CampbellReith
consulting engineers

70 Elsworthy Road
London NW3 3BP

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12066-63
Revision: D2

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Appendix

1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by the London Borough of Camden (LBC) to carry out an audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 70 Elsworthy Road, London NW3 3BP - Planning Reference 2015/4684/P.

1.2. CampbellReith accessed the LBC Planning Portal and reviewed the latest revisions of submitted documentation against an agreed audit check list.

1.3. The Audit reviewed the BIA for potential impacts on land stability and on local surface and groundwater conditions arising from the proposed basement development in accordance with the LBC's policies and technical procedures.

1.4. Subsequent to the issue of the above initial audit, a number of clarifications and confirmations have been issued. This current audit constitutes a revision to the original CampbellReith audit, amended as necessary, to accommodate the clarifications and confirmations received. Any references in this audit to the revised BIA shall be taken as a reference to the original BIA, updated as above.

1.5. The revised BIA includes screening, scoping, site investigation and impact assessment stages as required in the LBC Planning Guidance document 'Basements and Lightwells (CPG4)', dated July 2015.

1.6. The qualifications of the authors, checkers and approvers of the revised BIA are in compliance with the requirements of CPG4.

1.7. There are some residual discrepancies in the BIA screening tables but closure of this audit is not dependent upon their resolution.

1.8. Ground conditions at the site comprise Made Ground to a maximum recorded depth of 1.2m, overlying the London Clay.

1.9. Two groundwater monitoring visits have been undertaken to date. The shallowest groundwater measurement is 1.7m bgl. The revised BIA recommends that groundwater monitoring should continue. It is assumed that this will be undertaken.

1.10. The revised BIA has confirmed that all trees to be retained, including the large tree within the garden to 68 Elsworthy Road, will not be impacted upon by the proposed development. The current arboricultural assessment of this latter tree is subject to any final comments from the LBC.

1.11. Although the basement will be constructed within a non-aquifer and any large-scale dewatering of the excavation is unlikely to be necessary, thus avoiding settlement issues, the revised BIA confirms that provision should be made to deal with potential inflows into the basement excavation by sump pumping or similar.

1.12. The revised BIA has confirmed that the area of impermeable surfacing will be similar (perhaps slightly less) to that at present. However, in order to reduce discharge into the drainage network, a SUDS will be adopted, comprising a green roof to the main building, below-ground attenuation crates and permeable paving to the majority of the hardstanding areas.

1.13. A FRA has been undertaken by (ER&C) and included within the revised BIA. It has been confirmed that the proposed basement is at low risk of flooding from any source but that the basement should nevertheless be tanked to cope with any groundwater presence and that a non-return valve should be provided to mitigate the risk of feedback from sewer surcharging.

1.14. It is accepted following the screening exercise conducted within the BIA and the various engineering mitigation measures proposed that there are no outstanding concerns at the site with regard to ground/slope stability issues, surface water flow/flooding issues or groundwater flow issues. However, see below regarding GMA and building damage category assessment.

1.15. The basement excavation is to be supported by means of a contiguous piled wall propped during excavation by temporary props at capping beam level and at low level above the excavation base. The basement RC ground-bearing slab and ground floor slab will provide propping in the permanent condition.

1.16. It is confirmed in the revised BIA that basement uplift forces will be resisted by the use of tension piles and that a void former will not be used.

1.17. Preliminary structural and stability calculations have been provided in the revised EWP report for the design of the basement walls and the underpinning to the mews building. It should be noted that these calculations have not been checked as part of this audit.

1.18. A GMA undertaken for the basement indicates that damage to neighbouring structures would generally conform with Burland Category 0 (negligible), with some buildings being subject to Burland Category 1 damage (very slight).

1.19. However, a number of issues remain to be resolved in the GMA as highlighted in the earlier CampbellReith audit. The GMA and building damage category assessments should be resubmitted complete with input geometry, soil parameters and detailed computer outputs as originally requested, so that the audit may be closed out.

1.20. Queries and requests for clarification/further information are summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by the London Borough of Camden (LBC) on 08 October 2015 to carry out a Category 'C' Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 70 Elsworthy Road, London NW3 3BP - Planning Reference 2015/4684/P.

