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Willow Cottages Group
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By Email only

27 May 2020

Dear Glen,

PLANNING APPLICATION PA2020/0927/P 31 WILLOUGHBY ROAD

Further to our recent correspondence, and your instruction dated 04 May 2020, we have undertaken a review of the Basement Impact Assessment report and supporting data submitted to London Borough of Camden ('LB Camden'), as regards the proposed basement development at 31 Willoughby Road, London NW3 1RT (Planning Application 2020/0927/P). A list of the documents reviewed is appended to this report.

The review was undertaken covering geotechnical and hydrogeological issues only, and has not addressed issues of structural stability or suitability of the proposed works themselves, other than as necessary to adequately address issues of geotechnical concern; issues of constructability of the works have also been considered.

It is anticipated that this report will be submitted to LB Camden (for which permission is expressly granted), and in this respect, LB Camden and their agents may rely upon the contents of this report to the extent necessary to assess planning application 2020/0927/P.

Basis of review.

This review has been undertaken against the requirements set down by LB Camden. In particular, the requirements for basement development are specified in Camden Planning Guidance: Basements, March 2018 ('the CPG').

Also of great relevance are a number of policies within the Camden Local Plan (2017), most notably:

- Policy A5 Basements,

but also including

- Policy D2 Heritage,
- Policy CC2 Adapting to climate change, and
- Policy CC3 Water and flooding.

The fundamental requirements for any acceptable basement development are set down in paragraph 1.18 of the CPG, which states:

> "Basements schemes should take place in a way that ensures they:
>
> • do not harm neighbouring properties including not placing occupiers at risk or have any significant effects on the stability or bearing capacity of adjacent land generally;
>
> • do not harm the water environment including avoid adversely affecting drainage, run-off, or ground permeability;
>
> • avoid cumulative impacts including impacts on the structural stability or the water environment in the local area, including flooding;
>
> • do not harm the recognised architectural character of buildings and surrounding areas, including gardens and nearby trees, and that conservation area character is preserved or enhanced;
>
> • conserve the biodiversity value of the site; and
>
> • achieve sustainable development."

The submitted Basement Impact Assessment.

A Basement Impact Assessment (BIA) report by Eldred Geotechnics ('The Eldred Report') has been prepared to support the basement extension planning application submitted for No. 31 Willoughby Road.

In additional to the Eldred Report, a number of other documents have been submitted as part of the planning application (see list of documents reviewed appended to this report). For the purposes of this review, the full document set has been deemed to form part of the basement impact assessment as necessary; thus, if information is absent from the Eldred Report but has been supplied elsewhere, this has not been deemed to be a deficiency.

The BIA undertaken by Eldred Geotechnics is noted as being "a new basement impact assessment report to accompany a further planning application", it being evident that a

basement development at 31 Willoughby Road has already been proposed, and the application (2016/7146/P) refused. No review of the original application documentation has been undertaken, since it was considered to be immaterial to the present application.

The Eldred Report specifically identifies Nos 29 and 33 Willoughby Road, Willow Cottages (in Willow Road) and the retaining wall between Willow Cottages and No. 31 Willoughby Road as being "property potentially at risk".

The requirements of the Basement Impact Assessment.

The CPG sets down a five-stage process for a BIA:

Stage 1 - Screening;

Stage 2 - Scoping;

Stage 3 - Site investigation and study;

Stage 4 - Impact assessment; and

Stage 5 - Review and decision making.

The Eldred Report generally follows the BIA process required by LB Camden, with a desk study and screening stage. Additional intrusive investigations were scoped and undertaken, and the impact assessment undertaken. Thus, the submitted documents do include elements that recognisably address Stages 1 to 4, as listed above, noting that Stage 5 is undertaken by LB Camden.

However, while the stages of the BIA may have been followed, it is not considered that the submission adequately addresses the requirements of the CPG.

Geotechnical and hydrogeological information presented in the Eldred Report.

