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168 HAVERSTOCK HILL

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BASEMENT IMPACT ASSESSMENT (BIA) & SITE INVESTIGATION REPORT

32399/R/001/RJM

October 2014

APPROVAL SHEET AND FOREWORD




168 HAVERSTOCK HILL

LONDON

NW3 2AT

**BASEMENT IMPACT ASSESSMENT (BIA)
&
SITE INVESTIGATION
REPORT**

Report Ref: 32027/R/001/RJM

Report Status: Final	Date of Issue: October 2014
	Signature
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Checked and Approved	 P G Hicks 

This report has been prepared with all reasonable skill, care and diligence within the terms of the contract with the Client and within reasonable limitations of the resources devoted to it by agreement with the Client.

This report is confidential to the Client and Knapp Hicks & Partners Limited accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

This report shall not be used for engineering or contractual purposes unless signed by the author and the approver and on behalf of Knapp Hicks & Partners Limited, and unless the report status is "Final".

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168 HAVERSTOCK HILL

LONDON, NW3 2AT

BASEMENT IMPACT ASSESSMENT (BIA) REPORT

1 INTRODUCTION

Knapp Hicks and Partners Limited (KHPL) have been instructed to undertake the first stage of a Basement Impact Assessment (BIA) for 168 Haverstock Hill, London NW3, to be prepared in accordance with London Borough of Camden guidance document CPG4. A site investigation was also undertaken to complement the BIA, and the findings are included and assessed in this report.

Due diligence and care has been used in the preparation of this report, however the contents should be read with due regard to the time and financial resource made available to compile this report.

Whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there may be conditions at the site that have not been disclosed by the available records and could not therefore be taken into account. In particular, it should be noted that groundwater conditions vary due to seasonal and other effects and may at times be significantly different from those measured by intrusive investigations. No liability can be accepted for any such variations in these conditions.

In addition, any recommendations made are specific to the development as detailed in this report, and no liability will be accepted should they be used for the design of alternative schemes without prior consultation with KHPL.

Site Description

The site is located at 168 Haverstock Hill, London NW3 at approximate grid reference TQ274850. At this location, Haverstock Hill is orientated NW-SE and the ground level falls gradually towards the south east.

No168 is a semi-detached 4-storey house with a semi-basement ground floor which was extended in 2004/5. The front garden is paved with York Stone and is used for parking. There is a lightwell to the front and a lightwell to the side which also serves a side entrance to the ground floor. To the rear there is an open terrace which extends the full width of the ground floor and towards the garden, and a larger garden is present beyond. The terrace is surfaced with decking, with concrete below.

The rear garden is mainly lawn, with a small water feature to one side. There are a number of mature trees along the boundaries but these are located in neighbouring properties. The detail of these trees is not known.

The terrace is decked and the surface is approximately 1.0m below the side passage and the rear garden.

A pathway extends along the southeast side of the house and is relatively level along its length. The pathway is approximately 1.23m to 1.31m wide.

No168 adjoins the house to the northwestern side which is of similar construction. The overall site is rectangular in shape with approximately 10.5m length frontage onto the northeastern side of Haverstock Hill. The footway at this location is wide, being approximately 4m from kerbside to the boundary wall. The site runs approximately 42m SW-NE, and is parallel with neighbouring residential properties.

The existing ground level at 168 Haverstock Hill is approximately 64.0mAOD.

No166 to the south east is also similar to No168 but the rear garden is overgrown. It was noted that the soils have been part excavated to the rear of No166 and, where these are exposed, they seem to consist of a gravelly silty CLAY.

Proposed Development

A set of plans and sections for the existing house layout and the proposed development is appended to this report.

It is proposed to create an extra basement area below the existing house and the existing rear terrace/patio which will contain a studio, wine cellar, cinema room, gym and sauna. The ground floor will remain the same size as existing. A swimming pool is proposed in the rear part of the basement. The pool will extend to an extra storey of depth. The pool will not extend beyond the extents of the existing ground floor terrace and will be approximately 7.4m length x 3.1m width and, therefore, does not extend to the full width of the basement.

To the rear of the property, the basement will extend to approximately 12m from the rear site boundary.

It is not anticipated that any trees will affect or be affected by the proposed scheme but it is recommended that the mature trees located in the neighbouring gardens are assessed by a suitably qualified arboriculturalist prior to commencement of construction so that Root Protection Areas etc are confirmed and may be clearly marked out.

Geology & Other Relevant Information

The 1:50,000 Geological Map (Sheet No. 256: North London) indicates the site to be underlain by London Clay. However, a thin layer of made ground is expected given the history of development on the site and surrounding area, and it is also expected that there will be around 1m to 2m depth of clayey, locally gravelly Head Deposits overlying the London Clay.

The above geology has been confirmed on site in boreholes which are described in the following section (See attached borehole records in Appendix C).

The findings of a Groundsure Report and a review of historic maps of the area surrounding the site are provided in Section 3 of this report.

2. SITE INVESTIGATION

Scope of Investigation

A site investigation was carried out in July 2014 and consisted of 2 No window sampler boreholes.

Standpipes were installed in both boreholes and groundwater levels were measured 1 week after their installation.

Window sampler borehole WS1 was located in lawn in the rear garden and was extended to a depth of 7.00m. Borehole WS2 was carried out at the front of the house by hand augering, and extended to 4.00mbgl. A paving slab was lifted to facilitate this. Ground level at WS2 is estimated to be around 350mm below the ground level at WS1.

All samples were logged by a geotechnical engineer as the boreholes were advanced, and pocket penetrometer determinations of undrained shear strength were recorded at regular depth intervals.

Geotechnical laboratory testing consisting of natural moisture content determinations, soil index property tests and particle size distribution gradings were undertaken on representative samples obtained from the boreholes and these have been assessed in relation to the proposed scheme.

Borehole logs are provided in Appendix C along with laboratory test results and graphs of the pocket penetrometer and moisture contents plotted against depth.

Ground Conditions

The boreholes confirmed the expected geology of topsoil and thin made ground resting on a thin layer of clayey sandy GRAVEL Head Deposits.

The Made Ground typically extends to between 0.80mbgl (WS1) to 0.95mbgl (WS2) and is a firm clay with occasional fragments of gravel of brick and flint. In WS2 a layer of brick fill was present at the base of the made ground, which probably reflects the site level when the house was originally constructed.

The Head Deposits were proved in WS1 only, i.e. to the rear of the house. They were encountered as a layer (0.80m to 1.22mbgl) of soft fine sandy SILT/CLAY which became more damp with depth before passing into a compact clayey GRAVEL from 1.22m to 1.90mbgl. The gravel is medium to coarse subrounded of flint and was recovered relatively dry.

From 1.90mbgl in WS1 and 0.95mbgl in WS2, both boreholes proved London Clay which became more stiff with depth. The results of pocket penetrometer measurements are presented in Appendix C. Recovery of samples of the London Clay in BH WS1 was hampered by ongoing groundwater seepage as the borehole was advanced.

Occasional fine rootlets were recorded in both boreholes: to 2.90mbgl in WS1 and to 1.75mbgl in WS2 in the London Clay. The natural moisture content is generally sufficiently high to suggest that significant desiccation is not present when compared against commonly used measures such as Plastic Limit+2%, and does not extend to depths which would affect the basement although the structural engineer should consider the effects of existing tree species and heights when designing the basement structure. Lower moisture contents encountered in WS1 are closely associated with the gravelly Head.

Archive records for recent works to extend the ground floor indicate that the existing foundations to the original walls to the front of the house will consist of a brick masonry with/without corbel which are likely to be founded on concrete strip foundations, founded either on natural clay strata or on a layer of compacted fill resting on the natural strata. To the rear of the house, foundations are expected to be a combination of trench fill mass concrete and reinforced concrete.

Groundwater

Groundwater was encountered in WS1 in the rear of the garden as a slow seepage. However as the borehole was advanced, there was generally a rapid inflow to fill the base of the hole with 200mm depth of water on removal of the sampling tubes.

No groundwater was encountered in WS2 as the borehole was advanced.

Standpipes were installed as follows:

WS1 – 2No to 6m and 2m respectively with a bentonite seal installed from 2.20m to 3.20m to try and separate the two.

WS2 – 1No installed to 3.92m depth.

A monitoring visit was carried out on 22/7/2014 and recorded the following groundwater levels.

Borehole	Depth of standpipe (mbgl)	Groundwater Level (mbgl)
WS1	6.0m	1.32m
WS1	2.0m	1.28m
WS2	1.28m	1.83m

Based on the above information it is considered likely that groundwater will be encountered during the basement excavation and construction works. The groundwater level in the deeper standpipe in WS1, and in WS2, was measured in standpipes installed into the London Clay. Given the low permeability of the London Clay, it is possible that the groundwater may have seeped into the holes from the Head and Made Ground at higher levels, but it is also possible that seepage could be occurring from more permeable sandy laminations within the Clay.

Appropriate further investigations and design options to mitigate against the groundwater are discussed at greater length in other sections of this report (Please refer to CPG4 Questionnaire C, Q13 in Section 3 of this report).

Classification for Buried Concrete

Tests from nearby sites indicate that ground conditions contain locally elevated levels of sulphate and therefore a Design sulphate class of DS-3 and an aggressive concrete classification of AC-3 are recommended for concrete in contact with the ground. This concrete class will be confirmed in due course.

3. BASEMENT IMPACT ASSESSMENT (STAGE 1 – SCREENING)

The London Borough of Camden has ruled that all new basement developments within the Borough are subject to the assessment process described in CPG4 Basements and Lightwells, adopted April 2011, with draft amendments added in 2014. This policy has been developed to ensure that permission will only be granted for new basements which do not:

- Cause harm to the built and natural environment and local amenity;
- Result in flooding; or
- Lead to ground instability

This is a new basement for a property which currently does not have one. It will occupy the full width of the semi-detached property, and will extend out below the existing terrace to the rear of the house. It is proposed to install additional living space including a swimming pool which will occupy a smaller footprint and extend to greater depth below the proposed basement.

The Basement Impact Assessment contains five stages in total:

- Stage 1 – Screening
- Stage 2 – Scoping
- Stage 3 – Site investigation
- Stage 4 – Impact assessment; and
- Stage 5 – Review and decision making

This report addresses the first stage in the process i.e. screening of the proposal and is supplemented by the findings of recent investigations of the existing structure (i.e. Stage 3) and recommendations for the construction methodology (i.e. Stage 2). At this stage, the guidance requires any proposed application to make an assessment on the impact of the development on (a) groundwater and surface water flows, and (b) land stability.

The screening process is described in Appendix E of CPG4 and includes 3 flowcharts as follows:

- Surface flow and flooding
- Subterranean (groundwater) flow
- Slope Stability

Potential impacts linked to the screening flowcharts are provided in CPG4 Appendix F.

Each of the above flow charts and responses to the questions asked are presented on the following pages of this report.

By way of an introduction to the site and to provide a review of the site setting in relation to the surrounding environment, we have reviewed a Groundsure Report for the area in which the site is located. The findings of this review are summarised on the following page and are intended to serve as an introduction to the CPG4 flowcharts which follow.

Review of GroundSure Report Reference EMS-235188 312764, dated 27 Jan 2014

- No records of artificial / made ground on site.
- No records of landslips on site.
- No Radon Protection Measures are required.
- Northern Line tunnels pass underground close to the site but we understand these are deep lines and are likely to be located well below the depth of influence of the proposed basement.
- Moderate risk of shrink-swell clays.
- Geology is confirmed as London Clay with Claygate Member strata expected approximately 500m NW.
- London Clay is an unproductive strata (non-aquifer).
- There are no records of Environmental Permits, Incidents or Registers within 50m
- There are no records of landfills, waste sites or other landuse within 50m
- There are no records of abstraction licences or Source Protection Zones which will affect the site
- There is no Groundwater Vulnerability and Soil Leaching Potential ON SITE
- There are no EA recorded river entries or surface water features within 250m of site
- There are no EA Zone 2 or Zone 3 floodplains within 250m of site
- BGS have assessed there is no groundwater flooding risk to assess, although confidence rating is variable.
- There are no Environmentally Sensitive Sites within 250m of site

Review of Historic Maps

1866	Site is occupied with the existing house since this date which is the earliest map provided with the Groundsure Report. A tree is shown in the back lawn and mature trees are present in the grounds of Haverstock Lodge to the rear.
1915-16	Haverstock Lodge has been replaced to the rear with housing and other development is shown around the area.
To present	Ordnance Survey plans at 1:2500 and 1:10,000 show very little change to the site since 1915. Some informal enquiries to London Underground staff have indicated that the WW2 deep underground shelters at the junction of Haverstock Hill and Upper Park Road, do not extend below the site.

A. Surface flow and flooding screening flowchart

Question		Yes (Y), No (N), Unknown (U) (see also notes provided at base of table)
1.	Is the site within the catchment of the pond chains on Hampstead Heath?	N
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?	N
3.	Will the proposed basement result in a change in the proportion of hard surfaced / paved external areas?	N
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?	N
5.	Will the proposed basement result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses?	N
Notes		
<p>Q1 - By inspection of Figure 14 of CPG4,</p> <p>Q2 – Existing surface water pipes are not shown on the survey but it is unlikely that this development will materially change existing routes. Existing sewers on site are approximately 2.9m deep. The main Thames Water combined sewer invert below Haverstock Hill is approximately 5mbgl</p> <p>Q3 – The footprint of the proposed development will not extend beyond the existing area occupied by roof or impermeable hardstandings (i.e. the existing ground floor terrace) and therefore it will not change the impermeable/permeable area ratio for the site.</p> <p>Q4 – Note: On CPG4, Figure 15, Haverstock Hill is not shown as having flooded during the flooding events of 1975 or 2002.</p>		

B. Subterranean (groundwater) flow screening flowchart

Question		Yes (Y), No (N), Unknown (U) (see also notes provided at base of table)
1a.	Is the site located directly above an aquifer?	N
1b.	Will the proposed basement extend beneath the water table surface?	Y
2.	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	N
3.	Is the site within the catchment of the pond chains on Hampstead Heath?	N
4.	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	N
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)?	N
6.	Is the lowest point of the 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?	N
Notes		
<p>Q1a – The site is located on the London Clay which is a non-aquifer.</p> <p>Q1b – Groundwater was encountered above the proposed depth of the basement in recent site investigation holes and construction works at the neighbouring property. However, this is likely to be a perched water table overlying the relatively impermeable London clay which will be encountered at between 1.0m and 2.0m below existing ground level. Recommendations are provided elsewhere in this document. Please refer to notes on Questionnaire C, Q13 for recommendations for further investigations to confirm the temporary works design, the Construction Method Statement, and requirements for dewatering.</p> <p>Q2 - A 5m deep sewer runs the length of Haverstock Hill in front of the property, and the sewer on site is approximately 2.9m deep. There are no records of existing water courses beneath the site.</p> <p>Q3 – By inspection of Figure 14 CPG4, the site is approximately 1km south east from the Hampstead Heath Extension Chain Catchment</p> <p>Q4 – The proposed development will not change the impermeable/permeable area ratio for the front of the site. To the rear, the basement will not extend beyond the existing terrace.</p> <p>Q5 – There will be no significant change to the drainage arrangements for the site</p> <p>Q6 – There are no surface water features in the vicinity of the site.</p>		

C. Slope stability screening flowchart

Question		Yes(Y),No(N), Unknown (U) (see also notes provided at base of table)
1.	Does the existing site include slopes, natural or manmade greater than 7deg. (approx. 1V in 8H)?	N
2.	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7deg.?	N
3.	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7deg.?	N
4.	Is the site within a wider hillside setting in which the general slope is greater than 7deg.?	N
5.	Is the London Clay the shallowest strata at the site?	N
6.	Will any trees be felled as part of the proposed development? Are any works proposed within any tree protection zones?	N
7.	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	N (Moderate Risk)
8.	Is the site within 100m of a watercourse or a potential spring line?	N
9.	Is the site within an area of previously worked ground?	N
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 construction?	N N
11.	Is the site within 50m of the Hampstead Heath ponds?	N
12.	Is the site within 5m of a highway or pedestrian right of way?	N (Approx 6.5m)
13.	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Y
14.	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	Y
Notes		
Q1 – See site plans provided with this report. The topography surrounding the site is gently		

sloping towards south east. The ground floor level of the existing house is approximately 1.0m below road level.

Q2 – There will be no changes to the surrounding topography.

Q5 – Based on available site investigation records and reference to the 1:50,000 Geological Map, the geological profile is expected to consist of variable depths of made ground and/or Head, over London Clay. The formation level for the proposed basement is expected to penetrate the London Clay by a minimum 3.0m at the front of the property and by a minimum 1.2m to the rear. Excavation of the swimming pool will penetrate the London Clay by greater depth. The London Clay is expected to be around 50m thickness or more at this location.

Q6 – Some mature trees are present in the gardens to the rear of the site. The Root Protection Area (as derived using BS5837:2005, Trees in relation to construction) will be confirmed in due course but the proposed scheme is not expected to impinge upon it.

Q7 – We are unaware of any shrink-swell subsidence or evidence thereof on site or in the area of the site.

Q8 – There are no Environment Agency flood plains, river network entries or surface water features in the vicinity of the site.

Q9 No previous workings are reported on or near the site.

Q10 - Groundwater was encountered as seepages in site investigation holes undertaken to the rear of the property. The seepages occur from strata, and possibly land drainage, overlying the London Clay and it is considered that there is a perched water table overlying the London Clay. After a period of monitoring, the groundwater level settles at 1.28m at the rear to 1.83mbgl at the front.

It is considered that dewatering will be necessary during construction, probably in the form of pumping from a sump in the base of the excavation.

Prior to commencement of construction, it is recommended that trial excavations are dug down to formation level to confirm the rate of inflow to open excavations and to assist with selection and design of appropriate temporary works and long term waterproofing measures to control the groundwater.

Q12 – The site is approximately 6.5m from the public footway alongside Haverstock Hill. Subject to the findings of a trial hand-dig, it is anticipated the basement will be excavated in a minimum of 2 stages, i.e. excavate to a pre-arranged depth and form that section of wall before commencing excavation to greater depth. It is considered that this method of construction will be sufficient to allow the construction of the scheme, and for maintenance of the highway and footway alongside.

Q13 – Basements of similar extent have been approved and constructed at similar properties nearby and the proposed scheme is expected to have minimal impact upon neighbouring properties on condition that a Construction Method Statement is prepared by a competent individual and strictly adhered to during construction. It will be necessary to undertake some underpinning of the shared wall with No170 prior to commencement of construction of the proposed basement at No168. Underpinning of No166 may also be required, in particular the 2-storey extension which butts up to the site boundary, and details for this should be prepared based upon detailed levels.

Knapp Hicks consider that it is feasible that the proposed scheme can be constructed by a competent contractor without causing damage to adjacent properties and infrastructure. However, this is conditional on the Basement Contractor, and their structural engineers, giving full consideration in their design and construction methodology to the location of the site, and all neighbouring properties and infrastructure, in relation to their proposed method of basement construction, the form of construction of all affected or potentially affected structures and

infrastructure, and all appertaining ground and groundwater conditions.

It is the responsibility of the basement contractor to develop appropriate techniques to avoid all adverse effects to neighbouring property. This concurs with the recommendations and advice provided in Camden Planning Guidance Document CPG4: Basements & Lightwells, all related guidance, and the recommendations made in Section 5 of this BIA Report.

Notwithstanding the above statements, this BIA document includes the findings of site investigations undertaken at the time of BIA preparation to help identify the critical issues which might affect the basement construction. The attached cross-sections through the property serve as a Conceptual Model for the scheme and illustrates the following factors which must be taken into consideration:

- 168 Haverstock Hill shares an adjoining party wall with 170 Haverstock Hill which is effectively a similar property.
- The boundary with 166 Haverstock Hill is occupied by a passageway serving the rear of No168, with a boundary retaining wall and the flank wall of No166 separating the 2 properties.
- The geology below the site typically consists of a sequence of up to 1.90m of Made Ground/HEAD deposits consisting of sandy CLAY, firm gravelly CLAY and compact clayey GRAVEL resting on London Clay which is known to extend to greater than 10.0mbgl in this area. The Head/London Clay boundary is expected to be a relatively horizontal boundary, but may undulate. The London Clay was typically stiff, becoming very stiff with depth.
- Groundwater was encountered in the investigations as perched water overlying the London Clay. The London Clay is expected to provide a relatively impermeable formation for the basement.

The detailed method of construction will be prepared in due course by a structural engineer on behalf of a basement contractor but, subject to the findings in 1 to 2 trial excavations to the depth of the basement, we would anticipate that the preferred method of construction will be a 2-stage excavation, with the existing walls being underpinned following a pre-determined sequence of underpins (i.e. Hit and miss as described in the industry standard reference document: Design and construction of deep basements including cut-and-cover structures, Institution of Structural Engineers, 2004).

Following the above method, the first stage of excavation would prove and fully penetrate the London Clay to create an impermeable seal through the overlying and potentially water bearing Head Deposits as described above.

The construction methodology will be required to incorporate measures to ensure that settlement of adjacent and nearby structures is within tolerable limits as defined by the Burland Damage Category Chart (CIRIA C580), as reproduced in CPG4, i.e. Category 2 (Slight) or lower. Such measures must include the following:

- (a) Undertake pre-construction Condition Surveys on potentially affected properties and infrastructure, to include trial pits to confirm details of the foundations to 166 and 170 Haverstock Hill.
- (b) Incorporation of a scheme of movement monitoring of adjacent property and ground levels, with pre-determined checks and controls.
- (c) Design the basement to be water resisting.
- (d) Design the basement to resist uplift from a water table 0.5m below the existing ground level.
- (e) Prior to commencement of construction, it is recommended that trial excavations are

dug down to formation level to confirm the rate of inflow to open excavations and to assist with selection and design of appropriate temporary works and long term waterproofing measures to control the groundwater.

- (f) Based on the findings of (e), consider incorporation a scheme of groundwater investigation and monitoring to identify potential higher permeability water bearing layers along the perimeter of the proposed scheme.
- (g) Incorporate groundwater control measures to address the potential temporary works issues associated with potential water bearing strata. Subject to the findings of (e) and (f), possible options include permeation grouting using cementitious injection or secant piling to create a cut-off around the perimeter of the basement during the underpinning and excavation procedures. As described above, the reinforced concrete underpins and raft floor slab shall be designed to resist water pressure. As previously stated, the effectiveness of this approach should be tested by trials in advance of construction.

Q14 – The site is located close to the Northern Line Underground Railway alignment but the tunnel is considered to be sufficiently deep that the proposed scheme should have negligible impact upon the tunnel.

4. RESULTS OF THE SCREENING PROCESS

The basement has been assessed in accordance with the three flow charts detailed in Appendix E of London Borough of Camden document CPG4 Basement and Lightwells.