2.2. The Audit was carried out in accordance with the Terms of Reference set by the LBC. The Audit reviewed the BIA for potential impacts on land stability and on local surface and groundwater conditions arising from the proposed basement development in accordance with the LBC's policies and technical procedures.

2.3. Subsequent to the issue of the above initial audit, a number of clarifications and confirmations have been issued. This current audit constitutes a revision to the original CampbellReith audit, amended as necessary, to accommodate the clarifications and confirmations received. Any references in this audit to the revised BIA shall be taken as a reference to the original BIA, updated as above.

2.4. A BIA is required for all planning applications with basements in the LBC in general accordance with policies and technical procedures contained within the following documents:

a) Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

b) Camden Planning Guidance (CPG) 4: Basements and Lightwells.

c) Camden Development Policy (DP) 27: Basements and Lightwells.

d) Camden Development Policy (DP) 23: Water.

2.5. The BIA should demonstrate 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; and,

c) Avoid cumulative impacts upon structural stability or the water environment in the local area.

The BIA should evaluate the impacts of the proposed basement considering the issues of land stability, hydrology and hydrogeology via the process described within the GSD and should make recommendations for detailed design.

2.6. The LBC Audit Instruction described the planning proposal as '*Erection of a 2 storey, 7 bed dwelling house with basement and accommodation in the roof space, following the demolition of the existing main dwelling house; extension of new basement under existing mews dwelling; alterations to fenestration and rear elevation of mews dwelling; associated landscaping works'.*

The Audit Instruction noted the following:

a) The basement proposals do not involve a listed building nor does the site neighbour any listed buildings.

b) The site is in an area subject to stability constraints (underground development) but is not in an area subject to surface water flow and flooding constraints or subterranean (groundwater) flow constraints.

c) It is not known whether the application requires determination by the Development Control Committee (DCC).

d) The scope of the submitted BIA extends beyond the screening stage.

2.7. CampbellReith originally accessed the LBC Planning Portal on 30 October 2015 and examined the following reports and drawings relevant to the audit:

a) A 'Camden Construction Management Plan (CMP)', dated 31 July 2015.

b) A 'Planning Statement' prepared by Savills (UK) Ltd, Chartered Surveyors, dated August 2015.

c) A 'Design & Access Statement' prepared by Wolff Architects, submitted August 2015.

d) A 'Ground Movement Assessment Report (GMA)' prepared by Geotechnical & Environmental Associates (GEA), dated 14 August 2015.

e) A 'Site Investigation & Basement Impact Assessment Report (BIA)' prepared by GEA, dated 17 August 2015.

f) A 'Structural Engineering Report & Subterranean Construction Method Statement' prepared by Elliot Wood Partnership (EWP), consulting engineers, dated August 2015.

g) A ' Below Ground Drainage/SUDS Assessment' prepared by EWP, dated 06 August 2015.

h) The following planning application drawings:

Existing Location Plan.

Existing House Floor Plans (x2).

Existing House & Mews Elevations.

Proposed Site Plan.

Proposed Basement Floor Plan.

Proposed Ground Floor Plan.

Proposed Mezzanine Floor Plan.

Proposed Section A-A.

Proposed Section B-B.

2.8. This updated audit is based upon a review of the following documents issued in November 2015.

a) A summary letter to the LBC Planning Department, entitled 'Submission of Further Information' prepared by Savills (UK) Ltd, dated 04 December 2015.

b) An updated BIA prepared by GEA, dated 25 November 2015.

c) A 'Flood Risk Assessment' included within the above BIA and undertaken by Evans Rivers and Coastal Ltd (ER&C).

d) An updated GMA prepared by GEA, dated 25 November 2015.

e) An updated 'Structural Engineering Report & Subterranean Construction Method Statement' prepared by EWP, dated November 2015.

f) A summary of responses to the original CampbellReith audit.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are the BIA author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plans/maps included?	Yes	Except that no maps or plans have been included in the screening sections of the BIA.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	As above.
Slope and Ground Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Except that data sources are not always fully referenced.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrogeology (Groundwater Flow) Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	No references are given for data sources.

