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76 Fitzjohn's Avenue
London
NW3 5LS

Basement Impact Assessment

For

London Borough of Camden

Project Number: 12466-62
Revision: F1

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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 76 Fitzjohn's Avenue (planning reference 2017/1047/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.

1.4. The Basement Impact Assessment (BIA) and supporting documents have been carried out by well-known firms holding the required qualifications.

1.5. 76 Fitzjohn's Avenue is not listed and nor are the neighbouring properties.

1.6. The proposal consists of constructing a single storey basement below the existing property with front and rear lightwells.

1.7. The geology was found to be made ground overlaying sandy clay with layers of sand. Water level monitoring has indicated that the proposed basement is above ground water level, and it is proposed this monitoring will be ongoing until construction.

1.8. The basement is proposed to be constructed of reinforced concrete using established design principles and following a conventional construction method.

1.9. An aspect of how the basement walls have been designed requires further calculation and clarification.

1.10. A ground movement assessment has been produced that concludes Burland category 1 (very slight) damage to the neighbouring properties. However clarification is required as to how this calculation has been carried out.

1.11. The BIA does not clearly demonstrate the impact on the surface water drainage system.

1.12. It is proposed to remove one of the two trees in the front garden, with the larger higher quality tree retained. The front lightwell construction method has been amended so as to lessen the impact on the retained tree.

1.13. A movement monitoring strategy has been proposed, although alterations are required in order to make the monitoring strategy bespoke to this specific project.

1.14. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

1.15. The property is located close to a Network Rail asset, whose approval will be required prior to construction.

1.16. An outline works programme has been provided.

1.17. Given the above number of outstanding queries it cannot be confirmed that the proposal adheres to the requirements of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 16/03/17 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 76 Fitzjohn's Avenue NW3 5LS.

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;

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 *"Creation of a single storey basement with lightwell to front and rear, installation of 1 x AC unit within front garden, removal of 1 x palm tree from front garden, alterations to side elevation fenestration, alterations to rear ground floor patio doors and erection of a new fence in the front garden."*

2.6. CampbellReith accessed LBC's Planning Portal on 06/04/17 and gained access to the following relevant documents for audit purposes:

- Arboricultural Impact Assessment, 160820-PD-11a
- Basement Impact Assessment, J16214
- Construction Method Statement, MBP-7009-February 2017
- Design & Access Statement, January 2016
- Planning Application Drawings consisting of

  Location Plan

  Existing plans and elevations

  Proposed plans and elevations

- Planning Comments and Response

2.7. Further planning comments and objections were received subsequent to the above date, along with updated architectural plans indicating reductions in the depth of the basement and the length of the front lightwell.

2.8. Following the D1 issue of this report, the following additional information was submitted by the applicant in October 2017;

- Works programme – 76 Fitzjohns Avenue
- CampbellReith Audit Query tracker – Applicant responses
- Construction Method Statement - MBP-7009 – Ver 1.13, May 2017

2.9. Following the D3 issue of this report, the applicant submitted the following additional information in October 2017;

- PDISP short and long term tabular results.
- Responses to Campbell Reith 20.12.2017 – email

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 1.3.2 of the BIA confirms that individuals holding MICE and CGeol accreditation have been involved with the BIA's production.
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	A detailed construction method statement, along with construction drawings have been provided.
Are suitable plan/maps included?	Yes	While maps from the GSD have not been provided, appropriate maps and plans have been provided to indicate the proposed development and the wider area.
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?	Yes	An explanation statement with referenced data sources has generally been provided for all 'no' answers.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	An explanation statement with referenced data sources has generally been provided for all 'no' answers.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	An explanation statement with referenced data sources has generally been provided for all 'no' answers. However it is felt that the screening to the question relating to surface water drainage has not been carried out correctly.

