



20 May, 2015

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Our ref: CG/18292a

Please reply to: Richard Ball

Dear Stefan,

4 Tavistock Place, Basement Impact Assessment: Stage 4

Further to our recent correspondence, we are writing to provide recommendations and updated conclusions with regard to the proposed extension of the lower ground floor level at No. 4 Tavistock Place. This letter is intended to address Stage 4 (Impact Assessment) of London Borough of Camden's (LBC) CPG4 planning document.

Proposed development

The proposed development comprises the extension of the existing lower ground floor level of the property into the rear garden. This will require the excavation of up to 3.5m of soil in the rear garden area. The property is terraced, and bounded by No. 2 Tavistock Place to the west and No. 6 Tavistock place to the east. The boundary conditions have been described within the *Construction Method Statement* provided by Form Structural Design, and are summarised briefly below:

West Boundary: The external area to No. 2 has been lowered in exactly the same manner that is proposed for No. 4. The boundary wall was underpinned during the redevelopment of No. 2. This wall will require limited underpinning as it is proposed to excavate to a level slightly below that of No. 2.

East Boundary: The external area to No. 6 has not been lowered, and the garden boundary wall will require underpinning for a full storey height. This will be constructed in traditional 'hit and miss' fashion with underpins designed to retain the soils on the No. 6 side.

South Boundary: A masonry wall some 3.5m high is present at the rear of the site. A reinforced concrete wall will be constructed in front of this wall in 'hit and miss' fashion and designed to retain the masonry wall and the mass concrete wall.

Internal boundary: Internally it is proposed to drop the existing ground floor level by up to 1m, however it is not proposed to excavate beneath the existing foundation level, and therefore no underpinning will be required.

Detailed development plans are provided within the Form SD *Construction Method Statement* document.

Screening and Scoping Assessment

CGL provided a Stage 1 & Stage 2 screening and scoping assessment for the proposed development in February 2015 which concluded that risks to and impacts of groundwater, surface water land stability were negligible allowing for good construction practices and given that only garden walls will require underpinning. It was noted that the groundwater level was not known, however given the relatively small dimensions of the excavation, it would be very unlikely to have an effect on groundwater levels locally or regionally.

Camden CPG4, clause 2.15 states: “At the screening stage, you will clearly need to set out why or why not a full BIA is required”. The screening and scoping report was intended to demonstrate the limited impacts that may be expected due to the small scale of the proposed development, and the fact that the only underpinning required is for garden boundary walls, which presents a lower risk than underpinning properties.

Independent Review

The CGL report was independently reviewed on the 24th April 2015. The review concluded that the CGL report “makes an appropriate screening assessment” and that “Stage 2 of the BIA is therefore present in the form of a discussion of the potential impacts”.

The review goes on to state that “There is no Stage 4 included within the BIA and it is assumed that the conclusion that the basement will have no effects has been used to conclude that an assessment is not required.” This statement is correct, and the intention of the Stage 1 & 2 assessment was to demonstrate that, in accordance with clause 2.15, a full impact assessment was not required.

The review concludes that “....the effect of the development should not be significant”, however recommends that a site investigation and desk study, including a study of historical maps should be carried out to allow the BIA to be completed.

Stage 3 Site investigation

Further to the review, the site’s historical development has been reviewed from historical mapping as summarised below, mapping extracts are provided overleaf.

1890 mapping shows the site as a terraced residential property, with *Tavistock Mews* to the southeast and *Tavistock Place* to the northwest.

1950 mapping shows the site to be part of a hotel. Its footprint in plan has not changed, suggesting that the property was incorporated unchanged into the hotel.

The site is understood to have been redeveloped in the 1970’s to make way for the property currently present on site, its development history is not atypical of London sites.



A ground investigation was undertaken on the 8th of May 2015 by Aviron Limited. The investigation consisted of a single window sample borehole excavated within the front lightwell to a depth of 6m below Lower Ground Floor Level. Standard Penetration Testing (SPT) was undertaken within the borehole, which was extended by Dynamic Probing to its full depth of 6m below starting level. It was not possible to excavate the borehole within the rear garden, or towards the back of the property due to access restrictions as reported by the ground investigation contractor.

The ground conditions encountered within the borehole are summarised in Table 1, full details are provided within the Aviron Factual Report¹.

¹ Aviron Limited (2015) Factual Report of Ground Investigation, 4 Tavistock Place, London WC1H 9RA ref: 15-192.01.

