Project No. 1678	April 2018

77 Avenue Road

Basement Impact Assessment & Structural Method Statement

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1. INTRODUCTION

Constructure Ltd were appointed in February 2018 to provide structural advice to support the application to the Eyre Estate for the proposed redevelopment of this existing detached residential property in the Camden borough.

This report has been produced to accompany the Planning Application submission by Wolff Architects, describing the scope and nature of the structural works and assessing the impact of the proposals. It details the outline approach that will be taken to safeguard the integrity of adjacent buildings, highways and services.

Local ground conditions have been assessed by desk-top study and ratified with targeted site investigations, scoped to ensure site conditions are well known. This assists to reliably inform the structural design and construction sequence.

Please refer to the appendix for a list of structural engineering drawings which support this report, and indicate the proposed structural intent of the building shell and core.

1.1 THE EXISTING PROPERTY

Situated within the residential area of St John's Wood, the site is rectangular, approximately 60m x 20m, located on the western side of Avenue Road. The existing house is situated towards the front of the site, and is an early 20th century building of traditional construction. Vehicular access to the single storey garage is gained via a ramp which slopes downwards from the paved forecourt which is set at street level.

The front garden is largely hard-landscaped and contains planted beds.

The rear garden comprises a lawn occupying the majority of the area with planted beds and mature trees around its perimeter. There is a hard-landscaped terrace, and raised planting to the rear of the house which leads to the planted garden. The rear garden can be accessed through the garage wing.

1.2 THE PROPOSED WORKS

It is proposed to demolish the existing early/mid 20th century detached dwelling house to construct another single detached dwelling house of similar general massing and site positioning, onto a two-level habitable basement which would enclose leisure facilities.

2. DESK STUDY

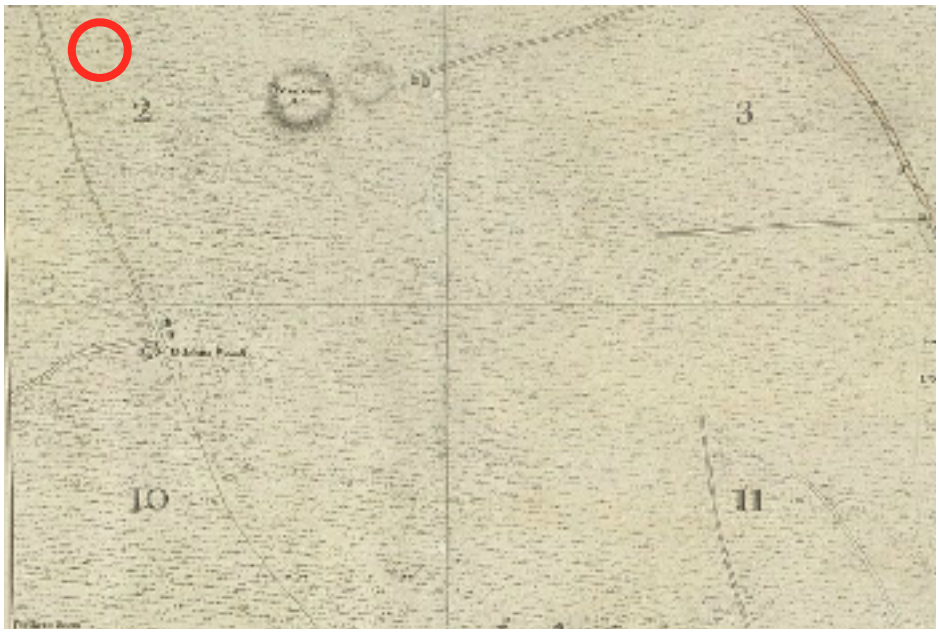
2.1 SITE HISTORY

Along with conducting a site walk-over to inspect the general site conditions and setting, a historic site usage search has been conducted.

Circa 1792, the map [Figure 1] shows that the site and surround pre-developed area was rural land.

The lower map [Figure 2], shows that the site to have been fully developed as a grid of streets and rows of detached houses between 1862 and 1871.

It is therefore apparent that the land upon which 77 Avenue Road constructed in 1800s was undeveloped until that time, and it is considered therefore that the historic land use presents no specific concerns of contamination risk.



[FIGURE 1] HISTORIC MAP SHOWING POSITION OF SITE UPON UNDEVELOPED LAND IN 1792

[FIGURE 2] HISTORIC MAP SHOWING DEVELOPED LAND 1862 - 1871

2.2 LOCAL GEOLOGY AND HYDROLOGY

From geological maps and borehole records for the area [Figure 3], the underlying soil is seen to be London Clay down to 30-40m, possibly with a layer of Made Ground overlying. These strata are underlain by about 10m of the Lambeth Group, overlying 10-15m of Thanet Sand. Chalk is thought to be present at around -30mOD.

