TSConsulting Ltd

Consulting Structural Engineers

Basement Impact Assessment

Relating to a proposed basement construction

at

13/15 John's Mews, London, WC1N 2PA

Prepared by

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REPORT: **By: Trevor Scott**

Job name: 13/15 John's Mews, London, WC1N 2PA **Job no. 1420**

Basement Impact Assessment (BIA)

1.0 Introduction

1.1 This report has been prepared in general accordance with the technical requirements for BIA for the London Borough of Camden contained within the following guidance documents.

- Guidance for Subterranean Development (GSD). Issue 01, November 2010. Ove Arup and Partners.
- Camden Planning Guidance (CPG4) 4: Basements and Lightwells
- Camden Development Policy (DP) 27: Basements and Lightwells

1.2 A BIA is required with all planning applications for basements in Camden in accord with DP27 to demonstrate that schemes:

a) Maintain the structural stability of the building and neighbouring properties;
b) Avoid adversely affecting drainage and run off or causing other damage to the water environment; and,
c) Avoid cumulative impacts upon structural stability of the water environment in the local area;

1.3 The purpose of this report is to evaluate the impact of the proposed basement on the local hydrology, hydrogeology and land stability as defined within the above guidance documents.

1.4 The report draws upon available data from completed studies undertaken for nearby properties, publicly available information and a site walkover. The reports for the adjacent buildings are not reproduced here but a site investigation has been commissioned to both test the conclusions drawn from adjacent sites and to obtain specific information for detailed design of the basement structure and the safe disposal of excavated material. This report is not yet available.

1.5 The properties are of residential size and appearance over two levels. They are currently divided up to form a workshop/garage at ground floor level across both properties and separate office accommodation across both units at first floor level. Separate access is provided to each unit.

1.6 It is proposed to develop the units as two individual properties with accommodation extended to provide additional space at roof level, through the provision of a mansard extension and below ground level through the provision of a single level basement extension across the footprint of both properties.

2.0 Site Description

2.1 The site location and boundaries are given on the Architect's drawings forming part of the overall submission. The site is in a mid -terrace location on John's Mews, off Northington Street at London WC1N 2PA, in the London Borough of Camden. It is currently occupied by residential construction flanked by similar properties on either side.

2.2 The structure of both properties appears to be of the same period and of traditional brick construction with timber structure at first floor and roof level. Internal modifications have been made to the layout to convert what would have been the original residential layout into a more open plan arrangement suitable for its present use as offices at first floor level and a garage/workshop at ground floor level.

2.3. The properties occupy the full plan area of the site, backing onto the rear gardens of properties at 23 and 24 John Street to the rear. The site is essentially flat with a concrete ground floor slab throughout.

2.4 The structure of the foundations will not be confirmed until the site investigation is complete but, from a knowledge of similar properties in the area, it is reasonable to assume that these will be of relatively shallow stepped brick construction, extending to depths in the region of 0.50m to 1.20m below ground level. At these depths it is most likely that the footings will be founded in Made Ground.

2.5 The block within which the properties are contained is, in general, of a mixed residential and commercial nature and basements exist at a number of properties within the immediate vicinity. There are no trees immediately adjacent the properties but semi-mature trees exist more than 15m away, within the grounds of St George the Martyr Primary School which occupies the bulk of the block on the opposite side of John's Mews. These trees are considered to be sufficiently remote as to have no impact on the properties when they fully mature.

2.6 A number of manhole covers are in evidence along the front of the properties along John's Mews, indicating the presence of services. These services have not yet been identified.

3.0 Geology and Hydrogeology

3.1 Data from a site investigation at a site in close proximity indicates that the site is underlain by made ground, underlain by Hackney Gravel which, in turn, is underlain by London Clay. The Hackney Gravel is predominantly clayey in nature and is considered likely to have a low to moderate permeability. London Clay has a very low permeability. In the event of any liquid spillage on the site, it is considered unlikely that significant infiltration of the soils is likely to have occurred. Contamination testing of the soils will be undertaken as part of the scheduled site specific ground investigation.

