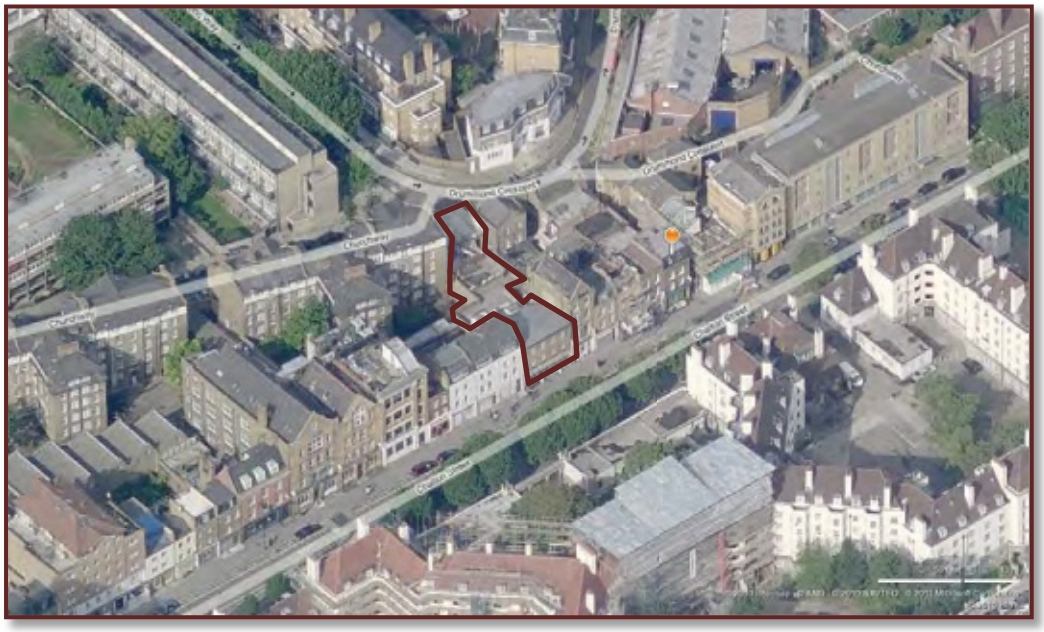
SCREENING AND SCOPING REPORT: 'LAND STABILITY'

Proposed development:

53-55, CHALTON STREET, LONDON, NW1 1HY



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PROPOSED REDEVELOPMENT:

53-55, CHALTON STREET, LONDON, NW1 1HY

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1.0 INTRODUCTION

Consideration is being given to redevelopment of the site which will involve demolition of the existing two to three storey building which has a basement throughout and the construction of a new five storey hotel building.