It is thought to be most probable that the Tyburn underground river passes to the south-east of the site, across Avenue Road, although the exact location of the could not be determined from the information available.

Borehole logs from the adjacent site of 75 Avenue Road have been reviewed, and are considered to represent the likely prevailing soils conditions to this site, and this has enabled a clearer picture of the upper natural strata, which were seen on the adjacent site to be 2 to 5m or so of sandy gravelly firm to stiff clays, overlying the more consistent clay material. Water strikes were seen to not be encountered, and the standpipe measurements showed water standing at around 8 metres below ground, considered to have been delivered to the boreholes due to seepage through clay stone inclusions within the clay substratum. The speed of migration of groundwaters in such soils are

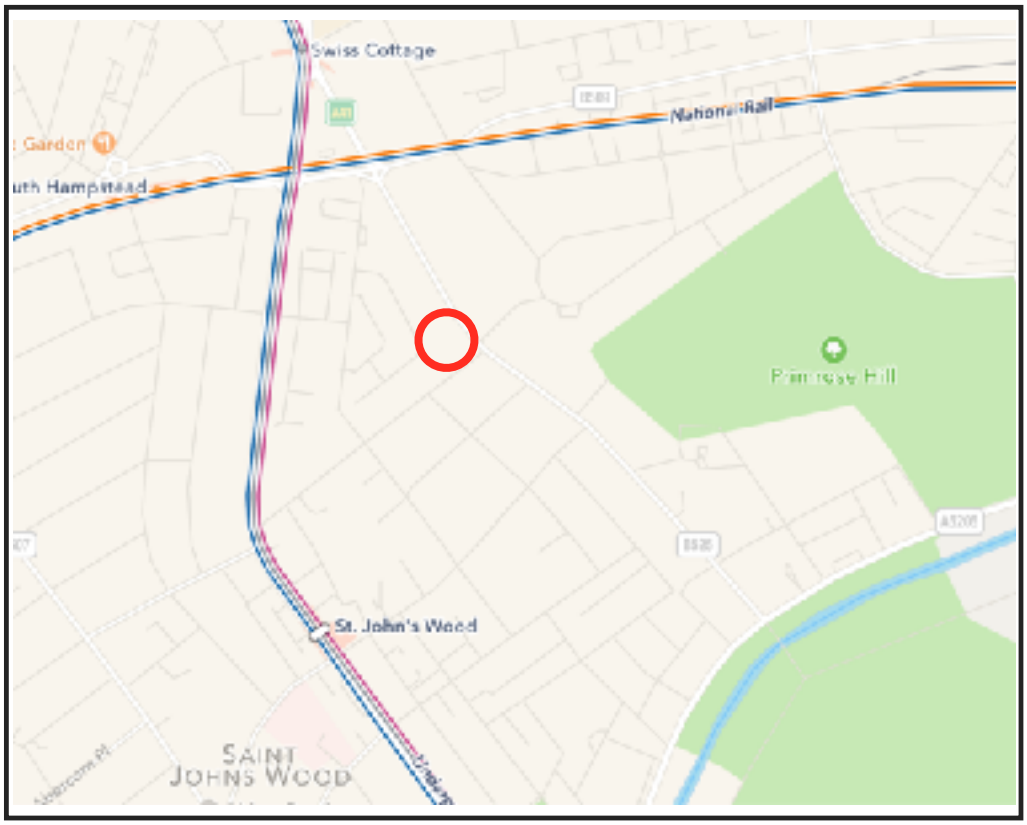
[FIGURE 3] LOCAL GEOLOGICAL MAP

considered to be slow, and therefore manageable during excavation.

This desk study of the prevailing ground conditions has been verified by a detailed site-specific soils investigation by Chelmer on 23.02.17, as presented in the Chelmer BIA report, ref BIA/9815 dated March 2018.

2.3 LONDON UNDERGROUND AND RAILWAY LINES

From the map with railway lines overlaid [Figure 4] it can be seen that the site is sufficiently far from above and below-ground railway infrastructure, with the closest line being approximately 300m away from the site to the west. Therefore no consultation with Railways Asset Protection teams is considered to be necessary.



