

### **Basement Impact** Assessment Audit

194 Goldhurst Terrace, London NW6 3HN

> For London Borough of Camden

> > Project No. 14006-53

Date October 2024

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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 194 Goldhurst Terrace, London NW6 3HN (planning reference 2024/0012/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 BIA has been carried out by engineering consultants Axiom Structures Ltd. The individuals concerned in its production hold suitable qualifications in accordance with the CPG: Basements.
- 1.5 The proposed development includes partial demolition of the existing building and the construction of a new basement extending beneath much of the main structure. A new single storey house with basement is also proposed. Updated drawings confirm that the depth of the basement varies across the site, reaching depths of up to 3.50m depth.
- 1.6 The basement will be founded in stiff clay of the London Clay Formation. It is not anticipated that groundwater will be encountered however allowance for dewatering small areas of perched groundwater using sump pumps has been recommended. It is accepted that the proposed basement will not adversely impact the hydrogeology of the area.
- 1.7 With the inclusion of appropriate mitigation measures it is accepted that the proposed basement will not adversely impact the hydrology of the area however, proposals will need to be approved by the LLFA and Thames Water.
- **1.8** The land stability scoping responses have been updated and confirm the proposed foundations are at sufficient depths to comply with the NHBC guidance for foundations near trees.
- 1.9 A Ground Movement Assessment (GMA) and Monitoring Specification have been undertaken. It is accepted that the impact to the neighbouring properties can be limited to Burland Category 1 (Very Slight) using movement monitoring during construction and appropriate trigger levels as specified in the revised BIA.
- 1.10 Considering the additional information presented, it is 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) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 194 Goldhurst Terrace, London, NW6 3HN (planning reference 2024/0012/P). The basement is considered to fall within Category B as defined by the Terms of Reference.
- 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 "Demolition of single storey side extensions and erection of three storey side extension, together with excavation of part basement and lightwells to create 8no. flats and associated external alterations. Relocation and rebuilding of existing detached garage and single storey side and rear extensions to create 1no. house together with basement excavation."
- 2.6 The Audit Instruction confirmed 194 Goldhurst Terrace neither involves, nor is neighbour to, listed buildings.
- 2.7 CampbellReith accessed LBC's Planning Portal on Date and gained access to the following relevant documents for audit purposes:



- Basement Impact Assessment Report by Axiom Structure Ltd, issued December 2023, reference 23091, revision P1.
- Design and Access Statement by ArchiSeDe Ltd.
- Flood Risk Assessment & SuDs Strategy by Nimbus Engineering Consultants, issued January 2024, reference C3146-R1-REV-D.
- Garage Relocation Method Statement by ArchiSiDe Ltd.
- Tree survey and Arboricultural Impact Assessment by ghatrees, issued December 2023, reference GHA/DS/160222:23.
- Heritage Impact Assessment by Handforth Heritage, issued December 2023.
- Town Planning Statement by Savills, issued December 2023.
- Preliminary Ecological Appraisal and Preliminary Roost Assessment by MKA Ecology, issued December 2023, reference 147323, revision 2.0.
- Drawings and sections provided by ArchiSiDe Ltd, issued in December 2023, including:
  - Existing Site Plan; Existing Basement Plan; Existing Ground Floor Plan; Existing North Elevation; Existing East Elevation; Existing South Elevation; Existing West Elevation; Demolition Plan; Existing Sections A-A, B-B, C-C, and D-D.
  - Proposed Site Plan; Proposed Basement Plan; Proposed Ground Floor Plan; Proposed Garden Floor Plan; Proposed North Elevation; Proposed East Elevation; Proposed South Elevation; Proposed West Elevation; Demolition Plan; Proposed Sections A-A, B-B, C-C, D-D, and E-E.
- 2.8 To address the queries raised in the D1 audit, the following updated documents were provided to CampbellReith:
  - Basement Impact Assessment issued by Axiom Structures Ltd, dated 5<sup>th</sup> September 2024, reference 23091, rev. P3. The report includes updated drawings:
    - Proposed Garden Floor Plan issued by ArchiSiDe Ltd, dated August 2024, ref.
       P.02, rev. D
    - Proposed Ground Floor Plan issued by ArchiSiDe Ltd, dated August 2024, ref.
       P.03, rev. C
    - Ground Floor Plan, issued by Axiom Structures, dated August 2024, ref. 23091-ASL-SK-S-0111 P3.
    - Sections and Levels, issued by Axiom Structures, dated August 2024, ref. 23091-ASL-SK-S-0200 P3.
    - Garden Floor Plan, issued by Axiom Structures, dated August 2024, ref. 23091-ASL-SK-S-0110 P3.
    - Outline Temporary Works Proposal, issued by Axiom Structures, dated September 2024, ref. 23091-ASL-SK-S-0401 P3.



