

3 Belsize Crescent: Subsurface Flow Basement Impact Assessment: screening stage

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1. Introduction

1.1 Background

This report presents the subsurface flow (groundwater) component of a basement impact assessment, to be submitted in support of a planning application for the basement development at 3 Belsize Crescent, London NW3 5QU (Figure 1.1, national grid reference TQ 2682 8495). The local planning authority is Camden Borough Council.

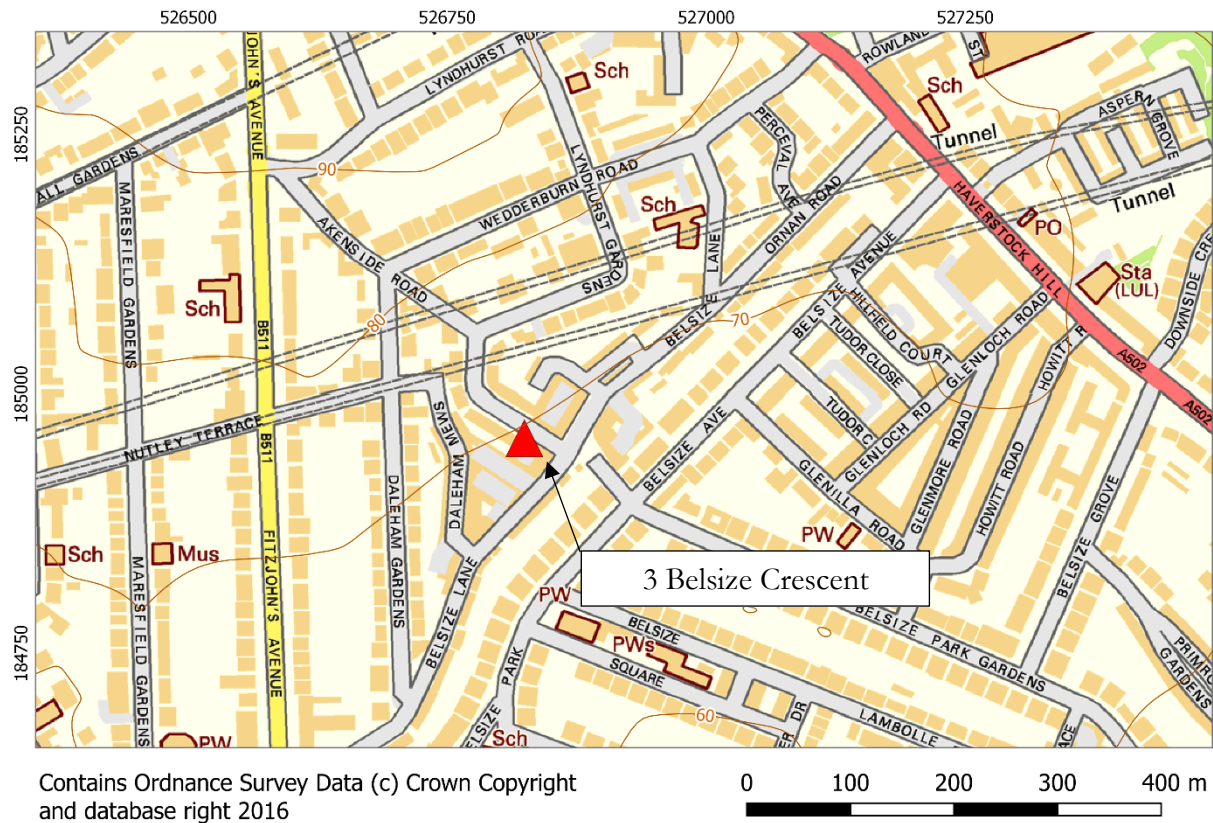


Figure 1.1 Location of 3 Belsize Crescent

1.2 Basement Works

The site comprises 3 Belsize Crescent which is a three-storey townhouse on the south west side of the crescent. To the east, south, west and north of the site are neighbouring residential properties. Number 1 adjoins the property to the south east and number 5 adjoins the property to the north west.