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	Section 7.0 of the BIA provides a conceptual ground model based on the ground investigation data.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	An appropriate scoping statement has been provided for each item carried forward from screening.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	An appropriate scoping statement has been provided for each item carried forward from screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	No items were carried forward from hydrology screening. However it is felt that the question relating to surface water drainage should have been carried forward.
Is factual ground investigation data provided?	Yes	Borehole logs and other SI data are appended to the BIA.
Is monitoring data presented?	Yes	Data is provided in section 5.3 of the GMA.
Is the ground investigation informed by a desk study?	Yes	A desk study is carried out in section 2 of the BIA.
Has a site walkover been undertaken?	Yes	A site walkover is referenced in section 2.1 of the BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	No	The presence of neighbouring basements has not been confirmed.
Is a geotechnical interpretation presented?	Yes	Section 8 of the BIA provides an interpretation of soil properties and relates this to different potential forms of construction.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Soil engineering properties relevant to the design of retaining walls are provided in section 8.1 of the BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	A partial ground movement assessment has been provided. However further details are required.

Item	Yes/No/NA	Comment
Are the baseline conditions described, based on the GSD?	Partially	The geology and baseline conditions have been described, however the presence of neighbouring basements has not been confirmed.
Do the base line conditions consider adjacent or nearby basements?	No	The presence of neighbouring basements has not been confirmed.
Is an Impact Assessment provided?	Yes	An impact assessment has been provided for all the items carried forward from the screening and scoping stages.
Are estimates of ground movement and structural impact presented?	Yes	A ground movement assessment has been provided.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	The impact assessment addresses each point raised by screening and scoping.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Mitigation measures have discussed in section 9 of the BIA.
Has the need for monitoring during construction been considered?	Yes	A movement monitoring strategy has been proposed.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Section 10 of the BIA.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Further information regarding the parameters used and detailed working of the ground movement assessment are required.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	The amount of impermeable area will be increased by the lightwells. The use of SUDs has not been proposed. Further assessment of surface water is required.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Further details regarding the ground movement assessment are required.

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	The ground movement assessment has calculated a worst case damage category of 1 (very slight). However, further justification is required.
Are non-technical summaries provided?	Yes	A non-technical summary has been provided in section 9.2 of the BIA.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of engineering consultants, Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications.

4.2. The Construction Method Statement has similarly been carried out by a well-known firm of engineering consultants, Michael Barclay Partnership; the author of which is a Chartered Structural Engineer.

4.3. The LBC Instruction to proceed with the audit identified that the basement proposal did not involve nor was adjacent to listed buildings. The Design & Access Statement identified that the property is within the Fitzjohn Netherhall conservation area.

4.4. The proposal consists of constructing a single storey basement below an existing two storey property, with the basement to extend to the entire footprint of the existing building, as well as beneath a two storey rear extension which has previously received planning permission. The basement will also extend outside of the building footprint at the front and the rear to allow for the formation of two lightwells.

4.5. The basement is proposed to be constructed by reinforced concrete underpins which are to be formed in a hit and miss sequence to the underside of the existing foundation. The ground floor structure is to be replaced with a reinforced concrete slab cast on metal decking, which is to bear into the existing masonry walls above the level of the underpinning. The basement slab is proposed to form a ground bearing raft foundation to distribute the load from the walls. Given that thick bands of sand are identified within the depth of the basement excavation care should be taken during the excavation work due to the potential instability of excavation faces in sand, and the suitability of such methods should be further considered, particularly if ground water is found to be present.

4.6. The underpinning has been designed as propped cantilevers, with high level propping proposed in the construction case and the new RC ground slab propping the walls in the temporary case. A dowelled connection is proposed between the top of the underpins and the underside of the existing foundation which would require the shear force to be transferred via the existing brickwork. Concrete columns have been indicated as spanning between the basement slab and the ground slab in a 3d diagram only, however these are not thought to form an effective shear connection between the wall and the slab in terms of lateral forces due to the slenderness of the columns that would have to be provided. In order to demonstrate the feasibility of a laterally propped cantilever wall, particularly if relying on the prop to reduce ground movements, this lateral shear connection should be substantiated via calculation as either being transferred via the brickwork, via the columns, or other proposed method.

