

9 Dartmouth Road Park Road,
London, NW5 1 SU

Basement Impact Assessment

March 2016



FAIRHURST
consulting engineers **gga**

9 Dartmouth Park Road, London NW5
114225



CONTROL SHEET




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1.0 NON TECHNICAL SUMMARY

Project Objectives	<p>At the request of Russell Taylor Architects, a Basement Impact Assessment has been carried out at 9 Dartmouth Park Road, London, NW51SU in support of a planning application for a proposed new development which includes replacing the existing extensions at lower ground and raised ground floor level with a new rear extension, part one storey part two storey, at the same levels as existing. This will involve lowering part of the external level at the rear and side of the house by approximately 1.39m from ground level (50.34mOD) to existing external lower ground level (48.95mOD).</p>
Geology/ Hydrogeology	<p>The British Geology Survey (BGS) map of the area (Sheet 256) indicates that the site is underlain by the London Clay Formation.</p> <p>According to Environment Agency Flood maps the site lies within Flood Zone 1, which is defined as areas where flooding from rivers and the sea is very unlikely, with less than a 0.1 per cent (1 in 1000) chance of such flooding occurring each year.</p> <p>With reference to Stanforth's 1864 map of London and Barton (1992) the site is approximately 150m south west from a tributary of the River Fleet.</p> <p>The Bedrock geology underlying the site (London Clay Formation) has been classified as Unproductive Strata; rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.</p>
Conclusions and Recommendations	<p>It is concluded that the proposed development is unlikely to result in any specific land or slope stability issues, groundwater or surface water issues.</p> <p>Despite the above it is recommended that the chosen contractor should have a contingency plan in place to deal with any perched groundwater inflows as a precautionary measure. Trial excavations to the proposed basement depth could be carried out by the main contractor following planning permission (i.e at detailed design stage) to confirm the composition and stability of the soil and to further investigate the presence of any groundwater inflows.</p>

2.0 INTRODUCTION

The purpose of this assessment is to consider the effects of a proposed basement extension on the local hydrology, geology and hydrogeology at 9 Dartmouth Park Road, London, NW5 1SX.

The site comprises a four storey terraced residential property (9 Dartmouth Road) including an existing lower ground floor (semi-basement) and front and rear garden areas.

Proposals for the site include replacing the existing extensions at lower ground and raised ground floor level with a new rear extension, part one storey part two storey, at the same levels as existing. This will involve lowering part of the external level at the rear and side of the house by approximately 1.39m from ground level (50.34mOD) to existing external lower ground level (48.95mOD).

The information contained within this BIA has been produced specifically to meet the requirements set out by Camden Planning Guidance – Basements and Lightwells (CPG4) (July 2015) in order to assist London Borough of Camden with their decision making process.

2.1 Data Sources

This section provides the baseline data used to complete the BIA in relation to the proposed development. Reference information used for this purpose is outlined below:

- Barton N (1992) The Lost Rivers of London. Historical Publications Ltd, London;
- British Geological Survey – 1:50,000 Geological Sheet 256, North London (Solid & Drift), 1990;
- British Geological Survey (BGS) borehole archive records;
- CIRIA C580 Embedded retaining walls – guidance for economic design (2003)
- Environment Agency Groundwater Vulnerability Mapping (1:100,000 series) Sheet 40, Thames, 1995;
- Environment Agency Internet database (www.environment-agency.gov.uk);
- London Borough of Camden (LBC) Planning Guidance (CPG4) – Basements and Lightwells (July 2015).
- LBC Conservation Area Guide for Dartmouth Park Road
- Regional Climates of the British Isles edited by Dennis Wheeler and Julian Mayes. Routledge 1997. 343 pp. ISBN 0-415-13931-7
- River Basin Management Plan (RBMP). Thames River Basin District (2009);
- Site reconnaissance survey completed by Fairhurst (December 2015);
- Stanforth (1864) Map of London. Available online, <http://london1864.com>.
- Russell Taylor Architect drawings

2.2 Guidance and Frameworks

The proposed basement is located in the London Borough of Camden (LBC) and as such will be required to be developed in accordance with the guidance and policies outlined in the following documents:

- LBC (Nov 2010). Camden geological, hydrogeological and hydrological study. Guidance for subterranean development (produced by Arup Consulting).

- LBC. Camden Planning Guidance. Basements and Lightwells (CPG 4) (July 2015).
- Development Policy (DP) 27 Basements and Lightwells.

2.3 BIA Approach

The BIA approach follows current planning procedure for basements and lightwells adopted by LBC and comprises the following elements:

- Screening;
- Scoping;
- Impact Assessment;
- Review

On the basis of the screening process it has been deemed unnecessary to carry out site the impact assessment and review stages.

