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Structural Design

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Basement Impact Assessment
Kidderpore Avenue Pre-Planning, For Mount Anvil

11316

Engineering at its Best

Report For

Mount Anvil

Scheme No: 11316

Kidderpore Avenue Pre-Planning

Basement Impact Assessment

Main Contributors

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1st July 2015

Issued By

Tom Purchase

Approved By

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Contents

1.0 Introduction

1.1 Tully De'Ath have been appointed by Mount Anvil to prepare a Basement Impact Assessment (BIA). This is intended to form part of a submission for planning for the redevelopment of the Kings College London Hampstead Campus site, situated off Kidderpore Avenue in the London Borough of Camden.

1.2 Tully De'Ath have appointed Southern Testing Limited (STL) as a sub-consultant to provide specialist geotechnical advice regarding the preparation of the BIA to comply with the requirements of the London Borough of Camden. These services also include undertaking ground movement analysis (GMA) and groundwater modelling (GWM).

1.3 This report covers the initial screening and scoping stages forming part of the BIA.

1.4 The report will be revised and resubmitted on the 13th July following completion of the site Investigation and ground water monitoring. Works to include Stages 3 and 4 of the BIA to comply with the requirements set out by the London Borough of Camden.

2.0 Proposed Development

2.1 The site is currently occupied by existing historic buildings. Some of these are currently occupied as student accommodation for Kings College London. Other buildings are uninhabited. Just to the North of the site there is a Thames Water reservoir.

2.2 The proposed redevelopment comprises a mixture of high end, refurbished and new build residential dwellings. As part of the development it is proposed to construct a new two-storey basement car park. Additionally new basements are proposed beneath the new build blocks; Rosalind Franklin Hall and Lord Cameron Hall.

3.0 Stage 1 - Screening

3.1 Please refer to STL Screening Report in Appendix A.

3.2 The screening process has concluded that there are a number of items that will need to be investigated further to assess their potential impacts. These can be found on page 10 of the STL report, and are quoted as follows:

i. *A geotechnical investigation to confirm the ground conditions underlying the site.*

ii. *Groundwater monitoring.*

iii. *An assessment of the potential impact of the new basement on groundwater levels and also the potential cumulative effects on the groundwater environment in the area.*

iv. *An assessment of any ground movements in relation to the nearby Highway (Croft Way) and adjacent structures.*

v. *An assessment of the potential impact on the stability of existing adjacent slopes.*

vi. *The existing surface water connections may also need to be clarified and potential*

discharges agreed with statutory authorities.

4.0 Stage 2 - Scoping

4.1 The scope of site investigation works has been identified following the screening exercise. This scope has been developed to take on board the conclusions of the screening exercise. It also identifies the investigations required to assist with the scheme development and design ahead of planning submission.

4.2 The scope of investigation works is summarised on the 'Specification for Desk Study & Site Investigation Revision A' document and drawing no. '11316/01A' contained within Appendix B.

5.0 Stage 3 - Site Investigation and Study

5.1 Content to be submitted with revised report on the 13th July following completion of site investigation and ground water monitoring works.

6.0 Stage 4 – Impact Assessment

6.1 Content to be submitted with revised report on the 13th July following completion of site investigation and ground water monitoring works.

Appendix A – Screening

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

Basement Impact Assessment
Stage 1 & 2 (Screening and Scoping Study)

Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: Kidderpore Avenue, London NW3

Client: Tully De'Ath (Consulting) Ltd

Report Date: April 2015

Project Reference: J12093 Rev01

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A INTRODUCTION

1 Introduction

The object of this study was to produce an impact assessment for the proposed basement construction on this site in accordance with the requirements of the London Borough of Camden. Their requirements are set out within their Development Policy DP27 – Basements and Lightwells the LB Camden guidance document entitled "Camden geological, hydrogeological and hydrological study – Guidance for subterranean development" and Camden Planning Guidance document CPG4 – Basements and Lightwells.

This report covers the initial desk study, screening and scoping processes, referred to as Stages 1 and 2 in CPG4.

2 Scope

This report presents our desk study findings and our interpretation of this data.

