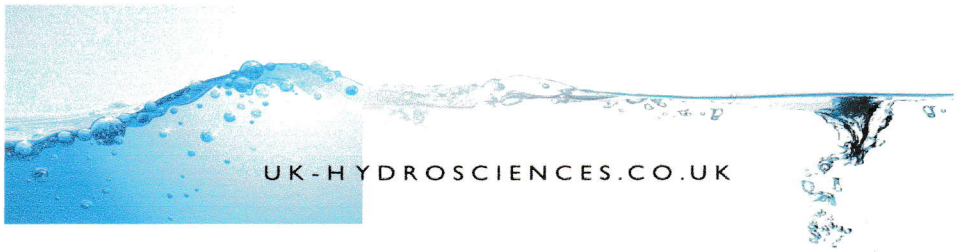

31 HEATH DRIVE, LONDON, NW3 7SD

BASEMENT IMPACT ASSESSMENT

Prepared for

CD&B Basements

Acting on behalf of
Mr. and Mrs. Gupta

Registered offices 1 Beauchamp Court, 10 Victors Way, Barnet, Herts, EN5 5TZ
Company Number: 8122371

ABOUT UK-HYDROSCIENCES

Details of Organisation
UK-Hydrosciences Ltd

Nature of Organisation
Consultants for Hydro-geological Reporting

Incident/Accident Record
None recorded

Qualifications & Membership of Professional Bodies
Desktop Reports Director: R Kearney – B.Sc (Hons.) , C.Geol. FGS ,BSc (Hons) Building Surveying, MSc (Hons) Project Management, SMSTS, MAPS.

Geotechnical Consultant Engineer
M A Baker. MSc Groundwater Engineering, FGS, Cgeol, Ceng.

Professional Indemnity/Liability Insurance
PI is in place to cover our duties under CDM with cover limited to £1,000,000 and the liability period limited to 6 years. Details are available upon request.

Familiarity with Construction Processes
Robert Kearney of DT Reports has been contracted be UK-Hydrosciences due to his extensive experience in building surveying and construction management for over 20years and has been instrumental in the development of some of the working practices adopted by the leading basement constructors.

Awareness of Relevant Health & Safety and Fire Regulations
Within the Company we have documentation relating to these matters which are regularly updated and circulated among the Directors and members of staff.

Health & Safety Practices
A copy of the Company's Health & Safety Policy is available upon request.

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CONTENTS

1.0 INTRODUCTION

1.1 Project Objectives

The purpose of this assessment is to consider the effects that the proposed lower ground extension may have on the local groundwater regime local to the residential property sited at 31 Heath Drive, London, NW3 7SB.
For this assessment a representative of UK-Hydrosciences visited the property on 16th April 2015.
The recommendations and comments given in this report are based on the information contained from the sources cited and may include information provided by the Client and other parties including anecdotal information. It must be noted that there may be special conditions prevailing at the site which have not been disclosed by the investigation and which have not been taken into account in the report.
No liability can be accepted for any such conditions.
This report does not constitute a full environmental audit of either the site or its immediate environs.

1.2 Planning Policy Context

Camden Planning Guidance for Basements and Lightwells (CPG4, September 2013) requires proposed subterranean developments to mitigate the potential effects of ground and surface water flooding and to include drainage systems that do not negatively impact the adjoining or adjacent properties to the site or the local water environment by way of changing the groundwater regime.

Camden Guidance CPG4 sets out 5 Stages:

1. Screening
2. Scoping
3. Site Investigation
4. Impact Assessment
5. Review and decision making

This report is intended to address the scoping process set out in CPG4 and the Camden Geological, Hydrogeological and Hydrological Study (CGHHS). It will review existing site investigation data and provide a preliminary assessment of the issues identified by the screening process.
This report also provides an impact assessment (4) of the geo-environmental impacts on adjacent structures and the surrounding area based on available site investigation data.
As part of this guidance a subterranean (groundwater) flow screening chart is provided (CPG 4, Figure 1). The completed chart in relation to this development is provided as Table 1, to this report.

2.0 SITE DETAILS

2.1 Site Location

The site is situated on the east side of Heath Drive in the Frognal area of Hampstead, London, NW3 7SD and is currently occupied by a substantial brick built period property in good condition.