4.7. It is stated in the construction method statement that lateral propping will only be provided at 2-3m centres as continuity reinforcement is to be provided between underpins. While this may be an acceptable strategy, no design or details of the continuity reinforcement is provided. This should be considered in the detailed design stage further if it is proposed to reduce the amount of propping during the construction stage to less than every pin given the impact this may have on ground movements.

4.8. The construction method statement provides outline details for the formation of the basement and the temporary works required. Notwithstanding the points raised in paragraphs 4.5 and 4.7, the method is satisfactory with the underpinning propped against the opposite face of soil in temporary case.

4.9. It is stated in the BIA that further assessment of the basement raft is required to determine heave and settlement. The construction method statement separately concludes that heave after the basement raft has been formed will likely be negligible. Further discussion of the heave potential has been carried out in the construction method statement. This is not substantiated via calculation, however it is accepted that heave pressures are likely to be off set by the weight of the existing structure.

4.10. The BIA identified that the differential foundation levels will likely be increasing with the neighbouring properties, and recommends that a ground movement assessment is carried out. A ground movement assessment appears to have been carried out with a screenshot of the inputted walls provided, the result is stated as being very slight (category 1). Although this is intended for use with piled retaining walls, it is accepted that it is likely to give conservative results, however, it is at odds with the construction method statement which suggests that category 2 damage would be realised. Tabulate settlement outputs from PDISP have been provided, however no calculation of horizontal strains is presented. No ground movement assessment has yet been provided with the GEA report as indicated by the construction method statement. The GMA and CMS should be consistent.

4.11. The screening identified that the basement will extend to within 5m of the public highway and foot path and recommends the provision of a retention system to ensure the stability of the public highway and footpath. The proposed front lightwell has been reduced in length and the proximity of the basement to the public footpath and highway is now greater than 5m.

4.12. Appropriate site investigations have been undertaken with an 18m borehole, two window samplers, and three trial pits. The trial pits were taken to the front wall, original rear wall, and extended rear wall. Water levels were also recorded with standpipes installed in each exploratory hole.

4.13. The geology was found to be made ground overlaying the Claygate Member to a depth of 18mbgl. Ground water was measured in the standpipes at depths of 1.05mbgl and 4.51mbgl, with no water found in the third pipe to the full depth of 4.41mbgl. The BIA has concluded that the first measurement is unreliable as the standpipe was located within a flower bed. This is discussed further in paragraph 4.16.

4.14. It has been identified that the Claygate Member is classed as a secondary aquifer, and is capable of containing perched water and local ground flows. Screening has identified that the excavation level will 'possibly' be located above the anticipated ground water level, which based on SI concludes is likely around 4.5mbgl, whereas the basement excavation extends to approximately 3.8mbgl. This is discussed further in paragraph 4.16.

4.15. Screening has identified that the historic River Tyburn is located close to the property, and also within 80m of a former spring line that feeds the Tyburn, although it is not clear how this distance was calculated. It is concluded that as the basement is not extending below the ground water level the spring line will not be impacted. While it is accepted that the water level in two of the exploratory holes at the time of monitoring was found to be below the proposed basement level, there is the potential for seasonal variation in ground water levels which may not have been picked up during a short period of monitoring, particularly if located within the vicinity of a spring line. It can be seen that 'Spring Path' is located immediately adjacent to the rear garden of the property potentially indicating this historic spring line may be located very close to the property.

4.16. Given that the geology has been identified as a secondary aquifer, along with potential historic nearby underground watercourses, and one high ground water reading, further ground water monitoring was carried out. This was carried out in August and September 2017, with further readings to be taken prior to construction. These subsequent readings identified ground water levels of between 4.6mbgl and 4.72mbgl. It is accepted that the basement is likely to be above the ground water level, however it is recommended that readings continue to be taken until construction commences in order to further understand seasonal variations.

4.17. The BIA states that the surface water discharge into the sewer system will not be increased as the portion of hardstanding is not increasing. As the basement will contain front and rear lightwells this could potentially increase the amount of surface water drainage to the sewer system. Details of existing permeable areas have been provided to be provided, however these do not clearly identify which areas are currently permeable and which are impermeable. Nor does it appear to agree with the construction method statement which states a $1m^2$ increase in the impermeable area. The change in the permeable areas and the impact that this has on the surface water flow that discharges to the sewer system should be clearly indicated, with SUDs proposed if appropriate.

