

London Borough of Camden

**37 & 39 Rudall Crescent
London, NW3 1RR**

**ASSESSMENT OF DOCUMENTATION SUBMITTED
TO SUPPORT PLANNING APPLICATION 2013/0824/P**

June 2013



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London Borough of Camden.**37 & 39 Rudall Crescent, NW3 1RR****Assessment of documentation submitted to support planning application
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London Borough of Camden.

37 & 39 Rudall Crescent, NW3 1RR

Independent assessment of documentation submitted to support planning application 2013/0824/P

June 2013

1. Introduction

A planning application has been submitted to London Borough of Camden for the creation of a new basement and various other works at 37 & 39 Rudall Crescent, London NW3 1RR. Supporting documentation has been submitted with the application, including a factual geotechnical report, a geotechnical interpretive report, a ground movement assessment report and a Basement Impact Assessment report. Objections to the proposals have been raised by the neighbours / local residents' association, on behalf of whom two technical reports have been prepared and submitted to the planning authority.

London Borough of Camden (LBC) have commissioned Geotechnical Consulting Group LLP (GCG) to undertake a review of the documentation submitted in support of the planning application to confirm whether it meets the requirements of the planning process, and to review the objections raised, to establish whether these are reasonable, and whether the planning applicant has put in place adequate measures to address these issues.

All information and documentation has been provided by LBC, either directly, or by reference to LBC documentation and application details available from the Council's website.

2. Documentation

The documentation submitted as part of the planning application and subject to review includes the following reports:

- Design and access statement, rev 01. Two Terrace Houses, 37 & 39 Rudall Crescent, produced by Webb Architects Limited. (Undated).
- 37 & 39 Rudall Crescent. Construction Management Plan 03. Revision 00, produced by Webb Architects Limited. (Undated).
- Planning policy compliance assessment report, prepared for Mr. Bernard Howard. Report No. 6669, dated 7th February 2013. Produced by Bell Cornwell.
- 37-39 Rudall Crescent, NW3. Basement Construction Sequence and Methodology. Project No 1168. Date 23 January 2013. Revision E. Produced by edge structures Ltd.

- 37 & 39 Rudall Crescent London NW3 1RR. Basement Impact Assessment Report, revision 1. Dated 30th January 2013. Produced by RKD Consultant Ltd.
- 37 & 39 Rudell Crescent, London NW3 1RR. Ground Movement Assessment Report, revision 0, dated 29th January 2013. Produced by RKD Consultant Ltd.
- 37-39 Rudall Crescent London NW3 1RR. Geotechnical Interpretive Report, revision 0, dated 21st November 2012. Produced by RKD Consultant Ltd.
- Arboricultural Report. Assessment of trees in relation to development for planning purposes. 37 & 39 Rudall Crescent London NW3 1RR. Dated October 2012. Report number 221019-PD-11a. Produced by Tim Moya Associates.
- 37 – 39 Rudall Crescent, London. Factual Geotechnical Report. Project No. 371080-01 (00). Dated November 2012. Produced by RSK.
- 37 – 39 Rudall Crescent, London. Geotechnical Desk Study Report. revision 0, dated 21st September 2012. Produced by RKD Consultant Ltd.
- Letter from Rudall Crescent Residents’ Association to London Borough of Camden, dated 30th March, 2013, referencing “Planning Application 2012/0824/P (*sic*) – 37 & 39 Rudall Crescent, NW3”.
- 37 & 39 Rudall Crescent NW3 1RR. Review of planning application 2013/0824/P to Camden Council with respect to Camden development Policy DP27. Report reference G1201-RP-01-E1. Edition E1 dated 28/03/13. Produced by Eldred Geotechnics Ltd.
- Review of ground conditions relevant to the application 2013/0824/P for basements at 37 and 39 Rudall Crescent, Hampstead NW3 1RR, dated 19th March 2013, produced by First Steps Ltd.

Additionally, the drawings submitted as part of the application and listed in full in section 9 were reviewed.

The following LBC documents were referred to, to form the basis of the review of the planning submission documents.

- Camden geological, hydrogeological and hydrological study; Guidance for subterranean development, Issue01, November 2010 (‘The ARUP report’).
- Camden Planning Guidance, basements and lightwells, CPG4
- Camden Development Policy DP27: Basements and lightwells.