Plans for the new basement development involve deepening the existing basement by 1000 mm to make the floor habitable (Figure 1.2). There is no proposal to extend the basement outwards from the basement footprint.

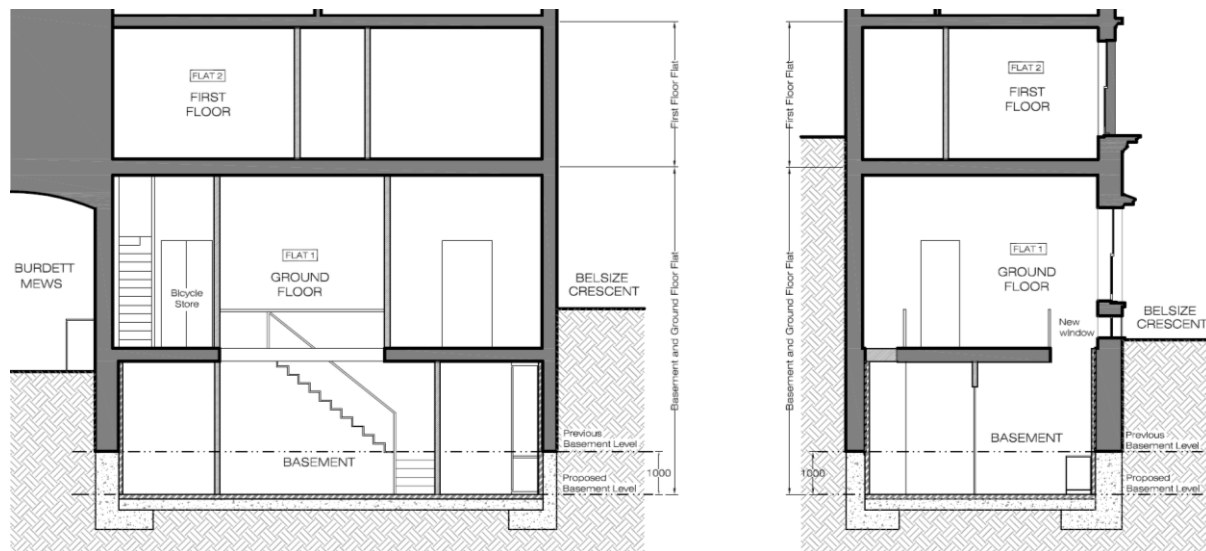


Figure 1.2 Proposed basement sections

1.3 Scope of Report

This report presents the sub-surface assessment for a basement development that complies with CPG4 screening and scoping stages, and makes reference to the basement impact assessment guidance of ARUP (2010)¹.

1.4 Authorship of Report

Stephen Buss Environmental Consulting Ltd was instructed in November 2015 to complete this report. This report has been prepared by Dr Stephen Buss MA MSc CGeol. Dr Buss is a UK-based independent hydrogeologist with more than 15 years' consulting experience in solving groundwater issues for regulators, water companies and other private sector organisations. **Dr Buss is a Chartered Geologist with the Geological Society of London.** Dr Buss's CV and publications list is available at www.hydro-geology.co.uk.



¹ ARUP, 2010. Camden geological, hydrogeological and hydrological study. Guidance for subterranean development.

2. Conceptual Site Model

2.1 Drainage and Topography

Elevation of 3 Belsize Crescent is about 70 m above Ordnance Datum (m AOD) according to Ordnance Survey contours (Figure 1.1). This is confirmed by the elevations of manhole covers reported by Water|Environment (2016)². Ground levels from the Thames Water asset plans include those of a manhole cover north of the site at 71.70 m AOD and a manhole cover to the south at 67.60 m AOD. Ground surface around the site slopes south-eastwards (gradient from Ordnance Survey 10 m contours is about 0.0425).

