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15-17 Tavistock Place
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Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12727-17

Revision: D1

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Appendix

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 15-17 Tavistock Place, London WC1H 9SH (planning reference 2017/5914/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 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 undertook an audit of a BIA of 15-17 Tavistock Place prepared by Wilde Carter Clack Ltd in 2015 (CampbellReith reference 12066-61). This related to a previous application (planning reference 2015/3406/P) which was approved in January 2017 and the application was subsequently altered under planning reference 2017/5914/P. Given the change in the size of the basement CampbellReith was instructed by LBC to prepare a new audit.

1.4. 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.

1.5. The BIA has been prepared by Geotechnical & Environmental Associates (GEA) with supporting documents provided by Wilde Carter Clack Ltd and Boswell Mitchell and Johnson Architects. The qualifications of the authors of the BIA are in accordance with CPG4 guidelines.

1.6. The proposed development comprises the demolition of the existing depot building on site and construction of a new four-storey building with a single level basement over the central part of the site which is to be used as laboratory and lecture theatre. It is understood the basement will extend to approximately 6.7m below the existing ground level.

1.7. The BIA includes the majority of the information required from a desk study in line with the LBC guidance. However, a conceptual site model, underground utilities information and evidence of consultations with TFL should be presented.

1.8. A site investigation was undertaken by GEA in May 2015. The ground conditions comprise Made Ground, overlying Lynch Hill Gravel, underlain by the London Clay and the Lambeth Group.

1.9. Groundwater is expected to be encountered within the Made Ground and the Lynch Hill Gravel and as such some form of groundwater control will be required during basement excavation. It is accepted there are no impacts to the wider hydrogeological environment.

1.10. The BIA outlines a number of methods by which the sides of the basement excavation could be supported in the temporary and permanent conditions. The stability assessment assumes the use of a secant piled wall, stiffly propped in the permanent and temporary cases. The temporary and permanent structural scheme should be confirmed, including sequencing and requirements for dewatering, to confirm the assessments made are applicable.

1.11. The outline construction management plan should be updated to reflect the current proposal including the proposed construction sequence and depth of basement. It is noted that although some of the BIA submission has been recently updated, there are inconsistencies through the documents between the former and current proposals, and the final scheme should be clarified.

1.12. A Ground Movement Assessment (GMA) has been presented which indicates predicted damage of Category 0 to 1 (Negligible to Very Slight) to surrounding structures, in accordance with the Burland Scale. The presence or absence of basements, underground structures / utilities or listed buildings within the zone of influence should be confirmed and impacts on retaining walls / highways presented. The validity of the presented assessment can only be confirmed once the requested structural information is presented, as 1.10, 1.11.

1.13. Correspondence with TFL is alluded to, which should be presented to confirm that asset protection agreements have been entered into in regards the adjacent assets.

1.14. An outline methodology and guidance for monitoring structural movements and limiting damage impacts, as applicable, should be provided.

1.15. A drainage strategy has been provided confirming that the development will incorporate a green roof, a blue roof and attenuation tanks, which is intended to reduce peak off-site discharge flow rates in line with best practice. It is accepted that there are no hydrological impacts.

1.16. The site is located within Critical Drainage Area Group 3-003 but is not located within a Local Flood Risk Zone and is at very low risk of flooding.

1.17. Non-technical summaries should be provided within any revisions to the BIA submitted.

1.18. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the requested additional information has been presented, the BIA does not meet the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 7 November 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 15-17 Tavistock Place, London WC1H 9SH, Camden Reference 2017/5914/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 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. The LBC Audit Instruction described the planning proposal as, "Variation of condition 2 (approved plans) attached to planning permission ref 2015/3406/P dated 27/01/2017 (for Demolition of existing shed buildings (Class D1) and erection of a part single, part two-storey, part three-storey medical research laboratory and higher education facility (Class D1) with

basement accommodation on 2 floors and associated plant on roof), namely to allow reduction of basement to a single storey; removal of flue stacks; creation of a lightwell atrium and amended roof profile; internal changes to research laboratories and plant rooms; various associated external changes to fenestration, rooflights and louvres; relocation of substation; relocation of accessible parking."

2.6. The planning portal confirmed the site lies within Bloomsbury Conservation Area and adjoins the Grade II listed terrace in Cartwright Gardens to the north.

2.7. A previous application (Camden Reference 2015/3406/P) included a Basement Impact Assessment (prepared by Wilde Carter Clack Ltd, ref 4159, dated June 2015 rev A) which was audited by Campbell Reith (Campbell Reith Reference 12066-61 rev D2 dated October 2015). The size of the basement of the current application has changed since the original application and therefore a new Audit is being undertaken.