3. Review Requirements

GCG were instructed to undertake the review of the documentation with a view to ascertain:

1. Whether the planning application submission contains a Basement Impact Assessment (BIA), which has been prepared in accordance with the processes and procedures set out in CPG4.
2. Whether the methodologies are appropriate to the scale of the proposed development and the nature of the site.
3. Whether the conclusions within the submission reports submitted as part of the application are based on all relevant evidence and considerations, and have been determined in a reliable and transparent manner. Further, that they were determined by suitably qualified professionals, with sufficient attention paid to risk assessment and use of conservatism.
4. Whether the conclusions within the reports submitted as part of the application are sufficiently robust and accurate, and contain mitigation measures as appropriate, that planning permission can be granted in accordance with the requirements of DP27, in respect of structural stability of the property for which the application has been submitted and any neighbouring properties, avoiding adversely affecting drainage and the water environment, and avoiding cumulative impact on structural stability or the water environment.
5. Whether the Eldred and First Steps Ltd reports raised reasonable concerns about the technical content or considerations of the submission that need to be addressed prior to planning permission being granted.
6. Whether the Eldred and First Steps Ltd reports raised relevant and reasonable considerations about the structural integrity of the road or the neighbouring properties that would benefit from particular construction measures or methodologies in respect of the development prior to or during construction, but which do not need to be implemented prior to granting of planning permission.

4. Basement Impact Assessment (BIA)

The requirements of a BIA are summarised in CPG4 and fully detailed in section 6 of the ARUP Report. A BIA requires five stages, as follows:

- Stage 1 – Screening
- Stage 2 – Scoping
- Stage 3 – Site Investigation and study
- Stage 4 – Impact assessment
- Stage 5 – Review and decision making (undertaken by LB Camden).

The first stage of the BIA methodology is screening, where matters of concern are investigated and the requirement for a full BIA is established. Three main issues are required to be considered: Subterranean flow, slope stability and surface flow and flooding. Each of these issues is covered by a separate screening flowchart (included as Figures 1 to 3 in CPG4), to assist the screening process.

The Basement Impact Assessment Report submitted as part of the planning application includes the screening process, and follows the screening flowcharts from CPG4; it complies with the processes and procedures of CPG4, and it identifies that a full BIA is required.

Stage 2 requires that the potential impacts of each of the matters of concern be identified. The development of a conceptual ground model and establishing communications with the neighbours is also recommended as part of the BIA stage 2.

The submitted BIA identifies “matters carried forward” from stage 1, and presents how these will be investigated. Reference is made within the BIA to a project specific Geotechnical Desk Study Report, which presents a conceptual ground model and recommendations for further ground investigations. Evidence of a consultation process with the neighbours is included; such consultation is ‘encouraged’ by CPG4, but does not appear to be mandatory, and no minimum level of communications is required. The submitted BIA complies with the requirements of stage 2 of the BIA as set out in CPG4.

The BIA process requires site investigation and study as stage 3. The submitted BIA makes reference to a desk study and site walkover, field investigations, monitoring, reporting and interpretation as required by CPG4. Submitted project specific documentation includes a Geotechnical Desk Study Report, a Factual Geotechnical Report on intrusive ground investigations undertaken in September 2012, a Geotechnical Interpretive Report and an Arboricultural Report. The desk study refers also to an intrusive ground investigation undertaken on the site completed by Herts & Essex. It is understood that this investigation was completed in 2011 as support for a previous planning application.

The ‘recent’ intrusive investigation works undertaken on this site include two boreholes and five trial pits; combined with the earlier Herts & Essex investigation, three points of groundwater monitoring have been established, as recommended by the Camden Geological, Hydrogeological and Hydrological study prepared by Arup. Borehole logs include reporting of ground level to Ordnance Survey datum, but lack co-ordinates, so in this respect do not comply fully with the abovementioned study.

Groundwater monitoring data from the recent investigation is included within the factual report for the period from the end of September to November 2012. The Geotechnical Interpretive Report shows that monitoring of the earlier (Herts & Essex) standpipe was undertaken throughout 2012. The ‘Arup’ report requires that monitoring be undertaken over “a period of time”, but states “the frequency of measurement and duration of monitoring must be chosen with reference to the specific effect which is being investigated”. The ‘Arup’ report also states that rainfall should be monitored for comparison with groundwater levels and the geotechnical interpretive report includes third party rainfall data for the period over which groundwater levels were monitored in the recent boreholes.

Overall, the desk study, intrusive ground investigations and subsequent interpretation are comprehensive and, notwithstanding the lack of national grid co-ordinates on the borehole and trial pit logs, are generally consistent with the requirements of CPG4 and are reasonable for the nature and scale of the proposed development.

Stage 4 of the BIA process requires an impact assessment, whereby the direct and indirect implications of the proposed project are evaluated. CPG4 requires that “The BIA will comprise a factual report and an interpretative report”, the latter to contain detailed site geology, geotechnical properties of the ground and an engineering interpretation of the implications of the ground conditions for the development of the site.

The documentation included with the planning submission includes the factual report of the intrusive investigation and a Geotechnical Interpretive Report, which together adequately address the issues of site geology and geotechnical properties of the ground, as required by CPG4. The submission also includes a basement construction sequence and methodology document and a ground movement assessment report, which meet the requirements to assess engineering implications.