The property lies between the former courses of tributaries of the River Tyburn³, which has been culverted beneath the city (Figure 2.1). Ground contours (Figure 1.1) indicate that the nearest tributary (to the west) probably flowed close to Fitzjohn's Avenue, about 200 m to the west of Belsize Crescent.

The nearest current surface water feature is the Hampstead Ponds chain, the nearest of which is Hampstead No. 1 Pond about 970 m to the north east of the site. Whilst the elevation of the pond is about the same as that of 3 Belsize Crescent there is a ridge feature between them that rises to nearly 80 m AOD.

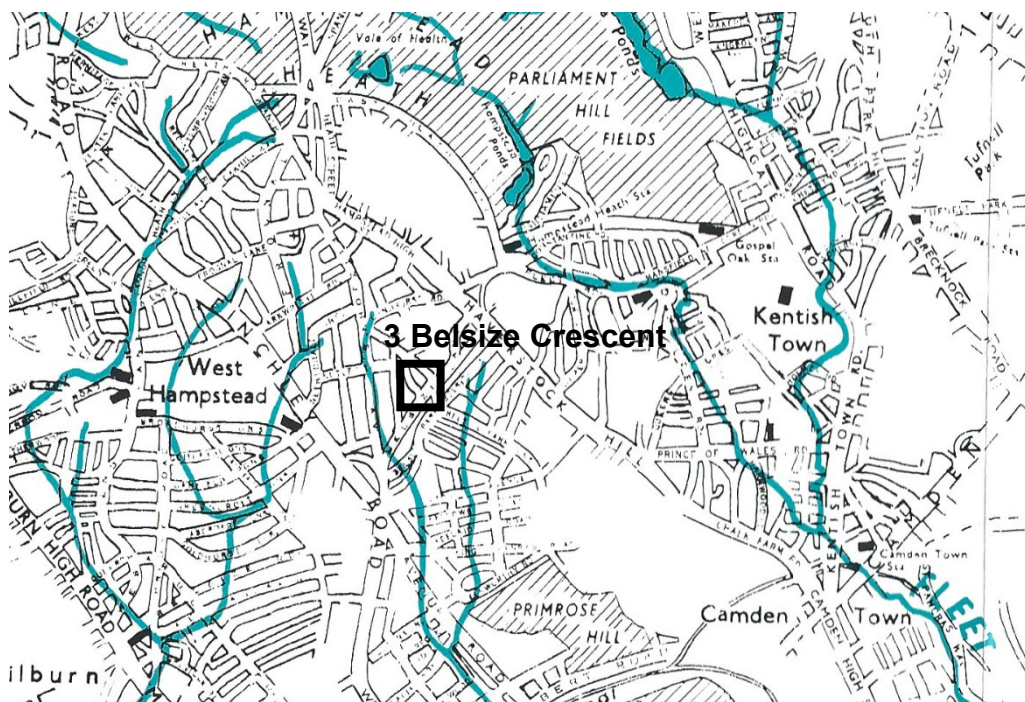


Figure 2.1 Location of lost rivers

² Water|Environment 2016. 3 Belsize Crescent, London Borough of Camden. Surface Water Flow and Flood Risk Assessment. Report for project number 15097.

³ Barton, N.J., 1993. The Lost Rivers of London 3rd edition.

2.2 Geology and Hydrogeology

Bedrock at the site comprises London Clay⁴. The base of the London Clay is at about 69 m below ground level at the Royal Free Hospital⁵ (about 500 m to the north east of the site) and isolates the main aquifer of the London Basin from the near-surface hydrogeology. No superficial deposits are mapped at the surface.

Outcrop of the Claygate Beds (which are highlighted in the ARUP 2010 report as prone to groundwater issues) is about 130 m to the north west of the property and at an elevation of about 78 m AOD.

