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190 Goldhurst Terrace
London, NW6 3HN

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 13693-41
Revision: F1

June 2022

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Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	May 2022	Comment	NSkb-13693-41-120522-190 Goldhurst Terrace.doc	NS	KB	KB
F1	June 2022	Planning	NSkb-13693-41-160622-190 Goldhurst Terrace_F1.doc	NS	KB	KB

Document Details

Last saved	16/06/2022 15:16
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Project Number	13693-41
Project Name	190 Goldhurst Terrace, London, NW3 6HN
Planning Reference	2021/2946/P

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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 190 Goldhurst Terrace (planning reference 2021/2946/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 (BIA) 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 proposed development comprises the construction of a single-level basement beneath the existing building.

1.5. The qualifications of the individuals involved in the production of the BIA are in line with Camden's guidance.

1.6. Screening and scoping assessments are presented, supported by desk study information.

1.7. The site investigation confirmed that the basement will be founded in the Weathered London Clay. Groundwater is not expected to be encountered during construction. However, any groundwater ingress during the excavation will be managed via traditional sump pumping. It is accepted the proposed development will not adversely affect the local hydrogeological environment.

1.8. A Flood Risk Assessment has been undertaken which concludes that the site is at very low-low risk of flooding from all the sources and that the proposed development will not increase groundwater flooding risk in the surrounding area. However, A SuDS (Sustainable Drainage System) proposal will need to be developed at post-planning stage to ensure that flood risk from surface water will not increase as part of the development.

1.9. Geotechnical parameters are presented. An outline structural proposal and associate drawings are included in the BIA. Underpinning is to be carried out following a traditional 'hit and miss' sequence. The underpins will be propped in the temporary condition and supported by the basement and ground floor slab in the long term.

1.10. A 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.

1.11. The result of the preliminary damage assessment confirms that damage to neighbouring properties will be within Category 1 of the Burland Scale.

1.12. The BIA recommends condition surveys to be undertaken as part of the Party Wall Agreements and recommends a project specific monitoring regime and Action Plan to be put in place, which will delineate lines of responsibility, monitor trigger levels and appropriate mitigation measures.

1.13. Based on the additional information provided, it can be confirmed that the BIA meets the requirements of Camden Planning Guidance: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on the 21st of February 2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 190 Goldhurst Terrace, London, NW6 3HN, planning reference 2021/2946/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.

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 "Erection of basement extension".

2.6. CampbellReith accessed LBC's Planning Portal on the 28th of March 2022 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Gabriel GeoConsulting Ltd, ref: GGC16550/R4, dated December 2021.
- Design and Access Statement by Planning Insight, rev. 1, ref: P0697, dated June 2021.
- Architectural Drawings by Robert Rhodes Architecture including existing and proposed plans and sections.
- Proposed Sequence of Works and Method Statement and associated structural drawings by Axiom Structures (received in April 2022):
  - 21108-ASL-SK-003 P5 (dated August 2021)

- 21108-ASL-SK-001 P5 (dated August 2021)
- 21108-ASL-SK-060 P3 (dated August 2021)
- 21108-ASL-SK-TW-040 P3 (dated August 2021)
- 21108-SK-TW-045 P1 (dated June 2019)

- Planning Consultation Responses as detailed in Appendix 1.

2.7. CampbellReith were provided with the following relevant documents for audit purposes in May and June 2022:

- Email from Gabriel GeoConsulting Ltd, dated 26/05/2022 (see Appendix 3).
- '190 Goldhurst GMA Summary' pdf plan (see Appendix 3).
- PDisp software Input and Output.

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	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Section 3 of the BIA.
Are suitable plan/maps included?	Yes	Section 4, 5 and 6 of the BIA and architect's drawings.
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 BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 7.2 of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 7.4 of the BIA.
Is a conceptual model presented?	Yes	Section 10 of the BIA.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 8 of the BIA.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 8 of the BIA.

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 8 of the BIA.
Is factual ground investigation data provided?	Yes	Appendix C of the BIA.
Is monitoring data presented?	Yes	Section 9.8 of the BIA.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	On 10/03/2016.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The closest neighbouring properties are considered to not have a basement.
Is a geotechnical interpretation presented?	Yes	Section 10.4 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	An indicative value for the bearing capacity to be adopted in the retaining wall design has been presented.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Investigation report, FRA provided.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Neighbouring properties are considered to not have a basement.
Is an Impact Assessment provided?	Yes	Section 10 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	GMA and outline structural proposal provided
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Section 10.9 of the BIA.
Has the need for monitoring during construction been considered?	Yes	Section 10.7 of the BIA.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Residual impacts are considered to be negligible.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
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	
Are non-technical summaries provided	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Gabriel GeoConsulting Limited, and the qualifications of the individuals involved in the production of the BIA meet the requirements of CPG Basements.

