BASEMENT IMPACT ASSESSMENT

FOR

PROPOSED DEVELOPMENT

AT

9 DOWNSHIRE HILL
LONDON
NW3 1NR

FOR

RINGLINE PROPERTIES LIMITED

Project No. P1917

Issue Date: 11 April 2012
Document Reference: P1917/ IH/ Issue 3
REVISED TO INCORPORATE RESULTS OF GROUND MOVEMENT STUDY

CONSULTING ENGINEERS

Foundation House, 4 Percy Road London N12 8BU
Tel 020 8445 9115 Fax 020 8446 9788
E–mail mail@maengineers.com

CONTENTS

EXECUTIVE SUMMARY

This executive summary is an overview of the key findings of the report, and the full body of the report should also be consulted for further detail and to give appropriate context.

Brief

This report was commissioned by Ringline Properties Limited and has been prepared to accompany the Planning Application. It was prepared by Michael Alexander Consulting Engineers and compiled by a Chartered Structural Engineer. It follows the approach laid out in Camden Planning Guidance 'Basements and Lightwells' CPG4 (April 2011) for the Basement Impact Assessment. It is to be read in conjunction with Metropolitan Development Consultancy proposals.

Project Description

9 Downshire Hill is a four storey residential property constructed in the early nineteenth century. The proposed works involve the demolition of the existing property and to rebuild a 5 storey property including a lower ground floor and basement below.

Screening Results

A screening exercise was carried out in accordance with the recommendations of CPG4 in respect of groundwater flow; land stability and surface flow/flooding. Reference was made to the Camden Geological, Hydrogeological and Hydrological Study and other data sources.

In respect of groundwater flow, the underlying soil is not an aquifer but interflow has been encountered within the shallow made ground. The site is not in close proximity to any surface or subsurface water features, but there is a potential spring line on the nearby stratigraphic boundary.

With regards to ground stability the screening process highlighted a number of issues which are regularly associated with the construction of basements in London Clay, in close proximity to adjoining buildings.

The screening for impact on surface water flow noted that the impermeable area of the site would be increased by the proposals, and the approach for surface water drainage would need a more detailed review.

The area was not affected by the 1975 or 2002 floods nor is the site at risk of flooding from rivers or reservoirs. Therefore it will not be necessary to prepare a detailed flood risk assessment

Scoping

The results of the screening exercise were used to check the scope of the investigations which had been previously carried out on the site. The scope of these investigations was found to be sufficient.

A hydrologist was commissioned to address certain aspects in relation to Groundwater and Surface Water Flow/Flooding.

Site Investigation and Study

The results of previous site soil investigations were reviewed and considered to provide adequate data.
Specialist reports were commissioned to cover Groundwater flows, Surface water considerations, and modelling of Ground Movements.

Basement impact assessment

The impact assessment in respect of Ground Stability and the outline construction method statement highlighted measures that will be taken to reduce water ingress into the basement during excavation and to minimise any ground movements. Other issues raised at scoping stage were found to be addressed by the proposed construction methodology.

Ground movements were assessed using both computer analyses and hand methods, using conservative assumptions as to the level of adjoining foundations. The results of these analyses were used to predict possible damage in accordance with the method outlined by Burland. The worst case predicted damage was category 2 (Slight) for walls running perpendicular to the party walls, which is within normally acceptable levels.

1.00 INTRODUCTION

1.01 Michael Alexander Consulting Engineers has been appointed to prepare a Basement Impact Assessment to support the Planning Application for proposed new house at 9 Downshire Hill, London NW3 1NR.

1.02 This report has been prepared by Isaac Hudson MEng MA(Cantab) CEng MIStructE, a Chartered Structural Engineer.

1.03 The proposed works involve the demolition of the existing property and to rebuild a 5 storey property including a lower ground floor and basement below.

1.04 The existing property is a detached dwelling dating from the early 19th century, formerly comprising accommodation to the lower ground floor, ground 1st and 2nd floor, but now derelict. The external walls are constructed from solid masonry and the internal walls are a combination of masonry and load bearing timber stud walls. The upper floors and the roof are of timber construction.

1.05 The existing property is located within the Hampstead Conservation Area.

1.06 The existing property is a grade II Listed building.

1.07 The properties located on the north side of Downshire Hill are generally 3-4 storey detached residential properties. The properties to the south side are generally 2-3 storey detached properties. The properties located closest to Rosslyn Hill are 3-4 storey terraced properties.

1.08 This document addresses the specific key issues in DP27 as described in Camden Planning Guidance CPG 4 (April 2011) in terms of the screening exercise.

2.00 BASEMENT PROPOSALS

2.01 The details of the existing building and proposals for the basement and upper floors are shown on Metropolitan Development Consultancy drawings, as follows:-

7412/06F - Proposed Basement Plan
7412/07H - Proposed Lower Ground Floor Plan
7412/10H – Proposed Roof Plan
7412/11D – Proposed Front Elevation
7412/12D – Proposed Rear Elevation
7412/13D – Proposed Side Elevation
7412/23B – Proposed Section A-A
7412/24A – Proposed Section D-D
7412/25B – Proposed Section B-B
7412/26 – Proposed Rooflight Details

2.02 The design and construction of the building structure shall be in accordance with current Building Regulations, British Standards, Codes of Practice, Health and Safety requirements and good building practice.

3.00 GROUNDWATER

3.01 STAGE 1 (SCREENING)

3.01.1 The impact of the proposed development on ground water flows is considered here as outlined in Camden Planning Guidance CPG 4 (April 2011). The references are to the screening chart Figure 1 in CPG4.

3.01.2 (Q1a) With reference to the Camden Geological, Hydrogeological and Hydrological Study (Figure (a) in Appendix A) the site is above an unproductive strata.

3.01.3 (Q1b) However, with reference to local standpipe records, there is evidence that groundwater interflow may be encountered above the level of the proposed basement.

3.01.4 (Q2) With reference to the Camden Geological, Hydrogeological and Hydrological Study, (Refer Figures (b) and (c) in Appendix A), the nearest watercourse is the Hampstead Heath Pond Chain which runs approximately 300m to the east of the site. The River Fleet also flows through the ponds and is therefore also 300m to the east of the site. The site is located close to a stratigraphic boundary which is a potential spring line.

From the British Geological Society 'Geoindex' (Refer Figure (j) in Appendix A) the nearest water well is located on South End Road approximately 250m to the east of the site. A further water well is located on Hampstead High Street approximately 250m to the west of the site.

3.01.5 (Q3) With reference to the Camden Geological, Hydrogeological and Hydrological Study, the site is not within the catchment of the pond chains on Hampstead, nor the Golder's Hill Chain.

3.01.6 (Q4) The surface permeability of the site will be affected by the proposals. There is an increase in the footprint of the building and hardstanding areas throughout the site.

3.01.7 (Q5) Soakaways are not considered appropriate to the site, due to the sub-soil conditions, and therefore no collected surface water will be discharged to ground as part of the site drainage.

3.01.8 (Q6) There are no local ponds in close vicinity to the site. There is a potential spring line on the stratigraphic boundary between the London Clay and Claygate Member to the west and north west of the site.

3.01.9 On the basis of items 3.01.2 to 3.01.8 above and in reference to Figure 1 of CPG4, the aspects carried forward to the scoping stage in respect of ground water are:

- The basement being below the level of local perched groundwater (Q1b)
- The site being adjacent to a potential spring line (Q2)
- The decrease in surface permeability (Q4)

It is not considered necessary to consider further the other issues raised in the screening stage where a negative response was given.

3.02 STAGE 2 (SCOPING)

3.02.1 With reference to the Camden Geological, Hydrogeological and Hydrological study Appendix F2, the potential impacts which will need to be considered will include:-

- Whether the basement works will affect the groundwater flow regime and hence increase or decrease the groundwater level locally.
- Whether there are any spring lines which will affect the site
- Whether the increase in hard standing will change the ground water levels

3.02.2 We have reviewed the scope of investigations carried out by Concept Site Investigations in April 2009 and December 2009, and confirm that it is sufficient to establish the existing groundwater flow regime.

3.02.3 A hydrological study by SLR Consulting Limited was also commissioned to advise comment on the existing groundwater flows and to prepare the impact assessment.

3.03 STAGE 3 (SITE INVESTIGATION AND STUDY)

3.03.1 Site soil investigations were carried out by Concept Site Investigations in March 2009 and December 2009 – refer their reports reference 09/2188 FR03 and 09/2238 FR03

3.03.2 During the ground investigation works, the level of water strikes were recorded as they were encountered in the boreholes and observation pits. Standpipes were then installed in the boreholes and sample of the window sample bores. Return monitoring visits were made to check stabilised levels.

3.03.3 The water levels were found to vary both from location to location and from visit to visit suggesting that the water encountered was the result of interflow rather than a static water table.

3.04 STAGE 4 (IMPACT ASSESSMENT)

3.04.1 The impact assessment in respect of Ground Water flows is addressed in SLR Consulting Limited's letter report 'Groundwater Assessment' reference SLR 401-3774-00001

3.04.2 Refer also Michael Alexander's drawing P1917/100 rev P2 'Proposed Weir for Passive Relief Measures', included in Appendix D

4.00 GROUND STABILITY

4.01 STAGE 1 (SCREENING)

4.01.1 The impact of the proposed development on land stability is considered here as outlined in Camden Planning Guidance CPG 4 (April 2011). The references are to the screening chart figure 2 in CPG4.

4.01.2 (Q1) The site slopes from the rear towards the front by approximately 6 degrees. Across the site, there is a 2 degree slope and therefore no slopes within the site either natural or manmade are greater than 7 degrees.

4.01.3 (Q2) The surrounding land will generally remain at existing slopes in the permanent condition.

4.01.4 (Q3) With reference to the Camden Geological, Hydrogeological and Hydrological Study, (Refer Figure (i) in Appendix A), the neighbouring properties also have slopes less than 7 degrees.

4.01.5 (Q4) Generally the wider hillside setting is sloping at less than 7 degrees. However with reference to the Camden Geological, Hydrogeological and Hydrological Study (Refer Figure (i) in Appendix A), the ground level slopes down towards the east of the site at the junction with Keats Grove by more than 7 degrees.

4.01.6 (Q5) The underlying soil strata is London Clay, and with reference to Camden Geological, Hydrogeological and Hydrological Study (Refer figure (e) in Appendix A).

4.01.7 (Q6) A number of trees within the footprint of the proposed basement or immediately adjacent will be removed as part of the works. Refer MDC drawings and arboricultural report by Arbtech reference 80210.