2.4 Qualifications

The qualifications required by LBC are fulfilled as documented in Table 1 below. All assessors meet the qualification requirements of the Council guidance.

Table 1 – Qualification Summary

Subject	Qualifications Required by CPG4	Relevant person(s) in Fairhurst
Surface flow and flooding	<p>A hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either:</p> <p>The 'CEng' (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers ('MICE')</p> <p>The CWEM (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management</p>	<p>Mr Alan Connell BSc (Hons) CEng MICE</p> <p>Mr Andrew Smith BSc(Hons) FGS MCIWEM</p>
Subterranean (groundwater flow)	A hydrogeologist with the 'CGeol' (Chartered Geologist) qualification from the Geological Society of London	Mr Phil Brown BSc (Hons) FGS CGeol
Land Stability	A Civil Engineer with the 'CEng (Chartered Engineer) qualification from the Engineering Council	Mr Alan Connell BSc (Hons) CEng MICE

3.0 BASELINE CONDITIONS

3.1 Site Description

The site is located on the western side of Dartmouth Park Road in Dartmouth Park, North London at approximate postcode NW5 1SU as detailed on Figure 1. The site is located within the Dartmouth Park Conservation area and is under the general authority of the London Borough of Camden.

The site and comprises a four storey, four bedroom, semi-detached property. The ground floor is raised above a semi basement. The street comprises further semi-detached properties as well as terraced properties.

The property is bound by Dartmouth Park Road to the north west, No. 11 Dartmouth Park Road to the north east, No 7 Dartmouth Park Road to the south west and residential gardens to the east.

The front garden is small and comprises mainly of cobblestones as well as some small bushes and ivy. The rear garden comprises a stone paved area immediately adjacent to the building and then grass further to the east with flowerbeds and several mature trees.

The site is essentially flat and at a level of approximately 50.34mOD although there are steps down to the existing semi basement which is at a level of approximately 48.95mOD.

In the surrounding area there is a slight slope in topographic gradient to the south west at an angle of approximately 2-3°. The wider general area slopes to the south towards the River Thames.

3.2 Site History

According to the Camden Council's conservation guide for the area, the buildings along Dartmouth Park Road were constructed in the late 1850s. The surrounding area has been primarily residential over the years.

3.3 Geology

The British Geology Survey (BGS) map of the area (Sheet 256) indicates that the site is underlain by the London Clay Formation. The boundary to the overlying Claygate Beds is indicated to be approximately 800m north of the site.

The BGS's online records indicate there is one historical boreholes located within 200m of the site located 170m south west of the site (BGS Reference TQ28NE22) with the soil conditions described below:

Table 2. Summary of BGS Borehole (170m SW of site)

Stratum	Depth to top		Depth to base	
	m	mOD	m	mOD
Superficial Head	GL	41.97	1.82	40.15
London Clay Formation	1.82	40.15	9.14	32.83

A groundwater strike is recorded in the borehole record at 7.80m below ground level (34.17mOD).

3.4 Hydrology and Drainage

3.4.1 Rainfall and Runoff

According to Mayes and Wheeler (1997) rainfall in the local area averages around 610mm and significantly less than the national average of around 900mm.

Evapotranspiration is typically 450 mm/yr resulting in about 160 mm per year as 'hydrologically effective' rainfall which is available to infiltrate into the ground or runoff as surface water flow.

With reference to Stanforth's 1864 map of London and Barton (1992) the site is approximately 150m south west from a tributary of the River Fleet (See Figures 2 and 2a). The Fleet rises on Hampstead Heath as two springs - one on the western side near Hampstead and one on the eastern side in the grounds of Kenwood House. Then they go underground, pass under Kentish Town, join in Camden Town and flow onwards to King's Cross. The river then flows below Farringdon Road and Farringdon Street, and joins the River Thames beneath Blackfriars Bridge.

The River Fleet has been largely lost through a culverting system as the urban extent of London has grown over time.

The area located immediately around the site is highly developed with more than 80% of the surface covered with hardstanding. Most of the rainfall in the area will run-off hard surface areas and be collected by the local sewer network.

3.4.2 Flood Risk

River or Tidal flooding

According to Environment Agency Flood maps the site lies within Flood Zone 1, which is defined as areas where flooding from rivers and the sea is very unlikely, with less than a 0.1 per cent (1 in 1000) chance of such flooding occurring each year. The EA's website also shows that this area does not fall within an area at risk of flooding from reservoirs.

