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42 Elsworthy Road, London NW3 3DL

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12985-42

Revision: D1

April 2019

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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 42 Elsworthy Road, London NW3 3DL (planning reference 2019/0149/P). The basement is considered to fall within Category C as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment (BIA) 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 BIA has been prepared by Create Consulting Engineers Ltd with a Structural Engineer's Method Statement prepared by Form Structural Design Ltd and a Ground Movement Assessment (GMA) prepared by CGL Ltd. The qualifications of the authors are in accordance with LBC guidance.

1.5. The proposed development involves the partial demolition of the conservatory and garage at the lower ground level which will be replaced by a two storey above ground section. The existing basement level will be extended and a second level of basement will be created.

1.6. The BIA includes the majority of the information required from a desk study in line with LBC guidance. The conceptual model is generally adequately presented within the text and figures of the GMA. However, the depth and installation methodology of the proposed contiguous piled wall should be confirmed.

1.7. Prior to the site investigation in 2017, consultations were undertaken with Network Rail regarding the tunnel located 30m north of the site and Network Rail had no comment at that time. It is recommended that further consultations are undertaken with Network Rail prior to construction to confirm asset protection criteria, if required.

1.8. A site investigation was undertaken by Create Consulting Engineers Ltd in July 2017. The ground conditions comprise Made Ground over London Clay. Groundwater was not encountered during drilling. Groundwater was encountered during monitoring, which is stated to be perched water.

1.9. The London Clay is designated as unproductive strata. There will be no impact to the wider hydrogeological environment.

1.10. The BIA and GMA present geotechnical interpretation, including retaining wall design parameters.

1.11. Outline temporary works are included in the Structural Engineer's Method Statement and in the GMA. The construction methods proposed in these documents are a combination of contiguous piles and underpinning, with top-down construction and stiff propping in both the temporary and permanent cases.

1.12. The BIA (Section 8) states that pre-cast concrete, driven piles will be utilised. The form of piling should be confirmed. Driven piles are unlikely to be suitable due to noise and vibration concerns. The final depth of piling for the contiguous walls should be confirmed.

1.13. The GMA considers the movements related to the excavation and construction of the new basement in relation to no 40 Elsworthy Road. The damage impact assessment indicates Category 1 damage (Very Slight). However, consultation responses indicate that no 40 Elsworthy Road is currently undergoing structural repairs for cracking. It should be confirmed that, considering the current structural condition, damage to no 40 Elsworthy Road will not exceed Category 1.

1.14. An assessment of ground movements has been presented in relation to the surrounding highways and underlying utilities. This should be confirmed once length and methodology of piling has been established, as stated in 1.12, including movement profiles as discussed in Section 4.

1.15. An outline methodology and guidance for monitoring structural movements during construction is provided within the GMA.

1.16. Elsworthy Road is within a Critical Drainage Area (Group 3-005) but the site is not located within a Local Flood Risk Zone. The site is at low risk of flooding from surface water run-off. Standard flood risk mitigation measures should be adopted.

1.17. The proposed scheme will not increase the proportion of impermeable area. There is no risk to the wider hydrological environment.

1.18. Trees are proposed to be removed close to the garage to neighbouring no 2 Lower Merton Rise. It should be confirmed whether removal of the trees will impact the garage foundations due to a change in soil moisture profile, and if so, what mitigation is proposed.

1.19. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the clarifications requested are presented, the BIA does not meet the requirements of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 24th February 2019 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 42 Elsworthy Road, London NW3 3DL, Camden Reference 2019/0149/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): Basements. March 2018.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The 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; and,

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 planning portal describes the proposal as: *"Reconfiguration of existing building from 3 self-contained residential units to provide 1 x 5 bedroom unit and 1 x 2 bedroom unit to include demolition of existing side extension and erection of two-storey side extension, basement excavation, alterations to existing eastern side extension and new steps into the rear garden and*

front side access; other alterations to fenestration, front boundary wall, landscaping, provision of cycle storage.".