Table 1: Ground conditions

Stratum	Level at top (mSD ^a)	Thickness (m)
Reinforced concrete slab	22.05	0.47
MADE GROUND: Comprising red sandy gravel of crushed brick over brown/grey sandy gravelly clay with brick and concrete gravel.	21.58	0.48
Loose to medium dense brown yellow very gravelly angular SAND. Gravel is sub-angular to angular fine to coarse flint. [LYNCH HILL GRAVEL]	21.10	0.55
Medium dense brown very sandy rounded to sub-rounded fine to coarse flint GRAVEL. [LYNCH HILL GRAVEL]	21.0	0.85
Stiff brown slightly sandy CLAY. [LONDON CLAY FORMATION]	20.15	Proven to 16mSD (via Dynamic Probing)

a. Metres above Site Datum

Two SPT tests were undertaken within the Lynch Hill Gravel, recording 'N' values of 16 and 21, consistent with a 'medium dense' soil. A typical stiffness for a soil of this type, based on the SPT 'N' values would be of the order of 16MPa to 18MPa with an angle of internal friction of the order of 32 degrees.

Extending the borehole with Dynamic Super Heavy (DPSH) recorded blowcounts of between 9 to 17 (per 300mm increment) for the first 2m penetration into the London Clay. Corresponding crudely to an undrained shear strength (c_u) value in the range of 40kPa to 75kPa assuming an f_1 multiplier of 4.5. A typical stiffness for the London Clay would be of the order of 20MPa to 37.5MPa.

Groundwater was recorded during the investigation at a depth of 1.71m below starting level, 20.34mSD. A monitoring visit undertaken on the 15th May 2015 recorded groundwater at 1.75m below starting level, 20.3mSD.

Stage 4: Impact Assessment

Groundwater flow: The new basement formation level is at 20.45mSD, approximately 150mm above recorded water levels in the gravel. It is therefore considered likely that the foundations of the existing property already extend below the groundwater level and it is likely that groundwater is flowing beneath them given the depth to the London Clay of some 2.5m below LGF level.

The new excavation does not extend below the level of the groundwater, and whilst locally new foundations may extend beneath the water level, they would not be expected to have a significant impact on groundwater flow velocity or water levels.

The effect of groundwater will be taken into account in the design of internal foundations and retaining walls.

Land stability: Underpinning will only take place along garden boundary walls, and vertical foundation loading will therefore consist only of the weight of the masonry wall. Underpinning of the eastern wall will be required

to support earth pressures from the retained soils at No. 6, and should therefore be designed for an allowable bearing pressure of 75kPa to restrict settlements.

Approximately 3.5m of excavation is required in the rear garden, giving rise to a net unloading of some 70kPa on the underlying soils in this area. Heave movements have been estimated based on the stiffness values stated in Stage 3 and would be expected to be of the order of 20mm to 25mm in the centre of the rear garden area, occurring over the long term and reducing at the perimeters of the excavation. Heave movements beneath the existing structure would be effectively negligible given the limited excavation into granular materials.

The impact of heave movements/geotechnically derived movements is expected to be negligible and workmanship will be the critical factor in controlling the realised amount of movement. It is anticipated that the majority of construction will take place above the groundwater level, with only local excavations extending beneath the water. These areas will predominantly be within the garden of the property and would relate to foundations for the perimeter walls. They would therefore not be expected to generate movements of significance to the adjacent structures. The contractor should provide an appropriate working methodology to control groundwater ingress where necessary during construction works.

Surface water flow and flooding: Unchanged from Stage 1 & 2 assessment and no significant impact is anticipated in this regard.

Conclusions

The ground investigation on site at 4 Tavistock Place has confirmed the presence of gravels beneath the site, consistent with the ground conditions expected from the Stage 1 & 2 assessment. Groundwater has been found to be present below the proposed formation level and therefore is unlikely to be affected by the proposed development save for in isolated locations where foundation dig levels may extend beneath its surface.

It is concluded that the scale of the development and the ground conditions encountered dictate that, with a good standard of construction, it is possible to develop the property as proposed without causing an impact of significance to groundwater, local properties, or surface water flow and flooding. Because no buildings are being underpinned, the predicted damage category is zero, or 'negligible'.

We trust the above is of assistance,

Yours sincerely,



Richard Ball, Associate Director, CEng MICE
Card Geotechnics Limited

Yours sincerely,



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