The findings and opinions conveyed via this report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Limited believes are reliable. Nevertheless, Southern Testing Laboratories Limited cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

This report was conducted and prepared for the sole internal use and reliance of Tully De'Ath (Consultants) Limited. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

B THE SITE

3 Site Location

The site which forms part of the King's College Hampstead campus is located on Kidderpore Avenue in the western part of Hampstead, near to the A41 Finchley Road.

It is approximately centred at National Grid Reference TQ 254 859.

The overall plot is roughly rectangular in shape and measures approximately 70m x 150m. The site presently contains various buildings dating back to the 19th century and comprising mainly three and four-storey blocks with landscaped garden areas.

A site location plan is presented as Figure 1.

4 Proposed Development

The proposals for this site are to construct a new two-storey underground car park below the existing central lawn area with some ancillary buildings to the north and west. Additionally basement areas are to be provided beneath Franklin Hall and Lord Cameron Halls on the eastern part of the campus.

Given the presence of the existing buildings and a below-ground water reservoir located immediately to the north of the site, careful consideration will need to be given to the method and sequencing of construction required in order to minimise any ground movements. It is envisaged that some form of piled retaining walls with suitable propping will be required.

The appended Figures 2 & 2a illustrate the proposals.

C GROUND CONDITIONS

5 Published Geological Data

The British Geological Survey Map No 256 indicates that the site geology consists of Claygate Member overlying the London Clay.

The study site is marked on appended Figure 3 based upon the North Camden Geological Map figure taken from "Camden geological, hydrogeological and hydrological study – Guidance for subterranean development", which indicates the same mapped geology.

6 Previous Ground Investigation data

A few publicly available records of historical boreholes are shown on the BGS website, relating to the Westfield College site opposite on the southside of Kidderpore Avenue. The borehole information indicates around 5 to 6m of Claygate Member overlying stiff London Clay, which generally agrees with the published information. Information is also available on the Camden Council website relating to previous planning applications, notably sites nearby to the southwest and southeast of the subject site at Kings College Campus and 7 Kidderpore Avenue respectively. Both these indicate silty clays overlying more typical London Clay, commonly with shallow groundwater records, again which generally agree with the BGS records.

D HYDROLOGY & HYDROGEOLOGY

Data from the Environment Agency and other information relating to controlled waters is summarised below. The groundwater vulnerability assessment is based on the current data on the EA website.

Data		Remarks
Aquifer Designation	Superficial Deposits	No superficial Deposits present.
	Bedrock	Secondary A aquifer (Claygate Member).
Groundwater Vulnerability		Minor Aquifer High
Abstractions		On the basis of the information given on the EA website (February 2015) there are no water abstraction licenses in the area.
Source Protection Zones		The site is not located within a Source Protection Zone.
Surface Water Features		The nearest surface water feature i one of the ponds on Hampstead Heath some 1.0km to the north. The site lies outside of the catchment area to the ponds.
Marine/Fluvial Flood Risk		On the basis of the information given on the EA website (February 2015) the site is not located within an area at risk of flooding from fluvial sources.
Surface Water Flood Risk		The "Risk of Flooding from Surface Water" mapping on the Environment Agency website (February 2015) shows that the site is located within an area of very low risk. Very low means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%).
Reservoir Flood Risk		On the basis of the information given on the EA website (February 2015) the site is not located within an area of potential risk of flooding from reservoirs.

7 Shallow Groundwater

Shallow groundwater is likely to be contained within the Claygate Member, which form a 'secondary' aquifer. The publicly available information indicates shallow groundwater was encountered within the Claygate Member stratum during drilling, but no longer-term information is known.

Given the available information that has been assessed it would appear there is likely to be a groundwater table within the Claygate Member and that the hydraulic gradient/flow is probably towards the south and southwest given the local topography of this site.

8 Surface Water Features

No culvert, rivers and or other water bodies are known within the immediate vicinity of the site.

From information shown on appended Figures 4, 5 & 6 this site is approximately 800m away from ponds on the western side of Hampstead Heath (Golders Hill Chain Catchment); which also represent the nearest surface water features. The site is outside the shown catchment of the Hampstead Heath ponds. The nearest water courses shown on the Camden Plan of

Watercourses-Figure 6 (Source:" Lost Rivers of London"), shows a tributary to the River Westbourne which follow a southerly route approximately 200m to the east of the site.