There are no nearby borehole records available from the British Geological Survey, but there are some a few hundred metres away. These reinforce the mapped absence of any thickness of permeable superficial deposits in the area:

- One borehole⁶ was drilled at the junction of Belsize Avenue and Haverstock Hill, reference TQ28NE38. This location is about 480 m north east of 3 Belsize Crescent. The log records 1.3 m of made ground, with 'clay' below. No groundwater is noted on the log.
- Sixteen trial pits/window sample holes and two boreholes were constructed at 3, 5 and 7 Fitzjohn's Avenue, about 500 m south west of 3 Belsize Crescent. The closest window sample hole⁷, reference TQ28SE2337, shows 1 m of made ground over London Clay, and records no groundwater. The nearest borehole⁸, reference TQ28SE2336, shows 1.2 m of made ground over London Clay, with a very small groundwater seepage at 12.1 m depth. The other borehole⁹, reference TQ28SE2335, shows 3.0 m of made ground over London Clay, but was dry to 30 m depth.

It is typical of some boreholes in the London Clay to exhibit seepages of water from horizons above low permeability bands; whilst others remain dry to depth. These are not instances of intercepting water tables, just pockets of water moving through slightly more permeable layers, and perhaps fractures, within the upper clay strata.

One borehole and two trial pits were constructed at 3 Belsize Crescent in January 2016 (Appendix A). These were logged from basement floor level. These encountered made ground to 0.65 to 0.75 m depth, then London Clay. The existing foundation level was 0.65 m to 0.75 m below ground level (i.e. the same as the depth of made ground).

Trial pit TP1 and borehole WS1 were constructed in the north east corner of the basement. WS1 went through the base of TP1; the borehole reached 2 m depth and was dry to its base. Trial pit TP2 encountered a seepage of water, which stood at 0.73 m depth. This elevation is at the very base of the gravelly made ground, and the trial pit was 0.80 m deep in total.

⁴ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

⁵ http://scans.bgs.ac.uk/sobi_scans/boreholes/590865

⁶ http://scans.bgs.ac.uk/sobi_scans/boreholes/590626

⁷ http://scans.bgs.ac.uk/sobi_scans/boreholes/18393270

⁸ http://scans.bgs.ac.uk/sobi_scans/boreholes/18393269

⁹ http://scans.bgs.ac.uk/sobi_scans/boreholes/18393263

2.3 Local basements

Other nearby properties on Belsize Crescent have basement floors. The basement at number 1 is probably at a slightly lower elevation than the current one at number 3, due to the slope of the ground surface. Number 5 has a lower ground floor which is probably at a rather higher elevation than the basement at number 3.

Details of any other recent basement developments have searched for via the Camden Planning Portal but none have been identified.

3. Basement Impact Assessment Screening: Groundwater

Subterranean (groundwater) screening follows the procedure outlined in Figure 1: Subterranean (ground water) flow screening chart of the Camden Planning Guidance 4 (CPG4) entitled Basements and Lightwells dated 2013.

1a) Is the site located directly above an aquifer?

NO. The geological map and the nearest off-site boreholes indicate that a layer of permeable superficial deposits is not present beneath the site. Local boreholes and the site borehole show clayey made ground, over London Clay (Section 2.2). None of these can be considered an aquifer. Beneath made ground a considerable thickness of London Clay isolates the deeper aquifer units of the London Basin aquifer from the surface.

1b) Will the proposed basement extend beneath the water table surface?

NO. Only one out of several local boreholes identified a groundwater seepage at 12.1 m below ground level. A 0.8 m trial pit (TP2) at 3 Belsize Crescent did encounter a seepage of water, at the base of gravelly made ground inside the foundations of the property, but a 2 m deep borehole at the site did not encounter any water.

It is typical of some boreholes in the London Clay to exhibit seepages of water from horizons above low permeability bands; others remain dry to depth. These are not instances of intercepting water tables, just pockets of water moving through the upper horizons. This is likely to be the case with the water encountered in the single local borehole, TQ28SE2336, about 500 m from the site.

