CampbellReith
consulting engineers

Basement Impact Assessment Audit

30 Grove Place, London NW3 1JR

For
London Borough of Camden

Project No.
14006-89

Date
March 2025

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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 30 Grove Place, London, NW3 1JR (planning reference 2024/2928/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 qualifications of the individuals involved in the BIA are in accordance with LBC Guidance.

1.5 It is proposed to construct a single storey basement below the full footprint of the existing building and below the existing courtyard garden area. The basement formation level will be set at 4.08m below ground level and will be constructed using underpinning in a hit-and-miss sequence.

1.6 Screening and scoping assessments have been provided.

1.7 A ground investigation was undertaken in February 2023. The BIA states that the site is underlain by Made Ground, Claygate Member and London Clay.

1.8 The BIA states that localised seepages can be mitigated using sump pumps. The BIA recommends that water levels should be monitored one month prior to the commencement of on-site work and throughout the construction process.

1.9 The Flood Risk Assessment states that the site is at low risk of flooding of all sources.

1.10 The Ground Movement Assessment (GMA) and Building Damage Assessment confirms a maximum Burland damage category of 1 (very slight) to the neighbouring properties can be achieved.

1.11 The BIA indicates that a movement monitoring scheme is to be adopted to make sure that movements generated remain within predicted limits.

1.12 It can be confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 07 August 2024 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 30 Grove Place, London, NW3 1JR (2024/2928/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

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance (CPG): Basements. January 2021.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Hampstead Neighbourhood Plan

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 "Extension & Alterations to existing dwelling including construction of new part basement level, demolition & replacement of the existing side kitchen extension, installation of skylights & solar panels and other minor fenestration alterations."

2.6 The Audit Instruction confirmed 30 Grove Place did not involve, or was a neighbour to, listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on 15 August 2024 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Croft Structural Engineers, Ref.: 221210 Rev 2, dated 14 April 2024.
- Basement Impact Assessment by Maund Geo-Consulting, Ref.: 30 Grove Place BIA MGC-113-GMA-V2, dated April 2024.

- Flood Risk Assessment by Aegaea, Ref.: AEG0952_NW3_Camden_01, dated 25 March 2024.
- Arboricultural Impact Assessment by Andrew Belson Arboricultural Consultant, Ref.: 5394.Hampstead.Egg.AIA Rev 0, dated 09 July 2024.
- Existing Architectural Drawings by Egg Design Limited, dated 10 May 2024.
- Proposed Architectural Drawings by Egg Design Limited, dated December 2022 and February 2023.
- Planning Consultation Responses

2.7.2 The following additional documents were provided to CampbellReith between September 2024 and February 2025, to address the queries raised in the D1 audit:

- Basement Impact Assessment by Maund Geo-Consulting, Ref.: 30 Grove Place BIA MGC-113-GMA-V4, dated February 2025.

2.7.3 Additional correspondence has been included within Appendix 3 of this report.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 2 of the Croft Structural Engineers BIA.
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	
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?	Yes	Section 7.3 of the Maund Geo Consulting BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 7.2 of the Maund Geo Consulting BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.3 of the Croft Structural Engineers BIA.
Is a conceptual model presented?	Yes	Section 5.0 of the Maund Geo Consulting BIA.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 8.0 of the Maund Geo Consulting BIA.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 8.0 of the Maund Geo Consulting BIA.

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 5.3 of the Croft Structural Engineers BIA.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Section 4.2 of the Maund Geo Consulting BIA.
Is the ground investigation informed by a desk study?	Yes	Section 3 of the Maund Geo Consulting BIA.
Has a site walkover been undertaken?	Yes	Section 3.2 of the Croft Structural Engineers BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 3.2.3 of the Croft Structural Engineers BIA. No 29 Grove Place has an existing basement. No 2 Well Mount Studios has a lower floor that is partly below ground. No 31 Grove Place, Well Mount Cottage, and 55 Christchurch Hill do not have existing basements.
Is a geotechnical interpretation presented?	Yes	Section 5.0 of the Maund Geo Consulting BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 5.0 of the Maund Geo Consulting BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	Flood Risk Assessment, Structural Report, and Arboricultural Impact Assessment.
Are the baseline conditions described, based on the GSD?	Yes	
Do the baseline conditions consider adjacent or nearby basements?	Yes	Section 3.3.2 of the Croft Structural Engineers BIA.
Is an Impact Assessment provided?	Yes	Section 9.0 of the Maund Geo Consulting BIA.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Section 10 of the Maund Geo Consulting BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Section 9.0 of the Maund Geo Consulting BIA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Movement monitoring, groundwater monitoring is recommended.
Has the need for monitoring during construction been considered?	Yes	Section 6.5.3 of the Croft Structural Engineers BIA.
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Section 10 & 11 of the Maund Geo Consulting BIA.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 11 of the Maund Geo Consulting BIA.
Are non-technical summaries provided?	Yes	Section 1 of the BIA.