E UNDERGROUND STRUCTURES

9 Basements

From our walkover survey of the local area and from a search of London Borough of Camden online planning applications, it does not appear that the neighbouring properties currently have or have applied for the construction of basements. To the south of Kidderpore Avenue, the Westfield College buildings have an underground car park. Any other residential basement structures that may be present within the nearby area will be located some distance from the proposed construction, so at this stage have been ignored.

10 Transport & Other Infrastructure

Immediately to the north of this site, within 10m of the boundary, is the underground potable water reservoir known as Kidderpore Reservoir, managed by Thames Water. No other tunnels or other infrastructure are known to be within the immediate vicinity of the site.

F BASEMENT IMPACT ON STRUCTURAL STABILITY

11 Structural Stability

DP27 "Maintain the structural stability of the building and neighbouring properties".

The proposed development includes for the construction of a new two-storey underground car park area with other single-storey basements. Given the proximity of the below ground reservoir all structures will need to be carefully designed and constructed in a manner to minimise any ground movements that may affect this or any other adjacent properties. Suitable support will be provided during the construction phase as required. During this period the adjacent boundary and neighbouring structures will be monitored for movement to make sure this is within acceptable limits.

G STAGE 1-SCREENING EXERCISE

Guidance from Camden Borough Council through its Development and Planning documents requires that any development proposal which includes a subterranean basement should be screened in order to determine whether there is a requirement for a full BIA to be carried out.

The proposals include for a number of new structures below existing ground levels. **Therefore screening is required.**

In this section, the screening flowchart questions contained within CPG4 are addressed in turn.

12 Surface Flow and Flooding

Question 1	**Is the site within the catchment of the pond chains on Hampstead Heath?**	**Action Required**
	No. The site is outside the Golders Hill Chain Catchment, about 550m to the north, see Figure 5.	None
Question 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 proposals will use the existing surface water sewer connections for the disposal of all surface water.	None
Question 3	**Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?**	
	Yes. The proposals include for an increase in hard surfaced area with a new access road into the car park and additional roof areas for the proposed buildings.	Take to Stage 2 Scoping
Question 4	**Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?**	
	No. The proposed drainage from the increased surface area of impermeable surfacing may alter inflow profiles to the existing sewer connection (but not to watercourses or adjacent properties) unless attenuation measures are incorporated.	None
Question 5	**Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?**	
	No. The quality of the surface water should be unaltered that is discharged to the sewer. The incorporation of interceptors may be needed for the car park areas.	None
Question 6	**Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?**	
	No. The site is not within an area known to be at risk of flooding (see Figure 7).	None

13 Groundwater Flow

Question 1a	**Is the site located directly above an aquifer?**	**Action Required**
	Yes. The site is located above the northern aquifer, designated a Secondary A Aquifer by the EA which comprises Claygate Member and Bagshot Formation, see Figure 8.	Take to Stage 2 Scoping
Question 1b	**Will the proposed basement extend beneath the water table surface?**	
	Unknown. At this stage the depth to groundwater at this site is unknown, but information from adjacent sites indicates that the watertable could be at a relatively shallow depth.	Take to Stage 2 Scoping
Question 2	**Is the site within 100m of a watercourse, well (used/disused) or potential spring line?**	
	No. The nearest watercourse is around 800m away, see Figure 4. We are unaware of any waterwells within the immediate area. Springlines for the adjacent Golders Hill Chain Catchment are greater than 500m to the north of this site. See Figure 5.	None
Question 3	**Is the site within the catchment of the pond chains on Hampstead Heath?**	
	No. The site is outside the Golders Hill Chain Catchment which is around 550m to the north, see Figure 5.	None
Question 4	**Will the proposed basement development result in a change in the proportion of hard surfaced /paved areas?**	
	Yes. The amount of hard surfacing and roof area will increase with these proposals.	Take to Stage 2 Scoping
Question 5	**As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?**	
	No. It is anticipated that all surface water will go to the existing sewer connections as the clayey nature of the soils are unlikely to support soakaways.	None

Question 6	**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. There are no known local water features or spring lines in the immediate vicinity of this site.	None