The planning portal also confirmed the site lies within the Elsworthy Conservation Area but the site or neighbouring properties are not listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 7th March 2019 and gained access to the following relevant documents for audit purposes:

- Structural Engineer's Method Statement (Rev P2) dated December 2018 by Form Structural Design Ltd including full construction sequence and layouts of the proposed structure and:
    - Geo-Environmental Assessment and Basement Impact Assessment (ref CB/CS/P17-1308/01) dated September 2018 by Create Consulting Engineers.
    - Ground Movement Assessment (ref CG/28854) dated December 2018 by Card Geotechnics Limited.
- Existing, demolition and proposed elevations and plans dated July 2018 by Marek Wojciechowski Architects.
- Report on the impact on trees of proposals for development (ref 1-38-4325/2) dated 27th September 2018 by John Cromar's Arboricultural Company Ltd.
- Design and Access Statement (ref 16092) dated October 2018 by Marek Wojciechowski Architects.
- Heritage Statement (including historical maps) dated October 2018 by Architectural History Practice.
- Comments and objections to the proposed development from local residents.

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	Conceptual site model should confirm length and methodology of piling.
Are suitable plans/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	Existing and proposed elevations and plans.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Section 5.1, Table 5.2. The closest section of the basement to pedestrian right of way is 1.58m. A Network Rail tunnel is located approximately 30m north of the site boundary.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Section 5.1, Table 5.1. The site is directly underlain by London Clay. A tributary of the Lost River Tyburn is located 150m west of the site.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Section 5.1, Table 5.3. Elsworthy Road is within a Critical Drainage Area (Group 3-005), although this was not identified within screening process. The impermeable site area will not increase as part of the proposed development
Is a conceptual model presented?	Yes	Within text and figures. Conceptual site model should confirm length and methodology of piling.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Report, Section 6.2. Conceptual site model should confirm length and methodology of piling.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	N/A	Monitoring data is stated to indicate surface water draining into standpipes. London Clay is designated unproductive strata.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	There is no change in the permeable / impermeable site ratio.
Is factual ground investigation data provided?	Yes	BIA Report, Section 7.
Is monitoring data presented?	Yes	Groundwater monitoring provided in BIA Report, Section 7.13. No groundwater was encountered during the site investigation. Monitoring data is stated to indicate surface water draining into standpipes.
Is the ground investigation informed by a desk study?	Yes	BIA Report, Section 4.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA Report, Section 5.2 and Ground Movement Assessment Report, Section 5 confirm that No. 40 Elsworthy Road is located 1.7m east of the site and that this building is not understood to have below ground levels.
Is a geotechnical interpretation presented?	Yes	BIA Report, Sections 7 and 8 and Ground Movement Assessment Report, Section 3.3.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Ground Movement Assessment Report, Section 4 and Calculations provided in Appendix C.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Movement Assessment Report and Report on the impact on trees of proposals for development.
Are baseline conditions described, based on the GSD?	Yes	
Do the baseline conditions consider adjacent or nearby basements?	Yes	There is no basement at the adjacent No. 40 Elsworthy Road.
Is an Impact Assessment provided?	Yes	BIA Report, Section 9.
Are estimates of ground movement and structural impact presented?	Yes	Ground Movement Assessment report provided which includes an assessment of the adjacent No. 40 Elsworthy Road.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	TBC	Conceptual site model should confirm length and methodology of piling.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Conceptual site model should confirm length and methodology of piling. A temporary works sequence indicating underpinning and propping is presented. Waterproofing and provision of sumps.
Has the need for monitoring during construction been considered?	Yes	Ground Movement Assessment Report, Section 5.1.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Long term heave and basement waterproofing discussed.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	TBC	Assessment of no 40 Elsworthy Road Accepted. Conceptual site model should confirm length and methodology of piling to complete GMA.

Item	Yes/No/NA	Comment
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The development will not increase the impermeable area.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	TBC	Conceptual site model should confirm length and methodology of piling.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Ground Movement Assessment report, Section 5. Damage Impact limited to Category 1 (Very Slight). Consultation responses indicate that no 40 Elsworthy Road is currently undergoing structural repairs for cracking. It should be confirmed that, considering the current structural condition, damage to no 40 Elsworthy Road will not exceed Category 1.
Are non-technical summaries provided?	Yes	Non-technical summary of BIA provided (Section 1 of BIA).

4.0 DISCUSSION

4.1. The BIA has been prepared by Create Consulting Engineers Ltd with a Structural Engineer's Method Statement prepared by Form Structural Design Ltd and a Ground Movement Assessment prepared by CGL Ltd. The qualifications of the authors of the reports are in accordance with CPG guidelines.

