

**7 Denmark Street,
London WC2H 8LS**

**Basement Impact Assessment
Audit**

For
London Borough of Camden

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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 7 Denmark Street, London, WC2H 8LS (planning reference 2016/0088/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, subterranean, and surface flow 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 Building Impact Assessment (BIA) has been carried out by Engenuiti Ltd. The qualifications of the individuals who have prepared and reviewed the BIA are in accordance with the requirements of CPG4.
- 1.5. The site is occupied by a three storey terraced Grade 2 listed property. It is intended to deepen an existing basement and to extend the basement to cover the entire site. Planning drawings show the basement to be connected to a proposed basement at Book Mews.
- 1.6. The BIA contains numerous discrepancies with respect to basement construction. No information is provided with respect to the proposed temporary works.
- 1.7. However, some discrete zones of high surface flood risk are identified in north of the site in Denmark street which should be addressed in the BIA.
- 1.8. The site is directly located above an aquifer. Although it is accepted that the basement will not significantly alter the groundwater regime, additional information on the groundwater level is required for construction.
- 1.9. The site and its surrounding are relatively flat, and no tree will be felled as a part of the proposed development. There is no concern with regard to shrink/swell on the site.
- 1.10. It is accepted that the proposed construction will not have an impact on its surrounding roads and pedestrian rights of way. Separate approvals are required with respect to Crossrail as the site lies within their safeguarding zone.
- 1.11. No site specific ground investigation has been carried out and the BIA is based on exploratory holes sunk for the applicant on other nearby sites. It is recommended that a site specific ground investigation is carried out to confirm the assumptions made with respect to ground and

groundwater conditions, or that the BIA is based on worst credible conditions and a ground investigation carried out and reported in a Basement Construction Plan.

- 1.12. If information from other sites is to be used, permission should be sought from the GI Contractors providing the information. No calculations have been presented for the retaining walls, slab or foundations.
- 1.13. It is noted that pumping from sumps will be employed if groundwater is encountered. It should be demonstrated how this might be achieved in the Lynch Hill Gravel and whether there would be any impacts on surrounding structures.
- 1.14. Whilst a ground movement assessment predicts damage no worse than very slight, the assumptions require clarification once the construction methodology has been confirmed. It should be noted that the owners of a listed building are obliged not to cause then harm.
- 1.15. Monitoring is proposed and it is accepted that this may be agreed with the party wall surveyor.
- 1.16. Queries and requests for clarification are discussed in Section 4 and summarised in Appendix 2.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 15 January 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 7 Denmark Street, London, WC2H 8LS, Camden Reference 2016/0088/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 single storey rear elements; additional storey to the rear mews building to create an eating area for the existing bar (A4) use; basement extension to provide additional office (B1a) space and new residential bicycle storage and associated works.*"

The Audit Instruction also confirmed that the proposed development is part of a grade 2 listed building, and some of the adjacent buildings are also acknowledged to be listed.

2.6. CampbellReith accessed LBC's Planning Portal on 11/02/2016 and gained access to the following relevant documents for audit purposes:

- Response from Thames Water
- Basement Impact Assessment (BIA) report
- Design and Access Statement

Structural Drawings:

- Existing Basement and Ground Floor Plan
- Existing First and Second Floor Plan
- Existing Section front and rear elevations
- Existing Section looking east
- Existing Section looking west
- Existing Section looking west through boundary wall
- Existing Site Plan
- Existing Third Floor and Roof Plan
- Proposed Basement and Ground Floor
- Proposed Detailed Section looking East
- Proposed First and Second Floor
- Proposed Section and Yard Elevation
- Proposed Section East
- Proposed Section looking East
- Proposed Section looking East at Boundary Wall
- Proposed Section Rear and Front Elevations
- Proposed Section West
- Proposed Site Plan
- Site location plan

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA prepared by Chartered Engineer and reviewed by Chartered Geologist.
Is data required by Cl.233 of the GSD presented?	No	The information provided does not justify the conceptual site model or provide sufficient information on the temporary works sequence.
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	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The answer to Q.10, and Q.13 is not accepted; as the groundwater table on the site, and presence of a basement for No. 122 Charing Cross Rd still have to be confirmed. Also, there seem to be an inconsistency with the main body of the report and the answer to Q.10.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The risk of flooding from rising groundwater cannot be satisfactorily evaluated until the groundwater level is confirmed within the site development locality.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The risk of surface flooding is not addressed properly.

