Ing ealtóir

CONSULTING STRUCTURAL ENGINEERS

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BASEMENT IMPACT ASSESSMENT for proposed subterranean works at:

3 Honeybourne Road

London NW6

JobNo: 15073

Client:

Imogen Strachan

Version	Date	Comments	Completed by
1	15-08-10		David Warren

CONTENTS:

1.0 TERMS OF APPOINTMENT:

1.1 INGealtoir, Consulting Structural Engineers, were instructed by the owners of no. 3 Honeybourne Road, London NW6 to prepare a Basement Impact Assessment for the proposed basement extension at the property.

1.2 This report is in response to The Camden Development Policy DP27, (Basements and Lightwells). The report is compiled in accordance with the guidelines set out in PG4: 'Guidance for Subterranean Development' (2010).

1.3 The report is based on the following drawings issued by Iain Hay Architects Architects:

191/11-20 & 22.

1.4 Ingealtoir extends a duty of care to the owners of the property to exercise reasonable care and diligence in the performance of our service.

1.5 All directions are given facing the elevation in question.

1.6 INGealtoir retain sole copyright of this report. The report cannot be reproduced or used by any unauthorized third parties. The use of the report is restricted to the purpose of an accompanying document to an application for planning consent. The report should not be used for any other purpose.

2.0 TERMS OF REFERENCE:

2.1 Following the format guidance in The Camden Policy Guidance PG4, the stages for the Basement Impact Assessment are:

Stage 1 – Screening

Stage 2 – Scoping

Stage 3 – Site investigation and study

Stage 4 – Impact Assessment

Stage 5 – Review and decision making

This report follows the Flow Charts and uses the Figurative information given in the Camden Geological, Hydro-geological and Hydrological Study.

2.2 The Flowcharts of the Appendix E to the Camden Geological, Hydro-geological and Hydrological Study are completed in table format in section 3 of this report and form the screening element of this report, including:

- Surface Flow and Flooding Impact Identification
- Subterranean (groundwater) Flow Impact Identification
- Slope Stability screening flowchart

2.3 The site of 3 Honeybourne Road is located with an arrow on the relevant Figures of the Camden Geological, Hydro-geological and Hydrological Study, appended to this report, Appendix 2.

3.0 GENERAL DESCRIPTION OF PROPERTY:

3.1 Honeybourne Road is a residential street running along a notional NW-SE axis between West End Lane and Fawley Road. The road slopes towards the southerly end. The houses date from the late Victorian/early Edwardian period of the middling size. No. 3 is on the notionally west side of the road. The front area of the house is currently occupied by two car parking spaces. The back garden extends some 25.00m to the rear.

Photo Nos. 1-4

Fig 1, App 2

3.2 Honeybourne Road is substantially occupied by terraced, 4-storey period mansion block flats. Nos. 3 & 5 are attached houses at the end of the road. No. 1 is a modern house built in the style of the original period pair. The three houses form a small terrace, completing the construction on this side of Honeybourne Road.

Photo No. 3&6

3.3 The accommodation is currently arranged over four levels, which includes a small loft conversion, with a small 'coal-hole' cellar

3.4 The construction of the period house is typical for the type and age, the solid stock brick enclosing walls, timber floors and a cut timber valley roof. A closet wing extends from the rear of the main body of the house on the LHS (front facing).

3.5 A three sided gable rises above the first floor and features as a projection in the mansard roof. The roof is slate clad.

3.6 The geological maps for the area indicate the surface geology is London Clay. The sub-soil conditions highlighted by the geotechnical investigation carried out by Chelmer SI Ltd, indicate the following profile:

App 4.

0.0 - 0.40m Paviors/sand bedding

0.40 - 8.00m Firm/Stiff London Clay

3.7 No ground water was encountered over the depth of the borehole.

4.0 TREE GROWTH IN THE VICINITY OF THE PROPERTY:

4.1 The following tree growth was noted around the property: **Photo Nos. 1&4**

A young recently planted tree is growing on the RHS of the property in the public footpath. The tree is approx. 3.0m high and is possibly a London Plane. Tree is approx. 6-7.0m away from the front of no. 3.

A 7.0m high pollarded Elm tree is growing in the public footpath on the RHS of the house. This tree is again approx. 6-7.0m away from the front of no. 3.

In the back garden, the closest significant tree is a semi-mature Silver Birch, which is approx. 7.0m high and approx. 6.0m from the rear of the closet wing. **ING drg. 101.**

4.2 The proposed basement construction will have minimal impact on the future growth patterns of the three trees in te immediate vicinity of the house.

4.3 There is no evidence of tree related subsidence at the property.

5.0 EXTENT OF PROPOSED WORKS:

5.1 The extent of the proposed subterranean works involves the construction of a single level basement beneath the main body of the house. A new light well, with steps up to the back garden, is proposed between the closet wing and the boundary with no. 5. **ING drg. 101**

App 3

5.2 The excavation for the construction of the basement will need to be completed without involving or disturbing the existing houses on either side of no. 3 Honeybourne Road.

5.3 The stable nature of the subsoil conditions suggest the most appropriate solution to the formation of the new basement is the use of a combination of reinforced concrete underpinning. The reinforced component of the underpinning will provide the flexural resistance to the active soil and surcharge pressures as well as providing vertical support for the existing superstructure masonry walls. The underpinning will be cast in a hit/miss sequence as indicated on INGealtoir drg. No.15073-101.

5.4 The proposed permanent works scheme is indicated on ING. Drg. Nos. 15073-101, 201, attached in Appendix 3. **App. 3.**

5.5 The sequence of construction for the demolition and construction phases will be prepared by the contractor chosen for the works. The following method, as indicated and referenced on ING drg. No. 901, is presented as a guide to the safe construction process for the basement. The sequence indicated is as follows: **ING drg 901&902**

App3.

1. Carry out trial pits establishing depths of existing foundations.

2. Underpin front bay wall facilitating formation of the front access enclosure. Underpin rear bay wall facilitating formation of the rear courtyard enclosure. Install 'Pynford' beams beneath bays at ground floor level. Needle and temp support front & rear bays. Excavate soil forming access for bulk excavation of basement.

3. Underpin existing walls forming basement in sequence shown and backfill against pins.

4. Install steel, knee-braced, walling beam system, propping tops of pins to deal with horizontal loads (HL). This system is to remain in place until the basement slab is cast and cured. Refer to ING drg. 15073-902 for suggested temp works strategy.

5. Temporary works to the internal walls of the main house. Install temporary beams and needles to deal with vertical loads (VL).

6. Carry out bulk excavation to top of underpinning toe. Install steel, knee-braced, walling beam system, propping bottom of pins to deal with horizontal loads (HL).

7. Carry out sub-slab drainage. Cast pad footing & spreader beam. Erect basement steel framing. Cast basement slab.

8. Decommission temp. works waling system.

9. Reinstate ground floor construction.

5.6 Calculations demonstrating the adequacy of the proposed underpinning basement enclosure scheme are attached. **Calcs.**

App. 3

6.0 RESPONSE TO BIA SURFACE FLOW AND FLOOD IMPACT SCREENING FLOWCHARTS:

6.1	Appendix E: Camden geological, hydrological and Hydrology study: Guidance for subterranean development. The subsoil indicated in figure 3 is London Clay.	Refer Fig. 3, App2.
6.2	Is the site within the catchment of the pond chains on Hampstead Heath?	No, refer to Figure 14, App2.
6.3	As part of the site drainage, will surface water flows (eg rainfall and run-off) be materially changed from the existing one?	No. Surface water run-off will remain unchanged.
6.4	Will the proposed basement development result in a change in the proportion of hard surface/paved external areas?	No. Net proportion of Hard standing/paved area remains unchanged.
6.5	Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No. The existing aggregated surface area of run-off will be unchanged. The Clay subsoil and the extent of surrounding landscaped area suggests the surface flow will not impact on surrounding buildings.
6.6	Will the proposed basement development result in a change to the quality of surface water being received by adjacent properties or downstream watercourses?	No. The subsoil is London Clay which is impermeable to surface water. The subterranean intervention is beneath the existing house. The quality of the surface water drainage will thus be unchanged by the proposed works.
6.7	Is the site in an area known to be at risk from surface water flooding such as South Hampstead, Gospel Oak and Kings Cross, or is it at risk from flooding, for example because the proposed basement is below the static level of a nearby surface water feature.	No. Refer to Fig 15 attached.

7.0 RESPONSE TO SUBTERRANEAN (GROUNDWATER) FLOW IMPACT SCREENING FLOWCHART:

7.1	Is the site located directly above an aquifer?	No. The site is remote from any aquifer as indicated on Figure 8 App2, attached.
7.2	Will the proposed basement extend beneath the water table surface?	No The upper aquifer will not be encountered. Borehole Investgation indicates London Clay which extends beyond the formation level of the proposed basement.
7.3	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No. Refer to Figure 11 App2.
7.4	Is the site within the catchment of the pond chains on Hampstead Heath?	No
7.5	Will the proposed basement development result in a change in the proportion of hard surface/paved areas?	No
7.6	As part of the site drainage, will more surface water (eg. rainfall and run-off) than present be discharged to the ground? (eg. via soak-aways and/or SUDS)	No. Surface water drainage remains same volume wise. Subsoil has a substantial clay fraction and is not suitable for use as a soakaway.
7.7	Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.	No.

8.0 RESPONSE TO SLOPE STABILITY SCREEN FLOWCHART:

8.1	Does the existing site include slopes, natural or manmade, greater than 7 degrees (approx 1 in 8)?	No. Refer Fig 16 App2
8.2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7 degrees (approx. 1 in 8)?	No. Landscaping will not be re-profiled.
8.3	Does the development of neigbouring land, including railway cutting and the like, with a slope greater than 7 degrees (approx 1 in 8)?	No.
8.4	Is the site within a wider hillsetting in which the general slope is greater than 7 degrees (approx 1 in 8)?	No. The slope of the site in greater context of surrounding terrain is as per 7.1 above.
8.5	Is the London Clay the shallowest strata at the site?	Yes. Refer to SI-App4.
8.6	Will any tree/s be felled as part of the proposed development and/or any works proposed within any tree protection zones where trees are to be retained?	No.
8.7	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects on site?	London No evidence of subsidence activity across the site.
8.8	Is the site within 100m of a watercourse or potential spring line?	No. Refer to fig.11 App2
8.9	Is the site within an area of previously worked ground?	No.
8.10	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?	No. Refer to Figure 8, App2.
8.11	Is the site within 50m of Hampstead Heath?	No.
8.12	Is the site within 5m of a Highway or pedestrian right of way?	Yes.
8.13	Will the proposed basement significantly increase the differential depth of foundations relative to neigbouring properties?	No. The proposed basement is an extension of an existing basement.

8.14 Is the site over (or within the exclusion zone of) any tunnels eg. railway lines? No.

8.0 SCOPING:

9.1 The screening has not highlighted any significant factors which might prejudice the extension of the existing basement at the property.

9.2 The scope of the proposed works is shown on ING drg. Nos. 15073/101&201 in Appendix 3.

9.3 The geotechnical borehole investigation indicates impermeable London Clay subsoil above formation level for the basement extension. No ground water was encountered in the 8.00m deep borehole. This suggests the development does not present a risk to the local hydrology.

9.4 The proposed basement extends over a relatively small portion of the property. The proposal presents similar conditions to surface flows as currently experienced on the site. All surface water flows will be designed to discharge into existing public utility assets

9.5 The works should be the subject of adequate supervision during the construction period.

10.0 SOIL INVESTIGATION/TRIAL PIT SURVEY:

10.1 A geotechnical investigation was carried out at the property on the 19th Aug. 2015 by Chelmer SI Ltd. A copy of the trial pit and geotechnical borehole investigation is contained in App 4. App4

11.0 IMPACT ASSESSEMENT:

11.1 The geotechnical investigation into the soil conditions beneath the house indicates that the impact on the local hydrology is negligible. The results of the SI suggest the basement extension will not present a negative impact to the natural environment.