4.2. The site is occupied by a three-storey terraced dwelling house with a rear extension/conservatory situated in the South Hampstead Conservation Area. A large paved parking area which slopes gently towards the Goldhurst Terrace carriageway is present at the front of the property, while the rear is occupied by a garden and a perimeter of raised planting. Below the hallway there is a small cellar, accessed internally via a ladder and used as a storage room. The building shares party walls with No. 188 and No. 192 Goldhurst Terrace which are understood to have a similar cellar. The property is not listed.

4.3. The proposed development comprises the construction of a single-level basement beneath almost the full footprint of the house excluding the rear extension/conservatory. The proposed Finished Floor Level (FFL) is at 37.550m AOD, which is c. 3.15m bgl. Lightwells at basement level are proposed at both front and rear of the property. A maximum excavation depth of 3.55m is considered in the BIA.

4.4. Screening and scoping assessments are presented and informed by desk study information. Most relevant figures/maps from the ARUP GSD and other guidance documents are referenced within the BIA to support responses to screening questions.

4.5. A site investigation was undertaken by Chelmer Ltd in January 2016. Site works comprised exploratory boreholes to a maximum depth of 8.00m bgl and hand dug trial pits to a maximum depth of 1.28m bgl. Made Ground of thickness between 0.70m to 1.10m was found on top of Weathered London Clay which were encountered to a depth of 5.50-6.00m bgl and overlying deposits of the London Clay Formation to the bottom of the boreholes. The hand pits proved the base of existing foundation to be at between 0.77 and 1.07m bgl.

4.6. Groundwater was encountered in only one of the boreholes within the Weathered London Clay at a depth 0f 0.80m bgl. On two return monitoring visits in March 2016, groundwater was found at c. 0.60m bgl in the borehole at the rear of the property and at c. 5.50-6.00m bgl at the front. It is accepted that the 'lost' Westbourne River may pass c. 80m to the east of the site and it will not be affected by the proposed development.

4.7. The BIA states that given the low permeability of the London Clay, any groundwater ingress during the excavation will be managed via traditional sump pumping. In the unlikely event that the more permeable deposits will be encountered during the excavation, then an engineered groundwater bypass may be required. As the adjacent properties are considered to only have small cellars similar to the existing on site, it is accepted that there will not be any cumulative impact on the local hydrogeological environment.

4.8. The site has a very low risk of flooding from surface water, however it is in a Local Flood Risk Zone and a slight increase (part of the proposed lightwell at the front) in hardstanding is proposed. As such a FRA has been undertaken which concludes that the site is at very low-low risk of flooding from all the sources and that the proposed development will not increase groundwater flooding risk in the surrounding area. A SuDS proposal will need to be developed at post-planning stage to ensure that flood risk from surface water will not increase as part of the development.

4.9. Geotechnical parameters to be adopted in the basement design and ground movement calculations are presented in the BIA. An indicative value of 150kPa is indicated in the BIA at formation level (see Appendix 3).

4.10. An outline structural proposal and associate drawings are included in the BIA. Underpinning below the existing perimeter wall (including party walls to No. 188 and 192 Goldhurst Terrace) is proposed to form the new basement. The underpinning is to be carried out following a traditional 'hit and miss' sequence. The excavation will be always kept stable by trench sheets and struts. The underpins will be propped in the temporary condition and supported by the basement and ground floor slab in the long term.

4.11. A 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 analysis was carried out using the Oasys programme PDisp and following the guidance provided in CIRIA C760. The full input and output of the software has been provided.

4.12. Ground movements calculated in the GMA occurring at neighbouring properties are between 5 and 12mm in both the horizontal and vertical direction. The result of the preliminary damage assessment confirms that damage to neighbouring properties will be within Category 1 of the Burland Scale. Considering the deepest excavation is going to take place at the rear of the property due to the presence of the existing cellar at the front and the presence of similar cellars underneath neighbouring properties, the GMA includes analysis for two of the neighbouring rear walls, which are considered to be the worst case scenario. The geometry associated with the proposed basement, neighbouring properties and wall analysed is presented in Appendix 3.