Part 3A which considers surface water and flooding issues has raised one issue with regard to the development, which is that potentially the basement may extend below a perched water table. However, subject to the findings of some preliminary full scale excavations, it is anticipated that the situation at No168 can reasonably be dealt with by temporary works measures and incorporation of appropriate water resisting measures in the structure.

Part 3B which covers subterranean (groundwater) flow has returned one potential issue with regard to the development: Groundwater has been encountered in recent site investigation holes above the proposed formation of the basement in adjacent property. It is considered that this can be overcome by sump pumping during excavation and by incorporation of groundwater control / tanking measures in the basement walls and floor. It is recommended that some trial holes be excavated to proposed formation level to check the rate of inflow to excavations, particularly towards the rear of the site, which penetrate deeper than the water levels recorded in nearby site investigation holes. Following these investigations, specialist advice may be sought as required to confirm appropriate groundwater control measures both for the temporary and the permanent works.

Part 3C covers slope stability. The screening flowchart has returned affirmative answers as follows: (1) Question 13 concerning the change in differential depth of the foundations between the new development and adjacent property. Again this can be dealt with through the design of appropriate temporary and permanent works to ensure the stability of the adjacent properties, with an accompanying scheme of monitoring. (2) A London Underground tunnel passes below the site but is considered to be sufficiently deep to be outwith the zone of influence of the proposed basement.

5. CONCLUSIONS AND RECOMMENDATIONS

The basement formation is expected to extend below a perched water table. It is acknowledged that there may be perched water within the made ground, and groundwater may arise from claystones and fissures in the London Clay above the proposed formation level. Groundwater level can also be subject to seasonal and other changes. However, Knapp Hicks propose that, subject to consultation with a reputable basement contractor and the additional measures described in this report, the groundwater and any related ground stability issues may be satisfactorily dealt with by the adoption of appropriate construction methods and adherence to a Construction Method prepared by a competent structural engineer and based on good industry practice for the construction of basements.

It is recommended that the rate of seepage into excavations penetrating to the proposed formation level be confirmed in advance of construction as this information will assist with selection of appropriate waterproofing techniques and decisions on the use of traditional underpinning techniques vs contiguous or secant piling techniques for the basement retaining walls. It is recommended that these investigations include CCTV condition surveys of all public and private sewers passing close to the boundaries of the proposed scheme.

The designer will ensure that appropriate temporary works and control measures are in place to ensure that any movement is detected as it occurs and no party walls with adjacent properties are undermined during the project.

REFERENCES

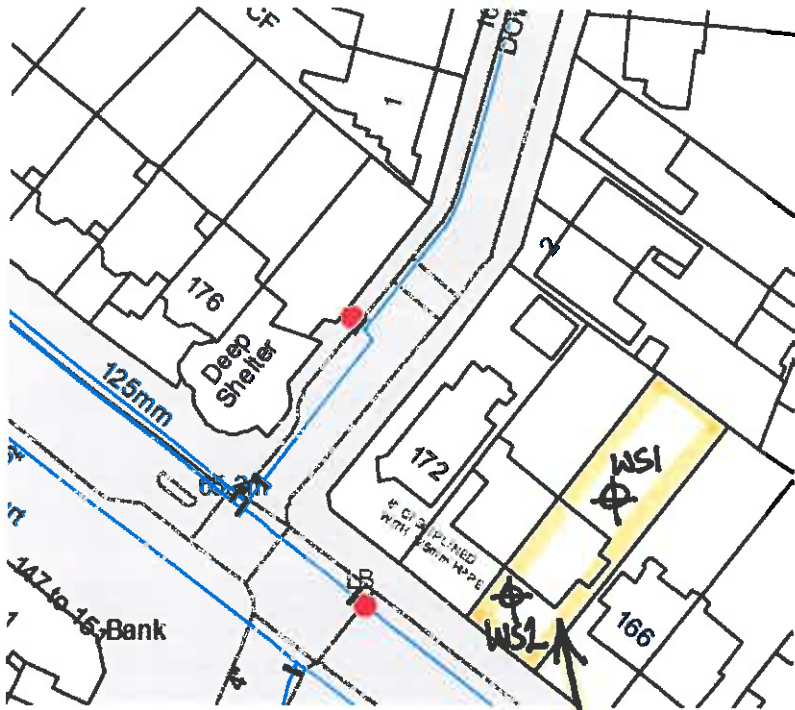
1. Camden Planning Guidance: Basements and Lightwells, CPG4

APPENDIX A

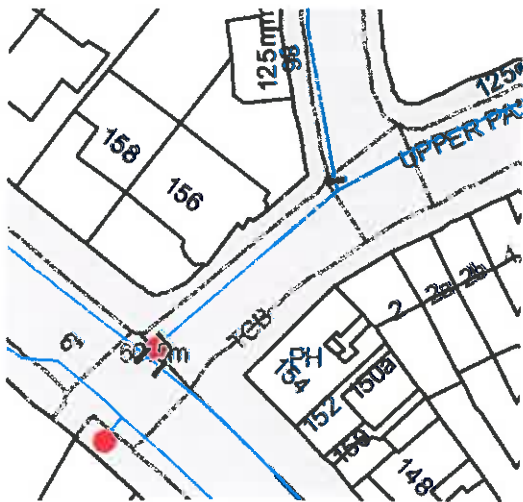
Site Plans & Cross Sections (Existing & Proposed)

- **Site & Borehole Location Plan**
- **Conceptual Ground Models**
- **Existing Plans & Elevations**
- **Proposed Plans & Elevations**
- **Construction Drawings (2004) for previous works for existing Lower Ground Floor Extension & Rear Patio / Terrace**

- **Site & Borehole Location Plan**



⊕ BOREHOLES
JULY 2014.



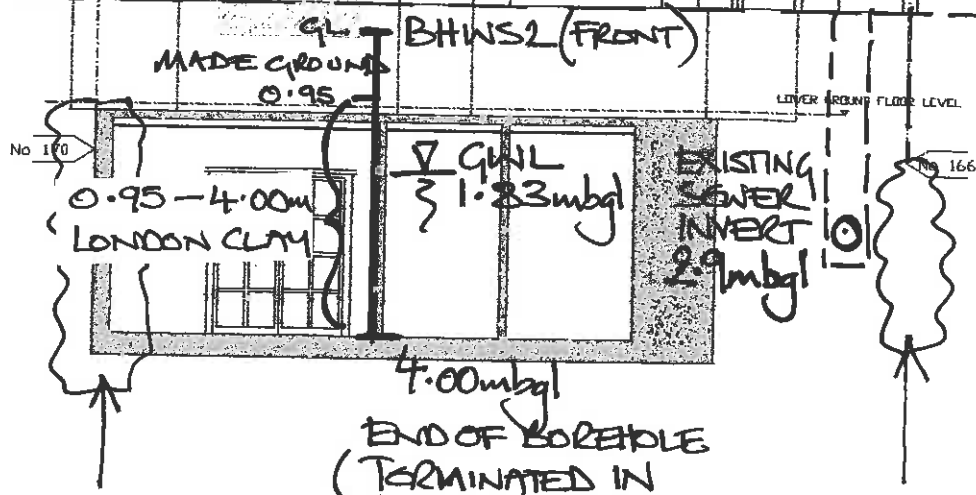
THE SITE :
168 HAYESTOCK HILL
NW3 2AT

- **Conceptual Ground Models**

PROPOSED FRONT ELEVATION



EXISTING GROUND LEVEL



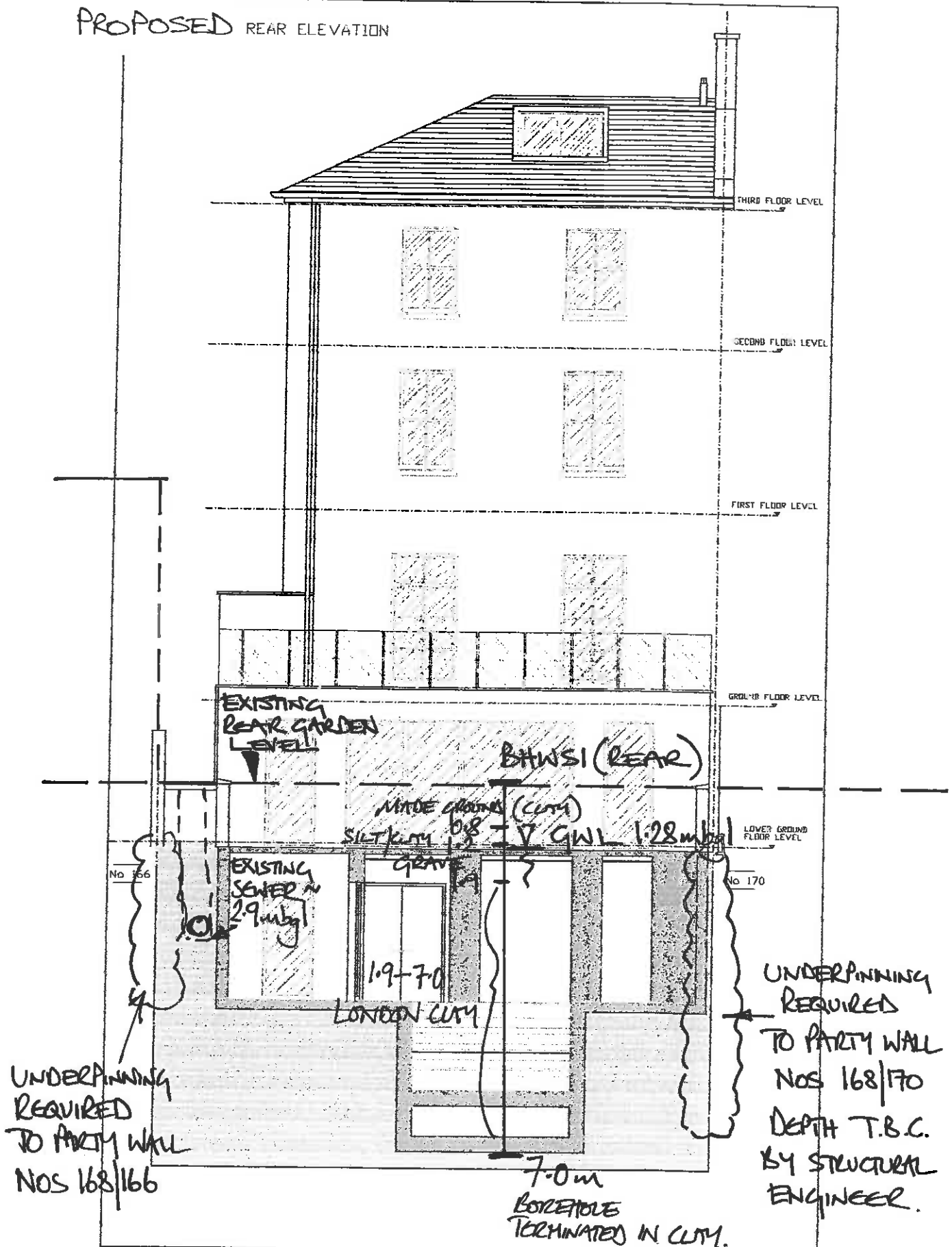
UNDERPINNING REQUIRED TO PARTY WALL NOS 168/170

UNDERPINNING REQUIRED TO PARTY WALL NOS 168/166

Thierry Pain Interior Design 34 RUE DES PETITS CARREAUX 75002 PARIS Email: thierrypaindesign@gmail.com	Project name:	ASSOR LONDON	Number of HOUSE	Level	Phase PROPOSED
	Drawing Description	APS	Plan	FRONT ELEVATION	Scale 1:5000x
	Date	168 HAVERSTOCK HILL			Date 15.03.2014
	Notes				Drawing 312/03-14

CONCEPTUAL MODEL — FRONT

PROPOSED REAR ELEVATION



UNDERPINNING
REQUIRED
TO PARTY WALL
NOS 168/166

UNDERPINNING
REQUIRED
TO PARTY WALL
NOS 168/170
DEPTH T.B.C.
BY STRUCTURAL
ENGINEER.

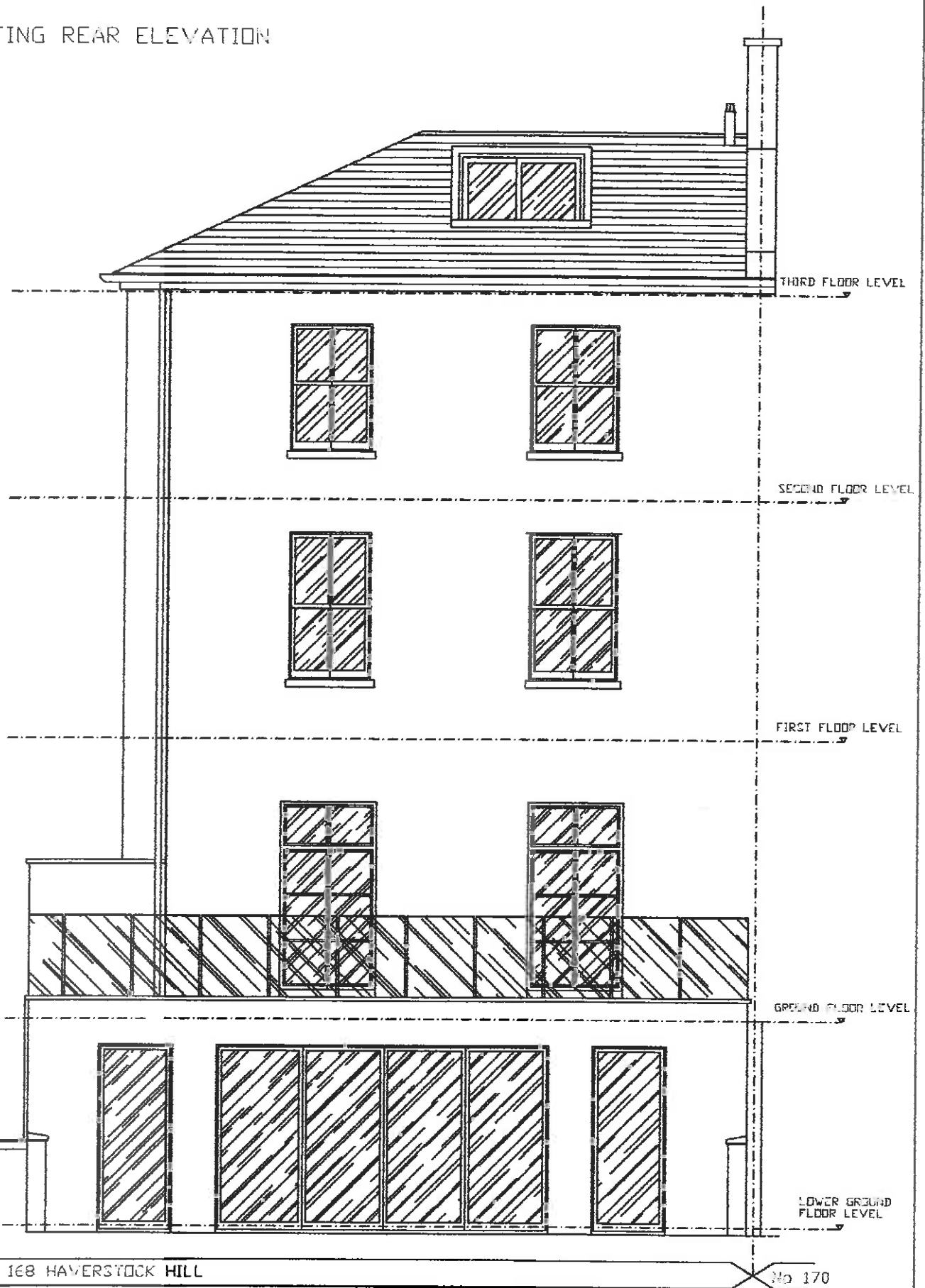
7.0m
BOREHOLE
TERMINATED IN CLAY.

Thierry Pain Interior Design 34 RUE DES PETITS CARREUX 75002 PARIS Email: thierrypaindesign@gmail.com	Project name: ASSOR LONDON	Building: HOUSE	Level: PROPOSED
	Drawing Description: APS	Plan: REAR ELEVATION	Scale: 1:500
Note: 168 HAVERSTOCK HILL		Drawing: 312/03-14	

CONCEPTUAL MODEL (REAR)

- **Existing Plans & Elevations**

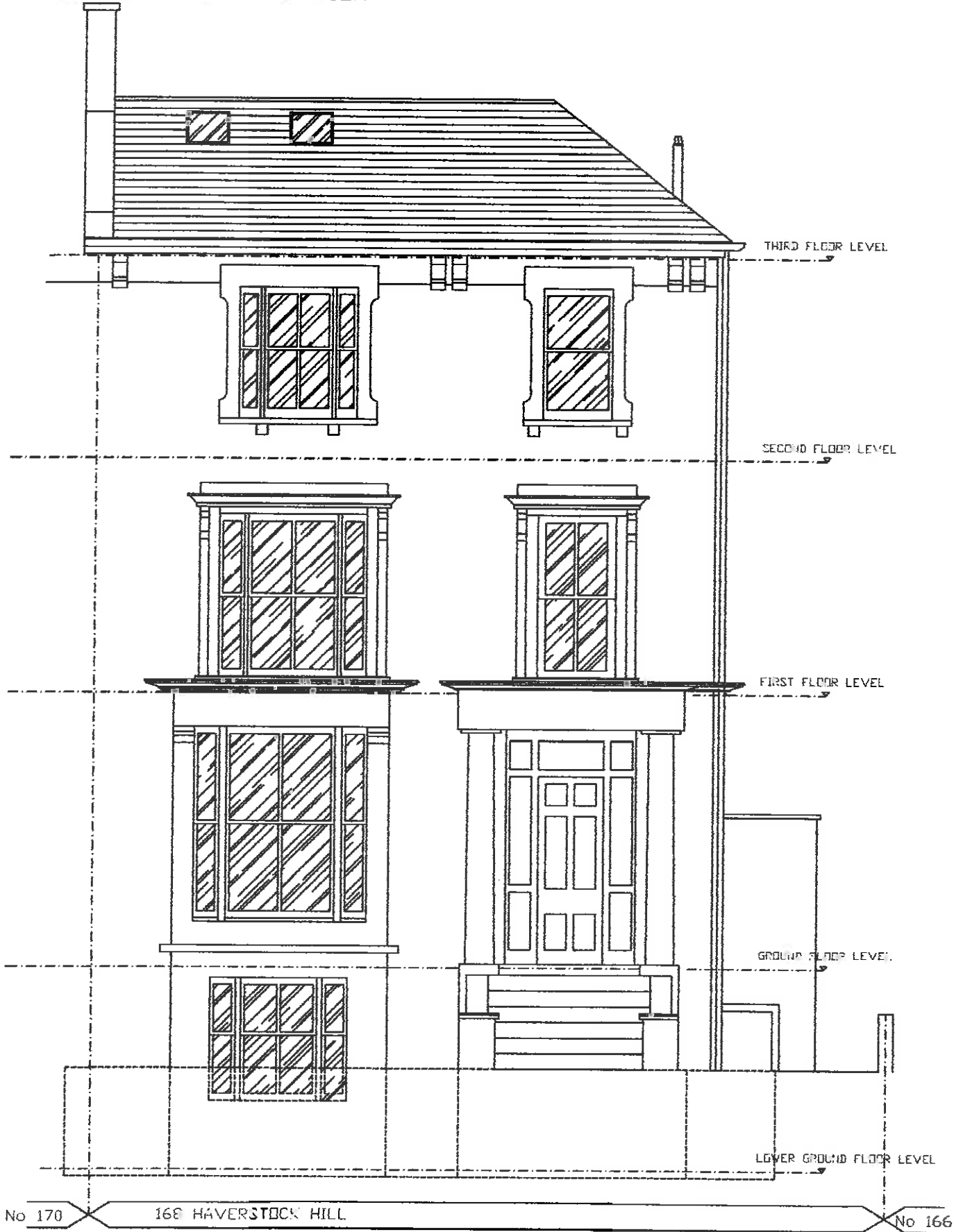
EXISTING REAR ELEVATION



No 166 168 HAVERSTOCK HILL No 170

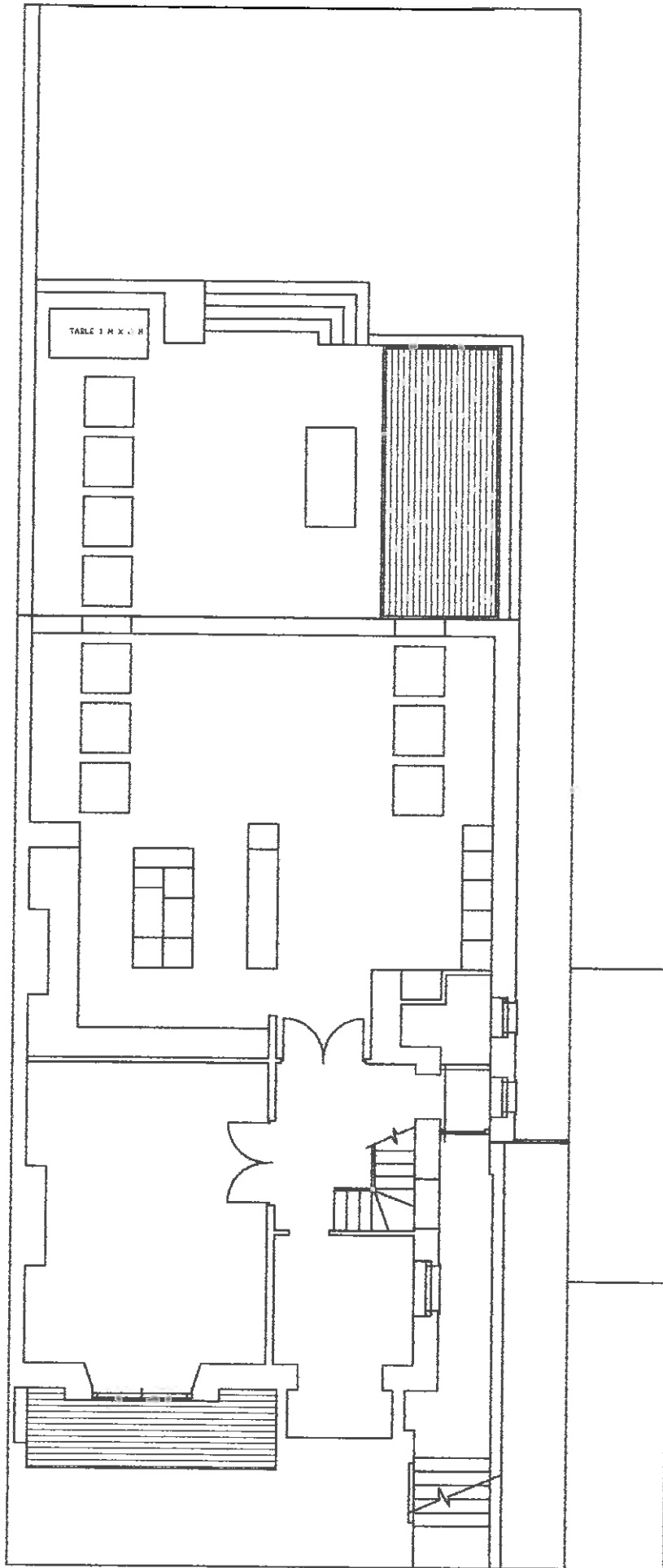
Thierry Pain <i>Interior Design</i> 34 RUE DES PETITS CARREAUX 75002 PARIS Email: therrypaindesign@gmail.com	Project name ASSOR LONDON	Building HOUSE	Level	Phase EXISTING
	Drawing Description APS	Plan REAR ELEVATION	Scale 1:500/43	Date 15.03.2014
	Note 168 HAVERSTOCK HILL			Drawing 312/03-14

