CampbellReith
consulting engineers

31 Willoughby Road
London NW3 1RT

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 13398-16
Revision: D3

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Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

T:+44 (0)20 7340 1700
E:london@campbellreith.com
W:www.campbellreith.com

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Author	E M Brown
Project Partner	E M Brown, BSc MSc CGeol FGS
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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 31 Willoughby Road, NW3 1RT (planning reference 2020/0927/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. Subsequent to the issue of the initial audit report, CampbellReith was instructed to consider a detailed review of the BIA by the Geotechnical Consulting Group (GCG) submitted to LBC by neighbours to the proposed basement, and summarise any pertinent information in an updated audit. Relevant comments have been added to Section 4 of this report.

1.5. The BIA has been prepared by individuals who possess suitable qualifications. It confirms that a piled foundation and suspended slab are proposed to mitigate against poor ground conditions. Basement walls are to be formed using underpinning techniques.

1.6. Responses to previously omitted screening questions have been provided. It is accepted that the screening exercise is adequate.

1.7. Drawings and sections are provided and now indicate the distance between the proposed basement and the boundary wall to Willow Cottages. The basement configuration has altered to bring it slightly further away from the boundary wall.

1.8. It is accepted that the extent of impermeable areas is not changing, however, as noted below it should confirmed that the risk of flooding will not be exacerbated by changes to groundwater flow.

1.9. The BIA confirms that the basement will extend below the water table, and further discussion of groundwater levels is provided. Modelling has been undertaken which shows a maximum change to groundwater levels of 25mm due to the basement proposals. It should be confirmed that the modelling considers the cumulative effect of surrounding basements and cellars and that there will be no adverse impacts to the sewer network and flood risk.

1.10. A construction sequence is described that adequately addresses the queries related to load transfer, temporary works and propping.

1.11. A number of question are raised in respect of the ground movement and building damage assessments and further information is required as detailed in Section 4.

1.12. Proposals are provided for a movement monitoring strategy during excavation and construction.

1.13. Until the queries described in Section 4 and summarised in Appendix 2 are addressed, it cannot be confirmed that the BIA complies with the requirements of CPG: Basements.

1.14. It should be noted that this report comprises an audit of the BIA and consideration of the detailed review undertaken by the GCG. The conclusions of the audit are based on Camden Planning Guidance and the Terms of Reference for audits. This report does not consider whether the queries raised by the GCG are closed out.

1.15. Due to the complexity of the suggested construction sequence and the sensitivity of nearby structures, a Basement Construction Plan is recommended.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 3 April 2020 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 31 Willoughby Road, London NW3 1RT, planning reference 2020/0927/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 impacts 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

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance: Basements. March 2018
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

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 *"Excavation of basement with rear lightwell below dwellinghouse (Class C3), demolition and reconstruction of single storey side extension."* The audit instruction noted that the nearby Willow Cottages on Willow Road are listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 15 April 2020 and gained access to the following relevant documents for audit purposes:

- Report of a Basement Impact Assessment for a Proposed Basement Extension of 31 Willoughby Road London NW3 1RT, Ref. G1808-RP-01-E2, dated February 2020 by Eldred Geotechnics Ltd
- Design, Access, Heritage and Planning Statement, Ref. 34624, dated February 2020 by Nexus Planning
- Planning Application Drawings consisting of:

  Location Plan

  Existing planning drawings Nov 19

  Proposed planning drawings Nov 19

- Arboricultural Tree Report, Ref. PS 1037, dated February 2020, by Phelps Associates

2.7. In addition to the above, CampbellReith was provided with the following documents by the planning officer on 24 April and 1 May 2020:

- Objections to Planning Application 2020/0927/P: 31 Willoughby Road NW3 1RT, Petition objection document, dated April 2020 and prepared by residents of 34, 37, 38, 39 and 41 Willow Cottages
- Objection document addendum_01: Further comments on surface water flood risk.