2.2 Geology

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area (Sheet 256, 'North London', Solid and Drift Edition) indicates the site to be underlain by Superficial Head deposits resting on the London Clay Formation.
Deposits of the overlying Claygate Member are recorded as outcropping about 200m to the north on higher ground.

2.3 Previous Reports

The results from intrusive site investigations and desktop studies are presented under separate cover as ***Heath Drive (31) ground investigations report reference AJP/SE1281*** and ***Ground Sure Flood Risk Assessment report reference GS-2109920*** and ***UK Hydrosciences Flood Risk Assessement.May 2015*** findings from these reports are referred to in this basement impact assessment.

2.4 Site Layout and History

The site was attended on 16th April 2015 for the purposes of conducting the site walkover.
The property comprises of a 4 storey, semi-detached, brick built, slate roofed period property in good order. Planting to the front plan has been limited to small areas of shrub beds, low hedging and decorative perennials set around a paved access way leading to a raised stairway to the front door.
A paved and gated side stairway leads to the lower ground floor access and is duplicated in reverse to form access to the rear garden.
The rear garden comprises of a patio adjacent to the house with shrub beds bounded by close board fencing and English bond garden walling.
The site lies on ground sloping down to the south away from Hampstead Heath towards the Finchley Road, the site itself having a slight slope down from the house to Heath Drive with a drop in elevation of approximately 0.2 m.
From a review of historical maps it would appear that the site was agricultural land until the early 1930's.

2.5 Proposed Development

The proposed works involve the refurbishment and remodelling of the ground floor, the lowering of the existing lower ground floor the underpinning of the Party Walls
It is understood that the ground floor alterations will be carried out prior to the formation of the basement and as such, this work has not been considered within this assessment.
The extent and scope of the underpinning are presented under separate cover – MMP Design drawings 4467 -02 & 03

2.6 Results of Basement Impact Assessment Screening

A screening process has been undertaken for the site in accordance with CPG4 and the results are summarised in Table 1 below:

Table 1 : Summary of screening results

ITEM	No.	DESCRIPTION	RESPONSE	COMMENT
Sub-terranean ground water flow	1 a	Is the site located directly above an aquifer	NO	The Bedrock geology underlying the site (solid permeable formations) associated with the 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.
	1 b	1 b. Will the proposed basement extend beneath the water table surface	NO	No groundwater was encountered during site investigations to a depth of 5.45m and the depth of the proposed works (2.4m) will not extend below t level.
	2	2. Is the site within 100m of a watercourse, well (used/ disused) or potential spring line	YES	There are no surface water features within 1 km of the site. However, according to the Lost Rivers of London the site is within 100m of a former tributary of the River Westbourne.
	3	3. Is the site within the catchment of the pond chains on Hampstead Heath	NO	The site is away from this area. The nearest surface water feature is recorded to be at least 1 km away from the site
	4	4. Will the proposed basement development result in a change in the proportion of hard surfaced I paved areas	NO	The amount of hardstanding on-site is not expected to change.
	5	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	Existing drainage paths are to be utilised where possible. Whether
	6	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	The site is underlain by Made Ground overlying Superficial Head with the London Clay Formation present at depth

	2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 1 in 8	NO	Remodelling of the site elevations are not proposed.
	3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 1 in 8	NO	The neighbouring land is essentially flat with only minor undulations present, sloping towards Heath Drive, at angles of between 2° and 4°.
	4	Is the site within a wider hillside setting in which the general slope is greater than 1 in 8	YES	There is a general slight slope across the site from east to west away from Hampstead Heath down towards the Finchley Road of up to approximately 9 degrees.
	5	Is the London Clay the shallowest strata at the site	NO	The site is underlain by Made Ground overlying Superficial Head
	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	There are no trees affected by the proposed development
	7	Is there a history of seasonal shink-swell subsidence in the local area and/or evidence of such effects at the site	YES	The site lies above the London Clay Formation, well know to have a high tendency to shrink and swell. Historically the front elevation of the property has been underpinned to remedy subsidence
	8	Is the site within 100m of a watercourse or a potential spring line	YES	The nearest surface water feature is recorded to be 1 km away from the site. However, according to the Lost Rivers of London the site is within 100m of an ancient river.
	9	Is the site within an area of previously worked ground	YES	Made ground has been encountered at the site.
	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 (solid permeable formations) associated with the London Clay Formation has been classified as Unproductive Strata.
	11	Is the site within 50m of the Hampstead Heath ponds	NO	The site is not located near Hampstead Heath ponds