4.01.8 (Q7) The London Clay strata is usually classified as having a high volume change potential and hence can lead to seasonal shrink-swell subsidence where buildings are founded in desiccated soils. We have however no specific evidence of subsidence having been experienced on site or in the immediate surrounding area.

4.01.9 (Q8), (Q11) With reference to the Camden Geological, Hydrogeological and Hydrological Study, (refer Figures (b) and (c) in Appendix A), the nearest surface water is the Hampstead Heath Pond Chain which runs approximately 300m to the east of the site. The River Fleet is also runs through the ponds and is located 300m to the east of the site, and are therefore not considered close to the site.

The site is remote from the Hampstead Heath Ponds. As the site is located around 130m to a stratigraphic boundary, the local geology suggests that the site is within close proximity of a potential spring line.

4.01.10 (Q9) The site is not in the vicinity of any recorded areas of worked ground. With reference to the Camden Geological, Hydrogeological and Hydrological Study (Refer figure (e) in Appendix A) the nearest recorded on the geological map is located to the south of West Heath Road and to the east of Branch Hill approximately 800m to the north-west of the site.

4.01.11 (Q10) With reference to the Camden Geological, Hydrogeological and Hydrological Study (Refer figure (a) in Appendix A) and the Environment Agency, the site is above an unproductive strata. However there is evidence of perched ground water within the made ground.

4.01.12 (Q12) The basement extension is approximately 4m from the footway adjacent to Downshire Hill, around 6m from the road itself.

4.01.13 (Q13) Due to the depth of the basement, the works will increase the differential depth of foundations relative to the adjacent buildings.

4.01.14 (Q14) With reference to the British Geological Survey 'Geoindex' (Refer figure (j) in Appendix A), there are no National Rail tunnels located below the site. The nearest National Rail line is located approximately 150m to the south of the site. With reference to tubemap.org (Refer figure (d) in Appendix A, the London Underground line also runs close to the site and is located approximately 120m to the west of the property.

4.01.15 On the basis of items 4.01.2 to 4.01.14 above and with reference to Figure 2 of CPG4, the aspects that should be carried forward to a scoping stage in respect of land stability are:

- Ground slopes greater than 7 degrees in the vicinity of the site (Q4)
- The removal of existing trees (Q6)
- The risk of potential subsidence due to the underlying subsoils being London clay (Q5, Q7)
- The site being adjacent to a potential spring line (Q8)
- The potential for encountering perched ground water during excavation (Q10)
- The proposed basement being within 5m of the public highway (Q12)
- The increase in foundation depth relative to the Adjoining Owners' foundations (Q13)

It is not considered necessary to consider further the other issues in the screening stage where a negative response was given.

4.02 STAGE 2 (SCOPING)

4.02.1 With reference to the Camden Geological, Hydrogeological and Hydrological study Appendix F3, the potential impacts which will need to be considered will include:-

- The potential risk of slope instability in the vicinity where existing slopes are greater than 7 degrees.
- The potential for soil swelling following removal of existing trees
- The risk of shrink swell subsidence and heave due to the presence of London Clay
- The potential impact on soil stability due to nearby spring lines
- Whether any de-watering required to construct the basement will cause ground settlement
- The potential for structural damage to neighbouring properties during excavation of the basement
- The potential for damage to the public footway or the services contained therein.

4.02.2 We have reviewed the scope of investigations carried out by Concept Site Investigations in April 2009 and December 2009, and confirm that it is sufficient to enable the above impacts to be assessed.

4.03 STAGE 3 (SITE INVESTIGATION AND STUDY)

4.03.1 Two site investigations have been carried out on the site by Concept Site Investigations. The first in April 2009 comprised a deep borehole, window samples and observation pits. The supplementary investigation in December 2009 comprised 2 further boreholes, static cone penetration tests, and an additional observation pit.

In addition further trial pits were excavated against the party/boundary walls in December 2011.

4.03.2 The ground conditions were found to be a moderate thickness of made ground over London Clay.

4.03.3 Groundwater was encountered in the standpipes installed in the boreholes and window samples – refer detailed description in section 3.03

4.03.4 Existing foundations of the adjoining buildings and boundary walls were recorded to enable these to be shown on the structural drawings and the foundation levels modelled in subsequent ground analyses.

4.03.5 The ground was found to have elevated levels of sulphate so concrete in contact with the ground will need to be specified appropriately to provide adequate resistance.

4.03.6 Arup prepared an interpretative report (reference 123323-02/rev D) following the results of the site soil investigation. The report makes recommendations regarding basement excavation and foundation design.

4.03.7 Following the receipt of the geotechnical information a specialist 'Ground Movement and Building Damage Assessment' has been commissioned to advise quantitatively on the likely ground movements and assess impact on the adjoining properties. The report will be prepared by Byland Engineering, a specialist geotechnical consultancy.

4.03.8 In accordance with the requirements of CPG4, if the building damage category predicted by the analysis is 'moderate' or greater then mitigation measures will be required to the design.

4.04 STAGE 4 (IMPACT ASSESSMENT)

4.04.1 This Impact Assessment in respect of ground stability covers the general requirements outlined in CPG4 and also addresses the specific issues raised in the screening and scoping stages.

4.04.2 The approach for maintaining ground stability during the works is demonstrated by the outline method statement given in Section 6.0.

4.04.3 The basement will be founded within the London Clay subsoils and there is a potential for uplift forces acting on the basement, due to heave recovery of the soil; there is also the possibility of hydrostatic pressures due to the potential groundwater flows in the made ground. The uplift forces will be resisted by a combination of the self weight of the structure, the perimeter piles, and a grid of tension piles under the raft slab.

4.04.4 The design of the new structure and, in particular the substructure, will take into account the close proximity of adjoining buildings. Those parts of the adjoining properties which are particularly close to the proposed basement construction will be continually monitored during the substructure works. The monitoring will be carried out using high accuracy measuring devices.

The potential for ground movements has been evaluated in detail by the preparation of a Ground Movement and Building Damage Assessment. This assessment will be based on the approach laid out in CIRIA Report C580 and use a combination of hand calculation and computer analysis.

The tensile strains output from analysis for both pile installation and excavation operations have been combined to assess the potential impact. The assessment identifies likely damage to adjoining buildings, using the method developed by Burland which classify the extent of cracking likely to be encountered by means of 'damage categories'.

4.04.5 For the walls listed in table 4.04.5, the predicted category of damage was greater than Category 0 'Negligible', as defined by Burland: -

Property	Wall	Damage Category
8 Downshire Hill	Rear wall of No. 8 extension	Cat 2 'Slight'
	Rear elevation of no. 8	Cat 2 'Slight'
10 Downshire HIll	Rear wall of No. 10 garage	Cat 2 'Slight'
	Rear elevation of no. 10	Cat 2 'Slight'

Table 4.04.5 Building Damage Summary from Byland Engineering report

The rear elevations are considered to be a worst case although the predicted ground movements adjacent to the front elevations will be of a similar order.

4.04.6 The predicted strains induced in the walls range from the negligible to the slight category and well below the moderate category at which mitigation measures must be considered as outlined in CPG4

4.04.7 The report highlights the necessarily conservative assumptions taken in the analysis, which mean that the analysis results are likely to be an upper bound on the movements and hence damage that will be experienced. Specifically: -

- The assessment is likely to be conservative as it considers the ground surface movements at a level of 78mOD. In practise the level of the foundations of the neighbouring properties will be somewhat deeper than 78mOD and as such the foundations themselves may experience less deflection than quoted in the analysis

- It is understood that the modern extension to no. 8 Downshire Hill is supported on piled foundations which is less likely to affected by ground level displacements.

4.04.8 A key consideration in limiting total movements will be the early installation of an effective prop to the structure close to ground level ('high level' as described in CIRIA C580). This will generally be achieved by the use of steel props spanning across the excavation or across its corners.

Capping beams will be installed to the top of the piled retaining walls and the top sections of the underpinning will be similarly reinforced to span laterally between prop locations and the lines of return piles. The props and capping beam will be installed prior to significant excavations being undertaken.
A limit of excavation prior to propping of 1 metre depth is usually found to limit pre-propping deflections to acceptable levels whilst permitting practical working room to construct the capping beams.

4.04.9 Overburden loads applied at ground level adjacent to excavations can increase pile deflections. The construction method will be interrogated to ensure this is avoided within the site boundaries. Beyond the boundaries the areas adjacent to the basement are generally paths or soft landscaping so there are unlikely to be significant 'live' overburdens occurring during the excavation work in these areas. Where adjoining buildings are adjacent to the proposed basement then the surcharge to the soils will be included in the design of the permanent and temporary works.

4.04.10 The following further issues were highlighted by the scoping stage and are discussed here:

- Generally the slopes of the ground within the site, within the adjoining properties and uphill from the site are less than the 7 degrees at which CPG4 suggests further consideration of slope stability is required. The area shown to have a slope greater than 7 degrees is downhill from the site so the excavation of the basement should not have any adverse effects on the slope stability of this ground.

- The removal of trees could increase soil moisture levels and hence lead to swelling of cohesive subsoils. The trees outlined to be removed are generally within the basement footprint and hence the affected soils will be removed as part of the basement excavation. Other trees being removed on the perimeter of the basement are remote from adjoining buildings so any swelling of the subsoils is unlikely to impact on existing foundations.

- The proposed basement will not be affected by seasonal movements of the London Clay strata since the founding level of the proposed raft foundation is below the influence of any trees. As described in section 0 any heave of the subsoil due to unloading will be resisted by the weight of the proposed building and by the use of tension piles beneath the basement raft.

- The scoping stage raised the concern that any changes to the groundwater flow regime could impact on soil stability. As outlined in section 3.03-3.04, any interflow within the made ground will be collected to the rear of the building and then redistributed within the front garden. Since these water flows within the made ground will remain essentially as before there should not be any consequent impact on ground stability.

- Excessive water ingress into the basement excavation could cause general de-watering of the surrounding sub-soils which could lead to foundation movements for the adjoining buildings. For this reason a secant piled retaining wall has been proposed for perimeter of the basement excavation.

  The toes of the secant piles will be into the impermeable London Clay subsoils and hence water ingress from the surrounding soils into the basement excavation will be limited.

- The methods proposed should reduce the risk of any damage to the public footway or the services contained therein. The footway will be scanned for services prior to works commencing so that the depth and location of services can be reflected in the Contractor's detailed method statements.