[FIGURE 4] LOCAL RAILWAYS

2.4 EXISTING UTILITIES AND UNDERGROUND SERVICES

Existing services including sewers and drainage runs will be identified prior to commencing the works. Most of the existing below ground drainage on the site will be removed due to the substructure works. Any remaining drains will be moved, as required, to suit the new drainage design, and the new drainage connected to the existing outfall into the public system on Avenue Road.

3. STAGES 1 & 2: SCREENING AND SCOPING ASSESSMENTS

Camden Planning Guidance CPG4 sets out the assessment requirements, the initial stages being a screening and scoping assessment, the checklists for which are addressed below. These inform the further desk study in subsequent sections.

3.1 STAGE 1: SCREENING

SCREENING CHECKLIST: SUBTERRANEAN GROUNDWATER FLOW			
CONSIDERATION		RESPONSE	JUSTIFICATION
1A	Is the site located directly above an aquifer?	NO	The site is located above the 'Unproductive' aquifer of the London Clay Formation.
1B	Will the proposed basement extend beneath the water table surface?	YES	A conservative assumption has been made that the groundwater level is at 3.8 m bgl, where seepage was encountered during drilling in BH1. However, the absence of water in the monitoring standpipe confirms that the London Clay is of very low permeability and is therefore likely to cause very little or no natural groundwater flow. Thus, the proposed basement is not anticipated to have any impact on the groundwater flows/levels and no significant impact on neighbouring properties would be expected (see Section 4.2).
2	Is the site within 100m of a watercourse, well (disused/ used), or potential spring line?	NO	There are no surface water features recorded within 100 m. The lost river Tyburn was indicated to run through the site but no evidence of this was found. The Tyburn is now assumed to be culverted and to run beneath the Avenue Road carriageway.
3	Is the site within the catchment of the pond chains on Hampstead Heath?	NO	The site is approximately 2 km from the catchment of the pond chains on Hampstead Heath.

4	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	YES	The proposed development is anticipated to decrease the total impermeable area. Therefore, the development is expected to decrease the risk of flooding by using mitigation measures such as geocellular storage and permeable paving.
5	As part of the site drainage, will more surface water (eg rainwater and run-off) than at present be discharged to the ground (eg via soakaways and/or SUDS)?	YES	Mitigation measures to reduce the impermeable area are proposed and SuDS implemented on site would require a controlled discharge to sewer, such to not exceed the maximum allowable flow rate, and on-site attenuation.
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 main water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?	NO	There are no surface water features records within 100 m.

SCREENING CHECKLIST: SLOPE STABILITY			
CONSIDERATION		RESPONSE	JUSTIFICATION
1	Does the existing site include slopes, natural or man-made, greater than 7°, or 1 in 8?	NO	The site is relatively flat at approximately 50.5 mOD
2	Will the proposed re-profiling of the landscaping at site change slopes at the boundary to more than 7°, or 1 in 8?	NO	No major ground re-profiling is proposed.
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°, or 1 in 8?	NO	The neighbouring land across the boundary follows the natural topography of the land, which is relatively flat.
4	Is the site within a wider hillside setting in which the slope is greater than 7°, or 1 in 8?	NO	The surrounding area is relatively flat.

5	Is the london clay the shallowest stratum at the site?	YES	Verified by site investigation.
6	Will any trees be felled as part of the proposed development, and/or any works proposed within tree protection zones where trees are to be retained?	NO	
7	Is there a history of seasonal shrink/swell subsidence in the local area, and/or evidence of such effects at the site?	NO	No evidence of shrink-swell subsidence was noted from the site inspection. The Groundsure report indicates a 'moderate' maximum shrink-swell hazard rating.
8	Is the site within 100m of a watercourse?	NO	There are no surface water features records within 100 m. The lost river Tyburn was indicated to run through the site but no evidence of this was found. The Tyburn is now assumed to be culverted and to run beneath the Avenue Road carriageway.
9	Is the site within an area of previously worked ground?	NO	No evidence of previously worked ground was encountered during the site investigation and no evidence of reworked ground from the lost river Tyburn channel was found on the neighbouring site
10	Is the site within an aquifer? If so will the proposed basement extend beneath the water table such that dewatering may be required during the construction?	NO	The site is located above the 'Unproductive' aquifer of the London Clay Formation.
11	Is the site within 50m of the Hampstead Heath ponds?	NO	Ponds are some 2000+m away
12	Is the site within 5m of a highway or pedestrian right of way?	NO	The proposed development will be some 9m from the pedestrian footpath along the highway

13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	YES	Neighbouring properties are likely to have foundations of differing depth to the proposed development. A Damage Category Assessment has been carried to assess the potential damage to neighbouring properties
14	Is the site over (or within exclusion zone of) any tunnels e.g. railway lines?	NO	The nearest underground railway line or railway tunnel to the site is the London Underground Jubilee Line, which is approximately 134 m to the west of the site and 17 m bgl.