- Ground Movement Assessment issued by Ground Projects, dated 18<sup>th</sup> September 2024, rev. P1.3. The document includes the following documents within the appendices:
  - Monitoring Specification issued by Axiom Structures, dated 5<sup>th</sup> September 2024, revision P1



#### 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The updated BIA confirms the assessments have been undertaken by individual with qualifications in accordance with the CPG: Basements.
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	
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	
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided?	Yes	



Item	Yes/No/NA	Comment
Is scoping consistent with screening outcome?		
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	No	However, a review of historical boreholes logs has been included.
Is monitoring data presented?	No	
Is the ground investigation informed by a desk study?	N/A	
Has a site walkover been undertaken?	Unknown	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Neighbouring foundations assumed to be 0.75m bgl.
Is a geotechnical interpretation presented?	Yes	Section 7.0 of BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	Flood Risk Assessment provided
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 screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	
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	
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	Sufficient mitigation measures have been included within the updated reports to limit the damage to Category 1 (Very Slight).
Are non-technical summaries provided?	Yes	



#### 4.0 **DISCUSSION**

- 4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Axiom Structures Ltd. The updated revision indicates that the assessments have been reviewed by individuals that hold suitable qualifications in accordance with CPG: Basements.
- 4.2 The Structural Engineer's Statement (SES) has also been carried out by Axiom Structures Ltd.
- 4.3 The LBC Instruction to proceed with the audit identified that the basement proposal does not involve, and is not adjacent to, any listed buildings.
- 4.4 The site currently comprises a three-storey detached block of flats housing an existing basement beneath the rear section and some modern single-storey extensions. The site also includes a standalone garage, a grass landscaped area and overgrown bushes and trees.
- 4.5 The proposed development includes creating 8 new flats through the demolition of the single storey extensions, replacing them with a new three-storey side extension. A new basement is proposed, extending beneath much of the main building and the new side extension. The works also include the dismantling of the standalone garage (reconstructing it to the west) to allow construction of a new detached single storey house with a single basement beneath.
- 4.6 Updated sections have been provided showing that the basement excavations will vary across the site, with a maximum depth of 3.50m below ground level (bgl).
- 4.7 The intrusive ground investigation is limited to two foundation inspection pits carried out to confirm the condition and depth of the existing foundations. The desktop study assessment, provided in the BIA, also includes review of historical borehole data near the site.
- 4.8 Based on the available information the conceptual site model assumes a thin cover of Made Ground over stiff clay of the London Clay Formation. Clause 8.1.1 of the BIA states that the `*proven ground conditions'* are stiff clays however, it should be noted that as no intrusive ground investigation has been undertaken, the ground conditions have not yet been proven.
- 4.9 Groundwater is presumed to be outside the influence of the proposed works however, limited pockets of perched groundwater may be encountered. These are anticipated to be easily controlled using sump pumps.
- 4.10 The BIA recommends that a site-specific ground investigation is carried out to confirm the ground conditions.
- 4.11 The two foundation inspection pits confirmed that the foundations of the existing building are at approximately 1.20m bgl on conventional strip footings.
- 4.12 Geotechnical parameters have been provided within Section 7.0 of the BIA, these are accepted to be suitable for the assumed ground conditions described above. An allowable bearing pressure of 150kN/m<sup>2</sup> for the basement founding stratum is suggested within the scheme calculations included in Appendix 5 of the BIA. The allowable bearing pressure calculations and the assumed parameters provided are considered acceptable for the anticipated ground conditions.



