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10 Nutley Terrace
London
NW3 5SB

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12066-37
Revision: D1

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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 10 Nutley Terrace, London NW3 5SB (planning reference 2015/6528/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 BIA has been prepared by well-known firms of geotechnical engineering consultants and site investigation operatives, Site Analytical Services Ltd. Those involved with the reports production hold the required qualifications for surface water, ground water, and land stability aspects of the BIA.

1.5. A Structural Engineering Report and Subterranean Construction Method statement has been produced by well known firm of engineering consultants Elliottwood. Those responsible for the production of the report hold the required qualifications for the land stability aspects of the BIA.

1.6. The proposal involves the demolition of an existing building on the site, with the construction of a new building containing a basement level that was not present previously.

1.7. The BIA has confirmed that the proposed basement will be founded within the London clay.

1.8. It has been demonstrated that ground water flows will not be affected by the proposal.

1.9. The basement is to be constructed using established techniques, with appropriate details provided as to how this will be achieved.

1.10. Consideration in the design of the basement has been given to the local geology.

1.11. It has been confirmed that the trees on the property that are to remain will not be affected by the proposals. However there is a discrepancy with regards to the position of a tree within the neighbouring property and whether or not this will be affected by the propoals. Clarification is required regarding this.

1.12. A Network Rail tunnel is located in close proximity to the property. It is accepted that the risk of damage to the tunnel is low, however approval for the proposals will be required from Network Rail.

1.13. Calculations to demonstrate that the risk of damage to the neighbouring properties is low have been presented. The works are still required to be carried out by a competent contractor with a high standard of workmanship to ensure that this is the case.

1.14. Clarification is required over the additional discharge into the sewer network, and whether this discharge can be attenuated on site prior to entering the sewer.

1.15. It is accepted that the surrounding slopes to the development site are stable.

1.16. It is accepted that the property is not within a high flood risk area.

1.17. A number of requests for additional information have been raised, with a summary of these included in Appendix 2 of this report.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 22nd March 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 10 Nutley Terrace, London NW3 5SB, Planning reference 2015/6528/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.

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 Audit Instruction described the planning proposal as "Partial demolition of the existing building and demolition of detached single storey garage (existing front and west elevation to first floor level and existing roof to be retained and refurbished), to be replaced by a new detached single-family dwelling in the same footprint, along with extensions to the rear and side at ground and first floor levels, and a new basement."

2.6. The Audit Instruction also confirmed 10 Nutley Terrace was not, or was a neighbour to, listed buildings.

2.7. CampbellReith accessed LBC's Planning Portal on 13th April 2016 and gained access to the following relevant documents for audit purposes:

- Design Study & Basement Impact Assessment Report (BIA), Site Analytical Services Ltd dated October 2015
- Structural Engineering Report and Subterranean Construction Method Statement. ElliotWood, Rev P3
- Planning Application Drawings, StudioMarkRuthven dated 11/06/15, consisting of:

  Location Plan

  Existing Plans

  Demolition Plans

  Proposed Plans
- Construction Management Plan
- Tree Survey Report, Patrick Stileman Ltd, dated 23rd June 2015
- Planning Comments and Response

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The appropriate qualifications and experience is held by the authors of the BIA.
Is data required by Cl.233 of the GSD presented?	Yes	CTMP, BIA, planning drawings.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA and structural engineering report.
Are suitable plan/maps included?	Yes	BIA
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	BIA
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	A statement of justification has been provided for no answers. Appropriate data sources have been consulted.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	A statement of justification has been provided for no answers. Appropriate data sources have been consulted.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	A statement of justification has been provided for no answers. Appropriate data sources have been consulted.
Is a conceptual model presented?	Yes	BIA Section 5.2
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	An appropriate scoping statement is provided for each potential impact identified by the screening exercise.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	An appropriate scoping statement is provided for each potential impact identified by the screening exercise.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	An appropriate scoping statement is provided for each potential impact identified by the screening exercise.
Is factual ground investigation data provided?	Yes	Factual report on ground investigation appended to BIA.
Is monitoring data presented?	Yes	However the number of monitoring visits was not confirmed.
Is the ground investigation informed by a desk study?	Yes	Section 3 of the BIA
Has a site walkover been undertaken?	Unclear	No explicit confirmation that a walkover has been undertaken is present. However the BIA is written in a way that suggests that the author is knowledgeable of the site and likely to have visited.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Yes. Both the properties on Maresfield Gardens are thought to have lower ground floors, and 14 Netherhall Avenue has a recently constructed basement level.
Is a geotechnical interpretation presented?	Yes	Section 6 in the BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 6.7 in the BIA
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural report.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	Section 7 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	Ground movement assessment report appended to the BIA.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Movement monitoring plan during the construction phase.
Has the need for monitoring during construction been considered?	Yes	Section 10 in Structural Engineering report.
Have the residual (after mitigation) impacts been clearly identified?	No	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Ground movement assessment, construction method statement
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	The area of hardstanding discharging to the sewer is to increase by 22.25m^2.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	The screening and scoping exercise has not identified any impacts that other nearby basements could contribute to.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	The ground movement assessment confirms that the Burland damage category for the neighbouring buildings will be no worse than very slight (category 1).
Are non-technical summaries provided?	Yes	A non-technical summary is provided for each section of the report.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of engineering consultants, Site Analytical Services Ltd, and the individuals concerned in its production have suitable qualifications as required by CPG4.