2.8. Subsequent to the issue of the initial (D1) audit report, CampbellReith was instructed on 17 June 2020 to review and comment on a detailed technical review of the BIA commissioned by neighbours to 31 Willoughby Road. The details of that review, which can be viewed on Camden's website with the remainder of the planning application documents, are given below:

- Letter to Willow Cottages Group, re Planning Application PA 2020/0927/9 31 Willoughby Road, prepared by Geotechnical Consulting Group LLP (GCG), dated 27 May 2020.

2.9. On 27 October 2020, CampbellReith was advised by LBC that a revised BIA had been uploaded to the planning website (Ref. G1808-RP-01-E4, dated 16 October 2020). An emailed objection, dated 22 October 2020, from neighbours living in the nearby Willow Cottages, was forwarded to CampbellReith by the planning officer. The objection contained an extract of an email from Dr Phil Smith of the GCG in response to the revised BIA. This updated audit considers the revised BIA and the subsequent comments from the GCG.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	A cross section in the revised BIA indicate dimensions indicates the distance between the existing and proposed structures. Further information on construction methodology is presented.
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	A cross section in the revised BIA indicate dimensions indicates the distance between the existing and proposed structures.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	A previously omitted question has been answered and clarification provided for other responses where requested.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	However, neighbours have submitted a plan showing a different surface water flood risk categorisation.
Is a conceptual model presented?	Yes	

Item	Yes/No/NA	Comment
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?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Numerous basements identified in surrounding area. No 29 Willoughby Road has partial cellar. The presence of nearby basements is indicated on the GMA model sections.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural report presented.
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	
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	The ground movement assessment does not consider all potential construction related movements.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Cannot be confirmed until queries raised by audit are addressed.
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	No	Cannot be confirmed until queries raised by audit are addressed.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Cannot be confirmed until queries raised by audit are addressed.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Mitigation measures described but further information required.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, the ground movement assessment does not consider all potential construction related movements.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Eldred Geotechnics Ltd (EGL) and the individuals concerned in its production have suitable qualifications. The BIA contains a Preliminary Structural Design Report. The BIA describes the recent planning history of the site and notes that EGL have been appointed to provide a new BIA for the current planning application. CampbellReith audit reports D1 and D2 consider the BIA dated February 2020. This updated audit considers the revised BIA, dated October 2020.

4.2. The LBC instruction to proceed with the audit identified that the basement proposal neighbours a row of listed cottages (Willow Cottages).

4.3. The proposed basement consists of a single storey construction beneath the footprint of 31 Willoughby Road with a lightwell to the rear. Basement slab level is shown as +81.95m OD which requires an excavation of around 4m. The basement slab is to be supported on piles and the walls are to be formed using underpinning techniques. Drawings and sections are presented which show the levels of the site, the proposed basement and the neighbouring properties (29 and 33 Willoughby Road and Willow Cottages). The revised BIA includes reference to further desk study research which has provided more information with respect to ground levels at Willow Cottages.

4.4. The scheme differed from that submitted for planning permission in 2016 (2016/7146/P) in the introduction of a piled foundation and measures to allow groundwater to flow around the basement (see also paras 4.15 and 4.16).

4.5. An objection raised by neighbours in Willow Cottages noted that the building layout shown in drawings and sections in the February 2020 BIA is inaccurate. Cross section A-A (drawing no G1808-PA-101-E2) indicates the distance between the proposed basement and boundary wall vary between 0.65 and 1.00m. CampbellReith has not undertaken a site visit to determine whether this is correct, however, it is noted that this matter has not been raised in recent objections.

4.6. The October 2020 version of the BIA shows the scheme to have been further revised with the basement extent being reduced slightly to increase the distance between the basement and the neighbouring Willow Cottages.

4.7. The BIA contains a ground model based on historic ground investigation information and new data obtained by EGL. It has identified that the site is underlain by a significant thickness of weak soils comprising around 3m of Made Ground over a similar thickness of Head Deposits. This interpretation is questioned by the GCG who suggest that a portion of the near surface soils may comprise the Claygate Member. The characteristics of the materials (Made Ground,

Head and Claygate Member) and hence the geotechnical hazards and behaviour, are likely to be similar. This is accepted by the GCG.