CPG4 refers to Appendix G of the ‘ARUP’ report and states that it requires that “it (the interpretative report) must contain details of the retaining wall design for the basement excavation”. Appendix G contains ‘typical site investigation document content lists’, which implies that the submitted documentation does not have to comply precisely with the listed data. The applicant’s documentation does not include a full and final design for the retaining wall, nor addresses some aspects listed in Appendix G, such as water-tightness. However, the key issues, such as methodology and sequence of work, propping, and resulting ground movements, are adequately covered.

There are a number of minor discrepancies in the documentation. These are generally not significant enough to be points of concern; however the following points were noted as having potential implications for the methodology or design of the proposed works:

- the sequence of construction drawings (produced by edge structures Ltd as part of the basement construction sequence and methodology) show two levels of props, the upper being to the existing above ground walls; it is not clear if the Ground Movement Assessment included the effects of this upper prop level, however, if the assessment did not include an allowance for the effect of this prop, it would be conservative.
- The same drawings appear to show new basement walls being constructed to above this prop level without the props being first removed, but rather with the props acting on the newly built wall.
- The depth of embedment of the kingposts shown on the drawings appears negligible, though a reasonable embedment depth is given in the ground movement report.

These issues are however minor in nature, and do not indicate any fundamental weakness in the proposed application. Clarification of these points should be obtained prior to start of construction or excavation, but they do not form a basis for refusing planning permission.

Overall, the submitted documentation appears to be comprehensive, and to have sensibly and reasonably addressed the requirements of the stage 4 of the BIA process.

4.1. Assessment of methodology.

The proposed works involve construction of a relatively small basement extension in a constrained site with limited access. Ground support for basement excavations is often undertaken through some form of piled wall construction. However, with the existing structures to be retained, and the small size of the site, it is unlikely to be practical to access the site with a piling rig along the sides of the property (i.e. the party walls), and access to the rear of the property also seems limited. Given the nature of the road and the restricted space to the front of the property, there is a risk that any form of piling technique might cause excessive disruption either to the neighbours or to traffic along Rudall Crescent.

Construction of a basement beneath an existing structure is typically undertaken by a process of underpinning the party walls. This is a widely used technique, to the extent that it is the standard way of undertaking this form of construction in London. The quality of an underpin depends largely on the quality of the workmanship during construction. However, the stability of an excavation to create an underpin does depend to some degree on the ground conditions in which it is to be formed. The applicant has made some attempt to demonstrate the suitability of the underpinning technique on this site, by including within the intrusive investigation a trial pit “carried out...on a scale closer to that which would occur in an underpinning operation”. This trial pit did not correspond to the full excavation that would be required to undertake an underpin, and so does not guarantee that the ground will be stable during the underpinning process, but provides some reassurance that this is likely.

The proposed redevelopment of the properties includes an extension of the ground floor at the rear of the property, and the new basement rear wall is to form the foundation to the new rear ground floor wall. The submitted sequence of works shows that the king posts are to act as piles supporting the existing second floor rear wall during the construction sequence, prior to completion of the basement construction and rear superstructure rebuild. There appear to be no design calculations confirming the performance of the king posts in this respect, but utilising the king posts as temporary foundations to support the existing structure and as an element of a kingpost retaining wall to create the basement excavation is a reasonable and appropriate technique.

Given that a kingpost wall is proposed for the rear wall of the excavation, it is reasonable that the same technique be used on along the front of the site.

However, as noted earlier the site is constrained in nature, and it is unclear how the kingpost piles would be installed at the rear of the property. It is assumed that a small piling rig would need to be brought through the existing house, but this part of the methodology does not appear to have yet been fully developed.

Hence, the proposed methodology for construction of the planned basement seems practical and appropriate for the size and nature of the site, given due regard to the limited area available, access to the site, and the nature of the proposed redevelopment, subject to confirmation that a suitable piling rig can access all necessary areas.

4.2. Requirements of DP27.

The proposed development will see the new basement extend beyond the footprint of the existing building; DP27 thus requires evidence that the development will “not harm the built and natural environment or local amenity”.

The ground movement assessment report notes that the neighbouring structures of No35 and No41 Rudall Crescent have not been internally inspected; such inspection would make the assessment of potential damage more robust, since it would confirm whether there is existing damage to the structures that might make them more vulnerable to ground movements. It is not known whether the applicant has made an attempt at such inspection, and permission was refused, or whether no attempt at inspection has been made. The Ground Movement Assessment Report states that it has been assumed that no significant historic damage has occurred to the neighbouring structures.

The Geotechnical Interpretative Report confirms that the depth of the party walls was established by trial pitting, and that the footings were probed beneath the apparent party wall footing to confirm actual founding depth. It appears that the Ground Movement Assessment Report was completed on the basis that the neighbouring properties have footings at the level of the respective party walls, and that the footing level does not vary across the width of the neighbouring structures nor are there basement structures under the neighbouring properties. This appears to be a reasonable assumption, and a conservative approach.