	12	Is the site within 5m of a highway or pedestrian right of way	NO	The boundary of the site lies adjacent to Heath Drive however the proposed area of works is in excess of 5m from the pedestrian right of way.
	13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties	NO	The majority of surrounding properties already have subterranean basements.
	14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines	NO	The nearest tube line is located over 100m from the site.
Surface Water and Flooding	1	Is the site within the catchment of the pond chains on Water Hampstead Heath	NO	The site is not located near Hampstead Heath.
	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 amount of hardstanding on-site is not changing therefore surface water will not be impacted by the development.
	3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas	NO	The amount of hardstanding on-site is not expected to increase.
	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	As no changes are occurring above the ground, surface water will not be impacted by the development.
	5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses	NO	As no changes are occurring above the ground ,surface water will not be impacted by the development
	6	Is the site in an area known to be at risk from surface water flooding	NO	There are no fluvial or tidal floodplains located within 1 km of the site.

3.0 EXISTING SITE INVESTIGATION DATA

3.1 Records of site investigations

Sub Surface South East Ltd investigated ground conditions at the site in April 2015 (Report Reference AJP/SE1281). The ground conditions revealed by the investigation are summarised in the following table.

Strata	Depth to top of strata (mbgl)	Description
Made Ground	0.00	Surface layer of topsoil underlain by a mixture of brick and concrete rubble and stiff to very stiff sandy silty clay with fine gravel, ashes and brick fragments
Superficial Head	1.90 to 2.90	Firm becoming stiff medium strength brown and occasional grey mottled silty clay and sandstone/ironstone cobble
London Clay Formation	to 5.45	Stiff medium strength brown and occasional grey mottled silty CLAY

3.2 Hydrological Context

Groundwater was not encountered during boring operations and the material remained dry throughout. The results from desktop studies are presented under separate cover as ***Ground Sure Flood Risk Assessment report reference GS-2109920***.

4.0 SUBTERRANEAN (GROUNDWATER FLOW)

4.1 Introduction

This section addresses outstanding issues raised by the screening process of Subterranean (Groundwater Flows) (see Table 1).

4.2 Groundwater Flow and Depth to Groundwater

No groundwater was encountered during site investigations to a depth of 5.45m and the depth of the proposed works (2.4m) will not extend below that level.

4.3 Springs, Wells and Watercourses

The nearest surface water feature is recorded to be in excess of 1 km from the site. There are no fluvial or tidal floodplains located within 1 km of the site.
With reference to 'Tile Lost Rivers of London' (Barton, 1992) and 'London's Lost River's (Tailing, 2011), the site lies within 1OOm of a tributary of the River Westbourne, which ran in a south westerly direction from Hampstead Heath through Hampstead, Kilburn, Paddington, Hyde Park, onto Knightsbridge and out into the Thames at Chelsea. The river is now completely enclosed and used as a sewer.
Given the predominantly clayey and low permeability nature of the near-surface soils, it is expected that there is very limited surface water infiltration potential and groundwater flow rates in the vicinity of the property will be very low.
The historic development of the area for housing will have further limited surface water infiltration. As a result it is considered that the proposed development will have minimal impact on any nearby watercourses

5.0 SLOPE AND GROUND STABILITY

5.1 Introduction

This section addresses outstanding issues raised by the screening process land stability (see Table 1).

5.2 Slope Stability

The 1:50,000 scale geological map for the area indicates that the site does not lie within an 'Area of Significant Landslide Potential'. No mapped areas of landslips are present in the site's vicinity and the natural ground stability hazards dataset supplied by the BGS (present in the desk study report for the site reference 12/19442-1) gives the hazard rating for landslides in the site area as 'very low'.
Information obtained for the site walkover, site plans and ordnance survey maps indicates that the site itself is essentially flat. There is however, a general slight slope across the site from east to west away from Hampstead Heath down towards the Finchley Road, up to approximately 9 degrees, although it should be noted that the immediate site area is heavily urbanised and slopes at the site/ in the site's vicinity may have been altered historically or as part of developments and landscaping.
The slope angle map produced as Figure 16 of the ARUP report indicates that slope angles in the site are less than r and that the site does not neighbour any land that contains cuttings/embankments or any other feature with slope angles in excess of r.
The proposed development does not include any remodeling of slopes to angles greater than r that could potentially result in slope stability issues.
It is therefore considered that slope stability can be maintained through the proper execution of the works as detailed by the MMP Design Ltd Construction Method Statement detailed in 4467 Calculations 150519.