The Eldred Report details the results of desk study and intrusive ground investigations undertaken at the site. These identify the stratigraphy to be 3.0m to 3.5m of Made Ground, believed to be sourced from excavations to create the neighbouring Willow Cottages, over 2.5m to 3.0m of 'Head' (naturally re-worked and redeposited material, sourced from nearby higher ground), over London Clay.

The Made Ground and Head should therefore be of a similar composition. Moreover, the head will have been derived from material upslope: specifically the Claygate Member and the Bagshot Beds. In fact, reference to the British Geological Survey Map sheet 256 (2006), which covers this area, shows the boundary between Claygate Member and Head deposits over London Clay to pass through the site, as noted in the Eldred Report. This stratigraphic boundary is mapped more generally to the east of Willoughby Road, but there is a localised bulge in the boundary to the west, which appears to reflect topography / the existence of a valley. The valley runs downslope west to east, with the centre of the valley just north of

the site, approximately under Willow Cottages / Willow Road, as the Eldred Report itself notes.

Thus while the near surface soils (within which the basement is to be constructed) are described as either Made Ground or Head, it is probable that the material is at the very least derived from the Claygate Member, and might possibly be insitu Claygate material, at least within part of the site plan area.

As has long been recognised, the Claygate Member is considered to be vulnerable to internal erosion, whereby flowing water removes silt from the soil, leading to voids, potential settlement, and potentially large scale (and rapid) collapse. It is understood that this issue has been raised in the past in relation to basement developments within LB Camden, for example, in Redington Road, and, even nearer to the site, in Rudall Crescent.

Part 5 of the Eldred Report includes laboratory test results from the intrusive works, from which it is evident (K4 soils test summary sheets) that the shallower soil (i.e. the soil that is to be excavated to form the basement) is composed of silty clayey sand and sandy silty clay. This is consistent with it being Claygate Member or being derived from the Claygate Member.

Particular hazards associated with the Bagshot Beds and the Claygate Member are noted in the Camden geological, hydrogeological and hydrological study: Guidance for subterranean development (November 2010, authored by Arup) (The Arup Report):

- *"The most common mineral in the Claygate Member is quartz, which at times constitutes more than half the soil type. Clay minerals are next in importance quantitatively…These minerals may exhibit a tendency for swelling and shrinkage…"*
- *"The geotechnical properties of the silts and clays of the Bagshot Formation are similar to those of the Claygate Member with clays possessing the potential for volume change on wetting and drying."*
- *"The sand in the Claygate Member and the Bagshot Formation make them relatively permeable, when compared with the underlying London Clay, allowing water to flow through them readily. The water within these strata is recharged at the surface from precipitation which, owing to the relatively high porosity of the deposits, is stored within the matrix of the strata and forms a local aquifer*"

From this, it is evident that there are two significant geohazards specifically associated with the geology present on site: shrink-swell behaviour of the clay, and groundwater flow potentially occasioning soil erosion.

The Eldred Report notes that prior to the construction of Willow Cottages, a stream ran along the valley alignment; the report supposes that the stream has since been culverted, and continues to follow its original alignment.

The Eldred Report states that the site is located on a Secondary 'A' Aquifer as designated by the Environment Agency (EA): the Claygate Member of the London Clay. This at first

glance contradicts the statement that the stratigraphy is Made Ground over Head, though it might be considered to be a consistent statement, if it is taken to mean that the hydrogeological properties of the Made Ground and Head are broadly the same as the Claygate Member (from which they are likely derived).