5.0 SURFACE FLOW AND FLOODING

5.01 STAGE 1 ASSESSMENT (SCREENING)

5.01.1 The impact of the proposed development on the surface water environment and whether a flood risk assessment is required is considered here as outlined in Camden Planning Guidance CPG 4 (April 2011). The references are to the screening chart figure 3 in CPG4.

5.01.2 (Q1) With reference to the Camden Geological, Hydrogeological and Hydrological Study, the site is not within the catchment of the pond chains in Hampstead, nor the Golder's Hill Chain.

5.01.3 (Q2) On completion of the development the surface water flows will be routed similarly to the existing condition, with rainwater run-off collected in a surface water drainage system and discharged to a combined sewer.

5.01.4 (Q3) There will be an increase in the proportion of hard surfaced/paved external areas (Refer figures (k) and (l) in Appendix A).

5.01.5 (Q4) All surface water for the site will be contained within the site boundaries and collected as described above; hence there will be no change from the development on the quantity or quality of surface water being received by adjoining sites. However the profile of the inflows into the surface water sewer will be changed by the development.

5.01.6 (Q5) The surface water quality will not be affected by the development, as in the permanent condition collected surface water will be generally be from roofs, domestic hard landscaping. During construction any contaminated arisings will be covered to ensure that the collected surface water is not in contact with contaminated soil.

5.01.7 On the basis of 5.01.2 to 5.01.6 above, with reference to figure 3 in CPG4, it is considered appropriate to carry forward to the scoping stage: -

- The potential impact of the increase in impermeable area
- The changes to the profile of inflows into the surface water sewer

It is not considered necessary to consider further the other impacts of the works in respect of surface flow and flooding, due to the negative responses above.

5.01.8 (Q6) The site is not surrounded by one of the streets noted within the Camden Planning Guidance CPG 4 (April 2011) as a street "at risk of surface water flooding" (refer figure (f) in Appendix A). The site is not at risk of static flooding.

5.01.9 With reference to the EA Rivers and Sea Flood Maps (Refer figure (g) in Appendix A), the site is not located within a flood risk zone from river flooding. The EA Reservoir flood map (Refer figure (h) in Appendix A), shows that the site is not at risk of flooding from reservoirs.

5.01.10 On the basis of 5.01.8 and 5.01.9 above and in accordance with the figure 3 in Camden Planning Guidance CPG 4 (April 2011), a flood risk assessment is not required.

5.02 STAGE 2 (SCOPING)

5.02.1 With reference to the Camden Geological, Hydrogeological and Hydrological study Appendix F1, the potential impacts which will need to be considered will include:-

- Whether the increase in impermeable area will impact on the rate of surface water received by the public combined sewer

5.02.2 The above impacts will be evaluated by considering whether the surface permeability of the site will be significantly affected by the works, and what measures will be used to mitigate the impact of this.

5.03 STAGE 3 (SITE INVESTIGATION AND STUDY)

5.03.1 The site is approximately 0.05 hectares in size and is generally laid to lawns. The area of roofs to the existing house is approximately 86m^2. Due to the derelict nature of the site it is hard to identify the extent of any former paved areas but it appears that hard landscaping surrounding the building covers approximately 62m^2 giving a total of 148m^2 impermeable area. This represents approximately 28% of the total site area.

5.03.2 The area of upper level roofs to the proposed house will be approximately 127m^2 but this will covered by a biodiverse roof which will limit the rate of run off. Terrace, lightwell and other hard landscaping surrounding the building will account for a further 263m^2.

5.04 STAGE 4 (IMPACT ASSESSMENT)

5.04.1 Refer SLR Consulting Limited's letter report 'Surfacewater Assessment' reference SLR 401-3774-00001

6.0 CONSTRUCTION METHOD STATEMENT

6.00.1 The following provides an outline Method Statement for the construction of the basement. This will be developed and finalised by the appointed Contractor, once the detailed design is complete.

6.00.2 The works will commence with demolition of the existing house down to ground floor level. The existing building is in poor condition so reference should be made to the Arup report ref REP123323/S005 'Dismantling of Building Fabric - Outline Method Statement'. It should be ensured that the existing basement walls remain propped at ground floor level, either by the existing floor or by temporary shores.

6.00.3 Prior to any excavation or works to the substructure, monitoring measurements to the adjoining buildings will be taken to act as a base level.

6.00.4 A piling mat will then be installed across the site. This is likely to be terraced with a central ramp, as shown on drawing P1917/01. The perimeter piling works will then proceed. There are several viable methods of temporary support to the surrounding ground, during the excavation of the basement. The proposals are that hard-soft secant piled walls will be used around the perimeter of the proposed basement. This method of construction is non-percussive and will reduce the disruption to the surrounding ground, minimise water ingress, and lessen any impact on the adjoining structures. The piles shall be designed as propped cantilevers with temporary supports inside the area of excavation. These temporary supports will be installed close to the proposed ground floor level, with the potential for an additional line of props at close to lower ground floor level for the deepest sections of the basement.

6.00.5 When the piling works are complete, reinforced concrete capping beams will be installed around the perimeter of the proposed basement. Temporary props will then be installed between the capping beams.

6.00.6 Once the perimeter capping beams and the internal props are installed, the existing lower ground floor structure can be demolished and grubbed out. At this stage the tension piles within the footprint of the basement could be installed from piling mat level. Alternatively these could be installed later in the construction process, from close to proposed basement, using a smaller piling rig.

6.00.7 Bulk excavation can now proceed. Any ground water encountered will be collected in temporary sumps and pumped. It is assumed that any water encountered will be limited to that found in the made ground within footprint of the building, as the secant piles 'plugged' in to the underlying London Clay will prevent water ingress from the surrounding ground.

During excavation monitoring readings will be regularly taken. If any unexpected movements are recorded either in the piles or the adjoining buildings then the excavation will be stopped and pre-agreed contingency measures implemented to prevent further movements.

6.00.8 When bulk excavation is complete to basement level, the bottom surface of the excavation will be immediately blinded. The internal tension piles will then be exposed and cut down to the level of the basement.

6.00.9 The basement raft will then be constructed, followed by the RC walls and columns to lower ground floor level.

6.00.10 The construction of the substructure works will then proceed by construction of the lower ground floor slab, then walls and columns to ground floor level. When the lower ground and ground floor slabs have been constructed and the concrete has reached target strength, then the lateral propping will be removed.

6.00.11 The works will then proceed with the construction of the upper floors of the building.

APPENDIX A

FIGURES

Figure (a)
Acquifer Designation Map
(Extract from Fig 8 of Camden Geological, Hydrogeological and Hydrological Study)

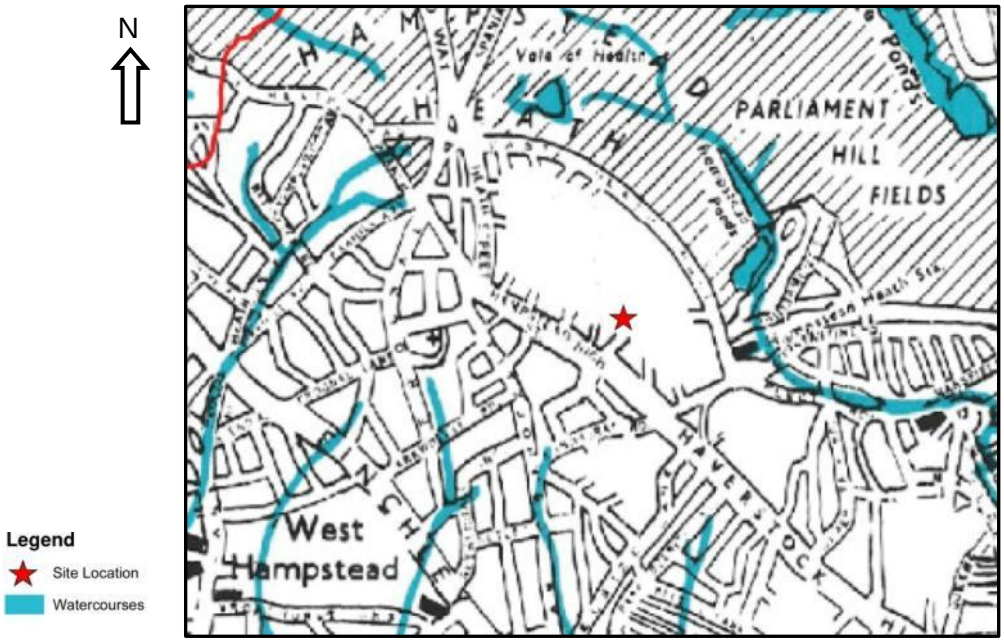


Figure (b)
Watercourses
(Extract from Fig 11 of Camden Geological, Hydrogeological and Hydrological Study)

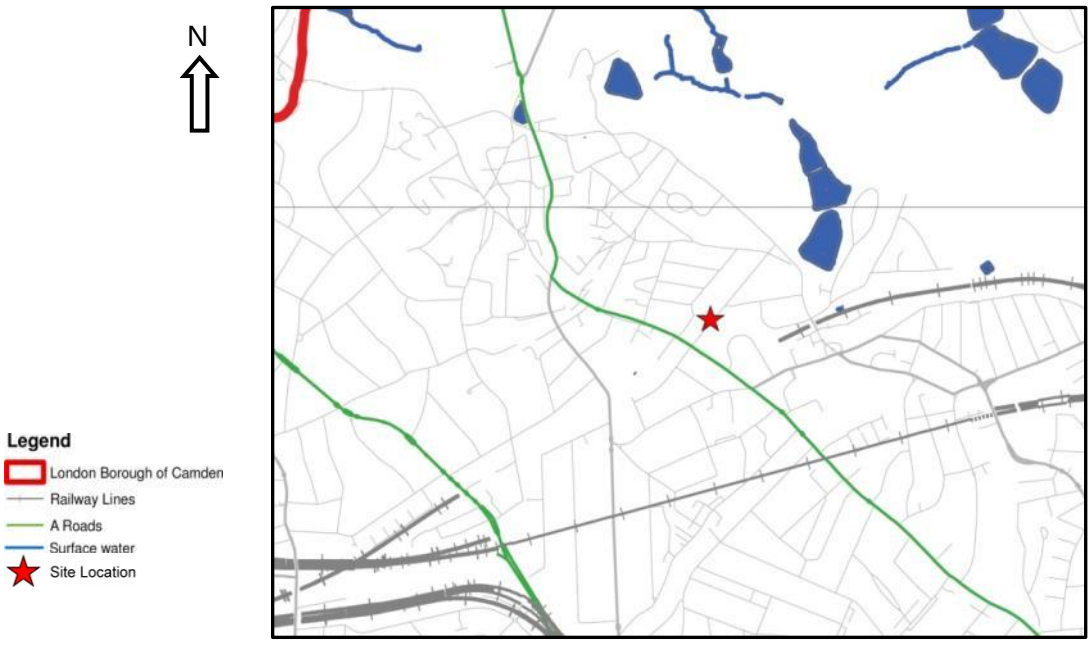


Figure (c)
Surface Water Features
(Extract from Fig 12 of Camden Geological, Hydrogeological and Hydrological Study)