The water detected in TP2 was inside the existing foundations of the property, and it seems probable that the water is not groundwater, but leakage from the property or an adjacent property. Despite there being shallower foundations in TP1 and WS1 there was no water detected: if there was a local perched water table in the made ground it should have been expected to have flowed in below the foundation here.

Hence it is considered that, in the event of water being encountered by the excavation, inflows will be low, but it may need a little dewatering. Waterproofing of the basement may be required for property protection purposes. However when the basement is constructed these flows are not expected to be sufficient to lead to any change in the groundwater flow patterns beneath or around the site.

2) Is the site within 100m of a watercourse, well (used/ disused) or potential spring line?

NO. There are no surface water bodies within 100 m of the site. The site lies about 200 m east of a former tributary of the former River Tyburn. There are no known water wells within 100 m of the site.

Geological conditions indicate that there is no potential for development of a spring line near the property, as the 1:50 000 geology map indicates that it is located on London Clay outcrop (Claygate Beds crop out about 130 m to the north west, and 8 m higher in elevation), and there are no superficial deposits nearby.

3) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?

NO. The development will be beneath the current footprint of the property, so surface water flows will be unchanged.

- 4) *As part of the site drainage, will more surface water (e.g. rainfall and runoff) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?*

NO. Discharge to the ground is not proposed.

- 5) *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 or spring line?*

NO. The nearest surface water body is the Hampstead No. 1 Pond, about 970 m to the north east of the site. Whilst the elevation of the pond is about the same as that of 3 Belsize Crescent there is a ridge feature between them that rises to about 80 m AOD.

4. Conclusions

Potential environmental impacts of the basement development at 3 Belsize Crescent have been considered. The following summary conclusions are made:

- There will be no increase in man-made impermeable area so the amount, timing and quality of surface water runoff will not be affected by the development. No water will go to ground as a result of the basement development.
- There are no local surface water bodies.
- Available geological and hydrogeological information indicates that there is no permeable aquifer beneath the site that is capable of maintaining a significant water table.
- Water strikes were identified in some local boreholes, and one trial pit on the site, but flowing groundwater is not anticipated at the level of basement excavation here. Therefore, there will be no change in the interaction between shallow groundwater and the existing basement. Waterproofing of the basement and a small amount of dewatering during construction may be required.
- Given that there is not likely to be any groundwater at a depth to be intercepted by the proposed basement, and the London Clay is not an aquifer, it is considered that there is no risk of hydrogeological issues arising from the proposed development.

These conclusions are considered to be robust and no further investigations are needed to satisfy the screening criteria for sub-surface risk. In particular, it is considered that there will be no benefit of the basement impact assessment going to the scoping or impact assessment stages.

Appendix A

Site Borehole Logs

FIELD DESCRIPTION

Carpet over concrete. (MADE GROUND)
 Brick. (MADE GROUND)
 Brown mottled grey/orange slightly sandy gravelly CLAY. Frequent brick and pottery fragments. (MADE GROUND)

Brown mottled grey/orange silty CLAY, rare fine selenite crystals. (LONDON CLAY)