4.2. The proposed site comprises a six-storey residential house including a lower ground level with a single storey conservatory and garage on the western side of the property, with the garage having a single storey above it. The proposed development involves the partial demolition of the conservatory and garage at the lower ground level which will be replaced by a two storey above ground section. A split-level basement is proposed within the footprint of the first basement extending to the footprint of the proposed lower ground level. The footprint of the second basement below ground level will extend to the footprint of the reconstructed section on the western side of the building. The second basement below ground level will contain the swimming pool and pool plant. The formation level for the basement 1 level is 42.40m OD and formation level for the basement 2 level is 39.88m OD.

4.3. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. Utility companies including National Grid, UK Power Networks, Thames Water, Cadent Gas Network and BT Openreach have been consulted with regards to underground infrastructure.

4.4. A Network Rail tunnel is located 30m north of the site running in a southwest to northeast direction. Consultations have been undertaken with Network Rail regarding the site investigation and Network Rail had no comment at that stage (the plan sent by Network Rail is not centred on the subject site but the plan does indicate that the subject site is outside the exclusion zone of the tunnel). It is recommended that further consultations are undertaken with Network Rail prior to the development to confirm asset protection criteria, if required.

4.5. An Arboricultural Assessment has been provided which concludes that the proposed basement works (during construction and as a final proposal) will not affect the existing trees around the site that are proposed to be retained, including a mature Plane tree that is subject to a Tree Preservation Order. The arboricultural consultant states that any excavation beyond the existing footprint of the building would be detrimental to the survival of the protected tree. It is therefore advised that in order to establish an accurate root protection area trial pits should be dug prior to the commencement of works on site.

4.6. Five trees are proposed to be removed (listed as 2, 5, 12, 13 and 14 in the Arboricultural Report), four of which are close to the northern site boundary and the garage to the neighbouring no 2

Lower Merton Rise. It should be confirmed whether removal of the trees will impact the garage foundations due to a change in soil moisture profile, and if so, what mitigation is proposed.

4.7. There is a culvert running from north to south approximately 150m to the west of the site. This is believed to be associated with the lost river Tyburn.

4.8. A site investigation was undertaken by Create Consulting Engineers Ltd in July 2017 comprising two 15m boreholes and two 5m windowless sampler boreholes. The ground conditions comprise Made Ground (to a maximum depth of 1.5m) over London Clay. It is understood that the basement excavation will extend directly into the London Clay. No groundwater was encountered during the investigation but monitoring of the groundwater levels was undertaken on 3 occasions between July and September 2017 with levels increasing in all four boreholes. CGL noted that the top of the standpipe response zone in all boreholes was in the Made Ground, which is likely to be more permeable than London Clay and therefore the groundwater present in the standpipes was likely to be perched water infiltrating through the Made Ground into the top of the standpipes.

4.9. The Structural Engineer's Report states that the reinforced concrete liner walls will be designed as a water resistant structure in accordance with BS 8007 and detailed with hydrophilic strips at all concrete joints in order to prevent water ingress. An internal cavity drainage system will also be included in order to ensure a dry, grade 3 environment complying with BS 8102. In addition, sump pumps and drainage will be required to remove any water ingress from the cavity drain system.

4.10. The construction methods proposed are a combination of contiguous piles and underpinning for the basement retaining walls, with top-down construction and stiff propping in both the temporary and permanent cases. Outline temporary works information is included in the BIA, Structural Engineer's Method Statement and in the GMA. The text and figures in these documents describe the conceptual model. However, the depth and installation methodology of the proposed contiguous piled wall should be confirmed. The BIA (Section 8) states that pre-cast concrete, driven piles will be utilised. Driven piles are unlikely to be suitable due to noise and vibration concerns.

4.11. The BIA and the Ground Movement Assessment (GMA) Report presents geotechnical interpretation, including retaining wall design parameters.

4.12. The GMA considers the movements related to the excavation and construction of the new basement in relation to neighbours, the highway and underlying utility assets. The damage impact assessment indicates Category 1 damage (Very Slight) will be sustained by 40 Elsworthy Road. A sensitivity analysis has been provided using a variety of methodologies and industry standard software. The range of movements and strains predicted are reasonable, considering the basement in the vicinity of the neighbour is to be formed as a single level utilising

underpinning. However, consultation responses indicate that no 40 Elsworthy Road is currently undergoing structural repairs for cracking. It should be confirmed that, considering the current structural condition, damage to no 40 Elsworthy Road will not exceed Category 1.