11.2 The presence of the London Clay fraction and evidence of the Camden GHH Study (figure 7) suggest there are no implications from underground water courses to the proposed basement development beneath the house.

11.3 There are no current signs of subsidence activity or subsoil instability in no. 3 Honeybourne Road or the its attached partners.

12.0 REVIEW AND DECISION MAKING:

12.1 The proposed basement development at no. 3 Honeybourne Road can be achieved using standard construction techniques and materials. The new construction will not be beneath the prevailing ground water level. The basement can be constructed using relatively light techniques, in a controlled manner. It is assumed that the sequence of construction and temporary works strategy will be substantially adopted by the contractor appointed to carry out the works; temporary works will be designed, ultimately by the contractor.

12.2 The construction of the underpinning will be carried using manual labour. It is assumed that a conveyor system of removal of the bulk excavation spoil will be employed. Both construction processes result in low vibration impact on adjoining properties.

12.3 The construction strategy has taken account of the established soil profile and the manner in which the loads are safely transferred to the underlying geology.

12.4 The use of a hit/miss underpinning strategy will minimise the risk of instability to adjoining building structures.

12.5 The proposed basement construction will have minimal impact on any existing tree growth in the immediate vicinity.

12.6 Temporary works will be installed during the individual underpinng bay construction and during the bulk excavation or the basement. These works will be designed by the contractor using the strategy outlined in ING drawings 15073-901&902.

12.7 The conclusion of this Basement Impact Assessment is that the proposed development of the site can be carried out with minimal risk to the natural environment.

David J Warren BA BAI MIStructE CEng

INGealtoir

12th August 2015.

13.0 APPENDIX 1:

SITE PHOTOGRAPHS:

Photo No. 1: View of property from North-East. Note severely pollarded Elm tree in footpath.

Photo No. 2: View of entrance porch.

Photo No. 3: View of recessed attachment to no. 1. Note modern brickwork and pointing.

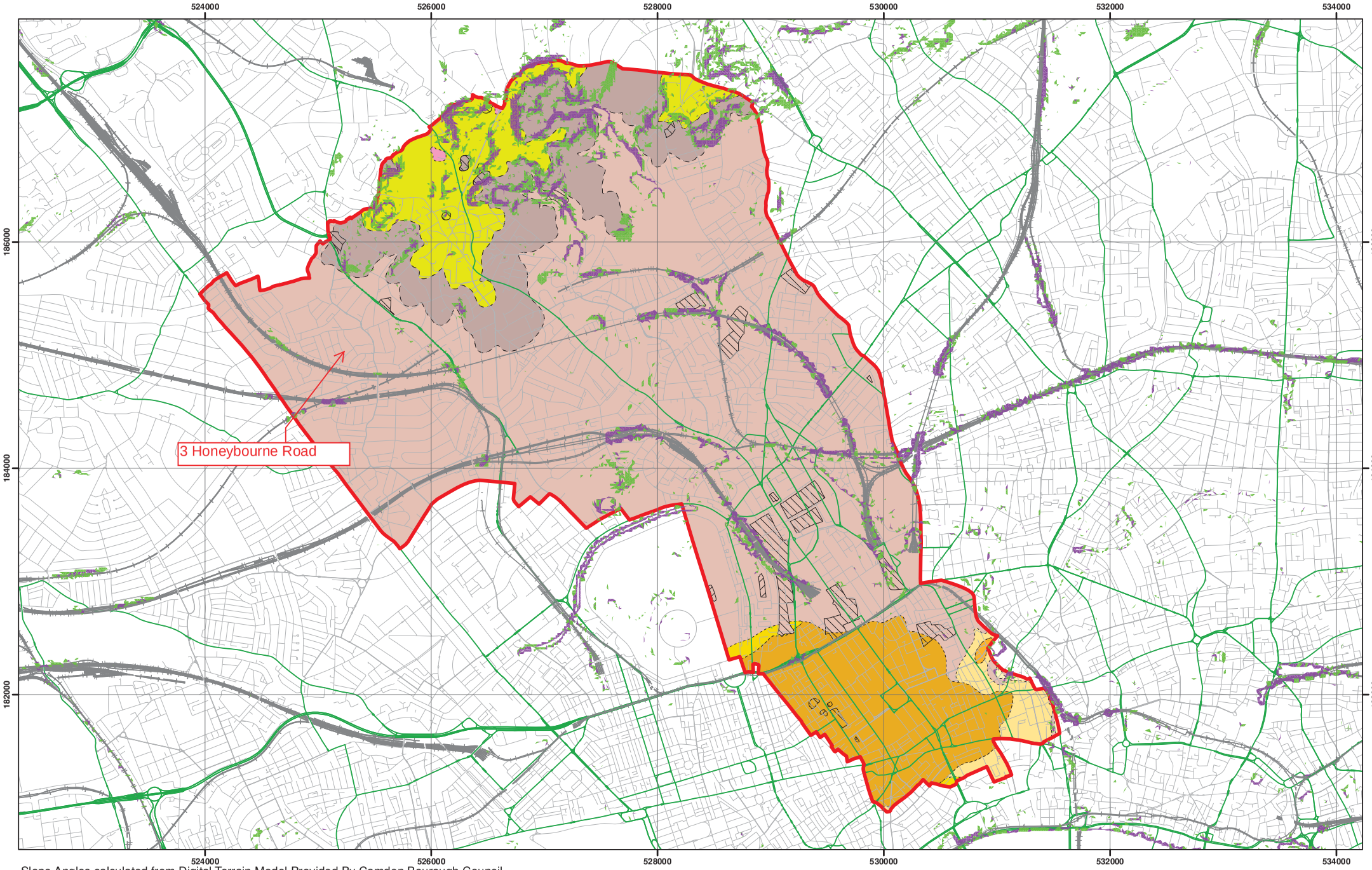
Photo No. 4: View of site towards the North East. The rear of No. 105 South End Road to the right.

Photo No. 5: View out of French doors to the rear garden.

Photo No. 6: View of junction of nos 3 & 5 at the rear.

14.0 APPENDIX 2:

FIGURES FROM CAMDEN GEOLOGICAL, HYDROGEOLOGICAL AND HYDROLOGICAL STUDY.



Slope Angles calculated from Digital Terrain Model Provided By Camden Bourough Council

N

Scale at A3: 1:30,000

1:10,000 BGS Mapping
Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

Slope
- 0° - 7°
- 7° - 10°
- > 10°

- London Borough of Camden
- Railway Lines
- A Roads

BGS 1:10K Artificial Ground
- MADE GROUND
- WORKED GROUND

BGS 1:10K Drift Geology
- ALLUVIUM
- HACKNEY GRAVEL FORMATION
- LANGLEY SILT FORMATION
- LYNCH HILL GRAVEL FORMATION
- STANMORE GRAVEL FORMATION

BGS 1:10K Solid Geology
- BAGSHOT FORMATION
- CLAYGATE MEMBER
- LAMBETH GROUP
- LONDON CLAY FORMATION

NB. Geological boundaries are largely indicative based on available geological mapping data

Camden Geological, Hydrogeological and Hydrological Study

Slope Angle Map

213923

FIGURE 16

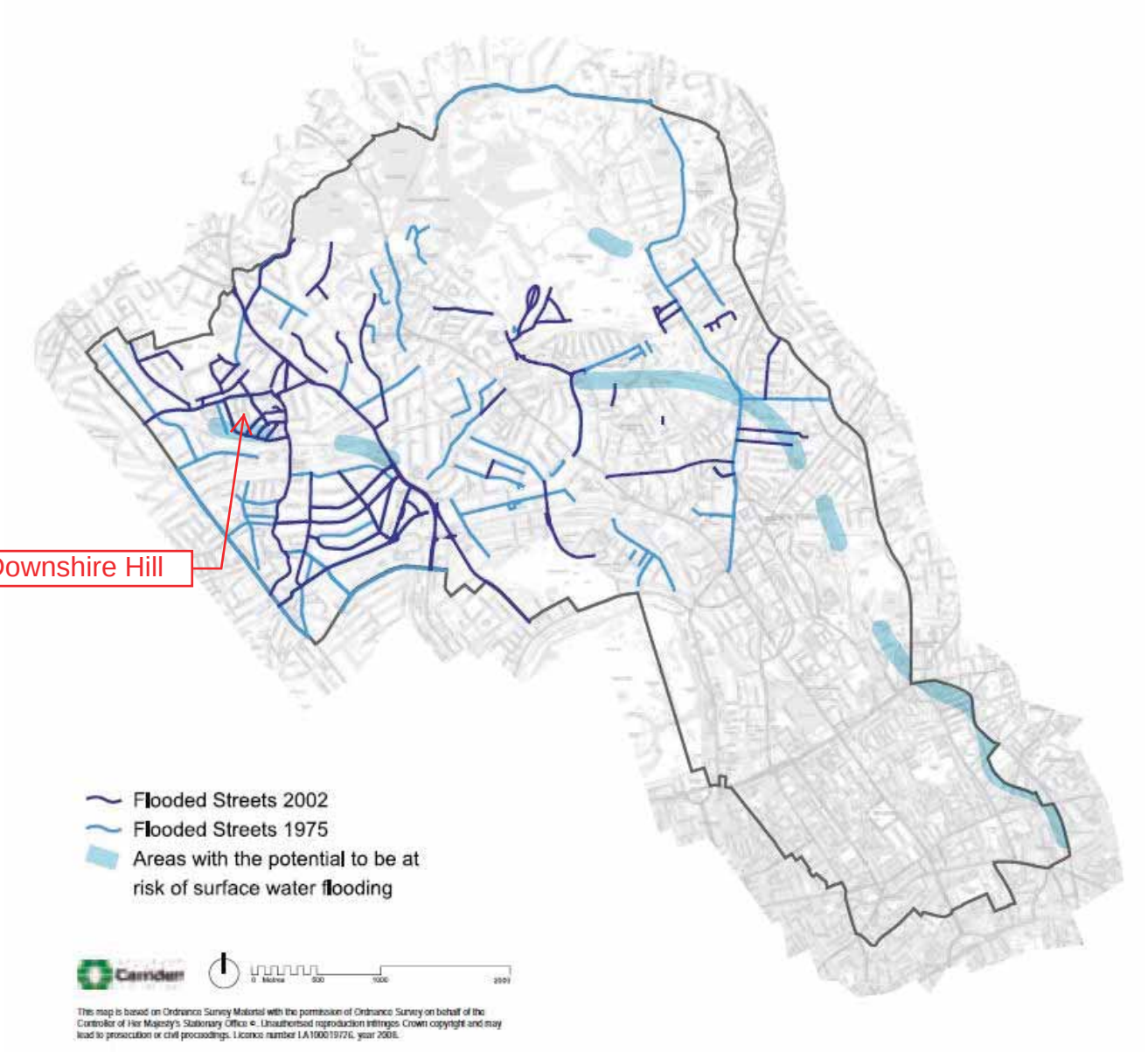
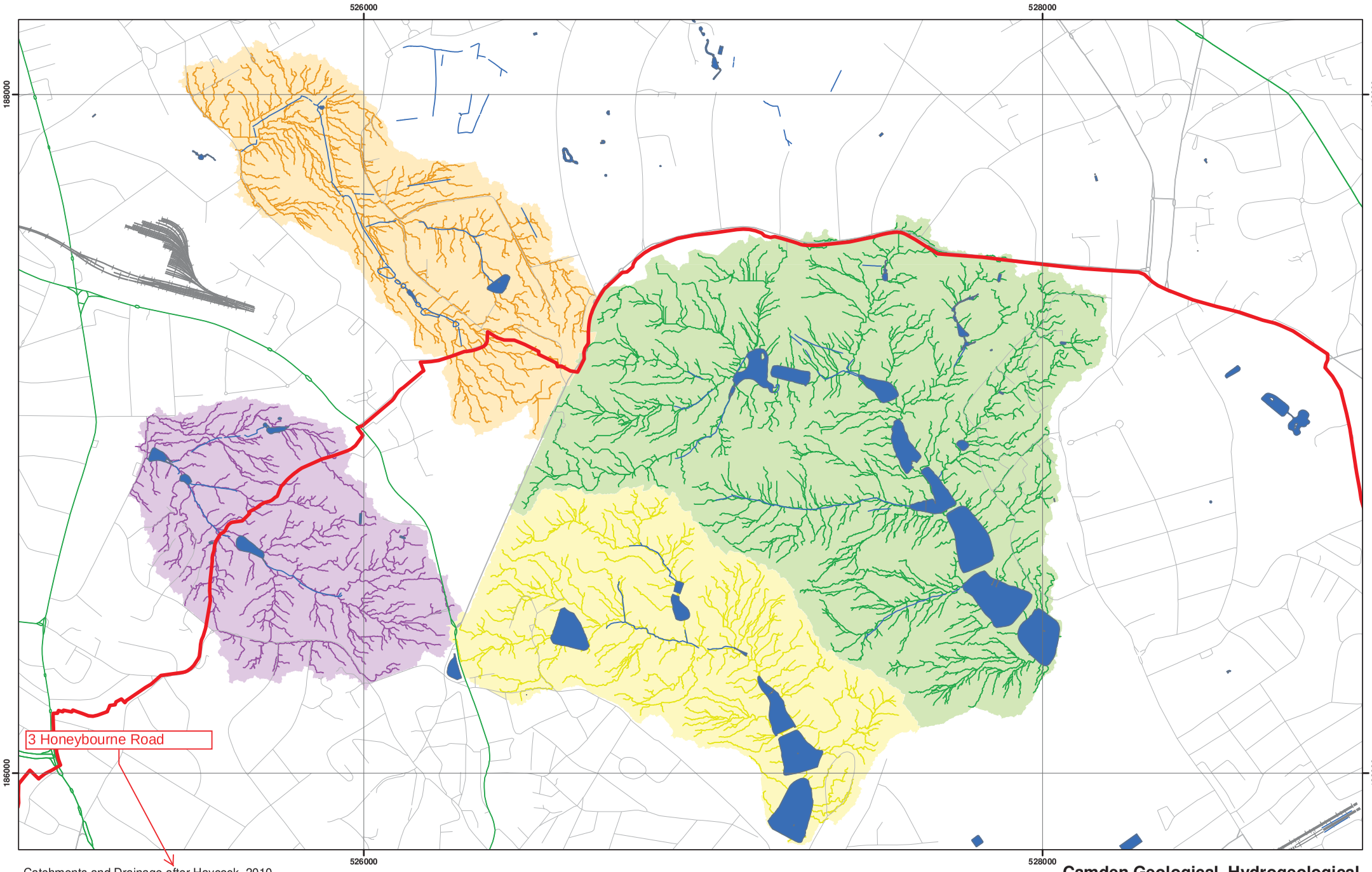


