has been undertaken as outlined in the Camden Planning Guidance – Basement and Lightwells CPG4 and the Camden geological, hydrogeological and hydrological study prepared by ARUP. The screening flow charts given in CPG4 have been used and are provided in Appendix C. They list the items identified as being relevant to this proposal and therefore requiring further assessment a BIA.

8.1 Non-technical summary of the screening stage (stage 1)

The purpose of the screening stage is to identify any matters of concern which should be investigated further through the BIA process. These matters have been identified in the flow charts given in Appendix C and will be discussed further in the following Scoping Stage (stage 2).

9.0 Scoping (stage 2)

The purpose of the scoping stage of the BIA is to define further the potential impacts identified within the screening stage as requiring additional investigation. The scoping stage has been undertaken as outlined in Camden Planning Guidance – Basements and Lightwells CPG4 and the Camden geological, hydrogeological and hydrological study prepare by ARUP.

9.1 Conceptual Ground model

To assist the scoping stage a conceptual ground model has been produced using the following;

- Information obtained during the screening stage of the BIA
- The geotechnical site investigations carried out in November 2011
- Readily available published data
- Application of hydrogeological principles

This is as follows:

Site location	Swiss Cottage, London
Local geology	Made ground over London Clay. Beneath the thick London Clay is Thanet Sands over the Chalk and flint stratum. See drawing 1636/01/SK101.
Local ground levels	The site gently slopes to the south west with levels ranging from approximately 48.7m AOD at the back to 46.00m AOD at the front.
Local surface water or below ground water features	The culverted river Tyburn passes to the east and west of the site.
Local groundwater level	The London Clay is effectively impermeable and will therefore prevent water from percolating vertically through the soil. Some ground water may be perched on the top of the clay in the made ground.
Local surface finishes	No.62 and the surrounding properties typically have hardstanding in the front driveways and soft landscaping in the rear gardens.
Current local surface water pathway	A proportion of local rainfall will be retained in the near surface soil (made ground and topsoil) with a proportion evaporating into the atmosphere or being taken up by plant and tree root systems. The

	remaining water within the topsoil is likely to either sit within the made ground or, where possible, follow the natural gradient of the land, to the south, finding its way into more permeable layers. A further proportion of local rainfall will run off the hard surfaced areas adjacent to site into the main surface water sewers.

Using the above conceptual ground model, the potential issues identified during the screening stage are discussed further.

9.2 Hydrology (surface water flow and flooding)

6	Is the site in an area known to be at risk from surface water flooding, such as South 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?	Yes, based on Figure 15 of Arup's hydrogeological study – Hydrogeological and Hydrological Study Flood Map, Avenue Road was flooded in 2002	

Avenue Road is shown as having a flood in 2002 due to the sewers overtopping on Figure 15 of Arup's Hydrogeological and Hydrological Study Flood Map of Camden. It is unknown whether the existing lower ground of 62 Avenue Road flooded at this time.

The effects of a surface water flood from Avenue Road to the site are summarised on drawing 1636/01/07 in Appendix J. This shows that, because of the natural topography of the site, a flood of 500mm above the current level of the pavement will not reach the footprint of the proposed building. All lightwells and basement access points will be set a minimum of 600mm above the road levels in front of the site. Only perched ground water was noted as part of the site investigations and there are no static water features on or close to the site. Surface water flooding from sewers is therefore not an issue.

9.3 Hydrogeology (groundwater)

1b	Will the proposed basement extend beneath the water table surface	The proposed basement will be founded in the clay and therefore may be below a perched water table	

Further information is required on the ground water and whether it is significant will require groundwater monitoring to be carried out as part of any further site investigation.

2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	The site is within 100m of a lost river of London (Tyburn) which has since been diverted underground (Figure 11 – Arup report). However it is not within 100m a current watercourse, well or potential spring line. Refer to Figure 12 of Arup report and drawing 1636/01/004 in Appendix J.	