SCREENING CHECKLIST: SURFACE FLOW AND FLOODING IMPACT IDENTIFICATION			
CONSIDERATION		RESPONSE	JUSTIFICATION
1	Is the site in the catchment of the pond chains in Hampstead Heath	NO	The site is approximately 2 km from the catchment of the pond chains on Hampstead Heath.
2	As part of the proposed site drainage, will surface water flows (eg volume of rainfall and peak run-off) be materially changed from the existing route?	YES	The proposed development is anticipated to decrease the total impermeable area. Therefore, the development is expected to decrease the risk of flooding by using mitigation measures such as geocellular storage and permeable paving.
3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	YES	See above
4	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of the surface water being received by adjacent properties or downstream watercourses?	NO	There are no nearby surface water features and the site is already bound by brick walls, limiting its catchment area. Therefore, the increased permeable area on the site is unlikely to have any negative effect on surface water being received by adjacent properties.

5	Will the proposed basement development result in changes to the quality of of surface water being received by adjacent properties or downstream watercourses?	NO	As above
6	Is the site in an area identified to have surface water flood risk or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	YES	The site is in an area where the flood risk from surface water is classified as medium.

3.2 STAGE 2: SCOPING

The screening assessment identifies the following matters, which are required to be studied and justified or discussed further.

- The proposed excavations are to extend beneath an assumed groundwater table. Therefore a groundwater flow impact assessment has been made by the geotechnical specialist
- The site is in a medium flood risk area, and so consideration has been made by the geotechnical specialist in the form of a surface water impact assessment
- The proposed excavations are to be in London Clay, and the neighbouring buildings are differentially founded to the proposed foundations. Therefore a ground movement assessment has been made by the geotechnical specialist

These aspects are considered further in Stage 4 (see section 5) and elaborated upon in section 6. (detailed design considerations)

4. STAGE 3: SITE INVESTIGATION

4.1 SITE INVESTIGATION

A trial pit investigation was carried out in February 2017, by Chelmer Ltd. This saw two boreholes being put down to 15m and 25m, and the findings are presented in their report ref FACT/8562. The boreholes showed nominal top soil/made ground overlying London Clay.

5. STAGE 4: IMPACT ASSESSMENT

Please refer to the geotechnical specialist's report ref. Chelmer Ltd BIA/9815 dated March 2018.

5.1 SUBTERRANEAN GROUNDWATER FLOW IMPACT

The existing subsoils are of London Clay. Site investigations demonstrated this to 15 and 25m of depth on the two boreholes, and were found to be nominally dry of groundwater,

save for a minor amount of seepage at about 4m below ground in one borehole, which is therefore the conservative assumption of indicating the groundwater level.

The exceptionally low permeability levels of the clay lead to the conclusion that the presence of a basement substructure would have negligible impact on groundwater flows.

5.2 SURFACE WATER FLOW IMPACT

The following statement is a summary from the Chelmer desk study and analysis:

> The site is in an area where flooding from rivers and seas is defined as a low probability and the flood risk from surface water is medium. This combined with historic flooding on Avenue Road during the 2002 floods indicates there are potential issues for surface water flooding.
>
> The basement is anticipated to produce an increase in impermeable surfacing. The site has a limited catchment area as the rear garden is bounded by a brick wall with only a small length (<2m) where the ground level rises slightly above the wall and is bounded by the wooden fence at the rear of the garden along the souths boundary.
>
> The development will be expected to marginally increase the surface water flood rise of the site. Conventional measures of managing surface water run-off should be considered; such as up-stands to protect lightwells and a ground level difference at external doorways.
>
> The lost river Tyburn, which is now culverted and likely runs beneath the Avenue Road carriageway, was indicated to have previously run beneath No. 77 Avenue Road. However from previous ground investigations undertaken at No. 73-75 to identify the location of the river did not find any evidence of the former river. Therefore due to the floor direction of the former river, north to south, and investigations undertaken to the adjacent building along with No. 77.

In regard to the affect to surface water flow, the proposed increase to surface water run-off is to be mitigated by attenuation (see Section 9.2). With respect to the lost river Tyburn, this study is considered “to provide sufficient evidence that no adverse impacts due to the basement development are anticipated to be produced by the former river”. It is also notable that the same buried tributary was indicated by records as having been thought to run through 55 Avenue Road, however works upon this site also found no evidence of the former river.