Figure 5 from Core Strategy, London Borough of Camden

Camden Geological, Hydrogeological and Hydrological Study
Flood Map

213923

FIGURE **15**



Catchments and Drainage after Haycock, 2010

N

Scale at A3: 1:10,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.125 0.25 0.5 0.75 1
Kilometers

Legend

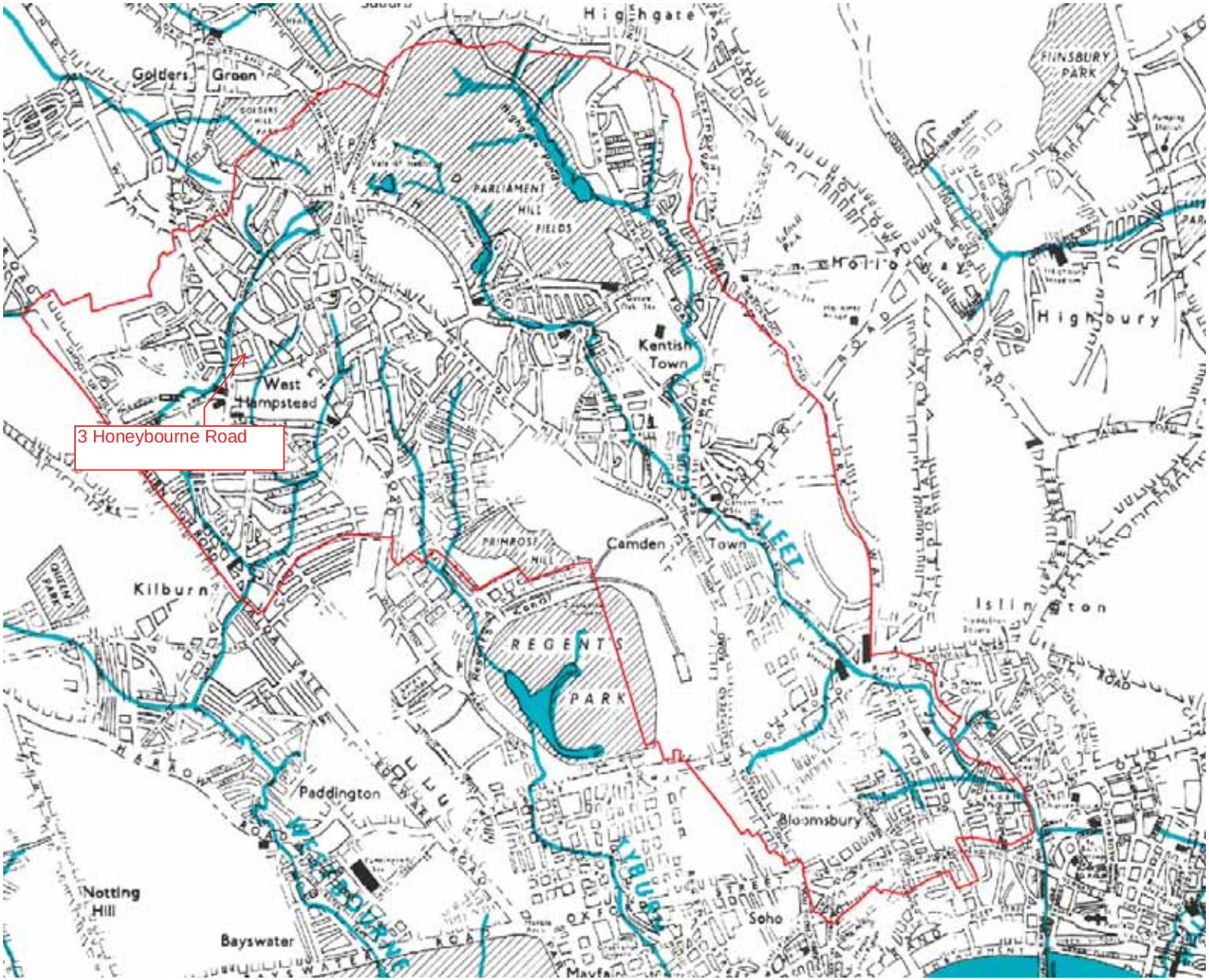
- London Borough of Camden
- Railway Lines
- A Roads
- Surface Water
- Highgate Chain Catchment
- Golders Hill Chain Catchment
- Hampstead Chain Catchment
- Hampstead Heath Extension Chain Catchment

