

**Observations on the recent BIA submitted in support of Planning Application 2016/2997/P for the excavation of a basement at 28 Redington Rd, London NW3 7RB and its Audit by Campbell Reith of 28/08/2017**

**Summary**

S1. Four key design issues involving the ground remain to be recognised and resolved by both ESG and Campbell Reith prior to Planning Permission being approved, and are listed below.

S1.1. How to respond to the evidence of former land sliding that will be intersected by the boundary between Nos.26 and 28 and its implications for ground stability, especially as it is associated with weak ground different from elsewhere on site.

S1.2. How to assess the implications of ground movement for the foundations of No.26 and the waterproofing of No.30, from excavating such a geology.

S1.3. How to manage ground water flow so that the basement does not cause ponding upstream in the area of the foundations for No.28 and diversion as concentrated flows downstream to No.30.

S1.4. The need to comply with Camden's requirements that geology should be reviewed by a Chartered geologist.

S2. The first three (S1.1, S1.2 and S1.3) need to be resolved prior to awarding Planning Permission so as to demonstrate, at least on paper, that the proposal recognises and adequately responds to existing ground conditions. These are not matters that should be left to an S106 which presumes the design is satisfactory and provides the leeway that enables aspects of a satisfactory design to be dimensioned because S1.1, S1.2 and S1.3 are fundamental to the design itself.

S3. Issue S1.4 is a straight matter of non-compliance with existing requirements and might explain why issues S1.1 to S1.3 exist at this stage in planning. Camden requires that relevant geology should be appropriately dealt with before approval is considered.

**Introduction**

1. This Note has been requested by Mr Harlan Zimmerman at No.26 and his neighbours at No.30 as they are located either side of this proposed excavation. These three sites are on a gentle slope, with No. 26 upslope of the proposed development and No.30 downslope.

2. All three sites are down slope of the water bearing Bagshot Beds and the more permeable upper section of the London Clay, known as the Claygate Formation.

3. More importantly, all three sites sit on an apron of mixed Clagate and Bagshot bed material that has been washed down slope from the higher ground to the east during the latter stages of the ice ages and acts as a shallow aquifer– not in a water supply sense (although this apron was often tapped for domestic supplies in the Hamsptead area in the Victorian era, using hand-dug wells 1m+ in diameter) but as a source of

freely running groundwater that is fairly constant and can be replenished rapidly by rainfall.

4. Further, the gentle slope now seen in this part of Redington Rd appears to mask a more dramatic landscape at depth probably fashioned by mass movements (landslides and/or mudflows) down the larger slope from the general area of the Vale of Heath.

5. These features have been highlighted, described and illustrated by cross sections and plans in the First Steps Ltd., report dated 27<sup>th</sup> August 2016. That report has been ignored by both Motts, who undertook the first BIA and the Environmental Scientifics Group (ESG) who have undertaken the second. Campbell Reith have, however, listed it as a report referred to but their current Audit shows no evidence of either understanding or appreciating the significance of the points that were made. These refer to the need for;

5.1 an appropriate understanding of the variations of ground conditions that could, if not appreciated, result in unexpectedly larger ground movements than usual on the boundary between Nos. 28 and 26 (and it is noted that no Ground Movement Assessment has actually been submitted yet), and

5.2 an adequate design to cope with groundwater that could be ponded upslope and affect No.26, and be diverted and thus concentrated into paths flowing towards No.30, downslope, where there already a history of problems with groundwater the correction of which has recently involved the residents in considerable expense.

### **Land stability**

6. The first of these foreseeable problems (previous instability and associated variability of ground strength and stiffness, as illustrated in the First Steps report) has not been addressed by the BIA (Campbell Reith 1.8). No assessment of ground movement, either vertical or horizontal, can be made without taking it into account. Campbell Reith's Audit identifies that assessments of ground movement have not yet been made but that damage less than Burland Level 2 is anticipated. This is not good enough. Camden now expect Burland Level 1 to be the threshold.

7. It should be remembered that Burland explains in his scheme that the significance of a particular size of crack depends not just on its size but on its implications; so very small cracks in the recent waterproofing completed at No.30 would be very significant indeed. There is a high threshold here that has not been appreciated.

8. This has implications for the construction management programme as ground conditions at the Redington Rd end of the site differ significantly from those at the opposite end of the site. There is no evidence to suggest that the ground will behave uniformly around the site and this will catch out a contractor.