Reference is made to an intrusive site investigation undertaken in August 2017 by GEA during which groundwater level monitoring was undertaken:

"*Occasional measurements from February 2016 to July 2017 showed levels varying over the site area and monitoring period by slightly about (*sic*) a metre between 82.3m and 83.2m OD without obvious reason."*

The additional intrusive investigations undertake in 2018 noted seepage at 2.8m depth (approximately 82.7m OD) in one borehole during field works. Post fieldworks monitoring in both the original and new instruments was commenced in June / August 2018, and appears to have been undertaken until the end of March 2019. The data is presented in part 5 of the Eldred Report, which shows that groundwater appears to be about 2.5m below site level in the rear garden of 31 Willoughby Road, as recorded in the four instruments completed for Eldred in 2018. However, the data from the older 2017 installations completed by GEA indicates groundwater at a level about 0.7m deeper than the data from the newer installations. Both sets of data show groundwater above proposed basement formation level (approximately 1.7m and 1.0m respectively).

It is also noted that the groundwater level shown in the Eldred boreholes is marginally lower than the level of the rear access to Willow Cottages. Given the permeability of the Claygate/Head deposits, and the suspected shallow foundation to the existing retaining wall between Willow Cottages and the site, this wall cannot be expected to act as a cut off. The access passage may be acting as a control on the stable groundwater level on site: effectively, it forms sump, a line of drainage, towards which groundwater will flow.

It is noted that the groundwater monitoring period was terminated in March; peak groundwater levels often occur around March to April, so potentially, the monitoring was terminated just before the annual peak level. Additionally, it is unclear whether the rainfall during the period of monitoring is typical of historical levels.

Issues of concern: Deficiencies in the submitted documentation, with reference to the LB Camden requirements.

Ground movement

The Eldred Report includes assessment of ground movements resulting from the works, taking into account changes in vertical loading, and lateral movement from the basement excavation, modelled using 'FLAC'. The 'FLAC' analysis is presented in part 5 of the report as a limited number of displacement plots: these plots are identified by a 'step number', but it is not clear what stage of the construction sequence is represented by the various 'step numbers'. In addition, while the magnitude of movements is shown, it is not clear in which

direction movements are predicted (i.e. is a negative x-displacement movement towards the excavation or away from the excavation?).

A further uncertainty is to what extent support elements are 'wished in place', and what allowance has been made for possible ground movements that occur between excavating and placing adequate ground support (this point is expanded upon below, in the comments on construction methodology and constructability).

Building damage

Any ground movement has the potential to cause damage to structures founded in the area of predicted ground movement.

Building damage due to engineering works is typically assessed with reference to the 'Burland' scale of damage. The use of this scale is often mis-understood; it is designed to classify damage based on the ease of repair, rather than give an exact indication of the size of cracks that will result. This is an important point, since it takes no account of any particular sensitivity of the structure being assessed. The proposed basement works will cause ground movements that impact on Willow Cottages and the retaining wall between the cottages and the basement site. It is understood that both of these structures are listed. It is therefore not acceptable to simply declare that they will suffer a given level of damage that can be repaired at some later date, rather it would be expect that the nature of the structures and any particularly sensitivities to ground movements are recognised.

The Eldred Report notes that Willow Cottages already show some distortion, and have had tie bolts installed. Foundation details for both the cottages and the wall seem uncertain, but appear to be accepted by all as being shallow. The existing wall is in poor condition; it is understood that, relatively recently, the removal of an ancillary storage structure in front of part of the wall led to the discovery of significant existing distress to the wall, and the Eldred Report explicitly states that this wall "*had to be resupported in recent years*".

Thus, it appears that both Willow Cottages and the wall are not in 'good' condition but, particularly with regard to the wall, are in a condition making them especially vulnerable to movements. It does not appear excessive to suggest that ground movements could potentially trigger an actual collapse of the retaining wall.

In section 11.2 of the Eldred Report, it is stated that groundwater pressure on the existing retaining wall will be unchanged, and that earth pressures on the wall will be reduced, and "*Consequently, the risk of damage to walls bounding the site will be reduced by the basement.*"

This statement is incorrect – the basement, once completed, should reduce the lateral load carried by the wall: this is not the same as reducing the risk of damage. In practice, the existing retaining wall will be surcharged (carrying additional load) from the piling rig during the piling operations. This is likely to produce lateral movement of the wall (towards Willow Cottages), and thus tending to destabilise the wall. Since the rig will only be adjacent to a portion of the wall at any one time, there will also be a degree of flexure along the length

of the wall (the wall will bow out slightly immediately adjacent to the piling rig, but not elsewhere along its length).