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by Maund Geo Consulting Ltd (Maund) and Croft Structural Engineers (Croft). The individuals concerned in the production of these BIAs have suitable qualifications that meet the requirements of CPG Basements.

4.2 The LBC instruction to proceed identified that 30 Grove Place did not involve, or was a neighbour to, listed buildings.

4.3 The BIA describes the existing development as a three-storey residential dwelling with a single-storey ground floor extension, originally part of a former church hall. The property includes a small courtyard garden paved with stone slabs, which are suspended about 0.20m above ground floor level. Beneath the ground floor, a void extends to a depth of approximately 1.30 to 1.80m below ground level.

4.4 The ground floor extension adjoins the neighbouring property (no. 31) to the southwest and the adjoining property to the northeast (no. 29) which also forms part of the former church hall. Grove Place is located on the northwest side of the property, at ground floor level. The house to the southeast (Well Mount Cottage) is situated at a significantly lower level due to the site being on a hill. Additional information provided by Croft confirms that ground level at Well Mount Cottage is approximately 2m below the ground level of the host building. The southeast masonry wall of the host building acts as a retaining wall to support the garden area.

4.5 The proposed development comprises the construction of a new full basement under the footprint of the building with a lightwell to the rear and some modifications to the upper levels. The basement formation level will be set at 4.08m below ground level (bgl) and will be constructed using hit-and-miss underpinning techniques.

4.6 Screening and scoping assessments are presented, informed by desk study information. Additional information, provided by Croft, has confirmed the following queries raised in the D1 audit revision:

- Question 4 of the land stability screening indicates that the wider hillside slopes have a gradient of approximately 1 in 12 (around 5°). Croft has updated their report to confirm the site is situated on a slope with a profile ranging between 1 in 9 to 1 in 12 (5° to 6°).
- Question 1a of the hydrogeology screening has been updated to confirm that the site is underlain by a secondary A aquifer of the Claygate Member however, states that the nature of the soils encountered in the ground investigation (clays/silts) are low permeability. The additional information, provided by Croft, also confirms that the site is not shown to be underlain by the Bagshot Formation.

- Question 1b of the Hydrogeology screening indicates that groundwater was encountered at a depth of 4.10m bgl, and it was stated that the proposed basement is not expected to extend beneath the water table. The screening response has been updated to confirm that groundwater may be present at the base of the basement and a provision for pumping is recommended.

4.7 A ground investigation was carried out by PM Sampling Ltd on 22 February 2023 comprising a single window sampler borehole to 5.65m bgl. The BIA states that the site is underlain by 2.50m of Made Ground (to 105.5m AOD) followed by Claygate Member. The borehole log has been updated to show the top of the London Clay Formation is present from 5.00m bgl (103.00m AOD). Formation level of the basement will be within the Claygate Member (at 4.08m bgl). Although there appears to be some uncertainty regarding the full thickness of the Claygate Member across the site, it is accepted that in this case, the impacts have been suitably assessed for the proposed development.

4.8 Groundwater was not encountered during the site works. A standpipe was installed to a depth of 5m bgl in the exploratory hole, and groundwater monitoring was undertaken (during March 2023) on two occasions and indicated groundwater to the depth of 4.10m bgl (103.90m AOD).

4.9 The Maund BIA states that the proposed basement extension, including the partial subfloor void and foundations, will reach depths of approximately 2.00m to 4.00m. The report states an allowance for groundwater control by pumping may be required during excavation and construction. In addition, the Croft BIA recommends that water levels should be monitored one month prior to the commencement of on-site work and throughout the construction process, noting that localised dewatering to pins may be necessary.