4.18. An Arboricultural report has been produced by Tin Moya Associates which indicates that of the two trees in the front garden one will likely have to be removed, with the larger high quality tree (T1) requiring some controlled excavation within its root protection areas that will coincide with the front light well. However no mention is made in the Arboricultural report of the proposal to batter back the ground to a slope at the front of the house to allow for access into the basement, and also to allow the construction of the front lightwell walls in open excavation. Creating a slope in this location will require a significantly larger area of excavation within the root protection area of T1, and also the passage of construction traffic over the RPA. While the construction method statement has not been updated to propose a different construction method for the front lightwell, it has been confirmed separately by the applicant that the front lightwell is no longer proposed to be constructed via battered back front garden.

4.19. A movement monitoring strategy has been proposed, with generic trigger levels provided and appropriate actions to be taken when triggers are reached. The trigger levels should be linked to the wall movements predicted by the ground movement assessment in order to ensure that the damage category predicted is not exceeded.

4.20. The proposed basement will be within the vicinity of a Network Rail asset with evidence of correspondence with Network Rail's safeguarding department presented, who have confirmed that a BAPA will be required. Network Rail approval is recommended to be secured via planning condition.

4.21. An outline works programme providing commencement dates and durations for main phases of work has been provided.

4.22. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

5.0 CONCLUSIONS

5.1. The Basement Impact Assessment (BIA) and supporting documents have been carried out by well-known firms holding the required qualifications.

5.2. 76 Fitzjohn's Avenue is not listed and nor are the neighbouring properties.

5.3. The proposal consists of constructing a single storey basement below the existing property with front and rear lightwells.

5.4. The basement is proposed to be constructed by reinforced concrete underpins with a reinforced concrete raft basement slab and foundation. A new ground floor structure is to be constructed as a reinforced concrete slab.

5.5. The underpinning has been designed to be propped at the head by the new ground floor slab, however there are some concerns regarding how the shear force generated by the propping will transfer via the existing masonry wall to the head of the wall. Calculations are to be provided for this connection or the underpinning is to be designed as unpropped

5.6. It is proposed to reduce the amount of lateral propping to every 2-3m rather than every underpin, with continuity reinforcement between the underpins allowing the underpins to span laterally between lateral props. The design of which should be considered in the detailed design stage.

5.7. The construction method comprises underpins to be formed in a hit and miss sequence.

5.8. A ground movement assessment has been produced that predicts a worst case damage category of 1 (very slight), however adequate details of how this analysis has been carried out have not been provided. This information is required so that the ground movement assessment can be checked for its appropriateness.

5.9. Appropriate site investigations have been carried out with boreholes and trial pits have been carried out. Ongoing water monitoring has indicated that the ground water level is located beneath the proposed basement level, however it is recommended this continue in order to determine the seasonal high level.

5.10. It has been identified that the property is located close to the underground river Tyburn and a spring line. The possible location of the spring line very close to the property adds further suggestion that water level monitoring should continue until construction commences.

5.11. The Construction Method Statement states that the damage to neighbouring buildings will be no worse than Burland category 2, which is in contraction to the ground movement assessment

section of the BIA. Although this error remains in the construction method statement it has been clarified that the damage category will not be greater than 1. Notwithstanding this details of the ground movement assessment are required.

5.12. Details of the impact on surface water drainage to the existing sewer system has not been clearly identified, in order to assess the requirement for SUDs.

5.13. Excavation is required within the root protection area of a tree in the front garden. However, the proposal to form a battered soil slope in this area is no longer proposed limiting the excavation required within the RPA.

5.14. A movement monitoring strategy has been proposed, although the trigger values of which require co-ordination with the ground movement assessment results.

5.15. The property is located close to a Network Rail tunnel. Evidence of correspondence with Network Rail has been provided and Network Rail approval will be required prior to construction.