Item	Yes/No/NA	Comment
Is a conceptual ground model presented?	Yes	
Slope and Ground Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Five issues identified. One relates to the River Tyburn which has been culverted and is thus not a cause for concern. Three issues relate to shrink/swell/tree problems but are not of concern due to the depth of the basement. The final issue relates to relative foundation depths and is addressed by the undertaking of a GMA and building damage category assessment – but see below.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	One issue identified. However this has been resolved as a result of the FRA now undertaken.
Hydrogeology (Groundwater Flow) Scoping Provided? Is scoping consistent with screening outcome?	Yes	One issue identified. However this relates to the River Tyburn - see above.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Two groundwater monitoring visits have been undertaken to date. The revised BIA recommends the undertaking of continued monitoring.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/~~absence~~ of adjacent or nearby basements confirmed?	Yes	

Item	Yes/No/NA	Comment
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	NA	
Are baseline conditions described, based on the 'Guidance for Subterranean Development (GSD)'?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	However, many of the issues raised in the previous audit remain to be resolved and the GMA and building damage category assessments should be resubmitted so that a full audit may be undertaken.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	

Item	Yes/No/NA	Comment
Have the residual (after mitigation) impacts been clearly identified?	NA	No residual impacts are foreseen.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Many of the issues raised in the previous audit remain to be resolved and the GMA and building damage category assessments should be resubmitted so that a full audit may be undertaken.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Many of the issues raised in the previous audit remain to be resolved and the GMA and building damage category assessments should be resubmitted so that a full audit may be undertaken.
Does the BIA report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, many of the issues raised in the previous audit remain to be resolved and the GMA and building damage category assessments should be resubmitted so that a full audit may be undertaken.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The revised BIA includes screening, scoping, site investigation and impact assessment stages as defined and required in the LBC Planning Guidance document 'Basements and Lightwells (CPG4)', dated July 2015.

4.2. The qualifications of the authors, checkers and approvers of the revised BIA are in compliance with the requirements of CPG4.

4.3. 70 Elsworthy Road is a six bedroomed dwelling house of conventional masonry construction with a single-storey extension to one side, housing a swimming pool. The building and extension were constructed in 1990/2000. The property lies south of Swiss Cottage and immediately north-west of Primrose Hill. The area surrounding the property is residential in nature and made up of large stand-alone dwelling houses.

4.4. The house is set towards the rear of a 75m long by 20m wide garden laid largely to lawn with boundary trees and shrubs. A brick-faced mews building at the front of the garden immediately adjacent to Elsworthy Road forms part of the property. The mews building forms one half of a semi-detached pair and provides a double garage and upper floor accommodation. The adjacent mews building belongs to 56, Avenue Road.

4.5. 70 Elsworthy Road is not of historic or heritage status and is not listed, but does lie adjacent to Elsworthy Conservation Area to the east. There are no listed buildings within the vicinity of the site.

4.6. It is proposed to demolish the main dwelling house and erect in its place a two-storey seven bedroomed dwelling with a single level basement and additional roof space accommodation. Basement depth will generally be 6m or so bgl but will be locally deepened to 7.5m bgl to accommodate a swimming pool. A lift shaft will also be constructed within the main building.

4.7. The proposed basement will extend below the main house, the garden and the ancillary mews building. The basement will not occupy the full width of the garden but will be set in slightly from the boundaries. No lightwells or roof lights will be provided. The mews building is to include a car stacker to permit below-ground parking.

4.8. The Planning Statement notes that the new proposal will result in a reduction in the area of hard landscaping and a commensurate increase in soft landscaping relative to the existing condition. It is stated that the depth of soil above the basement will be greater than the minimum 0.5m required by the LBC. A limited number of poor quality trees will be removed to facilitate construction but this will be mitigated by the planting of a significant number of new

trees. Mature trees are present in adjacent gardens and it is understood that this includes a very large chestnut tree in the garden of 68 Elsworthy Road – see Appendix 1.

4.9. A number of one and two-storey basements have been constructed at nearby properties in Elsworthy Road, Avenue Road, Wadham Gardens and Radlett Place in recent years. The locations of these basements are shown within the Design and Access Statement and typical floor plans have been included in the revised BIA.

4.10. A ground investigation (GI) was undertaken at the site by GEA and included the sinking of a single cable percussion borehole adjacent to the mews building to a depth of 15m below ground level (bgl) and two window sampler holes in the garden areas to depths of 5m and 8m bgl respectively. Standard Penetration Tests (SPTs) were undertaken at regular intervals in all holes.