Once the proposed basement is completed, the existing soil pressure will be lessened: in fact, likely significantly reduced, since the open excavation to form the basement will tend to cause the ground between wall and basement to move into the basement excavation. This will unload the wall. This process will again be 'pulsed' along the wall, causing the wall to flex along its alignment throughout the works.

Furthermore, details of the foundations of the listed boundary retaining wall appear unknown, but it appears to be accepted that they are minimal. The basement formation level lies below the likely foundation of the wall, and as such, ground movement during construction towards the excavation will see the soil under the foundation of the wall move downwards and towards the basement. Some degree of vertical and lateral movement of the wall is therefore likely.

Overall, the existing listed retaining wall is going to be subjected to a complex pattern of changing loads and associated movements. For a new wall, built to modern standards, in good condition, this would likely not be an issue. However, the wall here is believed to be in excess of 150 years old, is of recognised heritage value, and is known to be marginally stable. The risk of damage is categorically not reduced by the works, but quite clearly during the execution of the works, will be significantly increased.

In respect of Willow Cottages, the Eldred Report simply states "*Structural damage risk assessment in accordance with both the Cording and Burland models provides a negligible risk level of Category 0 for each property*". There is no corresponding calculations to demonstrate how this classification has been determined. It is unclear what elements of Willow Cottages have been assessed, and what modes of deflection have been considered. For example, since one end of the Willow Cottages terrace is closer to the proposed basement, a degree of torsional displacement of the terrace is likely to result. It is noted that the Eldred Report states "*Input properties used for analysis are provided in the geotechnical report. Which (*sic*) also provides calculations relating to damage risk assessment*". This appears to be a reference to the Eldred Report (part 5) Appendix E: Preliminary geotechnical design report. This contains predictions of lateral strain, tilt and deflection ratio for 29 Willoughby Road, on which basis a 'Burland' classification is derived, but does not address Willow Cottages. The cottages are of a different construction (including height to length ratio) and condition to the properties immediately adjacent to 31 Willoughby Road, and need to be specifically assessed.

Additionally, as noted above, the use of the 'Burland' scale, while widely used, does not provide a complete assessment when there are specific circumstances, such as here where the building is of heritage value (listed).

In addition, an assessment of the lateral strains induced normal to the line of the basement wall may not reflect the critical case: for the existing listed retaining wall, there will be relatively little lateral strain across the width of the wall, simply due to its limited thickness.

The full mode of deflection needs to be considered (strains along the length of the wall, varying vertical movement, distortion/bending/tilt of the wall along its length, etc.).

A further consideration is the presence of the culverted stream that passes under Willow Cottages. This is clearly an old structure, dating from a time before the cottages were constructed, and its condition is uncertain, though might reasonably be expected to be in a relatively poor state. No assessment of the effects of movement have been undertaken on the culvert, nor does it appear clear that its condition, alignment or depth have been ascertained. The potential for the culvert to be fractured due to basement-induced ground movements exists. This could increase the risk of flooding of Willow Cottages during high intensity rain events. It might also introduce an element of soil erosion under the cottages, which could result, long term, in settlement and damage.

Growing area

The CPG discusses and illustrates the requirements of Policy A5. In Table 1 of the CPG, criterion 'l', it indicates the requirement that a basement should be set back from neighbouring boundaries:

"The policy objective is to provide significant space free from basement development to enable water drainage and area for planting."

The proposed development does leave a narrow strip, approximately 0.5m wide, for this purpose (the piles to the underpinning are located at approximately 1m centre of pile to back of retaining wall, and are not positioned directly under the basement wall, which lies somewhat closer to the existing boundary retaining wall).

