

**35 Pilgrim's Lane, London,
NW3 1SS**

**Basement Impact Assessment
Audit**

For

London Borough of Camden

Project Number: 12727-66

Revision: F1

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1.0 NON-TECHNICAL SUMMARY

- 1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 35 Pilgrim's Lane, London, NW3 1SS (planning reference 2018/1078/P). The basement is considered to fall within Category B as defined by the Terms of Reference.
- 1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.
- 1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.
- 1.4. The Basement Impact Assessment (BIA) and Ground Investigation and Assessment Report have been carried out by those holding appropriate qualifications.
- 1.5. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.
- 1.6. The proposal neither involved a listed building or was adjacent to listed buildings.
- 1.7. The proposed scheme involves extending the existing lower ground floor to the front and out to the side of the property with two new lightwells and replacement of existing basement slab in the rear part of the existing lower ground floor.
- 1.8. An appropriate site investigation has been carried out, including investigation of ground water levels.
- 1.9. The ground conditions have been identified Made Ground overlaying London Clay. Groundwater was observed below the formation level of the basement.
- 1.10. An appropriate construction methodology has been proposed which indicates the basement is to be constructed in accordance with good practise construction principles using common basement construction techniques.
- 1.11. Existing anticipated underpinning below the brick wall on the boundary with Denning Road to the rear of the proposed basement extension is to be retained. The existing structure to be checked for adequacy for highway loading once it is possible to survey.
- 1.12. Significant ground water flows are not anticipated to be encountered during the basement construction.

- 1.13. Horizontal and vertical ground movement analysis has been carried out.
- 1.14. A ground movement assessment has been produced that predicts damage category 0 and 1 for the immediate neighbouring structures.
- 1.15. Appropriate drainage proposals have been presented to limit the impact on the existing drainage system.
- 1.16. Construction methodology has been presented as part of the BIA.
- 1.17. The Ground Movement Monitoring has been recommended as part of the Ground Investigation and Assessment to the surrounding properties during construction.
- 1.18. An outline works programme covering key phases of work has been presented.
- 1.19. Outline structural calculations for the basement retaining walls have been provided to demonstrate feasibility of the proposal.
- 1.20. Public assets TFL, Crossrail and Network Rail have been consulted and no impact has been identified.
- 1.21. It is accepted that there are no slope stability concerns regarding the proposed development and is not in an area subject to flooding and it will not significantly impact on the wider hydrogeology of the area.
- 1.22. Taken the above, it can be confirmed that the proposal confirms to the requirements of CPG4.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 20/03/2018 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 35 Pilgrim's Lane, London, NW3 1SS, Ref. 2018/1078/P.
- 2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.
- 2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
 - Camden Planning Guidance (CPG) 4: Basements and Lightwells.
 - Camden Development Policy (DP) 27: Basements and Lightwells.
 - Camden Development Policy (DP) 23: Water.
 - Local Plan 2017, Policy A5 Basements.
- 2.4. 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;
 - c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;
- evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.
- 2.5. LBC's Audit Instruction described the planning proposal as "Reconfiguration and extension of the lower ground floor level, three storey side extension to include terrace at 1st floor, extension of gable end, front and rear dormers, rooflights to front and rear slopes, alterations to landscaping to front and rear garden and boundary wall, all to residential dwelling (Class C3)." The Audit Instruction also confirmed 35 Pilgrim's Lane involved, or was a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 11/04/2018 and gained access to the following relevant documents for audit purposes:

- 01_PILGRIMS LANE_BIA - Basement Impact Assessment by Symmetrys Ltd, dated February 2018 ref. 17363 Rev.A
- 02_PILGRIMS LANE_BIA - Ground investigation & assessment by LMB Geosolutions Ltd, dated February 2018, issue 1
- 35 PILGRIMS LANE_DESIGN AND ACCESS STATEMENT by alma-nac, dated February 2018
- 35 PILGRIMS LANE_HERITAGE STATEMENT, by Iain Rhind – Head of Hertitage, Lichfields, London
- 35 PILGRIMS LANE_PLANNING DRAWINGS 01_SITE LOCATION PLAN, by alma-nac, February 2018
- 35 PILGRIMS LANE_PLANNING DRAWINGS 02_EXISTING DRAWINGS, by alma-nac, February 2018
- 35 PILGRIMS LANE_PLANNING DRAWINGS 03_PROPOSED PLANS AND SECTIONS, by alma-nac, February 2018
- 35 PILGRIMS LANE_PLANNING DRAWINGS 04_PROPOSED ELEVATIONS, by alma-nac

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are 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 plan/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	Responded to screening question adequately.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Justification is provided for 'no' answers
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Justification is provided for 'no' answers
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Justification is provided for 'no' answers
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Hard surface has increased and more surface water will be discharged to the ground.