2.8. CampbellReith accessed LBC's Planning Portal on 11th December 2017 and gained access to the following relevant documents for audit purposes:

- Ground Investigation and Basement Impact Assessment (ref J13113A) dated September 2017 by Geotechnical & Environmental Associates.
- Existing and Proposed Plans, Layouts and Elevations (ref 2924) dated October 2017 by Boswell Mitchell and Johnson Architects.
- Design and Access Statement dated June 2015 by Boswell Mitchell and Johnson Architects.
- Proposed Construction Management Plan dated October 2017 by Wilde Carter Clack Ltd.
- Depot Re-development Drainage Review On land at rear of London School of Hygiene & Tropical Medicine (Rev B) dated January 2015 by Wilde Consultants.
- Report on proposed SUDS (ref 4159) dated September 2017 by Wilde Carter Clack Ltd.
- 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	The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	No	Utility companies have not been approached with regards to underground infrastructure. Correspondence with TFL to be provided confirming asset protection agreements (if applicable). The BIA documents should be updated to reflect the current proposal including the proposed construction sequence and depth of basement.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	However, this should be illustrated by a conceptual site model which highlights potential impacts.
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	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA Report, Section 3.1.2. Data sources have not been referenced but assessments generally accepted. Potential impacts to the boundary walls should be considered. Impacts to TFL assets to be clarified / protection agreements confirmed.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Data sources have not been referenced but assessments accepted.
Hydrology Screening:	Yes	BIA Report, Section 3.1.3. Data sources have not been referenced

Item	Yes/No/NA	Comment
Have appropriate data sources been consulted? Is justification provided for 'No' answers?		but assessments generally accepted. The site is located within Critical Drainage Area Group 3-003 but is not located within a Local Flood Risk Zone.
Is a conceptual model presented?	No	This should indicate the proposed development in the context of the existing site conditions and adjacent structures, highlighting any potential impacts.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Consideration of boundary walls required.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	The site is located within a Critical Drainage Area but not within a Local Flood Risk Zone.
Is factual ground investigation data provided?	Yes	BIA Report, Section 5.
Is monitoring data presented?	Yes	BIA Report, Section 5.5. Groundwater monitoring in 2013 and 2015. As discussed in the report, monitoring of the standpipes should be continued to determine the equilibrium level and to identify any seasonal fluctuations.
Is the ground investigation informed by a desk study?	Yes	BIA Report, Section 2 (a previous desk study is referred to but a summary of the pertinent information is provided in the current report).
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	No reference is made to basements. A disused underground fuel

Item	Yes/No/NA	Comment
		storage tank is understood to be located beneath the pathway to the south of the depot. A response from a local resident of the adjacent 13 Tavistock Place indicates a basement that houses an electricity sub-station.
Is a geotechnical interpretation presented?	Yes	BIA Report, Sections 5 and 8.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Geotechnical parameters for design presented. BIA Report, Section 10. Final scheme not confirmed.
Are reports on other investigations required by screening and scoping presented?	Yes	Drainage Review and Report on Sustainable Urban Drainage.
Are baseline conditions described, based on the GSD?	No	Confirmation of construction method required, including temporary and permanent scheme, and sequencing.
Do the base line conditions consider adjacent or nearby basements?	No	Assumptions made regarding founding depths of adjacent properties.
Is an Impact Assessment provided	Yes	BIA Report, Section 15. However, not all potential impacts considered.
Are estimates of ground movement and structural impact presented?	No	Ground movement assessment presented (BIA Report, Sections 11, 12 and 13). Should be confirmed pending construction method and temporary works.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	It does not address the potential stability impacts to boundary walls. Confirmation of construction methodology required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Temporary propping (BIA Report, Section 8 and 10), monitoring and trigger levels (BIA Report, Section 13.2) and groundwater

Item	Yes/No/NA	Comment
		control (BIA Report, Sections 8, 9 and 10) are discussed. Confirmation of construction methodology required. Impacts to boundary walls to be considered.
Has the need for monitoring during construction been considered?	Yes	BIA recommends monitoring; outline scheme to be presented.
Have the residual (after mitigation) impacts been clearly identified?	No	To be further assessed, as applicable.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Structural scheme to be confirmed; adjacent infrastructure / services / basements to be identified; asset protection agreements should be confirmed, as applicable; outline structural monitoring scheme including appropriate trigger values / contingency actions to be presented.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	SUDS scheme proposed.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Further structural information required and confirmation of construction methodology. It is accepted that the development will not materially change run-off from the current site arrangements.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Damage Assessment analysis (BIA Report, Section 13) has predicted that the development will result in building damage of sensitive structures of between Category 0 (Negligible) and Category 1 (Very Slight). To be confirmed pending confirmation of construction methodology.
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The BIA has been prepared by Geotechnical & Environmental Associates (GEA) with supporting documents provided by Wilde Carter Clack Ltd and Boswell Mitchell and Johnson Architects. The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines.