4.8. Continuous data loggers were installed in water monitoring installations and recorded water levels from August 2019 to March 2020. The BIA considers that the groundwater level is around 2.50m below ground level (c 86m OD). Objectors to the scheme have obtained rainfall data since 1948 and show that the winter of 2019/2020 was drier than many. They have queried whether the groundwater assumptions are sufficiently conservative. This is echoed by the GCG who remark that there is no consideration of whether the rainfall prior to and during the monitoring period was typical.

4.9. The revised BIA further considers groundwater levels in light of additional groundwater observations from 33 Willoughby Road and the topography. It is accepted that the evaluation of the hydrogeological regime appears to be reasonably conservative.

4.10. A geotechnical interpretation is given, based on the new and historic ground investigation information. Recommendations are made for soil strength parameters and stiffness as well as permeability. It is accepted that they are a cautious estimate.

4.11. The screening exercise identified a number of potential impacts that required further consideration and were taken through to scoping. In respect of surface water, the BIA noted there was a risk of flooding to the rear of the adjacent Willow Cottages and, whilst the risk was identified as low (1 in 1000 years), the consequence was considered high. Information has been presented by a number of residents of Willow Cottages indicating that a higher risk of surface water flooding exists at the rear of their properties. This is confirmed by the GCG who note that part of the rear of the cottages has a moderate flood risk (1 in 100 year return period).

4.12. The impact of the basement on the flood risk is considered in the BIA and it concludes that, as the extent of impermeable areas is remaining unchanged, the proposals do not exacerbate the risk of surface water flooding. This is accepted, although concerns remain in relation to the contribution to flooding from groundwater.

4.13. With respect to groundwater, the screening identified that the site is underlain by an aquifer and that the basement will extend below the water table and the spring line. The scoping exercise considered the topography of the surrounding area and reviewed groundwater levels recorded at a number of nearby sites. It concluded that the site is on the southern side of an east-west trending valley, upslope of Willow Cottages. Historic maps showed a stream close to, and parallel to, Willow Cottages and EGL believe it is probable that it has been culverted beneath a passage to the rear of the cottages.

4.14. EGL consider that this former stream governs the groundwater levels which, on this side of the valley, appear to reflect the topography and flow in an approximately northerly direction. New information referred to in the revised BIA indicates that the culvert is likely to be around 1.40 to 1.60m below ground level at the rear of the cottages. As noted in the earlier BIA, neighbours have not reported regular groundwater flooding of the rear passageway (at c 83.10m OD).

4.15. The conceptual model indicates that the basement would intercept the groundwater, causing it to be dammed beneath No 29 Willoughby Road and potentially reducing it beneath 33 Willoughby Road and Willow Cottages. The earlier BIA stated that changes to water levels would '*probably*' be a few millimetres and recommended the installation of a geocomposite between the basement construction and the retained soil to allow groundwater to flow around the basement, thus avoiding any impact.

4.16. The feasibility of installing this system was queried by both CampbellReith and the GCG and has been omitted from the revised construction methodology. The revised BIA contains the results of groundwater modelling using the finite element programme, FLAC. This indicates a maximum variation in groundwater levels due to the damming effect of the basement to be 25mm. In light of comments raised by the GCG, it should be confirmed that the modelling considers the loss of aquifer volume and that there will be no adverse impacts on the drainage network and flood risk.

4.17. Both the BIA and an objection from neighbours refer to numerous basements in the surrounding area and the neighbours note that many of them are prone to water ingress. It should be confirmed that the groundwater modelling considers the cumulative impact of these several basements.

4.18. The previous BIA version noted that water would be expected to be encountered during construction of the basement. It recommended further investigation to allow the need for dewatering to be assessed and necessary measures designed. The BIA estimated settlement of c4.5mm might occur as a result of groundwater control measures. The D2 audit queried the assumptions used as a basis for the estimate and sought further clarity on the potential for differential settlement across the potentially impacted buildings.