4.11. Ground conditions were shown to comprise Made Ground to depths of between 0.75m and 1.2m bgl, underlain by soft to firm, becoming stiff, London Clay to 5m bgl or so, overlying stiff, becoming very stiff, London Clay to the depth of boring (15m bgl). Groundwater seepages were encountered during boring within the Made Ground at 0.3m bgl towards the Elsworthy Road end of the site (believed to be a perched water table arising from surface run-off) and within the London Clay at 3.7m bgl at the upper end of the site (associated with claystones).

4.12. Groundwater standpipes were installed in each of the above exploratory holes. The revised BIA confirms that two monitoring visits have been made to the site to date. The shallowest groundwater measurement is 1.7m bgl at the top end of the site near the main property. A recommendation has been made in the revised BIA for continued groundwater monitoring.

4.13. Regarding topography, and issues of slope and ground instability, the BIA confirms that the site does not slope at more than 7^{o} (1:8) and that the proposed works will not alter this situation. It is also confirmed that the site does not lie within a wider hillside setting in which the general slope is greater than 7^{o} nor neighbour land, including railway cuttings and the like with a slope greater than 7^{o}. The site does not lie within 50m of the Hampstead Heath ponds. On the basis of the above, there are no general slope/ground stability concerns at the site.

4.14. The BIA confirms that the London Clay is the shallowest 'natural' stratum at the site, locally overlain by Made Ground as noted above. The London Clay is known to be susceptible to shrink/swell effects and the stratum has been noted in the GI report to be of high volume change potential. However, although no comment is made in the BIA to indicate whether or not there is a history of seasonal shrink-swell subsidence in the local area, it was recorded that soil desiccation had not been observed during the GI fieldworks, although desiccation might be present within close proximity to existing trees. Nevertheless, although some small trees are to be felled as part of the landscaping works, the proposed basement ground-bearing slab would

be expected to lie below any desiccation zones and shrink-swell issues should therefore not be a problem for the new development.

4.15. The revised BIA has confirmed that all trees to be retained, including the large tree within the garden to 68 Elsworthy Road, will not be impacted upon by the proposed development. The findings of the current arboricultural assessment for this latter tree are subject to any final comments from the LBC.

4.16. The BIA records that the property is not located within 100m of a watercourse or potential spring line, nor does it lie within 50m of Hampstead Heath ponds. The site does lie within 100m or so (between) two mapped tributaries of the former River Tyburn, but this former river will have been culverted many years ago to form part of the local sewer network and thus cannot contribute to current above ground or subterranean groundwater flows. The BIA also records that the GI did not identify any alluvial deposits which could indicate potential continuity with the former River. On the basis of the above, there are no stability issues arising from the basement being located in proximity to any of the water features discussed.

4.17. The BIA confirms that the site does lie not within an aquifer (the London Clay is relatively impermeable) and hence no significant dewatering will be required during excavation, thereby avoiding any associated settlement issues. However, the construction method statement in the revised BIA has included for the provision of sump pumping or similar to cater for any seepages through more permeable layers within the London Clay (and presumably also from any perched water within the overlying Made Ground).

4.18. The BIA confirms that the site does not lie within 5m of a highway or pedestrian right of way.

4.19. The BIA confirms that the proposed basement will result in a differential in foundation depths relative to neighbouring properties - see below regarding the undertaking of a ground movement assessment (GMA).

4.20. The BIA confirms that the site does not lie above or within the exclusion zone of any tunnels. The site does in fact lie some 80m to the south of three east-west running Network Rail tunnels (Euston to Willesden Junction) which comprise the Primrose Hill tunnel network. However, Network Rail has confirmed that the site lies outside its exclusion zone.

4.21. Regarding surface water flow and flooding, the BIA confirms that the property does not lie within the catchment area of the ponds on Hampstead Heath and thus will have no influence on the water flow to the ponds.