The site is located in a fork of the river Tyburn. As the river has been culverted it will not be affected by the construction of the basement.

9.4 Slope and ground stability

5	Is the London Clay the shallowest strata on site?	Yes, Figure 3 of Arup Report - Camden Geological Map and the findings on site show the shallowest stratum on site is London Clay.	

The geology on site is made ground over London Clay. The proposed basement will be founded in the London Clay on piled foundations. Clay has a tendency to expand and contract with changes in moisture content in the close surface soil as moisture levels change due to tree root action and temperature changes. The proposed basement is to be founded approximately 3.5m into the clay which is well below the level that will be affected by seasonal variations.

Clay also tends to expand or contract if there are significant changes in load on the soil. Initial calculations suggest the proposed building will weigh less than the excavated soil. Therefore to prevent the expanding clay applying an upward force on the slab, clay heave protection boards will be laid beneath the proposed basement slab

13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes, the basement is being formed adjacent to neighbouring properties which do not have a basement.	

The proposed basement is likely to result in differential depths of the foundations relative to neighbouring properties. A ground movement assessment is to be carried out to determine the extent of any effects on the neighbouring properties.

9.5 Non-technical summary of the scoping stage (Stage 2)

A conceptual ground model has been prepared, which has been used to identify the potential issues associated with the construction of the basement. These have then been discussed further and it is concluded that, in order to assess the impact of the potential issues identified in the scoping stage, the following information is needed:

- Groundwater levels
- Geology

The site investigations carried out in 2011 have already provided this information, with the exception of the groundwater levels. Further investigations have therefore been carried out in 2016 for this (see section 10.0 below).

10.0 Site Investigation and study (stage 3)

A site investigation was carried out on 62 Avenue Road in November 2011 with further ground water monitoring in August 2016. A copy of Southern Testing's report can be found in Appendix F and this includes a desk study and factual report. The site investigation included:

- 3 No. 21-25m deep boreholes (November 2011)
- Contamination sampling and testing (November 2011)
- 3No. 6.0m deep wells for monitoring of groundwater levels monitoring (August 2016)

The geology of the site generally comprises a layer of Made Ground (dark brown sandy clay) up to 3.5m deep overlaying London Clay proven to a depth of 25m BGL.

Ground water level monitoring was carried out on site in August 2016 and the following levels were measured:

Test Location	**Date of Reading**	**11/08/2016**	**25/08/2016**
	Depth to Base of Installation (m)	**Standing Perched Water Level (m)**	
MW1	5.89 BGL (40.77 AOD)	4.83 BGL (41.83 AOD)	3.15 BGL (43.51 AOD)
MW2	6.04 BGL (42.36 AOD)	5.54 BGL (42.86 AOD)	4.45 BGL (43.95 AOD)
MW3	5.70 BGL (42.75 AOD)	3.26 BGL (45.19 AOD)	3.25 BGL (45.20 AOD)

The above readings refer to perched groundwater sources that are likely to be associated with surface water entries and fissure flows within the underling London Clay.

Based on the result of the site investigations and the size and depth of the proposed basement, Southern Testing have advised that the anticipated ground movement due to heave of the London clay can be conservatively quantified as 50-60mm. Of this upwards movement, approximately 50-60% will occur during the construction of the basement. Therefore the residual heave to be considered in the long term will be approximately 25-30mm.

The site investigation indicated the Made Ground contains elevated concentrations of lead and therefore Made Ground excavated from site should be classed as Hazardous under the Waste Acceptance Criteria (WAC), whilst the natural clay soils on site can be classed as inert under the WAC. For further details refer to the Southern Testing report.

10.1 Non-technical summary of the site investigation and study (Stage 3)

A site investigation comprising boreholes, soil testing and groundwater monitoring has been carried out by Southern Testing in 2011 and 2016 in order to validate the assumptions of the conceptual ground model with regards to the geology and groundwater levels. The actual geology and groundwater has been found to be consistent with the initial conceptual ground model.