4.19. The revised BIA presents numerical modelling of the proposed basement development to address the queries raised in 4.18. In regards to potential movements specifically from temporary groundwater control measures, it is accepted that movements are likely to be negligible, given the very low permeability of the underlying London Clay, the depth of foundations of the neighbouring buildings, and the short period of time (12 months) that groundwater control is to be utilised.

4.20. In addition to the presence of an aquifer and the proposed excavation extending into the groundwater table, the screening for land stability impacts identified the differing ground levels between the site and the passage to the rear of Willow Cottages. The revised BIA addresses two land stability screening questions (worked ground and differential foundation depths) that were not adequately covered previously.

4.21. A construction sequence with drawings and calculations is presented in the BIA. In order to avoid impacts and ground movement associated with constructing foundations to bear in the Made Ground or Head Deposits, it is proposed to support the basement on a piled slab. The construction sequence refers to ground levels being reduced to provide 3 and 4m headroom. The revised BIA advises that excavation to enable piling rig access and the construction of a working platform will not require excavation greater than 0.50m.

4.22. The basement walls will be formed using underpin techniques but with the underpins 'taking their support' from the piled foundations. The revised BIA confirms the construction works sequencing, including sufficient details on how the loads are transferred in the temporary state whilst the permanent concrete structure is curing sufficiently to accept the loads i.e. through the underpins to the piles.

4.23. The revised BIA considers ground movements associated with the construction of the basement and their impact on 29 and 33 Willoughby Road using numerical modelling software. The D2 audit queried the conclusions of the assessment and a number of the assumptions used as the basis for assessment. The queries are repeated in full in 4.24, along with additional comments arising from the audit of the revised BIA. In general, the use of numerical modelling has not specifically answered the previous queries raised and does not comply with the requirement that BIA conclusions are reached in a "transparent manner" (LBC BIA Audit Terms of Reference).

4.24. The previous BIA concluded that horizontal movement would be limited to 2mm, immediate settlement to 2mm and total settlement to 5mm. The adopted soil parameters were described and the model geometry provided. Whilst the soil parameters were accepted as moderately conservative and justified by the ground investigation, the model raised some queries as follows:

- It was not clear if the excavation and props were 'wished into place'. Although not specifically commented upon in the revised BIA, the modelling process described in section 10.2 suggests that construction elements are still 'wished into place'.
- The model did not appear to reflect staged excavation. The revised BIA has used a staged modelling process. However, given the 'wished into place' simulation adopted, it cannot be confirmed that the changes in net soil pressures and pore water pressures

upon which the model relies reflect a conservative sequence of ground movements likely to be generated by the construction process.

- The movements modelled in the previous BIA did not allow for construction related movements associated with underpinning (typically taken to be at least 5mm vertical and horizontal). In the revised BIA (paragraph 181) it is noted that an allowance of 5mm horizontal movement for inward yielding of the retaining walls has been allowed for. It is unclear if the resultant vertical settlement behind the wall is accounted for in the model, and whether vertical movements resulting from the underpinning process (e.g. shrinkage of the dry pack) have been allowed for.
- It was not clear how the settlement associated with dewatering has been considered. This is discussed in 4.18.
- The previous damage assessment considered ground movements at intervals of 2, 4, 6 and 8m from the excavation. It was not clear which neighbouring structures had been assessed and how their geometry corresponds with the reported movements. Whilst lines of section are provided in the revised BIA, their relationship to critical structures is not given. It is unclear whether the damage assessment has considered strains along or across the walls and whether the reported values at model nodes reflect the most onerous movements. Contour plots were requested previously and are still required for clarity.

4.25. The previous GCG review requested more detail on some of the above queries and clarifications on the construction methodology and impacts to neighbouring structures, including the culvert.