4.13. The BIA recommends condition surveys to be undertaken as part of the Party Wall Agreements and recommends a project specific monitoring regime and Action Plan to be put in place, which will delineate lines of responsibility, monitor trigger levels and appropriate mitigation measures.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved in the production of the BIA are in line with Camden's guidance.

5.2. Screening and scoping assessments are presented, supported by desk study information.

5.3. The site investigation confirmed that the basement will be founded in the Weathered London Clay. Groundwater is not expected to be encountered during construction. However, any groundwater ingress during the excavation will be managed via traditional sump pumping. It is accepted the proposed development will not adversely affect the local hydrogeological environment.

5.4. A FRA has been undertaken which concludes that the site is at very low-low risk of flooding from all the sources and that the proposed development will not increase groundwater flooding risk in the surrounding area.

5.5. Geotechnical parameters are presented. An indication of the allowable bearing capacity at formation level to inform detailed retaining wall design has been presented.

5.6. An outline structural proposal and associate drawings are included in the BIA. Underpinning is to be carried out following a traditional 'hit and miss' sequence. The underpins will be propped in the temporary condition and supported by the basement and ground floor slab in the long term.

5.7. A 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. Full input and output of the software has been presented.

5.8. The result of the preliminary damage assessment confirms that damage to neighbouring properties will be within Category 1 of the Burland Scale.

5.9. The BIA recommends condition surveys to be undertaken as part of the Party Wall Agreements and recommends a project specific monitoring regime and Action Plan to be put in place, which will delineate lines of responsibility, monitor trigger levels and appropriate mitigation measures.

5.10. Queries and requests or information are summarised in Appendix 2. Considering the additional information presented, the BIA meets the requirements of Camden Planning Guidance: Basements.

Appendix 1: Residents' Consultation Comment

Residents' Consultation Comments

Only residents' consultation comments relevant to this audit have been considered and are discussed as follows:

Surname	Address	Date	Issue raised	Response
Michael Gould	Redacted	5/03/2022	Structural integrity concerns	See Section 4.10. – 4.12.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Land Stability	Indication of the allowable bearing capacity at formation level to inform detailed retaining wall design is not presented and is requested.	Closed – See Section 4.9.	15/06/22
2	Land Stability	The GMA should include all the walls within the zone of influence of the proposed basement and a plan showing the geometry of the proposed excavation in respect to the neighbouring walls should be presented for clarity. The full input and output of the software used in the GMA should be presented.	Closed – See Section 4.11. – 4.12.	15/06/22
3	Hydrology	A SuDS proposal will need to be developed at post-planning stage to ensure that flood risk from surface water will not increase as part of the development.	Note only	N/A

Appendix 3: Supplementary Supporting Documents

Additional information from Gabriel Geo Consulting

RE: 190 Goldhurst TerraceKeith Gabriel to camdenaudit@campbellreith.com, nicolasimonini@campbellreith.com, katharinebarker@campbellreith.com, sofie.fieldsend@camden.gov.uk 26/05/2022 18:00
Cc "Andrzej Plocieniak", "Richard Nuttall", "Shuqi and Hai Lin"
History:This message has been replied to.

8 Attachments

S1 INPUT.pdf S1 SETTLEMENTS.pdf S2 INPUT.pdf S2 SETTLEMENTS.pdf S3 INPUT.pdf
S3 SETTLEMENTS.pdf S4 INPUT.pdf S4 SETTLEMENTS.pdf

Dear Campbell Reith

Further to your queries raised in the BIA Audit Report (13693-41 D1, May 2022), please find below our responses:

Query 1 - *Indication of allowable bearing capacity at formation level*.

With reference to section 3.4 of the BIA, existing ground level is at 40.50m AOD and formation levels will be at between 36.60m and 36.95m AOD (ie approximately 3.50m to 4.00m below ground level). With reference to sections 9 and 10 of the BIA, and Table 5 in section 10.5.5, the foundations will be formed within the stiff clay with an undrained shear strength of 80kN/m^2 or greater. Allowable bearing capacity would typically be limited to 150kPa in order to limit settlements.

For this specific development, the maximum imposed net bearing pressure on any one foundation is predicted to be 141 kPa (Table 4, section 10.5.3), within the allowable bearing capacity. Typically the net bearing pressure is considerably lower. As section 10.5.8, for the specific loads applicable to the proposed development, analyses of resultant heave / settlement have been undertaken indicating very limited movements.

Query 2 - *The GMA should include all the walls within the zone of influence of the proposed basement and a plan showing the geometry of the proposed excavation in respect to the neighbouring walls should be presented for clarity. The full input and output of the software used in the GMA should be presented*.