EXISTING FRONT ELEVATION



No 170 168 HAVERSTOCK HILL No 166

Thierry Pain <i>Interior Design</i> 34 RUE DES PETITS CARREALX 75002 PARIS Email: thierrypaindesign@gmail.com	Project name ASSOR LONDON	Building HOUSE	Level	Phase EXISTING
	Drawing Description APS	Plan FRONT ELEVATION	Scale 1:500A3	Date 15.03.2014
	Note 168 HAVERSTOCK HILL		Drawing 312/03-14	



Thierry Pein
Interior Design
34 Rue des Petits Champs
75002 PARIS
Tél : 01 42 78 11 26
E-mail : tpein@orange.fr

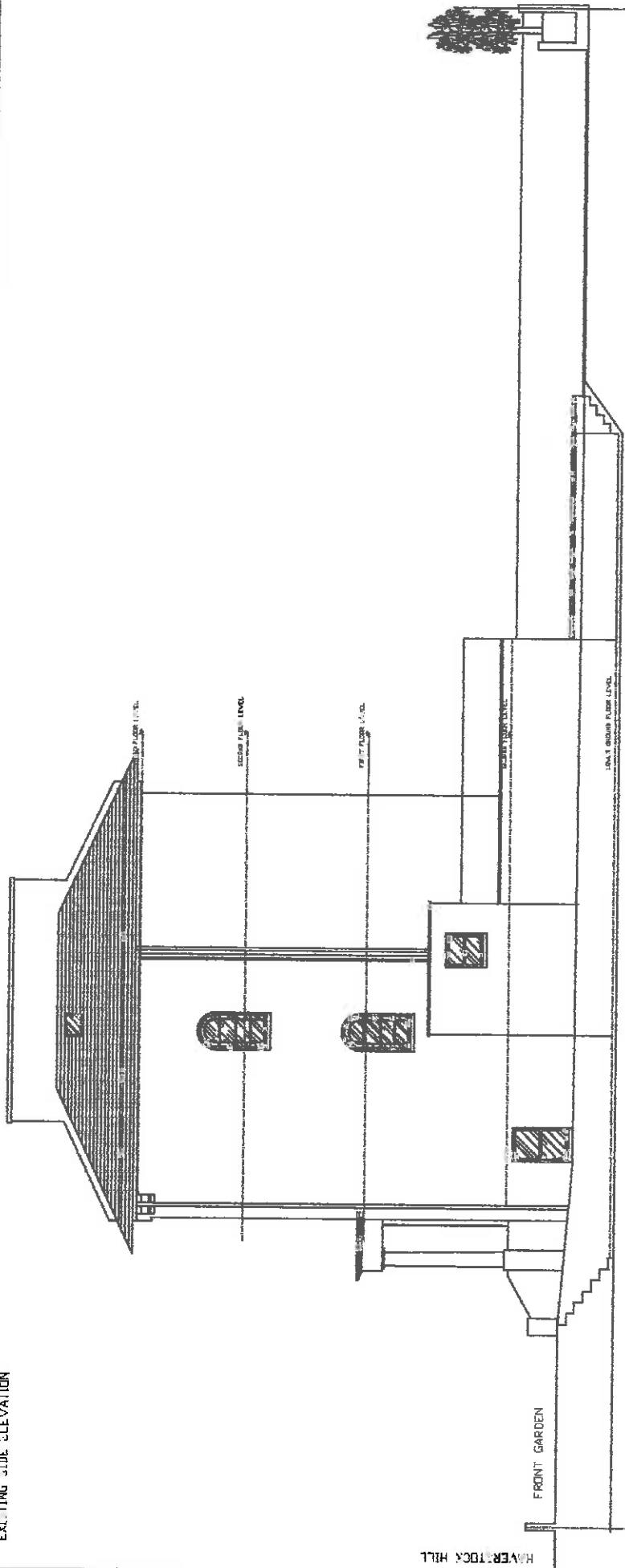
PROJET
27/04/2011

PROJET
EXISTING LOWER GROUND
FLOOR
LONDON
MARC ASSOR
188 HAVERSTOCK HILL

DATE /
J.C.C.
APR
D.C.E. 2011

DATE /
J.C.C.
APR
D.C.E. 2011

EXISTING SIDE ELEVATION



HAVERSTOCK HILL

Thirty Nine Interior Design 30 E. Main Street Haverstock Hill, MA 01830 Tel: 978.234.1111 Fax: 978.234.1112 www.thirtynineinteriordesign.com	Client: GRUBB Project: APR Date: 15.09.2014 By: APR	House: HOUSE Type: EXISTING Date: 15.09.2014 By: APR
For: SIDE SECTION No: 168 HAVERSTOCK HILL		

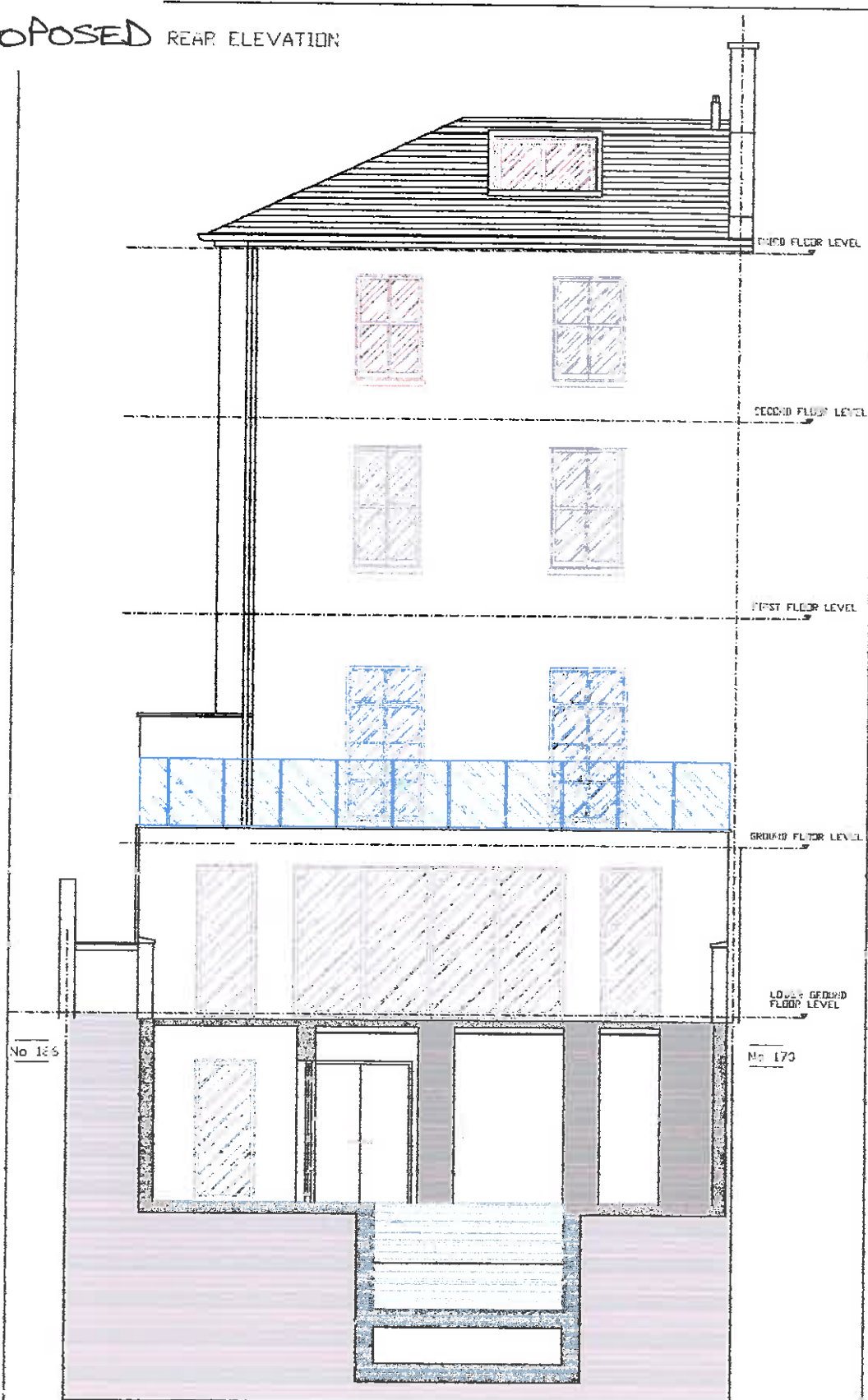
- **Proposed Plans & Elevations**

PROPOSED FRONT ELEVATION



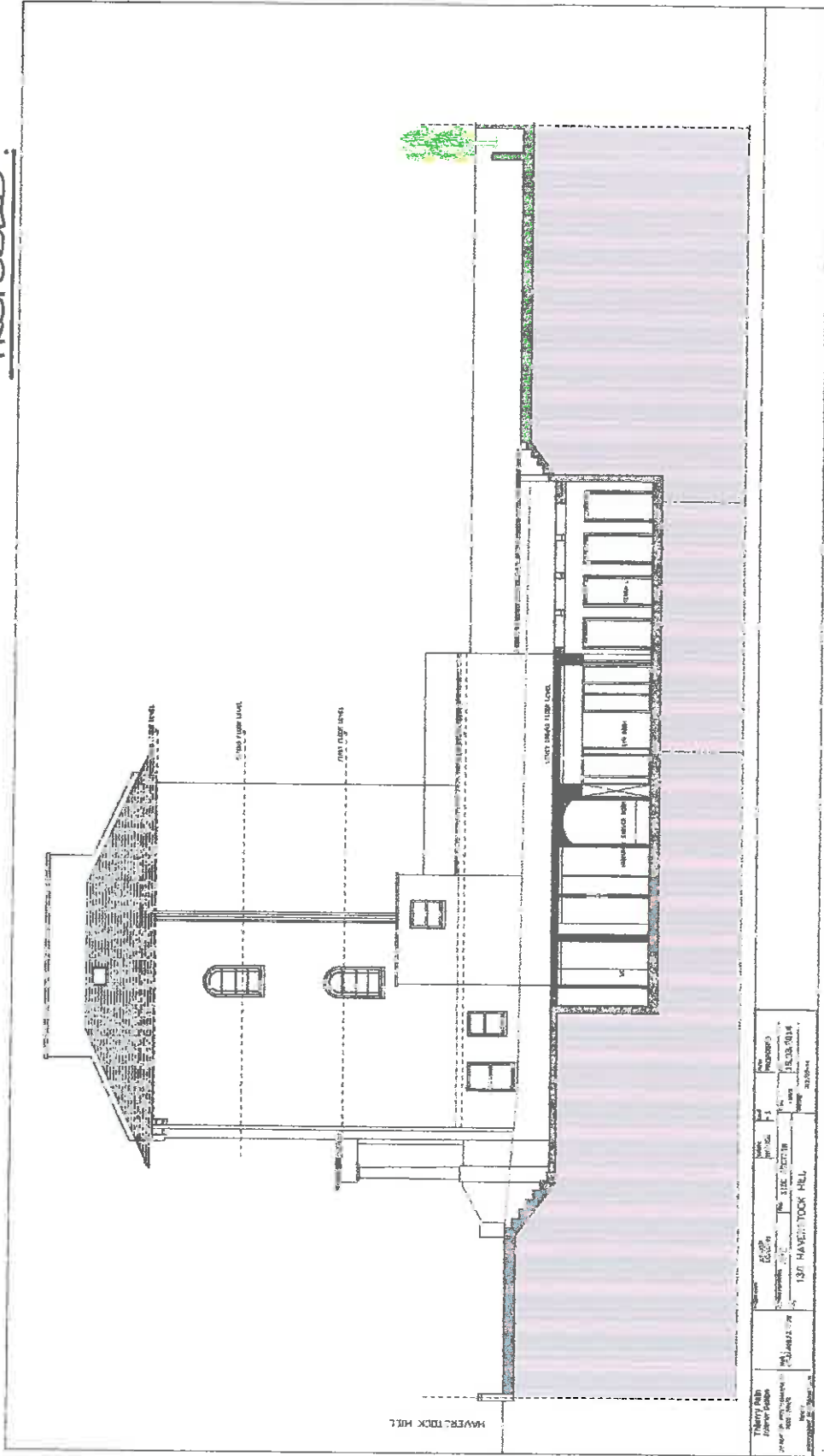
Thierry Pain Interior Design 34 RUE DES PETITS CARREAUX 75002 PARIS Email: thierrypaindesign@gmail.com	Project name		Building		Phase	
	ASSOR LONDON		HOUSE		PROPOSED	
	Drawing Description		Plan		Scale	
	APS		FRONT ELEVATION		1:5000	
Mob : 00.33.608.25.77.26		Date		15.03.2014		
Note		168 HAVERSTOCK HILL		Date		
				312/03-14		

PROPOSED REAR ELEVATION



Thierry Pain Interior Design 34 RUE DES PETITS CARREAUX 75002 PARIS Email: thierrypaindesign@gmail.com	Project name		Building	Level	Phase
	ASSOR LONDON		HOUSE		PROPOSED
	Drawing Description	Plan	Scale	Date	
APS	REAR ELEVATION	1:5000	15.03.2014		
Title			Drawn by	Date	
168 HAVERSTOCK HILL				312/03-14	

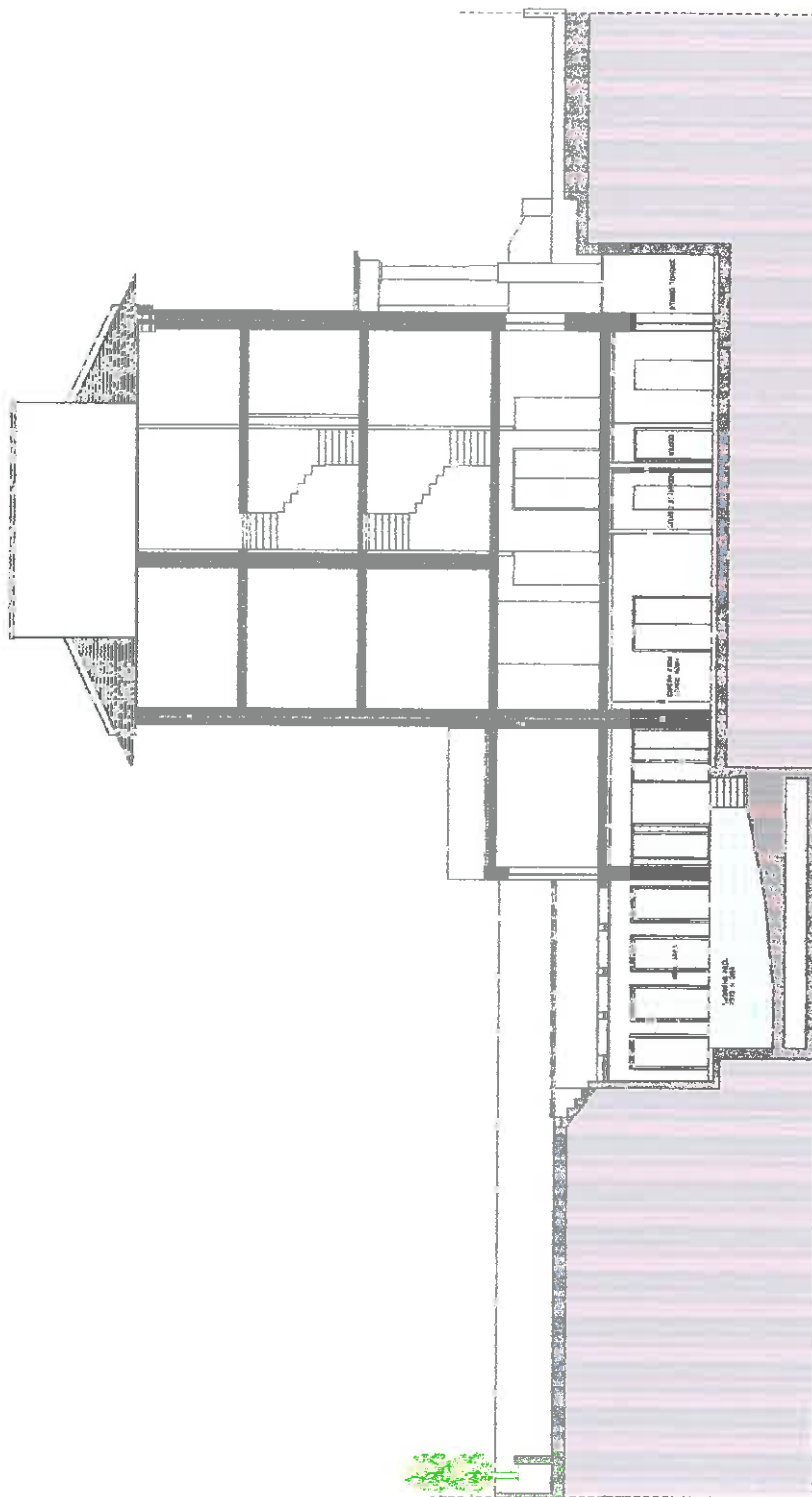
PROPOSED:



MAVERICK HILL

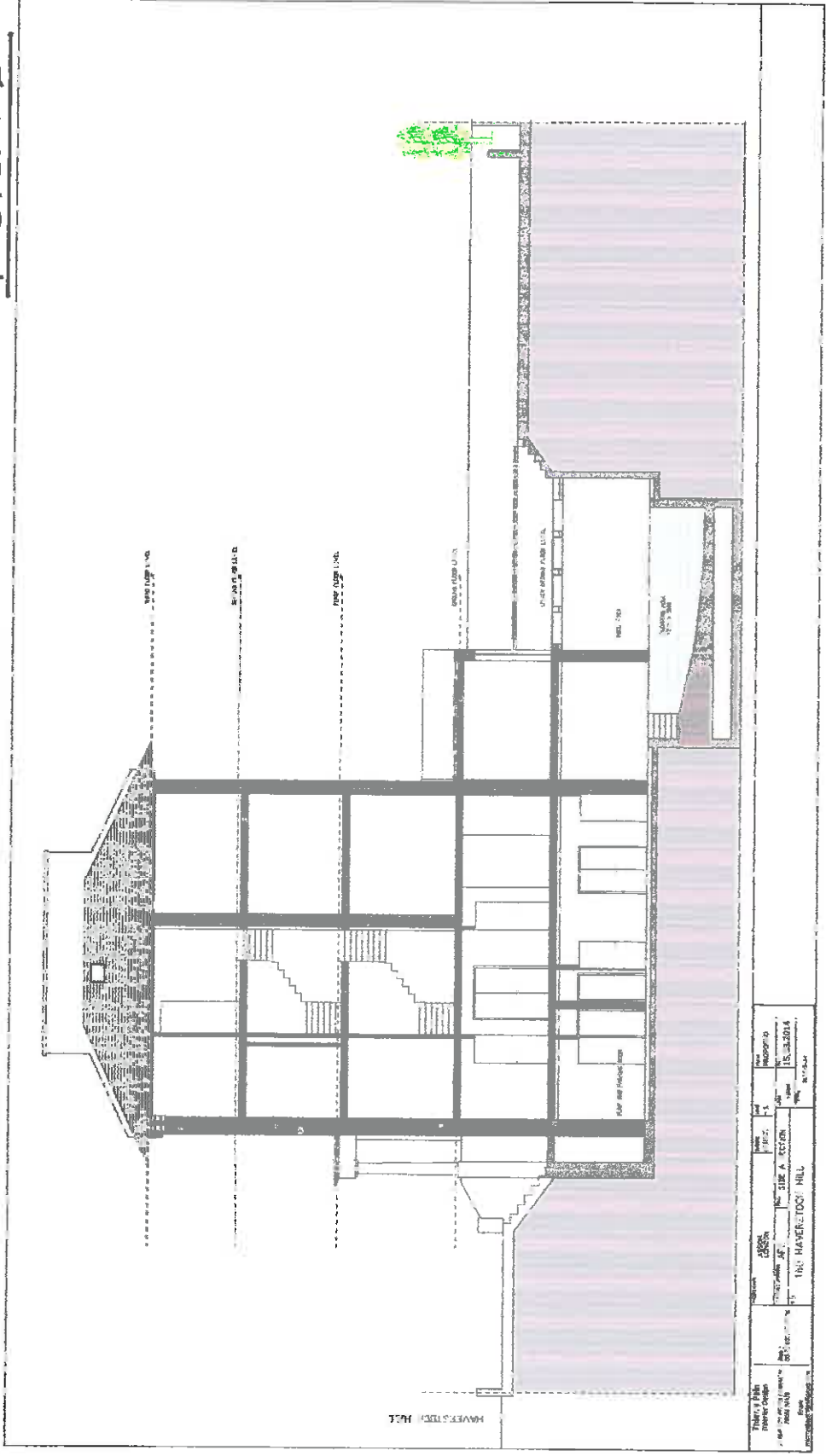
Project Name	1371 MAVERICK HILL
Client	1371 MAVERICK HILL
Architect	1371 MAVERICK HILL
Date	12.03.2014
Scale	1/8" = 1'-0"
Sheet No.	1371 MAVERICK HILL
Project No.	1371 MAVERICK HILL