11.0 Impact Assessment (stage 4)

The impact assessment stage of the BIA describes the impacts of the proposed basement development on the environment and how this will be mitigated in the design and construction. For the factual site investigation report refer to Appendix F.

11.1 Updated Ground Model

The ground model from the scoping stage has been updated to reflect the findings from the site investigation and shall be used to inform the design of the basement, its construction and assess its effects on the potential issues highlighted in the scoping stage.

Site location	Swiss Cottage, London
Local geology	There is 1-3.5m of made ground over London Clay to a proven depth of 25m. Refer to Appendix I for photos of the near surface ground conditions. See drawing 1636/01/SK101.
Local ground levels	The site gently slopes to the south west with levels ranging from approximately 48.7m AOD at the back to 46.00m AOD at the front.
Local surface water or below ground water features	The culverted river Tyburn passes to the east and west of the site.
Local groundwater level	Perched groundwater from both surface water entries and fissure flows was identified with levels varying between 43.51m AOD and 45.20m AOD
Local surface finishes	No.62 and the surrounding properties typically have hardstanding in the front driveways and soft landscaping in the rear gardens.
Current local surface water pathway	A proportion of local rainfall will be retained in the near surface soil (made ground and topsoil) with a proportion evaporating into the atmosphere or being taken up by plant and tree root systems. The remaining water within the topsoil is likely to either sit within the made ground or, where possible, follow the natural gradient of the land, to the south, finding its way into more permeable layers. A further proportion of local rainfall will run off the hard surfaced areas adjacent to site into the main surface water sewers.

11.2 Proposed structural design

It is proposed to demolish the existing building and construct a new 5 storey bespoke residential building comprising a lower ground floor for staff accommodation and a pool/fitness area and a basement level for car parking and pool plant rooms.

The basement, lower ground and ground floor slabs and walls will be constructed in in-situ reinforced concrete.

The structure above ground will comprise brick/block cavity walls with precast concrete floors and steel beams. The mansard roof will be built using a series of streel frames with timber infills (see drawings 1636/001/10-15 in Appendix D).

Drawings 1636/001/16-17 show the indicative cross sections through the proposed structures.

11.3 Construction of the basement structures

The new basement structure will be formed with a reinforced concrete box founded on piles, comprising reinforced concrete slabs, perimeter and internal walls and columns. The box will be designed to resist horizontal earth and water pressures and vertical loads from the above superstructure. It is envisaged that a bottom-up sequence of construction will be adopted to build the structure below ground.

A contiguous piled wall is to be used in order to support the excavation to form the new basement structures. This has been chosen to maintain structural stability and integrity to the adjacent existing structure during and after the construction of the basement.

The piles are set back from the adjacent structures by 1.0m from the face of the walls to the centre line of the piles. This is a sufficient distance to enable them to be built without physical damage to the adjacent walls. A 225mm thick reinforced concrete retaining wall will be constructed inside the contiguous piled wall to complete the basement box. Calculations for the design of the retaining wall can be found in Appendix E.

The site investigation has indicated the geology is capable of supporting the loads and construction techniques being proposed. Allowable bearing pressures in the order of 150kN/m^2 have been suggested for spread foundations which is sufficient for these forms of construction.

The site investigation has also indicated that the potential long term heave will be approximately 25-30mm. 250mm thick CORDEK Cellcore boards CC2030 (or equivalent) will be been specified, which will provide a 150mm equivalent void. This is well in excess of the anticipated heave movement and therefore deemed to be sufficient.

CPG27 requires the proposed basements to avoid cumulative impacts upon structural stability or the water environment.
On the basis of the measurements to date, groundwater ingress is not expected to be a significant problem in terms of dewatering issues during construction.

Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1×10^{-9} m/s and $1x\ 10^{-14}$ m/s, with an even lower vertical permeability. Accordingly, the groundwater flow rate is anticipated to be extremely low to negligible.

However, allowances for some dewatering will be made from perched sources e.g. within the made ground/base of existing foundations, in the form of intermittent pumping from strategically placed collector sumps.

