BASEMENT IMPACT ASSESSMENT
FOR
152 ROYAL COLLEGE STREET, LONDON NW1 0TA

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Introduction

152 Royal College Street is a vacant lot on the corner of Royal College Street and Baynes Street (formerly Prebend Street NW1) and adjoins No. 154 Royal College Street which is a four storey structure (including a basement). Baynes Street runs parallel to the Grand Union canal for about 30m. Camden Road mainline station is about 150m away at the junction of Royal College Street and Camden Road to the north of the site. Camden Road underground is located about 400m west of the site further along Camden Road near to its junction with Camden High Street. The presence of external stepped access and/or pavement light to properties along Royal College Street suggests that basements predominate in the vicinity.

Camden Planning Guidance: Basements and Lightwells (CPG4)

Camden have produced guidance to supplement their Local Development Framework (LDF) to ensure that advice is provided at planning stage so that site specific information is prepared and submitted so that the application can be assessed for its impact on the natural and built environment; flooding risk and ground instability risk.

Site Location

Site location is TQ290841 with postal address 152 Royal College Street, London NW1 0TA. The property is at the junction of Royal College Street and Baynes Street. The site altitude is about 29m with a slight fall south as the road crosses the canal. Bomb Sight (www.bombsight) records that a high explosive bomb fell in Baynes Street during the war The buttresses of the building which stood on the site remain to afford support to the front and rear elevations of No. 154 Royal College Street It is possible that the original building had a basement but this is unclear from an initial visual survey.

Site relationship to underground rail line.

Camden Town underground station serves the Northern Line and is part of the deep level network opened in 1907 with platforms located about 15-17m below road level. The Northern line underground service is categorised as a “deep-level” rail line for most of its length. There is an air raid shelter associated with the Camden Town station which indicates that the underground generally follows Kentish Town Road and Chalk Farm Road as the line forks at the station. Although all references appear to indicate adequate separation between the site and the underground rail network, a specific request should be made to London Underground Limited for details of any other sub-surface structures which may be close to the property.

Site Geology

The British Geological Survey 1:50 000 scale geology for the site and environs indicates bedrock is London Clay formation, comprising clay, silt and sand. Boreholes closest to the site have been examined on the website with one at Pratt Street (TQ281492 about 400m to the south) indicating London Clay depth of circa 30m. A similar report (referenced BH1) is reproduced in the Appendix and indicate London Clay Formation below made ground at the corner of Camden Street and Camden Road within 150m to the west of the site. The nearest record to the north of the site is at Witcher Place and again confirms clay at least 18m in depth. A further record within 400m to the east is reproduced as BH2 and again indicates some 20m depth of London clay.

Borehole 2 is dated 1995 and indicates firm clay below 2.0m depth.

Hydrogeology

London Clay is classified as an “unproductive stratum” and it is possible therefore that water may be encountered in the made ground overlying the London Clay at the horizon between the soil types. Reference to the boreholes obtained from the British Geological Survey indicate no record of water strikes. The London Regional Flood Risk Appraisal dated October 2009 had “no identifiable flood risk issues” for Camden Town.

It is assumed therefore that, conservatively, water pressures will be taken into account when designing the basement structures in the absence of detailed water monitoring. In accordance with current good practice, water level should be assumed to be at ground level for a "worst credible" design solution.

Trees and vegetation - affect on foundations

Although there is no significant vegetation at the site, within 20m a row of trees follows the line of the canal in a broad curve away from the site on the opposite side of the road. The trees seem to comprise Sycamore/Maple, medium water demand, judging by the palmate leaves, with a potential mature height circa 30m. The height of trees appears to be about 4 storeys or circa 12m. General guidance is for a separation distance of 1.0 x mature tree height. However, the footing depths for a basement is likely to be at least 2.5m below existing ground level which should be adequate for all but high water demand trees in highly shrinkable clay. Designer to take account of potential mature height for tree variety on opposite side of road together with ground conditions encountered at the site.

BASEMENT IMPACT ASSESSMENT

Stage 1 - Screening of groundwater

Item	Consideration	Response
a	Is the site over an aquifer?	No - predominant soil type is London Clay
b	Will new construction be below water table?	**No - but basement design to allow for water presssures to cater for future changes**
c	Is the site within 100m of watercourse or water feature?	**Yes - Grand Union canal/Regents canal 25m to south of site**
d	Is the site within catchment of pond chains on Hampstead Heath?	No.
e	Will the development increase the hard surfacing at the site?	No - building over existing hard surfacing on building footprint.
f	Will there be an increased in surface water drainage?	No.
g	Is the new construction below mean water level?	No - evidence from borehole history indicates dry conditions