5.3 STABILITY OF EXCAVATIONS

Excavations in made ground are more likely to be unstable and so may require temporary support.

Excavations within the firm clay are expected to be stable in the short term.

The excavation for the basement and sub-basement will exceed 1.2m, therefore temporary restraint to the excavations will be necessary for safety compliance.

5.4 STABILITY OF NEIGHBOURING PROPERTY

5.4.1 UNDERPINNING

The south boundary wall stability is to be assured by proper sequencing of the shallow underpins to the existing boundary wall which is within the sandy clay soil.

The proposed underpinning will be some 8m below the current wall. It is reasonably judged that only a very minor increase in load due to the concrete in place of the soil will be experienced, and with the slightly increased bearing area, the difference in ground bearing pressure is zero to negligible. In consideration of these factors, the risk of settlement of the underpins themselves, as a result of vertically applied ground bearing load, is considered to be negligible, and therefore of no considerable consequence particularly in view of the greater influence presented by the excavation itself.

5.4.2 GROUND MOVEMENT ANALYSIS

The proposed excavation of the basement will remove a depth of some 8.0m.

A Ground Movement Analysis, in line with CIRIA C760 to determine the movement response of the clay subsoils as a result of the proposed excavations. This has been conducted by Chelmer Ltd, please refer to the report ref. BIA/9815.

From the report it was concluded the the basement excavation has an influence across the adjoining building structures resulting in the worst case damage category of Burland Scale Category 1 (‘very slight’).

6. DETAILED PROPOSALS AND DESIGN CONSIDERATIONS

6.1 CONSTRUCTION OF SUBSTRUCTURES

The protection of the neighbouring properties and boundary structures has been carefully considered, such to ensure that during the works, the boundary and neighbouring structures are protected from ground movement. The techniques proposed therefore are designed to conform with this.

6.1.1 BEARING PILES

Within the property, bearing piles will be installed, which in the permanent condition will support internal columns, load-bearing walls and suspended base slabs, and will be designed with inherent tension capacity to resist any upthrust from buoyancy effects due to theoretical extreme ground water effects.

6.1.2 PILED RETAINING WALLS

Along with the proposed propped underpinned walls under the existing boundary walls, a Continuous Flight Auger piling technique will be employed to form a perimeter retaining wall to contain the excavation. This technique is non-percussive and of minimal vibration, and so is suitable or use close to neighbouring boundaries. The piled wall will be formed using 450mm diameter piles spaced at 600mm centres, in a contiguous arrangement.

This piling, along with those for the consented basement will be constructed off a piling mat made of compacted hardcore (typically 300mm thick) laid to approximately existing garden level. The piles will be broken-down and capped with a reinforced concrete capping beam, which will be set at the level of the proposed basement cover slab.

This piling will serve as a permanent perimeter foundation, carrying the vertical basement loads, whilst the new concrete basement formed within will serve as the remanent retaining structure, as such the concrete basement shell will be designed to be stiff, sufficient to limit ground movement accordingly.

Specialist piling designer's advice has been sought before finalising the scheme for planning. This has confirmed that the appropriate techniques and arrangements, and pile sizes, are appropriate to this scheme, and that the currently envisaged upper intermediate regime of lateral propping will afford a robust temporary retaining system as a whole.

6.1.3 HEAVE PROTECTION

The nature of the clay soil is such that heave under the excavation will be of enough significance that a heave protection mat is deemed required to be provided under the basement, to enable the soil to expand without over-stressing the slab. As such, allowance is to be made for a heave mat. The basement slab will therefore be designed to resist a hogging moment, which will be equivalent to the crushing load of the heave mat, such that the heave force is not transferred to the structures.

6.1.4 WATER PRESSURE AND CONTROL

The clay soils will effectively be contained by spanning across the gaps between the piles, and the low flow rate of any ground water through clay soils means that seepage will be controlled practically with local dewatering pumps where necessary. Water ingress potentially on top of the clay stratum (i.e within the fill material) would be controlled with local trench sheeting or equivalent measures locally, again if found to be necessary.

6.1.5 PROPPING AND DEFLECTION CONTROL

The piling will be designed by a specialist and to a performance which limits deflection laterally in response to the earth and dynamic loads imposed outside of the excavation. The performance specification will require the piling selection to be limited such to ensure no structural damage. The piling will be embedded into the earth beneath the extent of the excavation to ensure lateral resistance at the toe of the wall, and propped at the top, and at intermediate levels, to ensure no more than 4m of vertical span, again to limit lateral deflection.