5.3 Shrinking/Swelling Clays

Although no Atterberg Limit tests were conducted on samples taken from the cohesive natural soils encountered in the boreholes it is known that the London Clay has a high susceptibility to shrinkage and swelling movements with changes in moisture content as defined by the NHBC Standards, Chapter 4.2.
It is understood that no trees are to be removed from the site as part of the development and the presence of the existing basement and depth of foundation will avoid the zone likely to be affected by the root systems of trees as shown in the recommendations given in NHBC Standards, Chapter 4.2, April 2003, "Building near Trees" and it is considered that this document is not relevant in this situation.

5.4 Heave of underlying soils

Heave can be reduced by proceeding with the excavation in stages as per the MMP Design Ltd Constriction Method Statement detailed in 4467 Calculations 150519
These processes and other ways of dealing with ground movements are described at length in BS8004 (British Standard Code of Practice for Foundations).

5.5 Compressible/Collapsible Ground

The natural ground stability hazards dataset supplied by the BGS gives the hazard rating for collapsible ground as 'very low' and compressible ground at the site is listed as 'no hazard'.

5.6 Springs, Wells and Watercourses

As discussed in Section 4.3 it is considered that the proposed development will have minimal impact on any nearby watercourses.

5.7 Made Ground

In the boreholes drilled at the site, made ground was found to extend down to depths of between 0.25m and 1.90m below ground level and comprised a surface layer of topsoil underlain by a mixture of brick and concrete rubble and stiff to very stiff sandy silty clay with fine gravel, ashes and brick fragments

A result of the inherent variability of uncontrolled fill, (Made Ground) is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should therefore, be taken through any made ground and either into, or onto suitable underlying natural strata of adequate bearing characteristics.

The bearing capacity of the made ground should therefore be assumed to be less than 50kN/m2 because of the likelihood of extreme variability within the material.

The proposed basement is not to be extended below Heath Drive and therefore it is suggested that the impact on this local access road is likely to be minimal.

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6.0 CONCLUSIONS

1. The proposals for the site include the lowering and extending of a single storey existing basement to approximately 2.4m below ground level together with internal refurbishments.

2. Ground conditions at the site were investigated by Sub Surface South East Ltd in April 2015 (Report Reference AJP/SE1281). The exploratory holes revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised between 0.00 m and 1.90m thickness of made ground locally overlying materials typical of Superficial Head with the London Clay Formation at depth.

3. No groundwater was encountered during site investigations to a depth of 5.45m and the depth of the proposed works (2.4m) and as such no impact on groundwater is expected

4. The nearest surface water feature is recorded to be in excess of 1 km from the site. The site lies within 100m of a tributary of the River Westbourne, although the river is now completely enclosed and used as a sewer. As a result, it is considered that the proposed development will have no impact on any nearby watercourses

5. The proposed development does not include any remodeling of slopes to angles greater than r that could potentially result in slope stability issues. It is therefore considered that slope stability can be maintained through the proper execution of the works as detailed by the Structural Engineer.

6. No trees are affected by the proposed development.

7. The natural ground stability hazards dataset supplied by the BGS gives the hazard rating for collapsible ground as 'very low' and compressible ground at the site is listed as 'no hazard'.

8. Heave can be reduced by proceeding with the excavation in stages as per the MMP Design Ltd Constriction Method Statement detailed in 4467 Calculations 150519

9 . The findings of this scoping report are based upon intrusive site investigations carried out by Sub Surface South East Ltd (Report Reference AJP/SE1281), which are provided under separate cover. On the basis of this information it is considered that the proposed development will not have a detrimental effect on groundwater or surface flooding in the vicinity of the site.

p.p. UK-HYDROSCIENCES LIMITED

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