PROPOSED



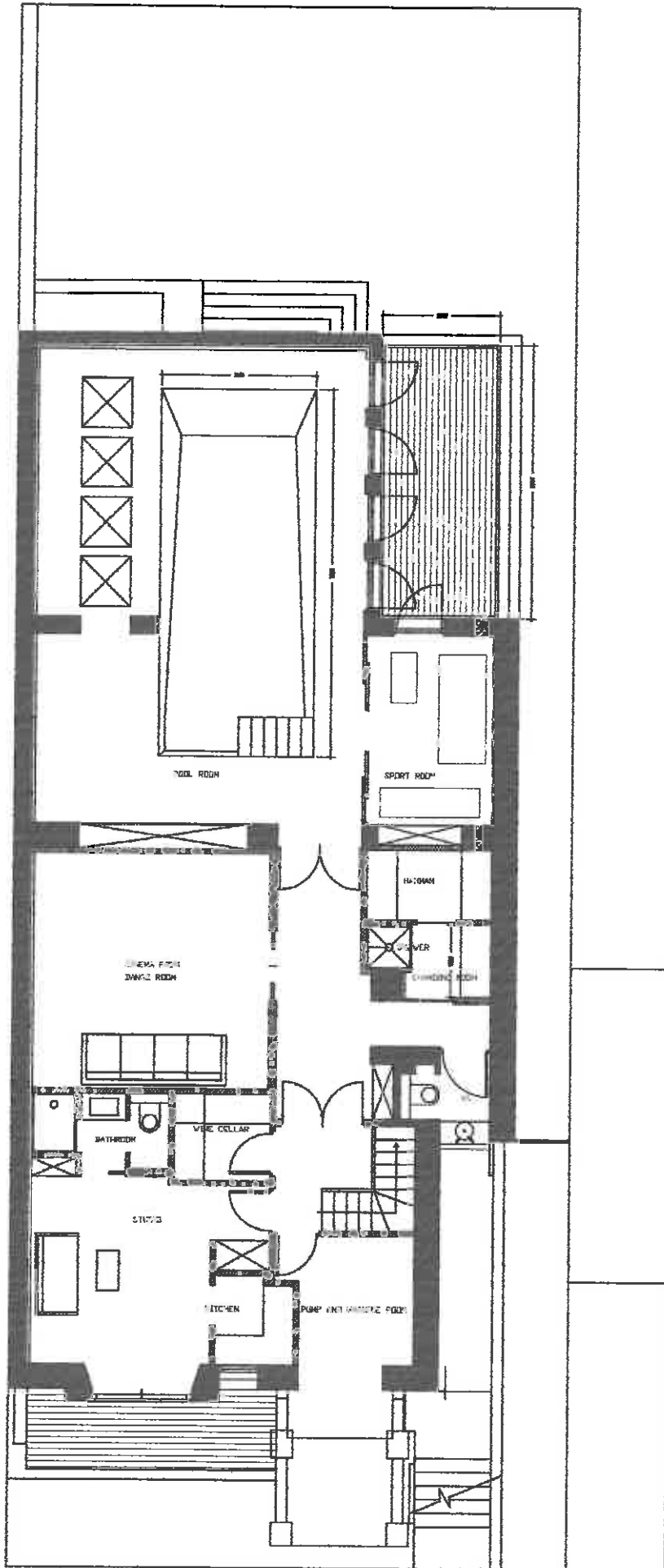
Project No.	15-03-0014
Client	SEE HAVEN 100' HILL
Scale	1/8" = 1'-0"
Date	15/03/2014
Drawn	30105-114
Checked	
Approved	

PROPOSED



HAYES STREET HILL

Project Name	Hayes Street Hill	Client	Hayes Street Hill
Architect	J. S. S. S.	Date	15.12.2014
Scale	1:100	Sheet No.	15.12.2014
Site	Site A	Scale	1:100
Section	Section A	Scale	1:100
Author	J. S. S. S.	Scale	1:100
Check	J. S. S. S.	Scale	1:100
Drawn	J. S. S. S.	Scale	1:100
Client	J. S. S. S.	Scale	1:100



Tillett Paine
Interior Design
34 RUE DES PETITS CHAMPS
75004 PARIS
Tel: +33 (0)1 42 52 11 11
Fax: +33 (0)1 42 52 11 12

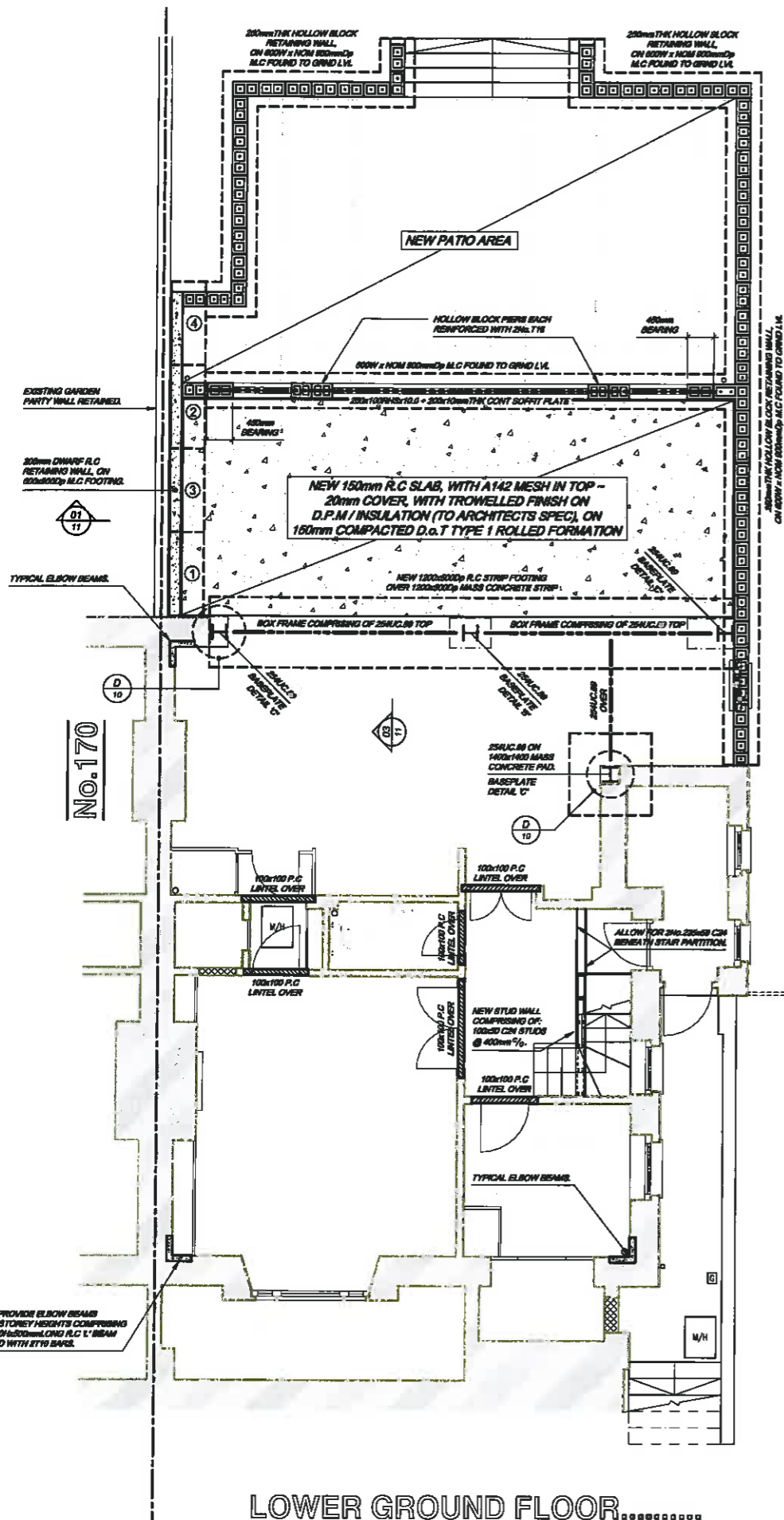
PROJ
PROPOSED NEW BASEMENT
LONDON
CLIENT
MARC ASSOR
168 HAVERSTOCK HILL

NO. 1
LONDON
VERSION 1.0
DATE
01.02.2004

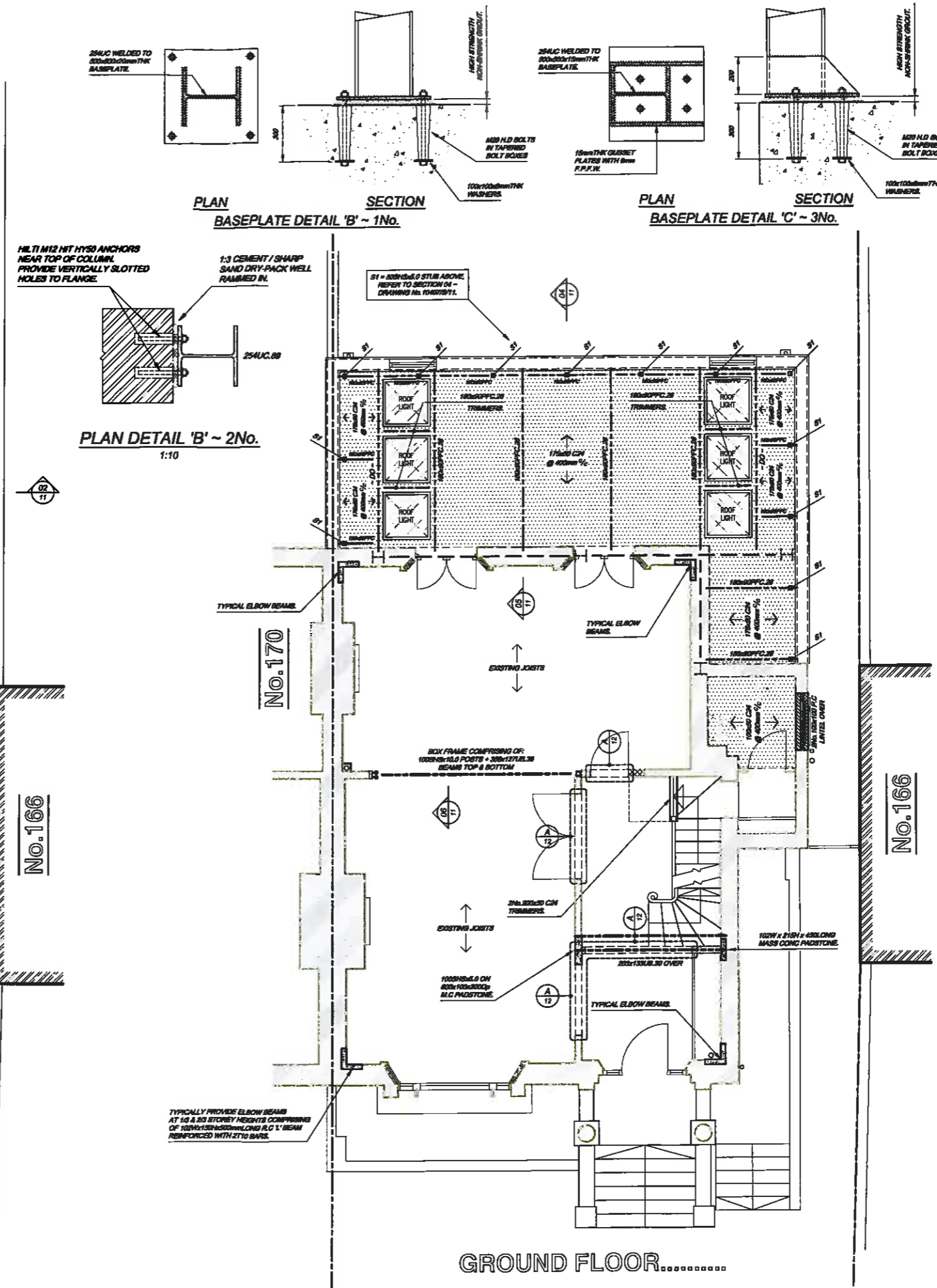
PROJ
PROPOSED NEW BASEMENT
LONDON
CLIENT
MARC ASSOR
168 HAVERSTOCK HILL

PROPOSED

- **Construction Drawings (2004) for previous works for existing Lower Ground Floor Extension & Rear Patio / Terrace**



LOWER GROUND FLOOR.....



GROUND FLOOR.....

PLAN SECTION
BASEPLATE DETAIL 'B' ~ 1No.

PLAN SECTION
BASEPLATE DETAIL 'C' ~ 3No.

PLAN DETAIL 'B' ~ 2No.
1:10

- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS AND SPECIFICATION CLAUSES.
 - DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY.
 - ALL DETAILS, MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTISE, BUILDING REGULATIONS, DOT SPECIFICATION FOR HIGHWAY WORKS, LOCAL BYE LAWS AND HEALTH & SAFETY REGULATIONS.
 - ALL STEELWORK TO BE GRADE S275 TO BS.4360.
 - ALL STEEL CONNECTIONS, DETAILS & WORKMANSHIP TO BE IN ACCORDANCE WITH BS.5390 AND DESIGNED BY THE FABRICATOR.
 - M, S, A & T DENOTE SERVICE MOMENT, SHEAR, AXIAL AND TORSION FORCES RESPECTIVELY IN KN. AND m.
 - ALL BOLTS TO BE GRADE 8.8 BLACKBOLTS.
 - CORROSION PROTECTION TO BS.5493: STEELWORK SHOTBLAST TO Sa 2½ + 1 COAT 75µm ZINC PHOSPHATE + 1 COAT 75µm M10. PAINT TO BE FULLY COMPATIBLE WITH FIRE PROTECTION SYSTEM.
 - INSITU CONCRETE MIXES TO BE IN ACCORDANCE WITH BS.8110 AND BS.5328 AS FOLLOWS:-
MASS CONCRETE FOOTINGS:
• C30/35mm² @ 28 DAYS.
• MINIMUM CEMENT CONTENT OF 275kg/m³.
• 20mm MAXIMUM SIZE OF AGGREGATE.
• MAXIMUM WATER-CEMENT RATIO OF 0.65
REINFORCED CONCRETE (UNEXPOSED):
• C35/40mm² @ 28 DAYS.
• MINIMUM CEMENT CONTENT OF 300kg/m³.
• 20mm MAXIMUM SIZE OF AGGREGATE.
• MAXIMUM WATER-CEMENT RATIO OF 0.60
 - MINIMUM COVER TO ALL REINFORCEMENT TO BE:-
• 20mm TO ALL BARS - FOR INTERNAL CONCRETE.
• 35mm TO ALL BARS - FOR CONCRETE IN CONTACT WITH THE GROUND.
 - ALL TIMBER TO BE GRADE C24 TO BS5268 AND FULLY TREATED.
 - ALL WORKING SPACE AROUND FOUNDATIONS AND WALLS TO BE BACK FILLED USING FULLY COMPACTED DOT TYPE 2 GRAVEL.
 - ALL FOUNDATION HAVE BEEN DESIGNED FOR A BEARING PRESSURE OF 100kN/m². FOUNDING LEVEL TO BE TO THE SATISFACTION OF THE LOCAL AUTHORITY.
 - CONTRACTOR TO SUPPLY METHOD STATEMENT FOR EXCAVATION AND CONSTRUCTION OF MASS CONC' BASES.

No.	BY	REVISION	DATE
D	-	UPDATED TO SUIT NEW LAYOUTS	28/07/04
C	-	STEEL SIZES REV.PCC LIMITS,B/PLATE DETAILS ADDED	16/08/04
B	-	ISSUED FOR TENDER	12/08/04
A	-	FOUNDING/R.C WALL ADDRESS WAS SHOWN, TIMBERS REV.	18/04/04

CLIENT: Mr M ASSOR
ARCHITECT: TRANSFORMATION ARCHITECTS

OFFICE COPY

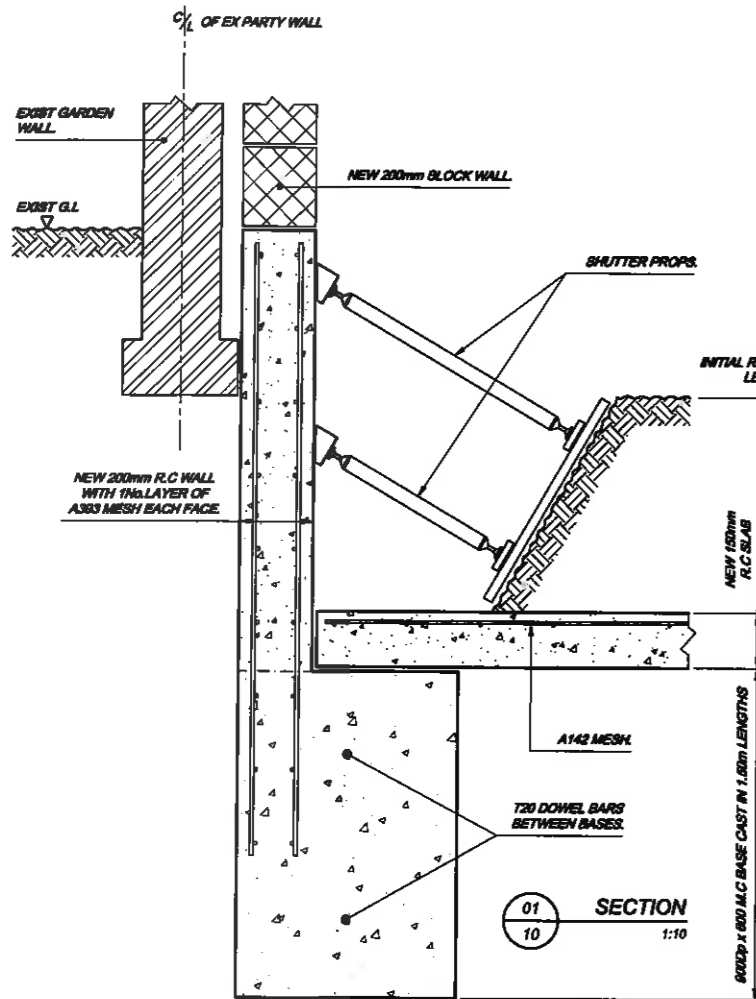
168 Haverstock Hill
London NW3

Structural Proposals
Lower Ground and
Ground Floor Plans

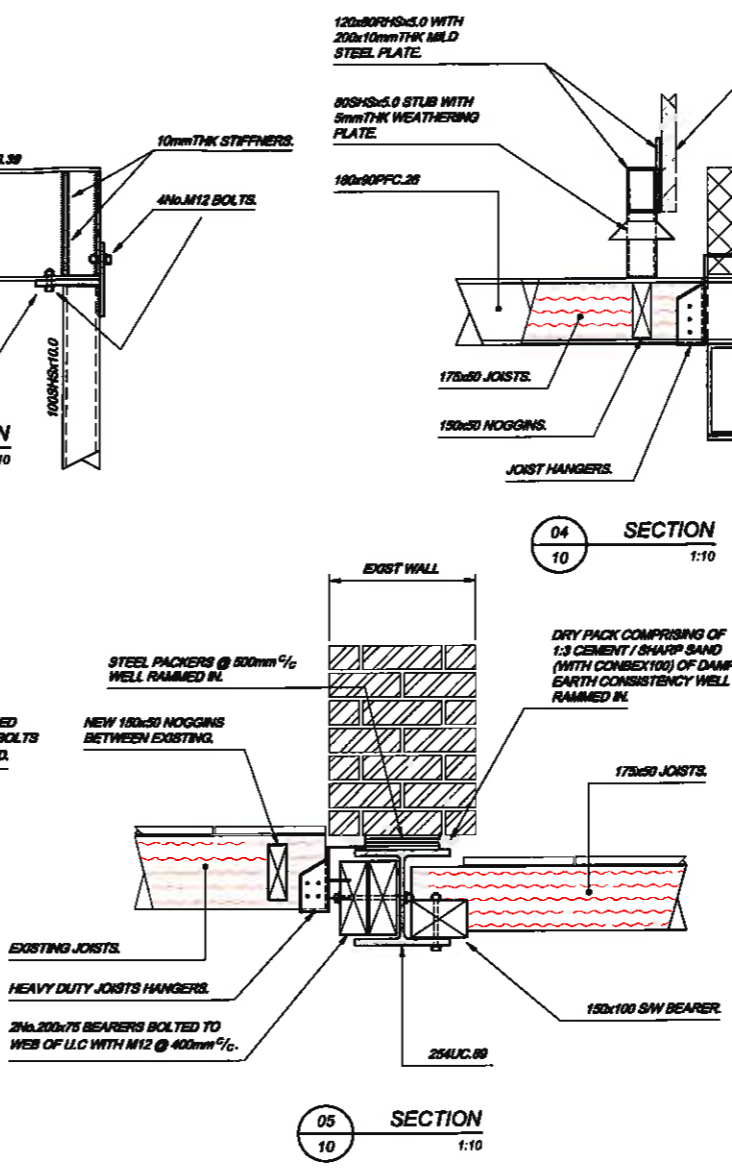
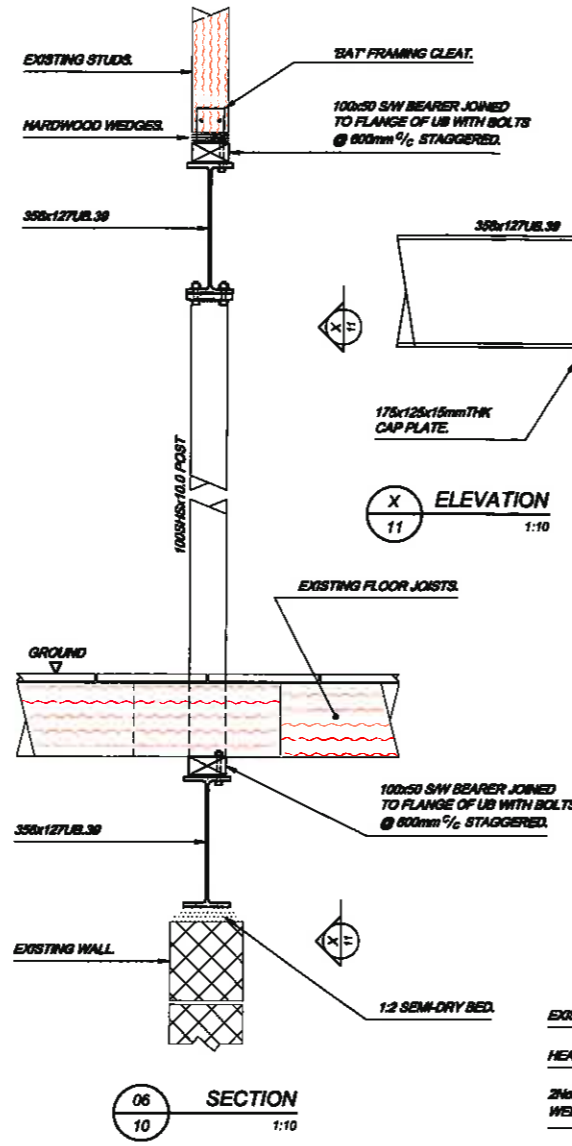
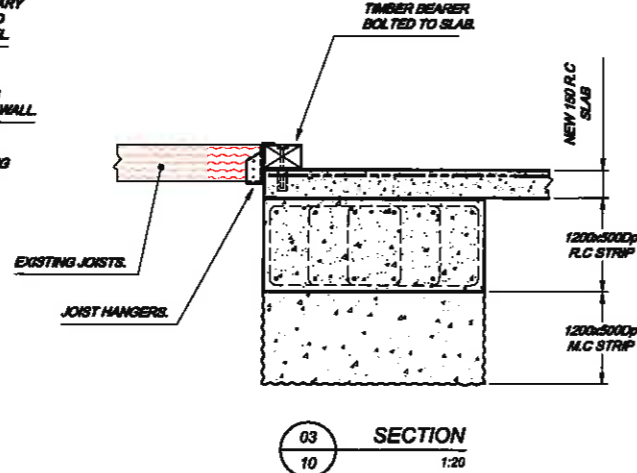
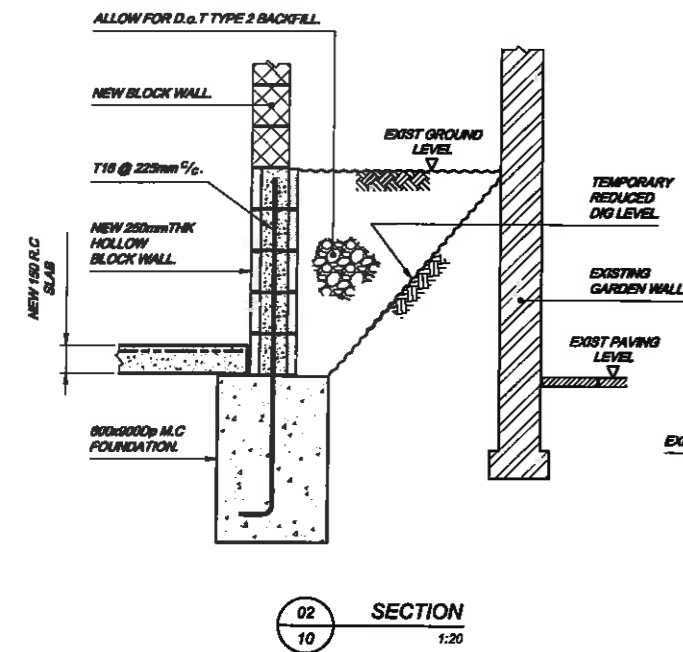
ROSS & PARTNERS
CONSULTING CIVIL & STRUCTURAL ENGINEERS
ROSEBERRY HOUSE tel: (020)-7837-8600
70 ROSEBERRY AVENUE fax: (020)-7837-6127
LONDON EC1R 4RR email: ross.partners@compuserve.com