### **Ground water**

9. It is stated that the basement slab will be above ground water level save for its northern area (Campbell Reith 1.9). Reference to geological cross section submitted by First Steps in August 2016 shows that is an optimistic conclusion by both ESG

and Campbell Reith, even with the basement now at 96mOD rather than 92mOD as originally proposed. In wet periods water can be expected in the sediments of the apron and the Claygate Formation, placing a water table potentially some metres above 96mOD. On these occasions the basement will create a substantial obstacle to groundwater flow.

10. To mitigate the effects of such a dam it is proposed that the basement should have a drainage layer placed beneath it to relieve water pressure and importantly to enable ground water to flow easily beneath the obstruction it creates (ESG 6.2). The design further proposes to prevent the secant piles that will form the walls of the basement from creating a dam that will pond and divert groundwater, they can be long (deeper than the floor slab) and short (no deeper than the floor slab) so providing a pathway for groundwater to the drainage blanket below the floor slab. This proposal is fundamentally flawed for the following reason.

11. The flow of water in the more permeable apron will be at a greater rate than is possible in the lesser permeable Claygate Formation and London Clay beneath it yet the proposal is to divert water from the more permeable apron into the less permeable beds below so it can continue its flow through a permeable drainage layer and then, once it has crossed the drainage layer, back up to close to its original level and carry on as if nothing had happened. It will not happen; for this to work the London Clay must be able to transmit water at a greater rate than the sandy silty material of the apron; a drainage layer is also needed on the outside of the retaining wall on the upstream side of the wall to conduct water to the drainage layer beneath the floor slab and a similar layer is needed on the downstream side of the wall to enable the water to continue its journey.

12. The design needs to go back to the drawing board as the assurances on strength and stiffness, which will be needed to satisfy the criterion for ground movement, will depend on saturation, particularly towards the Redington Rd end of the site where weak clay at depth was recovered. Further, as shown in the Figs from First Steps, there appears to be ground strengthened by desiccation on site (and that is to be expected) and this ground would weaken on saturation. The foundations of No.26 could well be in such material.

13. Campbell Reith have not picked up these issues and have been satisfied by the promise that further monitoring of ground water will be undertaken, but fails to ask to what effect. The design is wrong and further monitoring is not going to make it right.

### **Outstanding issues**

14. Section 7 of ESG's report lists outstanding issues which do not resolve two known issues for concern.

14.1 Ground water. It is proposed this is monitored but for what purpose? To understand the hydrogeology and feed the numerical models that are proposed, information will be required about rainfall and ground water response to it over a period of at least one winter so as to establish the ground response to recharge (it's a shame that Motts didn't advise that because if they had one years' worth of data would be available now). If this is not going to be done the prospect of more monitoring is disingenuous (besides, the instrumentation in BH5, where data is badly

needed, corrupts the water levels). The design needs to be changed to cater for this unknown.

14.2 Ground stability. The geological cross section strongly suggests there is an old failure on the south side of the site and this can have profound implications for ground movement near No.26. This has been ignored by Campbell Reith, not identified by ESG, and not listed in the Outstanding issues. Further, without better information on this, the 4<sup>th</sup> Outstanding issue (monitoring with inclinometers) will produce data to which it will be difficult to respond with confidence.

15. Finally, it should be noted that ESG's BIA has not been written by a Chartered geologist and should be; this is not just a matter of signing it off. The BIA fails to pick up the issues that were raised in August 2016 and outlined here.

## Conclusions

16. The key design issues that remain to be recognised by both ESG and Campbell Reith and acted upon prior to Planning Approval so as to demonstrate, at least on paper, that they can be solved, are as follows.

16.1 The evidence of former land sliding that will be intersected by the boundary between Nos.26 and 28 and its implications especially as it is associated with weak ground different from elsewhere on site.

16.2 The assessment of ground movement from excavating such a geology and its implications for the foundations of No.26 and the waterproofing of No.30.

16.3 The management of ground water flow so that the basement does not cause ponding upstream in the area of the foundations for No.28 and diversion as concentrated flows downstream to No.30.

17. In compliance with Camden's requirements the geology should be reviewed by a Chartered geologist.



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## References

ESG. 28 Redington Road, London, NW3 7RB. Interpretative report on ground investigation. Report No D7043-17. August 2017.

28 Redington Road NW3 7RB  
4<sup>th</sup> September 2017  
Planning Application 2016/2997/P

Campbell Reith. 28 Redington Road, London NW3 7RB  
Basement Impact Assessment Audit. For London Borough of Camden  
Project Number: 12336-98 Revision: D2. August 2017

First Steps Ltd. 28 Redington Road NW3 7RB. Planning Application 2016/2997/P.  
27th August 2016. With Figs.