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	The development will result in a change in the proportion of hard surfaced external area.
Is factual ground investigation data provided?	Yes	Ground Investigation and Assessment, Appendix E, F and G
Is monitoring data presented?	Yes	Ground Investigation and Assessment, Appendix E, F and G
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	
Is a geotechnical interpretation presented?	Yes	Ground Investigation and Assessment, Appendix B
Does the geotechnical interpretation include information on retaining wall design?	Yes	Ground Investigation and Assessment, Appendix I
Are reports on other investigations required by screening and scoping presented?	Yes	GMA
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Ground Investigation and Assessment, Appendix B
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Ground Investigation and Assessment, Appendix I

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA, paragraph 14
Has the need for monitoring during construction been considered?	Yes	BIA, paragraph 11.2, responded adequately
Have the residual (after mitigation) impacts been clearly identified?	No	No residual impacts have been identified.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Ground Investigation and Assessment, Appendix I
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Permeable paving has been proposed to mitigate a small increased in hardstanding area
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Damage Category 0 and 1 is expected to the neighbouring properties.
Are non-technical summaries provided?	Yes	BIA, paragraph 15

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been carried out by an established firm of engineering consultants, Symmetrys Ltd and the individuals concerned in its production have suitable qualifications in engineering geology as required by CPG4.
- 4.2. The Ground Investigation and Assessment Report has similarly been carried out by an established firm of geotechnical consultants, LMB Geosolutions Ltd. The author is a chartered geotechnical engineer, which complies with CPG4 requirements.
- 4.3. The LBC Instruction to proceed with the audit identified that the basement proposal neither involved a listed building or was adjacent to a listed building.
- 4.4. The BIA submissions include land Stability, Hydrogeology and Hydrology screening and scoping, relevant site investigations and impact assessment as defined and required in the LBC Planning Guidance document 'Basement and Lightwells (CPG4).
- 4.5. The site consists of three storey high including lower ground floor with a two storey outrigger to the rear stepping down to single storey end terrace property. The structure is load bearing masonry with timber floor joists spanning front to back and a duopitch roof over the main part of the building with a flat roof over the existing part two and single storey. A lower ground floor is present beneath the footprint of the existing property with a lightwell to the front of the house visible from Pilgrim's Lane.
- 4.6. The proposed scheme involves extending the existing lower ground floor to the front and out to the side of the property with two new lightwells.
- 4.7. The site investigations are supported by a desk study of the British Geological Survey (BGS) Digital Map and the Environment Agency (EA) website. The BGS borehole records suggest that approximately 2.10m of Topsoil / Made Ground is present to the west of the site but that it is absent to the east of the site. It is anticipated that the site is located directly over 50m thick London Clay Formation.
- 4.8. A site specific ground investigation was conducted by LMB on 29th November 2017 and comprised of 1 No. Heavy Duty Dynamic (windowless) sampler boreholes to 7.35mbgl (refusal) and 2no. hand excavated trial pits to 1.2mbgl to expose existing building foundations. The bore holes' log has confirmed the site is located over 3.25m thick Made Ground made of orange and brown silty gravelly clay overlaying brown to grey slightly silty Clay indicating London Clay Formation Level up to the depth of the borehole at 7.35mbgl. The London Clay has been identified as an unproductive Strata.