DRN: CHD DATE: February 2004
STATUS: TENDER SCALE: 1:50

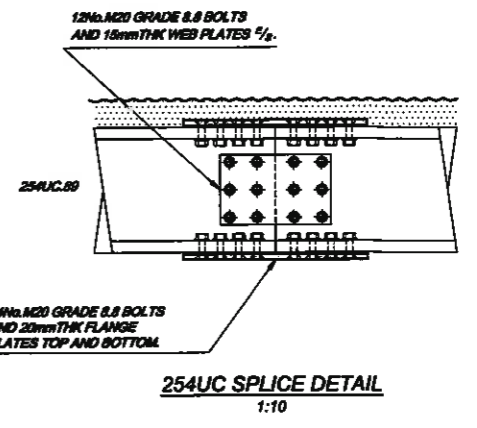
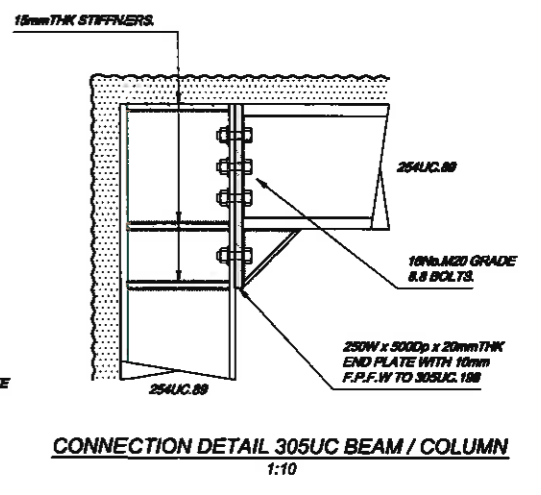
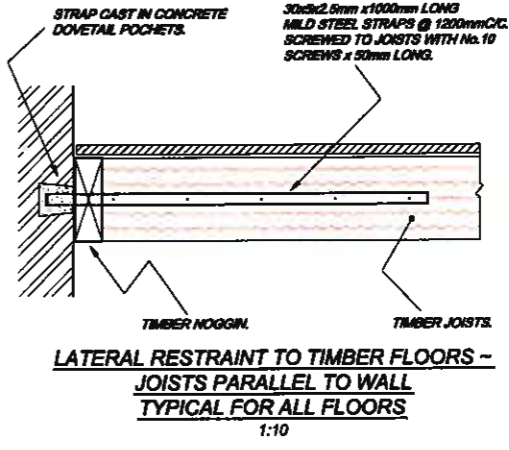
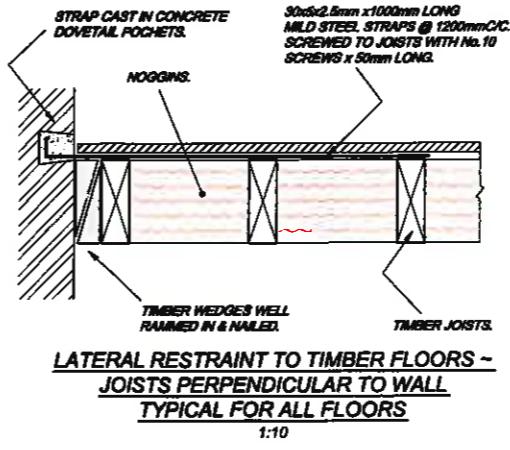
DRG. No. 10407/S/10 D



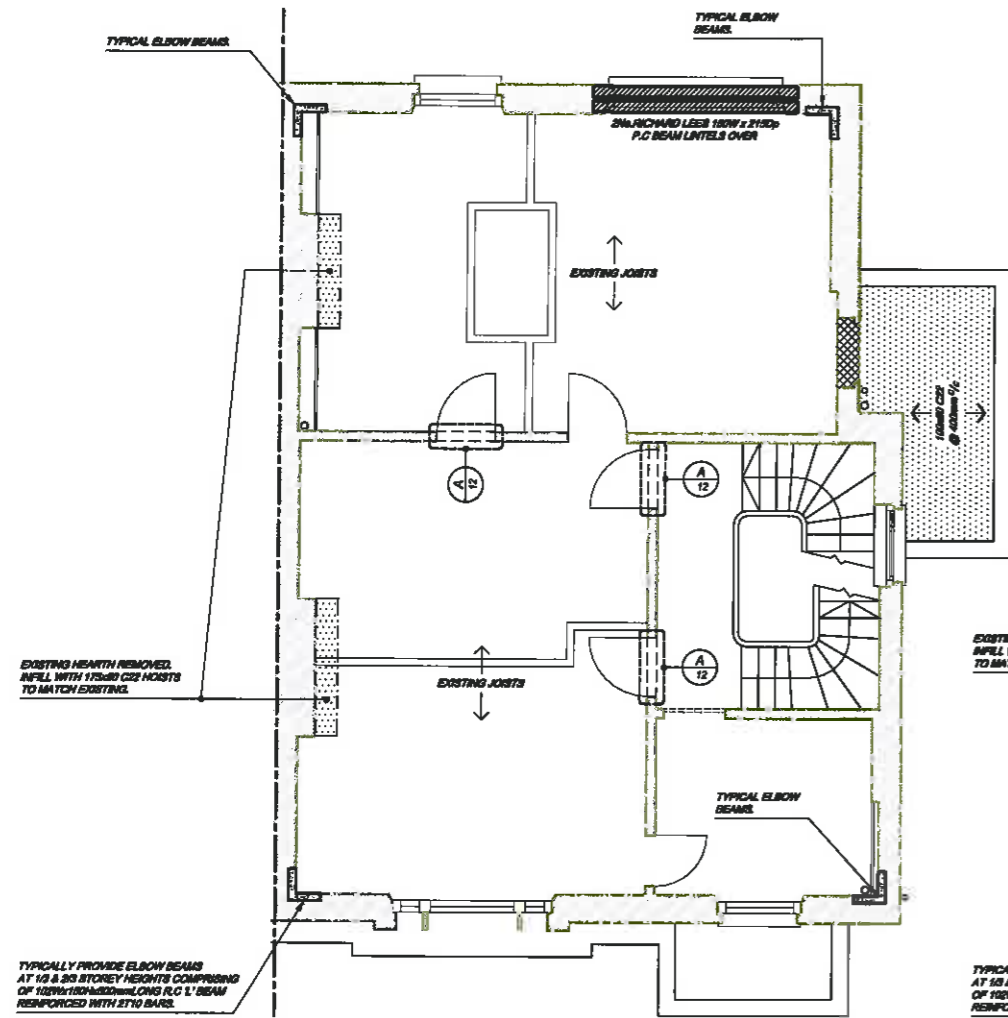
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- 1.0) CARRY REDUCED DIG OF GROUND UP TO 100mm ABOVE EXISTING FOOTING LEVEL.
 - 2.0) CAREFULLY EXCAVATE BASE MARKED '1', INSTALL MESH AND CONCRETE TO TOP OF BASE LEVEL.
 - 3.0) WHEN CONCRETE HAS SET ERECT SHUTTER AND CONCRETE R.C. WALL. LEAVE PROPS IN PLACE.
 - 4.0) REPEAT, IN SUCCESSION, OPERATIONS 2.0 & 3.0 ABOVE FOR BASES MARKED '2' & '3' & '4'.



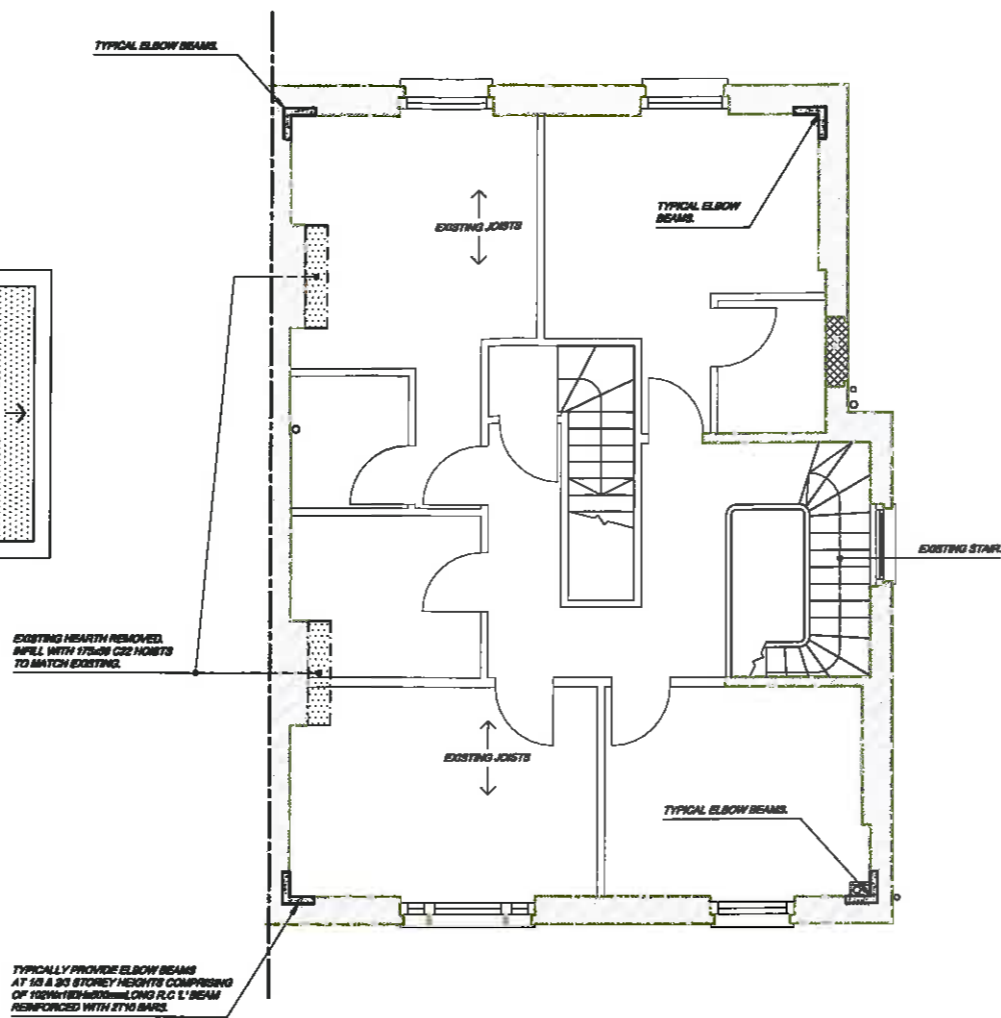
- NOTES:**
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS AND SPECIFICATION CLAUSES.
 2. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY.
 3. ALL DETAILS, MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, CODES OF PRACTISE, BUILDING REGULATIONS, DoT SPECIFICATION FOR HIGHWAY WORKS, LOCAL BYE LAWS AND HEALTH & SAFETY REGULATIONS.
 4. FOR GENERAL NOTES REFER TO DRG. No. 10407/S/10.



C	-	SECTIONS / DETAILS UPDATED TO SUIT NEW LAYOUTS	20.07.04
B	-	COLUMN TO BEAM CONNECTION DETAILS ADDED	16.08.04
A	-	ISSUED FOR TENDER	11.08.04
No.	BY	REVISION	DATE
CLIENT: Mr M ASSOR			
ARCHITECT: TRANSFORMATION ARCHITECTS			
OFFICE COPY			
168 Haverstock Hill London NW3			
Structural Proposals Lower Ground & Ground Sections and Details			
ROSS & PARTNERS CONSULTING CIVIL & STRUCTURAL ENGINEERS ROSEBERRY HOUSE 70 ROSEBERRY AVENUE LONDON EC1R 4RR Tel: (020)-7837-8895 fax: (020)-7837-8127 email: ross_partners@compuserve.com			
DRN:	CHD:	DATE:	April 2004
STATUS:	TENDER	SCALE:	As Shown
DRG. No.	10407/S/11 C		

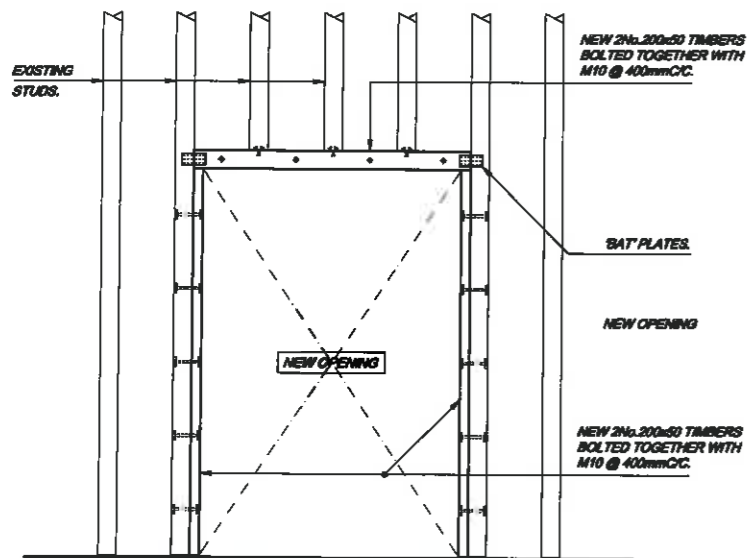


FIRST FLOOR.....



SECOND FLOOR.....

NOTES:
 1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS AND SPECIFICATION CLAUSES.
 2. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY.
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 4. FOR GENERAL NOTES REFER TO DRG.No.10407/S/10.



A DETAIL
12
1:20

TYPICAL DETAIL OF NEW STUD WALL OPENING

D	-	UPDATED TO SUIT NEW LAYOUTS	28.07.04
C	-	NEW STAIR & FLOORING + HEARTH NOTE.	17.06.04
B	-	ISSUED FOR TENDER	12.06.04
A	-	ELBOW BEAMS ADDED.	18.04.04
No.	BY	REVISION	DATE

CLIENT: **Mr M ASSOR**

ARCHITECT: **TRANSFORMATION ARCHITECTS**

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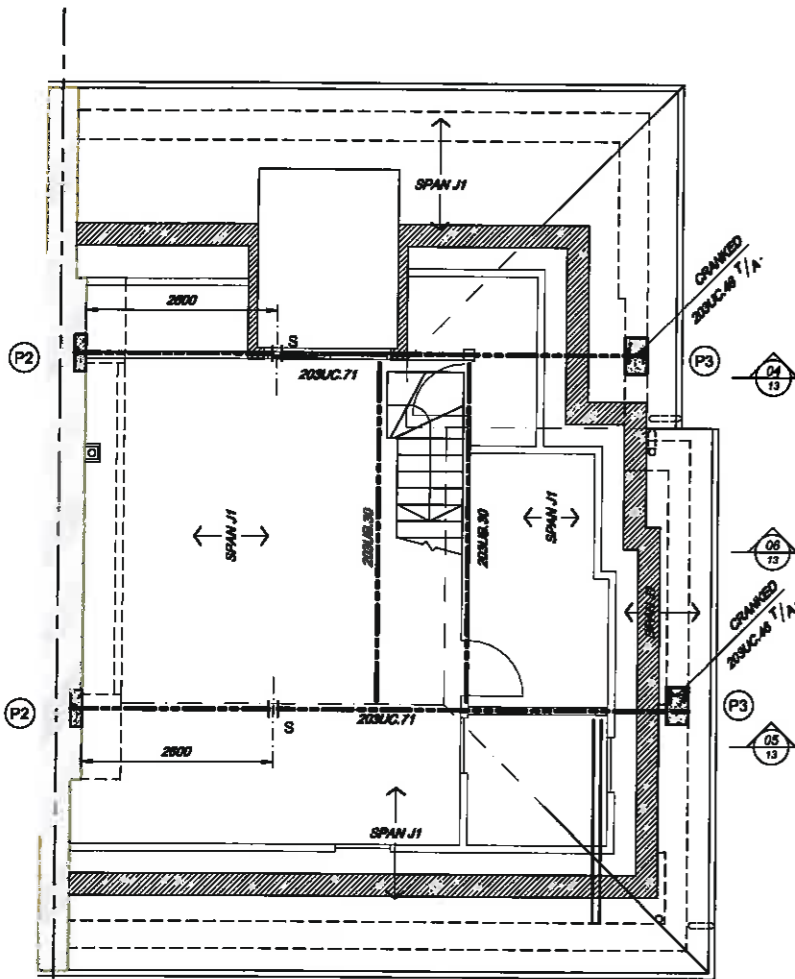
168 Haverstock Hill
London NW3

Structural Proposals
First and Second Floor
Plans and Details

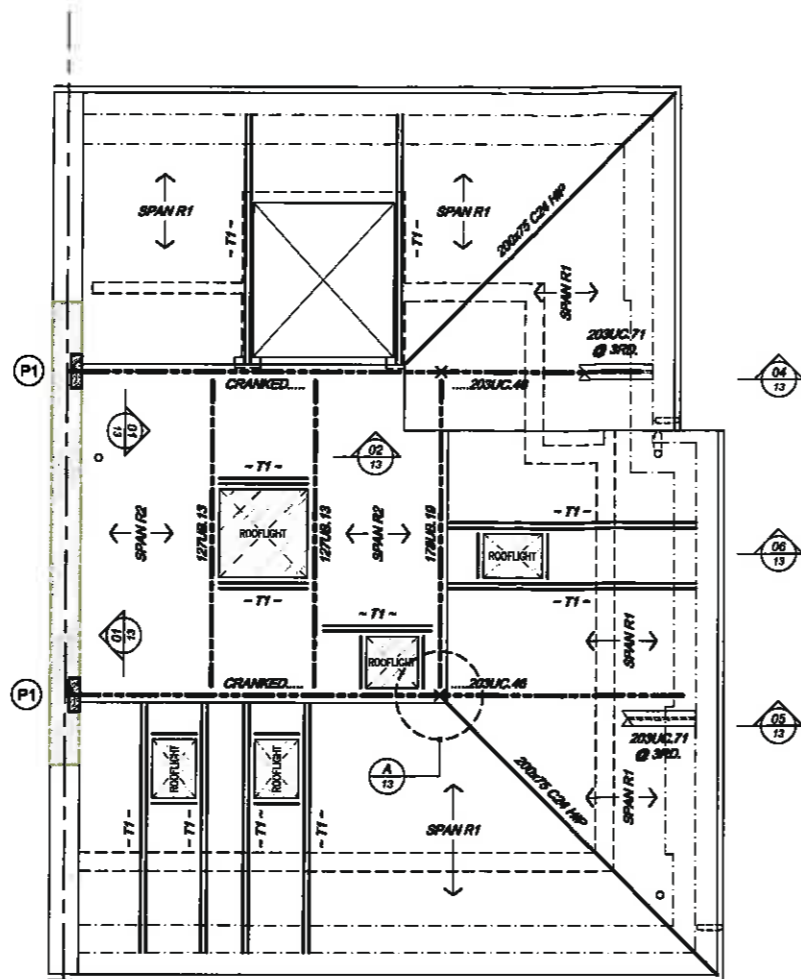
ROSS & PARTNERS
 CONSULTING CIVIL & STRUCTURAL ENGINEERS
 ROSEBERRY HOUSE
 70 ROSEBERRY AVENUE
 LONDON EC1R 4RR
 Tel: (020)-7637-8886
 Fax: (020)-7637-6127
 e-mail: r.p.partners@compuserve.com

DRN: CRD: DATE: February 2004
 STATUS: TENDER SCALE: 1:50

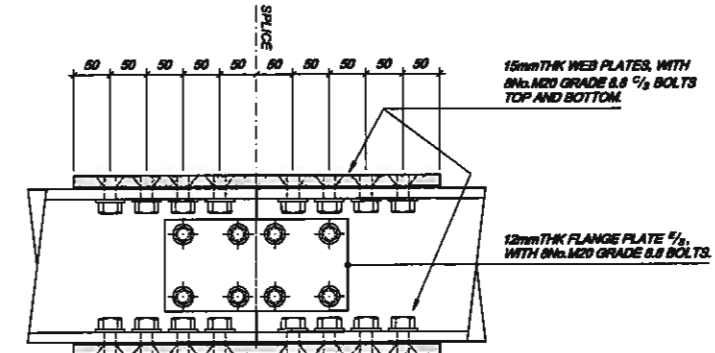
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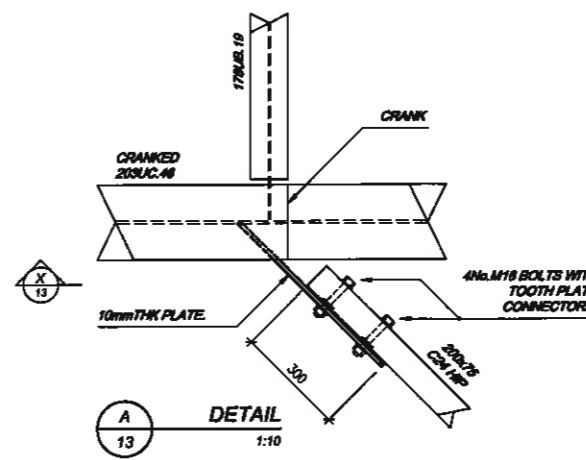
THIRD FLOOR.....