4.22. With respect to the area of impermeable surfacing in the new development and changes to the route, profile or quality of surface water flows received by adjacent properties or downstream watercourses, the revised BIA has confirmed that the area of impermeable surfacing will be

similar (perhaps slightly less) to that at present. Drainage will be to the sewer in Elsworthy Road as currently. However, in order to reduce discharge into the drainage network, a SUDS will be adopted, comprising a green roof to the main building, below-ground attenuation crates and permeable paving to the majority of the hardstanding areas which will provide further storage within the underlying sub-base layers. Based on the above, the revised BIA confirms that there will be no negative impacts from surface water flows on adjacent properties or downstream watercourses as a result of basement construction.

4.23. With regard to the risk of flooding of the basement due to fluvial/tidal flooding, surface water flooding, sewer flooding, groundwater flooding or flooding from canals and other artificial sources, a FRA has been undertaken by ER&C and included within the revised BIA. It has been confirmed that the proposed basement is at low risk of flooding from any source but that the basement should nevertheless be tanked to cope with any groundwater presence and that a non-return valve should be provided to mitigate the risk of feedback from sewer surcharging.

4.24. Concerning subterranean (groundwater) flows, the BIA confirms that the site does not lie directly above an aquifer, within 100m of a watercourse, well, pond or potential spring line, nor below a defined water table – although as noted above, there may be perched water within the Made Ground. It is considered that the above, together with the relative impermeability of the London Clay and the shallow depth of the overlying Made Ground will mean that any groundwater flow into or around the basement will be limited and that the basement is likely to have little impact on groundwater flow locally and on nearby structures – see the comments above regarding sump pumping during basement excavation.

4.25. Regarding the question of whether or not more surface water than at present from rainfall will be discharged into the ground (e.g. via soakaways or SUDS), the attenuation schemes discussed above should not result in any increased discharge over and above the present situation.

4.26. A preliminary method statement and sequence of construction for the new basement are set out in some detail within the EWP structural report. A bottom-up construction sequence is currently envisaged.

4.27. The basement perimeter walling is to generally comprise reinforced concrete (RC) contiguous bored cfa piles with a capping beam. RC liner walls will be constructed within the outer box. The contiguous piled walls will support lateral ground pressures in both the temporary and permanent condition and also contribute to the support of vertical loads from the new building. Temporary propping at capping beam level and at low level will be provided until such time as the basement ground-bearing slab and the ground floor slab are in place and able to take load. Piles will be installed within the basement footprint to support the internal walls and resist any net uplift forces arising from heave and hydrostatic pressures. Heave pressures will vary across

the basement footprint due to the different loading/unloading regimes in the main building, mews building and garden areas.

4.28. The section of basement below the existing mews building will be formed using sequentially constructed 'L-shaped' RC underpins designed to resist lateral forces in the temporary and permanent cases and vertical loads from the building. Transitional underpins will be constructed with stepped founding depths along the front and rear walls to the mews building to accommodate the change in depth from basement level to ground floor level. A temporary grillage of steel beams/needles supported on temporary piles will be adopted to support vertical loads from the mews building prior to completion of the basement structure. The temporary piles will be cut down to basement floor slab level when the basement has been completed.

4.29. Preliminary structural and stability calculations have been provided in the revised EWP report for the design of the basement walls and the underpinning to the mews building. It should be noted that these calculations have not been checked as part of this audit.

4.30. An assessment of the vertical and horizontal ground movements within and beyond the basement areas has been undertaken using the OASYS computer programmes X-disp and P-disp. X-disp has been used to predict the vertical and horizontal ground movements arising from pile installation and from wall deflection consequent upon basement excavation. P-disp has been used to predict the heave movements arising from bulk excavation for the basement. Lateral propping in all X-disp runs has been assumed to be of a high support stiffness category as defined in CIRIA C580, this is appropriate.

4.31. In order to accommodate the different excavation shapes for the main basement area (existing building and garden areas) and that beneath the mews building, two distinct models have been created for the X-disp analyses (one for each area) and building damage assessments undertaken separately for these two areas. However, as pointed out in the previous audit, it is considered that the undertaking of separate models and damage assessments without consideration of the additive effects at lines of confluence between the two models is un-conservative. Also, as already pointed out, the re-entrant corner where the two areas combine has not been modelled. This is of particular significance to the assessment of damage to the mews building which will have been underestimated. The above points remain to be addressed.

4.32. The P-disp analyses have been undertaken to evaluate the immediate heave following basement excavation and the total heave taking account of the compensating loads arising from construction of the new building i.e. the net total heave. The difference between these two results is the net long-term, post construction heave.