For the longer term condition, seepage entries from fissure flow within the clays and any perched water from within the overlying made ground should be allowed for in the design of the basement area e.g. provision of waterproofing measures, and also for hydrostatic uplift of the basement floor slab.

The effect of the new basement on groundwater is discussed in section 11.9 below.

11.4 Sequence of construction for the basement

The structural proposals have been developed to suit normal construction techniques. A construction sequence of the basement and the temporary works required has been carefully considered and be used for the purposes of undertaking the structural design. It demonstrates that works can be executed with due regard to the local amenity. A sequence of construction for the basement is summarised below and illustrated in Appendix G.

The site is accessed from Avenue Road with a good amount of space on site for construction vehicles to manoeuvre and unload. The design of the basement is such that it requires no access from the neighbouring properties.

Phase 1 – Demolition

- Demolish the superstructure of the existing house to above the ground floor slab
- Install temporary props to top of the basement walls
- Remove the ground floor slab
- Break up holes through the existing basement slab at the locations of proposed piles and remove obstructions from the ground.
- Commence backfilling of the existing basement, battering back along the sides with the boundary walls and remove props.

Phase 2 – Piling

- Complete backfilling to the required piling platform level
- Install piles for the contiguous piled wall around the perimeter of the proposed basement
- Install internal basement piles.

Phase 3 – Capping beam and ground floor slab

- Reduce the levels to allow for the construction of the capping beam
- Construct the capping beam
- Install first level of temporary props at capping beam level
- Remove slab/walls to former basement structure.
- Further reduce levels to the proposed second level of propping

Phase 4 – Progress excavation and construct lower ground reinforced concrete slab

- Install second level of temporary propping
- Further reduce levels to proposed basement slab level
- Regrade ground to rear of building as it was before

Phase 5 - Excavate and cast 2nd level of RC retaining wall

- Reduce levels to the underside of the basement slab and locally dig to form pile caps
- Trim piles
- Install underground drainage system
- Install layer of pea shingle, cellcore and blinding under the proposed slab and pile caps
- Construct pile caps
- Construct basement slab

Phase 6 – Complete below ground structure/ commence construction of superstructure

- Install tanking system
- Construct the reinforced concrete walls to the front of the contiguous piled wall

- Construct internal RC walls and columns
- Build RC slabs and remove propping
- Commence the construction of the superstructure walls and floors

11.5 Programme

Although the works described in section 5.3 are relatively demanding from a structural point of view, they are not unusual and will be carried out in a careful and controlled manner and use normal construction techniques. The site has good access allowing for relatively straightforward removal of spoil. The demolition of the existing structure and the construction of the basement are expected to last around 6-8 months.

11.6 Construction Management Plan

- The Contractor will be required to submit his own Construction Management Plan and Site Waste Management Plan prior to work commencing on site. The contents of this plan must be in accordance with The London Borough of Camden's guidance and be agreed by them.
- The Contractor will be required to demonstrate due diligence and commitment toward minimising environmental disturbance to local residents and will be required to complete the work in accordance with the Considerate Constructors Scheme standards.
- Noise, dust and vibration will be controlled by employing best practicable means as prescribed in legislation such as; The Control of Pollution Act, 1972; The Health & Safety at Work Act, 1974; The Environmental Protection Act, 1990; Construction Design and Management Regulations, 1994 and The Clean Air Act, 1993. Noise, vibration and dust monitoring to be implemented.
- The contractor will need to produce a Traffic Management Plan. This should carefully consider vehicle movements and their impact on other road users, pedestrians, residents and the environment. Mitigation measures should be implemented where necessary.
- The contractor will erect site hoarding to define the boundaries of the site
- Working hours to be restricted as required by the London Borough of Camden
- Vehicles should be washed and cleaned before leaving site and vehicles should not be left idling
- Measures should be adopted to prevent site runoff of water or mud
- Water to be used as a dust suppressant
- Skips should be covered
- All temporary works are to be designed by a qualified Temporary Works Coordinator
- Movements of surrounding buildings should be monitored throughout construction, the results reviewed and action taken to mitigate excessive movements.