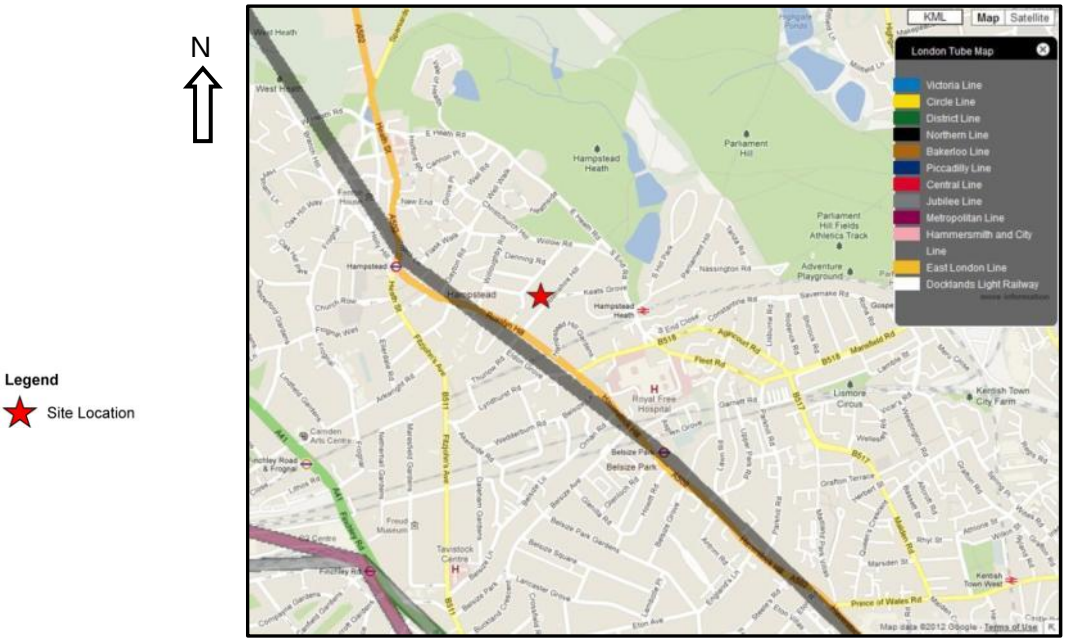


Figure (d)
Map of underground infrastructure
(Extract from maptube.org)

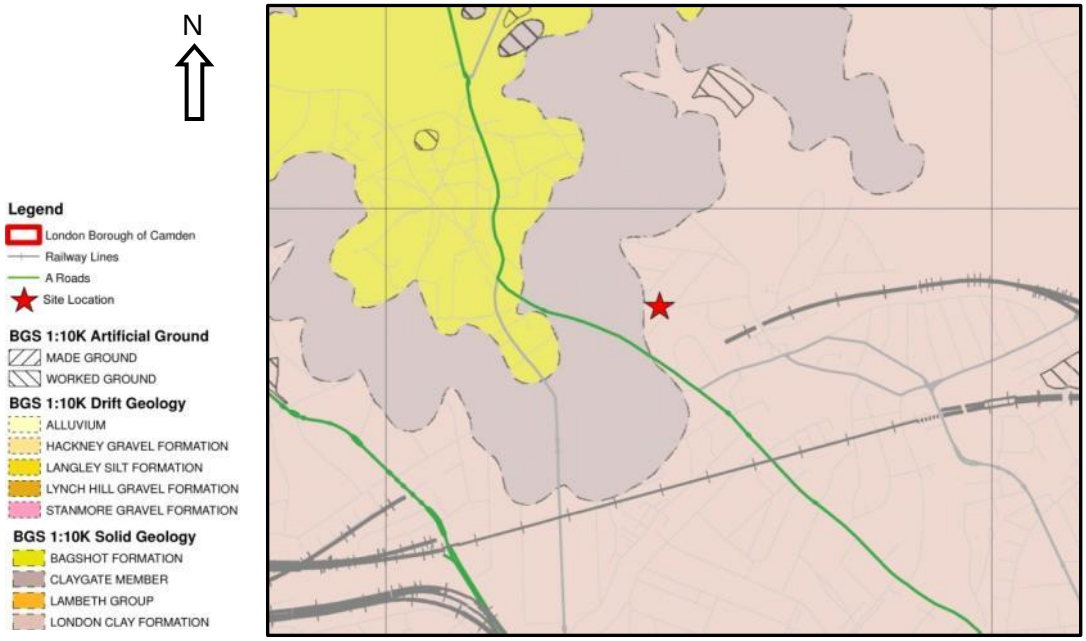


Figure (e)
Geological Map
(Extract from Fig 4 of Camden Geological, Hydrogeological and Hydrological Study)

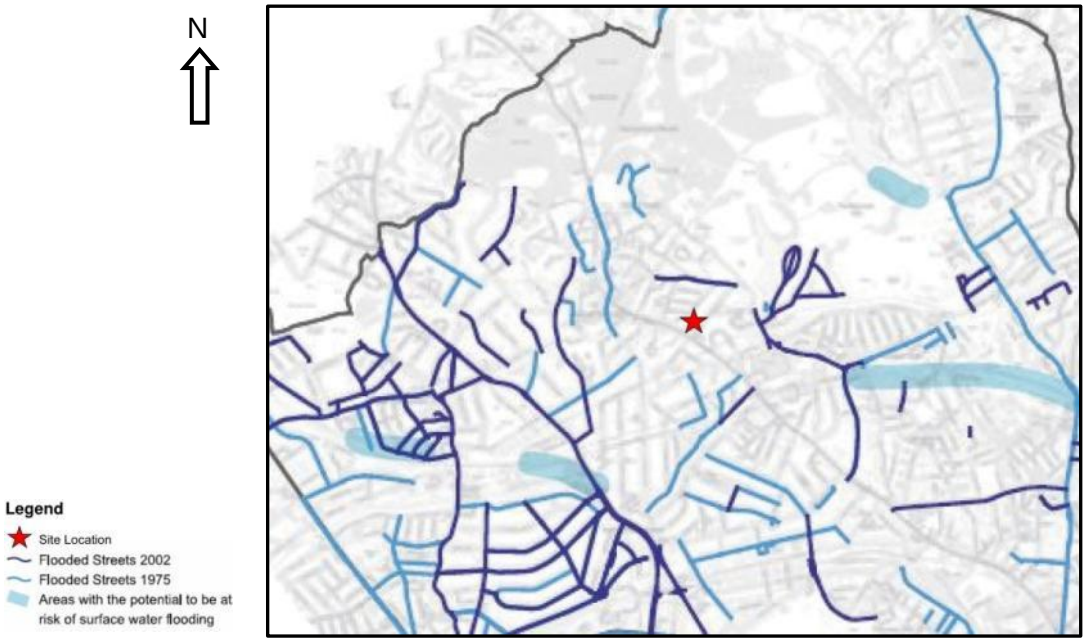


Figure (f)
Flood Map
(Extract from Figure 15 of Camden Geological, Hydrogeological and Hydrological Study)

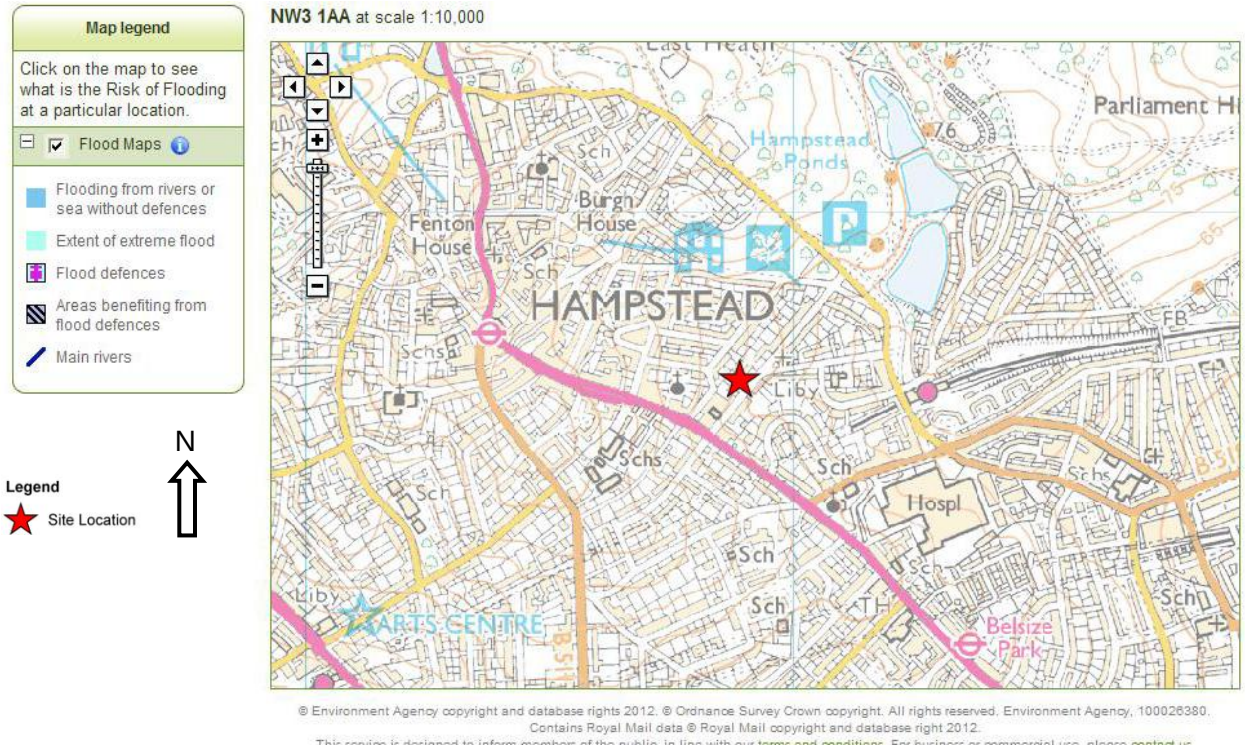


Figure (g)
Areas at Risk of Flooding from Rivers or Sea
(Extract from Environment Agency flood map)