The full inputs / outputs of the PDisp model are provided (as attached). However, please note that as section 10.6.7 of the BIA, although a detailed sequential model has been assessed in PDisp for the purposes of predicting heave / settlement specific to the changes in load generated during the proposed construction sequence, the GMA and damage assessment is based upon the "low stiffness" movement curve in CIRIA C760 (Figure 6.15b) and predicts settlements at the wall of >12mm. This is significantly more conservative than the PDisp movements predicted and, given that the temporary works requires propping and is specified to be propped by the Structural Engineer in the submitted drawings, typically the movements would be expected to fall within the "high stiffness" range predicted by CIRIA C760 ie the assessment is reasonably conservative.

In addition, the assessment focusses on the structural walls to adjacent properties where greatest movements are predicted ie adjacent to deepest excavations. Note that the adjacent properties also have cellars which would mitigate impacts (ie differential depth in foundations between proposed basement / adjacent cellars is reduced) across portions of the buildings' footprints and the existing cellar at the site limits the excavation requirements across part of the site (ie reduces potential for generating movements). On the basis that the walls of the adjacent structures at the locations where greatest movements are being generated have been assessed conservatively, demonstrating that a maximum of Burland

category 1 damage will be sustained, the remaining walls within the adjacent properties will clearly be less impacted and fall within the CPG Basements / Policy A5 maximum damage policy criteria; therefore, a full analysis of all the walls is not presented.

We would be happy to discuss this further with you, as required.

Best wishes

Keith

Keith Gabriel
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From: Richard Nuttall <richard@axiom-structures.co.uk>
Sent: 13 May 2022 09:42
To: Keith Gabriel <keithg@gabrielgeo.co.uk>
Cc: Andrzej Plocieniak <andrzej@axiom-structures.co.uk>; gkite@milvumgroup.com
Subject: FW: 190 Goldhurst Terrace

Hi Keith,

I hope this email finds you well.

See email below from Shuqi on Goldhurst Terrace regarding queries that have been raised on the BIA on Goldhurst Terrace. The 3 points shown within Appendix 2 appear to be relatively simple responses, are you able to assist?

Many thanks,

Richard Nuttall
MEng (Hons) CEng MICE
Senior Structural Engineer
.....

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177 Southwark Bridge Road
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From: Shuqi and Hai Lin [mailto:shuqiandhai@gmail.com]
Sent: 12 May 2022 17:06
To: Andrzej Plocieniak <andrzej@axiom-structures.co.uk>; Richard Nuttall <richard@axiom-structures.co.uk>
Subject: 190 Goldhurst Terrace