- 4.13 The surface water and flooding screening responses highlight that the site is situated within a street that flooded in both the 1975 and 2002 flood events and is located in the Goldhurst local Flood Risk Zone. In addition, the development will include an increase in hard surfacing. The Flood Risk Assessment (FRA) provided includes a scheme to manage the surface water by reducing the rate of discharge. This is proposed to be done using wall mounted rainwater harvesting tanks and green or sedum roofing. Hardstanding areas will be formed of porous surfacing. The remaining surface water runoff will be attenuated to restrict flow rates into the public drains. It is assumed that the proposals will require approval from the LLFA and Thames Water.
- 4.14 The hydrogeology screening and scoping identifies that the site is within an unproductive aquifer and thus, the risk of water inflows during excavation are unlikely. However, as a residual risk remains, an allowance for localised dewatering is recommended within the BIA. The updated BIA confirms a lost river is situated 180m from the site.
- 4.15 Land stability screening determines that the London Clay is the shallowest strata and that trees will be felled as part of the development works. The BIA also identifies that there is a history of shrink-swell subsidence in the local area.
- 4.16 The scoping response relating to shrinkable soils has been updated to confirm that the minimum foundation depth based on the proximity of trees to the proposed development is 2.35m bgl. The BIA confirms a minimum foundation depth of 2.50m bgl has been adopted for the scheme. It is noted that part of the development encroaches into a Tree Protection Area.
- 4.17 The screening and scoping also suggests that the development is within 5m of a highway or pedestrian right of way and will increase the differential depths of foundations relative to neighbouring properties. The scoping identifies that the neighbouring properties closest to the proposed basements include No. 192 and No. 196 of Goldhurst Terrace and thus a Ground Movement Assessment has been carried out. The additional documents provided confirm that the highway is some 4m from the nearest point of the proposed basement (included in Appendix 3).
- 4.18 The proposed temporary and permanent works, included in Section 7.0 of the BIA, outlines that the existing building will be underpinned via a hit and miss sequence. The new basement will be constructed with reinforced concrete (RC) walls connected to a RC basement slab. In paragraph 7.2.12 of the BIA it is stated that the outline construction sequence and temporary works presented therein will be superseded by the contractor's proposals. It should be noted that any changes made to the information provided to support this BIA may require additional assessment to confirm the impacts still meet the requirements of CPG Basements.
- 4.19 A sequence of the underpinning is included in Appendix 5 of the BIA. Updated drawings provided in the most recent BIA revision show that the lightwell along the northern boundary has been reduced in length and is no longer directly adjacent to the garage at No. 196 Goldhurst Terrace.
- 4.20 Drawing 23091-ASL-SK-TW-0401 P3 shows the existing garden wall will be demolished and sections approximately 1m wide will be excavated beneath the external walls of the main



property. Sacrificial trench sheeting will be installed along the site boundary using a conventional dig and push method supported with double bracing struts to maintain stability and the reinforced base slab will be cast across the ground. A reinforced concrete wall will then be cast against the trench sheeting and the external wall will be underpinned. The drawing provides additional information regarding the methodology and confirms the props will remain in place during the curing of the retaining wall and underpin section (included in Appendix 3).

- 4.21 A Ground Movement Assessment (GMA) has been provided by Ground Projects. The GMA has considered the potential impact to neighbouring properties where maximum vertical and horizontal movements of 5mm and 10mm respectively are estimated. The results suggest up to Category 1 (Very Slight) damage with the exception of a façade at No. 192 which indicates Category 2 (Slight) damage.
- 4.22 Additional assessment was carried out and identifies that the damage can be limited to Category 1 (very slight) across all neighbouring façades where the movement is restricted to the trigger values proposed in the Monitoring Specification provided in the appendices of the GMA. It is therefore accepted that, with the use of mitigation comprising movement monitoring using red trigger values of 4mm vertical and 7mm horizontal, the damage to the neighbouring properties can be limited to Category 1 (Very Slight) damage.
- 4.23 The results of the GMA indicate maximum vertical and horizontal movements of 5mm and 8mm respectively to the highway, which is considered to have a negligible impact.
- 4.24 A preliminary structural monitoring strategy is to be carried out during the construction works; a monitoring layout plan and programme is to be agreed as part of the pre-commencement works and is subject to Party Wall agreements. Updated trigger values are provided within the Monitoring Specification included in Appendix B of the GMA.