14 Slope Stability

Question 1	**Does the existing site include slopes, natural or manmade, greater than 7 degrees? (approximately 1 in 8)**	**Action Required**
	Yes. There are some areas of the site where existing slopes appear to be greater 7 degrees (see Figure 9).	Take to Stage 2 Scoping
Question 2	**Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7 degs? (approximately 1 in 8)**	
	No. There is no re-profiling proposed.	None
Question 3	**Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degs? (approximately 1 in 8)**	
	Yes. The land immediately to the south and east of the site does appear to have slopes in excess of 7 degrees. The site is shown adjacent to an area with slopes in excess of 7 degrees, see Figure 9.	Take to Stage 2 Scoping
Question 4	**Is the site within a wider hillside setting in which the general slope is greater than 7 degrees? (approximately 1 in 8)**	
	Yes. The land to the south, southeast and southwest has many slopes in excess of 7 degrees, see Figure 9.	Take to Stage 2 Scoping
Question 5	**Is the London Clay the shallowest strata at the site?**	
	No. The Claygate Member underlies the site, see Figure 3.	None
Question 6	**Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained? (Note that consent is required from LB Camden to undertake work to any tree/s protected by a Tree Protection Order or to tree/s in a Conservation Area if the tree is over certain dimensions).**	
	Yes. Some trees are likely to be removed as part of these proposals.	Take to Stage 2

		Scoping
Question 7	**Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?**	
	No. We have no evidence indicating any possible shrink-swell subsidence in the local area.	None
Question 8	**Is the site within 100m of a watercourse or a potential spring line?**	
	No. The nearest watercourse or springline is in excess of 100m of this site, see Figures 4, 5 & 6.	None
Question 9	**Is the site within an area of previously worked ground?**	
	No. The nearest area of recorded worked ground is about 250m to the northwest, see Figure 3.	None
Question 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?**	
	Yes. The site does overlie an area of aquifer (Claygate Member & Bagshot Formation), see Figure 8. The depth to the underlying watertable is unknown at this stage.	Take to Stage 2 Scoping
Question 11	**Is the site within 50m of the Hampstead Heath ponds?**	
	No. The site is located at a distance greater than 500m from Hampstead Ponds. See Figure 5.	None
Question 12	**Is the site within 5m of a highway or pedestrian right of way?**	
	Yes. Parts of the proposals are very close to Croft Way immediately to the east of the site.	Take to Stage 2 Scoping
Question 13	**Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?**	
	Yes. The proposals include for the car park to be around 6.5m deeper than the existing ground levels, close to, but not immediately adjacent to the subterranean reservoir just to the north. The proposed car park will also lower the ground in close proximity to the existing buildings forming the halls of residence, to the east and south.	Take to Stage 2 Scoping

Question 14	**Is the site over (or within the exclusion zone of) any tunnels, e.g. Railway lines?**	
	No there are no known tunnels within the vicinity of this site.	None

STAGE 2 - SCOPING EXERCISE

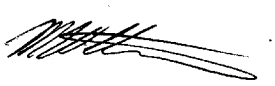
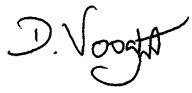
On the basis of the above screening exercise, it is concluded that there are a number of items that will need to be investigated further to assess their potential impacts.

These are as follows:

- *A geotechnical investigation to confirm the ground conditions underlying the site.*
- *Groundwater monitoring.*
- *An assessment of the potential impact of the new basement on groundwater levels and also the potential cumulative effects on the groundwater environment in the area.*
- *An assessment of any ground movements in relation to the nearby Highway (Croft Way) and adjacent structures.*
- *An assessment of the potential impact on the stability of existing adjacent slopes.*

These issues will be assessed within a subsequent Site Investigation Report.

Additionally the existing surface water connections will need to be clarified and potential discharges agreed with statutory authorities.