4.2. The Structural Engineering Report and Subterranean Construction Method Statement has similarly been carried out by a well-known firm of engineering consultants, Elliottwood. The individuals concerned in its production have suitable qualifications as required by CPG4.

4.3. The LBC Instruction to proceed with the audit identified that neither the basement proposal either involved a listed building, or was adjacent to listed buildings.

4.4. The proposal involved the demolition of an existing 2 storey property, with first floor front and side elevation facades retained. The new building is to incorporate a single storey basement level extending well beyond the existing footprint of the property, and to a total depth of approximately 3.9m. The superstructure is to be constructed as a two storey building incorporating the retained facades to a smaller plan size than that of the basement level.

4.5. The superstructure is to be constructed of a combination of load bearing masonry and steel framing, with timber floors and a timber roof.

4.6. The basement level is proposed to be constructed as a reinforced concrete retaining wall, some of which support masonry and steel framing to form the superstructure. The ground floor slab is to be a suspended reinforced concrete slab spanning between the retaining walls, also providing a permanent prop to the heads of the walls.

4.7. As the existing building is to be mostly demolished, underpinning of existing walls is limited to the retained façade in the temporary case. The underpinning will ultimately become basement level internal load bearing walls supporting the ground level slab once the façade is supported by steel framing at the first floor level. Sacrificial mass concrete underpinning will also be provided to some of the retained ground floor walls in the temporary case. That will be demolished in the permanent case once the façade is provided with permanent support.

4.8. The retaining walls are to be formed in a hit and miss sequence in order to allow for the concrete to cure prior to the formation of adjacent bays. An outline temporary works sequence has been provided that details a methodical sequence of works in which propping is provided to all parts of the structure until permanent support is provided and inherent stability of the structure is achieved. The temporary works involve cross basement and raking propping of the basement retaining walls, sacrificial underpinning to retained elements, and needle beam supports to the existing façade. While the temporary works design will have to be developed

further prior to the construction stage, the current proposals are accepted as following best practice techniques and include an appropriate level of detail for the scheme design stage.

4.9. The BIA has identified that the clay sub soil is susceptible to heave when undergoing unloading. Heave protection has been incorporated into the design by provision of a suspended ground floor slab that spans between the toes of the basement walls. Compressible material is then to be provided beneath the basement slab to allow for the clay sub soil to increase in volume without damaging the ground slab. This technique is considered appropriate for a single storey basement in medium to high plasticity clays.

4.10. A Network Rail tunnel is located beneath Nutley Terrace which is estimated to be positioned 4m from the front wall of the basement, and 20m below ground level, positioning the top of the tunnel approximately 16m below the underside of the basement. The use of piles has been avoided in order to minimise impact on the tunnel, this is welcomed, however approval from Network Rail will be required for the proposal that is to be applied for independently of the planning process.

4.11. The structural report indicates that a basement is currently (at the time of the structural report) being constructed to the neighbouring property 14 Netherhall Gardens, and is of underpinning to the existing property and piled walls to the rear of the basement. Further details of this basement are not given, however it has been assumed that the basement is to the same level as is proposed for 10 Nutley Terrace. The neighbouring properties on Maresfield Gardens have been assumed to contain lower ground floor levels as observed from google streetview. This does not take into account that these properties may have elements at the rear that are founded at a shallower level, however given the distance of these properties are some 20m away from the proposed basement ground movement are not thought to be significant.

4.12. A ground movement assessment has been produced that considered both 14 Netherhall Gardens, and the adjacent properties along Maresfield Gardens. The properties on Maresfield Gardens have been judged by inspection to fall within the very slight or less damage category. Given that they are located some 20m from the proposed basement this conclusion is accepted. 14 Netherhall Avenue has been confirmed to have a recently constructed basement founded to a similar level to the proposed. The damage assessment to 14 Netherhall Gardens was calculated as very slight or less.

4.13. The BIA confirms that two underground rivers are located within the vicinity of the property, the Tyburn 200m to the east, and the Westbourne 200m to the west. It has been confirmed that both rivers are culverted and will not be impacted by the proposal. This conclusion is agreed with.

4.14. Site investigations have been carried out that include three boreholes to a maximum depth of 15m. Three trial pits have also been carried out to the perimeter walls of the existing house to reveal the existing foundations.

4.15. The ground conditions have been found to be made ground of up to 1m depth overlaying London Clay to depth. This is in agreement with the anticipated geology as discussed in the desk study phase of the report.

4.16. Ground water levels in the three boreholes have been monitored with three readings taken. All three boreholes were found to remain dry throughout the monitoring period from August to October 2015.