4.33. The above P-disp results should have been combined with those from the X-disp analyses to give the total movements and a cumulative damage assessment made based on this. However,

this has not been done. This together with the above issues regarding the use of two models in the X-disp analyses and the re-entrant corner issue mean that the ground movement and damage assessments are invalid.

4.34. Building damage assessments have been undertaken in accordance with CIRIA C580 for selected 'sensitive' neighbouring properties, including the existing mews building. The distances to neighbouring properties were noted to be approximate only. It has generally been assumed that neighbouring properties do not have basements and are founded at 1.5m bgl. This is likely to be either representative or conservative. However one property known to have a swimming pool was assumed to be founded at 2.5m bgl. In order to be able to model the stabilising effect of the underpinning to the mews building, a founding depth of 5.4m bgl was assumed.

4.35. The current analyses indicate that damage to neighbouring structures would generally be Burland Category 0 (negligible) with some buildings subject to Burland Category 1 damage (very slight).

4.36. However, given the above issues, the current damage categories require reassessment. The GMA and building damage category assessments should be resubmitted complete with the input geometry, soil parameters and detailed outputs from the above two programmes as originally requested, so that a full audit may be undertaken.

4.37. The EWP structural report states that monitoring of all structures and infrastructure adjacent to the basement works is to be implemented. Monitoring principles, typical trigger values and required responses to be confirmed between EWP, the contractor and adjoining owners' surveyors are outlined.

4.38. The GMA report notes that condition surveys should be undertaken of nearby properties likely to be affected by the works before and after construction and that contingency measures should be implemented should movements exceed the pre-defined trigger levels.

4.39. An outline works programme has been included within the revised BIA.

5.0 CONCLUSIONS

5.1. The revised BIA includes screening, scoping, site investigation and impact assessment stages as required in the LBC Planning Guidance document 'Basements and Lightwells (CPG4)', dated July 2015.

5.2. The qualifications of the authors, checkers and approvers of the revised BIA are in compliance with the requirements of CPG4.

5.3. There are some residual discrepancies in the BIA screening tables but closure of this audit is not dependent upon their resolution.

5.4. Ground conditions at the site comprise Made Ground to a maximum recorded depth of 1.2m, overlying the London Clay.

5.5. Two groundwater monitoring visits have been undertaken to date. The shallowest groundwater measurement is 1.7m bgl. The revised BIA recommends that groundwater monitoring should continue. It is assumed that this will be undertaken.

5.6. The revised BIA has confirmed that all trees to be retained, including the large tree within the garden to 68 Elsworthy Road, will not be impacted upon by the proposed development. The current arboricultural assessment of this latter tree is subject to any final comments from the LBC.

5.7. Although the basement will be constructed within a non-aquifer and any large-scale dewatering of the excavation is unlikely to be necessary, thus avoiding settlement issues, the revised BIA confirms that provision should be made to deal with potential inflows into the basement excavation by sump pumping or similar.

5.8. The revised BIA has confirmed that the area of impermeable surfacing will be similar (perhaps slightly less) to that at present. However, in order to reduce discharge into the drainage network, a SUDS will be adopted, comprising a green roof to the main building, below-ground attenuation crates and permeable paving to the majority of the hardstanding areas.

5.9. A FRA has been undertaken by (ER&C) and included within the revised BIA. It has been confirmed that the proposed basement is at low risk of flooding from any source but that the basement should nevertheless be tanked to cope with any groundwater presence and that a non-return valve should be provided to mitigate the risk of feedback from sewer surcharging.

5.10. It is accepted following the screening exercise conducted within the BIA and the various engineering mitigation measures proposed that there are no outstanding concerns at the site

with regard to ground/slope stability issues, surface water flow/flooding issues or groundwater flow issues. However, see below regarding GMA and building damage category assessment.

5.11. The basement excavation is to be supported by means of a contiguous piled wall propped during excavation by temporary props at capping beam level and at low level above the excavation base. The basement RC ground-bearing slab and ground floor slab will provide propping in the permanent condition.

5.12. It is confirmed in the revised BIA that basement uplift forces will be resisted by the use of tension piles and that a void former will not be used.