4.10 The BIA indicates that the site is located in Flood Zone 1 and falls within a Critical Drainage Area (CDA) Group 3_010. It states that the site is at a low risk of flooding. A Flood Risk Assessment (FRA) has been undertaken.

4.11 The surface water screening and groundwater screening both identify that the site is currently fully covered with hardstanding, which will not change as a result of the basement development. The Croft BIA report has been updated to confirm there will be no increase in hard surfaces.

4.12 The Croft BIA reports that the use of complex SuDS features is not considered necessary for a development of this scale, as there is not a significant increase in surface water discharge into the existing sewer system. Instead, it is proposed to use permeable paving to minimise surface water discharge, which will also act as a storage area, allowing water to recharge the groundwater in the area.

4.13 Geotechnical parameters are presented in the BIA and the following clarifications/updates have been provided:

- The ka and kp values have been updated within the Croft Structural Engineers BIA and are now consistent with those quoted in the Maund Geo Consulting BIA.

- The retaining wall structural calculations have been updated, the parameters are now consistent with those provided in the Maund Geo Consulting BIA.

4.14 The construction sequence is described in the Croft Structural Engineers BIA, stating that the basement retaining walls will be constructed using a hit and miss underpinning technique, with temporary propping supporting the excavation.

4.15 A Ground Movement Assessment (GMA) and Damage Assessment are provided to demonstrate that ground movements and consequential damage to neighbouring properties will be within the LBC's policy requirements. The analyses are carried out using the Oasys programme PDisp.

4.16 The GMA has been undertaken for the proposed development and considers ground movements resulting from heave and underpin installation. The following clarifications/updates have been provided:

- The BIA adopts user defined curves to predict the underpinning induced ground movements of 5mm with good workmanship control. The movements modelled within the GMA are accepted to be suitably conservative for the proposed development.
- The construction of the underpins has now been considered with minimal impact of heave considered along the party walls and beyond the host building. The magnitudes of movements considered in the assessment are accepted to be suitably conservative for the proposed development.
- A plan illustrating the neighbouring buildings that have been assessed has been provided.
- Additional information regarding the structural loads imposed on the underpins has been provided.

4.17 The GMA provided confirms a maximum Burland damage Category of 1 (very slight) of the neighbouring properties can be achieved.

4.18 The BIA indicates that a monitoring scheme is to be adopted to make sure that the movements generated are maintained within predicted limits. Croft Structural Engineers BIA includes trigger levels and an action plan.

4.19 The Arboricultural Impact Assessment and BIA confirm that no tree removal will be required as part of the proposed development.

5.0 CONCLUSIONS

5.1 The qualifications of the individuals involved in the BIA are in accordance with LBC Guidance.

5.2 It is proposed to construct a single storey basement below the full footprint of the existing building and below the existing courtyard garden area. The basement formation level will be set at 4.08m below ground level (bgl) and will be constructed using hit-and-miss underpinning techniques.

5.3 Additional information confirming the elevations of the surrounding properties and the extent of the void below ground floor level has been provided.

5.4 Screening and scoping assessments are presented and clarifications have been provided where requested.

5.5 A ground investigation was undertaken in February 2023. The BIA states that the site is underlain by Made Ground, Claygate Member and London Clay.

5.6 The BIA states localised seepages can be mitigated using sump pumps. The BIA recommends that water levels should be monitored one month prior to the commencement of on-site work and throughout the construction process.

5.7 The Flood Risk Assessment states that the site is at low risk of flooding.

5.8 Geotechnical design parameters are provided in the BIA.

5.9 The Ground Movement Assessment (GMA) and Building Damage Assessment have been provided and confirms damage to the neighbouring properties can be limited to Burland Category 1 (very slight).

5.10 The BIA indicates that a movement monitoring scheme is to be adopted to make sure that movements remain within predicted limits.