4.17. The basement will be founded wholly within the London clay. The BIA concludes that ground water flows will be limited within the clay and therefore the hydrogeological environment will not be effected. This conclusion is agreed with, however a method for dealing with local inflows within the 1m of made ground would be advised.

4.18. A movement monitoring strategy has been presented. While it is not explicitly stated which properties are to be monitored it is assumed that only the immediately adjacent 14 Netherhall Gardens is proposed for monitoring given the distance of the next closest property. Trigger values and appropriate actions have been provided in the monitoring strategy. The trigger values provided do not relate to the predicted movements for the property from the ground movement assessment, and appear to be generic commonly accepted trigger values. Given that limited movements predicted for 14 Netherhall Gardens and the fact that it contains a basement level to a similar depth it is felt that generic trigger values are acceptable in this instance.

4.19. While the site is sloped at approximately 7 degrees it is accepted that there are no slope stability concerns regarding the proposed development, and it is not in an area prone to flooding.

4.20. A tree survey report has been produced and presents root protection areas for trees within the property boundary and in the neighbouring gardens to the Maresfield Gardens properties. It has been demonstrated that of the trees that are to remain within the properties boundary all will have their root protection areas unaffected by the proposal. Of the two root protection areas of trees in the neighbouring gardens the tree that is located within the boundary of 35 Maresfield Gardens is shown in a differing location on the site plan as that on the plans included in the tree survey report. This has a potential impact on whether or not this trees root protection area will be affected by the works, this discrepancy should therefore be clarified.

4.21. The area of hardstanding is increasing by 22.25m^2 which is proposed to discharge into the existing sewer system, as it is claimed that due to the impermeable London clay a soakaway

onsite is not appropriate. The structural engineering report indicates that SUDs are recommended by way of attenuation tanks to restrict run off rates to that of a greenfield site. However the BIA identifies this impact through screening and scoping, and concludes that the additional run off is not significant and that SUDs are not required. Consistency is required between the reports, and it is suggested that where possible SUDs should be provided to attenuate flow where the amount of hardstanding discharging into the sewer has increased by any amount.

5.0 CONCLUSIONS

5.1. The BIA and SSR have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications.

5.2. The proposal involves the demolition of an existing two storey building, with the retention of first floor facades only. A new three storey structure including basement level is proposed for the site.

5.3. The BIA has confirmed that the proposed basement will be founded within the London clay, which is a suitable bearing material. This has been confirmed by suitable site investigations.

5.4. It is unlikely that ground water flows will be disrupted by the basement, due to the basement being located within the impermeable London clay with no superficial deposits over this.

5.5. The basement walls are to be formed of reinforced concrete retaining walls that in the permanent case will be propped at ground level by the RC ground slab.

5.6. Outline temporary works and a construction method statement have been provided, stating industry standard construction techniques and confirming the feasibility of the construction method and temporary works that are required.

5.7. Heave protection is to be provided by a compressible material beneath a suspended basement slab.

5.8. Clarification is required regarding the position of the tree that is within the boundary of 35 Maresfield Gardens, and whether this tree's root protection area will be affected by the proposals.

5.9. A Network Rail tunnel is located approximately 4m away from and 16m below the proposed basement. Piling has not been proposed in order to prevent loading from the basement being transmitted near to the tunnel. It is accepted that the risk of damage to the tunnel is low, however approval for the proposals will be required from Network Rail.

5.10. An appropriate ground movement assessment has been carried out concluding a damage category of very slight or less. Given the distance to the properties on Maresfield Gardens, and the existing basement to the nearest neighbouring property 14 Netherhall Gardens, it is accepted that the risk of significant ground movement is low.

5.11. Clarification is required over the requirement for SUDs to attenuate additional run off flows. If attenuation is not provided then evidence why the site is not suitable to provide this is required.

5.12. A generic movement monitoring strategy has been proposed that is accepted as appropriate given the low risk of movement to neighbouring properties.

5.13. It is accepted that the surrounding slopes to the development site are stable.

5.14. It is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding.

5.15. A number of requests for additional information have been raised, with a summary of these included in Appendix 2 of this report.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Kudsi	37B Maresfield Gardens	22/01/2016	Damage to tree roots	The Arboricultural report confirms that the root protection area of the tree within the boundary of 37 Maresfield Gardens will not be affected by the works.
Cohen	Flat 1, 39 Maresfield Gardens	28/01/2016	Damage to property	The construction method statement, and ground movement assessment confirm that the risk of damage to the neighbouring properties is acceptable.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Approvals	Network Rail approval is required for the proposal	-	N/A
2	Drainage	Consistency between reports regarding requirement for SUDs is required. If attenuating SUDs not provided evidence for their unsuitability to be provided.	Open	
3	Arboricultural	Consistency is required for the position of the tree that is within the boundary of 35 Maresfield Gardens between the site plan and the tree survey report, and whether or not this trees root protection area will be affected by the proposals.	Open	

Appendix 3: Supplementary Supporting Documents

None

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