- 4.9. The Ground Investigation and Assessment by LMB recommended that the foundations are carried through the Made Ground to a minimum depth of c.3.30m bgl and placed on the firm London Clay.
- 4.10. Within the two BGS borehole logs reviewed, groundwater was only recorded within Chalk. Groundwater monitoring was undertaken following completion of the fieldworks on 4th and 8th December 2017. No groundwater strikes were recorded during the ground investigation works. During return monitoring, groundwater was recorded at depths ranging between 3.09m and 3.73m bgl, however rather than being representative of a permanent and laterally continuous aquifer unit, the recorded groundwater level has been concluded as most likely be reflective of the pore water pressures within micro fissures and local mudstone horizons. LMB Geosolutions Ltd have advised that a dewatering strategy is not necessary for this planning application. This conclusion is accepted; however, care should be taken during construction should any ground water be identified with a dewatering plan in place should it be required.
- 4.11. A site walkover survey has been undertaken by LMB on 14th November 2017 that included external areas and has confirmed the presence of basements at the neighbouring properties including the adjacent no. 37 Pilgrims Lane and 49 Denning Road properties.
- 4.12. Construction methodology has been presented as part of the BIA. The extended lower ground floor to the side and back of the property will be constructed using reinforced concrete retaining walls cast in a hit and miss sequence, a widely utilised technique, to form basements walls. Temporary lateral propping is proposed to the faces of the retaining walls to ensure that the basement does not cause any local ground movements whilst construction is taking place.
- 4.13. The lower ground floor extension will primarily contain the side lightwell to the property. A portion of the existing lower ground floor retaining wall will remain to the side extension, which is to be incorporated into the proposed layout with the proposed retaining walls abutting the existing wall.
- 4.14. The new retaining walls will tie into the existing wall and formed in an underpinning sequence using reinforced concrete L-shaped pins. This will ensure that the basement slab resists any potential soil pressure due to heave of hydrostatic loads.
- 4.15. The rear extension at lower ground floor will be formed using two reinforced concrete L-shaped pins excavated below the existing footings. The existing floor construction within the Store and Boiler Room will also be removed and replaced with new 350mm thick RC slab.
- 4.16. Outline structural calculations for the basement retaining walls have been provided to demonstrate feasibility of the proposal.

- 4.17. Existing anticipated underpinning below the brickwall on the boundary with Denning Road to the rear of the proposed basement extension is to be retained. The existing structure to be checked for adequacy for highway loading once it is possible to survey.

SUDs have been considered as part of the application. The increase in the areas of hardstanding from 161.4m² to 178.4 m² have been considered and all surface water runoff from the new steps and balcony will be guided to the permeable paving/soft landscaping zones within the rear garden. The foul water from the additional facilities will be reviewed and if necessary drained to a submersible pump chamber which will connect to a rising drain directed to the nearest available inspection chamber. Gravity flow will be utilised into the existing combined sewage system. To mitigate the risk of back flow suitable measures such as non-return valves will be incorporated into the drainage specification. It is accepted that the impact on surface water drainage is likely to be minimal.

- 4.18. A Ground Movement Analysis (GMA) has been carried out by LMB which follows the method as described in CIRIA 760 Vertical and horizontal ground movements have been calculated due to excavation and installation with an estimated damage category to the neighbouring properties be no higher than Category 1 ('very slight') on the Burland Scale for the adjacent 37 Pilgrim's Lane and Category 0 (Negligible) for the neighbouring 49 Denning Road, 56 Pilgrim's Lane and 43 Denning Road. While the method described in CIRIA760 is not strictly applicable to underpinning or L-shaped retaining walls, however this would provide a conservative analogy when applied in this manner and is accepted by LBC. As correctly noted in the BIA, the underpinning techniques should be also carried out with good control of workmanship on site.
- 4.19. The Ground Movement Monitoring has been recommended in the Ground Investigation and Assessment by LMB to the adjacent properties. Trigger movement limits of 7mm are proposed for horizontal and vertical movements of the existing adjacent building elevations and garden walls. An outline works programme covering key phases of work has been presented.
- 4.20. Network Rail, Crossrail and Transport for London (TfL) have been contacted to confirm if their assets are located within the vicinity of the site. The response from Network rail and Crossrail have shown there are no below ground assets within the close proximity of the site and a similar outcome is anticipated with Crossrail.
- 4.21. The BIA has indicated that the development is 300 meter away from the "lost" River Fleet, however as it is a significant distance away and it will not impact on the wider hydrogeology of the area, any other watercourses, springs or the Hampstead Heath Pond chain catchment area.

- 4.22. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.
- 4.23. Given the above it can be confirmed that the proposal confirms to the requirements of CPG4.