3.2 The site is located on a minor aquifer indicating that there are moderate amounts of groundwater available beneath the site. Groundwater level on the adjacent site was established at approximately 7.0m bgl.

Hydrology

3.3 There are no surface water bodies located in the vicinity of the site. The closest watercourse is the River Thames, which is located approximately 1,500 m to the south of the site.

There is also understood to be an infilled tributary of the River fleet located just to the north of the site.

Flooding

3.4 With reference to the National Flood Risk Assessment by the environment agency the site is not identified as an area with an identified flood risk from rivers or the sea, with a less than 0.1 per cent (1 in 1000) chance of flooding occurring each year.

3.5 John's Mews is not identified within the table in section 2, page 29, of CPG4 as a street at risk from surface water flooding.

4.0 Screening

4.1 In accordance with the GSD, an initial screening exercise has been undertaken of Subterranean Flow (Table 4.1), Slope Stability (Table 4.2) and Surface Flow and Flooding (Table 4.3). These tables follow the format of the GSD screening flowcharts contained within Appendix E of the GSD.

Table 4.1 Subterranean Flow

No.	Question	Answer	Justification
1a.	Is the site located above an aquifer	Yes	Site is underlain by Made Ground over River Terrace Deposits. See section 3.
1b	Will the proposed basement extend beneath the water table surface?	Yes	Anticipated groundwater level of 7.0m bgl (see section 3) vs proposed level of 4m bgl. Site investigation to confirm in due course.
2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line.	No	No such features recorded within 100m of the site on Figures 2, 11, 12 of the GSD, aerial photography (Google Earth) or Environment Agency website (see section 3). Nor were such features noted during the site reconnaissance (See section 2).
3	Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site is not located within the areas indicated on Figure 14 of the GSD.
4.	Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	Site visit confirmed that the area of the proposed basement is already covered with hardstanding.
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	The extent of the basement in combination with its depth relative to groundwater level means that the development is not amenable to soakaway drainage. The existing site is covered with hardstanding as will the proposed development; volume and peak will not be materially changed.
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	No such features are within 100m of the site as discussed above.

Table 4.2: Slope Stability

No.	Question	Answer	Justification
1	Does the existing site include slopes, natural or manmade, greater than 7º?	No	Site reconnaissance [Section 2] and ordnance survey maps [Section 4] confirm that the site is essentially flat.
2	Will the proposed re-profiling of the landscape at the site changes slopes at the property boundary to more than 7º?	No	The current Architectural plans do not indicate landscape re-profiling.
3	Does the development neighbour land, including railway cuttings and the like, that slope greater than 7º?	No	Site reconnaissance [Section 2] and ordnance survey maps confirm that site does not neighbour such features.
4	Is the site in a wider hillside setting with a slope of more than 7º.	No	Site reconnaissance indicates that the general area is essentially flat.
5	Is the London Clay the shallowest strata at the site?	No	Adjacent site data referenced above indicates made ground overlying River Terrace deposits before London Clay.
6	Will any tree(s) 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	Site visit confirmed no trees on or directly adjacent to site.
7	Is there a history of shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	The London Clay is overlain by water bearing River Terrace Gravels and the site is remote from trees. Such a setting is not conducive to shrink-swell subsidence but an analysis of potential heave resulting from removal of overburden will be undertaken and measures taken t accommodate it, if necessary.
8	Is the site within 100m of a watercourse or potential spring line?	No	See answer to Q2 of Table 4.1
9	Is the site in an area of previously worked ground?	Yes	Given the geological data consulted (Section 3), Made Ground is anticipated to depths of 4-5m.
10	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required?	Possibly	See answers to Q1a and Q1b of Table 4.1. GWL for the adjacent site is at a depth that would not be problematic. However specific investigations are being undertaken for this site to determine if some form of groundwater control is required. It is likely that this would be limited to localised pumping during underpinning works.
11	Is the site within 50m of the Hempstead Ponds?	No	Figure 14 of the GSD indicates that site is considerable greater than 50m from the Hempstead Ponds.
12	Is the site within 5m of a highway or pedestrian right of way?	Yes	The site is immediately adjacent John's Mews.
13	Will the proposed basement significantly increase the differential depth of the foundations relative to neighbouring properties?	Yes	The existing party wall foundations are anticipated to be in the region of 0.50 to 1.20mbgl (see Section 2) whereas the proposed basement will extend to 4m bgl.
14	Is the site over (or within the exclusion zone of) any tunnels?	Possibly.	Impact of sewers not yet determined. Will be determined as part of the ground investigation desk study.