#### 5.0 CONCLUSIONS

- 5.1 The BIA has been carried out by engineering consultants Axiom Structures Ltd.; the individuals concerned in its production hold suitable qualifications in accordance with CPG: Basements.
- 5.2 The proposed development includes partial demolition of the existing building and the construction of a new basement extending beneath much of the main structure. A new single storey house with a single storey basement is also proposed. An updated plan of the proposed basement (ref. 23091-ASL-SK-S-0200 P2) confirms that the depth of the basement varies across the site, reaching depths of up to 3.50m bgl.
- 5.3 The basement will be founded in stiff clay of the London Clay Formation. It is not anticipated that groundwater will be encountered however allowance for dewatering small areas of perched water using sump pumps has been recommended. It is accepted that the proposed basement will not impact the hydrogeology of the area.
- 5.4 With the inclusion of appropriate mitigation measures it is accepted that the proposed basement will not adversely impact the hydrology or flooding of the area. Drainage proposals will require approval by the LLFA and Thames Water.
- 5.5 The updated BIA confirms a lost river is located 180m from site.
- 5.6 The land stability scoping responses have been updated to confirm the proposed foundations are at sufficient depths to comply with the NHBC guidance for foundations near trees. It is accepted that the proposals will not have a significant impact on the stability of the area.
- 5.7 The Structural Engineer's Statement indicates an allowable bearing pressure of 150kPa has been assumed and the engineer has provided outline calculations.
- 5.8 The most recent GMA revision indicates that damage to neighbouring structures can be limited to Burland Category 1 (Very slight) by using movement monitoring during construction and appropriate trigger levels as specified in the revised BIA
- 5.9 Considering the additional information presented, it is 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.



Appendix 1 Consultation Responses



#### Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Peel	Goldhurst Terrace	Unknown (uploaded to portal 12/02/2024)	The risk of flooding has not been sufficiently identified within the FRA and BIA. Groundwater monitoring has not been undertaken for the site and potential cause for groundwater flooding of the area.	A FRA has been provided. It is assumed this will be reviewed by the LLFA and Thames Water. The impacts to subterranean flow have been considered in the scoping and screening of the BIA.
Charles/ Goldstein	261 Goldhurst Terrace	20/02/2024	Concerns on the impact to the local drainage and flooding with the most recent event being in 2021. It also notes that the area was historically a water meadow prior to development. Concerns of the impact to the foundations of neighbouring properties during development.	A FRA has been provided. It is assumed this will be reviewed by the LLFA and Thames Water. A Ground movement Assessment has been undertaken for the proposed basement.
CRASH	N/A	21/02/2024	The increase in permeable surfaces may lead to increased risk of flooding. Concerns of the impacts to the subterranean flow and groundwater regime.	A FRA has been provided. It is assumed this will be reviewed by the LLFA and Thames Water. The impacts to subterranean flow have been considered in the scoping and screening of the BIA.
Gao	259 Goldhurst Terrace	23/02/2024	The basement proposal extends into the garden further than 50% depth of the host building.	This is not considered within the scope of this audit.