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	However, it is based on nearby site investigations. No site investigation or groundwater monitoring is proposed on the site.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	No	The referenced site investigations belong to nearby locations. It should be confirmed that the information is representative to the location of the proposed development and can be officially used in the BIA considerations.
Is monitoring data presented?	No	Not on the site location.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	No	Not known.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	However, it is yet to be investigated for the neighbouring buildings in No. 122 Charing Cross Road and No. 8 Denmark Street.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	However, it should be confirmed if it can be used on the site.
Are reports on other investigations required by screening and scoping presented?	Yes	

Item	Yes/No/NA	Comment
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Not completely for the land stability section.
Is an Impact Assessment provided?	Yes	The conclusions are presented in the main report; however, further assessments are required to be submitted.
Are estimates of ground movement and structural impact presented?	Yes	As above.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	However, the screening outcome is incomplete.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	NA	Once the detailed assessments are provided, it can be evaluated whether sufficient mitigation measures are undertaken.
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	NA	Once the detailed assessments are provided, it can be evaluated whether sufficient mitigation measures are undertaken.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	It is proposed that the new basement will drain into the existing drainage and Thames Water has no objection; confirming that the sewers are not at risk of overloaded flooding. However, if sump and pump during the excavation is needed and the collected water is proposed to be discharged into the public sewers, permission from Thames Water is required. The possibility of increasing the risk of surface water flooding in Denmark Street is yet to be investigated.

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	NA	More information is awaited.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, there are discrepancies with respect to the construction methodology and further clarification is required.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The Building Impact Assessment (BIA) has been carried out by Engenuiti Ltd. The individuals who have prepared and reviewed the BIA have the specified qualifications, although no proof of expertise in ground engineering and flood risk assessment has been provided.
- 4.2. The existing building is a 3 storey terraced Grade 2 listed building with a single partial basement that extends below the footprint of the structure to the edge of the open yard to the rear. It is located on the south side of Denmark Street. The submitted application is a part of an integrated redevelopment plan of St Giles Circus; the main project is covered by a separate BIA (report number 029-S-REP-006). The site is bounded by Denmark Street to the north, and has shared walls with No. 6 and 8 Denmark Street to the east and west. The south of the site is partly shared with the rear of Book Mews and No. 122 Charing Cross Road. The presence of a similar depth basement is shown in the provided drawings for No. 6 Denmark Street; however, it is not clear whether the other neighbouring buildings include a basement level or not.
- 4.3. The proposed development consists of partial demolition of single storey rear elements, including the existing rear mews and utilities areas at ground floor level and construction of a two-storey addition to the rear yard linked to a new single-storey restaurant with a glazed ceiling. Some of the paved yard is to be kept. It also includes the extension of the existing basement to the site boundary to accommodate plant and a cycle storage area for residents.
- 4.4. The property to the rear at Book Mews does not contain a basement according to the existing plan drawings, although a basement is shown in the proposed drawings linked to that planned for 7 Denmark Street. The construction sequence of these two sites should be confirmed in order to assess the effect of the ground movements induced by basement excavation and construction on each property.
- 4.5. It is stated in the BIA that the prime access to and from the site will be from Book Mews. A detailed assessment of the construction traffic and access routes is due to be prepared by the Principal Contractor as a part of the Construction Management Plan.
- 4.6. No site investigation has been undertaken on the site, and the presented conceptual model and soil parameters used in design of the retaining walls are based on two adjacent site investigation reports prepared by GEA (in 2012), and Concept Ltd (in 2015) located at distances of about 30 to 50m from the site. It is stated in the BIA that the restricted size and access to the site 'negates' the possibility of working within it directly. Considering the variations in depth of the Made Ground and the underlying Lynch Hill Gravel, it is not clear how representative the existing results would be to the referenced site. It should be confirmed that consent has been obtained from GEA and Concept Site Investigations that their data may be used for this project.