Table 4.3: Surface Flow and Flooding

No.	Question	Answer	Justification
1	Is the site within the catchment of the ponds on Hampstead Heath?	No	See answer to Q3 of Table 4.1
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 existing buildings occupy the full area of the site and the proposed alterations will not change this. Thus volume and peak will not materially changed
3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	No	There is no change.
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 water courses?	No	The status quo will be maintained: the existing site is covered with hardstanding as will the proposed development. The site is remote from watercourses
5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream water courses?	No	The status quo will be maintained: the existing site is covered with hardstanding as will the proposed development. The site is remote from watercourses
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 features?	No	The site is not in an area of known surface water flood risk (see Section 3). The site is remote from water features: see response to Q2 in Table 4.1.

5.0 Scoping

5.1 This scoping study incorporates a site walkover, desk study data and ground investigation data as discussed in sections 2 and 3 of this report. It considers the findings of the screening exercise presented in section 4 where either 'yes' or 'unknown' or 'possibly' responses have flagged a potential issue.

5.2 The anticipated ground conditions are presented in table 3.1. An equilibrium groundwater level of around 7.0m bgl is anticipated in the River Terrace Gravel aquifer. The basement formation level is anticipated to be 3.5m bgl with underpinning extending to approximately 4.0m bgl. The surrounding party walls are assumed to be founded at depths of around 0.50 to 1.20mbgl. The road pavement to John's Mews is directly adjacent to the west of site. The site is in proximity to a sewer running under the pavement immediately adjacent but the depth of this has not been established.

5.3 With due consideration of the ground model, the potential impacts in relation to the matters requiring further consideration from the screening stage are discussed in Tables 5.2 and 5.3 below. For each matter discussed the potential impact is defined in terms of significance based on EIA terminology as defined in Table 5.1 below. Tables 5.2 and 5.3 also consider the potential residual significance assuming the suggested mitigation measures are taken forward. For each potential impact a comment is presented on the pertinent matters and a concluding discussion is presented in Section 6.0.

TABLE 5.1: SIGNIFICANCE MATRIX USED WITHIN THE ASSESSMENT

MAGNITUDE OF EFFECT	SENSITIVITY OF RECEPTOR				
	Very high	**High**	**Medium**	**Low**	**Negligible**
Very large	Substantial Significance	Substantial Significance	Moderate Significance	Moderate Significance	[1]
Large	Substantial Significance	Moderate Significance	Moderate Significance	Minor Significance	[2]
Medium	Moderate Significance	Moderate Significant	Minor Significance	[2]	Neutral Significance
Small	Moderate Significance	Minor Significance	[2]	Neutral Significance	Neutral Significance
Negligible	[1]	[2]	Neutral Significance	Neutral Significance	Neutral Significance
[1] The choice between '*Moderate Significance'*, '*Minor Significance'* and *'Neutral Significance' will* depend on the specifics of the impact and will be down to professional judgement and reasoning.					
[2] The choice between '*Minor Significance'* and '*Neutral Significance'* will depend on the specifics of the impact and will be down to professional judgement and reasoning.					