However, it must be remembered that the boundary is formed by an already marginally stable listed structure. Planting in this strip must inevitably be severely curtailed, to avoid a potential build-up of root pressure which could apply a destabilising lateral force on the listed wall, since the new basement wall will prevent any root spread away from the boundary. Such a limit on planting would need to be maintained throughout the life of the wall and/or basement, and would therefore have to be communicated to any future site owner.

Hydrogeology.

The Eldred Report, in the 'screening' section, table 5.1.1, states (Q2) that surface water flows will not be materially changed.

This is not certain to be the case. As is noted by the Arup Report, the soils of the Claygate member are relatively porous, and so provide capacity for short-term storage of infiltration. It is this capacity that leads to the site being classified as a 'Secondary A' aquifer by the EA, as noted in the Eldred Report. Thus, while the surface area of impervious material may not be significantly changed, excavating this material (the Claygate or Claygate-derived soil) to form the proposed basement effectively removes a volume of sub-surface material that is

currently acting as a natural attenuation tank. Replacing this with a bypass drain will result in an increased rate of run-off from the site, surcharging the local surface water drains.

Part 5 of the Eldred BIA includes a flood risk assessment report[1] that states, in reference to the 1975 and 2002 flood events:

"*The SFRA discusses the two large surface water flooding events in the Borough, which occurred in 1975 and 2002 and caused widespread damage. It is understood that during these events the sewers reached maximum capacity."*

It is noted that Willow Road is shown in the Local Plan as a 'Flooded street (1975 and 2002)'. The loss of sub-surface attenuation of rainfall infiltration would make the potential for further flooding of Willow Road and surrounding areas more likely, and increase the severity of any event that might occur.

Thus, it is considered that the proposed basement development is inconsistent with the Local Plan, Policy CC3:

"The Council will seek to ensure that development does not increase flood risk and reduces the risk of flooding where possible"

This same issue would also seem to breach the requirements for climate change resilience, set down in Local Plan Policy CC2:

"The Council will require development to be resilient to climate change

…

b. not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;"

In this instance, there is effectively natural sustainable drainage (through natural attenuation) that will be reduced as a result of the development.

The Eldred Report, in screening (Q6) notes that the passage behind Willow Cottages has a low (0.1%, i.e. 1000 year return) probability of flood risk. However, the flood risk maps included in part 4 of the BIA in fact shows that this area has a mix of Low (1000 year return) and medium (100 year return) flood risk. There is therefore an apparent error of fact in the screening assessment. Moreover, a 100 year return period indicates a relatively high probability that the event will occur, and is presumably based on current assessment, taking no account of potential climate change effects, which are typically expected to result in more

[1] Proposed basement at 31 Willoughby Road, London, NW3 1RT. Flood risk Assessment. January 2016. Ref 1542/RE/12-15/01 Revision A, by Evans Rivers and Coastal.

intense rainfall events. Any factor that increases the potential for the local surface water drainage network to be overloaded is likely to also increase the risk of flooding in this area.

Additionally, as previously noted, it seems likely that the passageway to Willow Cottages acts as a control on the level of the groundwater in the soil under the proposed development site; the loss of porous soil under the site to attenuate groundwater flow will increase the risk of flooding in this passageway.

Groundwater control

The Eldred Report identifies the likely need for groundwater control. As discussed above, flow within the Claygate Member can result in internal erosion, as silt and fine sand is washed out from the soil, creating voids, which in turn can lead to increased ground movements. This is acknowledge in the Eldred Report, but in a very off-hand manner, with a statement that "*In some areas the local use of non-woven geotextiles may be required to prevent excessive wash out and loss of fine material*". Given that this is a well-known hazard associated with excavation into the Claygate Member, a more comprehensive and definite plan for controlling groundwater inflows should have been provided.