5.11 No trees are going to be felled as part of the proposed redevelopment.

5.12 It can be confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process.

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Appendix 1

Consultation Responses

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Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Anon	NA	09/08/2024	River Fleet runs under this part of Hampstead Heath, concerns regarding groundwater flow.	The BIA states in Section 7.2 of the Maund Geo Consulting BIA that there are no wells or spring lines within 100m of the site.
			Impact to trees and roots.	This falls outside the scope of the BIA Audit. The BIA states that no trees are going to be felled as part of the proposed redevelopment.
Richler	NA	Unknown	Damage to neighbouring properties due to construction	A GMA has been undertaken to assess them impacts to the neighbouring properties and confirms a maximum Burland damage category 1 (very slight).
			Issues with blocking natural drainage and groundwater flow.	The BIA confirms the development does not involve the increase of hard surfacing. The GI data shows the groundwater to be below the base of the basement.
Anonymous	NA	Unknown	The proposed development will increase the risk of flooding in the area.	A Flood Risk Assessment has been carried out and confirms the site is within an area of low risk from flooding. In addition, there will be no increase in hardstanding as part of the development.
			Damage to neighbouring properties due to construction.	A GMA has been undertaken to assess them impacts to the neighbouring properties and confirms a maximum Burland damage category 1 (very slight).

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Confirmation of the elevations of the surrounding properties and the extent of the void below the ground floor level is requested.	Closed	October 2024
2	Screening	Clarification is requested for some of the responses given to the screening stages.	Closed	October 2024
3	Land Stability	Further justification for the ground model adopted in the BIA is requested.	Closed	February 2025
4	Hydrogeology and Land Stability	Consideration should be given to the likelihood of groundwater ingress during basement construction, potential stability and hydrogeological impacts and any mitigation requirements.	Closed	October 2024
5	Hydrogeology and Hydrology	Confirmation of the impact the proposed basement will have on the proportions of hardstanding is requested and should be presented consistently.	Closed	October 2024
6	Land Stability	Geotechnical parameters to be reviewed in line with the comments made in Section 4.	Closed	October 2024
7	Land Stability	Comments and requests for clarification relating to the Ground Movement Assessment have been discussed in Section 4 and require a response. The building damage assessment may require subsequent revision.	Closed	February 2025
8	Land Stability	Further consideration of the movement monitoring trigger level values is requested following review of the Ground Movement Assessment.	Closed	February 2025

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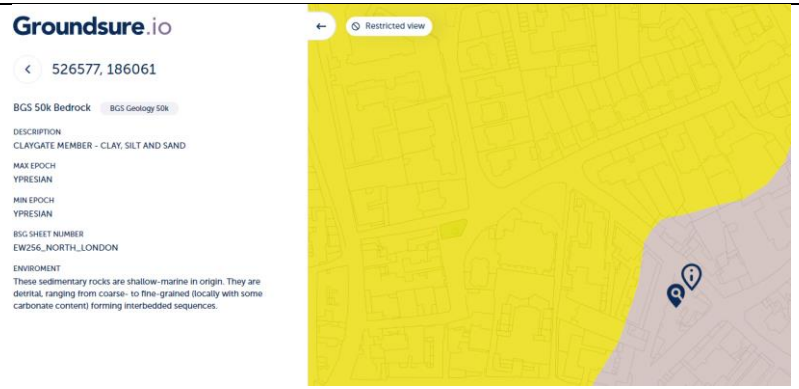
Appendix 3

Supplementary Supporting Documents

Reply to queries from Campbell Reith Basement Impact Assessment Audit (CR ref: 14006-89 September 2024)

Query No.	Query Reference	Query	Response
1	4.4 & 4.14	Confirmation of the elevations of the surrounding properties and the extent of the void below the ground floor level is requested.	4.4- The extent of the void and the relative differences in ground levels are shown in the elevation drawings 31222/P/005-10. The elevation of the property Well Mount to the southeast is approximately 2m lower than No. 30 Grove Place. This was stated in Q13 of the Land stability Screening. It can be argued that due to the lower level of Well Mount, ground movement impact is likely to the negligible, therefore the assessment is conservative. 4.14 The void underneath the existing ground floor is noted on section 1 of the Croft BIA. The propping will remain as noted on appendix E of the Croft BIA
2	4.6	Clarification is requested for some of the responses given to the screening stages.	4.6 - The gradient of the hillside taken from OS 1 25 00 survey ranges from approximately 1 in 9 to 1 in 12 or from about 5^0 to 6^0. 4.6 it is agreed that the Claygate Member is a secondary A aquifer. However, the material is of low permeability being predominantly a clay or a silt. 4.6 In MGC BIA Section 5 of groundwater screening has been amended to refer to Croft groundwater levels in design. The site is not underlain by the Bagshot Beds See info from BGS (and Arup report). The geological boundary is topographically above the site