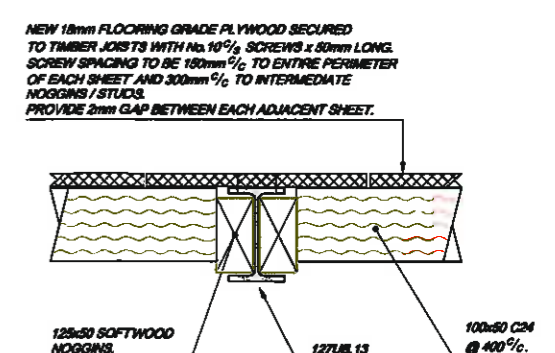
ROOF.....



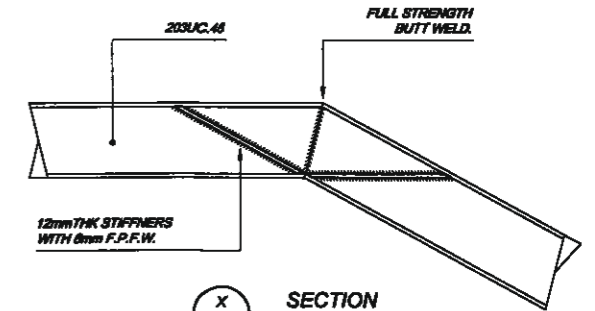
SPLICE DETAIL FOR 203UC
1No. PER BEAM @ 1/2 POINT IN SPAN
1:5



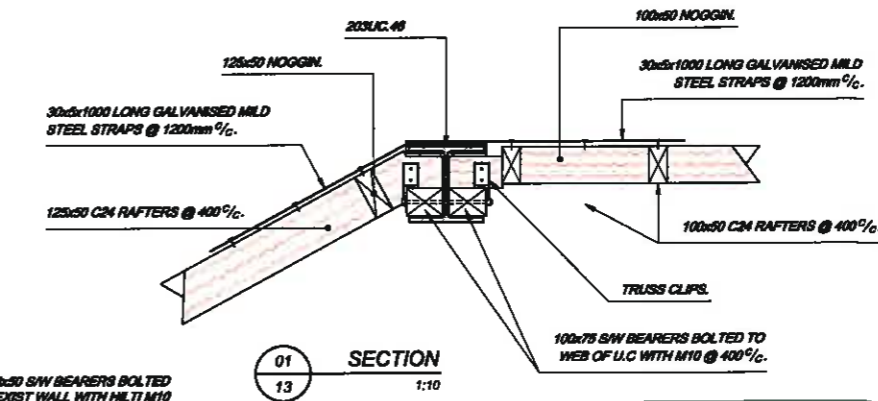
DETAIL
1:10



SECTION
1:5

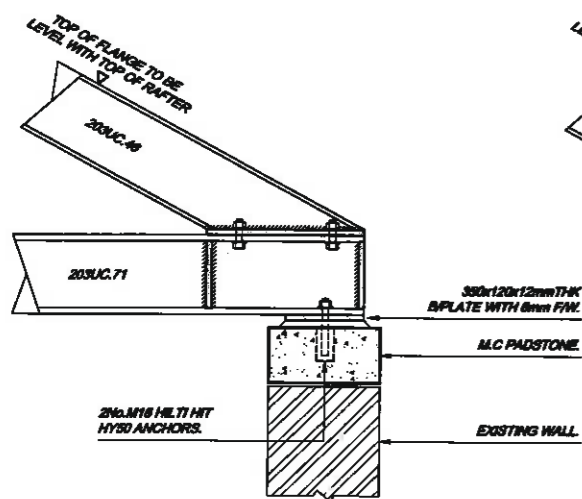


SECTION
1:10

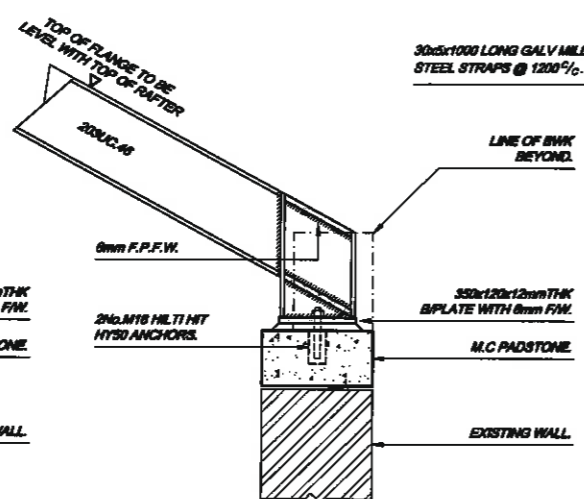


SECTION
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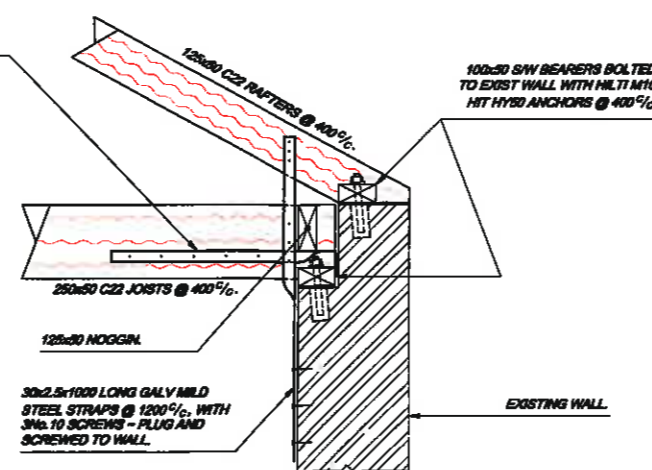
- NOTES:**
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 - FOR GENERAL NOTES REFER TO DRG.No.10407/S/10.



SECTION
1:10



SECTION
1:10



SECTION
1:10

- LEGEND:-**
- S.....DENOTES SPLICE POSITION
 - J1.....250x50 C22 JOISTS @ 400mm C/C
 - R1.....125x50 C22 RAFTERS @ 400mm C/C
 - R2.....100x50 C22 RAFTERS @ 400mm C/C
 - T1.....2No. 125x50 C22 TIMBERS BOLTED TOGETHER WITH M10 @ 400mm C/C
 - P1.....102W x 150H x 675LONG MASS CONCRETE PADSTONE
 - P2.....102W x 150H x 750LONG MASS CONCRETE PADSTONE
 - P3.....340W x 150H x 500LONG MASS CONCRETE PADSTONE
- DENOTES STUD WALLING COMPRISING OF:
100x50 C22 STUDS @ 400mm C/C, WITH MID-HEIGHT NOGGINS AND 100x75 C22 HEAD & SOLE PLATES TOP & BOTTOM RESPECTIVELY.

C	-	UPDATED TO SUIT NEW LAYOUTS	29/7/04
B	-	ISSUED FOR TENDER	17/04/04
A	MDR	PADSTONE SIZES AMENDED	18/04/04
No.	BY	REVISION	DATE

CLIENT: Mr M ASSOR

ARCHITECT: TRANSFORMATION ARCHITECTS

OFFICE COPY

168 Haverstock Hill
London NW3

Structural Proposals
Third and Roof Floor
Plans and Details

ROSS & PARTNERS
CONSULTING CIVIL & STRUCTURAL ENGINEERS
ROSEBERRY HOUSE Tel: (020)-7837-8895
70 ROSEBERRY AVENUE Fax: (020)-7837-8127
LONDON EC1R 4RR e-mail: ross.partners@compuserve.com

DRN: CHD DATE: February 2004
STATUS: Preliminary SCALE: 1:50

DRG. No. 10407/S/13 C

APPENDIX B

Photographs – Existing Site



**Photo 1 – General View of front of house (centre frame) from Haverstock Hill.
Note general slope of Haverstock Hill from left to right, towards south east.**



**Photo 2 – View along side passage between No168 (left) and No166 Haverstock Hill
Note side passage with gated access to rear of house, and reduced level passage to gain access to ground floor. Steps on left rise to gain access to existing first floor.**



Photo 4 - Detailed view of side access passage and reduced level access passage to ground floor.



Photo 3 – View of front drive. Note stepped terracing of paving to left hand side of front door, and light well at front window.



Photo – Detailed view of light well at front of house



Photo 4 - View of rear of house showing party wall with No170 (right of frame)



Photo 5 – View from rear garden of terrace at rear of ground floor.



Photo 6 – View of side passage and boundary with No166 from rear garden



Photo – View of rear terrace and garden from side passage.



Photo - View of 166/168 boundary and side passage.

Note drop in ground level from 168 to 166.



Photo – View towards eastern corner from centre of garden.

APPENDIX C

Ground Investigation Records

- 1. Knapp Hicks Window Sampler Borehole logs (Dec 2012)**
- 2. Geotechnical Laboratory Test Results**

WINDOW SAMPLER / HAND AUGER BOREHOLE LOGS

Borehole WS1	(Window Sampler Borehole in Rear Garden)
Ground Level – 0.35m	Turf on hard friable greyish brown mix of topsoil with fragments of brick, stone, concrete, cinder etc
0.35m – 0.80m	Grading to: Firm mid brown silty CLAY with occasional gravel of brick
0.80m – 1.22m	Soft greyish orange brown fine sandy SILT/CLAY, becomes more damp with depth.
1.22m – 1.90m	Compact damp clayey GRAVEL. Gravel is subrounded medium to coarse of flint. Becoming more dense with depth.
1.90m – 6.00m	Stiff to very stiff brown fissured CLAY (London Clay) Trace rootlets noted to 2.90mbgl. 2.0m to 3.0m 60% sample recovery 3.0m to 4.0m 60% sample recovery 4.0m to 5.0m 100% sample recovery 5.0m to 6.0m 65% sample recovery Note pockets of gypsum mineralisation at 4.15m and 4.55mbgl From 4.25m becoming very stiff From 4.70m becoming bluish grey From 5.0m becoming brownish dark grey and more plastic From 5.0m becoming stiff to very stiff
6.00m	End of Borehole

Additional Comments

- Groundwater was noted during driving of the window sampler equipment with steady slow inflow recorded at the bottom of the hole each time the tubes were withdrawn from the hole.
- Upon completion, 2 No standpipe piezometers were installed with one response zone from 4.0m to 5.0m and another from 1.0m to 2.0m. A 1m bentonite seal was placed from 2.20m to 3.20m.
- One groundwater monitoring visit has been undertaken, 8 days after installation of the well.
- Continuous resistance to driving was encountered as the sample tubes were driven. No obvious softer zones were detected.
- Poor sample recovery occurred in the London Clay and this is considered to be due to the groundwater percolating down the hole as the sampling tubes were driven.
- Refer to attached sheets for pocket penetrometer results and natural moisture content results.

Borehole WS2	(Hand Auger Borehole at front of house)
Ground Level – 0.10m	Yorkstone Paving on concrete bedding
0.10m – 0.95m	MADE GROUND: Firm clayey fill with fragments of gravel. Grades into a layer of brick at base
0.95m – 4.00m	Firm orange brown CLAY. Traces of old rootlets noted down to 1.75mbgl. From 2.0m becoming dry stiff brown fissured and gleyed grey silty CLAY with orange fine sandy lenses. From 3.0m becoming mid brown From 3.5m becomes bluish grey Note pockets of gypsum mineralisation at 3.75m
4.00m	End of Borehole

Additional Comments

- No groundwater was noted during excavation of the inspection pit / borehole or for 1 hour after completion of the borehole. Sample tubes were recovered dry.
- Upon completion a standpipe was installed to 3.92mbgl with response zone from 2.92m to 3.92mbgl.
- One groundwater monitoring visit has been undertaken, 8 days after installation of the well.
- Continuous resistance to augering was encountered. No obvious softer zones were detected.
- Full sample recovery occurred as the auger was advanced.
- Refer to attached sheets for pocket penetrometer results and natural moisture content results.



Client: Knapp Hicks & Partners Ltd

Address: Prospect House
 1 Highpoint Business Village
 Henwood, Ashford
 Kent TN24 8DH

Client Contact: Mr Richard Moore
Site: 168 Haverstock Hill

Test Requested: Particle Size Distribution
Test Method: BS 1377-2 : 1990 : Clauses 9.2 & 9.5

Sample Details: Sampled and submitted by: Client
 Client Ref: WS1 @ 1.15-1.20m
 Laboratory Ref: 0595/14/02
 Date Received: 14/07/2014

Report No: 0595/14/02

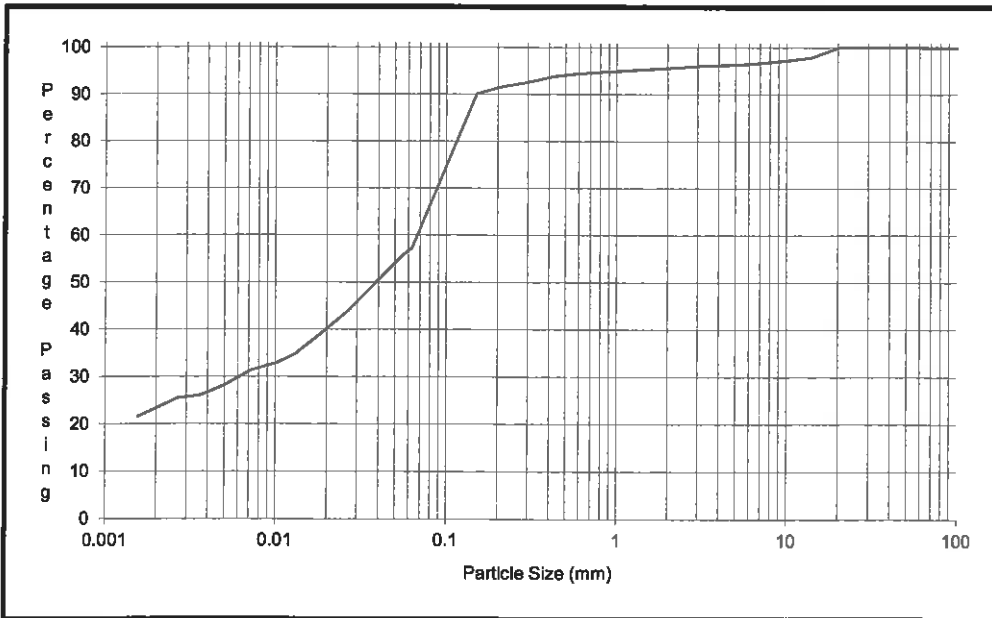
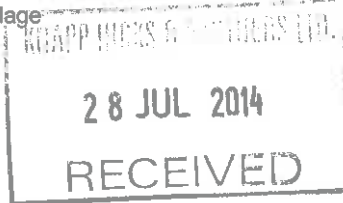
Your Ref: 32399

Report Date: 25/07/2014

Date Tested: 16-23/07/2014
 Date Sampled: 11/07/2014
 Type of Sample: Bulk

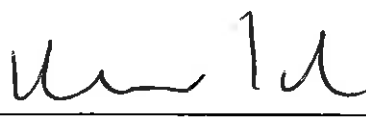
Visual Description: Brown and grey sandy CLAY with occasional gravel

Preparation Method : In accordance with BS 1377-1:1990
 Assumed Particle Density: 2.68 Mg/m³



Material Type	Percentage Passing
Cobbles	
Gravel	4
Sand	38
Silt	34
Clay	24

Comments :

Signed :  Kwaku Baah - Laboratory Manager

For and on behalf of PBA Laboratories



Client: Knapp Hicks & Partners Ltd
Address: Prospect House
 1 Highpoint Business Village
 Henwood, Ashford
 Kent TN24 8DH

Report No: 0595/14/04
Your Ref: 32399
Report Date: 23/07/2014

Client Contact: Mr Richard Moore
Site: 168 Haverstock Hill

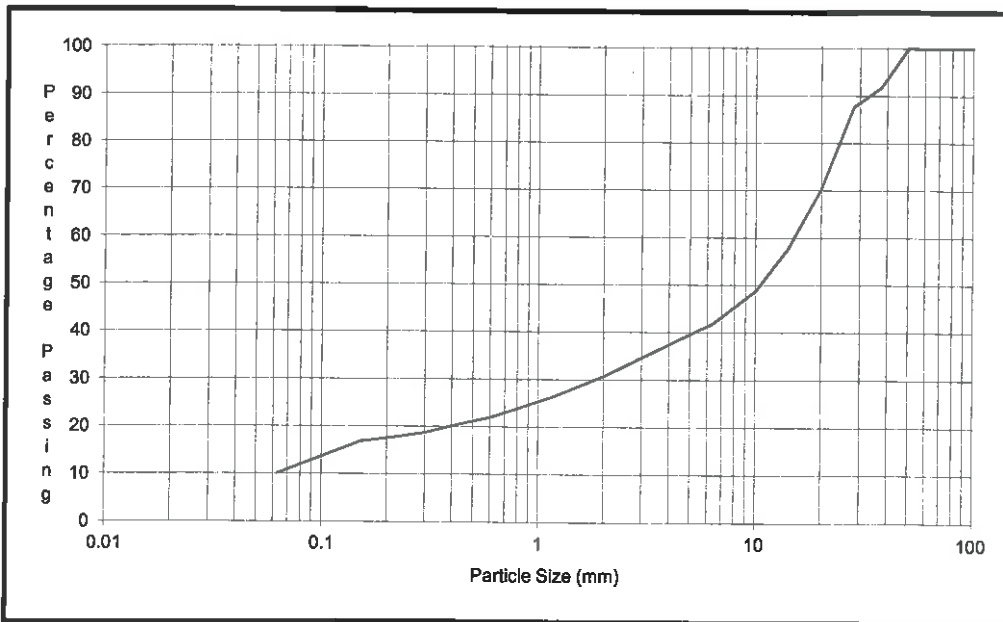
Test Requested: Particle Size Distribution
Test Method: BS 1377-2 : 1990 : Clause 9.2

Sample Details: Sampled and submitted by: Client
 Client Ref: WS1 @ 1.40-1.80m
 Laboratory Ref: 0595/14/04
 Date Received: 14/07/2014

Date Tested: 16/07/2014
 Date Sampled: 11/07/2014
 Type of Sample: Bulk


Visual Description: Brown clayey sandy GRAVEL

Preparation Method : In accordance with BS 1377-1:1990



PARTICLE SIZE	
mm	% Passing
90	100
75	100
63	100
50	100
37.5	92
28	88
20	70
14	58
10	49
6.3	42
5	40
3.35	36
2	31
1.18	26
0.6	22
0.425	20
0.3	19
0.212	18
0.15	17
0.063	10

Comments :

Signed :  Kwaku Baah - Laboratory Manager

For and on behalf of PBA Laboratories



Client: Knapp Hicks & Partners Ltd
Address: Prospect House
 1 Highpoint Business Village
 Henwood, Ashford
 Kent
 TN24 8DH

Report No: 0595/14/MC1
Your Ref: 32399
Report Date: 23/07/2014

Client Contact: Mr Richard Moore
Site: 168 Haverstock Hill

Test Requested: Determination of Moisture Content, Liquid, Plastic Limits & Plasticity Index
Test Method: BS 1377-2: 1990, Test Nos. 3.2; 4.4 (1 point LL); 5.3; & 5.4

Sample Details: Sampled and submitted by: Client
 Date Sampled: 11/04/2014
 Date Received: 14/04/2014
 Date Tested: 16/07/2014

TEST RESULTS:

Laboratory Reference	Client Reference	MC (%)	L.L (%)	P.L (%)	P.I (%)	% Retained on 425µm sieve	Condition of Test	Sample Type
0595/14/01	WS1 @ 1.00m	24	-	-	-	-	Natural	Disturbed
0595/14/02	WS1 @ 1.15-1.20m	-	36	17	19	6	Natural	Disturbed
0595/14/03	WS1 @ 1.40m	12	-	-	-	-	Natural	Disturbed
0595/14/05	WS1 @ 2.00m	27	-	-	-	-	Natural	Disturbed
0595/14/06	WS1 @ 2.50-2.70m	29	72	26	46	0	Natural	Disturbed
0595/14/07	WS1 @ 2.90-3.00m	30	-	-	-	-	Natural	Disturbed
0595/14/08	WS1 @ 3.50-3.65m	31	69	26	43	0	Natural	Disturbed
0595/14/09	WS1 @ 3.90m	30	-	-	-	-	Natural	Disturbed

Visual Descriptions:

Laboratory Reference	Client Reference	Description
0595/14/01	WS1 @ 1.00m	Brown sandy CLAY
0595/14/02	WS1 @ 1.15-1.20m	Brown sandy CLAY with occasional gravel
0595/14/03	WS1 @ 1.40m	Brown sandy CLAY and GRAVEL
0595/14/05	WS1 @ 2.00m	Brown CLAY
0595/14/06	WS1 @ 2.50-2.70m	Brown CLAY
0595/14/07	WS1 @ 2.90-3.00m	Brown CLAY
0595/14/08	WS1 @ 3.50-3.65m	Brown CLAY
0595/14/09	WS1 @ 3.90m	Brown CLAY

.....END OF TEST REPORT.....