Camden Geological, Hydrogeological and Hydrological Study

Hampstead Heath Surface Water Catchments and Drainage

213923

FIGURE 14

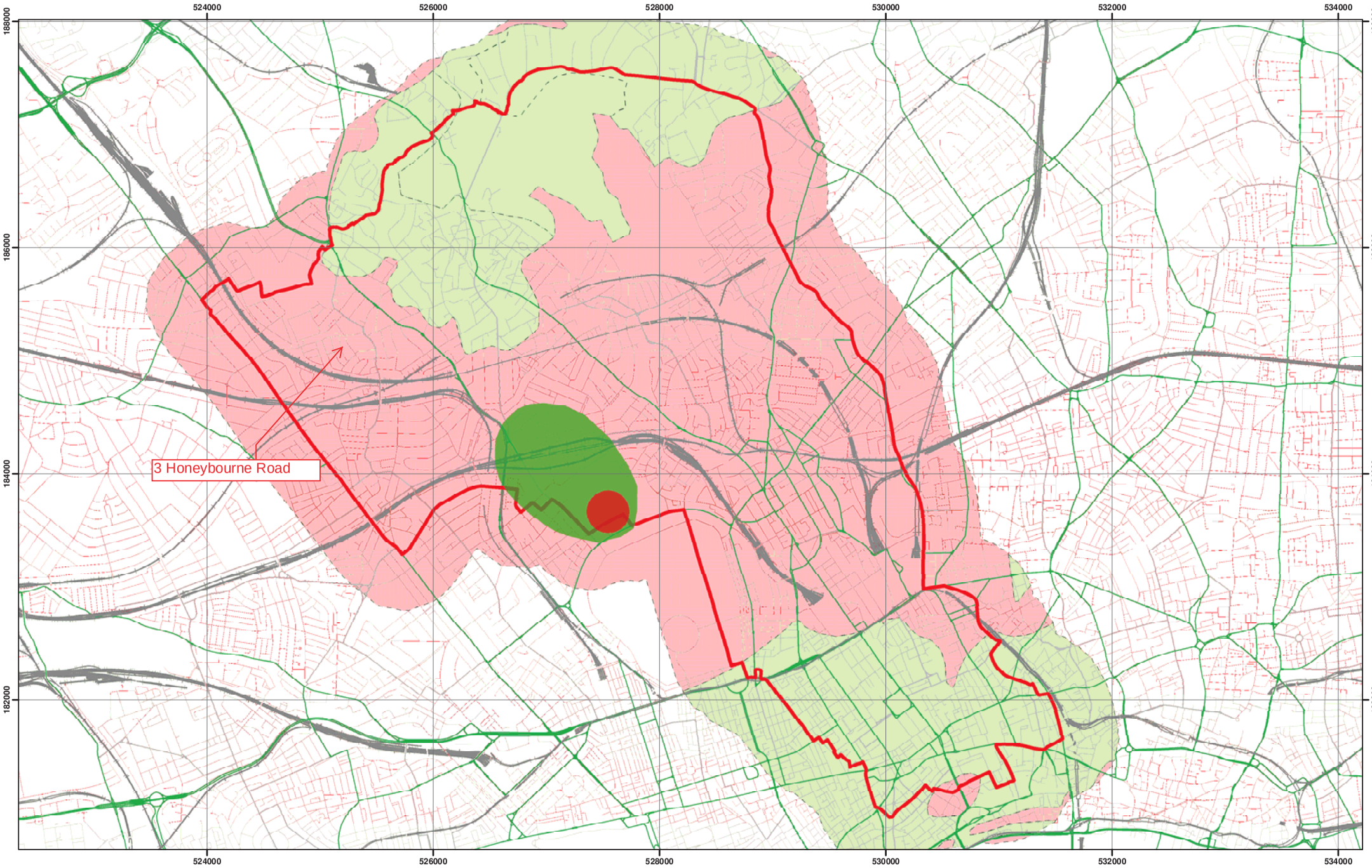


Source – Barton, Lost Rivers of London

Camden Geological, Hydrogeological and Hydrological Study
Watercourses

213923

FIGURE **11**



Environment Agency Aquifer Designation based on BGS Mapping

N

Scale at A3: 1:30,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

- Borough of Camden
- Railway Lines
- A Roads

Aquifer Designation

- Secondary A Aquifer
- Unproductive Strata

Source Protection Zone

- Outer Source Protection Zone
- Inner Source Protection Zone

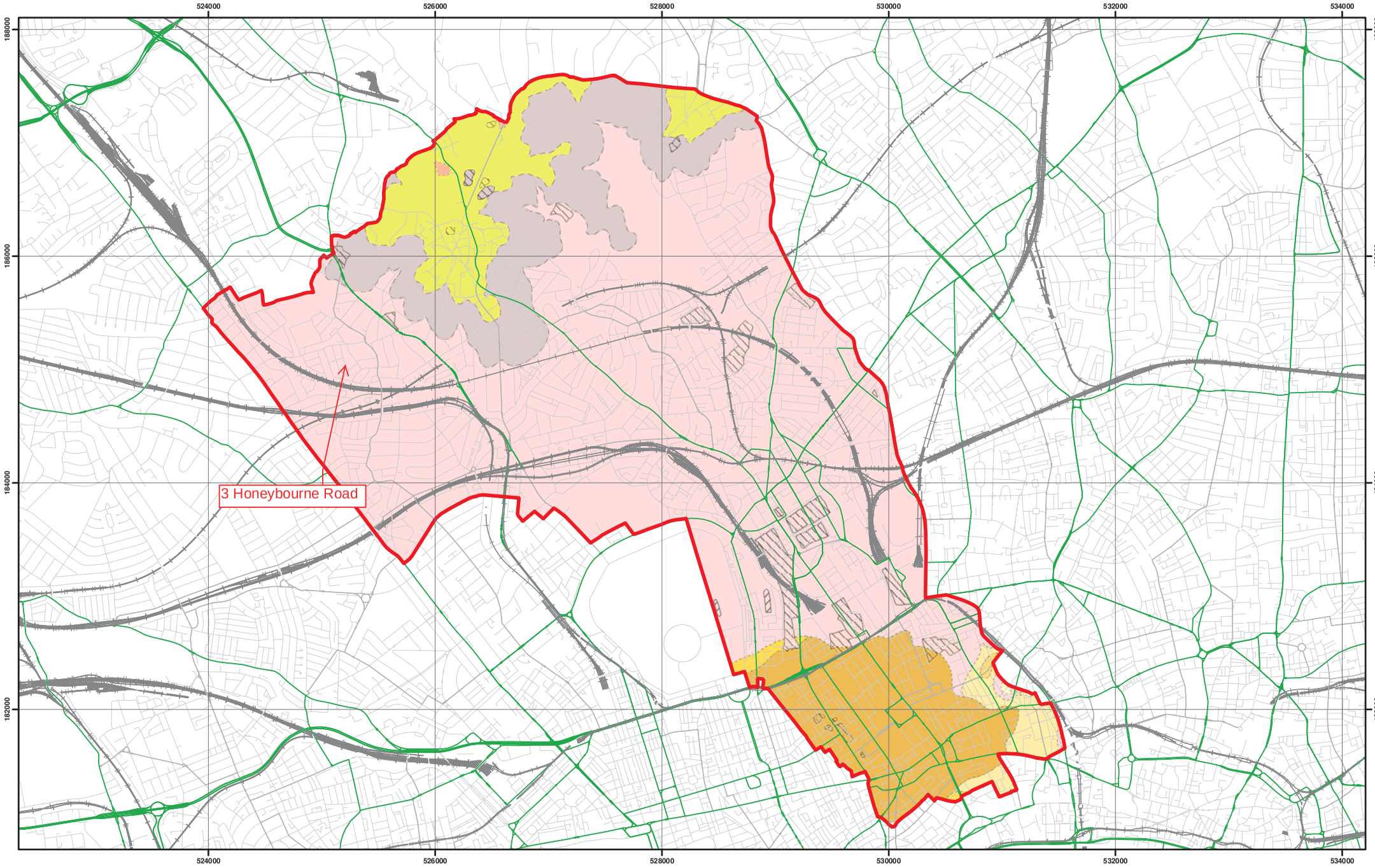
NB. Aquifer boundaries are indicative based on available geological mapping data

Camden Geological, Hydrogeological and Hydrological Study

Camden Aquifer Designation Map

213923

FIGURE 8



Data source - BGS Mapping - Scale 1:10,000

N

Scale at A3: 1:30,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

- London Borough of Camden
- Railway Lines
- A Roads

BGS 1:10K Artificial Ground

- MADE GROUND
- WORKED GROUND

BGS 1:10K Drift Geology

- ALLUVIUM
- HACKNEY GRAVEL FORMATION
- LANGLEY SILT FORMATION
- LYNCH HILL GRAVEL FORMATION
- STANMORE GRAVEL FORMATION

BGS 1:10K Solid Geology

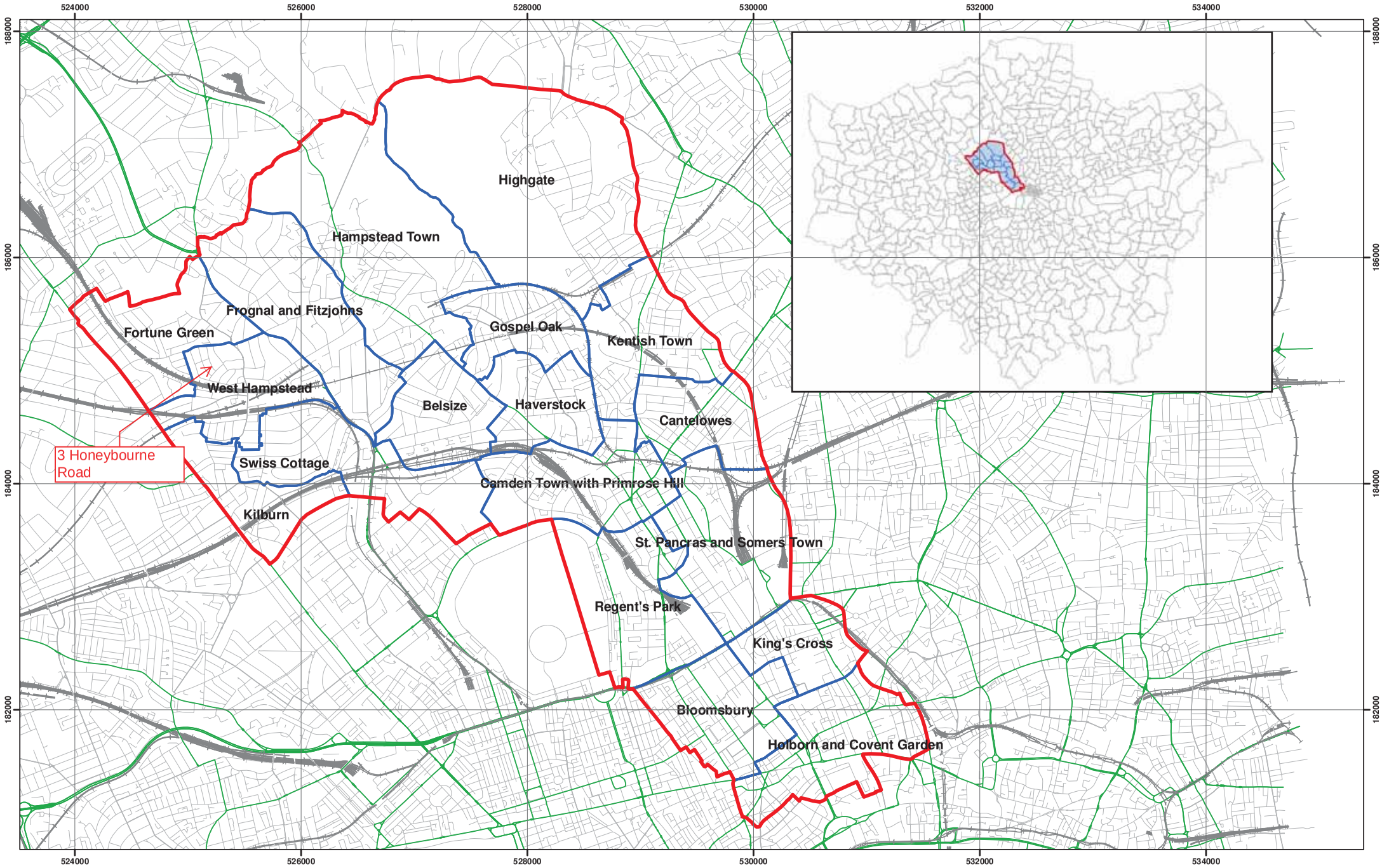
- BAGSHOT FORMATION
- CLAYGATE MEMBER
- LAMBETH GROUP
- LONDON CLAY FORMATION

NB: Geological boundaries are largely indicative based on available geological mapping data

Camden Geological, Hydrogeological and Hydrological Study

Camden Geological Map

213923 FIGURE 3



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Scale at A3: 1:30,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

- London Borough of Camden
- Camden Wards
- Railway Lines
- A Roads

Camden Geological, Hydrogeological and Hydrological Study

Camden Administrative Boundaries

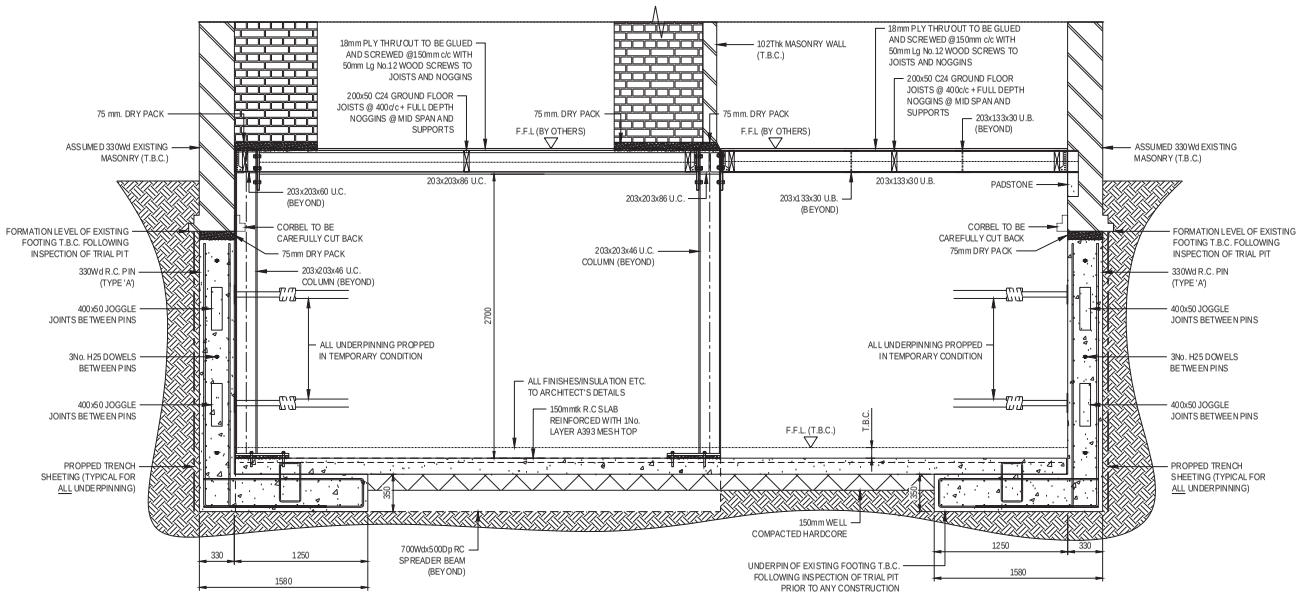
213923 FIGURE 1

15.0 APPENDIX 3:

INGealtoir Structural Scheme Drawings.