			
3	4.7	Further justification for the ground model adopted in the BIA is requested.	The Bagshot Member lies to the northwest of the site not at the site itself. Furthermore, the description of the material is consistent with the Claygate Member. As stated in the MGC BIA an adjacent borehole at a similar level also indicated the presence of the London Clay Formation at a similar level (ref Section 5.3.2). The ground model is considered as accurate as the data allows.
4	4.9	Consideration should be given to the likelihood of groundwater ingress during basement construction, potential stability and hydrogeological impacts and any mitigation requirements.	It is anticipated that groundwater flow if present will be slow due to the clay or silt nature of the material encountered. The presence of groundwater will be accounted for in the detailed design stage.
5	4.11	Confirmation of the impact the proposed basement will have on the proportions of hardstanding is requested and should be presented consistently.	This has been updated on the Croft BIA. No change in hardstanding surfaces is noted.
6	4.13	Geotechnical parameters to be reviewed in line with the comments made in Section 4.	Ka 0.46 and kp 2.3 in MGC BIA No other changes are proposed Croft BIA updated to reflect values noted in MGC BIA

7	4.16	Comments and requests for clarification relating to the Ground Movement Assessment have been discussed in Section 4 and require a response. The building damage assessment may require subsequent revision.	XDISP has not been used in the assessment The hard layer has been increased to 10m. The excavation gm curves are based on the PDISP contours The ground movement is a summation of different forces. There is both heave and settlement and based on the input parameters from the ground model and loads. The inputs from soil removal and loads are included in the PDSIP analysis for the drained analysis PDISP input and output now provided The cross sections already show ground movements for adjacent buildings. Plan view Figures 6.1 and 6.2 in MGC BIA have been annotated to show this as well. The loads provided by the structural engineer are included in the GMA
8	4.17	Further consideration of the movement monitoring trigger level values is requested following review of the Ground Movement Assessment.	A revision for the movement monitoring was carried out to increase the depth to the hard layer within the London Clay. The trigger levels were reviewed according to the updated ground movement results and no revisions were requested as trigger levels are tighter than suggested movement recorded.

Hi Felicity,

Campbell Reith have emailed back asking for further clarity. Eleni from Croft was cc'd in to the email so has this already. The queries are as follows:

We reviewed the responses and still required some additional clarification on two of the queries as outlined below:

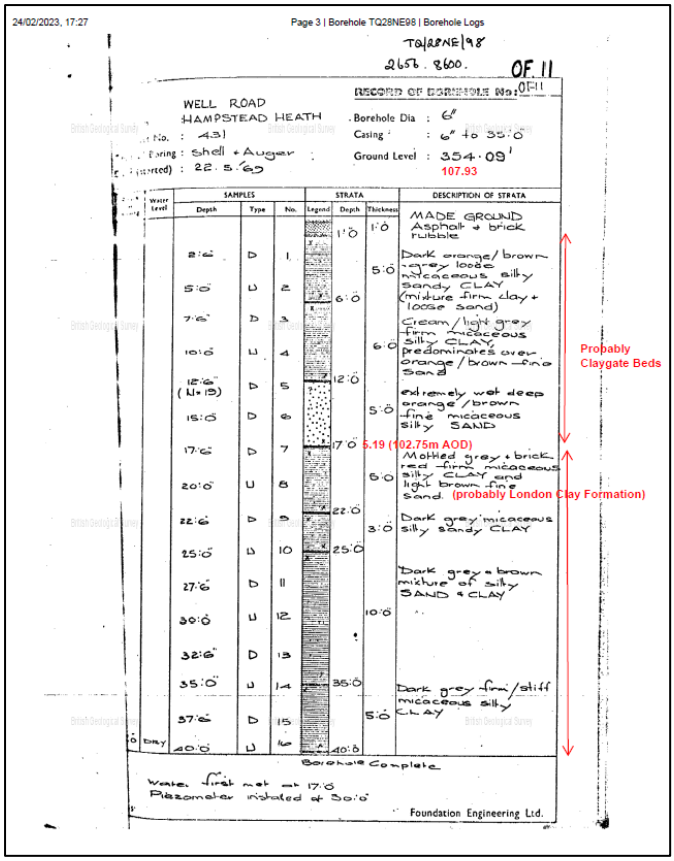
Queries 3/ 6

The ground model provided in Table 5.1 of the Maund report would suggest that the foundations (at an elevation of 104m AOD) would be placed within the Claygate Member and Table 5.2 shows this stratum to have an estimated Cu value of 30kPa. Can they please provide some clarification on how the bearing capacity of 60kPa was determined. Additionally, the loads are outlined to be in the region of 65kPa along the retaining walls that runs along the party walls. The BIA suggests that the net loading will only be 15kPa due to the removal of the soil however, the construction of the wall will replace the excavated soil with concrete beneath the party walls.

The bearing pressure from a load of 97 kN/m (combined LL and DL) acting over a 1.5m wide foundation onto the sol formation will give a bearing pressure of 64.7 kPa (65 kPa) as stated in Section 6.2 of MGC-113-GMA-V3. However, as we need to remove 2.5m of soil for the basement, a pressure of 50 kPa (2.5 x 19 kN/m^3) will be removed giving a net additional bearing pressure on the foundation formation level of 15 kPa. The 'concrete' is part of that wall load.

The query is referring to the ground model and how the bearing capacity was determined. On review of the ground investigation information, it is not clear how the ground model was established (e.g. the top of the London Clay at 5m). Boreholes available in the area suggest the Claygate Member to be thicker than that assumed in the report. We require some further justification of the ground model and clarification on how the bearing capacity was determined at the foundation level.

The ground model is based on the borehole record and adjacent borehole OF11. The interpretation of the borehole OF11 has been annotated with probable London Clay formation encountered at 102.75m AOD, compared to the site borehole BH01 at 103.00 m. In Borehole BH01 there is a layer of silty fine sandy clay at the underpin foundation formation level of 104 m becoming a gravelly sandy silt. The bearing capacity has been based on the SPT N value, based on an undrained shear strength of 30 kPa at 4.0m bgl. The borehole record has been edited with increased reduced level information to clarify this.



TQ28NE/98

2658 . 8600. OF 11

RECORD OF BOREHOLE No: OF11

WELL ROAD
HAMPSTEAD HEATH

No. : 431
Boring : Shell + Auger
Started) : 22.5.65

Borehole Dia : 6"
Casing : : 6" to 35:0
Ground Level : 354·09'
107.93

Water level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
					1'0	1'0	MADE GROUND Asphalt + brick rubble
	2:6	D	1			5'0	Dark orange/brown -grey loose micaceous silty sandy CLAY (mixture firm clay + loose sand)
	5:0	U	2		6:0		
	7:6	D	3			6'0	Cream/light grey firm micaceous silty CLAY predominates over orange/brown fine Sand
	10:6	U	4				
	12:6 (N=13)	D	5		12'0	5'0	extremely wet deep orange/brown fine micaceous silty SAND
	15:0	D	6				
	17:6	D	7		17'0	5.19 (102.75m AOD)	
	20:0	U	8			5'0	Mottled grey + brick red firm micaceous silty CLAY and light brown fine sand. (probably London Clay Formation)
	22:6	D	9		22:0	3:0	Dark grey micaceous silty sandy CLAY
	25:0	U	10		25'0		
	27:6	D	11			10'6	Dark grey + brown mixture of silty SAND + CLAY
	30:0	U	12				
	32:6	D	13				
	35:0	U	14		35:0	5:0	Dark grey firm/stiff micaceous silty CLAY
	37:6	D	15				
dry	40:0	U	16		40:6		

Probably Claygate Beds

Borehole Complete

Water first met at 17:0
Piezometer installed at 30:0

Foundation Engineering Ltd.