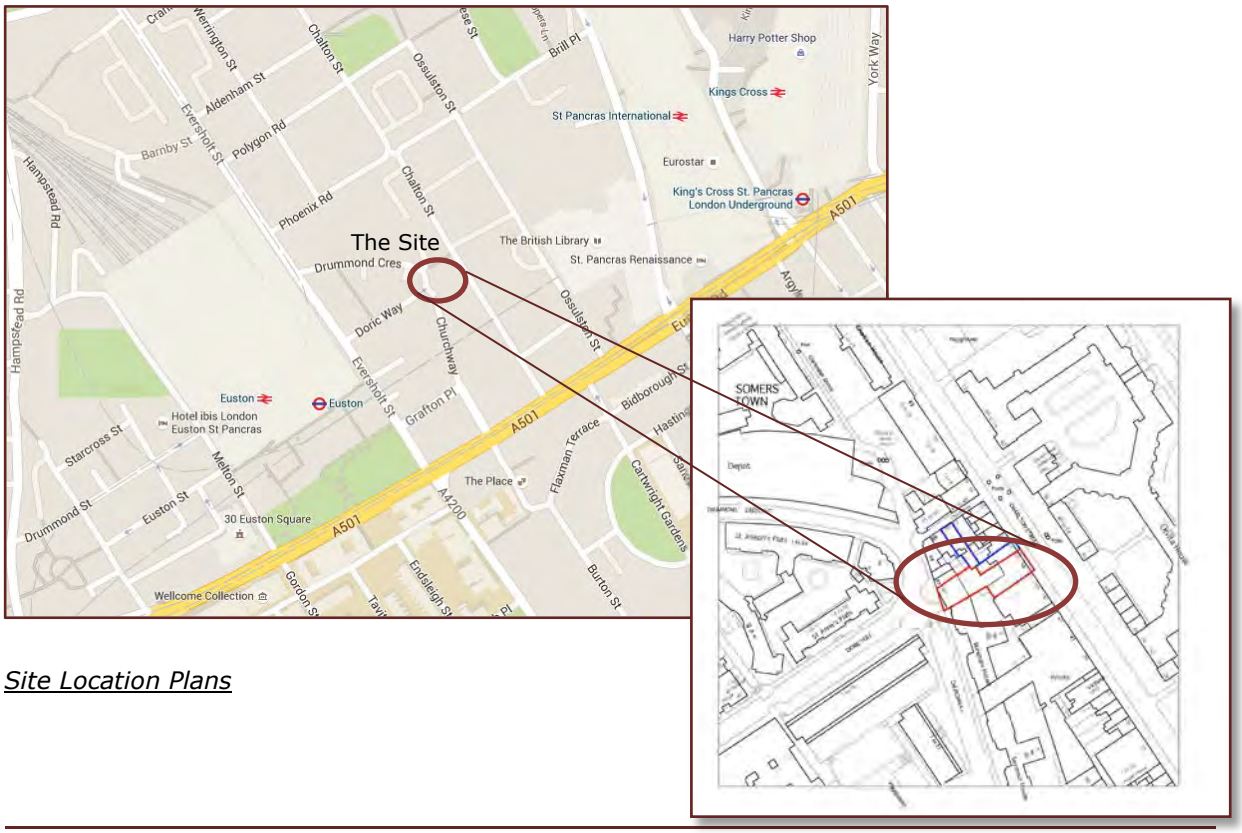
This report presents the potential impact relating to the proposed subterranean development in terms of 'land stability' as presented in the guidance documents published by Arup 2010: 'Camden geological, hydrogeological and hydrological study: Guidance for subterranean development', Issue01 dated November 2010 and CPG4, 'Basements and Lightwells', published by Camden Council.

The Land stability report is addition to the report by Steve Buss Environmental Consulting Ltd, 'Surface Water and Subsurface Flow Basement impact assessment: screening stage" [Ref. 2016-003-025-001 dated 27 June 2016].

This Report has been prepared for the benefit of the Client and associated parties directly involved with the design and construction of the project under direction of the Client. No reliance can be assumed by others without written agreement from Soil Consultants Limited.

2.0 SITE DESCRIPTION AND PROPOSED BASEMENT

The site of our investigation comprises the existing terraced property, No 53-55, Chalton Street in the Euston district of the London Borough of Camden, at postcode NW1 1HY [OS Grid Ref. TQ 29753 82813] as shown on the Location Plans below..



Site Location Plans

The site extends from Chalton Street to Churchway at the rear (south-west) and is very approximately rectangular on plan, with the existing two to three storey buildings occupying the whole of the property. The site is about 10m wide at the Chalton Street frontage and measures about 40m to the rear boundary. A Nisa food retail store occupies the ground floor and there are residential flats above. The property is surrounded by further residential / office and commercial properties.

The site is on ground that is generally level and lies at an approximate elevation of +19.5mOD. There are no significant/mature trees within a relevant distance of the site, although there is a small ornamental tree within the pavement several metres beyond the Churchway boundary.

As part of the scheme the existing single level basement is to be extended so that it is beneath the full footprint of the new building. An earlier proposed basement scheme is shown on the appended drawing [Ref 1103/200 dated August 2015]; this scheme is due to be updated but the new revised scheme will have the same size proposed basement. The existing basement and proposed scheme are shown below:

Existing Basement Plan

Proposed Basement Plan

Proposed Cross Section

3.0 STAGE 1 - SCREENING

The purpose of the screening stage is to determine whether a full Basement Impact Assessment is required and CPG4 provides flowcharts for each of the three disciplines [Groundwater Flow, Land Stability and Surface Flow/Flooding] for this purpose, identifying a series of questions. An answer of 'Yes' or 'Unknown' will require progression to Stage 2 of the CPG4 categories. Answers of 'No' indicate that no further investigation is generally required - these answers require written justification. The purpose of this section is to present the screening stage for the Land Stability discipline.