Surface Water Flooding

According to CPG4 (2015) No 9 Dartmouth Park Road did not flood during either the 1975 or the 2002 flood events. Modelling of surface water flooding has been undertaken by the Environment Agency and a copy for the site area is reproduced as Figure 3 to this report. The site is shown as having a 'Very Low' risk of flooding; the lowest category for the national background level of risk.

As detailed in Table 3 below, the scheme will result in a slight increase in impermeable areas by approximately 9m².

Table 3. Existing and Proposed Permeable/Impermeable Areas

Element	Existing (m ²)	Proposed (m ²)
Impermeable (hardstanding - building footprint, concrete areas)	66m ² (hard landscaping) 67m ² (building footprint)	62m ² (hard landscaping) 80m ² (building footprint)
Permeable (softscaping - grassed areas, (including green roof), permeable and porous paving)	140m ²	131m ²
Total (should be the site area and remain the same)	273m ²	273m ²

Sewer Flooding

The London Regional Flood Risk Appraisal (2009) advises that foul sewer flooding is most likely to occur where properties are connected to the sewer system at a level below the hydraulic level of the sewage flow, which in general are often basement flats or premises in low lying areas. There is no record of sewer flooding having occurred in the existing basement at No. 9 Dartmouth Park Road and therefore the risk of sewer flooding is considered low.

3.5 Hydrogeology

The Environment Agency Groundwater Protection Policy uses aquifer designations that are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) and also their role in supporting surface water flows and wetland ecosystems.

The Bedrock geology underlying the site (London Clay Formation) has been classified as Unproductive Strata; rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Other hydrogeological data obtained from the data sources detailed in Section 2.1 includes:

- The underlying soil classification of the site is of high leaching potential;
- There are no source protection zones within 500m of the site
- There are no surface water abstraction licenses within 2km of the site
- There are no water wells within 250m of the site

3.6 Proposed Development

Proposals for the site include replacing single storey and two storey rear extensions at lower ground and raised ground floor level with a new rear extension, part one storey part two storey, at the same levels as existing. This will involve lowering part of the external level at the rear and side of the house by approximately 1.39m from ground level (50.34mOD) to existing external lower ground level (48.95mOD).

It should be emphasised that the existing semi-basement will not be lowered as part of these proposals. The area at the existing basement level will be enlarged and some of the external ground levels will be lowered to the level of the basement.

3.7 Planning Summary

Reference to LBC planning portal (1987 to present) shows that there has been several recent developments along Dartmouth Park Road which are similar to what is proposed at No. 9. A summary is described in Table 4 below.

Table 4. Summary of similar developments along Dartmouth Park Road

Site	Reference	Description	Status
18 Dartmouth Park Road	2013/2424/P	Erection of part 1/part 2 storey rear extension following demolition of existing rear extension and stair, installation of 3 rooflights and replacement of all windows. Alterations to side elevation including excavation and insertion of new windows and door, in connection with change of use from two flats to single dwelling house (Class C3).	Granted 30/09/2013
11 Dartmouth Park Road	2011/5120/P	Additions and alterations to include erection of a single storey rear extension, alterations to existing 3 storey rear extension including installation of roof lights, enlargement of window infill of existing window at side elevation and replacement of rear door to dwelling house (Class C3).	Granted 06/12/2011
52 Dartmouth Park Road	2011/2716/P	Erection of a single storey rear extension at ground floor to residential flat (Class C3) following the demolition of the existing extension.	Granted 01/08/2011
Lamorna Dartmouth Park Road, London, NW5 1SU	2010/4432/P	Erection of rear extension at ground floor level and conversion of garage plus associated elevational alterations to provide additional habitable accommodation to existing single dwelling house (Class C3).	Granted 11/10/2010

3.8 Results of Basement Impact Assessment Screening

A screening process has been undertaken in accordance with the most recent guidance from Camden Council (CPG 4, 2015) and the findings are described below.

Subterranean (Groundwater) flow

Question	Response	Details
1a. Is the site located directly above an aquifer.	No	The Bedrock geology underlying the site (London Clay Formation) has been classified as Unproductive Strata.
1b. Will the proposed basement extend beneath the water table surface.	No	Reference to nearby BGS Borehole TQ28NE22 indicates that groundwater is unlikely to be encountered during the 1.39m excavation
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line.	No	There are no surface water features within 100m of the site. According to publications regarding Lost Rivers of London (Barton, 1992), the site is not within 100m of a former river or watercourse.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site is over 750m south east from these features
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas.	Yes	The scheme will result in a slight decrease in impermeable areas on the site
5. As part of 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	Soakaways are not considered appropriate to the site due to the sub-soil conditions and therefore no surface water will be discharged to ground as part of the site drainage.
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 or spring line.	No	There are no surface water features within 100m of the site. According to publications regarding Lost Rivers of London (Barton, 1992), the site is not within 100m of a former river or watercourse.