11.7 Ground Movements and Structural Damage

A ground movement assessment in accordance with CIRIA C580 has been carried out and the impact of ground movements on nearby structures assessed in accordance with the Burland Categories of damage – see Appendix E1. The damage categories for different parts of the neighbouring buildings are described below. Other nearby buildings have not been assessed as they are sufficiently far for the damage to be negligible.

No.60: Both the side wall and annexe wall to No.60 fall into Category 0 (negligible), the rear wall falls into Burland Category 1 (very slight), again both within the acceptable limits set out by Camden's planning guidance on basements in CPG4.

No.64: The side wall of No.64 falls into Burland Category 0 (negligible) and the front wall in Burland Category 1 (very slight), both within the acceptable limits set out by Camden's planning guidance on basements in CPG4.

This form of assessment is conservative and in reality any damage is likely to be less than identified in this assessment.

11.8 Mitigation Measures

In line with CPG4, mitigation measures will be implemented to control ground movement.

- The structural proposals have been designed to provide stiff supports to the basement retaining walls in the temporary permanent cases. The stiff reinforced concrete retaining wall and contiguous piled wall will be propped during construction, limiting ground movement during construction and in the permanent case.
- High-stiffness propping at frequent intervals to the retaining walls will be provided during construction. This will make the construction of the basement trickier for the contractor but will reduce movements caused by the excavation behind the retaining wall and the effect of the basement construction on neighbouring properties.
- During the construction of the basement the contractor will be required to undertake monitoring of the groundwater levels and ground conditions encountered to ensure that the assumptions and findings from the BIA remain valid.
- Due to the depth of the basement a general unloading of the soil beneath the basement is expected to produce some heave as the clay expands. This has been considered as part of our design and a layer of clay heave protection board has been allowed for beneath the structure. This will act as a sacrificial layer and crush as the clay below expands, preventing the soil from applying any significant force on the basement slab. For details refer to section 11.3.
- The distance of the piled retaining wall from the existing structures has been carefully considered to be sufficiently far away to allow for its construction without physical damage to the adjacent structures. Piling at these distances is common and well understood.

In summary, with careful sequencing and temporary propping as shown on the sequence of construction drawings movements will be very small and will not result in structural damage to the adjacent walls or adjoining properties.

For the rear wall of No.60 and the front wall of No.64, fine cracks that can be easily treated during normal redecoration will be repaired at the end of the works on site. This will leave the existing adjacent buildings in a state equivalent to Burland Category 0. A specific provision for this will be made as part of the party wall awards which will be negotiated between the Building Owner and the Adjoining Owners.

11.9 Impact of basement on groundwater, surface water and soil

The existing building is currently founded on London Clay. The addition of a new basement level will lower the current foundation level. However, this will still be well within the London Clay stratum.

The identified perched ground water sources are likely to be associated with both surface water from the made ground and fissure flow within the London Clay. On the basis of the measurements to date, groundwater ingress is not expected to be a significant problem during construction. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1 x 10^{-9} m/s and 1x 10^{-14} m/s, with an even lower vertical permeability. Accordingly, the groundwater flow rate is anticipated to be negligible.

Any groundwater flows will likely follow the local/regional topography which in this instance comprises locally slight falls to the south-west. Because the very slight falls in the local/regional topography, hence negligible hydraulic gradient, and the very low/impermeable nature of the underlying clay materials, there is negligible risk of the proposed basement walls causing a “damming effect” or mounding of water on the upstream faces.

In light of the above observations, it is concluded that the construction of the proposed basement will not block any significant flow of perched water in the ground and will have negligible effect on the area’s hydrology or water levels in the vicinity of the proposed building.