The proposed methodology appears to be appropriate for the site conditions and planned works, and the ground movement assessment robust, so the scheme should adequately maintain structural stability of the present structures on the proposed development site and the neighbouring structures. The application states a search was undertaken to establish whether other basement developments have been granted permission in the local area, and that no other such schemes have been approved in the immediate vicinity; hence there appears to be no cumulative structural impact.

The submission documents include an assessment of the change in surface area of natural ground and of ground that drains to the sewer system. It demonstrates that the change in drainage regime on the site is minor and should have no harmful impact.

The submission documents adequately address ground movements and hydrogeological issues with respect to potential impact on local amenity.

5. Compliance with requirements

In summary of the above, and addressing the first four of the specific review requirements:

1. The planning application does contain a Basement Impact Assessment, and this does appear to have been prepared in accordance with the processes and procedures set out in CPG4. The documentation submitted is comprehensive, so while there are some minor omissions in the information supplied (e.g. no Ordnance survey national grid co-ordinates for intrusive investigation points) and some aspects of the design are provisional (details of the kingpost wall, for

- example), the applicant has submitted an appropriate level of documentation to support their planning application.
2. The methodologies proposed are suitable for the size and nature of the site, and the scope of the development proposed, assuming that suitable piling plant is available to access the rear of the property. However, the elements of the construction methodology are not fully detailed, and would need to be further developed before construction could begin.
 3. The authors of the Basement Impact Assessment are identified as Dr Adam Pellew, CEng and Dr Hamdi El-Ghonemy, CGeol; the reports therefore have been authored by individuals with the requisite professional qualifications, as per CPG4. The reports are comprehensive, and the conclusions of the BIA appear to be based on a sensible interpretation of the factual evidence obtained from the desk study and intrusive ground investigations. The approach taken appears competent and professional, with appropriate conservatism where applicable.
 4. The submission documents adequately address issues of structural stability and the water environment, with respect to DP27.

6. Neighbours' concerns.

In response to the applicant's submission, concerns have been raised against the scheme by the Rudall Crescent Residents' Association, with reports commissioned by the occupants of the neighbouring properties from First Steps Ltd and Eldred Geotechnics Ltd.

6.1. First Steps Ltd report.

The First Steps Ltd report identifies a single point of concern, being potential instability of the Claygate sediments during excavation to form the underpins and kingpost walls, particularly during / following heavy rain events. The First Steps Ltd report notes that the applicant's documentation identifies some variation in the hydrogeological behaviour observed across the site and that the observation of the trial pit left open to represent an underpin excavation was undertaken over a brief period, much shorter than the excavations will be open for during construction. Both of these points are valid points of concern. The report states "the correct and "safe" design in response to the facts known of groundwater is to ensure that flows which can cause erosion into the basement excavation during construction do not happen, by adopting a construction technique which prevents them from happening".

It is certainly the case that the scenario raised by the First Steps Ltd report, of instability during excavation, is possible. However, it is less certain whether it is likely, nor is it certain what impact erosion into the basement during excavation would actually have. There are four questions to consider:

1. Will the proposed excavation extend below the groundwater, either under normal conditions or following heavy rainfall?
2. If the answer to 1 is yes, will groundwater flow occur into the excavation?
3. If the answer to 2 is yes, will this flow cause erosion of the soil?
4. If the answer to 3 is yes, will this cause ground movements that may result in unacceptable damage?

The documents submitted to support the application do not expressly consider these questions in this format.

From the ground investigation report, it is clear that the answer to (1) is yes, the proposed excavation will extend to below the groundwater level, even in the absence of heavy rain.

While the site investigation shows some variability in the ground, the Claygate Member encountered on site appears to be predominantly clay, with silt and sand pockets and partings. The logs of the trial pits undertaken on site show no seepage from the Claygate Member during the pitting process, despite heavy rain over the period of investigation, with significant water inflow only noted in pits undertaken outside of the current building, where the flow was from the Made Ground, while pits completed through the existing ground floor remained dry. It should be noted however that most pits were terminated shortly after penetrating into the Claygate Member, and none extended the full depth of the proposed basement excavation. The rainfall sensitivity assessment in the application indicates that pore water pressures in the Claygate Member responded immediately or close to immediately to rainfall events, and since the trial pits were dug over a period of three days, it is to be expected that any response to the rainfall would have been evident, were it going to happen.

Thus, the submitted site investigation data shows that pore water pressures in the Claygate member respond rapidly to rain events, particularly where in contact with the Made Ground, but that significant ground water flow does not appear to result, indicating that the soil here has a low mass permeability.