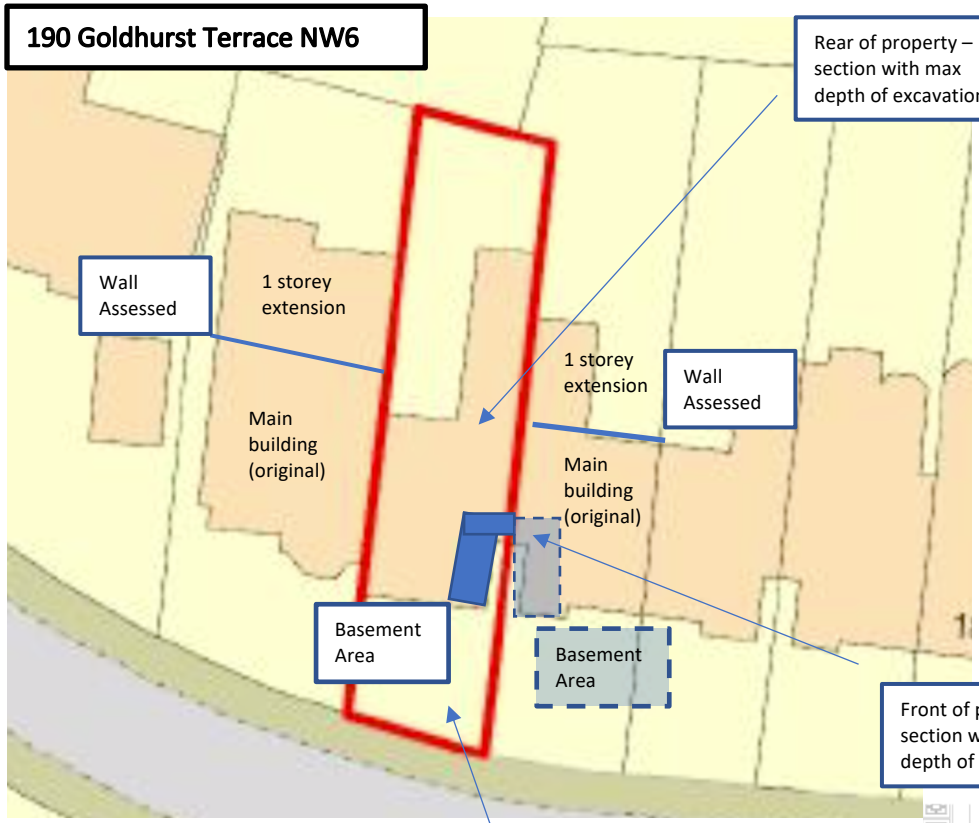
Dear Andrzej and Richard,

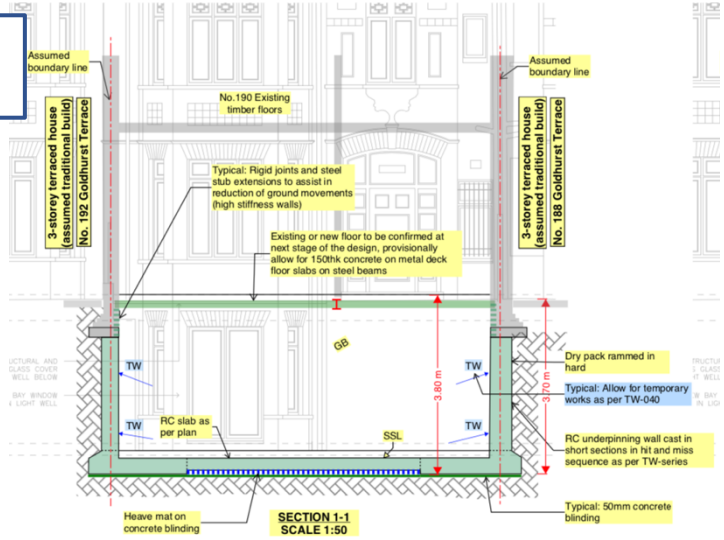
Hope you are well. I have received the attached document from the case officer pertaining to the council's BIA audit. They have requested additional information. Please see the attached audit appendix 2 (page 17) for their queries that need to be addressed. The person who did my BIA is now retired. I would be most grateful if you could provide a letter or something to address those points for us?

Many thanks and Kind Regards,

Shuqi

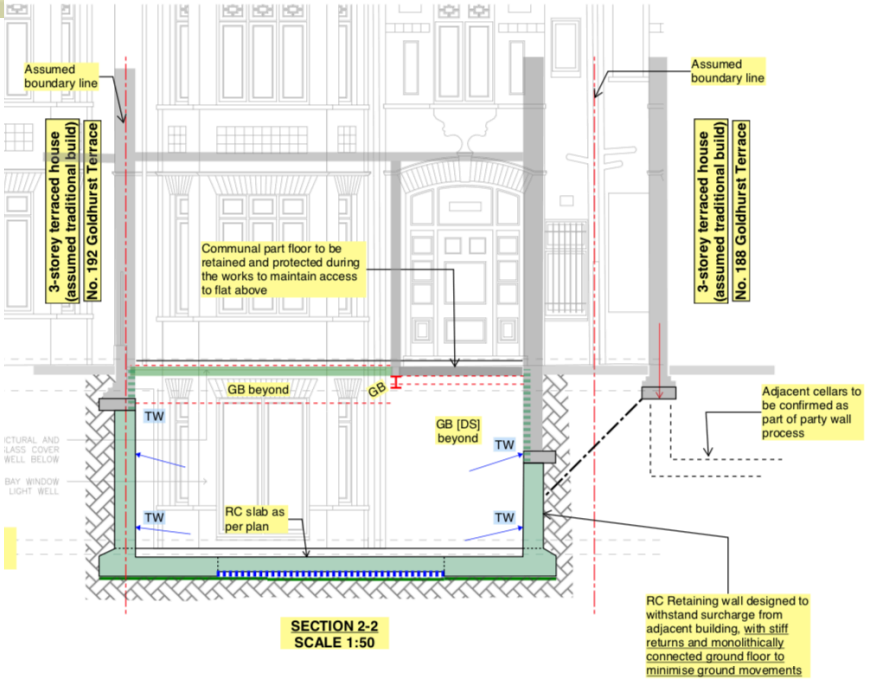
190 Goldhurst Terrace NW6





Monitoring of Movements as BIA:

- Amber Trigger 5mm
- Red Trigger 8mm



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