Once underpinning and piling is complete, a top level of propping can be installed, and excavation can commence for the new basement. Temporary lateral propping will also be installed at an intermediate level, once excavation reaches mid-depth, to resist thrust from the externally retained earth. Internal bearing piles will be broken down as the excavation progresses, saving those that are supporting temporary vertical props to the facade in particular, which will be left as free-standing columns inside the excavation void, until the new basement cover slab and transfer structure and internal columns are formed to take over the support function.

6.1.6 CONCRETE BASEMENT SHELL

The 300mm thick concrete walls will provide against the piled walls and underpin faces, to provide the permanent structure. The floor slab will form a full-continuity enclosure, attributing stiffness and integrity, and forming a water-tight shell which may have a water-tight additive such that the structure provides an integral barrier to ground water, in conjunction with a waterproof membrane and/or a drained cavity system, which will be architecturally defined, although a Grade 1 or 2 basement waterproofing strategy to a car lift is considered suitable.

The cover slab will be fixed and formed to be continuous with the earlier-formed capping beam to the retaining wall, so as to empty the piled temporary retaining perimeter wall as a permanent vertical foundation.

6.1.7 BASEMENT WATERPROOFING STRATEGY

The basement will be designed to a minimum of Class 2 to BS8102 (see below table for an extract of the standard). The basement walls will be lined with a reinforced concrete wall to give a flat working surface and take up the pile tolerances. The waterproof membrane and/or the drained cavity protection would be provided inside this line.

Grade	Example of use of structure[A)]	Performance level
1	Car parking; plant rooms (excluding electrical equipment); workshops	Some seepage and damp areas tolerable, dependent on the intended use[B)] Local drainage might be necessary to deal with seepage
2	Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas	No water penetration acceptable Damp areas tolerable; ventilation might be required
3	Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres	No water penetration acceptable Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use

A) The previous edition of this standard referred to Grade 4 environments. However, this grade has not been retained as its only difference from Grade 3 is the performance level related to ventilation, dehumidification or air conditioning (see BS 5454 for recommendations for the storage and exhibition of archival documents). The structural form for Grade 4 could be the same or similar to Grade 3.

B) Seepage and damp areas for some forms of construction can be quantified by reference to industry standards, such as the ICE's *Specification for piling and embedded retaining walls* [1].

[TABLE 1] GRADES OF WATERPROOFING PROTECTION WITHIN A BASEMENT (EXTRACT TAKEN FROM BS8102)

6.1.8 HIGHWAYS

The front of the property is adjacent to the public highway. The surcharge used in the design is based on the Highways Agency Design Manual for Roads and Bridges Volume 1, Section 3, Part 14. Values of HB loading of 12.0kN/m2 or HA loading of 10.0kN/m2 are to

be considered. The proposed front retaining wall will therefore be designed to resist these forces.

6.2 PARTY WALL MATTERS

The proposed development falls within the scope of the Party Wall Act 1996. Procedures under the Act will be dealt with in full by the Employer's Party Wall Surveyor. The Party Wall Surveyor will prepare and serve necessary notices under the provisions of the Act and agree Party Wall Awards in the event of disputes. The Contractor will be required to provide the Party Wall Surveyor with appropriate drawings, Method Statements and other relevant information covering the works that are notifiable under the Act. The resolution of matter under the Act and provision of the Party Wall Awards will protect the interests of all owners.

The scheme for 77 Avenue Road will be developed so as not to preclude or inhibit similar, or indeed any, works on the adjoining properties in the street. The Surveyors will verify this as part of the process under the Act.

6.3 DESIGN CODES

The following design codes will be followed during the detailed design stage:

The Building Regulations 2010 - Approved Document A

- BS 648 - Weights of building materials
- BS 5950:1 - Structural use of steelwork in building
- BS 5268 - Structural use of timber
- BS 5628-1:2005 - Code of practise for the use of masonry
- BS 6399:1 - Loadings for buildings (Dead and imposed loads)
- BS 6399:2 - Loadings for buildings (Wind loads)
- BS 8000:Section 2.2:1990 - Workmanship on building sites
- BS 8002 - Earth retaining structures
- BS 8004 - Foundations
- BS 8102 - Protection of structures against water from the ground
- BS 8110:1 - Structural use of Concrete

7. CONSTRUCTION METHODOLOGY

7.1 SEQUENCE OF WORKS

The outline construction sequence and temporary works assumed in the design and described in this report will be superseded by the Contractor's construction proposals, although this report presents the general methodology that is to be followed, in order to achieve the proposed constructions as safely and conventionally as the building form will permit. The Contractor will be required to provide full proposals, method statements and calculations to the engineer prior to the commencement of any works on site and these will be considered in conjunction with the permanent structures and verified as suitable before the works are implemented.