J N Race MSc CGeol (Countersigned)

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D Vooght MSc (Signed)

For and on behalf of Southern Testing Laboratories Limited

STL: J12093
09 April 2015

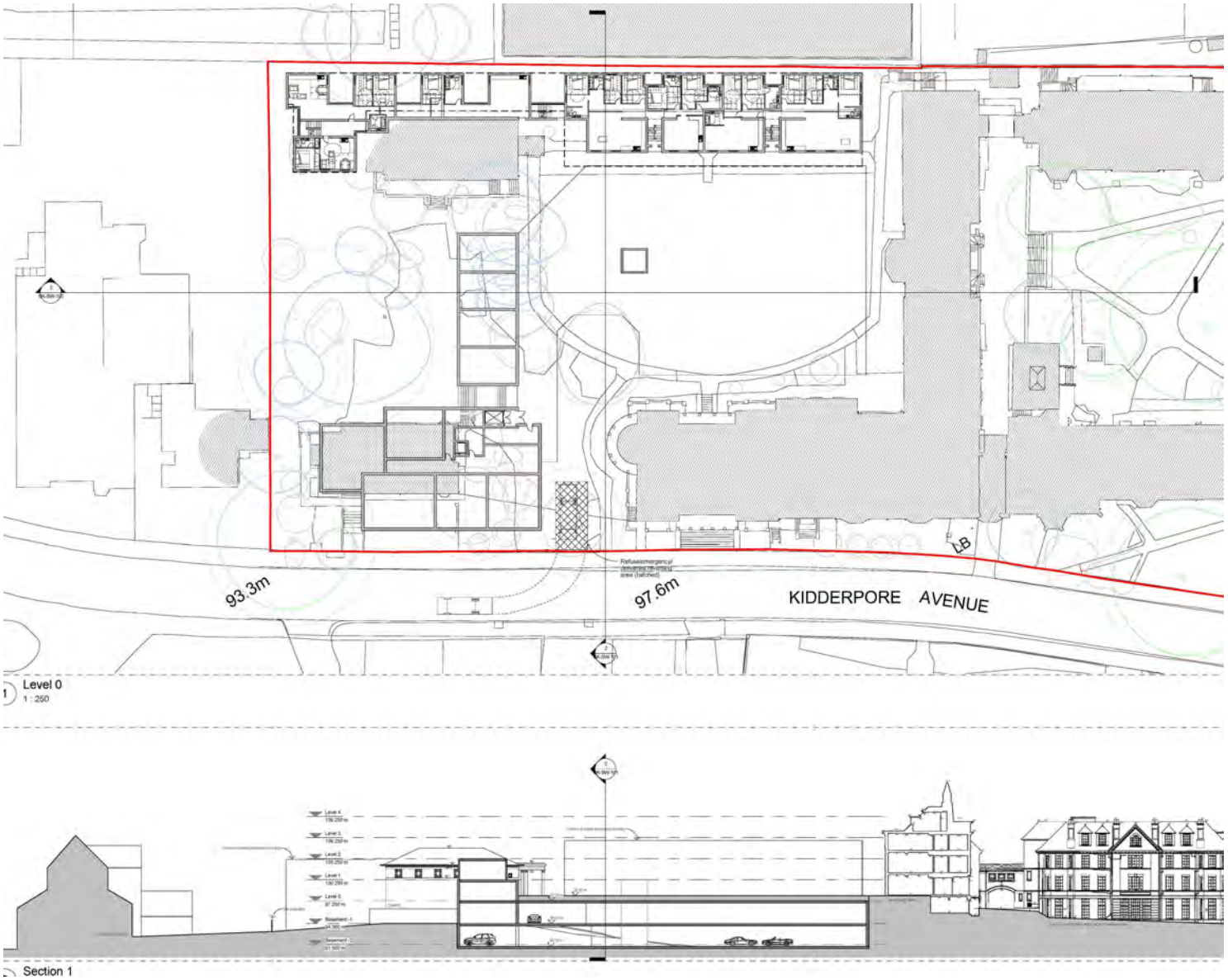
FIGURES

Site: Kidderpore Avenue, London NW3	STL: J12093	Fig No: 1
Date: 06 January 2015	Site Location Plan	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult



Site:	Kidderpore Avenue, London NW3	STL: J12093	Fig No: 2
Date:	06 January 2015	Plan showing proposals at western part of site.	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult

Site:	Kidderpore Avenue, London NW3	STL: J12093	Fig No: 2A
Date:	06 January 2015	Plan showing proposals at eastern end of site.	