4.13. In relation to the surrounding highways and underlying utilities, the GMA should be confirmed once the length and methodology of piling has been established, as discussed in 4.10. It is also noted that the GMA appears to consider that the effect of heave below the basement will influence beyond the contiguous piled wall. The movements described by CIRIA C760 (combined installation and excavation) and any settlement of the piles due to foundation loading should be presented, representing a reasonably conservative approach.

4.14. An outline methodology and guidance for monitoring structural movements during construction is provided within the GMA (Section 5.1). Prior to works commencing a conditions survey should be undertaken on all adjacent neighbouring walls and property facades and trigger values and contingency actions set for use during monitoring as the construction progresses.

4.15. Elsworthy Road is within a Critical Drainage Area (Group 3-005), although this was not identified within the BIA screening or scoping process. The site is not located within a Local Flood Risk Zone. The site is at 'low' risk of flooding from surface water run-off. Elsworthy Road did not flood in 1975 or 2002. Standard flood risk mitigation measures should be adopted, such as non-return valves (as discussed in 4.16).

4.16. The proposed scheme will not increase the proportion of impermeable area. It is expected that surface water and foul will be drained by utilising the existing gravity fed system where possible, and the minimal amount of water entering the basement level via the cavity drain system will fall to a sump below the new basement slab level. From the sump it will then be positively pumped to the outfall. A non-return valve will be installed at the main outfall to ensure the lower slab areas are not flooded by the combined sewer system in times of sustained heavy rainfall.

4.17. The proposed scheme will not increase the proportion of impermeable area. There is no risk to the wider hydrological environment.

4.18. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with CPG guidelines.

5.2. It is proposed that the existing basement level will be extended and a second level of basement will be created.

5.3. The BIA includes the majority of the information required from a desk study in line with LBC guidance.

5.4. The ground conditions comprise Made Ground over London Clay.

5.5. The London Clay is designated as unproductive strata. There will be no impact to the wider hydrogeological environment.

5.6. The BIA and GMA present geotechnical interpretation, including retaining wall design parameters.

5.7. Outline temporary works are presented. The BIA states that pre-cast concrete, driven piles will be utilised. Driven piles are unlikely to be suitable due to noise and vibration concerns. The final methodology and depth of piling for the contiguous walls should be confirmed.

5.8. The damage impact assessment indicates Category 1 damage (Very Slight) to no 40 Elsworthy Road. This should be confirmed, considering the current structural condition of no 40 Elsworthy Road.

5.9. An assessment of ground movements has been presented in relation to the surrounding highways and underlying utilities. This should be confirmed once the comments in Section 4 (4.13) are addressed.

5.10. An outline strategy for monitoring structural movements is presented.

5.11. The site is at low risk of flooding from surface water run-off. Standard flood risk mitigation measures should be adopted.

5.12. The proposed scheme will not increase the proportion of impermeable area. There is no risk to the wider hydrological environment.

5.13. It should be confirmed whether removal of the trees will impact the garage foundations to no 2 Lower Merton Rise due to a change in soil moisture profile, and if so, what mitigation is proposed.

5.14. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the clarifications requested are presented, the BIA does not meet the requirements of CPG Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Mortimore Kyme	40A Elsworthy Road	4th March 2019	Concerns re current structural condition of their property and the further impact of the adjacent proposed works	Section 4

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Land Stability	Piling Methodology and length to be confirmed	Open – to be provided as 4.10	
2	Land Stability	Current structural condition of 40 Elsworthy Road to be considered in impact assessment and GMA updated, as required, to ensure no more than Category 1 damage.	Open – to be provided as 4.12	
3	Land Stability	GMA in relation to piling to be updated to provide baseline C760 movements plus settlements	Open – to be provided as 4.13	
4	Land Stability	Impacts of removing trees in vicinity to garage of no 2 Lower Merton Rise	Open – to be provided as 4.6	
5	Land Stability	Consultation and asset protection agreements to be entered into with utility / infrastructure asset owners, as required	Note Only	Note Only

Appendix 3: Supplementary Supporting Documents

None

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