Stage 1 - Screening of slope stability

Item	Consideration	Response
aa	Does the ground slope greater than 7degrees?	No - refer Arup report Figure 16
bb	Does the work include re-profiling ground levels above 7 degrees?	No. Land not re-profiled
cc	Does land off site slope greater than 7 degrees?	No - refer Arup report
dd	Does the site lie in a hillside setting?	No. General slope 1 in 100.
ee	Is the London clay the shallowest strata at the site?	Yes. Historic boreholes in vicinity indicate London Clay below made ground overlying Reading beds below 30m depth.
ff	What is the relationship between the development in respect of tree root zones and tree removal?	**Sycamores on opposite side of road alongside canal - minimal influence.**
gg	Is there a history of seasonal ground movement in the area?	**Unknown - no apparent defects on site or in adjacent roads except weathering of parapet brickwork and some cracking over shopfront bressemers.**
hh	Is the site within 100m of water course or feature?	Yes a canal.
ii	Is the site within an area of previously worked ground?	Yes - area developed post 1720's and buttresses to 154 suggest previous building on site.
jj	Is the site within an aquifer?	No.
kk	Is the site within 50m of Hampstead Heath ponds?	No.
ll	Is the site within 5m of a highway or a pedestrian right of way	Yes. Boundary at back edge of pavement
mm	Will the development significantly increase the differential footing depths in relation to neighbouring properties.?	No. Existing properties appear to have basements
nn	Is the site within any exclusion zone for underground services e.g. rail lines	**No. Deep level Northern Line circa 300m west of site location. Checks required to assess if other structures may be encountered**.

Stage 1 - Screening of flooding and surface water

Item	Consideration	Response
a1	Is the site within Hampstead heath ponds catchment?	No.
a2	Will surface water run-off from the site be materially increased?	No. Design to consider existing surface water run-off which may drain to highway.
a3	Will the proposed development result in an increased hard surface?	No.
a4	Will the development result in an increase in long-term and instantaneous surface water downstream of development site?	No.
a5	Will the development result in changes to the quality of surface water received downstream of site.	No. Anticipate status quo.

Stage 2 - Scoping

Issue	Consideration	Risks & actions
b	Will the basement extend below water table?	**Potential:** Disruption of ground water flow through made ground or within permeable horizons in London Clay
e	Will hard surfacing be increased at the site?	**Potential:** Increased surface water run-off affects water collection downstream of site. **Actions:** Drainage design to incorporate attenuation; SUDS; rainwater harvesting to mitigate position
f	Will there be an increase in surface water run-off?	**Potential:** Increase flood risk downstream of site. **Actions**: Drainage design to included measures to mitigate increase in surface water run-off.
ee	Is the London clay the shallowest strata at the site?	**Potential:** Overburden loss from basement excavation **Actions:** Party Wall award Condition Surveys required of adjacent structures; designed footing
ff	What is the relationship between the development in respect of tree root zones and tree removal?	**Potential:** Trees off-site affected by development **Actions**: Retained trees with intact root zone(s) probably sufficient distance from development Monitoring of adjacent structures and Party Wall Condition Surveys required to protect interests of others.
gg	Is there a history of seasonal ground movement in the area?	**Potential:** New development undermines adjacent structures **Actions**:Check private access at rear to Bruges Place, Baynes Street and Condition Survey adjacent structures.
mm	Will the development significantly increase the differential footing depths in relation to neighbouring properties.?	**Potential**: Boundary wall to Bruges Place at rear **Actions:** Investigate as part of Party Wall works
nn	Is the site within any exclusion zone for underground services e.g. rail lines	**Potential**: Stress changes in tunnel lining due to soil excavation **Actions:** Designer to liaise with London Transport and London Underground
a3	Will the proposed development result in an increased hard surface?	**Potential:** Increased surface water run-off causes flooding downstream **Actions:** Designer to consider existing discharge may be onto public highway.

Stage 3 - Site Investigation

Based on the results of the screening and scoping, it is anticipated that the site will comprise London Clay below made ground from historic records which will be sufficient for preliminary design work. However, it cannot be discounted that ground conditions may vary from the anticipated conditions and it is recommended that further investigations including trial pits be formed early in the process to confirm design assumptions, depth of made ground, tree roots and relative levels of adjacent structures. Indeed, it be useful to make further enquiries or tests on ground water levels for the basement and drainage design. The drainage design may need to consider that existing surface water run-off may discharge onto the highway. The relative construction depths of the bridge over the canal, its abutments and the canal itself will need to be considered for potential surcharge from the new development.

Stage 4 - Impact Assessment

The site is within 100m of a watercourse. The site would appear to be mainly on London Clay and relevant historic borehole records indicate that there is no water table close to the proposed footing depth. The historic boreholes are typically small diameter and may not have remained open for sufficient time to determine the presence of groundwater. However, the depth of made ground overlying London Clay and the potential for water running on the horizon at the clay interface with the made ground cannot be discounted at this stage. It is also possible that perched water may collect in depressions in the upper surface of the London clay. The water level of the canal appears to be at least a storey height below road level so the possibility of excavating below the canal appears very unlikely. Checks on relative levels and cross sections should reveal if the new development will surcharge existing structures.