4.26. The GCG note that the application of the Burland damage criteria is overly simplistic in this instance due to the sensitivity of the surrounding structures and their poor condition. CampbellReith concur that derivation of the Burland damage categories assumes masonry panels in good condition and that Willow Cottages, and the retaining wall in particular, are not is such a condition and are therefore more susceptible to ground movement.

4.27. The revised BIA's estimate of Negligible impact on Willow Cottages is based on experience and the numerical modelling although, as noted above, queries remain on the validity of the modelling to reflect all the movements likely to be generated by the construction process. CampbellReith had accepted that, with their distance from the excavation (c3.50m) and the relatively small differential in foundation depth (c1.00m), impacts will be limited. However, this is queried by the GCG, who also note that the culvert to the rear of Willow Cottages could be damaged. Contour plots as requested in para 4.24 would assist in determining the validity of EGL's conclusion and identifying any other structures potentially at risk of damage.

4.28. The revised BIA (Section 11.2) specifically addresses potential damage to the boundary retaining walls and Willow Cottages, arguing that the ground pressures on the walls will be

reduced and water pressures will remain generally unchanged. The revised construction sequence makes specific allowances for propping and isolating the boundary retaining wall during construction to mitigate against damage, with monitoring to be undertaken during the works.

4.29. The proposed construction methodology allows for the provision of temporary propping and restraints to existing structures, including the use of berms, to allow the piling process to proceed, in combination with monitoring during the works.

4.30. Detailed groundwater monitoring observations and model predictions have been made in order to ensure that final retaining wall designs incorporate reasonably conservative groundwater pressures.

4.31. Outline proposals are provided for a movement monitoring strategy during excavation and construction

4.32. Due to the complexity of the suggested construction sequence and the sensitivity of nearby listed structures, it is recommended that a Basement Construction Plan is prepared prior to construction. This should contain the detailed design of temporary and permanent works together with confirmation that the magnitude of predicted impacts will not be exceeded. IN the meantime however, further information is required to justify the conclusions reached with respect to ground movement/building damage assessments and groundwater flows.

5.0 CONCLUSIONS

5.1. The BIA has been prepared by individuals who possess suitable qualifications. It describes the basement proposals and considers impacts to the host building and neighbouring structures in the three areas required by CPG: Basements, namely stability, surface water and subterranean flows.

5.2. The BIA confirms that the ground conditions comprise several metres of weak soils. A piled foundation and suspended slab are proposed as mitigation. Basement walls are to be formed using underpinning techniques.

5.3. Responses to previously omitted screening questions have been provided. It is accepted that the screening exercise is adequate.

5.4. Drawings and sections are provided. An updated cross section indicates the distance between the proposed basement and the boundary wall to Willow Cottages. It is also noted that the basement configuration has altered to bring it slightly further away from the boundary wall.

5.5. The BIA identifies the absence of flood risk with the exception of a low flood risk to the rear of Willow Cottages. This is disputed by the neighbours who provide evidence of a high surface water flood risk. It is accepted that the extent of impermeable areas is not changing, however, as noted below the risk of flooding may be exacerbated by changes to groundwater flow.

5.6. The BIA confirms that the basement will extend below the water table, and further discussion of groundwater levels is provided. The originally proposed bypass drain is now omitted and modelling has been undertaken which shows a maximum change to groundwater levels of 25mm due to the basement proposals. It should be confirmed that the modelling considers surrounding basements and cellars and that there will be no adverse impacts to the sewer network and flood risk.

5.7. Both the BIA and neighbours' objections refer to the presence of numerous basements in the surrounding area. As noted above, a statement regarding possible cumulative impacts has been presented in the revised BIA although it should be confirmed that groundwater modelling includes allowance for these basements.

5.8. A construction sequence is described that adequately addresses the queries related to load transfer, temporary works and propping.

5.9. Building damage is estimated to be negligible to 39 and 33 Willoughby Road, Willow Cottages and the retaining wall to the rear of Willow Cottages. However, a number of question are raised in respect of the assessment and further information is required as detailed in Section 4.