3.1 Land Stability

The screening stage for slope stability has been considered as set out in Figure 2 of CPG4 Camden Council, 2010 [Slope stability screening flowchart] and the results have been tabulated in Table 1 below. Responses of note are as follows:

- Question 7 [shrink/swell] is answered 'Unknown'. Although the London Clay is expected to be the shallowest strata present [Question 5 – yes]. Notwithstanding the 'normal' seasonal movement of the soils, the absence of any significant nearby trees would suggest that related shrink/swell concerns should not be an issue and the answer would likely be 'No'. However, this cannot be fully addressed without an intrusive ground investigation and this question is considered further in Stage 2.
- Question 9 [historical workings] and Question 10 [aquifer depth], are answered 'Unknown'. These cannot be fully addressed without an intrusive ground investigation and this question is considered further in Stage 2.

- Question 12 [adjacent to highway and pedestrian right of way], Question 13 [differential foundation depths] are answered 'Yes' and are considered further in Stage 2.

All other questions are answered 'No' and supporting evidence supplied as required.

Table 1: Impact of proposed basement works on Land Stability

Impact question	Answer	Justification	Reference
1] Does the existing site include slopes, natural or man-made greater than 7 degrees [approximately 1 in 8]?	No	No significant apparent slope indicated by survey plans/online data	Slope angle map Arup Figure 16
2] Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7 degrees?	No	There are no plans to alter these site levels	Site plans / proposed development plans
3] Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	No	Available survey information shows no other slopes greater than 7 degrees within a relevant distance	Slope angle map Arup Figure 16
4] Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	No	Map review and assessment of slope angles from survey data.	Slope angle map Arup 2010 Figure 16
5] Is the London Clay the shallowest stratum at the site?	Yes	Available data shows the London Clay to be the shallowest strata, though some made ground and unmapped superficial soils may also be present.	BGS Published Geology
6] Will any trees 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	Significant/mature trees are not present on [or within an influencing distance from] the site. A small ornamental tree is present in the pavement several metres beyond the Churchway boundary.	Site plans and public domain photographs
7] Is there a history of seasonal shrinkage/swelling subsidence to the local area, and or evidence of such effects at the site?	Unknown	The London Clay is generally classified as a soil with a high shrinkage/volume change potential. However, this stratum may not have been adversely affected because significant trees are not present with an influencing radius of the site. Notwithstanding the effects of root growth, clay soils could be affected seasonally and affect foundations if these are very shallow.	Previous ground investigations in the London Clay Public domain photographs and survey plans
8] Is the site within 100m of a watercourse or a potential spring line?	No	See comments in report presented by Steve Buss Environmental Reporting Ltd	Report by Steve Buss Environmental Reporting Ltd

Impact question	Answer	Justification	Reference
9] Is the site within an area of previously worked ground?	Unknown	Published geological data suggests worked ground nearby to the W/SW but not beneath the site, so confirmation will be required by intrusive investigation.	BGS Published Geology and Arup 2010 Figure 16
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?	Unknown	The BGS map shows the site be underlain by the London Clay which is normally classified as "Unproductive". A perched water table may be present in any permeable layers of made ground or other superficial soils. The Steve Buss Environmental Consulting Ltd report concludes that there is no permeable aquifer beneath the site that is capable of maintaining a significant water table. A determination of whether ground water will be encountered during the basement excavation can only be confirmed following intrusive investigations.	BGS Published Geology Arup 2010 Figure 16
11] Is the site within 50m of the Hampstead Heath Ponds?	No	See comments in report presented by Steve Buss Environmental Reporting Ltd	Ref Arup 2010 Figure 14
12] Is the site within 5m of a highway or pedestrian right of way?	Yes	Chalton Street pavement along north-eastern boundary and Churchway pavement along south-western boundary.	Site plans
13] Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	Basement retaining walls are likely to extend below founding levels to adjacent properties. The movement expected from a properly constructed and supported wall should be relatively small.	Proposed development plans
14] Is the site over [or within] the exclusion zone of any tunnels, e.g. railway lines?	No	None within relevant distance of the site. Nearest underground tunnels are located about 90m to south and run in an approximate SW to NE direction. Nearest over ground railway lines are about 200m to the west.	Site location maps

4.0 STAGE 2 - SCOPING

The purpose of Stage 2 is to assess the potential impacts of the proposed scheme that Stage 1 has indicated require further consideration.

These are addressed below for each of the relevant questions.

4.1 Land Stability

As discussed in Section 3.1 soil volume change [Question 7] is unlikely to be a significant issue as there are no significant nearby trees and the new founding depth for the proposed basement will be about 3.0m to 3.5m below ground level so well below the influence of vegetation and seasonal variations.