Slope stability

Question	Response	Details
1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8).	No	The site contains steps down to the lower ground floor level however despite this it is essentially flat
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8).	No	Re-profiling of landscaping at the site is not proposed
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8).	No	In the surrounding area there is a slight slope in topographic gradient to the south west but this equates to around a 2-3° slope angle.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8).	No	There is a general slope to the south towards the River Thames but this is less than 7 degrees.
5. Is the London Clay the shallowest strata at the site.	Yes	The British Geology Survey (BGS) map of the area (Sheet 256) indicates that the site is underlain by the London Clay Formation.
6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained.	No	No trees will be felled as part of the development
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site.	Yes	The London Clay Formation is prone to shrinking and swelling.
8. Is the site within 100m of a watercourse or a potential spring line.	No	There are no surface water features within 100m of the site. According to publications regarding Lost Rivers of London (Barton, 1992), the site is not within 100m of a former river or watercourse.
9. Is the site within an area of previously worked ground.	No	According to information from the BGS the site is not in the vicinity of any recorded areas of worked ground
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	The Bedrock geology underlying the site (London Clay Formation) has been classified as Unproductive Strata.
11. Is the site within 50m of the Hampstead Heath Ponds	No	The site is over 250m from these features
12. Is the site within 5m of a highway or pedestrian right of way.	Yes	The site is within 5m of Dartmouth Park Road
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties.	No	The existing semi-basement will not be lowered as part of these proposals and therefore the works will not be lower than existing or neighbouring foundations.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines.	No	Reference to online sources shows that there are no tfl or Network Rail owned tunnels below the site.

Surface Water and Flooding

Question	Response	Details
1. Is the site within the catchment of the ponds chains on Hampstead Heath	No	With reference to the Camden Geological, Hydrogeological and Hydrological Study, the site is not within the catchment of the pond chains on Hampstead, nor the Golder's Hill Chain
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	On completion of the development, the surface water flows will be routed similarly to the existing condition, with rainwater run-off collected in a surface water drainage system and discharged to a combined sewer. Any groundwater flows will not be impeded by the basement.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.	Yes	The scheme will result in a slight increase in impermeable areas on the site
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	All surface water for the site will be contained within the site boundaries and collected as described above; hence there will be no change from the development on the quantity or quality of surface water being received by adjoining sites.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses.	No	All surface water for the site will be contained within the site boundaries and collected as described above; hence there will be no change from the development on the quantity or quality of surface water being received by adjoining sites.
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 from flooding, for example because the proposed basement is below the static water level of nearby surface water feature.	No	According to modelling by the Environment Agency, there is a 'Very Low' risk of surface water flooding (the lowest category for the national background level of risk) for No.9 and the surrounding area. There are no surface water features within 100m of the site which could create a flood risk for the proposed basement. According to CPG4 (2015) Dartmouth Park Road did not flood during either the 1975 or the 2002 flood events.

3.9 Non-Technical Summary of Chapter 3.0

The site is located on the western side of Dartmouth Park Road in Dartmouth Park, North London at approximate postcode NW5 1SU. The site is located within the Dartmouth Park Conservation area and is under the general authority of Camden Council. The site comprises a four storey, four bedroom, semi-detached property. The ground floor is raised above a semi basement.

Proposals for the site include replacing single storey and two storey rear extensions at lower ground and raised ground floor level with a new rear extension, part one storey part two storey, at the same levels as existing.

The British Geology Survey (BGS) map of the area (Sheet 256) indicates that the site is underlain by the London Clay Formation which has been classified as Unproductive Strata; rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

According to Environment Agency Flood maps the site lies within Flood Zone 1, which is defined as areas where flooding from rivers and the sea is very unlikely, with less than a 0.1 per cent (1 in 1000) chance of such flooding occurring each year.

The scheme will result in an increase in impermeable areas by approximately 9.0m².

The following have been identified as being the potential issues which will be carried forward to the Scoping Phase in this report:

Subterranean Groundwater Flow

- Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas.

Slope Stability

- Is the London Clay the shallowest strata at the site.
- Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site.
- Is the site within 5m of a highway or pedestrian right of way.

Surface Water and Flooding

- Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.

4.0 SCOPING PHASE

This purpose of the scoping phase is to assess potential impacts for each of the issues identified in the screening process and provide recommendations/actions.

Where no remaining actions exist from the screening stage, the Impact Assessment and Review stages as detailed in Section 2.3 are not deemed necessary.