DO NOT SCALE OFF THIS DRAWING

1. GENERAL:
   - 1.1. All drawings are to be read in conjunction with "INGealtóir" standard specification. We draw the Contractors particular attention to section 4 of the specification with regards to temporary works design.
   - 1.2. All setting out details / dimensions are to be provided by the Architect unless already noted on INGealtóir drawings.
   - 1.3. All waterproofing / tanking / insulation / finishes etc. are by others.
   - 1.4. All dimensions in millimeters unless stated otherwise.



01 SECTION 01
Scale: 1:25

ANY EXPLORATORY EXCAVATION OR EXCAVATION FOR PERMANENT WORK MUST NOT UNDERMINE 45 DEGREE DISPERSION ZONE OF EXISTING FOUNDATION

TRIAL PITS EXPOSING EXISTING FOUNDATIONS TO BE INSPECTED PRIOR TO DEMOLITION

* ALL DIMENSIONS TO BE CONFIRMED ON SITE PRIOR ANY STRUCTURAL WORK

INSULATION BY OTHERS WATERPROOFING BY OTHERS. DRAINAGE BY OTHERS.

TEMPORARY WORKS BY CONTRACTOR

Rev	Date	By	Comment
-	-	-	-

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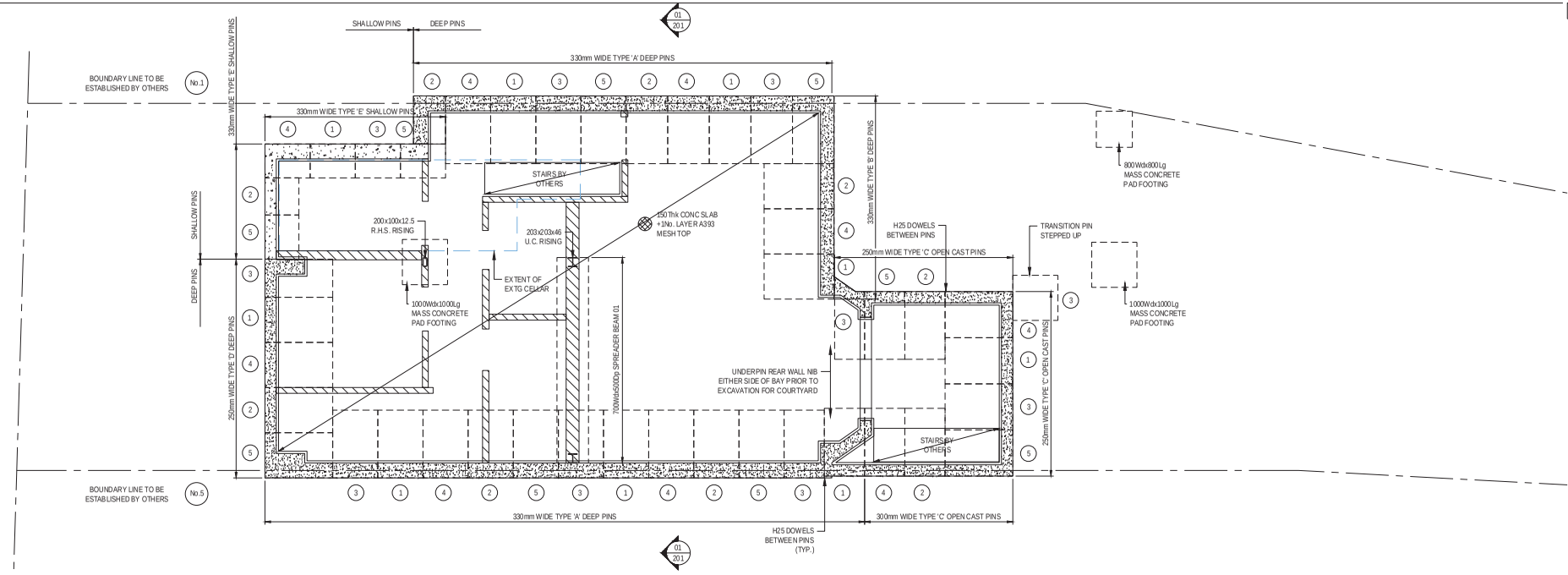
LONDON, NW6

Drawing Title
SECTION 01

Scale	1:50 @ A1	Issued	
By	MFS	Status	PRELIMINARY

Job No.	Dwg No.	Rev
15073	201	-



B BASEMENT

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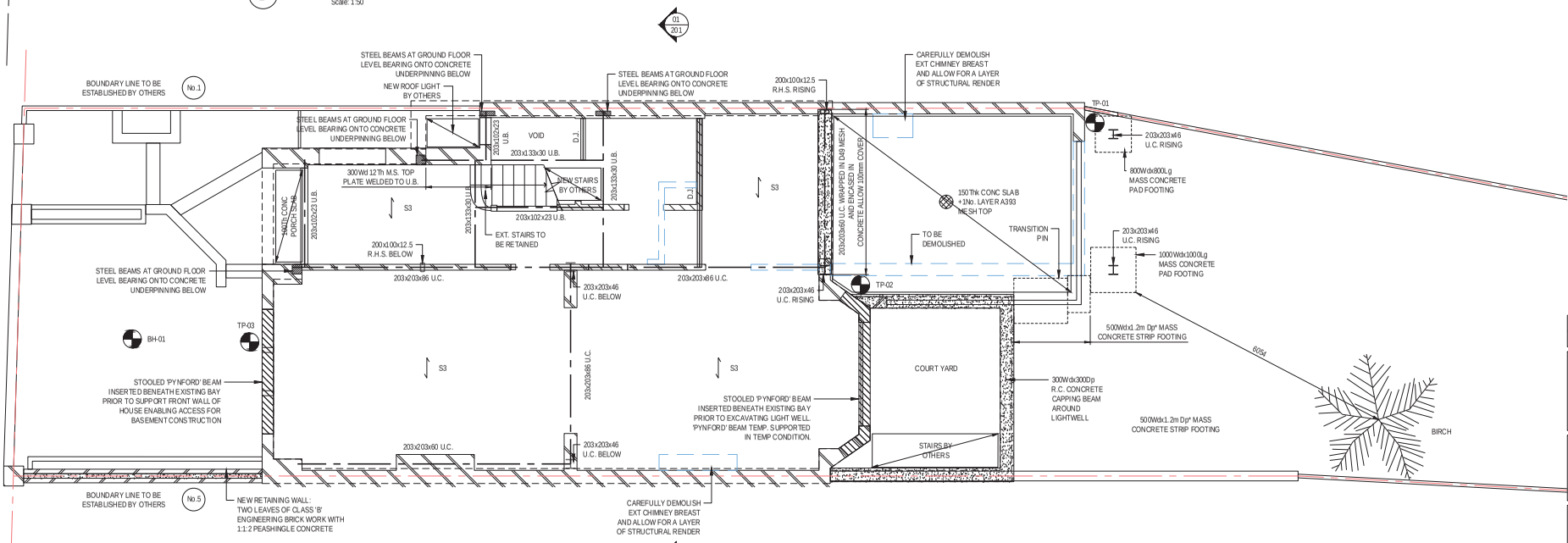

G GROUND FLOOR

Scale: 1:50

ANY EXPLORATORY EXCAVATION OR EXCAVATION FOR PERMANENT WORK MUST NOT UNDERMINE 45 DEGREE DISPERSION ZONE OF EXISTING FOUNDATION

TRIAL PITS EXPOSING EXISTING FOUNDATIONS TO BE INSPECTED PRIOR TO DEMOLITION

ALL FOUNDATION DEPTHS TO BE CONFIRMED FOLLOWING INSPECTION OF TRIAL PITS.

INSULATION BY OTHERS WATERPROOFING BY OTHERS. DRAINAGE BY OTHERS.

FORMATION LEVEL OF PINS TO BE APPROVED BY BUILDING INSPECTOR.

DO NOT SCALE OFF THIS DRAWING

1. GENERAL:
   - 1.1. All drawings are to be read in conjunction with "INGealtoir" standard specification. We draw the Contractors particular attention to section 4 of the specification with regards to temporary works design.
   - 1.2. All setting out details / dimensions are to be provided by the Architect unless already noted on INGealtoir drawings.
   - 1.3. All waterproofing / tanking / insulation / finishes etc. are by others.
   - 1.4. All dimensions in millimeters unless stated otherwise.

2. UNDERPINNING METHOD STATEMENT:

Underpinning to be carried out in accordance with ASUC Guidelines on Safe and Efficient Underpinning & Mini Piling Operations.

- 2.1. Excavate formation trench for individual pin, from floor level to underside of existing foundation and clear away spoil into skips. Width of each section generally not exceeding 1m.
- 2.2. At underside of foundation, continue excavation, and head in under wall to back of existing corbel.
- 2.3. Place poling boards and wailings to support sides of excavation as soon as possible if sub grade is unstable.
- 2.4. Remove any deleterious material and/or loose masonry from underside of footing.
- 2.5. Continue excavation to agreed formation level, placing earth works support as work proceeds and bottom out excavation.
- 2.6. Building Inspector and Engineer to inspect excavation to agree depth and satisfactory bearing capacity of formation level.
- 2.7. If areas of structure over are weak or heavily point loaded, build in sacrificial props on pre-cast pads into underpinning.
- 2.8. Immediately before concreting excavation, remove earthwork support and erect shuttering. (note: no further access is allowable into excavation after this point.)
- 2.9. Cast concrete pin to required mix to within 75mm of underside of existing foundation (concrete transported in wheelbarrows).
- 2.10. After minimum 48 hours, dry pack gap between underpinning & existing corbel with 1:3 cement/sharp sand earth damp mix rammed firmly into position.
- 2.11. PROP HEAD OF PINS IN TEMPORARY CASE.
- 2.12. Allow a minimum of 3 days between casting a pin and any adjacent excavation.

3. CONCRETE:
   - 3.1. Concrete: Conform to the requirements of BS8110 and those contained in the Concrete Specification.
   - 3.2. Max aggregate size 20mm
   - 3.3. Concrete to be grade C40 unless stated otherwise.
   - 3.4. Maximum free water / cement ratio to be 0.45
   - 3.5. Min cement content to be 330kg/m³.
   - 3.6. Concrete to be Class 2 sulphate resisting.
   - 3.7. Minimum cover to be 40 mm.

3. REINFORCEMENT:
   - 3.1. Anchorage and laps of reinforcement shall be according to BS8110-1997 (3.12.8), curtailment of reinforcing bars shall be according to BS8110-1997 (3.12.10)
   - 3.2. Minimum cover.
     - 3.2.1. Basement Slab - 40mm

4. MASONRY:
   - 4.1. All block work is to be 7N/mm² lightweight block. Unless stated otherwise.
   - 4.2. All below ground masonry to be frost resistant. Mortar in all below ground masonry to be designation (ii) 1:¼:4.
   - 4.3. All cavity wall ties are to be 'Halfen HTST' type stainless steel ties at 900 c/c horiz & 450c/c vert. Unless stated otherwise.

5. STEEL:
   - 5.1. All steel sections are to be grade S355 to BS5950.
   - 5.2. The Contractor is responsible for maintaining the structural integrity of the steel frame during the construction phase and is to provide any necessary temporary propping to ensure stability during construction.
   - 5.3. Fire protection of structural steelwork is to the architect's details.