5.0 CONCLUSIONS

- 5.1. The Basement Impact Assessment (BIA) and Ground Investigation and Assessment Report have been carried out by an established firm of engineering consultants, Symmetrys Ltd and the individuals concerned in its production have suitable qualifications in engineering geology as required by CPG4.
- 5.2. The LBC Instruction to proceed with the audit identified that the basement proposal either involved a listed building or was adjacent to a listed building.
- 5.3. The BIA submissions include land Stability, Hydrogeology and Hydrology screening and scoping, relevant site investigations and impact assessment as defined and required in the LBC Planning Guidance document 'Basement and Lightwells (CPG4).
- 5.4. An appropriate site specific SI has been carried out consisting of one borehole and two trial pits.
- 5.5. The ground conditions have been identified as 3.25m thick Made Ground overlaying London Clay. Ground water was observed at depths ranging between 3.09m and 3.73m bgl. Based on the investigation it is recommended that the foundations are carried through the Made Ground to a minimum depth of c.3.30mbgl and placed on the firm London Clay.
- 5.6. Dewatering strategy is not necessary for this planning application considering the groundwater does not represent the permanent and laterally continuous aquifer unit. This conclusion is accepted; however, care should be taken during construction should any ground water be identified with a dewatering plan in place should it be required.
- 5.7. A lower ground floor is present beneath the footprint of the existing three storey high property with a lightwell to the front of the house visible from Pilgrim's Lane.
- 5.8. The proposed scheme involves extending the existing lower ground floor to the front and out to the side of the property with two new lightwells and replacement of existing basement slab in the rear part of the existing lower ground floor.
- 5.9. The extended lower ground floor is proposed to be constructed using reinforced concrete retaining walls cast in a hit and miss sequence up to a depth of approximately 3.30m bgl, with temporary lateral propping. This is accepted as an appropriate method of construction.
- 5.10. A portion of the existing lower ground floor retaining wall will remain to the side extension, which is to be incorporated into the proposed layout with the proposed retaining walls abutting the existing wall.

- 5.11. Existing anticipated underpinning below the brickwall on the boundary with Denning Road to the rear of the proposed basement extension is to be retained. The existing structure to be checked for adequacy for highway loading once it is possible to survey.
- 5.12. A site walkover survey has confirmed the presence of basements at the neighbouring properties including the adjacent no. 37 Pilgrims Lane and 49 Denning Road properties.
- 5.13. A GMA has been carried out that predicts Damage Category 1 ('very slight') on the Burland Scale for the adjacent 37 Pilgrim's Lane and Category 0 (Negligible) for the neighbouring 49 Denning Road, 56 Pilgrim's Lane and 43 Denning Road. It is accepted by LBC, that this would provide a conservative analogy when applied in this manner. The underpinning techniques should be also carried out with good control of workmanship on site.
- 5.14. SUDs has been considered as part of the application. The surface water run off due to the increase in hardstanding is proposed to be guided to the permeable paving/soft landscaping zones within the rear garden. The foul water is proposed to be drained to a submersible pump chamber which will directly connect to the nearest available inspection chamber. Non-return valves are proposed to control the gravity flow into the existing combined sewage system.
- 5.15. Heave due to hydrostatic loads is proposed to be resisted by the basement slab connected into the new concrete retaining walls tied to the existing walls.
- 5.16. Construction methodology has been presented as part of the BIA.
- 5.17. The Ground Movement Monitoring has been recommended as part of the Ground Investigation and Assessment to the surrounding properties during construction.
- 5.18. An outline works programme covering key phases of work has been presented.
- 5.19. Outline structural calculations for the basement retaining walls have been provided to demonstrate feasibility of the proposal.
- 5.20. It is accepted that nearby rail assets are outside of the zone of influence of the proposed site.
- 5.21. The development is 300 meter away from the "lost" River Fleet, however it will not impact on the wider hydrogeology of the area, any other watercourses, springs or the Hampstead Heath Pond chain catchment area.
- 5.22. It is accepted that there are no slope stability concerns regarding the proposed development and is not in an area subject to flooding.
- 5.23. Taken the above, it can be confirmed that the proposal confirms to the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments [Request 'relevant comments' from the Case Officer]

Surname	Address	Date	Issue raised	Response
Mrs. Deaner	37 Pilgrim's Lane	15/03/2018	Concern regarding a potential damage to the adjacent existing basement walls has been raised.	<p>A Ground Movement Analysis (GMA) has been carried out for the adjacent 37 Pilgrim's Lane and the estimated damage category to the neighbouring property is estimated to be no higher than Category 1 ('very slight') on the Burland Scale.</p> <p>Also a construction monitoring scheme is proposed to be carried out throughout the construction stage to demonstrate that movements are within those predicted in the GMA.</p>

Appendix 2: Audit Query Tracker

Audit Query Tracker - None

Query No	Subject	Query	Status	Date closed out

Appendix 3: Supplementary Supporting Documents

None

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