Signed:  Kwaku Baah - Laboratory Manager

For and on behalf of PBA Laboratories



Client: Knapp Hicks & Partners Ltd
Address: Prospect House
 1 Highpoint Business Village
 Henwood, Ashford
 Kent
 TN24 8DH

Report No: 0595/14/MC1
Your Ref: 32399
Report Date: 23/07/2014

Client Contact: Mr Richard Moore
Site: 168 Haverstock Hill

Test Requested: Determination of Moisture Content, Liquid, Plastic Limits & Plasticity Index
Test Method: BS 1377-2: 1990, Test Nos. 3.2; 4.4 (1 point LL); 5.3; & 5.4

Sample Details: Sampled and submitted by: Client
 Date Sampled: 11/07/2014
 Date Received: 14/07/2014
 Date Tested: 16/07/2014

TEST RESULTS:

Laboratory Reference	Client Reference	MC (%)	L.L (%)	P.L (%)	P.I (%)	% Retained on 425µm sieve	Condition of Test	Sample Type
0595/14/11	WS1 @ 4.50m	32	-	-	-	-	Natural	Disturbed
0595/14/12	WS1 @ 4.90m	29	-	-	-	-	Natural	Disturbed
0595/14/13	WS1 @ 4.80-5.00m	-	74	24	50	0	Natural	Disturbed
0595/14/14	WS1 @ 5.60-5.75m	30	-	-	-	-	Natural	Disturbed
0595/14/15	WS1 @ 6.00m	30	-	-	-	-	Natural	Disturbed
0595/14/16	WS1 @ 6.80m	30	-	-	-	-	Natural	Disturbed
0595/14/17	WS2 @ 1.25m	31	-	-	-	-	Natural	Disturbed
0595/14/18	WS2 @ 1.50m	32	70	24	46	0	Natural	Disturbed
0595/14/19	WS2 @ 2.00m	29	-	-	-	-	Natural	Disturbed
0595/14/20	WS2 @ 2.25m	29	-	-	-	-	Natural	Disturbed

Visual Descriptions:

Laboratory Reference	Client Reference	Description
0595/14/11	WS1 @ 4.50m	Brown CLAY
0595/14/12	WS1 @ 4.90m	Brown CLAY
0595/14/13	WS1 @ 4.80-5.00m	Brown CLAY
0595/14/14	WS1 @ 5.60-5.75m	Brown CLAY
0595/14/15	WS1 @ 6.00m	Brown CLAY
0595/14/16	WS1 @ 6.80m	Brown CLAY
0595/14/17	WS2 @ 1.25m	Brown CLAY
0595/14/18	WS2 @ 1.50m	Brown CLAY
0595/14/19	WS2 @ 2.00m	Brown CLAY
0595/14/20	WS2 @ 2.25m	Brown CLAY

..... END OF TEST REPORT

Signed:  Kwaku Baah - Laboratory Manager

For and on behalf of PBA Laboratories



Client: Knapp Hicks & Partners Ltd

Report No: 0595/14/MC1

Address: Prospect House
 1 Highpoint Business Village
 Henwood, Ashford
 Kent
 TN24 8DH

Your Ref: 32399

Report Date: 23/07/2014

Client Contact: Mr Richard Moore
Site: 168 Haverstock Hill

Test Requested: Determination of Moisture Content, Liquid, Plastic Limits & Plasticity Index
Test Method: BS 1377-2: 1990, Test Nos. 3.2; 4.4 (1 point LL); 5.3; & 5.4

Sample Details: Sampled and submitted by: Client
 Date Sampled: 11/07/2014
 Date Received: 14/07/2014
 Date Tested: 16/07/2014

TEST RESULTS:

Laboratory Reference	Client Reference	MC (%)	L.L (%)	P.L (%)	P.I (%)	% Retained on 425µm sieve	Condition of Test	Sample Type
0595/14/21	WS2 @ 2.50m	30	69	26	43	0	Natural	Disturbed
0595/14/22	WS2 @ 3.00m	31	-	-	-	-	Natural	Disturbed
0595/14/23	WS2 @ 3.50m	31	72	26	46	0	Natural	Disturbed
0595/14/24	WS2 @ 4.00m	30	-	-	-	-	Natural	Disturbed

Visual Descriptions:

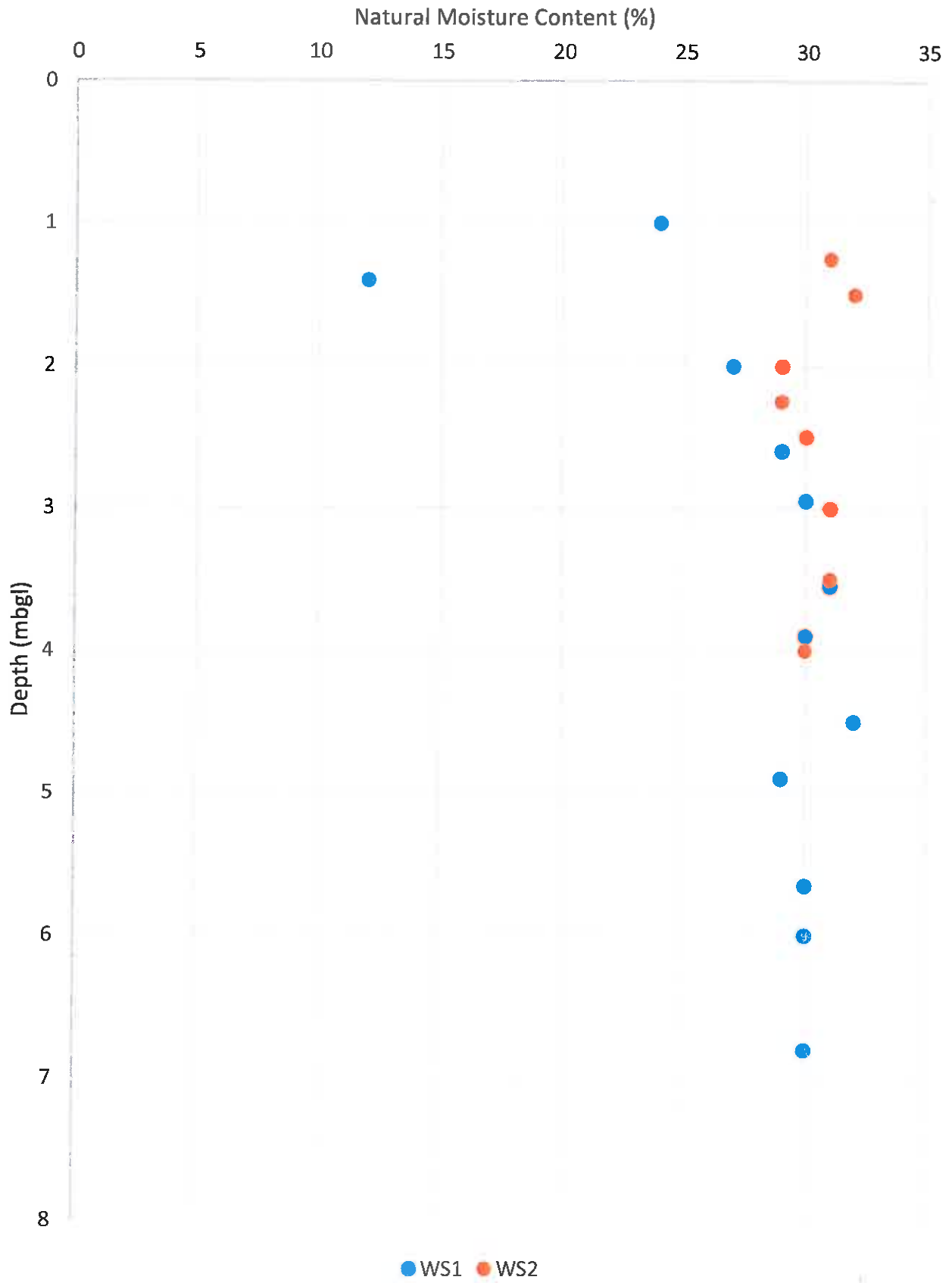
Laboratory Reference	Client Reference	Description
0595/14/21	WS2 @ 2.50m	Brown CLAY
0595/14/22	WS2 @ 3.00m	Brown CLAY
0595/14/23	WS2 @ 3.50m	Brown CLAY with selenite crystals
0595/14/24	WS2 @ 4.00m	Brown CLAY with selenite crystals

.....END OF TEST REPORT.....

Signed:  Kwaku Baah - Laboratory Manager

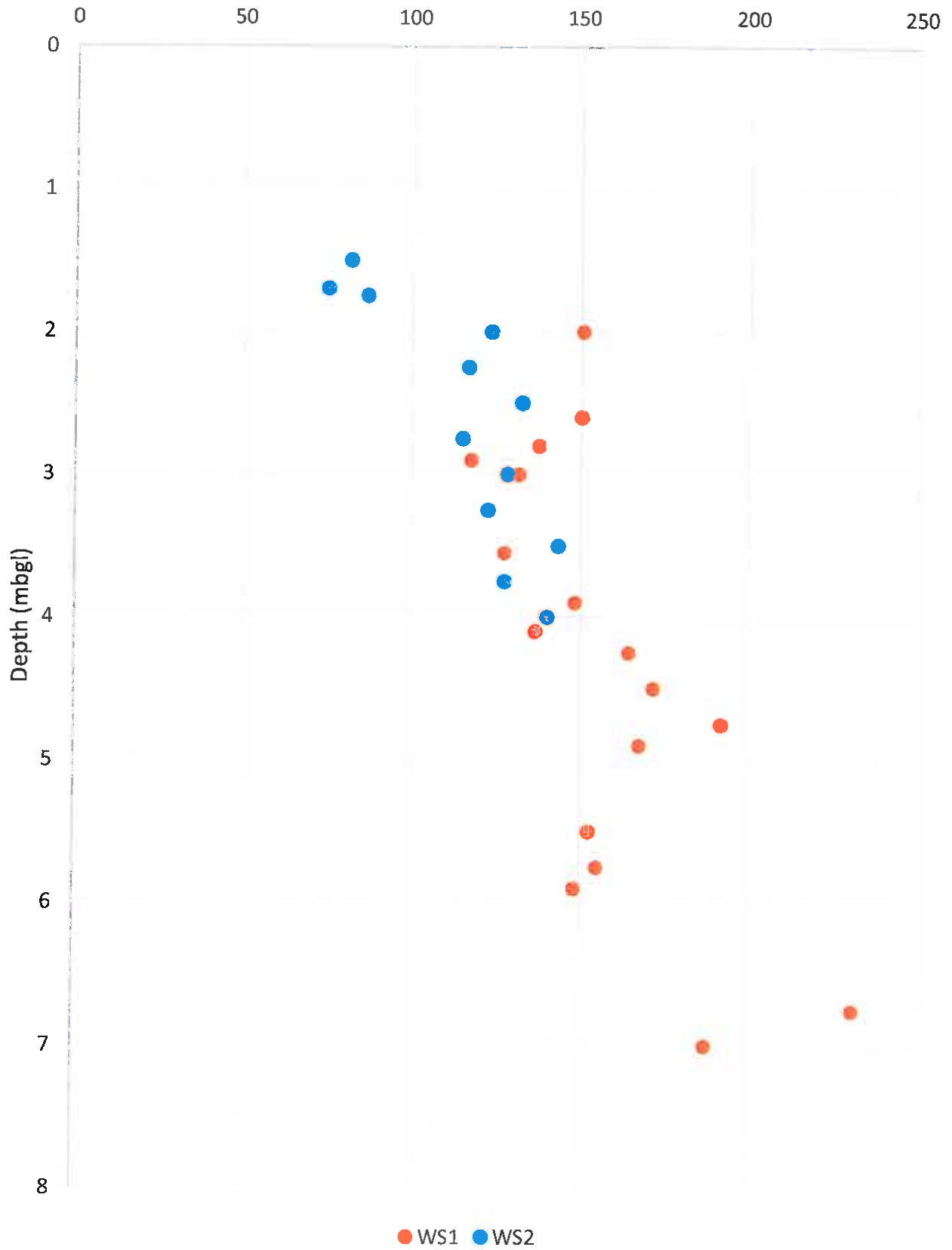
For and on behalf of PBA Laboratories

168 Haverstock Hill, N3



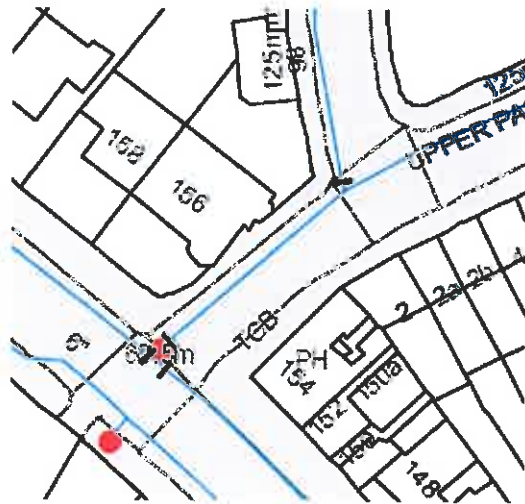
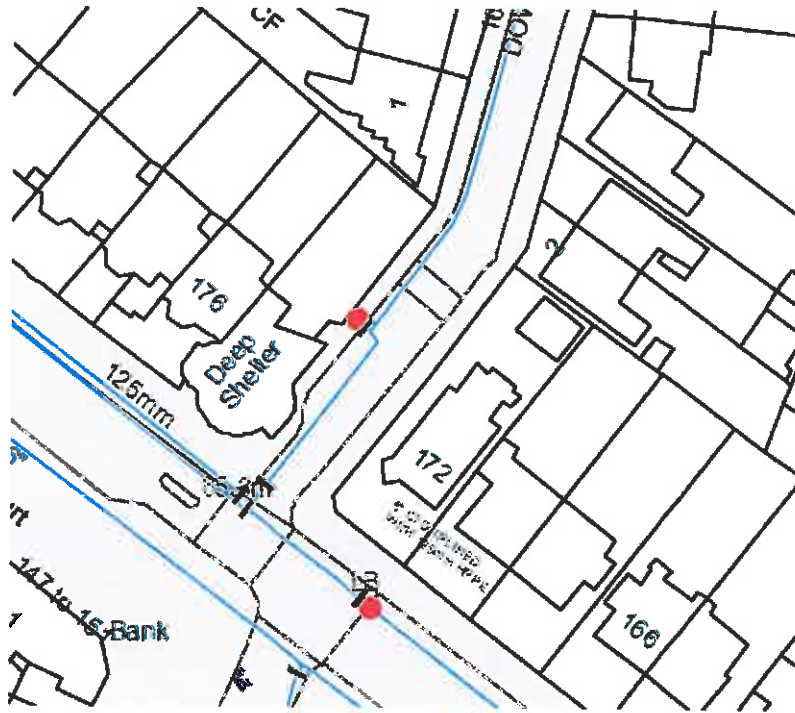
168 Haverstock Hill

KN/m² (Derived from pocket penetrometer measurement)



APPENDIX D

THAMES WATER SEWER RECORDS



Asset Location Search



Jennifer Sturman
Knapp Hicks & Partners Ltd
Kingston House
The Long Barrow
ASHFORD
TN24 0GP

Search address supplied 168
Haverstock Hill
NW3 2AT

Your reference N/A

Our reference ALS/ALS Standard/2014_2826996

Search date 25 July 2014

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk



Asset Location Search



Search address supplied: 168, Haverstock Hill, NW3 2AT

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Asset Location Search



Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TQ2784NW
TQ2785SE
TQ2785SW
TQ2784NE

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

The following quartiles have been printed as they fall within Thames' water area:

Asset Location Search



TQ2784NW
TQ2785SE
TQ2785SW
TQ2784NE

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0845 920 0800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

An invoice is enclosed. Please send remittance to Thames Water Utilities Ltd., PO Box 3189, Slough, SL1 4WW.

Asset Location Search



Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0845 850 2777
Email: developer.services@thameswater.co.uk



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527250,184750

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
0801	n/a	n/a
1902	62.11	58.09
0901	62.91	58.78
0902	n/a	n/a
1901	61.97	57.88
1703	60.66	55.43
1802	61.84	57.63
181A	n/a	n/a
1903	64.43	60.02
181B	n/a	n/a
181C	n/a	n/a
1801	n/a	n/a
2801	61.76	56.43
2904	67.6	62.19
291A	n/a	n/a
2905	64.04	59.84
2903	67.27	62.74
47CA	n/a	n/a
47BI	n/a	n/a
4801	63	58.43
2802	64.04	58.75
3801	64.9	59.53
3803	n/a	n/a
2902	66.47	62.08
3901	69.11	65.48
3602	60.08	n/a
3603	60.03	57.67
4602	57.77	53.04
3604	60.12	55.97
3606	n/a	n/a
361A	n/a	n/a
2701	n/a	n/a
4702	n/a	n/a
37BD	n/a	n/a
47CB	n/a	n/a
47BJ	n/a	n/a
37BE	n/a	n/a
07BJ	n/a	n/a
0501	57.19	n/a
0601	n/a	n/a
0502	n/a	n/a
0602	n/a	n/a
0701	59.18	54.13
151A	n/a	n/a
17CB	n/a	n/a
17CC	n/a	n/a
17CD	n/a	n/a
17CE	n/a	n/a
271A	n/a	n/a
2503	n/a	n/a
2601	n/a	n/a
25BF	n/a	n/a
25BG	n/a	n/a
25BH	n/a	n/a
25BD	n/a	n/a
25BC	n/a	n/a
2501	58.86	52.71
3501	n/a	n/a
25BI	n/a	n/a
3504	57.44	n/a
3505	58.33	n/a
25BB	n/a	n/a
25AJ	n/a	n/a
2504	n/a	n/a
4501	53.89	49.28
3512	n/a	n/a
3511	n/a	n/a
3618	n/a	n/a
3605	59.65	58.06
4601	54.08	52.44
3617	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527750,185250

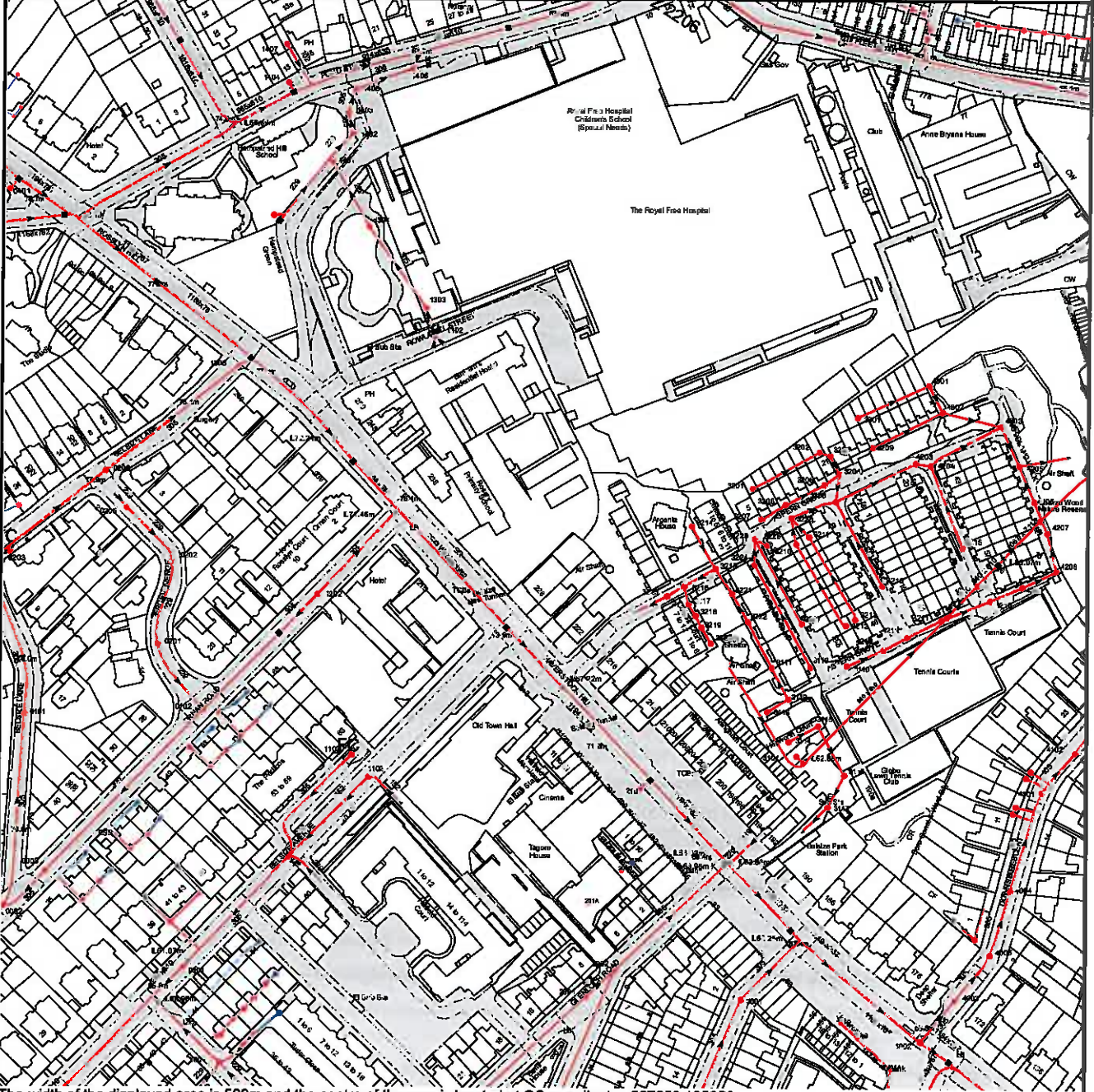
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8203	n/a	n/a
8404	47.21	42.61
9407	n/a	n/a
941A	46.7	42.75
9401	45.55	41.63
6317	n/a	n/a
62AJ	n/a	n/a
63CF	n/a	n/a
62BH	n/a	n/a
62BB	n/a	n/a
6401	51.76	n/a
6301	n/a	n/a
62BD	n/a	n/a
7301	n/a	n/a
741B	50.25	47.06
7302	n/a	n/a
741C	n/a	n/a
741D	n/a	n/a
741A	49.635	46.46
7201	49.3	46.25
8302	n/a	n/a
8304	n/a	n/a
841A	48.57	43.34
82CH	n/a	n/a
82CG	n/a	n/a
82CI	n/a	n/a
82CJ	n/a	n/a
8409	n/a	n/a
821A	n/a	n/a
82CE	n/a	n/a
82DA	n/a	n/a
5302	n/a	n/a
52CH	n/a	n/a
52CG	n/a	n/a
52CD	n/a	n/a
52CC	n/a	n/a
52CE	n/a	n/a
52CB	n/a	n/a
52CA	n/a	n/a
5401	n/a	n/a
5420	n/a	n/a
6416	n/a	n/a
6417	n/a	n/a
6418	n/a	n/a
6306	54.49	50.28
6202	n/a	n/a
6318	n/a	n/a
6203	n/a	n/a
6205	n/a	n/a
6320	n/a	n/a
6319	n/a	n/a
6204	n/a	n/a
62BG	n/a	n/a
63CE	n/a	n/a
63CC	n/a	n/a
62BA	n/a	n/a
62BC	n/a	n/a
54DE	n/a	n/a
5101	61.5	57.66
5104	n/a	n/a
5105	n/a	55.97
5201	n/a	n/a
6102	n/a	n/a
7101	55.44	51.44
711C	53.05	48.63
711E	n/a	n/a
711D	52.22	43.38
711A	n/a	n/a
711B	n/a	n/a
8101	n/a	49.11
82CF	n/a	n/a
81AG	n/a	n/a
81AH	n/a	n/a
81AI	n/a	n/a
81AJ	n/a	n/a
81BA	n/a	n/a
81BC	n/a	n/a
81BB	n/a	n/a
811A	47.9	42.25
9004	47.34	42.85
9005	46.1	43.96
90AB	n/a	n/a
90AC	n/a	n/a
99BD	n/a	n/a