Borehole complete at 2.00m

FIELD TESTING

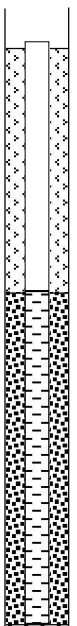
SAMPLING

WATER

FILL

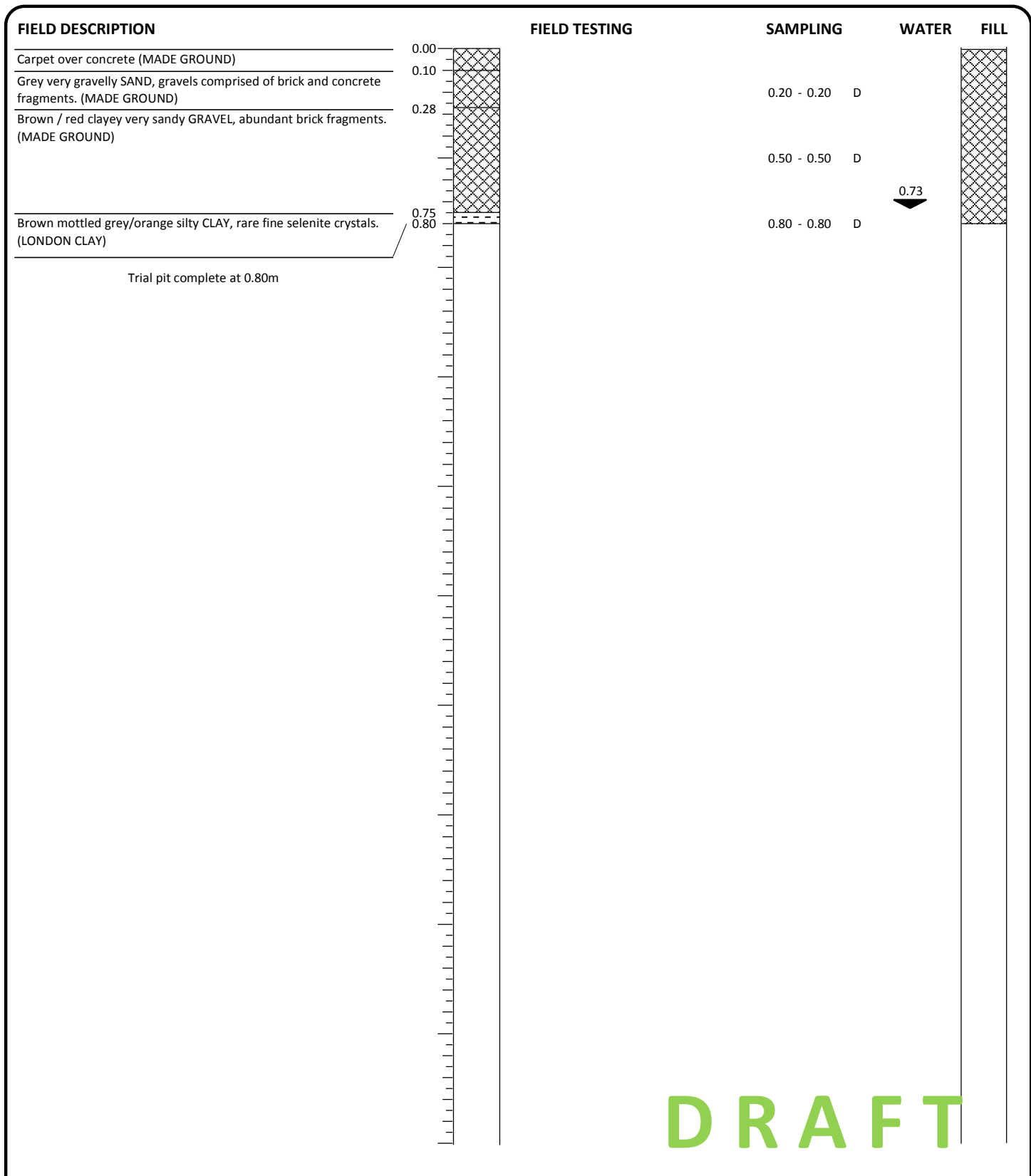


0.30 - 0.30 D
 0.50 - 0.50 D
 0.80 - 0.80 D
 1.00 - 1.00 D
 1.50 - 1.50 D
 2.00 - 2.00 D



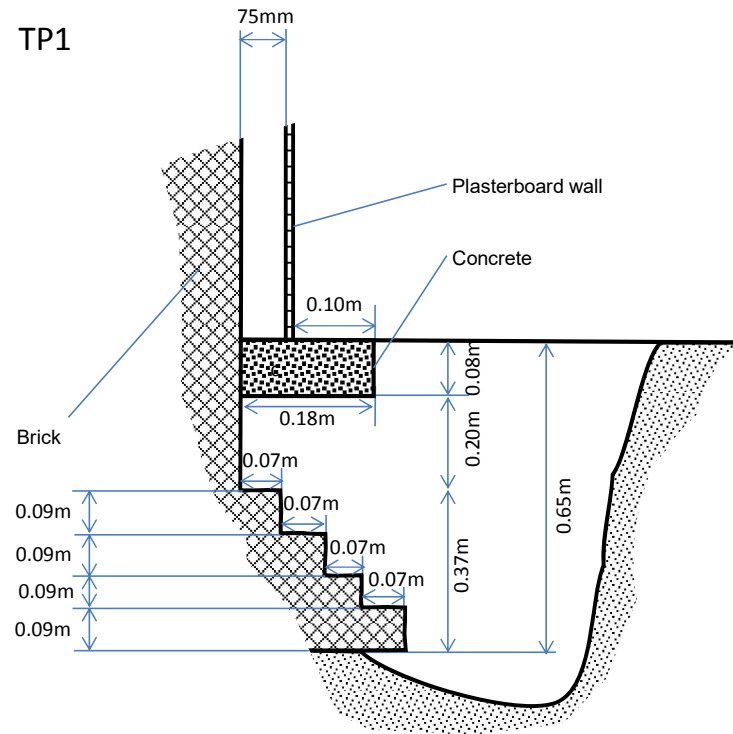
DRAFT

REMARKS Stability: No instability encountered Groundwater: No groundwater encountered. Chiselling: Not applicable Casing/dia: Not applicable Backfilling: 1.90m of pipe installed: Plain pipe from 0.00-0.90m, slotted pipe from 0.90-1.90m. Notes: Hand excavated to 0.80mbgl. TP1 incorporated in first 0.80m of WS1 log.	TITLE: Window Sampler Log		REFERENCE: LS1985	POSITION: WS1
	PROJECT: 3 Belsize Crescent, London, NW3 5QU		ELEVATION: N/A	CO-ORDINATES: Not to scale
	CLIENT: David Templer		METHOD: Archway "Dart" Windowless	
	DRILLED BY: OSI	LOGGED BY: JB	STARTED: 14/01/2016	SCALE: Not to scale
	INPUTTED BY: JB	CHECKED BY: MR	COMPLETED: 14/01/2016	SHEET No: Page: 1 of 1



REMARKS <div> <div>Stability:</div> <div>No instability encountered</div> </div> <div> <div>Groundwater:</div> <div>Seepage of water observed, standing at 0.73m.</div> </div> <div> <div>Chiselling:</div> <div>Not applicable</div> </div> <div> <div>Casing/dia:</div> <div>Not applicable</div> </div> <div> <div>Backfilling:</div> <div>Position backfilled with arisings</div> </div> <div> <div>Notes:</div> <div>Hand excavated to 0.80m</div> </div>	TITLE:		REFERENCE:	POSITION:
	Hand Dug Pit		LS1985	TP2
	PROJECT:		ELEVATION:	CO-ORDINATES:
	3 Belsize Crescent, London, NW3 5QU		N/A	Not to scale
	CLIENT:		METHOD:	
	David Templer		Archway "Dart" Windowless	
	DRILLED BY:	LOGGED BY:	STARTED:	SCALE:
	OSI	JB	14/01/2016	Not to scale
	INPUTTED BY:	CHECKED BY:	COMPLETED:	SHEET No:
	JB	MR	14/01/2016	Page: 1 of 1