5.16. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

5.17. An outline works programme has been provided.

5.18. Given the above number of outstanding queries it cannot be confirmed that the proposal adheres to the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
The Heath and Hampstead Society	-	22/03/17	No assessment of damage to adjoining buildings is made	A ground movement assessment has been produced, of which further clarification has been requested.
Orwell	-	23/03/17	Information provided on water table is flawed	The applicant has carried out further ground water monitoring which to date has indicated a ground water level below the basement level. Ground water monitoring to continue until construction.
Earrey	86a Fitzjohn's Avenue	30/3/17	Basement may extend below the ground water level and disrupt the local water supply	The applicant has carried out further ground water monitoring which to date has indicated a ground water level below the basement level. Ground water monitoring to continue until construction.
Earrey	86a Fitzjohn's Avenue	30/3/17	Subsidence to the road and public footpath.	A ground movement assessment has been produced, of which further clarification has been requested.
Earrey	86a Fitzjohn's Avenue	30/3/17	Disturbance of lead could be poisonous	Not pertinent to BIA.
Williams	16A Maresfield Gardens	24/3/17	Presence of natural watercourse below property.	The applicant has carried out further ground water monitoring which to date has indicated a ground water level below the basement level. Ground water monitoring to continue until construction.
Zimmerman	26 Redington Road	28/3/17	Basement not fit for purpose due to sloping terrain.	The BIA has adequately screened for slope instability issues.
Eldred Geotechnics Ltd	-	22/04/17	The application provides no assessment of the risk of damage to neighbouring property.	A ground movement assessment has been produced by the applicant. Clarification of parameters used has been requested to allow detailed review of this assessment.
Eldred Geotechnics Ltd	-	22/04/17	Increase in impermeable area due to the front lightwell, adversely effecting drainage.	Details of existing impermeable areas have been provided which indicate a modest increase in surface water drainage only. However further clarification has been requested.

Eldred Geotechnics Ltd	-	22/04/17	Inadequate research of the ground water regime in the immediate region.	The applicant has carried out further ground water monitoring which to date has indicated a ground water level below the basement level. Ground water monitoring to continue until construction.
First Steps Ltd	-	-	Interception of water by the basement making it difficult for number 78 to carry out similar basement construction in the future.	CPG4 does not stipulate that the impact on unplanned basements needs to be considered.
Feiereisen	-	-	Erosion risk to neighbouring properties foundations	The presence of ground water would provide the greatest risk to erosion of soils beneath existing neighbouring foundations. The applicant has carried out further ground water monitoring which to date has indicated a ground water level below the basement level. Ground water monitoring to continue until construction.
Feiereisen	-	-	Impact of heave on neighbouring properties	Further assessment of the foundation solution is requested.
Feiereisen	-	-	Impact of the basement on trees outside of the boundary of number 76.	An Arboricultural report has been produced that confirms that all trees both on and off site were surveyed that may be of significance to the proposed development.
Feiereisen	-	-	Risk of lead contamination to the public, in particular local children.	Not pertinent to BIA.
Nataf-Pesonen	-	28/04/17	Movement monitoring trigger values of neighbouring properties exceeds that of the predicted damage category.	While the Burland crack width does not correspond to the wall displacements monitored during construction, it is accepted that the trigger values should be linked to the wall movements predicted from the GMA which has been raised as a query.
Pesonen	74 Fitzjohn's Avenue	28/04/17	Impact of ramp in front garden on Beech tree that is to be retained.	It is no longer proposed to form a ramp to the front of the property during construction.
Spinella	-	11/06/17	Possibility that the excavation extends below the water table, and insufficient period of monitoring.	The applicant has carried out further ground water monitoring which to date has indicated a ground water level below the basement level. Ground water monitoring to continue until