TABLE 5.2: SUBTERRANEAN (GROUNDWATER) FLOW. POTENTIAL IMPACTS

1a	Is the site located above an aquifer	The construction of the basement may affect the groundwater flow regime, although as discussed in section 5.4 below a negligible effect on the status quo is anticipated. The potential for this situation to occur will depend on the nature of the basement construction adopted (i.e. will it result in cut off of the water under the structure) the extent and depth of other basements in the area and the direction of groundwater flow. It is not anticipated that basement construction will involve the creation of a cofferdam keyed into the Clay. The potential effect of any such change is considered negligible as the site is remote from existing and historic wells, water courses and spring lines. Whilst the site is indicated to be in an area of 'moderate to high susceptibly' to groundwater flooding, the impact on the associated risk is considered to be limited, given that the basement is of limited plan area and that the existing groundwater level is below the deepest level of the excavation and a negligible effect is anticipated on the status quo conditions. **Given the above such matters are considered to be of minor significance.** The presence of groundwater has been considered in the design of the basement where checks have been carried out for resistance to hydrostatic uplift and associated lateral pressures on the walls. The basement design will also incorporate an internal drainage system to cope with potential water ingress through (any) defects in the overall construction. Such matters are of high sensitivity for the client but are associated with a small effect (hydrostatic pressure) or large effect (water protection) and so are considered to be of minor significance and moderate significance respectively. **Both of these have been reduced through the engineering design to minor or neutral significance.**
1b	Will the proposed basement extend beneath the water table surface?	

TABLE 5.2: SUBTERRANEAN (GROUNDWATER) FLOW. POTENTIAL IMPACTS

9	Is the site in an area of previously worked ground?	Such ground has a relatively poor load bearing and settlement characteristics, which lead to a risk of structural failure or adverse differential movement. **This matter is of substantial significance**. This potential impact will be addressed by utilising the underlying River Terrace Deposits as a founding stratum. Piled foundations would be utilised as a fallback solution in the event that the River Terrace deposits proved to be at an impractical or unsafe depth for traditional underpinning techniques to work. Subject to such operations this matters is reduced to **minor significance**. Temporary lateral support will be required to the excavation whichever solution were adopted.
10	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required	If the water table were proven to be higher than anticipated and the River Terrace Deposits are to be used as a founding stratum for the proposed building and/or underpinning, then some form of dewatering or groundwater control may be required during construction. It is likely that this would take the form of localised pumping rather than the installation of a full scale dewatering system. Subject to the results of the site investigation study this matter is likely to have a residual **minor significance.**
12	Is the site within 5m of a highway or pedestrian right of way?	Basement construction could result in ground movements detrimental to the highway and any infrastructure contained therein. This matter is considered to be of substantial significance and the design and construction of the basement take this into account. There will be a requirement to incorporate temporary propping into the excavation as it proceeds and for this to remain in place until the ground floor slab construction is complete. A movement monitoring system will be incorporated to check, in tandem, against excessive movement and with these two elements in place, the residual risk is considered to be of **minor significance.**
13	Will the proposed basement significantly increase the differential depth of the foundations relative to neighbouring properties?	The basement excavation has the potential to undermine the adjacent foundations leading to a risk of movement and damage. **This matter is considered to be of substantial significance.** Underpinning of neighbouring foundations is impractical, the preferred solution being to design the new underpinned foundations to generate similar pressures at depth to that which the existing foundations currently experience.
14	Is the site over (or within the exclusion zone of) any tunnels?	A sewer is believed to run in the street immediately adjacent to the properties. Further utilities searches are required to determine if other sewers or tunnels exist under the site and the asset owners consulted to determine their constraints. Initial data suggests that the site may be sufficiently remote from such features for such matters to be **of minor significance.**

6.0 Conclusions and Recommendations

6.1 The existing information and assessment suggests that, subject to supplementary investigations and detailed design, the proposed basement at 13/15 John's Mews should not:

- cause harm to the built and natural environment and local amenity;
- result in flooding; or
- lead to ground instability.

6.2 The principal investigation required to complete the detailed design is the ground investigation to establish the following:-

- The ground profile and in particular the depth to the River Terrace Gravel bearing strata.
- The water table.
- The details and depth of Party Wall foundations.
- The level of (any) contamination that may exist in the material to be excavated. This is essential for appropriate disposal of the material and to determine the correct specification for the buried concrete forming the basement structure and underpinning.
- The location of any buried sewers and/or tunnels.

6.3 Pending the outcome of a detailed site investigation a preliminary design for the basement has been prepared by the author. The following drawings and supporting calculations are appended to this report in support of the application.

Drawings: - 1420/01 – Proposed ground floor plan

1420/02 – Proposed basement plan

1420/03 – Construction Sequence.

Structural calculations for the permanent works.

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