TP1



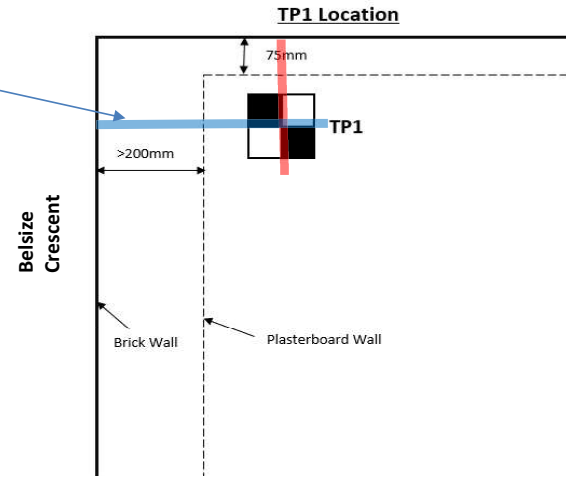
0.00-0.08m - Carpet over concrete (MADE GROUND)

0.08-0.15m - Brick (MADE GROUND)

0.15-0.65- Brown mottled grey/orange slightly sandy gravelly CLAY. Frequent brick and pottery fragments. (MADE GROUND)

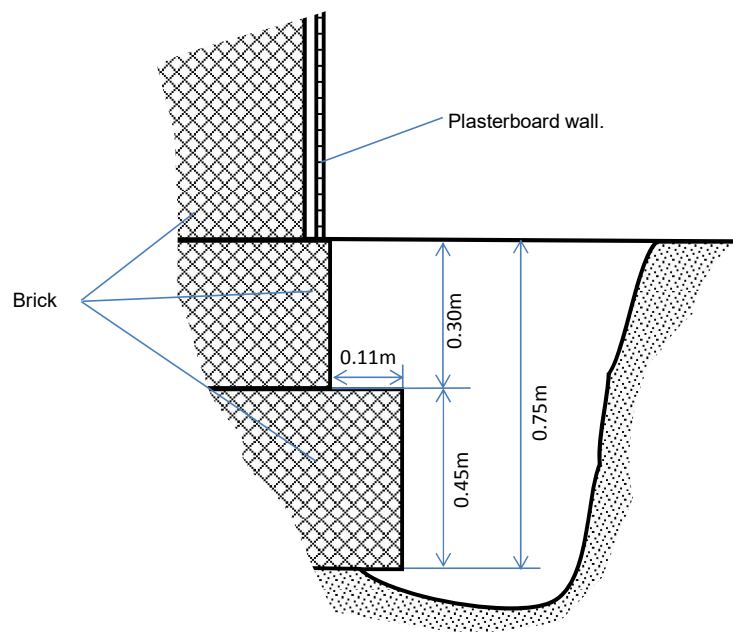
0.65-0.80m-Brown mottled grey/orange silty CLAY, rare fine selenite crystals. (LONDON CLAY)

Unable to prove foundation



TITLE:	Foundation Exposures	REF:	LS1985	PREPARED:	JB
PROJECT:	3 Belsize Crescent, London, NW3 5QU	VERSION:	v1	CHECKED:	MR
CLIENT:	David Templer	FIGURE:	TP1	DATE:	15/01/2016

TP2



0.00-0.10 Carpet over concrete. (MADE GROUND)

0.10-0.28 Grey very gravelly SAND. (MADE GROUND)

0.28-0.75 Brown/ red clayey very sandy GRAVEL, abundant brick fragments. (MADE GROUND)

... Slow water seepage, standing at 0.73m
0.75-0.80 Brown mottled grey/orange silty CLAY, rare fine sericite crystals. (LONDON CLAY)



DRAFT

TITLE:	Foundation Exposures	REF:	LS 1985	PREPARED:	JB
PROJECT:	3 Belsize Crescent, London, NW3 5QU	VERSION:	v1	CHECKED:	MR
CLIENT:	David Templer	FIGURE:	TP2	DATE:	15/01/2016