Subterranean (Groundwater Flow)

Screening Question		Response	Action(s)
4	Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas.	<p>As identified in the initial screening and scoping stages the scheme will result in an increase in impermeable areas by approximately 9.0m².</p> <p>The sealing of the ground surface to rainfall, by increasing the building area, would result in slightly decreased recharge to the underlying ground, although the low permeability of the underlying London Clay would result in a low recharge in any case and consequently there would be little to negligible effect on groundwater. No additional SUDS are therefore considered necessary.</p> <p>Also, given the limited scope of the scheme and minimal increase in impermeable areas, the scheme is also considered compliant with the surface water management and flood risk elements of National Planning Policy Framework (NPPF) and Camden policy.</p>	No further assessment required

Slope Stability

Screening Question		Response	Action(s)
5	Is the London Clay the shallowest strata at the site.	The London Clay Formation is recorded as having a high susceptibility to shrinkage and swelling. However, the basement will extend below the potential depth of root action in accordance with guidance from NHBC Standards, Chapter 4.2.	No further assessment required
7	Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?		
12	Is the site within 5m of a highway or a pedestrian right of way?	<p>The proposed basement is not to be extended below Dartmouth Park Road and therefore it is suggested that the impact on this access road is likely to be minimal. Temporary works to address potential instability are to be incorporated into detailed design and construction sequence.</p> <p>There is nothing unusual in the proposed development that would give rise to any concerns with regard to the stability of public highways.</p>	No further assessment required

Surface Water and Flooding

Screening Question		Response	Action(s)
3	Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.	As detailed above, given the limited scope of the scheme and minimal increase in impermeable areas, the scheme is also considered compliant with the surface water management and flood risk elements of National Planning Policy Framework (NPPF) and Camden policy.	No further assessment required

4.1 Non-Technical Summary of Chapter 4.0

Based on the scoping phase it is not considered that the proposed basement would result in any detrimental changes to Dartmouth Park Road located in the vicinity of the property. Also given the limited scope of the scheme and minimal increase in impermeable areas, the scheme is considered compliant with the surface water management and flood risk elements of NPPF and Camden policy.

On the basis of these findings, no further site investigation is recommended as necessary for the site.

5.0 CONCLUSIONS

A Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden. Information has been used to assess potential impacts identified by the screening process. It is concluded that the proposed development is unlikely to result in any specific land or slope stability issues, groundwater or surface water issues.

Despite the above it is recommended that the chosen contractor should have a contingency plan in place to deal with any perched groundwater inflows as a precautionary measure. Trial excavations to the proposed basement depth could be carried out by the main contractor following planning permission (i.e at detailed design stage) to confirm the composition and stability of the soil and to further investigate the presence of any groundwater inflows.

Figure 1 – Site Location Plan

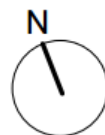
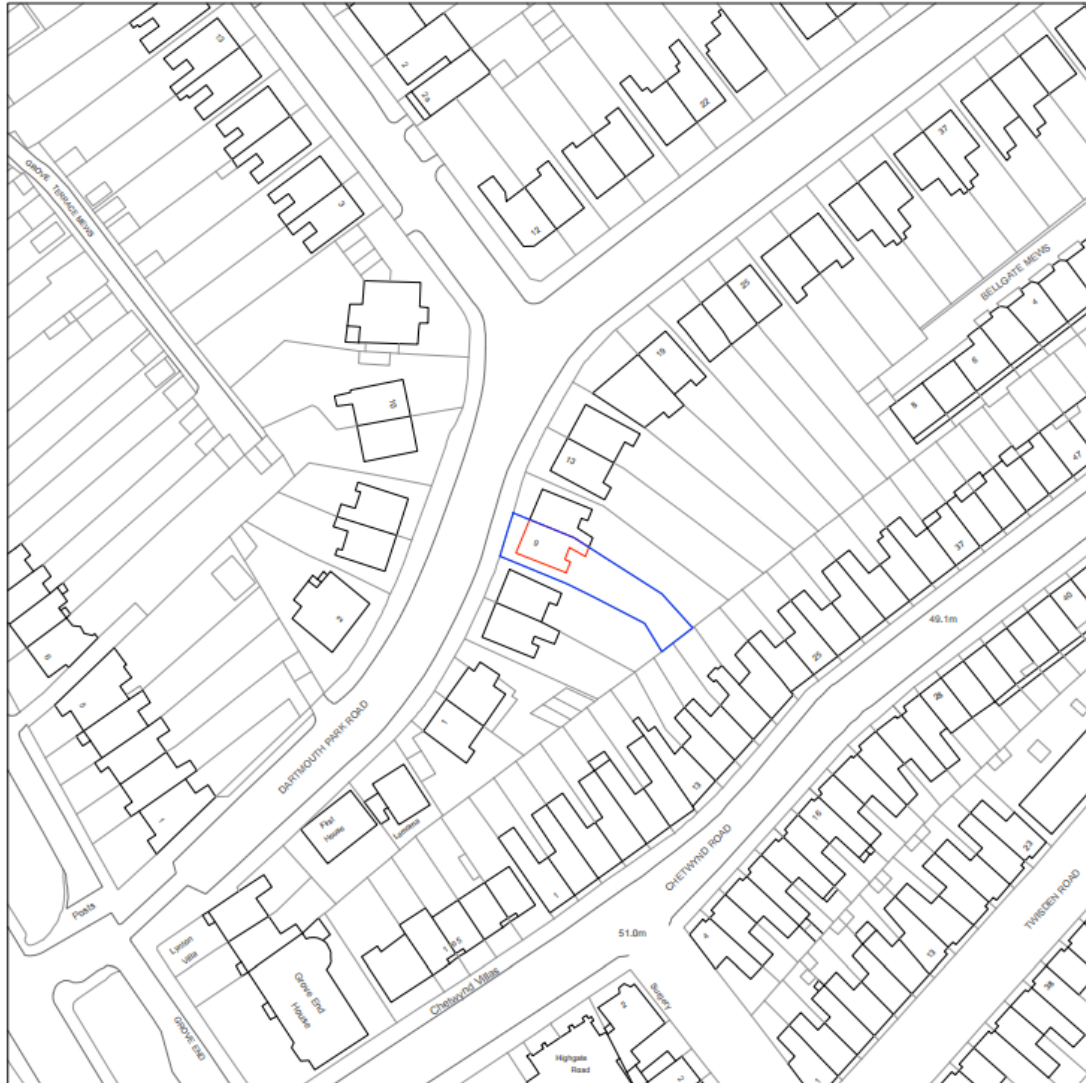