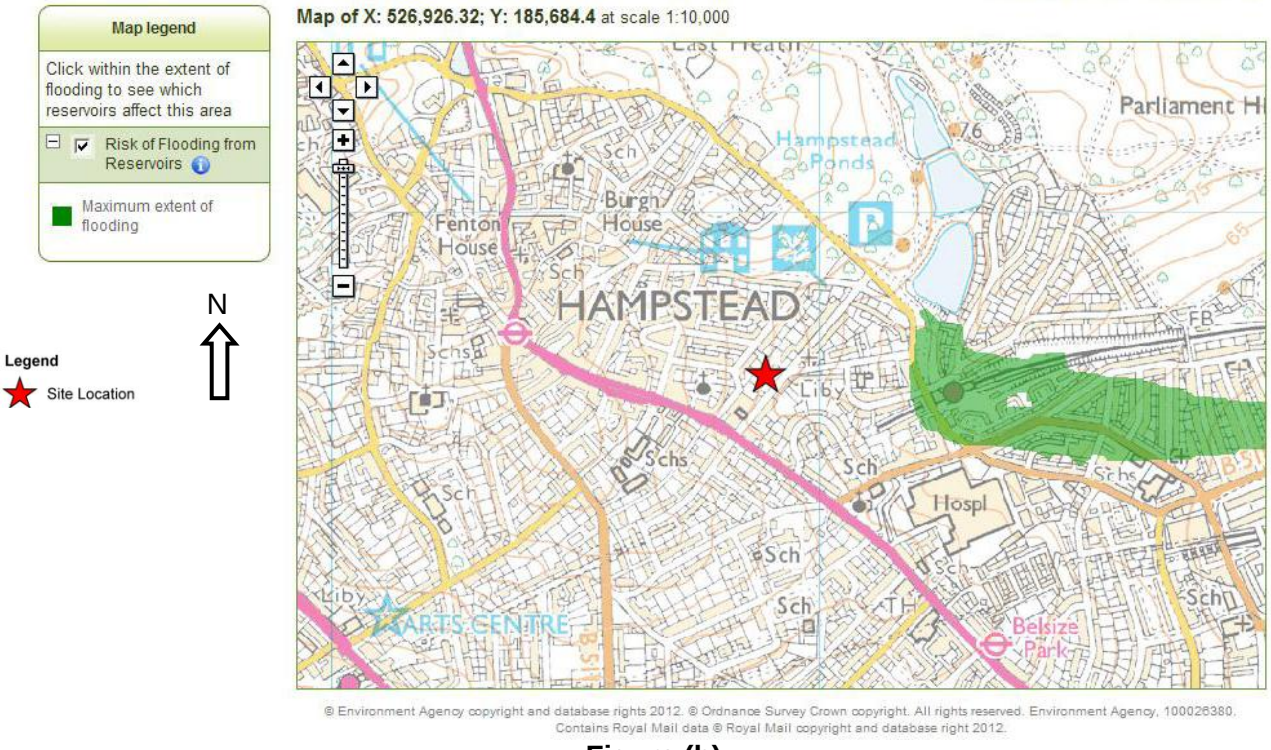


Figure (h)
Areas at Risk of Flooding from Reservoirs
(Extract from Environment Agency flood map)

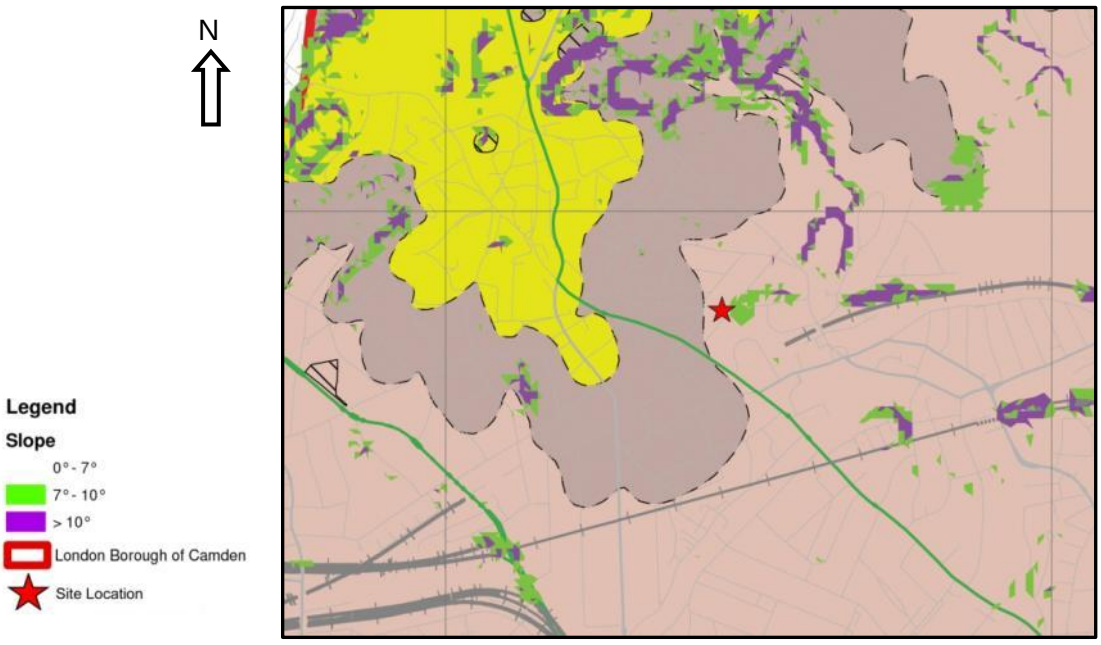


Figure (i)
Slope Angle Map
(Extract from Figure 16 of Camden Geological, Hydrogeological and Hydrological Study)

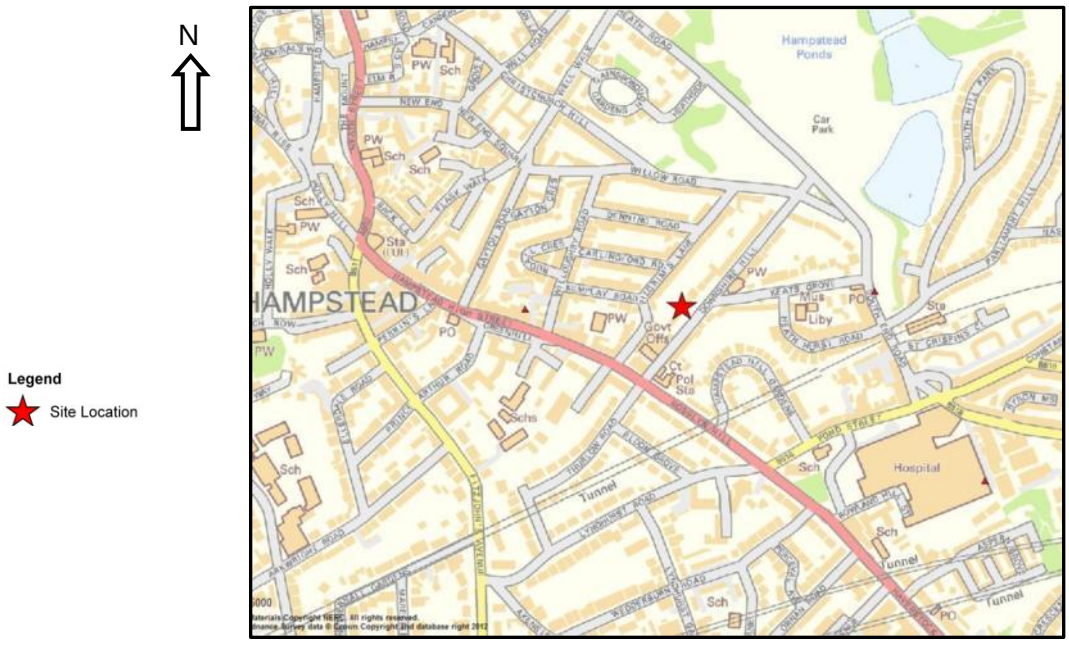


Figure (j)
Map showing National Rail and Water Well Locations
(Extract from British Geological Survey, Geoindex)