6. TIMBER
   - 6.1. New timber in the works is to be selected structural timber not inferior to grade C16 to BS5268: part 2, unless noted otherwise on the drawings.
   - 6.2. Joists & rafters are to be notched no greater than one fifth of overall depth.
   - 6.3. 50mm wide full depth soft wood skew nailed noggins are to be inserted at supports and mid-span of all joists & rafter spans.
   - 6.4. All timber stud partitions to be supported on doubled joists
   - 6.5. All double joists to be bolted together using M12 bolts + 51mmØ toothed plated connectors @ 500c/c.

-	-	-	-
Rev	Date	By	Comment

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Project
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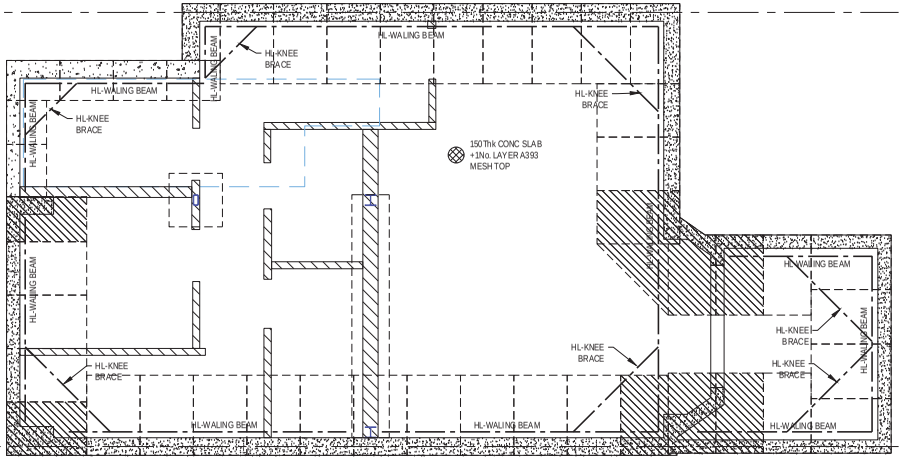
LONDON, NW6

Drawing Title
BASEMENT
GROUND FLOOR

Scale	1:50 @ A1	Issued	
By	DV	Status	PRELIMINARY

Job No.	Dwg No.	Rev
15073	101	-

DO NOT SCALE OFF THIS DRAWING



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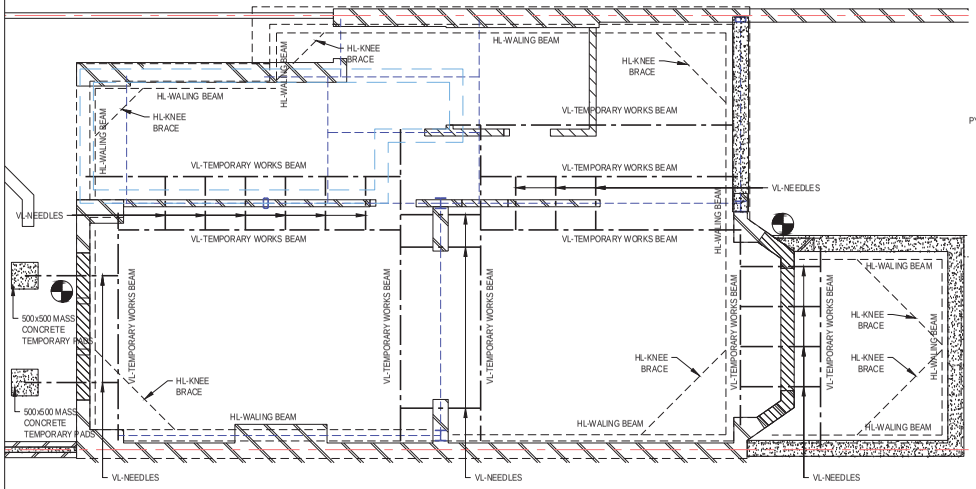

G GROUND FLOOR
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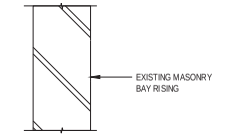

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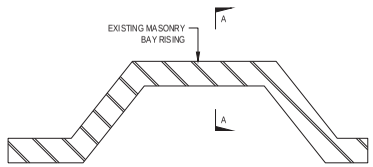

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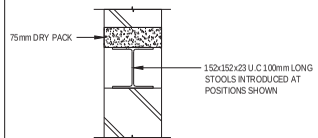

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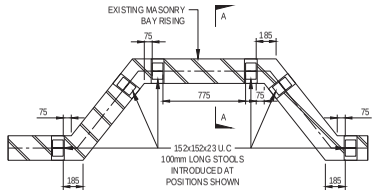

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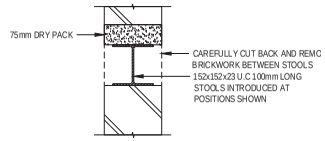

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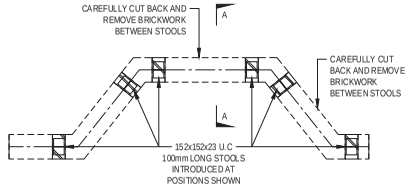

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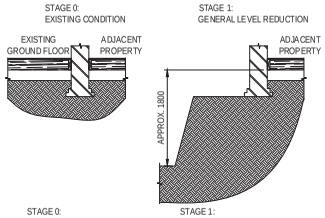

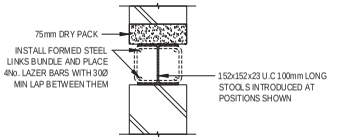

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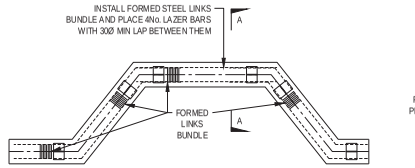

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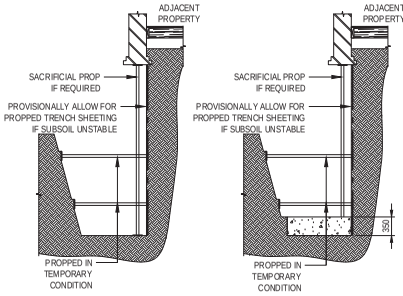

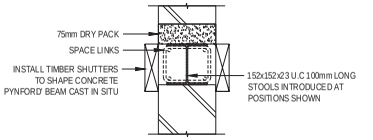

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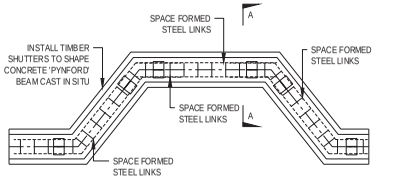

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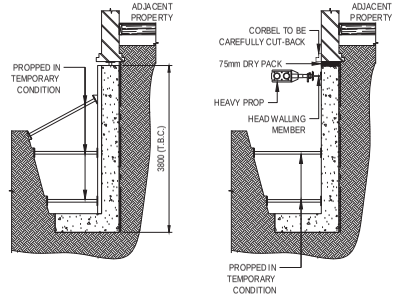

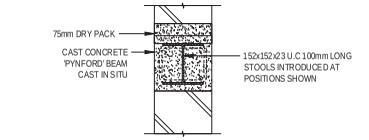

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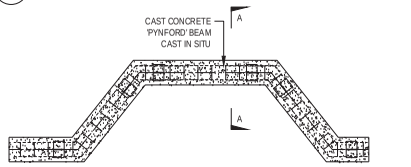
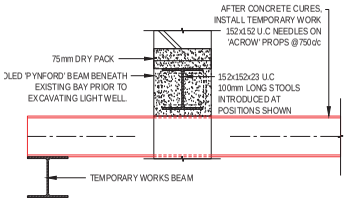


05 STAGE 05
Scale: 1:25

STAGE 4: CONCRETE STEM OF UNDERPIN

STAGE 5: STRIKE SHUTTER WHEN CONCRETE HAS GAINED SUFFICIENT STRENGTH, DRYPACK, TRIM - OFF PROJECTING FOOTING, RE - PROP UNTIL BASEMENT SLAB IS CAST



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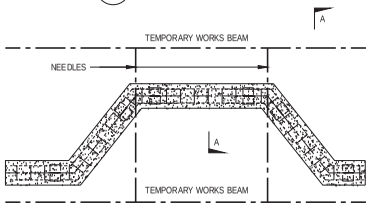

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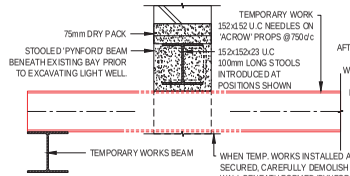

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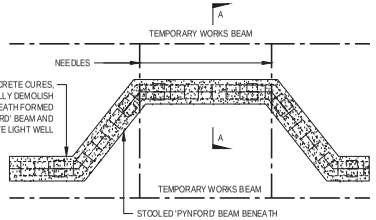

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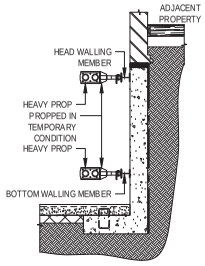

STAGE 6: BULK EXCAVATION, CAST BASEMENT SLAB, RE - PROP UNTIL CONCRETE HAS GAINED SUFFICIENT STRENGTH

UE1 UNDERPINNING SEQUENCE
Scale: 1:1

-	-	-	-
Rev	Date	By	Comment

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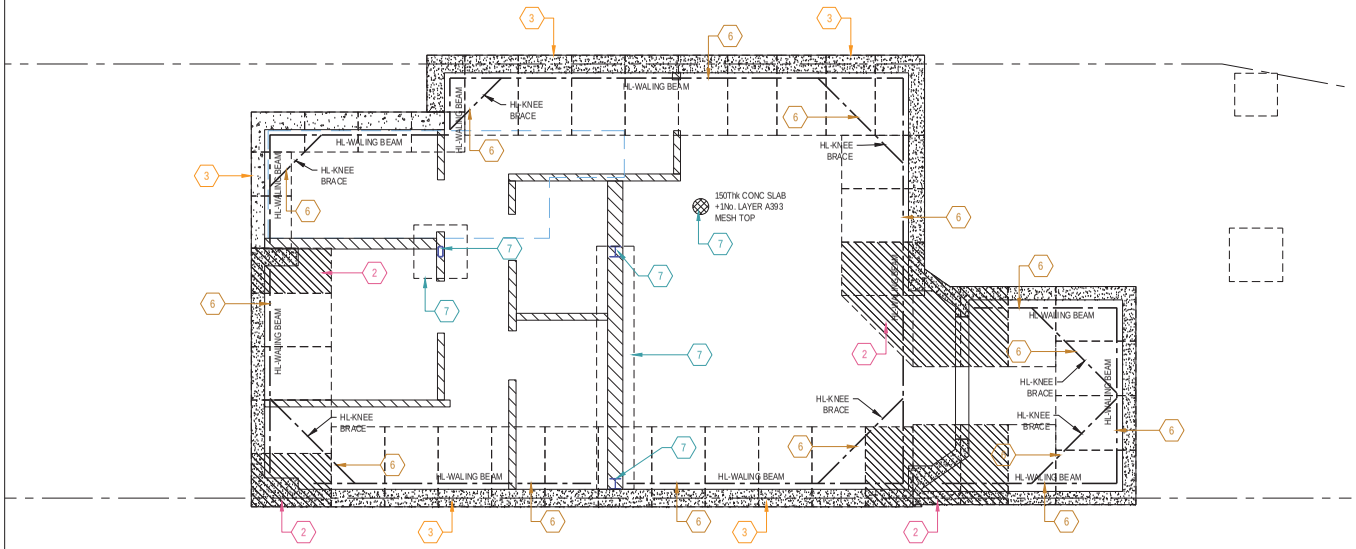
Drawing Title
TEMPORARY WORKS
STRATEGY