5.10. Proposals are provided for a movement monitoring strategy during excavation and construction which can be developed during the agreement of the Party Wall award.

5.11. Until the queries described in Section 4 and summarised in Appendix 2 are addressed, it cannot be confirmed that the BIA complies with the requirements of CPG: Basements.

5.12. Due to the complexity of the suggested construction sequence and the sensitivity of nearby listed structures, a Basement Construction Plan is recommended.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Not given	34, 37, 38, 39 and 41 Willow Road (Willow Cottages)	Objection 24/04/20 and Addendum 30/04/20	Effects of piling on retaining wall not considered	Query raised in audit report
			Layout of neighbouring properties shown incorrectly	Query raised in audit report. Further information presented in revised BIA
			Cumulative impact of basements on groundwater not considered	Query raised in audit report
			Water penetration into basement	BIA confirms that due to direction of groundwater flow, basement proposals will not exacerbate water penetration into basements/ lower ground floors of Willow Cottages
			Groundwater levels over monitoring period do not represent the norm	Query addressed in revised BIA
			Surface water flood risk to Willow Cottages incorrectly identified	BIA confirms that basement proposals will not impact surface water flood risk
			BIA considers risk only to host property	BIA considers impacts to host property and surrounding structures
Geotechnical Consulting Group LLP	52A Cromwell Road, London SW7 5BE	27/05/2020	The BIA does not demonstrate the proposal would not cause harm to surrounding properties	Query raised in audit report
			The basement proposals will adversely affect drainage and run off	Query raised in audit report
			Cumulative impacts have not been assessed	Query raised in audit report

Glen Robinson & Hilary King	3p and 34 Willow Road	22/10/2020	Potential for basement proposals to cause damage to neighbouring listed properties.	Queries raised in audit report

Appendix 2: Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Land stability screening to be completed and response to Question 9 confirmed	Closed	January 2021
2	BIA	Accuracy of plans with respect to layout to be confirmed.	Closed (although not verified by site visit)	January 2021
3	Subterranean flows/stability	Assumed groundwater levels to be confirmed as being moderately cautious	Closed – additional information and justification provided	January 2021
4	Subterranean flows	Feasibility and efficacy of mitigation measures to be confirmed or assessment provided in more detail	Open – construction methodology altered and mitigation measures omitted. Inclusion of potential cumulative effects in hydrogeological modelling to be confirmed. Clear statement of impacts to drainage network and flood risk to be provided.	
5	Subterranean flows	Cumulative impact of numerous nearby basements to be confirmed	Open – further discussion provided but inclusion of potential cumulative effects in hydrogeological modelling to be confirmed.	
6	Stability	Queries in relation to construction sequence to be addressed: • Further detail re staged excavation and temporary/enabling works • Stability of underpin excavations • Load transfer to piles in temporary case • Installation of drainage membrane	Closed	January 2021
7	Stability	Queries in relation to ground movement and damage assessment to be addressed: • Model assumptions • Confirmation that all causes of movement considered • Impact of piling on retaining wall to be considered • Contour plots and confirmation of impacts to Willow Cottages and	Open – as 4.23 to 4.29.	

		culvert • Consideration of impact of structural condition of affected properties on damage assessment		

Appendix 3: Supplementary Supporting Documents

None

London

15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
E: london@campbellreith.com

Birmingham

Chantry House
High Street, Coleshill
Birmingham B46 3BP

T: +44 (0)1675 467 484
E: birmingham@campbellreith.com

Surrey

Raven House
29 Linkfield Lane, Redhill
Surrey RH1 1SS

T: +44 (0)1737 784 500
E: surrey@campbellreith.com

Manchester

No. 1 Marsden Street
Manchester
M2 1HW

T: +44 (0)161 819 3060
E: manchester@campbellreith.com

Bristol

Wessex House
Pixash Lane, Keynsham
Bristol BS31 1TP

T: +44 (0)117 916 1066
E: bristol@campbellreith.com