The matter of previously worked ground [Question 9] presents a potential impact as there may be Made Ground below the existing building footprint. The presence of such soils and any dewatering of any contained ground water will need to be addressed by a later intrusive investigation.

The depth of the aquifer in relation to the basement [Question 10] is assessed further in the report by Steve Buss Environmental Reporting Ltd which concludes that there is no permeable aquifer beneath the site that is capable of maintaining a significant water table. This aspect will also need to be addressed by a later intrusive investigation.

With regard to the impact on adjacent highways / pedestrian right of way [Question 12], the proposed basement extension will abut the front of the site along Chalton Street and along Churchway. This means that there will be a new excavation within influencing distance of these two footpaths which should be considered during the design of future intrusive ground investigation and during design and construction of the basement structure.

The differential depth of the proposed foundations in relation to neighbouring properties [Question 13] is such that underpinning of party wall foundations may be required and this will need to be discussed as part of a later ground investigation report.

5.0 CONCLUSIONS

From the available information we consider that the impact on baseline conditions from the proposed development should be **LOW**, but that this should be supported by implementation of a ground investigation and an appropriate construction methodology and action plan of measurement, monitoring and response. The works must be undertaken by reputable specialists, potential movements due to construction must be assessed, and the temporary and permanent works must be adequately designed, with due consideration to the geology and hydrogeology of the site and surrounding areas.

We conclude that for the proposed basement construction, it should certainly be possible to design the construction methods to ensure that ground movements do not adversely affect either adjacent properties or infrastructure.

Stephen Buss
Environmental Consulting Ltd

53-55 Chalton Street: Surface Water and Subsurface Flow Basement Impact Assessment: screening stage

Version control log

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2016-003-025-001	27 June 2016	Steve Buss	Soil Consultants	First draft

Client: Rangepay Ltd

Dated: June 2016

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DISCLAIMER

This report has been prepared by Stephen Buss Environmental Consulting Ltd (SBEC) in its professional capacity as hydrogeologist, in a manner consistent with the level of care and skill ordinarily exercised by members of the geological and engineering professions practising at this time, within the agreed scope and terms of contract, and taking account of the manpower and resources devoted to it by agreement with its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole. As with any environmental appraisal or investigation, the conclusions and observations are based on limited data. The risk of undiscovered environmental impairment of the property cannot be ruled out. SBEC cannot therefore warrant the actual conditions at the site and advice given is limited to those conditions for which information is held by SBEC at the time. The findings are based on the information made available to SBEC at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time.

This report is provided to the client addressed above. Should the client wish to release this report to any other third party for that party's reliance, SBEC accepts no responsibility to any third party to whom this report or any part thereof is made known. SBEC accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against SBEC except as expressly agreed with SBEC in writing.

The findings do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

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1. Introduction

1.1 Background

This report presents the surface water and subsurface flow (groundwater) component of a basement impact assessment, to be submitted in support of a planning application for the basement development at 53-55 Chalton Street, Kings Cross, London NW1 1HY (Figure 1.1, national grid reference TQ 2977 8283). The local planning authority is Camden Borough Council.