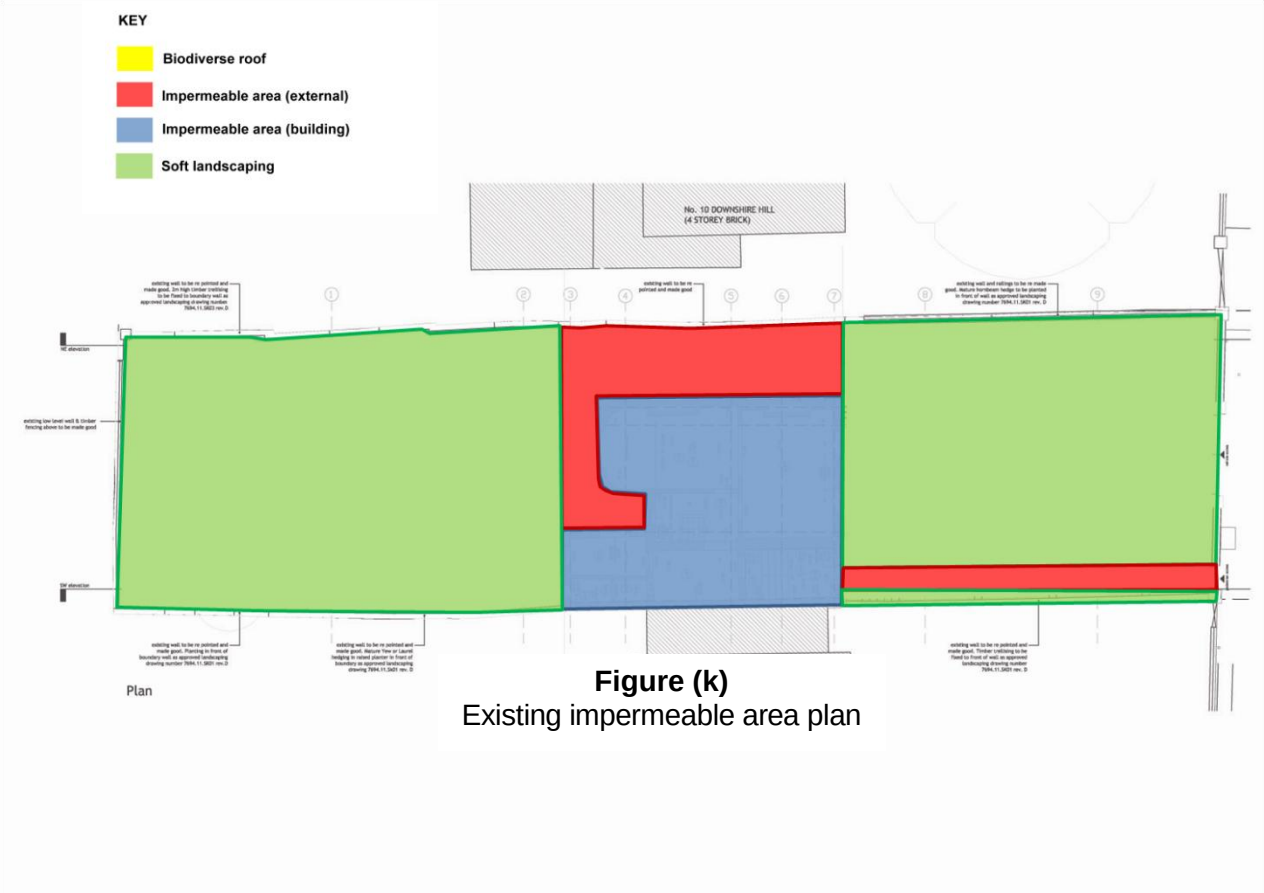
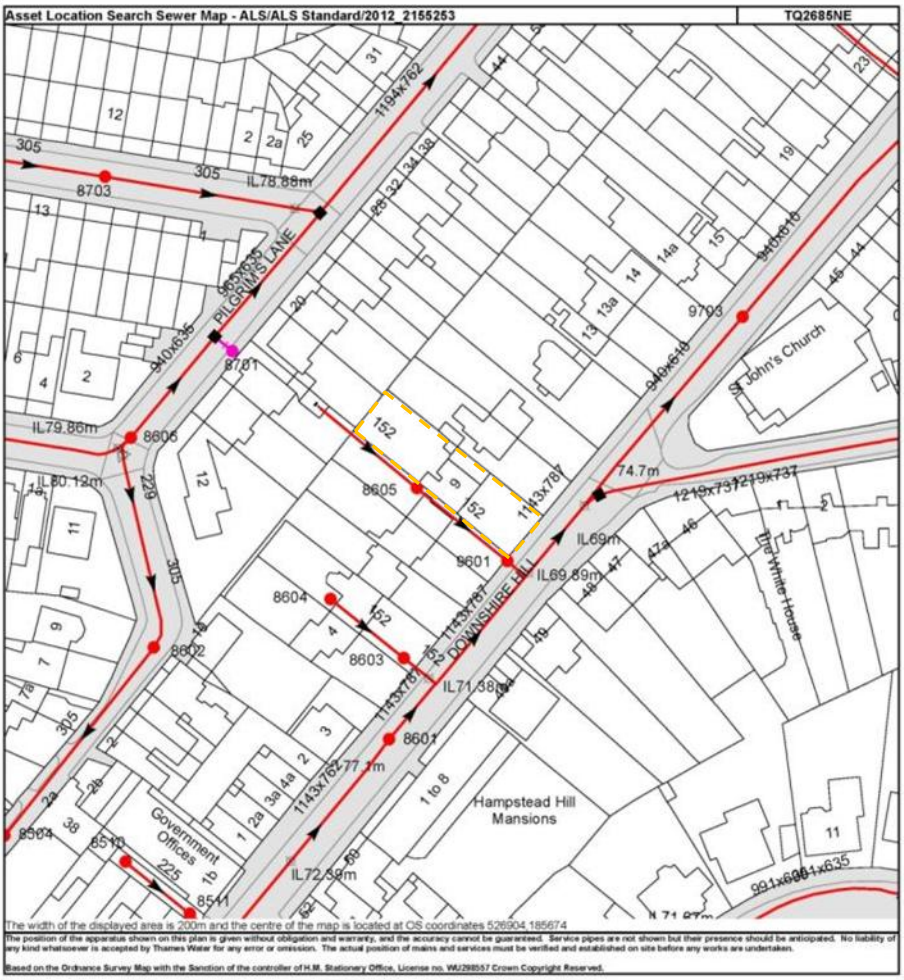


Figure (k)
Existing impermeable area plan

Figure (l)
Proposed impermeable area plan

APPENDIX B

THAMES WATER RECORDS



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
- Vent Pipe
- Bio-solids (Sludge)
- Proposed Thames Surface Water Sewer
- Proposed Thames Water Foul Sewer
- Gallery
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Sludge Rising Main
- Proposed Thames Water Rising Main
- Vacuum

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, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Outfall
- Undefined End
- Inlet

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

Lines denoting areas of underground surveys, etc.

- Agreement
- Operational Site
- Chamber
- Tunnel
- Conduit Bridge

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

- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- Gulley
- Culverted Watercourse
- Proposed
- Abandoned Sewer

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
8511	n/a	n/a
8510	n/a	n/a
8601	76.83	71.48
8603	76.27	74.59
8602	81.66	79.62
8604	76.28	75.87
9601	75.48	73.59
8605	77.22	75.79
8606	83.06	79.91
8701	n/a	n/a
9703	74.13	n/a
-	-	-
8703	85.06	81.88

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.

Figure B1 - Extract from Thames Water Asset Search showing a combined sewer

APPENDIX C

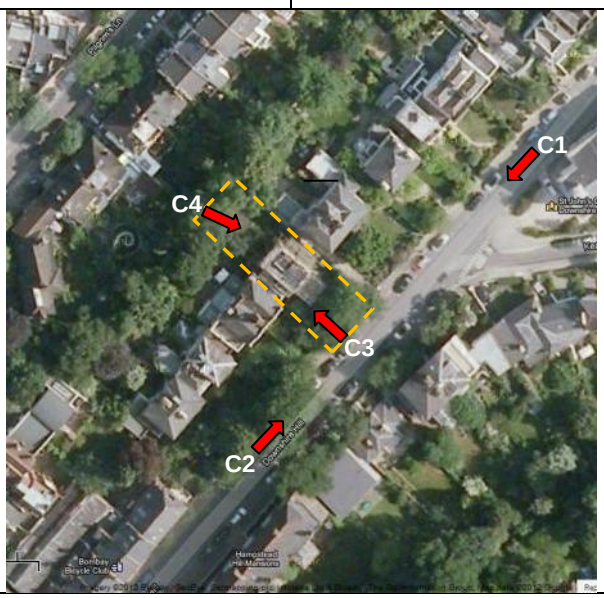
PHOTOGRAPHS

Photo C1

Photo C2

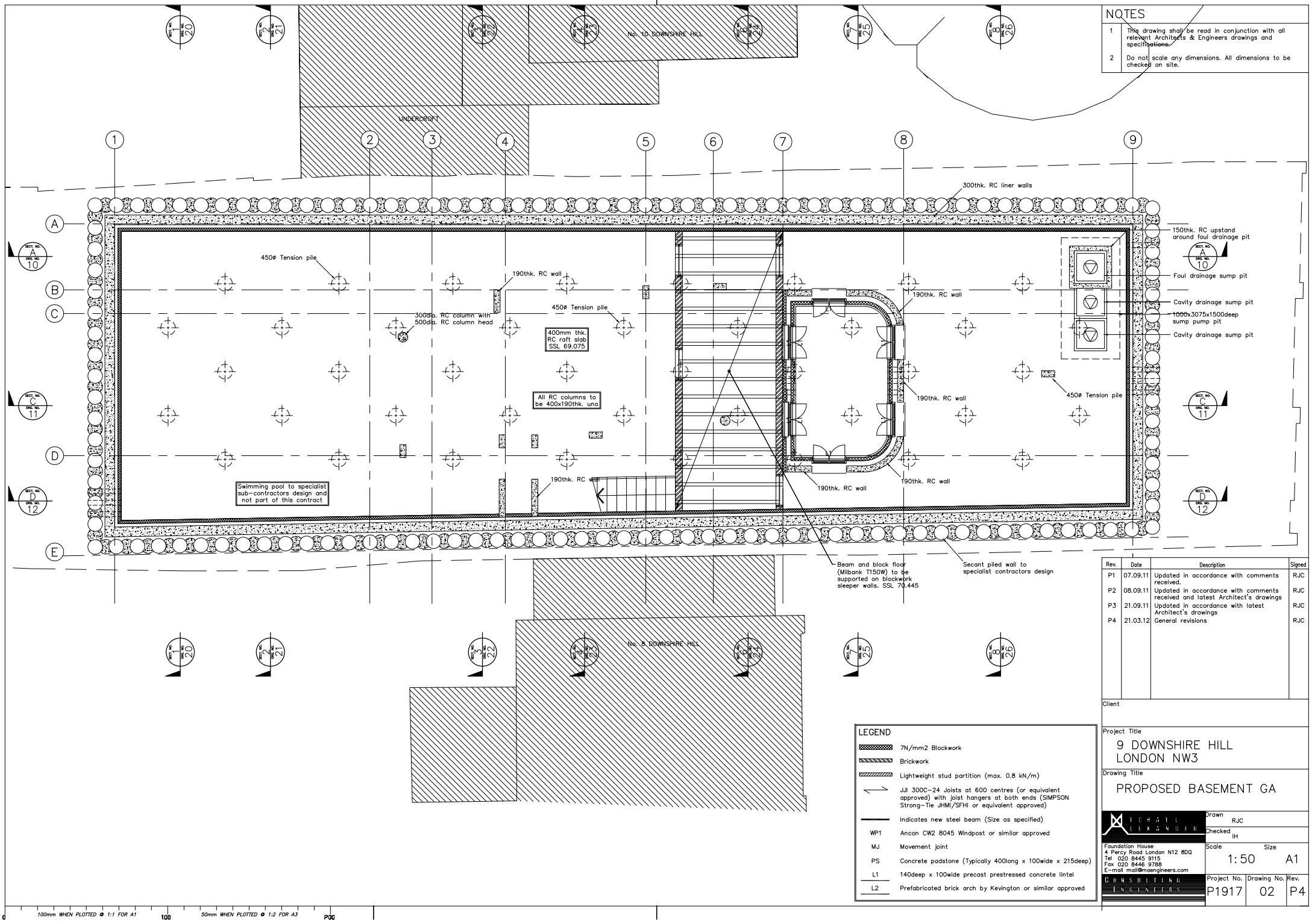
Photo C3

Photo C4



APPENDIX D

STRUCTURAL DRAWINGS



NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.