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
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ST Consult

524000

526000

528000

186000

THE SITE

524000

526000

528000

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

N

Scale at A3: 1:15,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.25 0.5 1 1.5

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

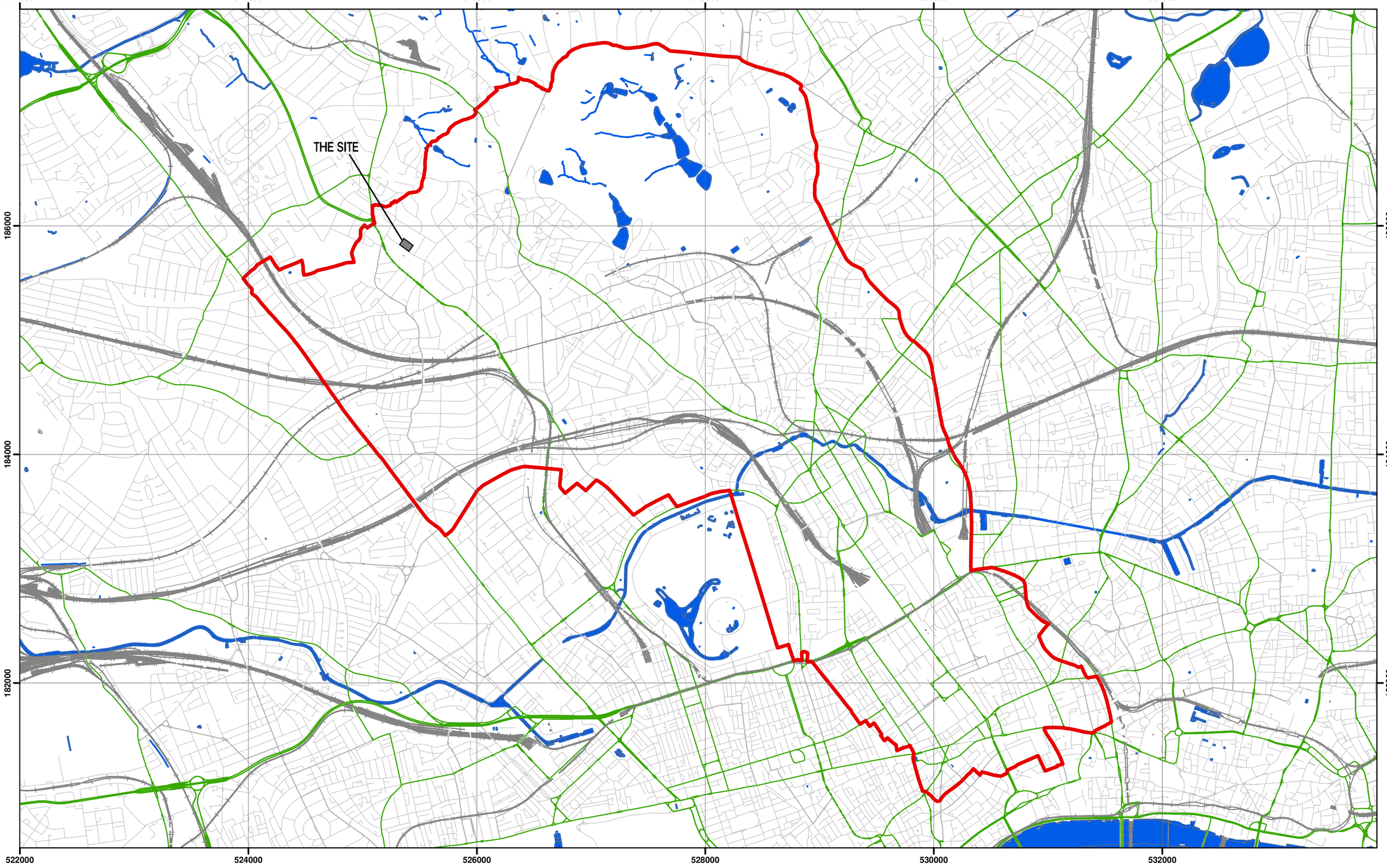
- BAGSHOT FORMATION
- CLAYGATE MEMBER
- LAMBETH GROUP
- LONDON CLAY FORMATION

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

Camden Geological, Hydrogeological and Hydrological Study

North Camden Geological Map

Report: J12093 Site: Kidderpore Avenue, London NW3 Figure: 3



Data Source: London Borough of Camden, 2010

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
- Surface water
- Railway Lines
- A Roads