While the submitted data is not conclusive, and does not prove that there is no risk of groundwater flow through the Claygate Member into any new basement excavation, it seems reasonably probable that if the basement development proceeds, water inflow will be limited in volume. This suggests that it is reasonable to view the answer to question 2 as being 'no', and on that basis, there would be no risk of unacceptable movement. However, the First Steps Ltd report notes that the Claygate Member is laterally variable, and on that basis suggests that the results of the intrusive works are not sufficient to discount the risk.

The description of the soil encountered suggest that it would not be greatly at risk of erosion even if inflow of groundwater occurred; however, if it is accepted that the ground may vary laterally and be more prone to inflow, conditions may also be such that there is more risk of instability. Since it is proposed to undertake the basement construction using underpinning or kingpost walls, the area of excavation open and unsupported at any point in time will be limited. Thus the volume of soil that might be subject to ground movement is restricted by the proposed construction methodology and hence the risk associated with ground instability caused by a heavy rain storm seems small.

Practically, the suggestion of adopting an alternate construction sequence that prevents any possibility of inflow, while undoubtedly reducing the risk of internal erosion of the soil, seems unfeasible given the nature of the site and the project, and as detailed above, seems unnecessary, since the risk of significant instability does not appear to be high.

It is not considered that the issue raised by First Steps Ltd is sufficient to refuse planning permission.

However, it would be reasonable to require the applicant to present, prior to works commencing, their detailed construction methodology, to include details of what groundwater control and temporary face support measures will be utilised, both where ground conditions are as anticipated and in the event that unstable ground conditions are encountered, including how the volume and quality (in relation to silt content) of groundwater entering the excavations will be monitored and disposed of.

6.2. Eldred Geotechnics Ltd report.

The Eldred Geotechnics Ltd report identifies a number of issues which are felt to be the basis of comment or objection, presented in a series of sub-sections.

Ground investigations.

The conversion factor to determine undrained triaxial strength from SPT data is commented upon (paragraph 15 of the Eldred report) as being a weakness in the ground investigation report, on the grounds that it is too high (the suggestion being that the factor was chosen such that the SPT data matched laboratory test data). It is agreed that the factor used is higher than might be selected assuming a normal degree of conservatism. A factor of 4.5 might be considered more typical, and this would result in a slight reduction in the assumed undrained strength profile of the soil. However, the impact of such a change would not require that the proposed scheme be significantly changed.

Interpretive geotechnical report.

It is noted that the site investigation proves conditions within a very limited volume of the soil (16), and that therefore the conclusion that sand layers found on sites elsewhere do not exist across the site is unproven. It is certainly the case that any intrusive site investigation only proves the ground at the precise location of the investigation, and significant variation of ground conditions is possible within quite short distances. However, the nature of the intrusive investigations undertaken on this site is quite extensive given the size of the site, and the results of the investigation have been reasonably interpreted. The statement in the Interpretive Geotechnical Report that “It is clear that the fine sand layers of the order...1.5m...are not present” is unconservative, since there is always some risk of ground variation, but there is no evidence to indicate that sand layers of that thickness exist on the site, and it is therefore a reasonable interpretation of the ground conditions that they are not present on the site. It would be unreasonable to ignore the factual site specific data and simply assume poor soil conditions just because they are possible within the general stratigraphy.

There is a valid concern that an unprepared contractor encountering difficult ground conditions may lead to excessive ground movement (17). However, this can be addressed by requiring the contractor to provide a method statement prior to construction starting, detailing how the ground will be supported in the event that ground conditions worse than anticipated are encountered.

The issue of undrained strength (19) is discussed above; in summary, the criticism is valid, but not of sufficient magnitude to materially affect the viability of the scheme.

The comments regarding groundwater (21, 22) again are valid points of concern, but they suggest that the actual site specific data should be considered unrepresentative because there is the possibility of worse conditions being encountered. The example given of adverse consequences, at Tanza Road, is stated as occurring due to an unprepared contractor. It would seem that the appropriate mitigation measure required is to ensure that the contractor is prepared for the possibility of increased groundwater flow, and has an appropriate contingency plan in place, with such plant, materials and manpower as may be needed on hand.

The concern expressed regarding groundwater flow passing under the retaining walls and entering through the basement of the excavation is valid (23 onward). Preventing base heave or instability due to this reason is typically done by extending the flow path, that is, by extending the depth below formation level that the retaining wall penetrates, which would not seem to be possible using the proposed King Post wall. The applicant should provide calculations to demonstrate that the basement formation level is stable in this regard with the chosen wall type. Since the results of this calculation may have implications for the construction methodology, it is recommended that this calculation be supplied prior to planning consent being given.

Ground Movement Report.