The appointed contractor will be required to provide a detailed works sequence with their tender submission. An outline sequence of the substructures works is likely to be as follows:

- Secure site, erect hoardings and protection fences initially to tree root protection areas
- Commence piling to rear garden by accessing through the existing garage
- Progress with enabling works: strip-out and demolition works. Detailed sequence by specialist contractor. Remove debris from site via the highway, in accordance with agreed management plan
- Underpin north boundary wall to 1.2m below ground, in mass concrete
- Underpin south boundary wall in 3 drops down to 8m below ground, in mass concrete
- Underpinning to be by strict 1,3,5,2,4 sequence with no more than 20% of existing walls being underpinned at any one time
- Pile the perimeter of the proposed basement, and the internal piles, from a piling mat laid upon existing ground level
- Break perimeter piles to the required level and form RC capping beam
- Provide wailings and lateral props to the pile heads/capping beam, and to underpinned boundary walls
- Progress excavation, providing de-watering pumping as necessary
- Once excavation has reached full depth, break down and prepare all internal bearing/ tension piles, and form pile caps/ground beams
- Lay internal drainage and construct manholes
- Lay sand blinding and heave mat
- Arrange reinforcement for sub-basement slab then cast concrete with kickers for all structural perimeter and internal walls containing a water-stop bar
- Attach wall reinforcement to starter bars from kickers on all perimeter and internal walls then cast concrete walls up to immediate level
- Remove intermediate props then repeat process to cast upper basement slab then rest of walls to final level. Upper props to remain
- Erect formwork for suspended ground floor slab, lay reinforcement and cast concrete
- Once cured, remove temporary upper level props

In following this sequence, at all times during the formation of the lower ground floor the perimeter retaining walls would be fully restrained, thus affording protection to the boundaries.

The resulting lower ground floor substructure would form a stiff and robust restraint to all of the neighbouring boundaries, and the podium presented for a base to the superstructure.

7.2 MOVEMENT CONTROL

The techniques proposed are proven to produce minimal or negligible movement effects to the party walls, and the deflection of the retaining walls can be practically limited so as to avoid disturbance to the retained ground.

It has been demonstrated that the excavations made and the works being conducted using normal techniques it is practical to achieve a level of 1 [very slight damage] on the Burland Scale.

A heave response, due to the relatively minor overburden relief, is not considered to represent a practical risk, however heave mats under the basement slabs against the ground are to be used, to ensure that the majority of the heave forces are not passed into the structure and foundations.

7.3 MONITORING OF ADJACENT STRUCTURES

It is proposed that the integrity of the adjacent properties is safeguarded by a system of movement monitoring. The Contractor shall appoint a specialist survey company to establish monitoring positions (targets) to key elements of the neighbouring buildings as deemed required.

The external facades and Party Walls will be monitored at these positions and the targets shall be firmly attached to allow 3D location measurement for the duration of the work, to a continuous and uninterrupted accuracy of +/- 1mm. Suitable remote reference bases unaffected by the works will be adopted.

Two series of baseline readings shall be taken before the work begins then readings shall be taken shortly after the start of excavation then at weekly intervals during the basement construction until the RC shell is complete and propped after which point the frequency will be reduced to then a final reading 6 months after completion.

All measurements will be plotted graphically, clearly indicating any movements over time. Results shall be submitted and circulated to all relevant parties including the appointed Party Wall Surveyors within 24 hours of being measured.

Trigger levels are to be agreed. In the event of a ‘red’ value being reached the Contractor must immediately stop, make safe the works, notify the Party Wall Surveyors and only recommence when agreed by the appointed Surveyors.

8. TEMPORARY WORKS

Temporary works design and coordination will be carried out by a suitably qualified and experienced specialist and full design details, including drawings and calculations, must be submitted to the structural engineer for comment. This specialist will be appointed by the Contractor who will be responsible for the design, erection and maintenance of all temporary works to ensure the stability of the existing structure, excavations and adjacent structures at all times.

Wailings and horizontal props will be provided to the perimeter retaining walls prior to excavating the lower ground floor, to contractor design. Once the RC lining structure and capping slab have been cast and cured to each area, props may be removed to these areas, in a sequence as agreed with the structural engineer prior to implementation of the works.

Monitoring points are to be installed to agreed areas, which will allow movement during the excavation to be assessed for compliance against maximum allowable, and trigger levels within the structural specification.