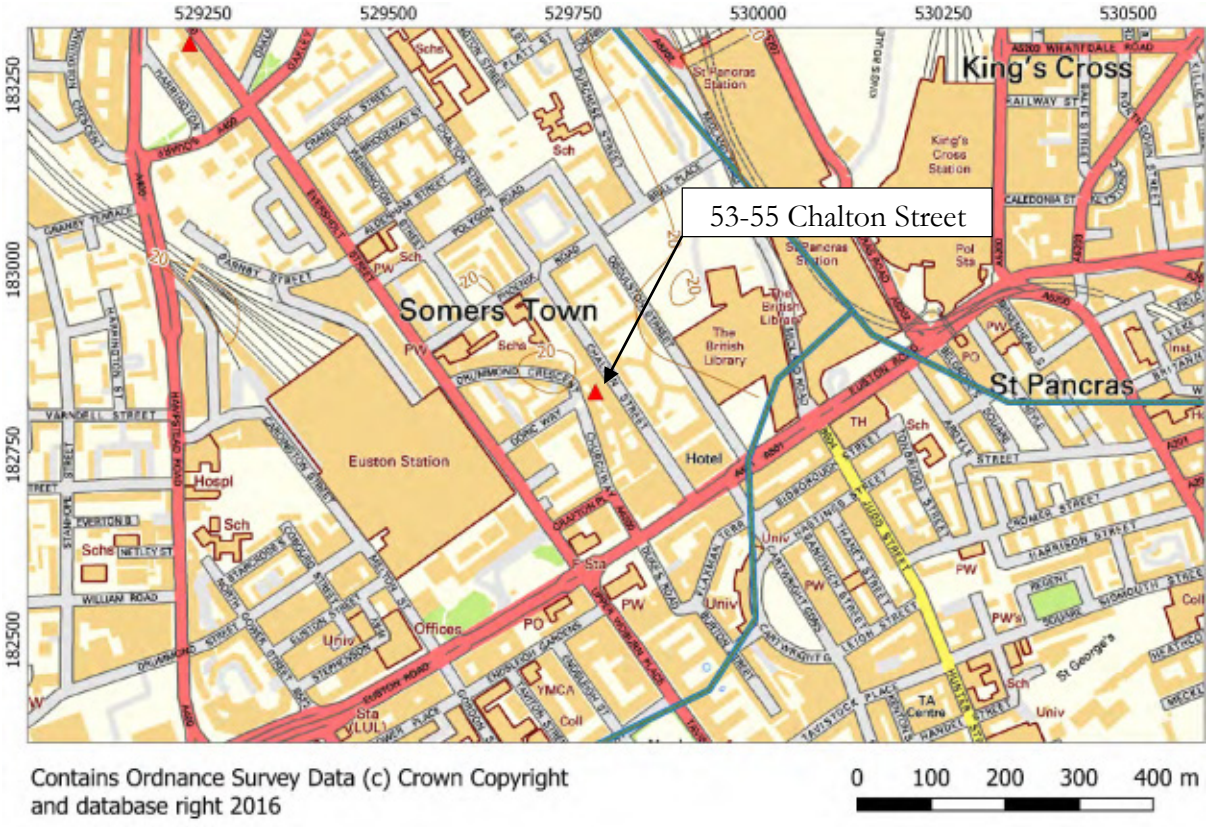

Figure 1.1 Location of 53-55 Chalton Street

1.2 Basement Works

The site comprises 53-55 Chalton Street which is currently a three-storey building on the west side of the street. The property continues westwards with a rear entrance on 60 Church Way. To the east, south, and north of the site are neighbouring mixed commercial, retail and residential properties; to the west there are mostly blocks of flats. Numbers 57 and 51 Chalton Street adjoin the property, to the north and south respectively.

Plans for the new basement extension involve excavating down from the existing basement, and extending towards Church Way, out to the extent of the ground floor. The basement extension is to be roughly rectangular, with length c. 6 m and width c. 8 m. The finished floor level (FFL) of the refurbished basement and the basement extension will be slightly deeper than the current floor level.

Figure 1.2 shows scans of: the current and proposed basement plan (with Chalton Street to the right of the page) and section A-A' through the proposed development. The extent of the basement extension is hatched in the section.