The issue raised here is the reliability of the method used to predict ground movements (30-35). It is correctly noted in the Eldred report that the methodology utilised was not developed for underpinned walls, but this is acknowledged in the Ground Movement Report. Also, as stated in the Ground Movement Report, there is no available dataset or reliable guidance to predict ground movements from an underpinned wall.

The Eldred report presents a number of concerns, all of which have the potential to cause ground movement and thus potentially result in damage to the structure under development and the neighbouring structures. However, they are also all 'general concerns' that would apply to any underpinning proposal undertaken on any site, and contain no site specific concerns. As is noted in the Ground Movement Report, underpinning movements are greatly affected by workmanship. The various points raised by the Eldred report are all factors that a competent contractor should be aware of and should address. It would not seem reasonable to assess a planning application on the assumption that the contractor will not be competent. Also, it is clearly not in the applicant's interest for excessive movement to occur during underpinning, since this will also affect his structure, and the extent of professional advice which the client has obtained to support his application also suggests that some care will be undertaken in choosing a competent contractor.

The concerns expressed in the Eldred report regarding the ground movement report do not appear to justify withholding planning consent.

Construction method.

The concern about water uplift acting on the new basement slab (37) is valid, and should be addressed by the applicant. In practice, it should be possible to address this without major redesign, so this issue is not a basis for refusing planning permission, but should be addressed prior to construction.

The concern about sealing the basement against groundwater is valid (37), but has implications for the serviceability for the basement rather than a direct impact on neighbouring properties. The issue of constructability of the detail shown in Figure 3-3 (37) is correctly identified, and needs resolving prior to construction, but again is an inconsistent detail rather than a fundamental flaw, so is not the basis for refusing planning permission.

The criticisms of the edges structures Ltd drawings (38) again correctly identifies a discrepancy in the submission (as also noted in this review, see section 4 above). Once again, this is a point that needs to be resolved prior to construction, rather than prior to award of planning permission. Similarly, the point about access for a piling rig (39, 41) is significant, (see section 4.1 above). It is for the applicant to determine how the requisite plant can access the piling location; however, if significant temporary works are required to provide this access, there is the potential for some impact on the neighbouring structures, depending on the nature of the works. Since the feasibility of the entire scheme as proposed is dependent on access to the rear garden for piling plant, it is recommended that the applicant provide a method statement detailing how the necessary plant will access the king post locations prior to granting planning permission.

The suggestion that the temporary works sequence shown will not work (40) is an exaggeration. The sequence shows, in the text description, “5: install further row of props between party walls & just above level of new basement slab as underpinning proceeds”. Installing the horizontal waling will clearly only be possible once the entire underpinned wall is constructed. The drawing concerned includes a note to the effect that final adopted sequence may vary. The suggestion in the Eldred report that bulk excavation cannot happen at the same time as the underpinning sequence is incorrect. The sequence shows the central wall between No37 and No39 underpinned initially, and then the underpins constructed under the party walls. Given the relatively narrow width of the properties, it is feasible that the act of excavating the underpins will also constitute most if not all of the bulk excavation in the area under the existing house.

It seems incorrect to suggest that the drawings fail to demonstrate a workable construction sequence (42). There are clearly issues that have not been fully developed or where there are inconsistencies that need to be resolved, but as the Eldred report notes, the drawings provide more detail than many schemes. Contrary to the statement in the Eldred report, it seems quite certain what construction method is intended, though there are still uncertainties as to how precisely it would be achieved. It is to be expected that there will be some uncertainties in the planned construction sequence prior to the appointment of the ground-works contractor, which typically occurs after award of planning permission.

DP27 (43) requires that “developers...demonstrate by methodologies appropriate to the site 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; c) avoid cumulative impacts upon structural stability or the water environment in the local area”.

Under strict application of clause 27.3 of DP27, the proposed development is a “larger scheme”, since the basement development is to extend beyond the footprint of the original building, and thus evidence is required to address each of considerations (a) to (h) in

DP27. This review of the application documentation was limited to considering clauses (a) to (c) as quoted above, and, subject to the specific issues raised elsewhere in this report, it is believed that the applicant has addressed these aspects of DP27.

The construction management plan has not been reviewed in detail (Eldred comments 44 to 47). The majority of this document is outside the scope of this review. While the construction management plan contains a suggested sequence of works, which differs significantly from the engineering drawings, it seems clear that the engineering drawings are the 'real' sequence that is proposed. To avoid uncertainty, the applicant should be required to clarify the sequence prior to planning permission being granted.

Coordination workmanship and site controls.

The points made in the Eldred report (48 to 53) are general comments that are applicable to any construction project. None of these points provide specific issues that would provide the basis for refusing planning permission. The last of the Eldred points (53) does however make sensible proposals, in that there should be a monitoring procedure and that trigger levels for movements, with associated actions, should be established. It is recommended that the establishment of such a monitoring regime is made a condition of any planning consent.