Although records do not indicate groundwater, it is anticipated that local fissures created by tree roots and depressions in the upper weathered clay surface may retain water run-off. The existing surface water run-off is affected by existing basements to Royal College Street , Randolph Street, Camden Road &c., which seem fairly typical features and the area has minimal slope which would affect surface water run-off. It is therefore considered highly likely that the proposed development will have little impact on the ground hydrology and that a large proportion of surface water run-off feeds the ribbons of trees and shrubs between roads and in back gardens or finds its way to the lower lying canal.

Flood risk is considered minimal in that the site and environs are not one of the streets prone to flooding recorded in 1975 or 2002.

The site does not have a significant slope and is therefore categorised as outside the slope angle zone at which slope instability may occur. The close proximity of properties in Bruges Place, Baynes Street, which do not appear to have basements, suggests that particular care may be needed to retain soil and monitor these buildings under Party Wall procedures.

Clay shrinkage and or swelling is potentially likely to occur due to removal of overburden to excavate for a new basement. The basement design details should consider heave precautions to the new basement. Investigation of properties in the area revealed general cracking to parapets and around openings but no characteristic pattern cracking wider and base or top indicative of ground movements. The records from nearby boreholes, previously described, suggest that the structure will be founded in London clay. It is probable that the shrinkage potential will be moderate or moderate to high. Given that the footprint of the building is already hardstanding, the design will only need to consider that existing surface water run-off appears to be onto the highway and measures may need to consider how surface water can be controlled to avoid inundation downstream.

It would appear that the nearest underground tunnel is on the Northern Line at Camden Town which meets at the station via tunnels which roughly follow Kentish Town and Chalk Farm Road. It is a deep tunnel and it is anticipated that some 20m of overburden rests over the tunnels and the small shallow development proposed should not affect these given the separation distance between the site and underground. As a precaution, it is considered appropriate that the designer contacts London Underground and other statutory providers to ascertain if there is any equipment at shallow depth (within the zone of influence of the new basement.)

Local considerations: The proposed development upto the boundary with Bruges Place, Baynes Street. There are no section drawings which indicate the boundary and relative construction levels. Fortunately, the private access to Bruges Place at the rear gives good separation but further details are required to determine the exact arrangement and a method of retaining the boundary wall and access road during the development because “open dig” will not be possible. It is considered likely that the boundary wall will have shallow footings, typical for a garden boundary wall. London Clay is typically a heavily fissured material and fissures are recorded in the historic boreholes. As a result, the unsupported sides of trenches are unlikely to stand if left open for any appreciable period. The designer of the basement may need to consider the relationship between the adjacent properties carefully, which may only have part basements and it is anticipated that further site investigation is required for detailed design and to satisfy party wall matters along the boundaries.

It appears that existing surface water run-off discharges to the highway. During the development, with the loss of hardstandings, the exposed clay will collect surface water run-off and measures to collect and dispose of surface water will need to be considered e.g. sumps and pumping to an approved discharge point. There is also the potential for local pockets of "perched water" within the clay or at the margins of soil types. The designer may need to consider further site investigation and groundwater monitoring with particular consideration regarding the effects of the works to properties in close proximity. It is anticipated that some sump pumping may be necessary and a suitable discharge point should be identified before works proceed.

Waterproofing of the new basement will be in accordance with Building Regulations and British Standards and further comment here is outside the scope of this report.

Preliminary Conclusions:

The proposed construction of a basement is considered acceptable in respect of **groundwater flow** at and below the site. Site control measures are anticipated to include temporary sump pumping to control local surface water run-off and groundwater based on the historic borehole records. In the absence of detailed relevant local water table readings, the provisional design of the basement should include buoyant uplift pressures.

The presence of numerous basements and part basements and with only slight slopes at the site and environs, the development is considered acceptable for **slope stability**. Further investigation is required to determine the relationship between the proposed works and existing foundations along the boundary with properties in Bruges Place, Baynes Street to the rear (at present no sections are provided indicating an assumed arrangement). In particular, the new construction will be close to or at the boundary and perhaps 3m below existing pavement level. It is anticipated that the design of temporary works and/or a combination of temporary permanent works and or sequencing will be appropriate and subject to party wall agreement(s and/or Highways approval).

It is anticipated that the **surface water run-off** from the new construction will be about the same as existing run-off. However, it is assumed that the existing discharge is onto the highway and further consideration and approval will be required to discharge the water to an approved outlet to avoid inundation downstream.

Adequate temporary support and/or permanent works design, using best practice, should ensure that ground movement during construction are within acceptable tolerances for the adjacent structures, highway and their footings in relation to the works.

Further investigation of statutory providers equipment and relationship between existing foundations to off-site properties, perhaps together with establishing site groundwater table, is considered necessary at some juncture to verify the detailed design assumptions.

The potential for the new basement and site development to **surcharge existing structures** should be checked by determining relative construction depths and production of cross-section drawings showing the site relationship to existing buildings and structures. Initial checks suggest that sufficient separation exists but that designed temporary and permanent support will be required e.g. to retain the highway.

Appendix A

BOREHOLE RECORDS
(*courtesy British Geological Survey website*)