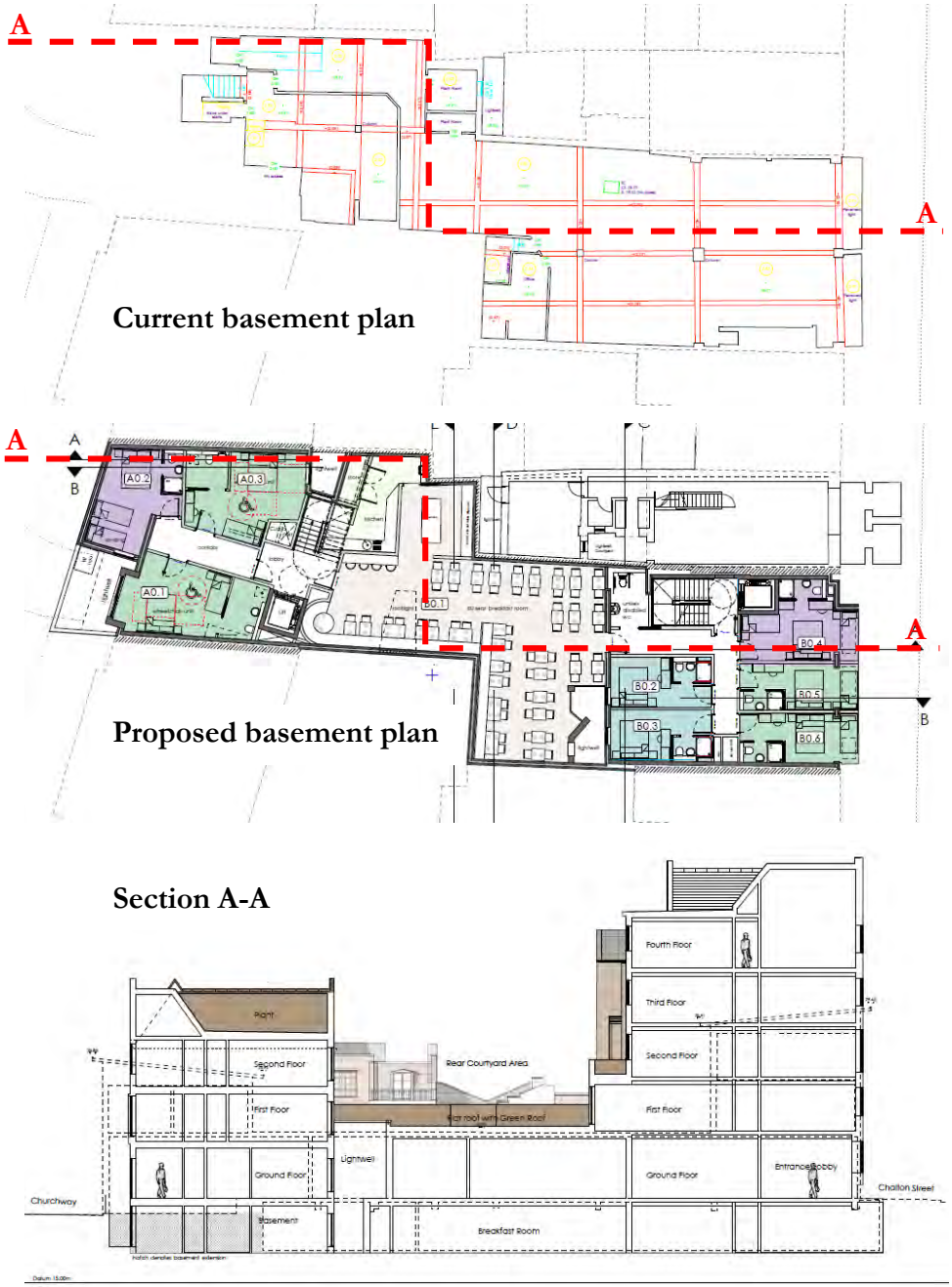

Figure 1.2 Plans and section of the proposed development (do not scale).

1.3 Scope of Report

This report presents the surface water, and sub-surface water, screening report 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 June 2016 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 17 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.

Hydrology aspects of this report have been prepared by Rupert Evans MSc CEnv C.WEM MCIWEM AIEMA. Mr Evans is a UK-based independent hydrologist with more than 10 years' consultancy experience in flood risk assessment, surface water drainage schemes and hydrology/hydraulic modelling. **Mr Evans is a Chartered Water and Environmental Manager (C.WEM) and a Member of the Chartered Institution of Water and Environmental Management.**

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

2. Basement Impact Assessment Screening: Surface Flow

Surface flow screening follows the procedure outlined in Figure 5: Surface flow and flooding screening chart of the Camden Planning Guidance 4 (CPG4) entitled Basements and Lightwells dated July 2015.

1) *Is the site within the catchment of the pond chains on Hampstead Heath?*

NO. Figure 14 of the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010, confirms that the site is not located within this catchment area.

2) *As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?*

No. The basement is entirely below the footprint of the existing building and therefore the existing drainage regime will remain the same.

The basement will be beneath the existing building, therefore the 1m distance between the roof of the basement and ground surface as recommended by the Arup report and para 2.16 of the CPG4 does not apply.

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

NO. There will not be an increase in impermeable area across the ground surface above the basement. The basement will be beneath the existing building footprint.

4) *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. There are negligible inflows from adjacent properties, and no flows to adjacent properties. The basement is entirely below the footprint of the existing building and therefore the existing drainage regime will remain the same.

5) *Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?*

NO. The proposals are very unlikely to result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses as the surface water drainage regime will be unchanged and it will be unpolluted roof water or low pollution hazard land uses draining into the sewer system.