Surname	Address	Date	Issue raised	Response
Waldman	48 Cromwell Avenue	23/02/2024	Groundwater has not been monitored and the impacts to subterranean flow have not been properly considered.	The impacts to subterranean flow have been considered in the scoping and screening of the BIA.
			Trees in proximity to the development have not been considered. Insufficient access for the piling to access the areas of the proposed basement.	In the context of this audit, the BIA considers the impact of trees in relation to the proposed basement. The construction method for the basement is
Waldman	48 Cromwell Avenue	28/02/2024	<ul> <li>Existing and proposed site plans do not adequately indicate the context of the proposal to No. 196.</li> <li>The impacts to the groundwater and surface water have not been properly considered.</li> <li>The property is situated in an area prone to flooding.</li> <li>Additional trees in proximity to the development have not been identified.</li> <li>Depths of the neighbouring properties has been assumed.</li> </ul>	<ul> <li>underpinning.</li> <li>It is accepted that the drawings provided contain sufficient information for the scope of this audit.</li> <li>The impacts to subterranean flow have been considered in the scoping and screening of the BIA.</li> <li>A FRA has been provided. It is assumed this will be reviewed by the LLFA and Thames Water.</li> <li>In the context of this audit, the BIA considers the impact of trees in relation to the proposed basement.</li> <li>The GMA assumes the foundations are at ground level. This is accepted to be suitably conservative for the assessment.</li> </ul>



Surname	Address	Date	Issue raised	Response
Alexandre	170 Goldhurst Terrace	04/03/2024	Concerns of the impact to subterranean flows.	The impacts to subterranean flow have been considered in the scoping and screening of the BIA.
Mistry	Unknown	04/03/2024		
Darlington	169 Goldhurst Terrace	Unknown (uploaded to portal on the 26/02/2024)		
Gould	Unknown	06/03/2024		
Cooksley	Unknown	02/03/2024	Concerns of the impact to surface water flows and flooding.	A FRA has been provided. It is assumed this will be reviewed by the LLFA and Thames Water.