9. POTENTIAL IMPACT UPON LOCAL ENVIRONMENT

The underpinning, contiguous piled walls, temporary propping construction method reduces the amount of potential ground movement and so minimises the effects of settlement and movement adjacent structures to ensure that structural damage will not be permitted to occur.

Along with this, the appointed Contractor shall undertake the works using good practice in accordance with the structural design following all the agreed methods of construction and required temporary works, such as horizontal propping of the piles. In practice some minor settlement is possible but this will not be permitted to be worse than 'Category 2, aesthetic' according to BRE Digest 251 guidelines.

The design of the works will consider the environmental forces swell as the response of the structural elements as their collective whole, and will be carefully designed to have the required stiffnesses to remain within acceptable deflection constraints. The coordination of sequencing, and the checking of compliance of temporary works will minimise potential for movement. The minimum movement that does occur will be defined by acceptable limits, which would be considered as being accommodated within the elasticity of the superstructures.

This overall approach considers all of the potential risks, and ensures that the excavation and construction of the proposed works will not affect the structural integrity of this property, neighbouring structures, roadways and public utilities.

9.1 NOISE, DUST AND VIBRATION

All demolition and construction works will be carried out by a competent and qualified contractor, who will be required to accord with the Considerate Constructors Scheme, and take all necessary measures to minimise the short term disturbances in terms of noise, vibration and dust which might impact on the local environment and the neighbouring residents and businesses.

The following measures and actions will be implemented:

Noise – Neighbours will be notified in advance of noisy activity, in particular where these are on or near boundary structures. Where there is particular sensitivity, activity will be restricted to 09:00-17:00 Monday to Friday.

In all cases where possible, electrically operation tools will be used in preference to engine driven machinery.

The use of site radios will be considered carefully in terms of their locations and volume levels, and if any neighbour complaints are received, a firm prohibition of their use will be enforced.

Vibration – While the use of percussive, powered machinery upon hard construction materials in many situations will likely give rise to inevitable vibration, wherever possible and in accordance with CCS Code, unnecessary vibration will be avoided and mitigated. This will take the form of careful planning and consideration of the hardness of the material being demolished, and the works planned and notified accordingly, and

where considered particularly unavoidable, the 09:00-17:00 working hours principle be observed.

Dust – Most of the works will be internal and so can be relatively easily isolated from becoming airborne and dispersing to neighbours and the local environment. External activity shall be contained as best as possible using suitable hoardings and sheeting.

Materials stored externally would be covered or contained to avoid wind and weather disturbance to granular and particulate materials. Structural concrete will be typically mixed off-site and delivered, but where small quantities or mortar are to be site mixed, this can be done in an enclosed area to limit cement dust from becoming airborne.

Deliveries of materials shall be covered where potential for dust is prevalent. Waste skips and excavated soils are to be covered whenever practicable.

For activities that generate dust, surface wetting-down, and water misting will be used to suppress dusting. Rotary cutters will use water as a dust suppressant.

Housekeeping – Shared driveways, external pavements on the site and in front of, will be regularly swept, and should vehicles or windows become soiled, the contractor shall arrange cleaning as the neighbour so desires.

9.2 DRAINAGE

The development is a new build as direct replacement of an existing single family dwelling house. There will be an increased discharge of surface water into the existing public sewer, as a consequence of an increase in drained surface area.

In order to control the flow into the public sewage infrastructure, the surface water drainage will be attenuated using a tank, as provisionally designed by specialist of some 12 cubic metres, located to the rear of the basement excavation. The location is shown on the site plan, between the protected tree root zones. The attenuation tank will be pumped to a shallow drainage run, to flow along the north side of the building, to the existing outfall manhole to the forecourt (exact location subject to survey).

9.3 TREES

An arboricultural survey has been carried out, as provided by Montagu Evans as part of the submission of information to the Eyre Estate. It is an acknowledged condition of the planning application to adhere to the guidances set out in the report, relating to the measures to be taken to ensure that the root protection zones are suitably fenced off or temporarily paved to prevent ground-level activity from compromising the roots.

10. SUMMARY

During construction, lateral and vertical stability of the building will be maintained by directly underpinning and temporarily propping, such that no significant adverse movement is expected.

Environmental impacts have been assessed, and the response to geotechnical and hydrological aspects have been considered. The proposals are deemed to not have any adverse impact in this respect.

Once complete, the new structure will provide a robust and secure support for both new and existing structure without detriment to the overall stability of the building or adjoining property.

APPENDICES

APPENDIX A: DRAWINGS