5.13. Preliminary structural and stability calculations have been provided in the revised EWP report for the design of the basement walls and the underpinning to the mews building. It should be noted that these calculations have not been checked as part of this audit.

5.14. A GMA undertaken for the basement indicates that damage to neighbouring structures would generally conform with Burland Category 0 (negligible), with some buildings being subject to Burland Category 1 damage (very slight).

5.15. However, a number of issues remain to be resolved in the GMA as highlighted in the earlier CampbellReith audit. The GMA and building damage category assessments should be resubmitted complete with input geometry, soil parameters and detailed computer outputs as originally requested, so that the audit may be closed out.

Appendix 1: Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Spencer (Murray)	Charmondel Services UK Ltd, 23 Berkeley Square, Mayfair, London W1J 6HE on behalf of Warden Property Ltd, 64, Avenue Road, London NW8 6HT.	01/10/15	Concern expressed that the existing building at 70 Elsworthy Road has been constructed on top of a previous boundary wall and that demolition and construction will affect 64 Avenue Road and land in that area.	See the summary letter to the LBC Planning Department dated 04 December 2015, entitled 'Submission of Further Information', prepared by Savills (UK) Ltd and referred to in Section 2.8.
Meir (Elias)	68, Elsworthy Road, NW3 3BP.	05/10/15	a) That the proposed basement extends far beyond the footprint of the original dwelling beneath the front and rear garden areas in contravention of the LBC planning guidelines on basement extent. b) That the depth of the proposed two-storey basement and lift shaft at more than 5m to 6m bgl is greater than the LBC preferred single-storey basement depth of 3m or so. c) That the project tree consultant has not made an on-site assessment of the root protection zone required for a very large chestnut tree within the property gardens. The root protection radius shown on drawings is believed to be approximately half the actual radius.	Ditto.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	The qualifications of the author of the GMA are to be confirmed.	Closed.	21/01/16
2	BIA	Maps and plans, references for data sources and justification for 'No' answers are to be included in the screening section of the BIA.	Closed. There are some residual discrepancies in the screening tables but closure of this audit is not dependent upon their resolution.	21/01/16
3	BIA	Soil description and groundwater level inconsistencies in the BIA should be resolved.	Closed.	21/01/16
4	Stability, hydrology and hydrogeology	Long-term groundwater monitoring should be undertaken.	Closed. This a recommendation within the revised BIA. Continued monitoring is advised. It is assumed that this will be undertaken.	21/01/16
5	Stability and hydrology	The protection zones of all significant trees are to be established and the basement boundaries adjusted if necessary.	Closed. The revised BIA has confirmed that all trees to be retained, including the large tree within the garden to 68 Elsworthy Road will not be impacted upon by the proposed development. The findings of the current arboricultural assessment for this latter tree are subject to any final comments from the LBC.	21/01/16
6	Hydrology	The need for a FRA is to be confirmed.	Closed. A FRA has been undertaken by (ER&C) and included within the revised BIA. It has been confirmed that the proposed basement is at low risk of flooding from any source but that the basement should nevertheless be tanked to cope	21/01/16

			with any groundwater presence and that a non-return valve should be provided to mitigate the risk of feedback from sewer surcharging.	
7	Stability	Provision should be made for sump pumping of the basement excavation.	Closed. This is included in the construction method statement for the works.	21/01/16
8	BIA	Conflicts between the BIA and structural report are to be resolved.	Closed. Although not checked in detail as part of this second audit, it has been confirmed in the 'summary of responses' document that such conflicts have been resolved.	21/01/16
9	Stability	The use or otherwise of basement slab void formers is to be confirmed.	Closed. It is confirmed in the revised BIA that basement uplift forces will be resisted by the use of tension piles and that a void former will not be used.	21/01/16
10	Stability	Calculations for retaining walls/underpinning are to be provided.	Closed. Preliminary structural and stability calculations have been provided in the revised EWP report for the design of the basement walls and the underpinning to the mews building.	21/01/16
11	Stability	The GMA and building damage category assessments should be resubmitted together with full computer input and outputs.	Open. Many of the issues raised in the previous audit remain to be resolved.	
12	BIA	An outline works programme should be provided.	Closed. This has been included within the revised BIA.	21/01/16

Appendix 3: Supplementary Supporting Documents

None

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