LEGEND

- 7N/mm2 Blockwork
- Brickwork
- Lightweight stud partition (max. 0.8 kN/m)
- JJI 300C–24 Joists at 600 centres (or equivalent approved) with joist hangers at both ends (SIMPSON Strong–Tie JHMI/SFHI or equivalent approved)
- Indicates new steel beam (Size as specified)
- WP1 — Ancon CW2 8045 Windpost or similar approved
- MJ — Movement joint
- PS — Concrete padstone (Typically 400long x 100wide x 215deep)
- L1 — 140deep x 100wide precast prestressed concrete lintel
- L2 — Prefabricated brick arch by Kevington or similar approved

Rev.	Date	Description	Signed
P1	07.09.11	Updated in accordance with comments received.	RJC
P2	08.09.11	Updated in accordance with comments received and latest Architect's drawings	RJC
P3	21.09.11	Updated in accordance with latest Architect's drawings	RJC
P4	21.03.12	General revisions	RJC

Client

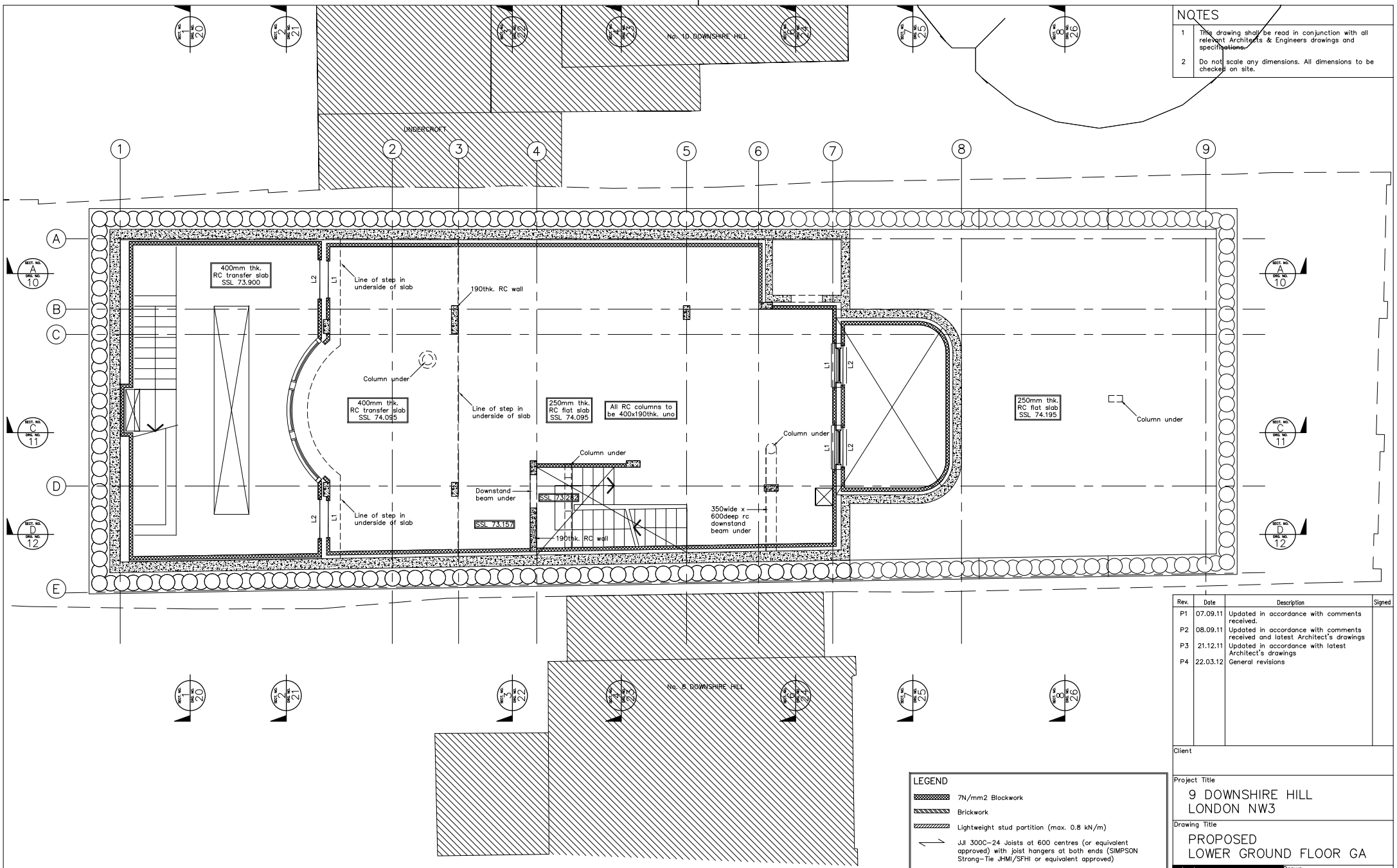
Project Title
9 DOWNSHIRE HILL
LONDON NW3

Drawing Title
PROPOSED BASEMENT GA

MICHAEL LEVANDER CONSULTING ENGINEERS
Foundation House
4 Percy Road London N12 8DQ
Tel 020 8445 9115
Fax 020 8446 9788
E-mail mail@maengineers.com

Drawn RJC
Checked IH
Scale 1:50
Size A1
Project No. P1917
Drawing No. 02
Rev. P4

0 100mm WHEN PLOTTED @ 1:1 FOR A1 100 50mm WHEN PLOTTED @ 1:2 FOR A3 P00



NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.

LEGEND

- 7N/mm2 Blockwork
- Brickwork
- Lightweight stud partition (max. 0.8 kN/m)
- JJI 300C–24 Joists at 600 centres (or equivalent approved) with joist hangers at both ends (SIMPSON Strong–Tie JHMI/SFHI or equivalent approved)
- Indicates new steel beam (Size as specified)
- WP1 — Halfen CW2 8045 Windpost or similar approved
- MJ — Movement joint
- PS — Concrete padstone (Typically 400long x 100wide x 215deep)
- L1 — 140deep x 100wide precast prestressed concrete lintel
- L2 — Prefabricated brick arch by Kevington or similar approved

Rev.	Date	Description	Signed
P1	07.09.11	Updated in accordance with comments received.	
P2	08.09.11	Updated in accordance with comments received and latest Architect's drawings	
P3	21.12.11	Updated in accordance with latest Architect's drawings	
P4	22.03.12	General revisions	

Client

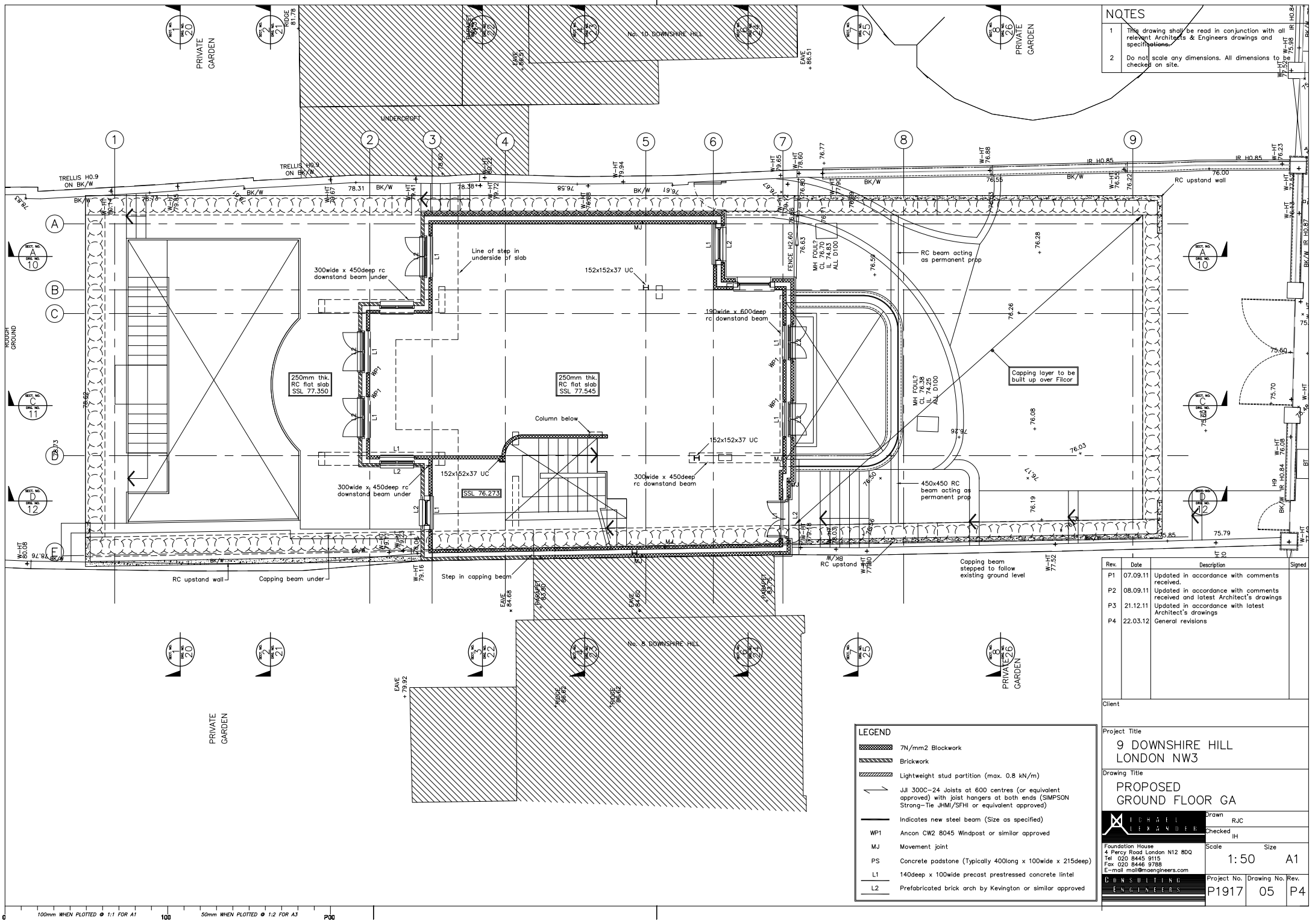
Project Title
9 DOWNSHIRE HILL
LONDON NW3

Drawing Title
PROPOSED
LOWER GROUND FLOOR GA

MICHAEL LENNANDER CONSULTING ENGINEERS
Foundation House
4 Percy Road London N12 8DQ
Tel 020 8445 9115
Fax 020 8446 9788
E-mail mail@maengineers.com