4.2. The proposed development comprises the demolition of the existing depot building on site and construction of a new four-storey building with a single level basement over the central part of the site which is to be used as laboratory and lecture theatre. It is understood the basement will extend to approximately 6.7m below the existing ground level.

4.3. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. However, a conceptual site model should be presented. The model should indicate the new foundation / retaining wall levels in relation to the existing development, the ground and groundwater conditions and the depth of foundations / basements of any structures within the proposed development's zone of influence. It should highlight any risks or potential impacts.

4.4. The presence or absence of underground utilities or infrastructure should also be confirmed. The Piccadilly underground line runs 20m east of the site (reported as 20m west of the site in the BIA report). Whilst the report states that TFL have confirmed the precise location of the tunnels and that the development would not affect their assets, no evidence of this has been provided within the documentation. If relevant, confirmation of asset protection agreements should be presented.

4.5. The River Fleet historically flowed in an easterly direction approximately 100m to the north of the site which is likely to have been culverted in the late 19th century. It is accepted that this unlikely to be impacted by the proposed development.

4.6. A site investigation was undertaken by GEA in May 2013 comprising four cable percussion boreholes to depths of between 20.45m and 30.45m, ten window sampler boreholes to depths of between 0.40m and 2.60m and five trial pits were manually excavated to depths of between 0.30m and 1.40m to investigate the existing foundations. Groundwater monitoring standpipes were installed in three of the cable percussion boreholes to depths of 6.20m, 6.30m and 4.50m. The ground conditions comprise Made Ground to depths of between 1.60 and 4.30m bgl, overlying Lynch Hill Gravel to a depth of 4.60m bgl (where present), overlying London Clay and the Lambeth Group. Groundwater was encountered in the Made Ground at depths of between 0.8m and 2.1m. Minor inflows were also recorded in the London Clay at depths of 9.65m associated with a claystone and at approximately 18.0 and 18.9m associated with the presence

of sand layers. The data is presented in an interpretative report in accordance with the GSD Appendix G3, although a conceptual site model has not been presented.

4.7. Groundwater levels were measured on 07 June 2013, 16 July 2013 and 18 November 2015. It should be noted that the BIA makes reference to a measured groundwater depth range on the 07 June visit of between 3.11m and 5.59m bgl. However, a shallower depth to groundwater of 1.70m bgl was recorded in the November 2015 visit. Groundwater is expected to be encountered within the Made Ground and the Lynch Hill Gravel and as such some form of groundwater control will be required during basement excavation. Continued groundwater monitoring is recommended within the BIA to confirm the design water level and to identify any seasonal fluctuations.

4.8. The BIA states that the direction of groundwater flow beneath the site is likely to be a southerly direction, downslope towards the River Thames. The BIA argues that the completed basement will present only a partial barrier to groundwater flow as there is space between the basement and the other neighbouring structures for groundwater to flow around it. It is accepted there are no impacts to the wider hydrogeological environment.

4.9. The BIA outlines a number of methods by which the sides of the basement excavation could be supported in the temporary and permanent conditions. Given the proposed depth of excavation some form of piled wall is likely to be required to provide stability and to control groundwater inflows. Sheet piled walls, a bored pile retaining wall and a contiguous bored pile are all discussed. If subsequent monitoring indicates that groundwater inflows are likely to be significant a secant wall may be required which could overcome the requirement for any secondary groundwater protection in the permanent works.

4.10. The stability assessment assumes the use of a secant piled wall, stiffly propped in the permanent and temporary cases. The temporary and permanent structural scheme should be confirmed, including sequencing and requirements for dewatering, to confirm the assessments made are applicable.

4.11. The BIA presents a geotechnical interpretation with a table of soil parameters provided for retaining wall design in the Made Ground, Lynch Hill Gravel and London Clay. Outline retaining wall calculations are presented. These should be confirmed as applicable to the final construction method and structural design.

4.12. The outline construction management plan should be updated to reflect the current proposal including the proposed construction sequence and depth of basement. It is noted that although some of the BIA submission has been recently updated, there are inconsistencies through the documents between the former and current proposals, and the final scheme should be clarified.