- 4.7. It is assumed in the BIA that the basement slab will be founded within the Lynch Hill Gravel at approximately 21m AOD, but it is acknowledged that in some areas the Made Ground may extend below this level. Groundwater was recorded on the adjacent site at 20.40m AOD in 2012 which is above the base of the deepest recorded Made Ground. It is also noted that the site is gently sloping to the south east, so the recorded level of 20.40mAOD to the south east of the site may not be exactly representative for the location of the proposed development.
- 4.8. In the design of the retaining wall, groundwater level is assumed at 1m below the existing ground level to accommodate rise in the groundwater level and accidental discharge of water mains. This assumption and the adopted soil parameters are accepted as reasonable for design although they should be confirmed by a site specific ground investigation. No calculations have been provided for the design of the retaining walls and slab, nor to justify the bearing stratum.
- 4.9. There are inconsistencies in the provided information. In the BIA document it is stated that the proposed basement does not extend beneath the groundwater level and that relatively modest underpinning will be required. However, the planning drawings show the need for excavations to approximately 4m beneath the existing yard and it has not been confirmed whether there are existing basements on all sides. Elsewhere, the construction methodology suggests that the underpinning will be undertaken in two stages of above and below the water table with bulk excavation to just above the existing foundation taking place prior to the underpinning. In order to maintain stability and minimise the ground movements, temporary supports in forms of 'trench sheeting' and 'props' will be adopted. In contrast to this, Section 9.0 of the BIA refers to the installation of piled foundations and a piled basement slab. No information with respect to temporary works is provided.
- 4.10. The sump-pump method of water collection is suggested in the BIA in case of encountering groundwater during the excavation in the superficial granular soil. It is proposed that any collected water will be discharged into the public sewerage network with Thames Water being consulted in advance. It should be clarified how this will be achieved as groundwater within granular strata can rapidly and continuously ingress into the excavated basement resulting in significant volumes of water requiring to be discharged during the construction. This level of dewatering can cause ground settlement which may extend beyond the site boundary and affect the neighbouring structures.
- 4.11. It is acknowledged that the site and its surroundings are 'gently' sloping towards the south: there is no concern about slope stability issues with this regard.
- 4.12. No trees will be felled as a part of the construction, and the site is not directly underlain by London Clay. Shrink/swell is not considered as an impact on the site.

- 4.13. It is accepted that the proposed construction will not have an impact on its surrounding roads and pedestrian rights of way as the basement itself is of a small size (single storey) and located at the back of the site. With respect to underground tunnels, the site is within the safeguarding zone for Crossrail who have commented on the planning application advising of their requirements.
- 4.14. The site is located on the Lynch Hill Gravel Formation which is designated as a 'secondary A' aquifer by the Environmental Agency. The construction of a basement across the flow of groundwater levels potentially can increase the groundwater flow immediately upstream of the development and change the local subterranean regime. This is also reflected in the Camden designated zone of groundwater vulnerability. It is accepted that the groundwater flow is likely to be to the south and that the site is in the shadow of larger underground structures to the north, as well as the existing basement at the front of the site, resulting in the impact from this basement being less significant.
- 4.15. It is noted in the BIA that discrete surface flooding is possible, affecting houses or infrastructure; since Denmark Street in the north of the site is shown to be locally at high risk of surface flooding. It should be confirmed that flood risk is not increased elsewhere as a consequence of the proposed development and whether mitigation measures are required for the site itself.
- 4.16. It is accepted that the site is not within the catchment of the ponds on Hampstead Heath, or in vicinity of any watercourse/lost rivers/spring lines, or at risk of sea/reservoir/sewer/river flooding.
- 4.17. No change will be made on the area of the hard paved surfaces as the existing open yard is already paved. No SUDS is proposed as there will be no change in the surface drainage regime.
- 4.18. The new basement will drain into the existing basement drainage: Thames Water has been contacted with regard to sewerage infrastructure capacity, and has no objection on the planning application. However, if any collected groundwater as a result of construction dewatering is proposed to be discharged into the public sewers, Thames Water's permission is required.
- 4.19. It is stated in the BIA that the ground movement damage induced by the proposed development to its adjacent structures shall not exceed the Burland Category 1. However, there is considerable uncertainty over the depth required for underpinning and the need for dewatering, and no detailed damage assessment or prediction of the induced ground movements is provided. The conclusions cannot therefore be verified. It should be noted that, as the structure is listed, it is incumbent on the owner not to cause any harm to the site itself.

- 4.20. Ground movement monitoring of the boundary walls is proposed prior, during, and after commencing the constructional works as required by the party wall award. Details may be agreed with the party wall surveyor.

