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Dear Sir

3 Kidderpore Avenue - Independent Review of Section 106

Further to our proposal letter of 29 October 2014 and your subsequent instruction to proceed, we have carried out a review of the information submitted for the post- planning application in relation to the property at the above address. This information is based on the developer's design team providing sufficient detail to allow independent certification *"into the detailed design phase of the Development ensuring that appropriate conservative modelling relating to the local ground conditions and local water environment and structural condition of neighbouring properties have been incorporated into the final design"*, reference Section 106 cl 2.7 (i)(a). Our comments of this review are given below, based on the documents provided to us, see Appendix A.

Review criteria

Our review was in relation to the requirements of Section 106 of the planning agreement. More specifically:

- (a) Review of the appropriateness of the design modelling with regards to ground and groundwater conditions and structural conditions of neighbouring properties
- (b) Review of assessment of impact on the structural integrity of the neighbouring properties with reference to the Burland (2001)^[6] damage categories.
- (c) Review of sufficiency of information provided on the following:
 - ii. Detailed structural appraisal of the neighbouring buildings
 - iii. Proposed method of ensuring the safety and stability of neighbouring buildings throughout construction
 - iv. Detailed design drawings incorporating conservative modelling
 - v. Engagement of a qualified engineer to monitor, inspect and approve the construction works

- vi. Measures to ensure the on-going maintenance and upkeep of the basement and ground water management measures to ensure the structural stability of the adjoining properties and the local water environment.

We have undertaken a high level review of the planning documents that are relevant to the above. We have assumed that the calculations in the documentation provided are correct and have not carried out any detailed calculations or checking of them.

Summary of findings

Modelling of ground and groundwater conditions

Appendix E of the CMS^[1] includes the geotechnical interpretation of the ground conditions at the site. The ground model concluded is in line with the conditions expected in this part of North London and appropriate for the design and impact assessment of the proposed works.

The groundwater conditions have been assessed, with reference to the wider hydrological and hydrogeological setting, concluding that the main issue is one of surface water runoff mitigation rather than subterranean water.

Structural appraisal and modelling of neighbouring structures

Section 2 of the DBCP^[5] includes the report on the structural appraisal of the buildings in No 1A and No 5. The report was carried out by Shear Water. The report concludes that the condition of both buildings at No1A and No 5 is “*within normal and acceptable limits with regard to age and type of construction*”.

We have not seen any photos recording existing condition of buildings and existing cracking, but understand that photographic records of the survey were taken to support the findings.

We note that parts of No 5 have historic cracks, which can be defined as “slight” damage according to the Burland (2001)^[6] damage categories. We advise that this classification is recorded.

We also note that the condition of the boundary wall is described as “*relatively slender and with limited lateral restraint*”.

We have seen no evidence that the current condition of the neighbouring buildings has been considered in the modelling for the design and impact assessment.

Impact assessment on neighbouring structures

Appendix F of the CMS report^[1] addresses the preliminary damage impact assessment for the neighbouring structures. The appendix describes the generic approach taken for the impact assessment. We have not seen evidence of how the vertical and horizontal wall movements from installation and excavation have been used to derive the strains for each of the buildings and the resulting damage assessment described “slight or very slight”. There is no explanation on whether the installation and excavation movements are considered additive or not in the assessment.

Additional sensitivity analysis of wall movements was carried out as part of the DBCP report ^[5], but with no further clarification or evidence on how this modifies the strains on the neighbouring buildings. It is unclear whether the assessment of damage classification also addresses the historical cracking in No 5 and whether the category of damage then becomes greater or the same. Furthermore, there is no consideration of impact due to movements from the underpinning of the boundary wall with No 5, as indicated in the planning construction sequence drawings.

A clearly laid out assessment for each of the structures, in accordance with the Burland (2001)^[6] methodology, will also identify the trigger limits appropriate to be specified for the monitoring of the neighbouring buildings.

Safety and stability during construction

The construction sequence drawings in the CMS are for “Planning Submission Stage” and do not include temporary works detail for construction. More specifically, we have found no evidence of underpinning details for the boundary wall with No 5; no evidence for the temporary support of the “slender and with limited lateral restraint” boundary wall; no details of proposed monitoring locations and monitoring strategy; what are the designers trigger limits to be set on the existing buildings and a proposal for regular monitoring and reviewing by a responsible party through to end of construction.

Whilst we understand there will be a Party Wall agreement in place, the need for setting trigger limits for acceptable movements and an instrumentation plan are important as a means of protecting adjacent neighbours.

Detail in design information

The only detailed drawing for construction we have seen is that for the surface water mitigation measures (drawing 8148_PH100 in DBCP). The drawing shows a small net reduction of the % runoff from the existing condition. It is unclear why the discharge rate from the property of 5l/sec has been reduced to 3l/s for the proposed works during a 1 in 100 year rainfall event. This is a material change that requires clarification.