4.13. A Ground Movement Assessment (GMA) has been presented which indicates predicted damage of Category 0 to 1 (Negligible to Very Slight) to surrounding structures, in accordance with the Burland Scale. The GMA identifies the potential sensitive structural receivers within the zone of impact of the proposed development, which include 4, 5, 6 and 7 Woolf Mews, Cartwright Gardens, Marchmont Street and 15-17 Tavistock Place. The presence or absence of basements, underground structures / utilities or listed buildings within that zone should be confirmed and impacts on retaining walls / highways presented. The validity of the presented assessment can only be confirmed once the requested structural information is presented, as 4.10 to 4.12.

4.14. As stated in the BIA (Section 13.2), an outline methodology and guidance for monitoring structural movements during construction should be provided in order to limit damage impacts. This should include proposed trigger values and contingency actions, as applicable.

4.15. It is understood that the existing site is presently fully drained with either existing impermeable roofs or impermeable paving at ground level. A drainage strategy has been provided confirming that the development will incorporate a green roof, a blue roof and attenuation tanks, which is intended to reduce peak off-site discharge flow rates in line with best practice. It is accepted that there are no hydrological impacts.

4.16. The site is located within Critical Drainage Area Group 3-003 but is not located within a Local Flood Risk Zone and is at very low risk of flooding. Tavistock Place did not flood in either 1975 or 2002.

4.17. Non-technical summaries should be provided within any revisions to the BIA submitted.

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 CPG4 guidelines.

5.2. The proposed development comprises the demolition of the existing depot building on site and the construction of a new four-storey building with a single level basement to a depth of approximately 6.7m bgl.

5.3. The BIA documents are inconsistent in describing the proposed works and should be updated to reflect the current proposal.

5.4. Underground utilities information should be presented and evidence of correspondence with TFL should be provided regarding asset protection agreements for Piccadilly Line assets, as applicable.

5.5. A site investigation has confirmed the underlying ground conditions to comprise Made Ground overlying Lynch Hill Gravel underlain by London Clay and the Lambeth Group. Groundwater is likely to be encountered during construction.

5.6. The stability assessments assume the basement will be formed by a secant piled wall, stiffly propped in both the temporary and permanent states. The structural scheme, construction method and sequencing should be confirmed. Groundwater control methodologies should be confirmed, if required.

5.7. A GMA has been presented which indicates damage of Category 0 to 1 (Negligible to Very Slight) to surrounding structures, in accordance with the Burland Scale. The presence or absence of basements, underground structures / utilities or listed buildings within that zone should be confirmed and impacts on retaining walls / highways presented.

5.8. An outline methodology and guidance for monitoring and controlling structural movements during construction should be provided.

5.9. An outline drainage strategy has been provided. It is accepted that there will be no impact to the wider hydrological environment.

5.10. It is accepted there will be no impact to the wider hydrogeological environment.

5.11. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested has been provided, the requirements of CPG4 have not been met.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Cockle	Flat 3, 13 Tavistock Place	25 November 2017	Concerns about monitoring of vibrations and movement during construction of basement. Concerns about boundary walls: Proposed Construction Management Plan states "the northerly boundary wall will be maintained, but may require strengthening or temporary propping" in Section 10.4. This westerly wall joins the northerly boundary wall which runs along the back of 13 Tavistock Place. The wall has shown signs of movement and should be regarded as frail.	Section 4

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	Conceptual Site Model to be provided highlighting current and proposed development in the context of ground and groundwater conditions, highlighting potential risks, impacts and mitigation actions.	Open	
2	Desk Study	Underground utility infrastructure information should be provided. Impacts should be assessed, if applicable.	Open	
3	Desk Study	Consultations with TFL to be provided regarding Piccadilly Line assets and protection agreements, as applicable.	Open	
4	Groundwater	In accordance with the BIA's own recommendations, further groundwater monitoring should be undertaken.	Open	N/A – ongoing
5	Land Stability	Construction methodology and structural scheme to be confirmed, including outline temporary and permanent works, sequencing and groundwater control.	Open	
6	Land Stability	GMA and damage impact assessment to be updated / confirmed, based on structural scheme / construction method.	Open	
7	Land Stability	Potential impacts to the boundary walls to be confirmed.	Open	
8	Land Stability	Monitoring structural movements during construction – outline scheme including trigger values, contingency actions etc to protect surrounding structures.	Open	

Appendix 3: Supplementary Supporting Documents

None

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