Appendix 2 Audit Query Tracker



#### Audit Query Tracker

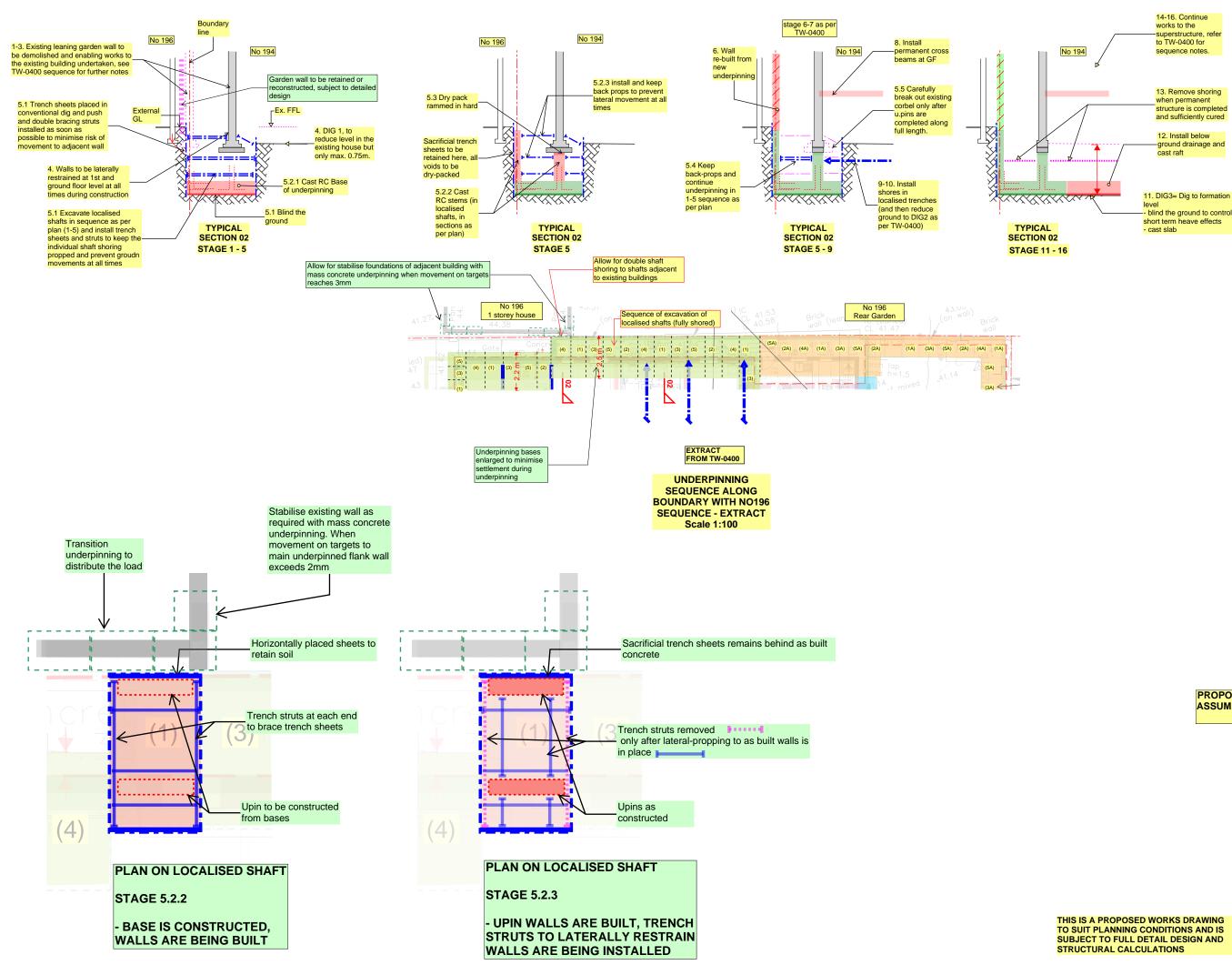
Query No	Subject	Query	Status	Date closed out
1	Qualifications	Provide evidence that the BIA has been undertaken by individuals with suitable qualifications and experience in accordance with the CPG	Closed	22/04/2024
2	Hydrogeology	Confirm the distances of any lost rivers in proximity to the site.		25/03/2024
3	Land Stability/ Ground Movement Assessment	Confirm the depth of the proposed basement and, if required, update the Ground Movement Assessment calculations.	Closed	22/04/2024
4	Land Stability	Provide further justification regarding the potential impact of vegetation on seasonal shrink-swell movements impacting the proposed basement.	Closed	25/03/2024
5	Land Stability	Confirm the anticipated impact of the proposed basement to the highway and pedestrian right of way.	Closed	20/05/2024
6	Construction Methodology/ Land stability	Confirm how the excavation of the lightwell adjacent to the north party wall will be carried out to ensure stability of the neighbouring foundations are maintained.	Closed	06/08/2024
7	Land Stability	Confirm that the loading of the proposed basement will not exceed the allowable bearing pressure of the founding stratum.	Closed	20/05/2024
8	Ground Movement Assessment	Update the Ground Movement Assessment to include the consideration of walls perpendicular to the proposed development. Revise the calculations as per the comments within Section 4.0.	Closed	01/10/2024
9	Mitigation	Revise the trigger values to ensure the potential impact to the neighbouring properties on reaching the maximum trigger value has been considered in the assessment.	Closed	01/10/2024



# Appendix 3

### Supplementary Supporting Documents

Additional information



#### NOTES

- If in doubt please ask.
- If in doubt please ask. Do not scale this drawing. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications.Any discrepancy is to be reported to the engineer immediately. The contractor must ensure and will be held represented by far the averaged tability is the
- responsible for the overall stability of the building/structure/excavation at all stages of the work.
- the work. All existing details shown are based on limited opening up. Assumptions have been made regarding existing construction. Framing and spans of existing slab joist and walls to be confirmed on site. To be Read with General Notes 5

#### PROPOSED SEQUENCE OF WORKS ASSUMED IN STRUCTURAL DESIGN - REFER TO TW-0400

P2	06.08.'24	Sequence and provision for underpinning added where noted		sw	AP		
Rev	Date	Amendments		Ву	Chk'd		
	PRELIMINARY						
+	AXIOM						
0	STRUCTURES						
		3637 2751 iom-structures.co	.uk				
Project: 194 GOLDHURST TERRACE, NW6 3HN, LONDON							
Drawing life: OUTLINE TEMPORARY WORKS PROPOSALS							
Date 1	2/2023	Scale at A1: 1:50	Scale :	at A3:			
Draw	sw	Designed by: AP	Chk'd I	ay: AP			

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