Filter drains surrounding the boundaries of the property to maintain surface and subsurface water flow conditions seems reasonable. Reduction in the area that discharges to sewer due to roof garden at the front of the property also beneficial.

The construction sequence drawings in the CMS are identified as “Planning Submission Stage” and not for construction.

Construction Supervisor

The DBCP report ^[5] makes clear reference to the appointment of a suitably qualified resident site engineer for the duration of construction of the works, in accordance with the requirements of Section 106, 2.7 (c, v).

Maintenance of completed basement

The DBCP report ^[5] explains that the maintenance and upkeep of the functionality of the drainage measures is addressed in the material / product specification for the project, as well as entry to the CDM operating manual for the site.

Qualifications and accreditation

The LB Camden "Subterranean Development Procedures"^[6] require that "At each stage in the process, the person/s undertaking to complete the BIA process on behalf of the developer should hold qualifications relevant to the matters being considered." (Section 6.7). The Council will be looking for a chartered engineer (CEng, MICE) and a chartered Geologist (CGeol FGS) qualifications.

As the independent reviewer, we have the duty to be impartial and follow the letter of the Camden requirements. We are well aware of Dr Hugh StJohn's substantial experience and expertise in the field of Geotechnics; although in our opinion he is suitably qualified to carry out the assessment, he appears nevertheless not to be a chartered member of a recognised relevant professional body and as such, Camden may challenge his authority. To overcome this, you may wish to consider that a chartered GCG geotechnical engineer counter-signs the geotechnical sections of the submitted reports.

Furthermore, there is no name or qualification provided for the hydrological assessment / SUDs report of the submission. Camden's requirements would be for a chartered Water and Environmental Manager (MCIWEM) or a Hydro-geologist with a Chartered Geologist qualification.

Our recommendations

1. *Damage impact assessment:* It is advisable to provide strain calculations in line with the Burland (2001) ^[6] to then make a building damage assessment, including demonstration of a sensitivity study for the likely deflection ratios and strains of the neighbouring buildings. This is a specific element of the Section 106.
2. *Current condition of neighbouring buildings:* it is advisable to show plans /sections and/or internal photos showing the current condition of the building, as it is unclear from the descriptions where historical cracking has occurred. Although this may be a party wall matter, it also has implications for the consideration of the construction sequence and mitigation strategy to be adopted and possibly the damage assessment of the No 5 building.
3. *Monitoring strategy and specification:* ground movement prediction and impact assessment are part of the basement design and as such, movement control and verification should be designed and specified by the Engineer and not the Party wall surveyors. We advise an outline monitoring scope and set trigger limits, frequency of readings, reviewing regime and contingency plan, to satisfy the requirement of 2.7(c, iii) of the Section 106 agreement.
4. *Construction drawings showing detailed design construction sequence and monitoring strategy;* the only sequence provided is termed "Planning Submission stage" (in Appendix C of the CMS Rev1, Feb 2011) and no updates were found. We have not seen any detailed design drawings showing the construction sequence along the boundary, temporary supports, and top down excavation levels, which comply with the design assumptions eg given in the WALLAP runs.
5. *Qualifications:* In order to overcome the risk of objectors challenging the authority of the geotechnical work, a chartered Geotechnical engineer should review and sign the geo documentation. Similarly, the name and qualifications of the author of the SUDs report and the PH drawing should also be declared.

Yours faithfully



Heleni Pantelidou, PhD, CEng, MICE
Associate

cc Christine Hereward Howard Kennedy Fsi

Appendix A:-List of Documents reviewed

- [1] TWS CMS (2011a) Construction Method Statement Consideration of Structural Stability Relating to Basement Construction in Conjunction with GCG Reports Interpretative Report on Ground Investigations - February 2011_Revision 1 Preliminary Damage Assessment Report February 2011_Revision 1. Author Simon Lane. February 2011.
- [2] MRH Geotechnical (2011) Ground investigation for 3 Kidderpore Avenue, Hampstead, London NW3 7SX. Author: Stephen J Hudson. February 2011
- [3] TWS (2011b) Comments on Report by ELDRED GEOTECHNICS LTD dated 30/03/11 (REFG1015-RP-02-E1). Author: Simon Lane. May 2011.
- [4] TWS (2013) Sustainable Urban Drainage System. Author: *Unknown*. May 2013
- [5] TWS DBCP (2014) Detailed Basement Construction Plan. Author: Simon Lane. July 2014
- [6] London Borough of Camden (2010) Camden geological, hydrogeological and hydrological study. Guidance for subterranean development. Arup. Issue 01. November 2010.
- [7] Burland, J.B. (2001) Assessment methods used in design. JB Burland, JR Standing and FM Jardine (eds) Building response to tunnelling: case studies from the construction of the Jubilee Line Extension, London, CIRIA Special Publication 200, CIRIA and Thomas Telford, London, Vol 1, pp 23 – 43.