6) *Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk of flooding, for example because the proposed basement is below the static water level of nearby surface water feature?*

POSSIBLY. The findings of this BIA together with the Camden Flood Risk Management Strategy dated 2013 and Figures 3i, 4e, 5a and 5b of the SFRA dated 2014, in addition to the Environment Agency online flood maps show that the site has a low flooding risk from sewers, groundwater, reservoirs (and other artificial sources), fluvial/tidal watercourses and surface water (although the north western frontage of the site appears to have a low to medium risk of surface water flooding - Figure 2.1).

In accordance with paragraph 5.11 of the CPG a positive pumped device should be installed in the basement in order to further protect the site from sewer flooding.

Figure 2.1 Risk of surface water flooding

3. Basement Impact Assessment Screening: Groundwater

Subterranean (groundwater) screening follows the procedure outlined in Figure 3: Subterranean (ground water) flow screening chart of the Camden Planning Guidance 4 (CPG4) entitled Basements and Lightwells dated July 2015.

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

NO. The geological map and the nearest off-site boreholes and trial pits indicate that a continuous layer of permeable superficial deposits is not present beneath the site. Boreholes and trial pits show up to 1.5 m of 'brown clay' or 'yellow clay', over London Clay (Section 4.2). None of these can be considered an aquifer. Beneath these a significant 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. The local water table is deep here, and within the Chalk aquifer, at more than 40 m depth. No water was observed in the London Clay, in local boreholes, until about 10-14 m depth (Section 4.2). It is typical of some boreholes in the London Clay to exhibit occasional seepages of water from horizons above low permeability bands; others remain dry to depth.

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

NO. There are no current surface water bodies within 100 m of the site. The site lies between the 'lost' River Tyburn (c. 2000 m to the west) and the River Fleet (c. 250 m to the south and east). 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 in the vicinity of the property, as the 1:50 000 geology map indicates that it is located upon the outcrop the London Clay, 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 is entirely 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 water body is the Grand Union Canal, about 600 m to the north east. This is too far from the site to be a concern, especially given that there are not permeable superficial deposits beneath the site.

4. Conceptual Site Model

4.1 Drainage and Topography

Elevation of 53-55 Chalton Street is about 20.5 m above Ordnance Datum (m AOD) according Ordnance Survey Terrain 5 data. Ground surface around the site slopes gently eastwards (gradient from Ordnance Survey 10 m contours is about 0.012).

The property location is between two historical rivers, but these have been culverted beneath the city. These were the 'lost' River Tyburn (c. 2000 m to the west as Regent's Park Lake) and the River Fleet (c. 250-300 m to the south and east)[2] (Figure 2.1). The nearest current surface water feature is the Grand Union Canal, about 600 m to the north east of the site.