MAUND GEO-CONSULTING
Julian Maund BSc PhD MIMMM CEng FGS CGeol
Registered Ground Engineering Advisor

Maund Geo-Consulting Ltd
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Chipping Norton
OX7 5DG
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Borehole No. **BH01**
Sheet 1 of 1

Project Name:	30 Grove Place NW3 1JR	Project No: MGC-113	Co-ords 526568 , 186047
Location:	Rear patio garden		Level: (m AOD) 108.00 (Approx.)
Client:	Mr G. Fraser		Date Drilled: 24/02/23

Hole Type: PM Trent lined
Hole Diameter: 100 mm
Logged By: JGM

Well	Water Strikes	Sampling and Insitu Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.50	D1		0.9	107.10		Made Ground: Loose fine to coarse clayey silty GRAVEL of brick and concrete. Possible layer of concrete at 0.8 to 0.9m.
		1.00	D2	N=3 (1/0,1, 0, 1, 1)				Made Ground: Very soft brown grey silty fine sandy CLAY with rounded fine gravel and brick fragments.
		2.00	D3	N=3 (1/0,1, 0, 1, 1)				
		3.00	D4	N= 4 (0/0, 1, 0, 1, 2)	2.50	105.50		Soft to firm brown grey silty fine sandy CLAY (possible Claygate Member)
		4.00	D5	N=6 (3/2, 1, 1, 1, 3)				becoming gravelly sandy silt at 4.0m
		5.00	D6	N= 9 (1/1, 2, 2, 2, 3)	5.00	103.00		Firm grey silty CLAY London Clay Formation
					5.45	102.55		Borehole complete at 5.45 m

Remarks:
Inspection pit to 1.0 m.
Borehole dry on completion.
Standpipe Piezometer installed to depth of 4.0m. Bentonite seal from 1.0 to 0.3 m. Gas bung and flat cover

Query 7/8

The ground movement assessment applies the long-term and short-term heave movements against the vertical movement to determine the maximum deflection. The report states this is due to it being assumed that 'the soil mass is removed in its entirety before the underpins are placed'. This is not considered to be a conservative assumption as the underpins will need to be installed before the basement can be excavated. In addition, as stated in the D1 report, heave movements will likely be confined to the basement perimeter and will not extend beyond the retaining wall. The assessment should therefore consider the potential damage for the underpin installation where no excavation has been undertaken.

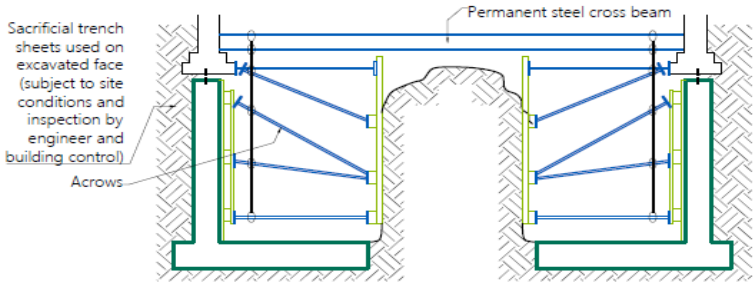
What is the D1 report?

'The assessment should therefore consider the potential damage for the underpin installation where no excavation has been undertaken'. We do not understand this comment - how can you install an underpin if you don't excavate?

In general the reason why we consider this assessment conservative is that there is a transition between short term movements and long-term movements. If hypothetically all the soil is removed below the basement in an instant there would be unrestrained heave across all of the basement excavation. However, in practice there is some excavation, some reloading from the underpins as the hit and miss sequence is undertaken and the central soil mass is only removed once the underpins have been installed. This limits the unrestrained short-term heave on the basement walls. So the model is likely to overestimate the heave and is therefore conservative. Heave from excavation is the main issue, as we have already determined the settlement is low due to the low net bearing pressure being less than the undrained shear strength of the formation soil.

The assessment should include consideration of the underpin installations prior to the basement excavation. The heave will likely be confined to the basement perimeter and will not extend beyond the retaining wall therefore, the impacts (to the neighbouring assets and buildings) from movements caused due to the underpinning installation should be considered as this will be carried out prior to excavation of the basement.