Methodology and Constructability

The proposed construction methodology involves the use of piles; from the Eldred Report:

"*Piles will support the construction proposed and reduce ground heave caused by the excavation. They will also be arranged to support underpinning below perimeter walls in such a way as to increase wall resistance to inward movement during the construction process*"

It is evident therefore that the piling is intended to be a fundamental aspect of the construction methodology. Drawing G1808-PA-101-E1 in part 5 of the Eldred Report shows that a line of piles is proposed to be installed with the pile centres approximately 1m from the line of the listed boundary wall. While it is possible to safely pile this close to existing structures, in this case, the piling rig is to be working directly above the top of a retaining wall known to be in poor condition. The effects of the loading caused by the rig on the stability of the wall (which, in addition to probably being marginally stable is, of course, a listed structure) has not been considered. Given the condition of the existing wall, the proposed methodology may not be viable.

Moreover, there is a wider issue with the proposed piling methodology, in that for it to be progressed with, a piling rig obviously needs to access the rear garden of 31 Willoughby Road. Given that there is no direct access to the garden from the public highway, how is this going to be achieved?

Access through the existing structure of 31 Willoughby Road would seem to require considerable breaking out of the façade and internal walls, plus potential strengthening of the existing floor and partial basement. Such temporary works would not be insubstantial, but would amount to a significant construction project in their own right, considerably

extending the duration of the works, and hence the noise, nuisance and disturbance caused to the neighbouring residents. The Construction Management Plan makes no reference of any such works, and in fact implies that they are not expected, since it refers only to "*alteration to minor parts of the existing domestic structure*" (which more widely seems a questionable statement, but that is an issue of structural engineering, so outside the scope of this report).

The Eldred Report makes reference to reducing levels to provide a working height above the piling mat, which implies a reasonably substantial (in both size and weight) machine is intended to be used for the piling, which in turn implies that much of the existing front façade would need to be removed to provide the requisite access.

Since the piling is an integral part of the proposed methodology, the applicant needs to demonstrate how the piling rig can safely access the work location, and (noting the issue of loading from the pile rig on the existing retaining wall) how the piling can then be safely undertaken.

As part of the mitigation measures proposed for the basement to avoid negatively impacting groundwater flow across the site, the proposed basement construction is to include a drainage layer outside the basement wall and under the base slab. From the Eldred Report: "*the scheme presented has been designed to allow groundwater to flow freely around and below the basement and thus leave the current groundwater regime unchanged*".

It is noted, though, that the Eldred Report is a little contradictory on this point, since in section 9.2, it instead states that "*Consequently disturbance of the existing groundwater regime will be avoided by conducting groundwater below the proposed basement in a conduit system, designed to allow water to drain at least as freely as it currently does in any direction*". This indicates that there is to be no flow around the basement, only under it.

Drawing G1808-PA-102-E1 (in part 5 of the Eldred Report) indicates that the underpin and base are to be cast against "*waterproof face of geocomposite drain designed to provide continuous groundwater drainage below basement*". This material is shown to be attached in 500mm wide strips placed vertically up the centre of the outer face of each underpin. The geocomposite appears to then extend along the top of the void former / below the base slab to provide the drainage path under the basement.

Construction of this detail will be atypical for underpinning, requiring that the pin excavation be maintained open longer than normal, and requiring more work at the base of the underpin excavation. It will require that the Cordek (void former) be placed across the full width of the underpin excavation, then the geocomposite fitted such that it will provide a continuous flow path under the slab, and that the vertical strip behind the underpins then be positioned. Only then can the underpin be cast. However, the underpin is not to be a simple vertical block of concrete, but is 'L' shaped, and will be constructed of reinforced concrete, and thus requires reinforcement to be positioned before concreting. It is not clear if it is intended to connect the underpin reinforcement to the piles, though this does not appear to be shown by the drawing.

All of this has to be carried out in the restricted space available within the underpin excavation. It will be difficult to undertake these works to a consistently high standard of workmanship, and delays in completing the process are likely: it will certainly take longer to complete each underpin compared to the time required for a simple vertical mass concrete pin. This increases the risk of ground instability within the underpin excavation and could lead to increased ground movement.