5.0 CONCLUSIONS

- 5.1. The Building Impact Assessment (BIA) has been carried out by Engenuiti Ltd. The qualifications of the individuals who have prepared and reviewed the BIA are in accordance with the requirements of CPG4.
- 5.2. The site is occupied by a three storey terraced Grade 2 listed property. It is intended to deepen an existing basement and to extend the basement to cover the entire site. Planning drawings show the basement to be connected to a proposed basement at Book Mews.
- 5.3. The BIA contains numerous discrepancies with respect to basement construction. Whilst it is stated that the basement will be constructed above the water table and that only limited underpinning is necessary, elsewhere it is stated that underpinning will be carried out in two stages, the first being above the water table and the second stage, below. Later in the BIA, reference is also made to piling. No information is provided with respect to the proposed temporary works.
- 5.4. It is accepted that the site is not within the catchment of the ponds on Hampstead Heath, or in vicinity of any watercourse/lost rivers/spring lines, or at risk of sea/reservoir/sewer/river flooding, and it will not change the surface drainage regime. However, a zone of high surface flood risk is present in the north of the site in Denmark Street which should be addressed in the BIA.
- 5.5. The site is directly located above an aquifer - the Lynch Hill Gravel Formation. Although it is accepted that the basement will not significantly alter the groundwater regime, additional information on the groundwater level is required for construction.
- 5.6. The site and its surrounding are relatively flat, and no tree will be felled as a part of the proposed development. It is understood that the proposed basement will be founded on the Lynch Hill Gravel strata, and London Clay is found to be at depth; there is no concern with regard to shrink/swell on the site.
- 5.7. It is accepted that the proposed construction will not have an impact on its surrounding roads and pedestrian rights of way. Separate approvals are required with respect to Crossrail as the site lies within their safeguarding zone.
- 5.8. No site specific ground investigation has been carried out and the BIA is based on exploratory holes sunk for the applicant on other nearby sites. These investigations indicate a highly variable thickness of Made Ground with the base potentially being below the proposed basement depth. This will have a considerable impact on the depth required for underpinning and whether or not groundwater will be encountered, both of which will influence likely ground

movements. It is recommended that a site specific ground investigation is carried out to confirm the assumptions made with respect to ground and groundwater conditions, or that the BIA is based on worst credible conditions and a ground investigation reported in a Basement Construction Plan.

- 5.9. Whilst reasonable, the design soil parameters and applicability of the referenced ground investigations should be confirmed by site specific investigation. If information from other sites is to be used, permission should be sought from the GI Contractors providing the information. No calculations have been presented for the retaining walls, slab or foundations.
- 5.10. It is noted that pumping from sumps will be employed if groundwater is encountered. It should be demonstrated how this might be achieved in the Lynch Hill Gravel and whether there would be any impacts on surrounding structures.
- 5.11. Whilst a ground movement assessment predicts damage no worse than very slight, it is not clear what has been assumed in respect of construction, which buildings have been considered and what assumptions have been made with respect to their geometry and foundations. This should be clarified once the construction methodology has been confirmed. It should be noted that the owners of a listed building are obliged not to cause then harm.
- 5.12. Monitoring is proposed and it is accepted that this may be agreed with the party wall surveyor.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA - General	Discrepancies in description of basement proposals and methodology to be resolved.	Open.	
2	BIA - General	Assumptions with respect to ground and groundwater conditions are based on information from adjacent sites. The depth to a suitable foundation stratum and the groundwater level should be confirmed, or the BIA based on worst credible conditions and a ground investigation reported in a Basement Construction Plan.	Open.	
3	Subterranean flows	Flood risk assessment should be provided to consider the risk of rising groundwater in Lynch Hill Gravel. Confirmation of the groundwater monitoring on the site is required.	Open.	
4	Surface flow	Flood risk assessment should be provided to address the identified risk of surface flooding in Denmark street.	Open.	
5	Land stability	Clarification required with respect to temporary and permanent construction methodology, ground movement and building damage assessments.	Open.	
6	Land stability	Indicative structural calculations are required.	Open.	
7	Land stability	The temporary exclusion of groundwater from the proposed basement requires further consideration.	Open.	
8	Land stability	Agreement of condition surveys and monitoring of potentially affected properties.	To be agreed as part of party wall award.	N/A

Appendix 3: Supplementary Supporting Documents

None

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