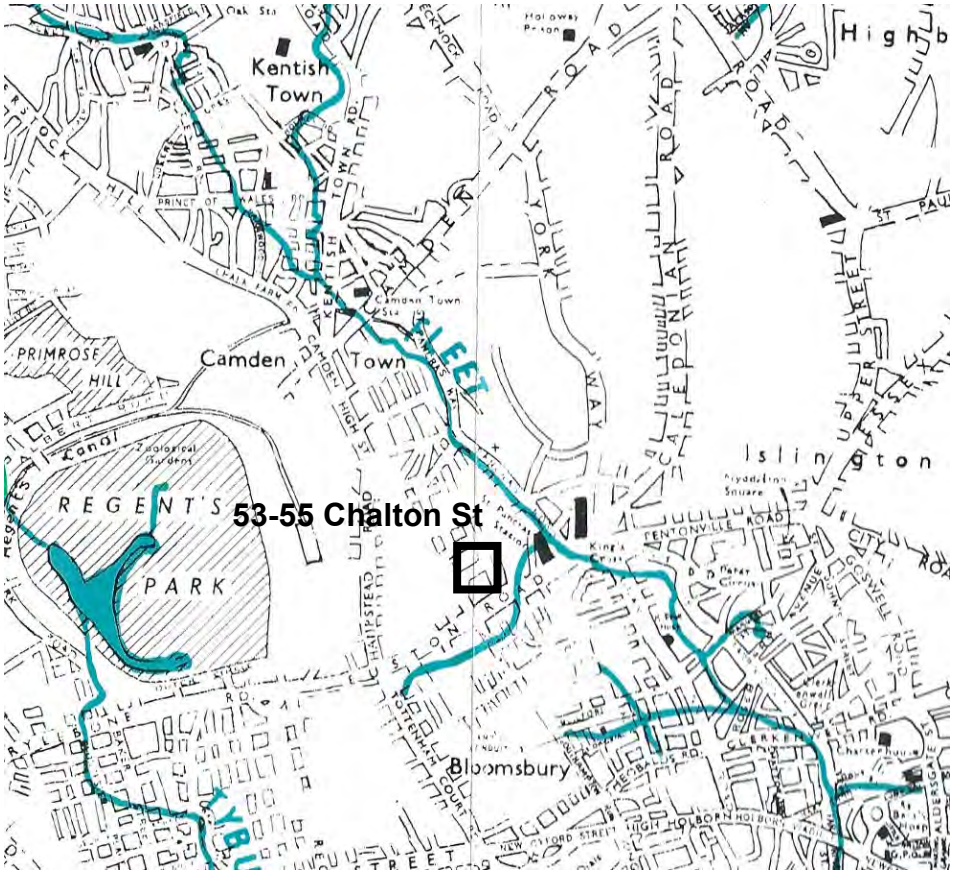

Figure 4.1 Location of tributaries of the River Tyburn (south west) and River Fleet (east)

4.2 Geology and Hydrogeology

Bedrock at the site comprises London Clay. The base of the London Clay is at about 18.2 m below ground level at the Victoria Tube #14 borehole[3] (about 30 m to the north west of the site) and isolates the main aquifer of the London Basin from the surface.

Nearby shallow borehole records available from the British Geological Survey show the absence of any thickness of permeable superficial deposits in the area:

[2] Barton, N.J., 1993. The Lost Rivers of London 3rd edition.
[3] http://scans.bgs.ac.uk/sobi_scans/boreholes/591872

- Victoria Tube #14 borehole, TQ28SE348, was drilled in December 1958. This shows a 1.5 m layer of 'soft to firm brown clay' over London Clay. This is probably mostly weathered London Clay.
- Four trial pits were dug at locations from about 30 m to 60 m north of the site[4], TQ28SE721, in 1956. All record 'brown clay' below made ground to a depth of 2.4 m. Two more trial pits about 60 – 100 m to the north of the site[5], TQ28SE677, show the presence of 'light clay' and 'yellow clay' to about 2 m depth, above the London Clay. These are probably superficial deposits rather than weathered London Clay.
- Whilst the geology map indicates outcrop of gravels about 200 m to the south of the site, borehole TQ28SE347 indicates[6] clay at the surface and London Clay at 1.5 m depth.

Referring back to the screening, a detailed assessment of the near-surface geology reinforces the view that there is not an aquifer directly beneath the site.

Groundwater levels

None of the boreholes described above refer to groundwater within 3 m of the ground surface (i.e. within the depth of influence of the basement). The two deeper boreholes nearest the site (TQ28SE348 and TQ28SE347) detected seepages in the London Clay at c. 13.6 m and 10 m depth respectively.

It is typical of some boreholes in the London Clay to exhibit occasional seepages of water from horizons above low permeability bands; others remain dry to significant depths. These are not instances of intercepting water tables, just pockets of water moving through the upper horizons.

In addition, the London Clay is not an aquifer, so there are not considerable amounts of water available.

4.3 Local basements

Other nearby properties on Chalton Street have basements that are likely to be at the same depth as that at number 53-55. Details of any other recent basement developments have searched for via the Camden Planning Portal but none have been identified, except changes of use of the existing basements.

[4] http://scans.bgs.ac.uk/sobi_scans/boreholes/592299
[5] http://scans.bgs.ac.uk/sobi_scans/boreholes/592248
[6] http://scans.bgs.ac.uk/sobi_scans/boreholes/591871

5. Conclusions

Potential environmental impacts of the basement extension at 53-55 Chalton Street 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.
- The site is adjacent to an area mapped as having a medium risk of surface water flooding. Basement development is not expected to exacerbate this risk.
- Available geological and hydrogeological information indicates that there is no permeable aquifer beneath the site that is capable of maintaining a significant water table. No water has been detected in local boreholes at depths comparable to the excavation depth of the basement.
- 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 to undertaking a site investigation for the purposes of this risk assessment; and the basement impact assessment does not need to go to scoping or impact assessment stages.