More fundamentally, there is a lack of clarity regarding exactly how the proposed works are to be undertaken in the area of the lightwell and the underpinned basement wall were it is closest to the listed retaining wall (the area shown hatched on Drawing G1808-PA-101-E1).

In respect of the lightwell, drawing G1808-PA-102-E1 shows no representation of 'hit-and-miss' type construction. The drawing appears to show that this is to be constructed as a two-stage excavation, one containing three piles (plus column C5), and the other without a pile being present. This second area seems to require a 4m long excavation in close proximity to the listed wall, with a complex wall shape needing to be cast. This is not conducive to good control of ground movements, though it appears that this is also to be effectively constructed in the open.

The whole construction sequence adjacent to the wall (in the hatched area shown on Drawing ~101) seems to lack clarity, and also reflects a lack of knowledge regarding the construction of the listed retaining wall. Section B-B on Drawing ~101 indicates that a trial pit is to be hand dug behind the wall to determine wall profile and footing details. Based on the levels shown in the section and elsewhere for the basement slab, this will require a 4m deep excavation. This is a significant engineering operation in its own right, so not so much 'before construction' as 'as part of the construction process'.

The section B-B shows a block of no fines concrete supporting the soil under the wall, but this is illustrative at best, since the foundation details are unknown. However, it seems clear that the intention within the 'hatched area' is to excavate fully behind the listed retaining wall. Then, at the base of a narrow, 4m deep excavation, this block of concrete is to be cast. It is not stated whether this to be cast in 1m long strips, following a traditional underpinning 'hit-and-miss' construction sequence, or whether it is intended that a 4m stretch of the wall is to have its footing undermined, to permit this concrete block to be cast along the full length of the hatched area.

Once the basement wall is completed, the geocomposite is shown attached to the outside face. It is unclear how this could be achieved in practice, given the limited space available and depth involved: it does not seem constructible as drawn.

The void between the new basement wall and the listed retaining wall is then to be backfilled in 150mm layers, each layer to be lightly compacted. It is not at all clear how compaction of soil layers can be achieved when they are 3m below ground level in such a constricted space as the void between the basement wall and the listed wall. Moreover, given that the listed retaining wall is already of marginal stability, the proposal to compact the soil behind it needs

to be carefully assessed for what effect it will have on the wall. The applicant should detail what method of compaction they propose, and provide evidence that this will not lead to intolerable lateral force or vibration affecting the retaining wall.

The detail on section B-B gives no indication of how the construction will transition from this specific detail: that is, there is no indication of how the excavation needed to do this work will be supported at each end.

The proposed work methodology is not simple, traditional mass-concrete underpinning. Based on the details provided, it is unclear how the works could be constructed safely and without unacceptable risk of damage to the listed retaining wall; some elements of the works as shown appear to be impossible to construct. The applicant should provide a much more detailed construction methodology and sequence, demonstrating how this work in practice will be carried out.

Cumulative impact

The Construction Management Plan makes some reference to the cumulative effect of the proposed works in respect of construction traffic, but there appears to be no assessment of the cumulative effect on ground movement or groundwater flow conditions from the proposed works, in combination with other previously implemented or currently proposed works in the area. Such an assessment is a requirement of the Local Plan, Policy A5 (clause p), and paragraph 1.18 of the CPG, as already quoted above.

Monitoring

The Eldred Report notes that monitoring of movements will be implemented. This is good. However, while perhaps not a point to be developed at this stage, a complete, detailed, monitoring plan should be completed and implemented prior to any works starting on site. It is suggested that the monitoring plan requirements should be subject to the agreement of LB Camden's experts as a minimum, with their sign off being a condition of planning permission being granted.

Monitoring should be against sensible movement limits, based on the predicted movements of the relevant structures; ideally, they would also be based on the specific maximum tolerable movement of the structure (that is, the limit beyond which damage is predicted).