Figure 2 – Location of site relative to the ‘Lost Rivers’ of London (Source: Barton, 1992)

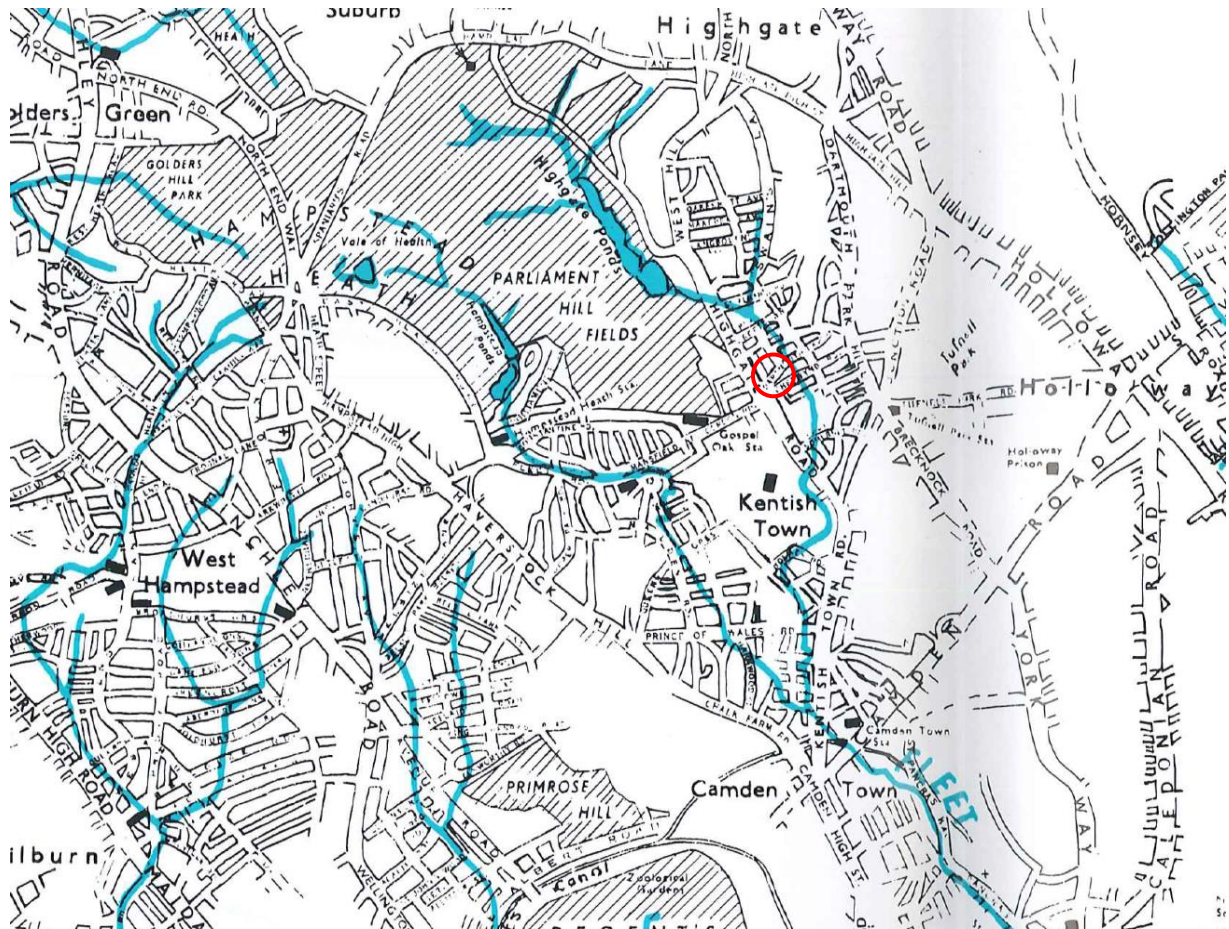
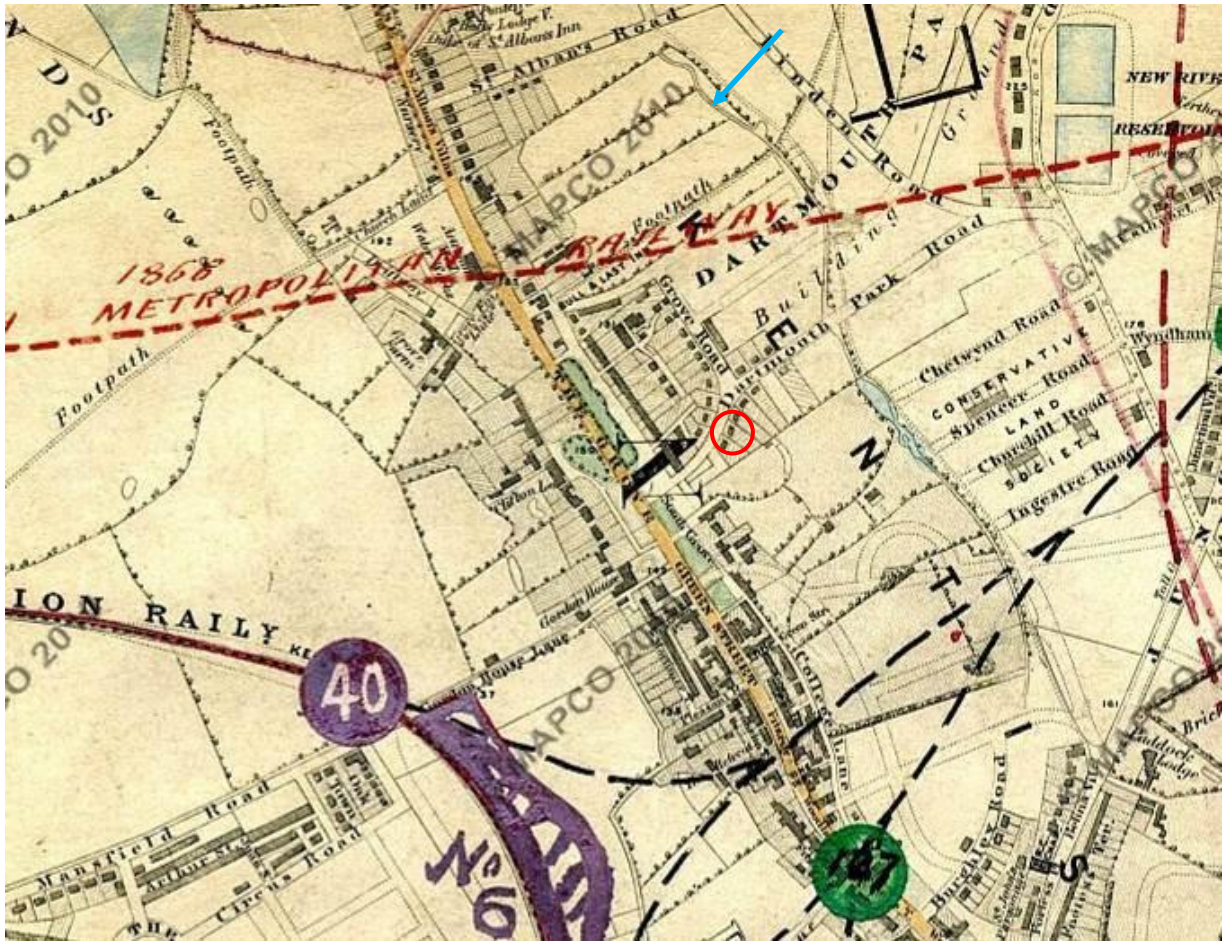
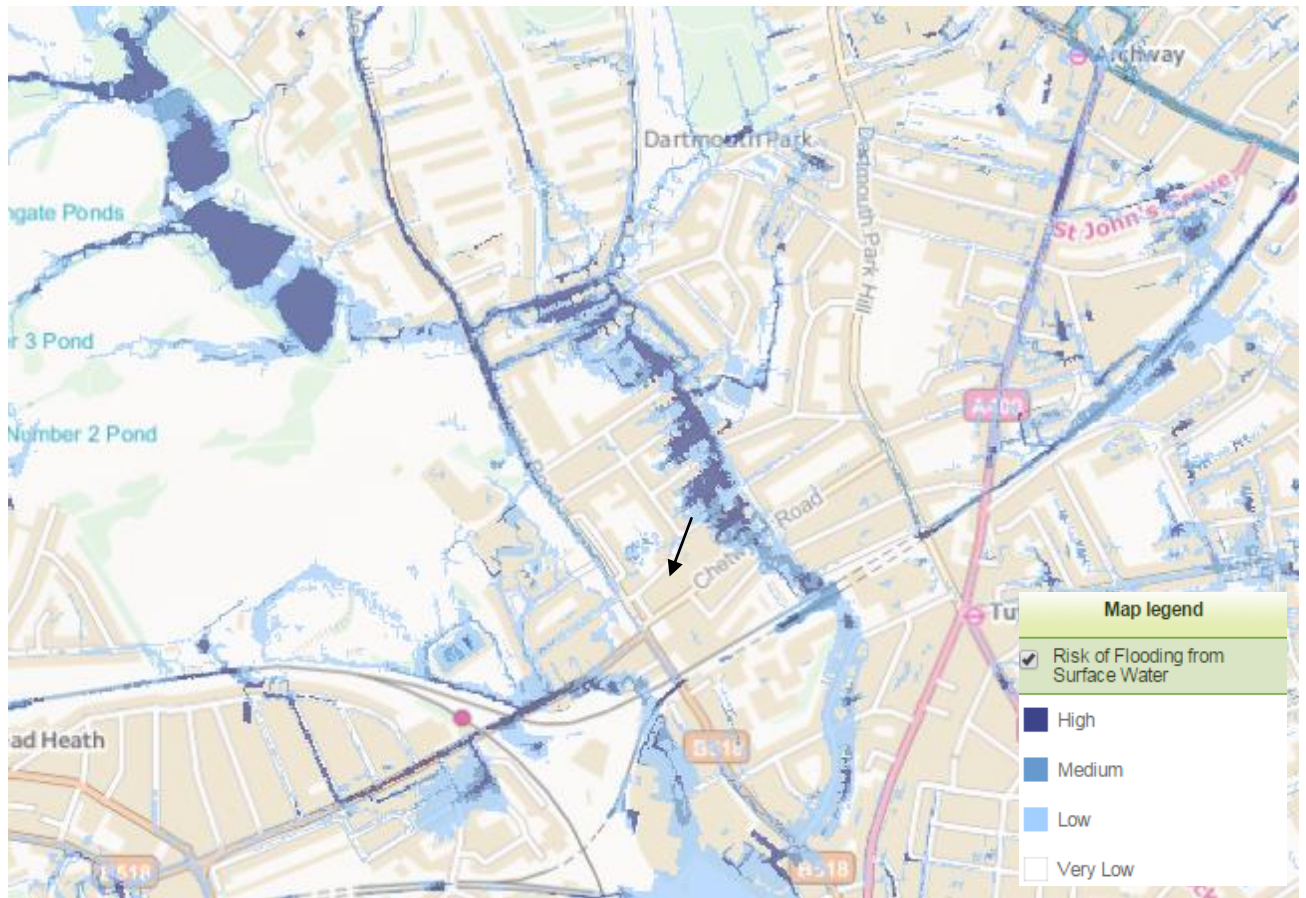


Figure 2a – Route of the River Fleet (arrowed) relative to the site (Stanford, 1864)



9 Dartmouth Park Road, London NW5
114225

Figure 3 – Risk of Flooding from Surface Water (Source: Environment Agency 2015)



9 Dartmouth Park Road, London NW5

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Appendix A - Site Photographs



Photograph 1. View looking towards the site



Photograph 2. Detailing the side passage and steps to the lower ground floor level



Photograph 3. Detailing the rear of the site

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