Drawn RJC
Checked IH
Scale 1:50
Size A1
Project No. P1917
Drawing No. 04
Rev. P4

0 100mm WHEN PLOTTED @ 1:1 FOR A1 100 50mm WHEN PLOTTED @ 1:2 FOR A3 P00



Rev.	Date	Description	Signed
P1	07.09.11	Updated in accordance with comments received.	
P2	08.09.11	Updated in accordance with comments received and latest Architect's drawings	
P3	21.12.11	Updated in accordance with latest Architect's drawings	
P4	22.03.12	General revisions	

Client

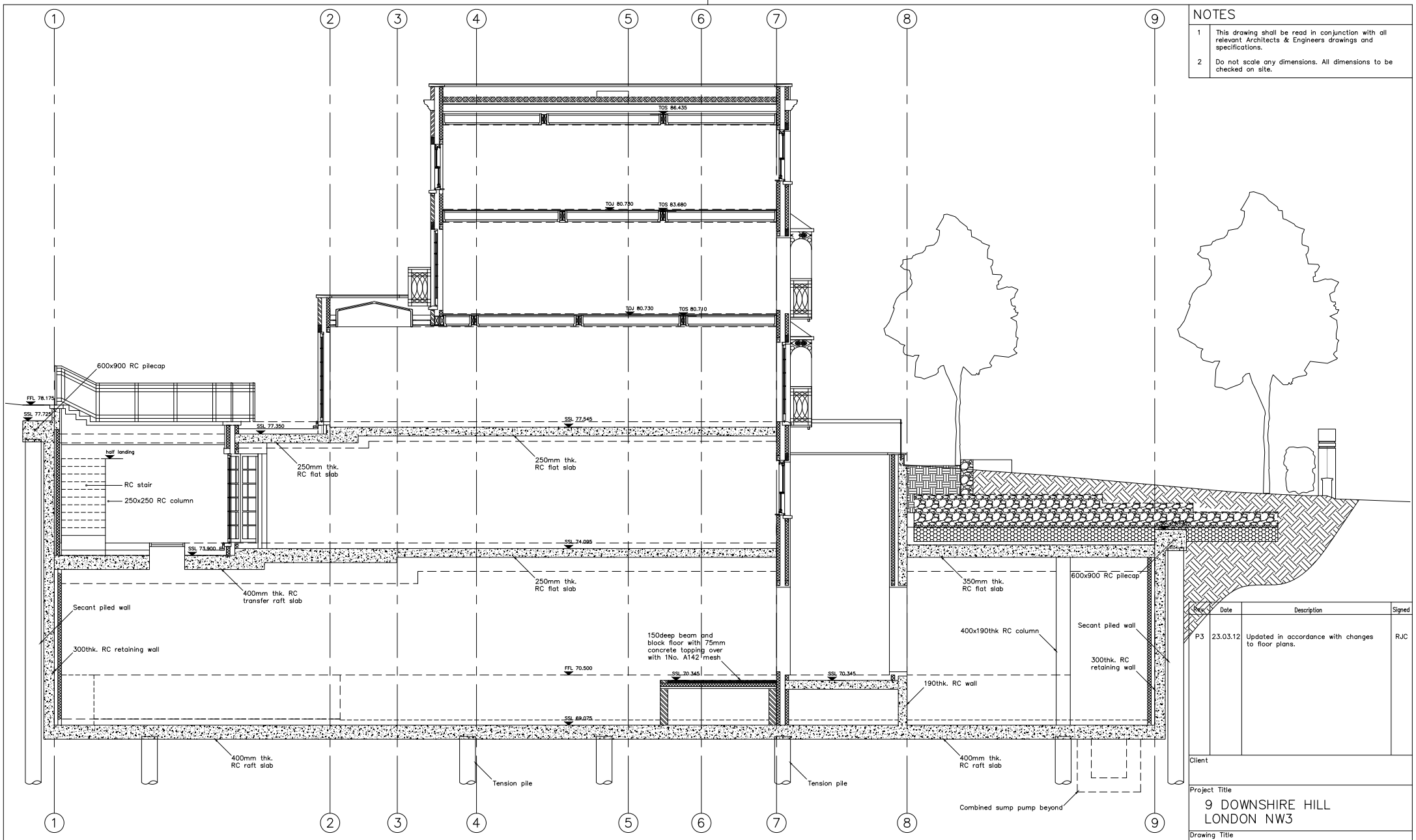
Project Title
9 DOWNSHIRE HILL
LONDON NW3

Drawing Title
PROPOSED
GROUND FLOOR GA

MICHAEL LEVANDER CONSULTING ENGINEERS
Foundation House
4 Percy Road London N12 8DQ
Tel 020 8445 9115
Fax 020 8446 9788
E-mail mail@maengineers.com

Drawn RJC
Checked IH
Scale 1:50
Size A1
Project No. P1917
Drawing No. 05
Rev. P4

100mm WHEN PLOTTED @ 1:1 FOR A1
50mm WHEN PLOTTED @ 1:2 FOR A3



NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.

Rev	Date	Description	Signed
P3	23.03.12	Updated in accordance with changes to floor plans.	RJC

Client

Project Title

9 DOWNSHIRE HILL
LONDON NW3

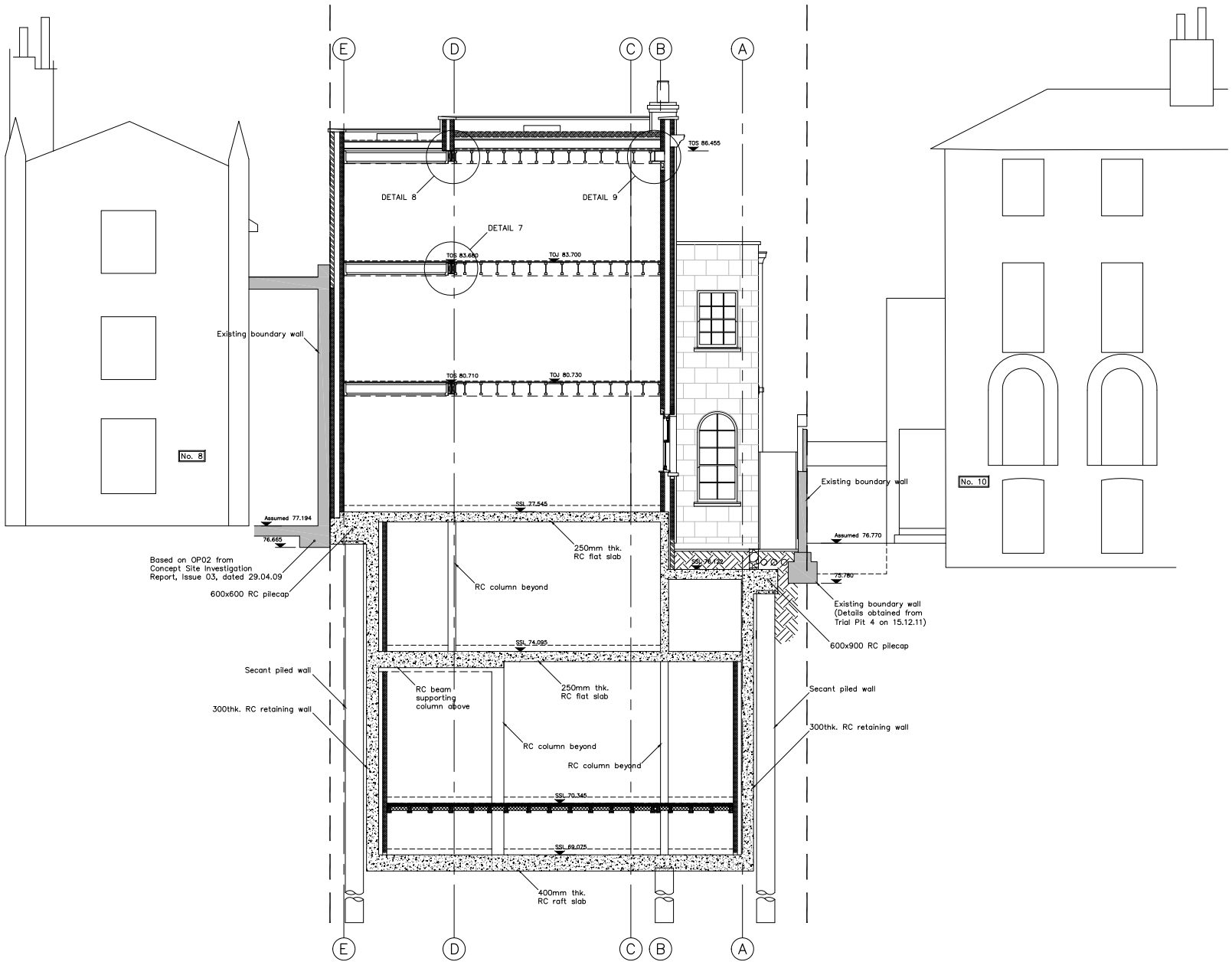
Drawing Title

PROPOSED SECTION C–C

MICHAEL LEVANDER CONSULTING ENGINEERS
Foundation House
4 Percy Road London N12 8DQ
Tel 020 8445 9115
Fax 020 8446 9788
E-mail mail@maengineers.com

Drawn RJC
Checked IH
Scale 1:50
Size A1
Project No. P1917
Drawing No. 11
Rev. P3

0 100mm WHEN PLOTTED @ 1:1 FOR A1 100 50mm WHEN PLOTTED @ 1:2 FOR A3 200



NOTES

1. This drawing shall be read in conjunction with all relevant Architects & Engineers drawings and specifications.
2. Do not scale any dimensions. All dimensions to be checked on site.
3. Refer to drawing no. P1917/50 for details 7,8 and 9.

Rev.	Date	Description	Signed
P3	05.01.12	Issued for Party Wall purposes.	RJC
P4	10.01.12	Issued for Party Wall purposes.	RJC
P5	23.03.12	Updated in accordance with changes to floor plans.	RJC
P6	10.04.12	General revisions	RJC

Client

Project Title

9 DOWNSHIRE HILL
LONDON NW3

Drawing Title

PROPOSED SECTION 6–6

MICHAEL LEXANDER CONSULTING ENGINEERS
Foundation House
4 Percy Road London N12 8DQ
Tel 020 8445 9115
Fax 020 8446 9788
E-mail mail@mengineers.com

Drawn RJC
Checked IH
Scale 1:50
Size A1
Project No. P1917
Drawing No. 24
Rev. P6

0 100mm WHEN PLOTTED @ 1:1 FOR A1 100 50mm WHEN PLOTTED @ 1:2 FOR A3 200