7. Review requirements in relation to objections.

The last two review requirements required consideration of the objection raised against the proposal, and the actions required to address the concerns raised.

5. The First Steps Ltd report and Eldred Geotechnics Ltd report both raise a number of issues that need to be addressed prior to construction, but in most cases, these issues do not need to be addressed prior to granting of planning permission. There are, however, a number of exceptions:
 - i. Calculations should be provided to demonstrate the stability of the base of the excavation against inflow of groundwater
 - ii. A method statement indicating how all necessary plant will access the site, in particular how the required piling plant will access the back garden, should be provided.
 - iii. The discrepancy in the sequence of works should be resolved.
6. The following issues raised by the First Steps Ltd report and Eldred Geotechnics Ltd report require addressing prior to commencing construction, but do not need to be implemented prior to granting of planning permission; satisfactorily addressing these point should be made a condition of any planning consent:
 - i. Monitoring of the groundwater instrumentation installed on site as part of the intrusive ground investigations should be recommenced and continued until at least 1 full years' worth of data is obtained, or until construction is commenced. It is recommended that this be carried out through the use of 'diver' style pressure transducers, providing continuous monitoring data; this would enable concerns regarding potential pulses of groundwater due to rainfall to be more accurately quantified, and thus reduce the probability of the contractor encountering unexpected conditions.

- ii. Measures to be taken in the event that unexpected ground conditions are encountered should be established.
- iii. The method of groundwater control and temporary face support to the excavations that will be used in the event of inflow during underpinning or construction of the kingpost walls should be detailed.
- iv. The issue of uplift on the basement slab in its temporary condition during construction should be addressed.
- v. Minor inconsistencies in the proposed construction sequence should be identified and clarified and a final proposed construction sequence established.
- vi. Design of the King Post walls, for both ground support and as temporary works foundations for the rear elevation, should be completed.
- vii. A monitoring regime should be established to determine movement of the surrounding structures, including the public highway, with trigger levels set for movement, and appropriate actions planned for the event that trigger levels are reached.

Additionally, it may be sensible to undertake a pre-condition survey of the neighbouring properties, if this is acceptable to all parties concerned, since this will form a reliable baseline to establish whether damage has occurred during construction, and so may reduce the possibility of dispute post construction.

8. Conclusion

GCG were appointed by London Borough of Camden to review documentation relating to planning application 2013/0824/P for 37 & 39 Rudall Crescent, to determine compliance with the requirements of CPG4 and DP27, and to identify issues raised in objection to the proposed scheme in expert reports commissioned on behalf of the neighbours that needed to be addressed either prior to the award of planning permission, or as conditions to be attached to such permission being granted.

In general, the applicant's submission is comprehensive; the documentation and methodology is more extensive than many schemes of a similar nature. The scheme itself is not particularly unusual, being a single storey basement under a terraced residential structure. The nature of the ground at this site provides the main area of concern, since there are known issues with the Claygate Member. However, the applicant has undertaken a reasonable assessment of these issues and presented an engineering solution that is viable.

The submission appears to comply with the requirements of CPG4 and DP27. Three issues have been identified which it is believed need to be addressed prior to planning permission being awarded. A further seven points have been identified where further work is required before construction should be permitted to start and which should be made conditions of the award of planning permission if granted, but which need not pose a restriction on granting of planning permission.

This report was completed by Dr Phil Smith on behalf of GCG LLP; the report was peer reviewed By Dr Felix Schroeder and Dr Jackie Skipper, both of GCG.

The author's and reviewers' technical and professional qualifications are as follows:

Phil Smith: BEng, MSc, PhD, DIC

Felix Schroeder: MEng, PhD, DIC, CEng, MICE

Jackie Skipper: BSc, PhD, DIC, CGeol, FGS.

9. References

The following documentation was reviewed:

Information submitted by the applicant to LBC, and downloaded from the LBC 'planning portal' website:

- Design and access statement, rev 01. Two Terrace Houses, 37 & 39 Rudall Crescent, produced by Webb Architects Limited.
- 37 & 39 Rudall Crescent. Construction Management Plan 03. Revision 00, produced by Webb Architects Limited.
- Planning policy compliance assessment report, prepared for Mr. Bernard Howard. Report No. 6669, dated 7th February 2013. Produced by Bell Cornwell.
- 37-39 Rudall Crescent, NW3. Basement Construction Sequence and Methodology. Project No 1168. Date 23 January 2013. Revision E. Produced by edge structures Ltd.
- 37 & 39 Rudall Crescent London NW3 1RR. Basement Impact Assessment Report, revision 1. Dated 30th January 2013. Produced by RKD Consultant Ltd.
- 37 & 39 Rudell Crescent, London NW3 1RR. Ground Movement Assessment Report, revision 0, dated 29th January 2013. Produced by RKD Consultant Ltd.
- 37-39 Rudall Crescent London NW3 1RR. Geotechnical Interpretive Report, revision 0, dated 21st November 2012. Produced by RKD Consultant Ltd.
- 37 – 39 Rudall Crescent, London. Geotechnical Desk Study Report. revision 0, dated 21st September 2012. Produced by RKD Consultant Ltd.
- Arboricultural Report. Assessment of trees in relation to development for planning purposes. 37 & 39 Rudall Crescent London NW3 1RR. Dated October 2112. Report number 221019-PD-11a. Produced by Tim Moya Associates.
- 37 – 39 Rudall Crescent, London. Factual Geotechnical report. Project No. 371080-01 (00). Dated November 2012. Produced by RSK.
- Drawings as follows:

Drawing 2011-1170-AT-101, Swept path analysis
Drawing 2011-1170-AT-102, Swept path analysis
Project 051, Dwg No 01. Outline Site Plan
Project 051, Dwg No 02. Profile sections A-A (No37)
Project 051, Dwg No 03. Profile sections B-B (No39)
Project 051, Dwg No 04. Profile sections C-C & D-D
1168-49-P1. Site Investigation: Trial pit & borehole findings
1168-50-P2 Existing Ground Floor plan.
1168-51-P2 Existing First Floor plan.
1168-52-P2 Existing Second Floor plan (loft).
1168-101-P4. Sequence of works, sheet 1 of 3
1168-102-P4. Sequence of works, sheet 2 of 3
1168-103-P2. Sequence of works, sheet 3 of 3
1168-108-P3. Proposed Basement Plan (option B)
1168-110-P3. Proposed Ground Floor Plan
1168-111-P2. Proposed First Floor Plan
1168-112-P3. Proposed Second Floor Plan
1168-113-P3. Proposed Roof Plan
1168-201-P3. Sections, sheet 1
1168-202-P3. Sections, sheet 2
1083.01.01(E) Existing Ground Floor Plans
1083.01.02(C) Existing First Floor Plans
1083.01.03(C) Existing Second Floor Plans
1083.01.04(B) Existing Roof Plans
1083.02.01(B) Existing Section AA
1083.02.02(A) Existing Section BB
1083.02.03(B) Existing Section CC

1083.02.04(B) Existing Section DD
1083.02.05(A) Existing Section EE
1083.02.06(A) Existing Section FF
1083.02.11(G) Proposed Sections
1083.02.12(D) Proposed Sections CC
1083.02.13(D) Proposed Sections DD
1083.02.14(E) Proposed Sections EE
1083.02.15(E) Proposed Sections FF
1083.03.02(-) Existing Front Elevation
1083.03.03(-) Existing Rear Elevation
1083.03.05(-) Existing Street Elevation 2
1083.03.11(E) Proposed Elevations
1083.03.12(B) Proposed Front Elevation
1083.03.13(C) Proposed Rear Elevation
1083.03.15(-) Proposed Street Elevation 2
1083.01.21(G) Proposed Basement Floor Plans
1083.01.22(E) Proposed Ground Floor Plans
1083.01.23(E) Proposed First Floor Plans
1083.01.24(E) Proposed Second Floor Plans
1083.01.25(C) Proposed Roof Plans
1083.01.41(E) Proposed Construction Management Plan
1083.04.12(C) Proposed Basement Wall Construction Section

Reports submitted in objection to proposed scheme:

- Letter from Rudall Crescent Residents' Association to London Borough of Camden, dated 30th March, 2013, referencing "Planning Application 2012/0824/P – 37 & 39 Rudall Crescent, NW3".

- 37 & 39 Rudall Crescent NW3 1RR. Review of planning application 2013/0824/P to Camden Council with respect to Camden development Policy DP27. Report reference G1201-RP-01-E1. Edition E1 dated 28/03/13. Produced by Eldred Geotechnics Ltd.
- Review of ground conditions relevant to the application 2013/0824/P for basements at 37 and 39 Rudall Crescent, Hampstead NW3 1RR, dated 19th March 2013, produced by First Steps Ltd.

Additional documentation reviewed:

- Camden geological, hydrogeological and hydrological study; Guidance for subterranean development, Issue01, November 2010 ('The ARUP report').
- Camden Planning Guidance, basements and lightwells, CPG4
- Camden Core Strategy documents:
 - CS5: Managing the impact of growth and development
 - CS14: Promoting high quality places and conserving our heritage
 - CS15: Protecting and improving our parks and open spaces and encouraging biodiversity
 - CS17: Making Camden a safer place
 - CS18: Dealing with our waste and encouraging recycling
- Camden Development Policies:
 - DP23: Water
 - DP24: Securing high quality design
 - DP25: Conserving Camden's heritage
 - DP26: Managing the impact of development on occupiers and neighbours
 - DP27: Basements and lightwells