Camden Geological, Hydrogeological and Hydrological Study

Camden Surface Water Features

Report: J12093 Site: Kidderpore Avenue, London NW3 Figure: 4

526000

528000

188000

186000

THE SITE

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

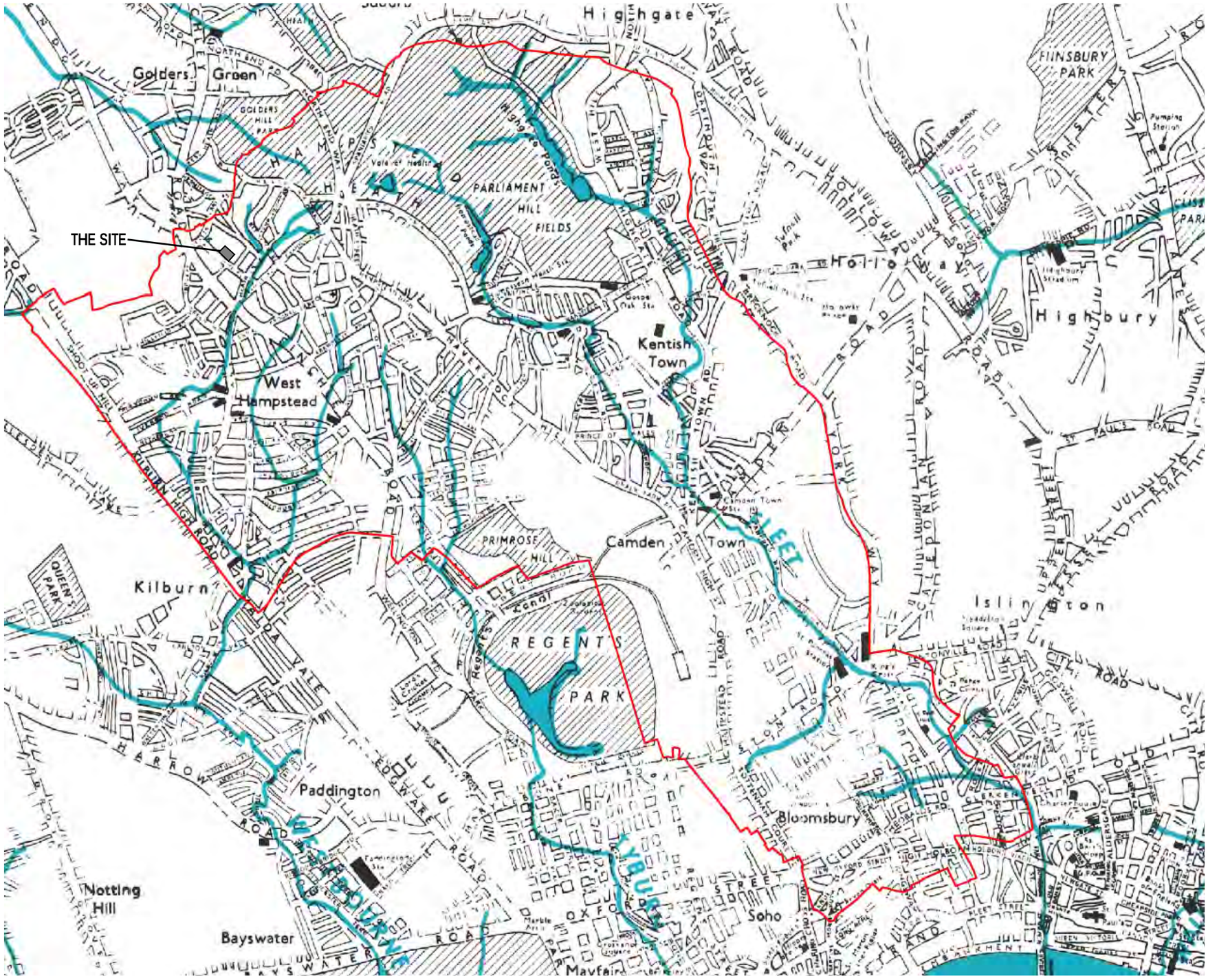
Legend

- 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