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4203	n/a	n/a
44CE	n/a	n/a
4404	n/a	n/a
4403	n/a	n/a
4301	n/a	n/a
4204	n/a	n/a
4211	n/a	n/a
4302	n/a	n/a
421A	n/a	n/a
44AD	n/a	n/a
4215	n/a	n/a
44AE	n/a	n/a
421B	n/a	n/a
4210	n/a	n/a
44AF	n/a	n/a
4303	n/a	n/a
4205	n/a	n/a
44AG	n/a	n/a
4209	n/a	n/a
4206	n/a	n/a
421C	n/a	n/a
44AH	n/a	n/a
4207	n/a	n/a
4208	n/a	n/a
44AI	n/a	n/a
44AJ	n/a	n/a
3223	n/a	n/a
3216	n/a	n/a
3217	n/a	n/a
3214	n/a	n/a
3218	n/a	n/a
3215	n/a	n/a
3221	n/a	n/a
3222	n/a	n/a
3201	n/a	n/a
3224	n/a	n/a
3225	n/a	n/a
3207	n/a	n/a
3226	n/a	n/a
3206	n/a	n/a
3228	n/a	n/a
3210	n/a	n/a
3227	n/a	n/a
3211	n/a	n/a
3202	n/a	n/a
3205	n/a	n/a
3203	n/a	n/a
3208	n/a	n/a
3204	n/a	n/a
3213	n/a	n/a
3301	n/a	n/a
3209	n/a	n/a
4216	n/a	n/a
44CD	n/a	n/a
1202	75.7	72.49
0202	76.15	73
0203	77.65	74.21
0205	77.44	74.61
02AC	n/a	n/a
0206	n/a	n/a
1306	n/a	n/a
1302	74.88	69.98
1303	73.65	68.84
1304	69.76	66.92
1415	n/a	n/a
0401	n/a	n/a
1401	70.55	64.57
1402	n/a	63.21
041C	n/a	n/a
1403	n/a	63.14
041B	n/a	n/a
1405	n/a	63.07
1404	n/a	n/a
041A	n/a	n/a
1406	n/a	62.88
1407	70.52	68.66
211A	n/a	n/a
4106	n/a	n/a
3117	n/a	n/a
4105	n/a	n/a
4101	64.04	57.4
2101	n/a	n/a
4104	n/a	n/a
3116	n/a	n/a
4103	n/a	n/a
3101	n/a	n/a
4102	n/a	n/a
3114	n/a	n/a
3115	n/a	n/a
3113	n/a	n/a
3112	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3111	n/a	n/a
3119	n/a	n/a
3110	n/a	n/a
4213	n/a	n/a
3220	n/a	n/a
4212	n/a	n/a
3219	n/a	n/a
3212	n/a	n/a
00DD	n/a	n/a
0003	69.82	66.47
00DA	n/a	n/a
00CF	n/a	n/a
01CF	n/a	n/a
01CC	n/a	n/a
01BI	n/a	n/a
01BH	n/a	n/a
01BJ	n/a	n/a
01BG	n/a	n/a
01CE	n/a	n/a
01CD	n/a	n/a
01AH	n/a	n/a
11BI	n/a	n/a
01AI	n/a	n/a
11BH	n/a	n/a
11CC	n/a	n/a
01BB	n/a	n/a
01BA	n/a	n/a
0101	n/a	n/a
01BC	n/a	n/a
0102	73.42	69.31
11CE	n/a	n/a
0201	74.64	71.3
1001	64.47	61.74
00AF	n/a	n/a
00BA	n/a	n/a
10BC	n/a	n/a
00AG	n/a	n/a
0001	65.67	60.94
00CC	n/a	n/a
0002	69.2	65.64
00DC	n/a	n/a
00CD	n/a	n/a
00CB	n/a	n/a
00DB	n/a	n/a
10AD	n/a	n/a
10BD	n/a	n/a
11CD	n/a	n/a
11CB	n/a	n/a
10AB	n/a	n/a
10BE	n/a	n/a
10BI	n/a	n/a
10BF	n/a	n/a
11CA	n/a	n/a
10BG	n/a	n/a
10AC	n/a	n/a
1101	68.22	63.83
1103	72.57	68.58
1102	70.97	68.32
401A	n/a	n/a
4002	64.6	59.54
301B	n/a	n/a
301A	n/a	n/a
3001	68.88	64.64
4003	64.6	59.28
2001	70.38	65.3
2002	70.35	65.04
4005	n/a	n/a
40BB	n/a	n/a
40BA	n/a	n/a
201A	n/a	n/a
4004	64.53	58.25
201B	n/a	n/a

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
6807	56.59	54.92
6806	57.14	55.64
7803	n/a	n/a
7902	54.74	n/a
89AC	n/a	n/a
88BH	n/a	n/a
89AD	n/a	n/a
88CH	n/a	n/a
88CG	n/a	n/a
98CB	n/a	n/a
57BI	n/a	n/a
5801	59.22	53.73
5802	n/a	n/a
5901	58.93	54.97
5903	60.87	56.22
67CH	n/a	n/a
67CB	n/a	n/a
67CD	n/a	n/a
67CI	n/a	n/a
67CC	n/a	n/a
67CE	n/a	n/a
6810	55.62	54.7
6703	54.98	51.63
67CJ	n/a	n/a
67CF	n/a	n/a
6811	n/a	54.54
67CG	n/a	n/a
6809	56.21	54.49
6705	54.81	52.51
7801	55.51	53.36
7703	n/a	n/a
7701	52.25	48.57
87AD	n/a	n/a
88AF	n/a	n/a
87AC	n/a	n/a
88AG	n/a	n/a
88AJ	n/a	n/a
88AI	n/a	n/a
87AF	n/a	n/a
87AG	n/a	n/a
88BI	n/a	n/a
88AH	n/a	n/a
6601	n/a	n/a
56DA	n/a	n/a
56CJ	n/a	n/a
56BF	n/a	n/a
56BE	n/a	n/a
56AC	n/a	n/a
5604	55.41	n/a
6701	n/a	n/a
57DA	n/a	n/a
67BH	n/a	n/a
67CA	n/a	n/a
5701	56.91	52.16
57AG	n/a	n/a
57AJ	n/a	n/a
57BH	n/a	n/a
6501	49.63	44.53
7505	50.47	45.31
7603	51.36	48.8
7501	47.41	43.53
7602	n/a	n/a
8502	42.65	39.47
8605	49.64	46.09
861B	n/a	n/a
861C	n/a	n/a
861D	n/a	n/a
8504	42.95	39.17
8603	49.14	44.99
861A	n/a	n/a
8506	43.11	38.89
9601	n/a	n/a
9602	n/a	n/a
5601	54.08	52.44
5614	n/a	n/a
5615	n/a	n/a
561A	n/a	n/a
98CC	n/a	n/a
9907	50.82	46.8
99DF	n/a	n/a
99DB	n/a	n/a
99DC	n/a	n/a
9803	50.34	n/a
99DD	n/a	n/a
9901	45.63	42.53
99BE	n/a	n/a
98EF	n/a	n/a
99BF	n/a	n/a
99BG	n/a	n/a
99BH	n/a	n/a
99BI	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
99BJ	n/a	n/a
99CA	n/a	n/a
99BC	n/a	n/a
99BB	n/a	n/a
9902	45.34	42.95
98DG	n/a	n/a
88CA	n/a	n/a
88CB	n/a	n/a
88CC	n/a	n/a
88BA	n/a	n/a
88BJ	n/a	n/a
87BB	n/a	n/a
88DD	n/a	n/a
87AE	n/a	n/a
88BB	n/a	n/a
88BE	n/a	n/a
87AH	n/a	n/a
87AI	n/a	n/a
88BG	n/a	n/a
88DE	n/a	n/a
88CD	n/a	n/a
87BA	n/a	n/a
88BF	n/a	n/a
88CE	n/a	n/a
88BD	n/a	n/a
87AJ	n/a	n/a
88BC	n/a	n/a
88CI	n/a	n/a
87BC	n/a	n/a
88DF	n/a	n/a
88CJ	n/a	n/a
88DA	n/a	n/a
88CF	n/a	n/a
97BJ	n/a	n/a
98EE	n/a	n/a
97CE	n/a	n/a
97DB	n/a	n/a
97DE	n/a	n/a
98EC	n/a	n/a
97BI	n/a	n/a
97CD	n/a	n/a
97DF	n/a	n/a
97DG	n/a	n/a
97BH	n/a	n/a
98CH	n/a	n/a
98CI	n/a	n/a
98CJ	n/a	n/a
98DA	n/a	n/a
98DD	n/a	n/a
98DE	n/a	n/a
98DF	n/a	n/a
88DG	n/a	n/a
98BJ	n/a	n/a
98CA	n/a	n/a
98BI	n/a	n/a
98BH	n/a	n/a
98CE	n/a	n/a
98CD	n/a	n/a
98BA	n/a	n/a
98CF	n/a	n/a
98CG	n/a	n/a
98BB	n/a	n/a
98AJ	n/a	n/a
98BF	n/a	n/a
9703	48.19	n/a
9802	49.53	n/a
9702	n/a	n/a
97DJ	n/a	n/a
97EA	n/a	n/a
9701	43.09	38.35
97EB	n/a	n/a
97ED	n/a	n/a
97EC	n/a	n/a
97CB	n/a	n/a
98ED	n/a	n/a
97CF	n/a	n/a
97CA	n/a	n/a
97CC	n/a	n/a
9501	40.21	36.45
9502	37.1	35.88

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ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Trunk Surface Water
	Trunk Foul
	Storm Relief
	Trunk Combined
	Bio-solids (Sludge)
	Proposed Thames Surface Water Sewer
	Proposed Thames Foul Sewer
	Gallery
	Surface Water Rising Main
	Proposed Thames Water Rising Main
	Vacuum

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'ns' or 'v' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Cutoff on a surface water sewer indicates that the pipe discharges into a stream or river.

	Outfall
	Undefined End
	Inlet

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

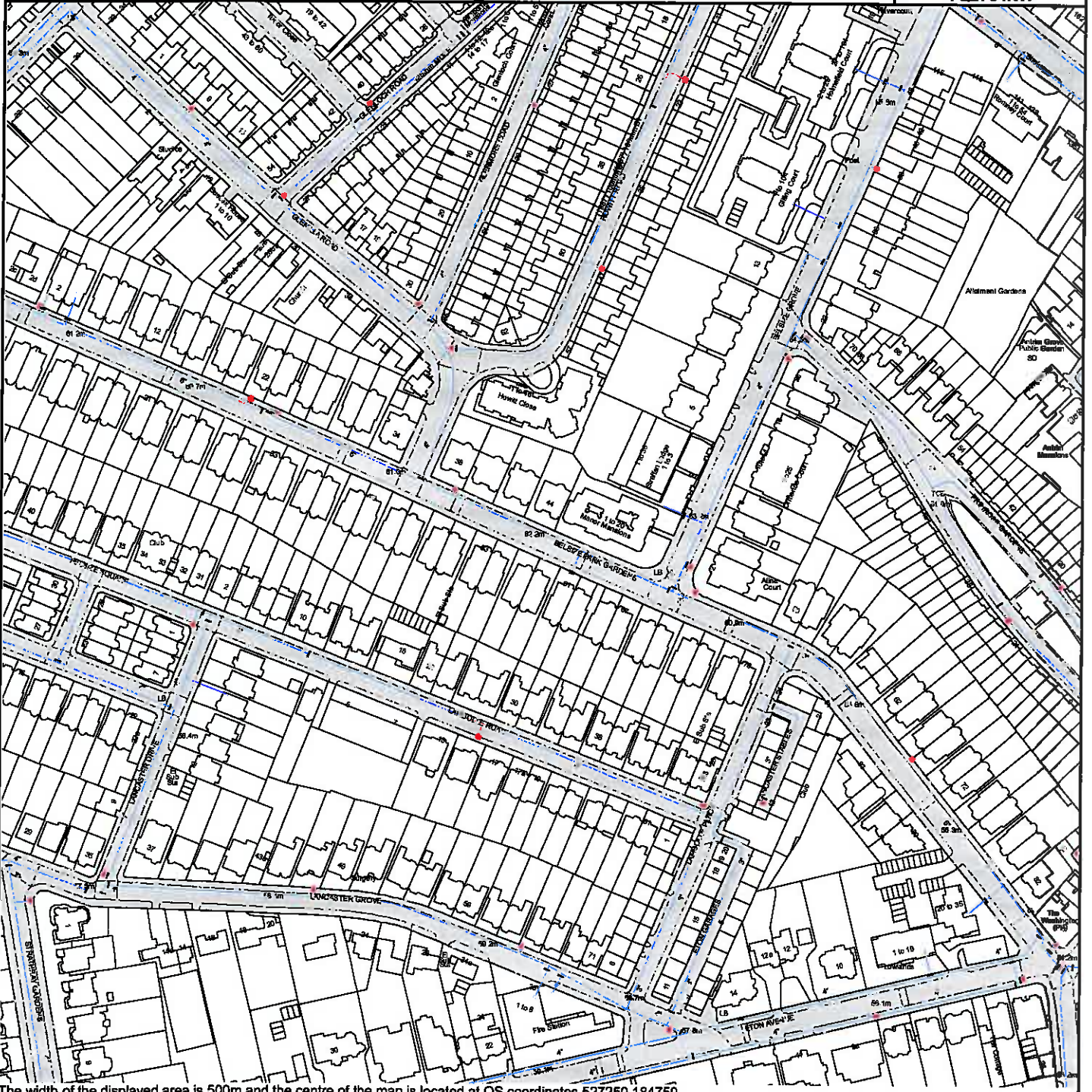
Other Symbols

Symbols used on maps which do not fall under other general categories

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit
	Areas
	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer
	Combined Sewer
	Culverted Watercourse
	Surface Water Sewer
	Gully
	Proposed
	Abandoned Sewer



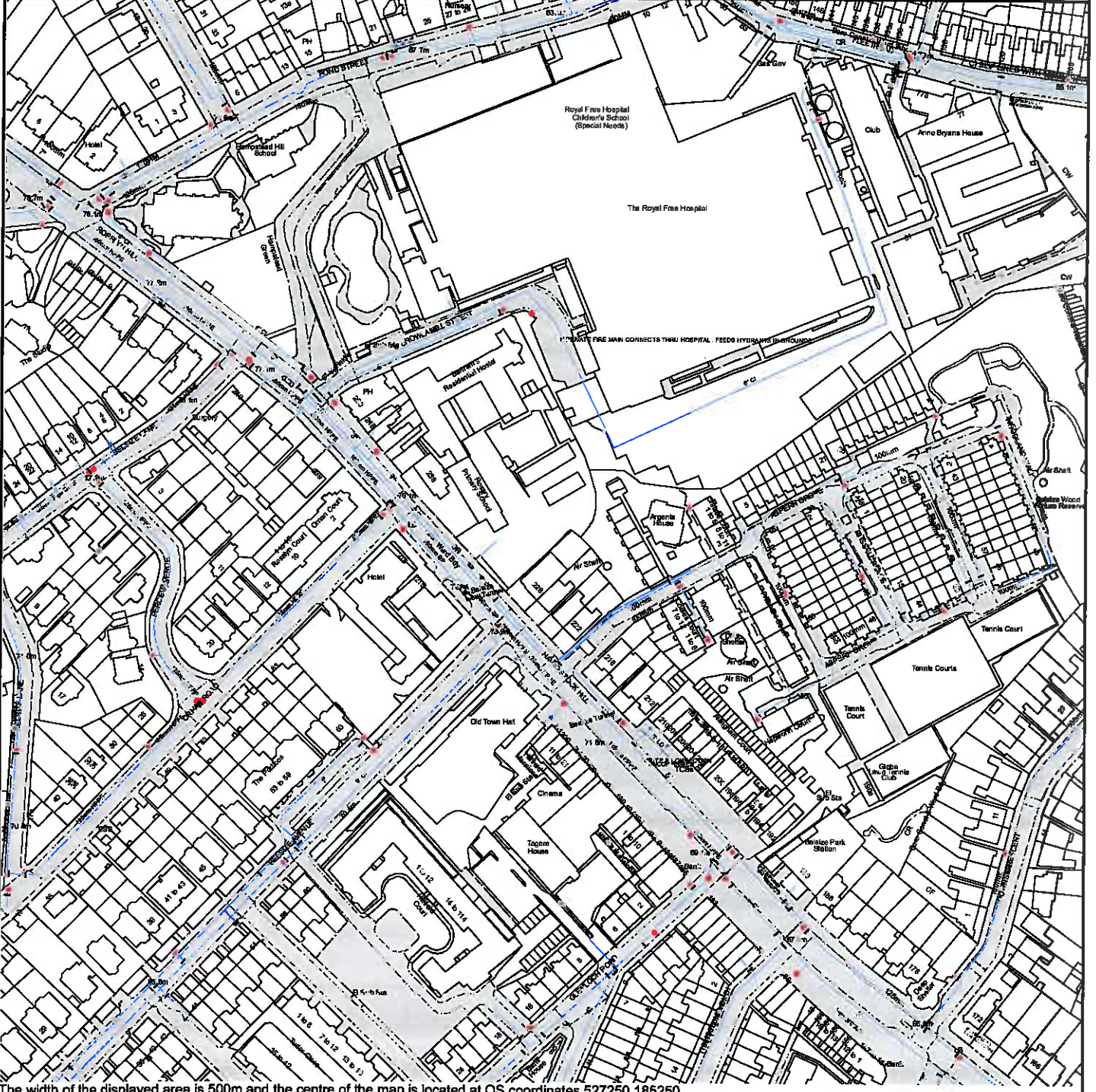
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527250,184750
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527750,185250

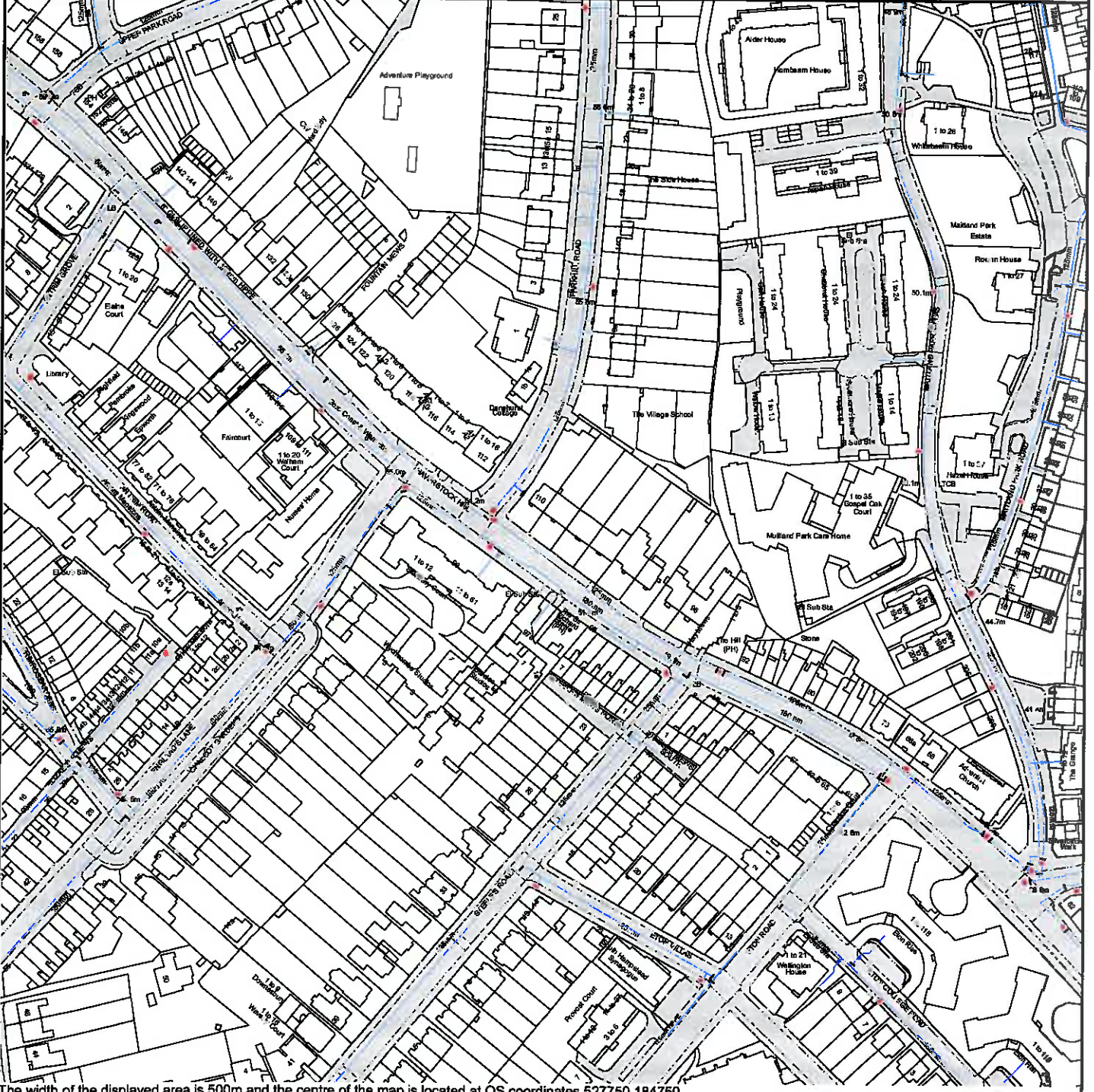
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 527750,184750



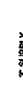


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ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

- 
d
Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
- 
t
Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
- 
s SUPPLY
Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.
- 
f FIRE
Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
- 
m METERED
Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.


- 
Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
- 
Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

-  General Purpose Valve
-  Air Valve
-  Pressure Control Valve
-  Customer Valve

Hydrants







-  Single Hydrant

Meters










-  Meter

End Items

Symbol indicating what happens at the end of a water main.

-  Blank Flange
-  Capped End
-  Emptying Pit
-  Undefined End
-  Manifold
-  Customer Supply
-  Fire Supply



Operational Sites

-  Booster Station
-  Other
-  Other (Proposed)
-  Pumping Station
-  Service Reservoir
-  Shaft Inspection
-  Treatment Works
-  Unknown
-  Water Tower

Other Symbols

-  Data Logger

Other Water Pipes (Not Operated or Maintained by Thames Water)

-  **Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
-  **Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0845 9200 800.

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to him at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking	Cheque
Call 0845 070 9148 quoting your invoice number starting CBA or ADS.	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

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