Scale	1:50 @ A1	Issued	
By	DV	Status	PRELIMINARY

Job No.	Dwg No.	Rev
15073	902	-

DO NOT SCALE OFF THIS DRAWING



B BASEMENT
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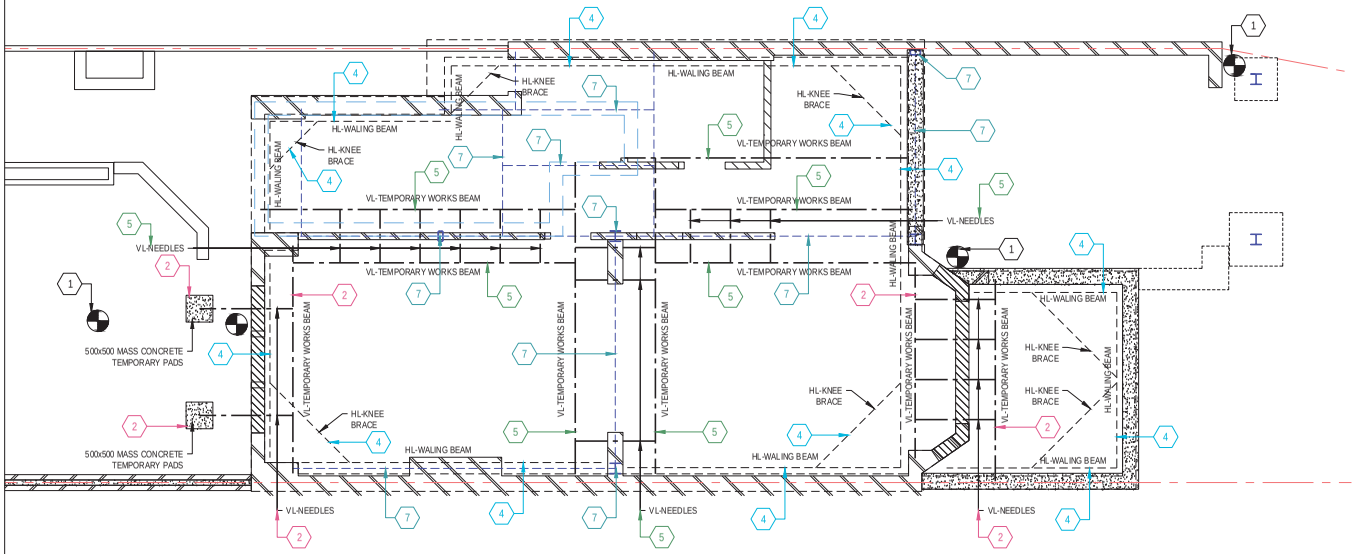

G GROUND FLOOR
Scale: 1:50

RECOMMENDED SEQUENCE OF CONSTRUCTION:

1. Carry out trial pits establishing the depth of existing wall footings.

2.Underpin front bay wall facilitating formation of the front access enclosure. Underpin rear bay wall facilitating formation of the rear courtyard enclosure. Install 'Pynford' beams beneath bays at ground floor level. Needle and temp support front & rear bays. Excavate soil forming access for bulk excavation of basement.

3.Underpin existing walls forming basement in sequence shown back fill against pins.

4.Install steel, knee-braced, walling beam system, propping tops of pins to deal with horizontal loads (HL). This system is to remain in place until the basement slab is cast and cured. Refer to ING drg. 15073-902 for suggested temp works strategy.

5. Temporary works to the internal walls of the main house. Install temporary beams and needles to deal with vertical loads (VL).

6. Carry out bulk excavation to top of underpinning toe.Install steel, knee-braced, walling beam system, propping bottom of pins to deal with horizontal loads (HL).

7.Carry out sub-slab drainage. Cast pad footing & spreader beam. Erect basement steel framing. Cast basement slab.

8. Decommission temp. works waling system. Reinstate ground floor construction.

Rev	Date	By	Comment
-	-	-	-

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LONDON, NW6

Drawing Title
RECOMENDED
SEQUENCE OF CONSTRUCTION

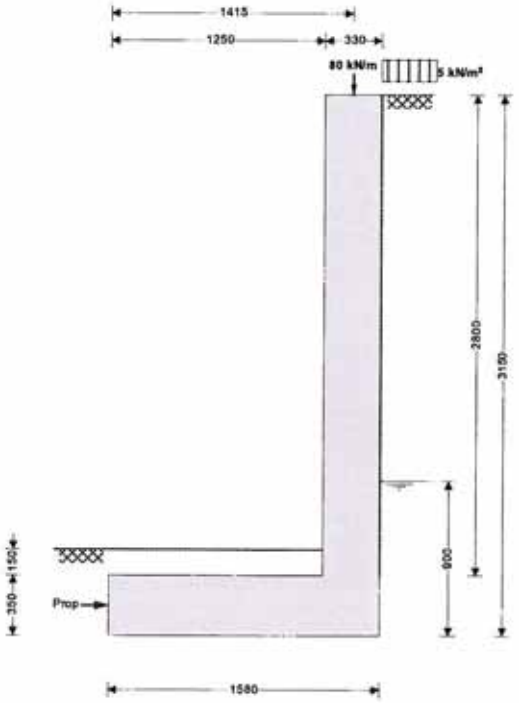
Scale	1:50 @ A1	Issued	
By	DV	Status	PRELIMINARY

Job No.	Dwg No.	Rev
15073	901	-

Tedds INGEALTOIR 31 OVAL ROAD NW17EA LONDON	Project 3 HONEYBOURNE, LONDON, NW6				Job no. 15073	
	Calcs for B-UNDERPINNING TYPE 'A'				Start page no./Revision 1	
	Calcs by DV	Calcs date 12/08/2015	Checked by	Checked date	Approved by	Approved date

RETAINING WALL ANALYSIS (BS 8002:1994)

TEDDS calculation version 1.2.01.06



Wall details

Retaining wall type	**Cantilever**		
Height of wall stem	h_{stem} = **2800** mm	Wall stem thickness	t_{wall} = **330** mm
Length of toe	l_{toe} = **1250** mm	Length of heel	l_{heel} = **0** mm
Overall length of base	l_{base} = **1580** mm	Base thickness	t_{base} = **350** mm
Height of retaining wall	h_{wall} = **3150** mm		
Depth of downstand	d_{ds} = **0** mm	Thickness of downstand	t_{ds} = **350** mm
Position of downstand	l_{ds} = **700** mm		
Depth of cover in front of wall	d_{cover} = **150** mm	Unplanned excavation depth	d_{exc} = **0** mm
Height of ground water	h_{water} = **900** mm	Density of water	γ_{water} = 9.81 kN/m³
Density of wall construction	γ_{wall} = **23.6** kN/m³	Density of base construction	γ_{base} = **23.6** kN/m³
Angle of soil surface	β = **0.0** deg	Effective height at back of wall	h_{eff} = **3150** mm
Mobilisation factor	M = **1.5**		
Moist density	γ_m = **18.0** kN/m³	Saturated density	γ_s = **21.0** kN/m³
Design shear strength	ϕ' = **24.2** deg	Angle of wall friction	δ = **0.0** deg
Design shear strength	ϕ'_b = **24.2** deg	Design base friction	δ_b = **18.6** deg
Moist density	γ_{mb} = **18.0** kN/m³	Allowable bearing	$P_{bearing}$ = **120** kN/m²

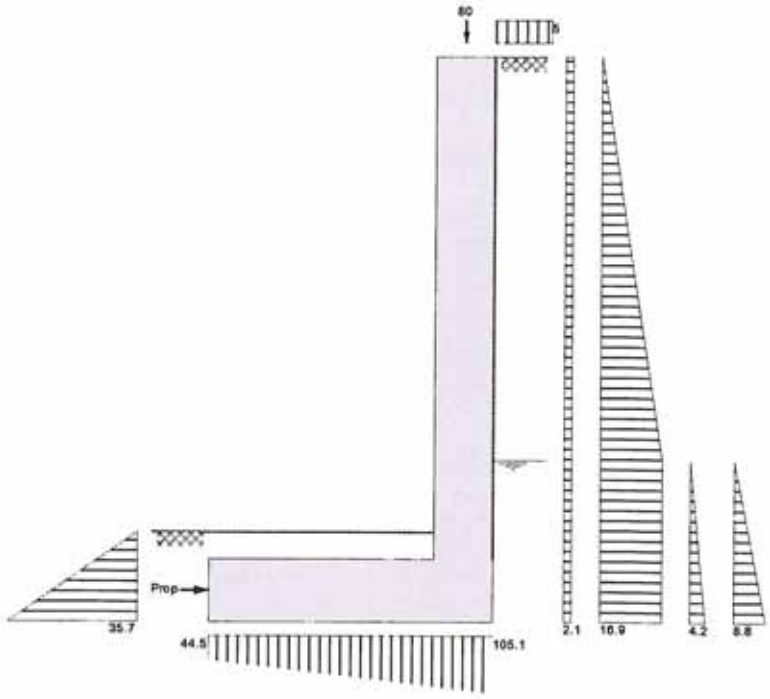
Using Coulomb theory

Active pressure	K_a = **0.419**	Passive pressure	K_p = **4.187**
At-rest pressure	K_0 = **0.590**		

Tedds	Project				Job no.	
INGEALTOIR 31 OVAL ROAD NW17EA LONDON	3 HONEYBOURNE, LONDON, NW6				15073	
	Calcs for B-UNDERPINNING TYPE 'A'				Start page no./Revision 2	
	Calcs by DV	Calcs date 12/08/2015	Checked by	Checked date	Approved by	Approved date

Loading details

Surcharge load	Surcharge = **5.0** kN/m²		
Vertical dead load	W_{dead} = **50.0** kN/m	Vertical live load	W_{live} = **30.0** kN/m
Horizontal dead load	F_{dead} = **0.0** kN/m	Horizontal live load	F_{live} = **0.0** kN/m
Position of vertical load	l_{load} = **1415** mm	Height of horizontal load	h_{load} = **0** mm



Loads shown in kN/m, pressures shown in kN/m²

Calculate propping force

Propping force F_{prop} = **9.3** kN/m

Check bearing pressure

Total vertical reaction	R = **118.2** kN/m	Distance to reaction	x_{bar} = **897** mm
Eccentricity of reaction	e = **107** mm		

Reaction acts within middle third of base

Bearing pressure at toe	p_{toe} = **44.5** kN/m²	Bearing pressure at heel	p_{heel} = **105.1** kN/m²

PASS - Maximum bearing pressure is less than allowable bearing pressure

RETAINING WALL DESIGN (BS 8002:1994)

TEDDS calculation version 1.2.01.06

Ultimate limit state load factors

Dead load factor γ_{f_d} = **1.4** Live load factor γ_{f_l} = **1.6**

Earth pressure factor γ_{f_e} = **1.4**

Calculate propping force

Propping force F_{prop} = **9.3** kN/m

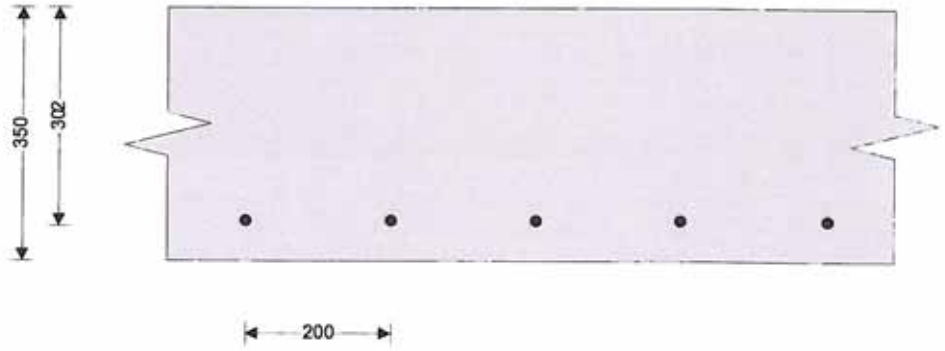
Design of reinforced concrete retaining wall toe (BS 8002:1994)