				construction.
Spinella	-	11/06/17	Site investigations within 750m of the site and not within site boundary	A site specific investigation was carried out, with some desk study information also taken from existing nearby boreholes
Unknown	-	Unknown	Applicant not recording of ground water levels over the winter period	The applicant has carried out further ground water monitoring to indicate that the ground level is not likely to be significantly above the proposed basement level. It has been recommended that further monitoring be carried out however this is not deemed critical to obtaining compliance with CPG4.
Eldred	-	14/11/17	The following issues where relevant to the stability, hydrogeology, hydrology have been taken from objection letter ref G1702/17L14/CNP1. Points listed below in an arbitrary order; 1) Ground movement assessment not justified 2) Closing out of query 4 relating to design of continuity reinforcement 3) Closing out of query 5 relating to inconsistencies relating to geological conditions 4) Closing out of query 6 relating to heave analysis. 5) Closing of query 8 relating the creation of a ramp at the front of the property. 6) Structural stability and	1) Further clarification has been requested regarding the calculation of the ground movement assessment 2) Providing continuity reinforcement is an acceptable solution and, in light of a detailed temporary work proposals not being required for planning submission, it has been accepted that the detail may form part of detailed design. 3) It was concluded that the screening and scoping was carried out in consideration of the relevant geological data/interpretation therefore satisfying the requirements of CPG4. However it is accepted that the CMS remains inconsistent. 4) It was concluded that the feasibility of designing the basement to accommodate heave forces could be accepted by inspection and is not critical to demonstrating the feasibility of the proposal at this stage. However it is accepted that the applicant did not provide any formal evidence to resolve this query. 5) Confirmation was received by the applicant that the proposal is no longer to form a slope at the front of the property within document "CampbellReith Audit query

			movements of the basement walls during construction. 7) Inconsistent depth of wall between drawings and structural calculations 8) Buoyancy not considered in structural design. 9) CMS incorrectly states that the basement is founded on dense gravels 10) Inadequate temporary works proposals.	tracker – applicant responses 25 September 2017" 6) The applicant has provided appropriate temporary works details. Clarification regarding the GMA has been requested. 7) Inconsistency does not prevent the demonstration of the feasibility of the proposal with respect to construction or structural adequacy. 8) Additional groundwater monitoring has shown that buoyancy not critical. 9) Agreed, however, the screening and scoping study has been carried out with consideration of the correct geology. 10) The applicant has demonstrated the feasibility of constructing the basement by providing outline temporary works details and construction methodology.

Where similar queries have been raised on separate occasions, the query has only been listed once.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	An outline works programme is required, that should as a minimum provide details of main phases of work with anticipated commencement dates and durations.	Closed	07/11/17
2	Stability	Connection between head of underpinning and ground floor slab to be proved by calculation to demonstrate adequacy for transmitting shear force between underpinning and prop. Or underpinning wall to be designed as an unpropped cantilever.	Open	
3	Stability	Design of continuity reinforcement required if propping not provided to each underpinning bay.	Closed	07/11/17
4	Stability	Details of ground movement assessment are required, such as parameters used in the calculation as discussed in paragraph 4.10.	Open	
5	Stability	Section 7 of the construction method statement requires amendment to be consistent with the rest of the submitted information, with regards to geological conditions and damage category.	Closed	07/11/17
6	Stability	Heave analysis or evidence to indicate that heave is negligible is required.	Closed	07/11/17
7	Stability	Viability of proposed permanent and temporary works methodologies to be confirmed once groundwater regime determined.	Closed	07/11/17
8	Stability	The Arboricultural report is to consider the impact of creating and use of a slope at the front of the property on retained tree T1, or this proposal is omitted with the construction method statement amended.	Closed	07/11/17
9	Stability	Movement monitoring values are to be linked to values calculated in the ground movement assessment to ensure the	Open	

		calculated Burland damage category is not exceeded.		
10	Stability	Evidence of correspondence with Network Rail to indicate whether the property is within a Network Rail safeguarding zone is required.	N/A	Network Rail approval is required for the scheme
11	Hydrogeology	Further ground water monitoring is required due to the high ground water level being recorded on one of the three standpipes that were monitored and the potential impacts for construction and the water environment.	Closed	07/11/17
12	Hydrology	Evidence that the area of impermeable area is not increasing is required, given that the lightwells are impermeable. Details of SUDs are required should the impermeable area be increasing.	Open	

Appendix 3: Supplementary Supporting Documents

None

London

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