The total area of hardstanding on site will be slightly decreased as part of the works, meaning the amount of water reaching the sewer system will slightly decrease by approximately 15%, as shown on drawing 1636/01/09 in Appendix J.

The site investigation by Southern Testing found elevated concentrations of lead in the made ground near the surface. All spoil from the excavation of the made ground will be disposed of site to a licenced tip in accordance with current good practice.

11.10 Impact of the proposed development on existing trees

An Arboriculturalist visited site in 2011, a copy of their report is included in Appendix G.

There are a number of trees on site and close to the boundary wall of the site. Trial pits have been dug to access the extent of the tree roots. All of the trees on site were given a BS 5837 category ratings of C, a tree of low quality or value, whereas the London Planes off site in the pavement where given Category A and B.

Other than the solitary Lime in the front garden, and the row of Limes in the rear garden, the trees are located in adjacent properties are separated by brick-built boundary walls which the arboriculturalist advises should prevent many of the roots from spreading into the site.

The Arboriculturalist has produced a recommended minimum distance to construction for each of the tree types on site. The design of the proposed basement has been developed in such a way to be outside these areas. Tree protection during works will ensure that works will not compact the soil where roots are growing.

The development will therefore have no impact on trees.

11.11 Baseline values vs. as constructed

The impacts of the proposals have been determined by comparing the baseline situation with the hypothetical as constructed basement situation. Refer to the table below.

Attribute	**Baseline value**	**As constructed value**
Groundwater levels	Perched groundwater from both surface water entries and fissure flows was identified with levels varying between 43.51m AOD and 45.20m AOD.	No expected significant changes from baseline values.
Structural integrity of surrounding structures	Burland Category 0	Burland Category 1 or less (within acceptable limits outlined in CPG4). Fine cracks that can be easily treated during normal redecoration will be repaired at the end of the works on site. This will leave the existing adjacent buildings in a state equivalent to Burland Category 0.
Contamination	Elevated concentrations of lead	Contaminated excavated material to be removed as discussed in section 5.7.
Trees	All trees on site have been classified to be of low quality or value.	No expected significant changes from baseline values.

11.21 Non-technical summary of the impact assessment (Stage 4)

A basement impact assessment, as required for planning by the London Borough of Camden, has been undertaken by Alan Baxter Ltd and Southern Testing for the proposed basement in the plot of No.62 Avenue Road.

The engineering rationale and construction issues associated with the proposed construction of a new basement have been explored and summarised in this report. A structural scheme design has been prepared along with a construction sequence to demonstrate that the proposals can be built safely by a contractor with the right skill and care without causing detriment to the local groundwater regime, slope stability, surface water regime or adjacent structures.

The structural proposals and construction methodology for the proposed basement have been developed with due regard to the existing site constraints and site specific ground conditions. The structure has been designed to maintain the stability and integrity of the surrounding land and existing structures. Anticipated ground movements have been shown not to cause structural damage to the existing buildings. Ground movements are limited to acceptable values by a combination of the structural design, suitably designed temporary works and good workmanship. For the areas where very slight damage may occur, fine cracks that can be easily treated during normal redecoration will be repaired at the end of the works on site.

The proposals will have negligible impact on the local ground water regime and are resistant to the risk of surface eater flooding from sewers.

Prepared by David Probert MEng, Jon Race BSc(Hons) MSc CGeol FGS
Reviewed by Simon Bennet MEng MICE MIStructE
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Alan Baxter Limited is a limited company registered in England and Wales, number 06600598.
Registered office: 75 Cowcross Street, London, EC1M 6EL.

Appendix A Site and location plans

Appendix B Geology and history maps

Appendix C Screening flowcharts

Appendix D Proposed structure drawings

Appendix E Calculations

Appendix E1 Ground movement calculations

Appendix E Calculations

Appendix E2 Retaining wall calculations

Appendix F Site investigation report

Appendix G Assumed sequence of construction

Appendix H Arboraculturalist report

Appendix I Photographic record of trial pits

Appendix J Other ABA drawings