Report: J12093 Site: Kidderpore Avenue, London NW3 Figure: 5



Camden Geological, Hydrogeological and Hydrological Study
Watercourses

Source – Barton, Lost Rivers of London

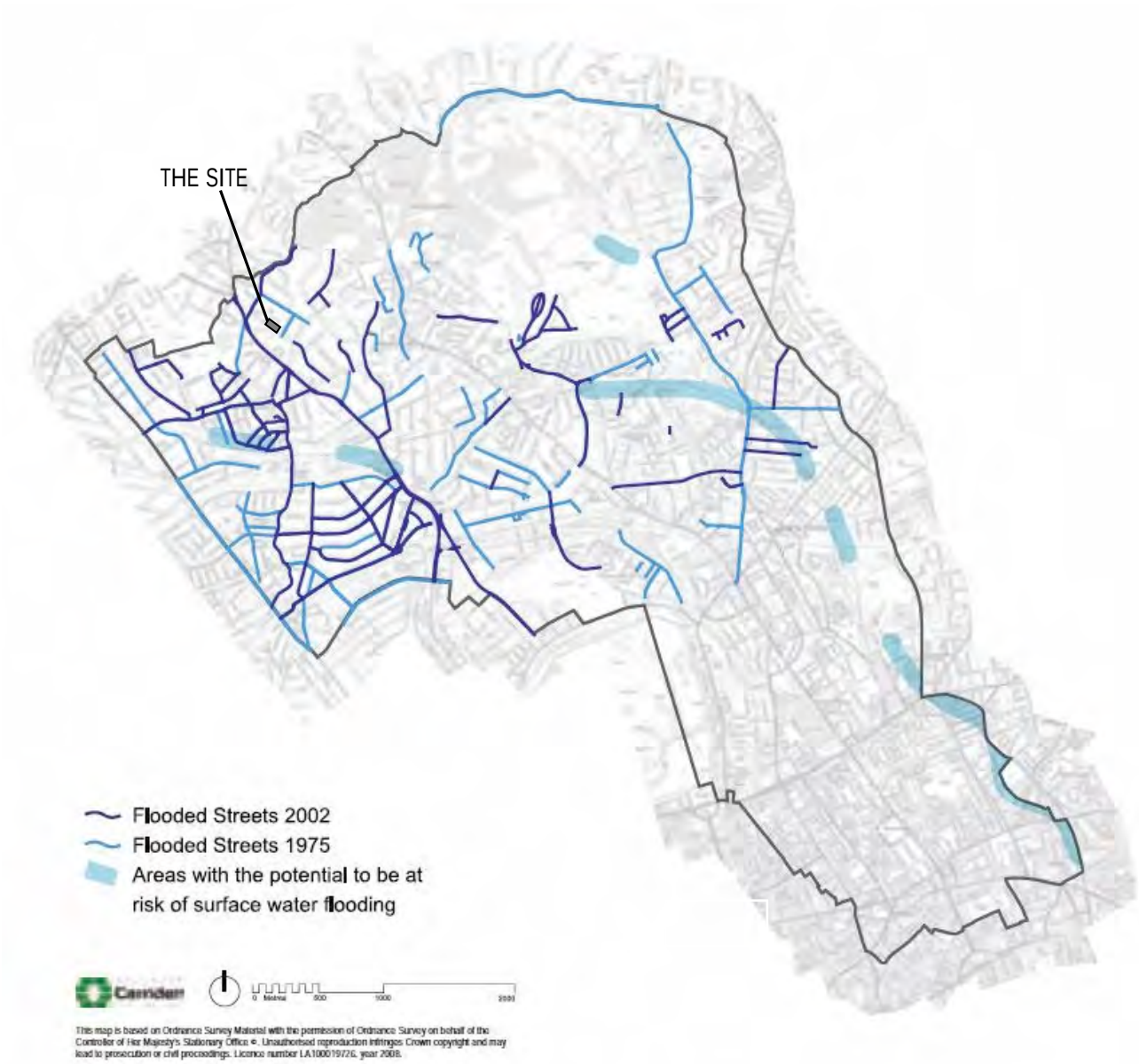


Figure 5 from Core Strategy, London Borough of Camden

Camden Geological, Hydrogeological and Hydrological Study
Flood Map