Monitoring needs to be undertaken at a sufficient number of points, and at sufficient frequencies, that any unanticipated movements are immediately identified. Weekly or twice-a week monitoring is considered to be inadequate. Given the presence of a marginally stable listed structure near to the proposed works, it is suggested that continuous monitoring (surveyor permanently on site or the use of an automated system) might be appropriate: I have experience of this being done once on an equally sensitive project.

The monitoring plan should also include an emergency action plan, setting out what will be done if movements go beyond tolerable limits; this may require that material or plant be

held on site to enable remedial measures to be immediately implemented (again, I have been involved in a project where this was done).

Conclusion.

The application to construct a basement at 31 Willoughby Road includes a Basement Impact Assessment (The Eldred Report). This report follows the requirements of the CPG and addresses the issues required.

However, in a number of key aspects, the issues appear to be inadequately addressed.

Policy A5 of the Local Plan places some absolute requirements with regard to basement development:

"*The Council will only permit basement development where it is demonstrated to its satisfaction that the proposal would not cause harm to:*

a. neighbouring properties;

…

The Council will require applicants to demonstrate that proposals for basements:

…

n. do not harm neighbouring properties, including requiring the provision of a Basement Impact Assessment which shows that the scheme poses a risk of damage to neighbouring properties no higher than Burland Scale 1 'very slight';

o. avoid adversely affecting drainage and run-off or causing other damage to the water environment;

p. avoid cumulative impacts;

q. do not harm the amenity of neighbours;

r. provide satisfactory landscaping, including adequate soil depth"

- The Eldred Report does not adequately demonstrate that the proposal would not cause harm to neighbouring properties.
- The proposal will remove an element of sub-surface water storage/attenuation, and therefore will adversely affect drainage and run-off.
- No consideration of cumulative impact is made, so it is not proven that there is no cumulative impact.
- If successfully constructed without causing failure of the existing listed retaining wall, limits on what can be grown along the side of the basement will likely be

required to avoid negatively affecting the stability of the listed wall, restricting landscaping options and affecting amenity for future site owners.

Hence, I consider that the submitted application fails to meet the requirements set down by LB Camden in the CPG and the Local Plan for a basement application to proceed.

Should you have any queries or comments on the above, please feel free to contact me.

Yours sincerely,
For Geotechnical Consulting Group,

Dr Phil Smith

DISCLAIMER

List of Documents reviewed

The following documents were reviewed, downloaded from LB Camden's online planning portal, unless noted otherwise:

Drawings:

Pdf File "Site location plan".

Pdf File "Tree Plan 31 Willoughby Road NW3 1RT".

Pdf File "109_Existing Planning Drawings_Nov 19".

Pdf File "109_Proposed Planning Drawings_Nov 19".

Reports and calculations:

"Report of A Basement Impact Assessment for a Proposed Basement Extension of 31 Willoughby Road London NW3 1RT". Ref. G1808-RP-01-E2. Dated February 2020. By Eldred Geotechnics Ltd. Report in 5 (five) parts.

"Construction Management Plan. Pro forma. 31 Willoughby Road, London NW3 1RT, Revision A". Dated December 2019. By PBA Mayfair London.

"31 Willoughby Road, London NW3 1RT. Design, Access, Heritage and Planning Statement". Dated February 2020. By Nexus Planning.

"Arboricultural Report – 31 Willoughby Road NW3 1RT. Tree Survey, Arboricultural Implications Assessment and Method Statement" Dated 28th February 2019. By Phelps Associates.

During the preparation of this report, a Basement Impact Assessment Audit report undertaken on behalf of LB Camden was completed and published on the planning portal this document was also reviewed:

"31 Willoughby Road, London NW3 1RT. Basement Impact Assessment Audit for London Borough of Camden" Project number 13398-16, revision D1, dated May 2020. By Campbell Reith.