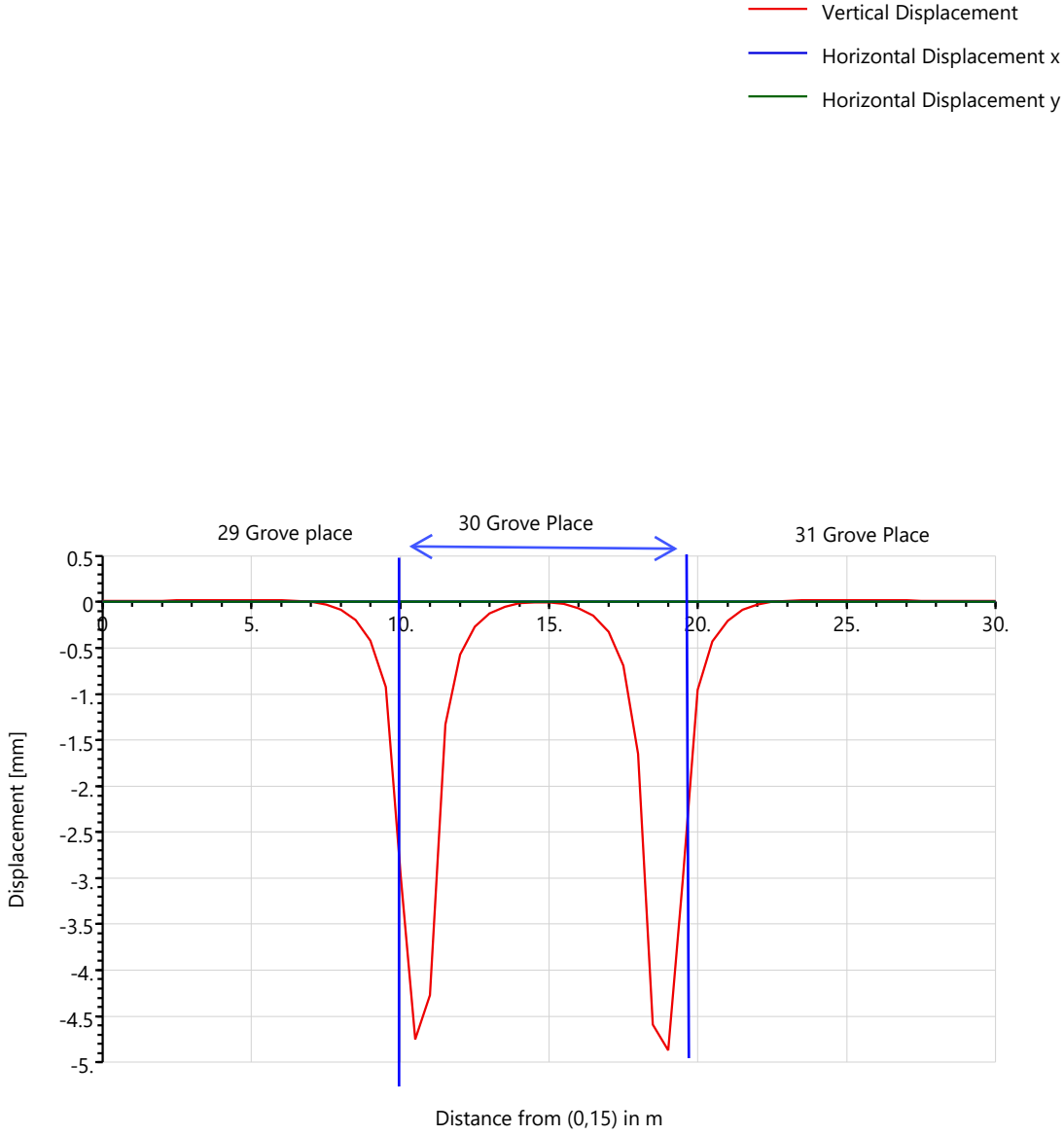
The underpin installation is part of the basement excavation. You have to excavate the soil in order to install the underpins as shown from Croft drawing TW03 included in the MGC BIA report, but it is accepted this is carried out as a first stage.



This may result some heave, before the underpins are installed on a hit and miss basis, although this will be mostly cancelled out from the foundation loads. This stage of the installation has now been specifically analysed for ground movement.

The central soil mass has also been specifically analysed for ground moment as a second stage. These ground movements have been combined to provide an overall ground movement model. I have included ground movement profiles which will be included in the damage assessment category, which remain well within Category 1.

Displacement for 29 to 31 Grove Place



Displacement for 29 to 31 Grove Place