Material properties

Strength of concrete f_{cu} = **40** N/mm² Strength of reinforcement f_y = **500** N/mm²

Base details

Minimum reinforcement k = **0.13** % Cover in toe c_{toe} = **40** mm



Design of retaining wall toe

Shear at heel V_{toe} = **122.7** kN/m Moment at heel M_{toe} = **102.9** kNm/m

Compression reinforcement is not required

Check toe in bending

Reinforcement provided **16 mm dia.bars @ 200 mm centres**

Area required $A_{s\_toe\_req}$ = **824.4** mm²/m Area provided $A_{s\_toe\_prov}$ = **1005** mm²/m

PASS - Reinforcement provided at the retaining wall toe is adequate

Check shear resistance at toe

Design shear stress v_{toe} = **0.406** N/mm² Allowable shear stress v_{adm} = **5.000** N/mm²

PASS - Design shear stress is less than maximum shear stress

Concrete shear stress v_{c_toe} = **0.550** N/mm²

v_{toe} < v_{c_toe} - No shear reinforcement required

Design of reinforced concrete retaining wall stem (BS 8002:1994)

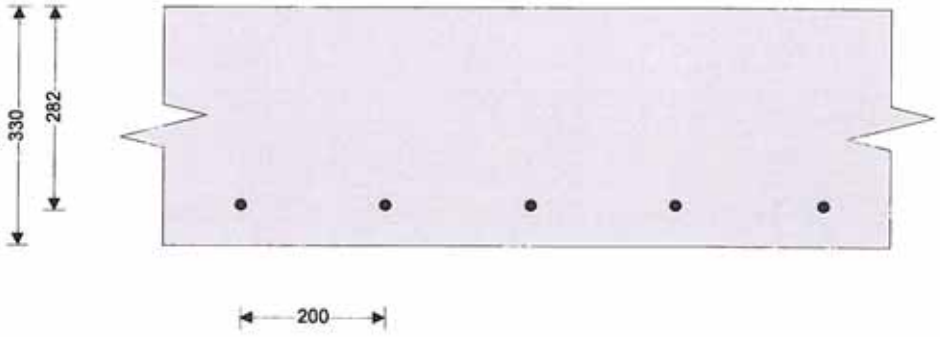
Material properties

Strength of concrete f_{cu} = **40** N/mm² Strength of reinforcement f_y = **500** N/mm²

Wall details

Minimum reinforcement k = **0.13** %

Cover in stem c_{stem} = **40** mm Cover in wall c_{wall} = **40** mm



Design of retaining wall stem

Shear at base of stem V_{stem} = **33.3** kN/m Moment at base of stem M_{stem} = **82.0** kNm/m

Compression reinforcement is not required

Check wall stem in bending

Reinforcement provided **16 mm dia.bars @ 200 mm centres**

Area required $A_{s\_stem\_req}$ = **703.9** mm²/m Area provided $A_{s\_stem\_prov}$ = **1005** mm²/m

PASS - Reinforcement provided at the retaining wall stem is adequate

Check shear resistance at wall stem

Design shear stress v_{stem} = **0.118** N/mm² Allowable shear stress v_{adm} = **5.000** N/mm²

PASS - Design shear stress is less than maximum shear stress

Concrete shear stress v_{c_stem} = **0.572** N/mm²

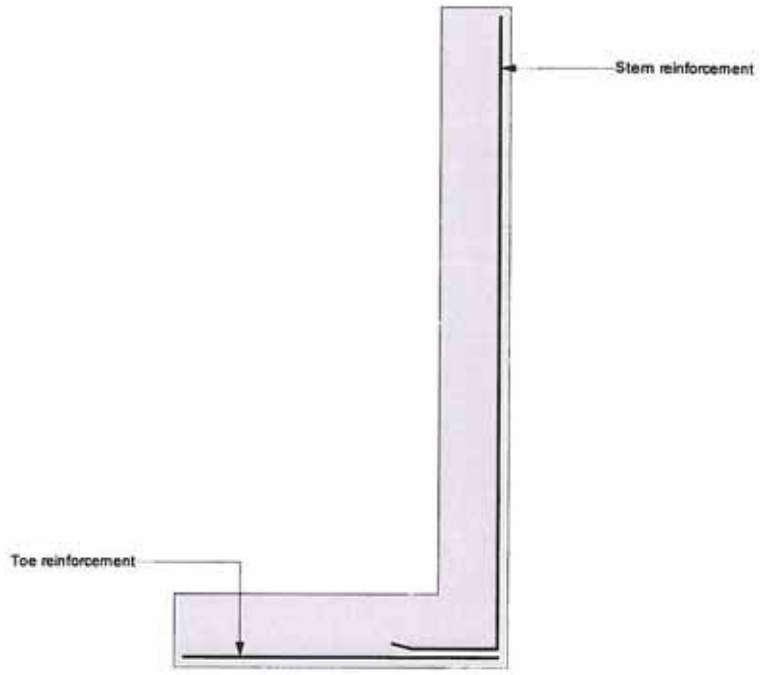
$v_{stem} < v_{c\_stem}$ - No shear reinforcement required

Check retaining wall deflection

Max span/depth ratio $ratio_{max}$ = **11.21** Actual span/depth ratio $ratio_{act}$ = **9.93**

PASS - Span to depth ratio is acceptable

Indicative retaining wall reinforcement diagram



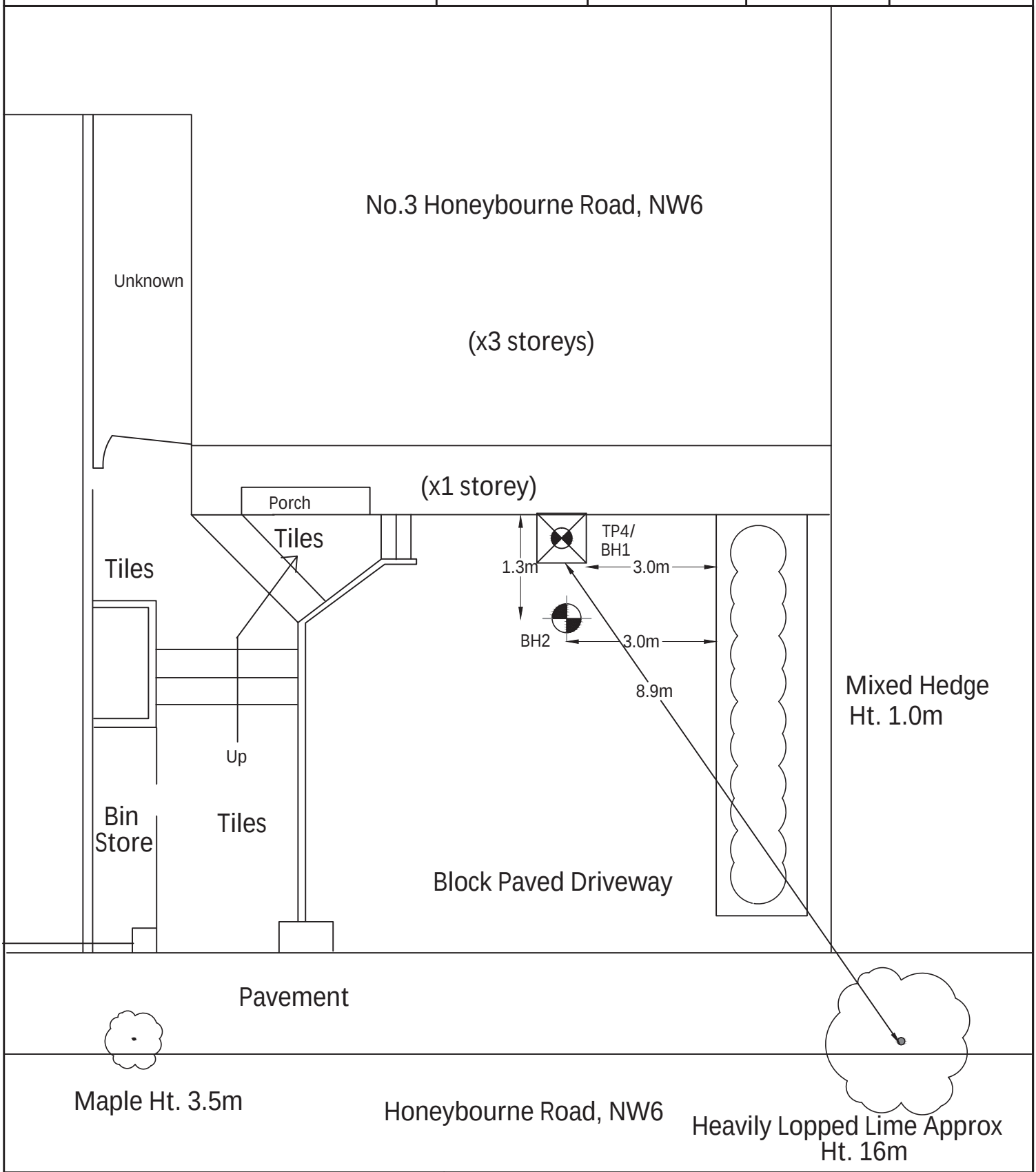
Toe bars - 16 mm dia.@ 200 mm centres - (1005 mm^2/m)
Stem bars - 16 mm dia.@ 200 mm centres - (1005 mm^2/m)

16.0 APPENDIX 4:

Record of Geotechnical Investigation.

Chelmer Site Investigations
'Groundbreaking Services'

Client: James Strachlan		**Scale:** N	**Sheet:** 1 of 1	**Date:** 19.08.15	
Location: 3 Honeybourne Road, London, NW6 1HH		**Job No:** 5678	**Weather:** Fine	**Drawn by:** DB	**Checked by:** ME



Notes: *Front of Property*

Key:

Tree/Shrub | Borehole | Trial Pit | G Gully | Tree Stump | Rain Water/ Soil Pipe | MH Manhole

Chelmer Site Investigations
'Groundbreaking Services'

Client: James Strachlan	Scale: N.T.S.	Sheet No: 1 of 1	Weather: Overcast	Date: 19.08.15
Site: 3 Honeybourne Road, London, NW6 1HH	Job No: 5678	Borehole No: 2	Boring method: CFA 100mmØ Secondman	

Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Test Result	Root Information	Depth to Water	Depth Mtrs
G.L.	BRICK PAVING SLABS	0.01							
0.01	SAND	0.39							
0.4	Firm, brown slightly sandy silty CLAY with partings of brown and orange silt and fine sand.			D			Roots of live and dead appearance to 1mmØ to 0.6m.		0.5
				D	V	62 64			1.0
				D			No roots observed below 0.6m.		1.5
				D	V	70 72			2.0
				D					2.5
				D	V	78 80			3.0
				D					3.5
3.0	Becoming stiff from 3.0m.	7.6		D	V	84 84			4.0
				D					4.5
				D	V	90 92			5.0
				D					5.5
				D	V	102 106			6.0
7.0	Becoming very stiff from 7.0m.			D	V	120+ 120+			7.0
8.0	Borehole ends at 8.0m			D	V	120+ 120+			8.0

Drawn by: LS **Approved by:** JH

Remarks: *Borehole dry and open on completion.*

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample J Jar Sample
B Bulk Disturbed Sample V Pilcon Vane (kPa)
U Undisturbed Sample (U100) M Mackintosh Probe
W Water Sample N Standard Penetration Test Blow Count