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# Basement Impact Assessment

154 Royal College Street, London, NW1 0TA

Project Ref: L24/055/02




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# Preamble

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# Revisions & additional material

## Document History and Status

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## Document Details

| | |
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# Contents

# 1.0 Executive Summary

1.1.1. The site location is 154 Royal College Street, London, NW1 0TA. The site falls within the London Borough of Camden. Grid Reference: TQ 29264 84099 (Easting: 529264; Northing: 184099)

1.1.2. The Existing / current site arrangement includes a residential property, composed of Basement, ground floor, first floor and second floor and Pitched roof with storage space.

1.1.3. The proposed development compromises of the extension of the basement under the footprint of the existing rear Garden, a rear extension to the existing ground floor, internal layout alterations to all floors and a loft conversion.

1.1.4. The report is based on the information produced by the clients Architects, borehole data provided by British Geological Survey (BGS) and is intended to provide the basis for planning and may be subject to further design discussion and development with the successful Contractor.

1.1.5. The following assessments are presented:

- Site Geology
- Site Hydrology (By Others Via Secondary Appointment)
- CPG4 Screening Flowcharts
- Construction Methodology
- Outline Temporary and Permanent Works Proposal
- Ground Movement and Damage Assessment

1.1.6. Refer to Architect drawings for:

- Existing floor plans and elevations.
- Proposed floor plans and elevations.

The authors of the assessments are:

- James Cove, BEng (Structural Engineer)

- David Brunning, BEng, C.WEM, MICWEM (Chartered Civil Engineer)

- Vasant Samudre, BEng, MSc (Structural Engineer): Reviewing/Checking Engineer

1.1.7. The ground and groundwater conditions beneath the site are as stated in Hydrological/Site report by others.

1.1.8. The construction methods proposed are standard underpinning construction technique. This is shown in Appendix 4 & 5 as indicative only. Please note that the drawings may be subject to confirmation of details and final input from the successful contractor.

1.1.9. A structural monitoring strategy to control the works and impacts to neighbouring structures will comprise, if required, of monitoring tools and scheduled movement registration. Slope monitoring is at the present not required, based on the information provided by the BGS. The engineer must be notified immediately if any slope stability issues are encountered.

1.1.10. The strategic drainage system is as designed by others.

1.1.11. This is a live document and that further detailed assessments will be ongoing as the design and construction progresses.

# 2.0 Introduction

This report has been prepared to set out the proposed design philosophy and construction method statement for the proposed basement construction at 154 Royal College Street, London, NW1 0TA. It will summarise the basis of the structural and civil engineering design and will be issued to all relevant parties including the Client, Local Planning Authority and Design team members.

This report is for the exclusive use of the Client and should not be used in whole or in part by any third parties without the express permission of JMS Engineers in writing.

This report should not be relied upon exclusively by the Client for decision-making purposes and may require reading with other material or reports.

The scope of the proposal is for the creation of proposed basement under the footprint of the proposed ground floor.

The report is based on the information produced by the clients Architects, & borehole data provided by trial holes examination on site and is intended to provide the basis for planning and may be subject to further design discussion and development with the successful Contractor.

The work carried out comprises a Basement Impact Assessment, which is in accordance with the procedures specified in the planning guidelines for the London Borough of Camden. The aim of the work is to assess if the proposed basement will have a detrimental impact on the surroundings with respect to groundwater and land stability and in particular to assess whether the development will affect the stability of neighbouring properties, local and regional hydrogeology and whether any identified impacts can be appropriately mitigated by the design of the development.

## 2.1. Sources of Information

2.1.1. The following baseline data have been referenced to complete the BIA in relation to the proposed development:

- Current/historical mapping provided by Google Maps and Online Historic Maps resources.
- Association of Specialist Underpinning Contractors (ASUC), Guidelines on safe and efficient basement construction directly below or near to existing structures.
- Fiona Cobbs, Structural Engineer's Pocket Book.
- Architect's floor layouts, sections and elevations.
- BS8000-0:2014: Workmanship on construction site.

## 2.2. Existing and Proposed Development

2.2.1. The existing property is currently occupied and compromises of a basement, ground floor, first and second floor accommodation. Refer to drawings in the Appendix.

2.2.2. The adjacent properties present similar features of 154 Royal College Street, London, NW1 0TA.

2.2.3. The property at 154 Royal College Street, London, NW1 0TA, and adjacent properties are not in the Listed Building Register.

2.2.4. Underground infrastructures are not present beneath/close to the site. Refer to Transport for London Property Asset Register in Appendix

2.2.5. Existing and Proposed development drawings are provided by AJS Architect. Refer to relevant Architect's drawings for details.

2.2.6. The proposed development will utilise standard underpinning construction technique which include sequenced stages of works as denoted by the ASUC "Guidelines on safe and efficient basement construction".

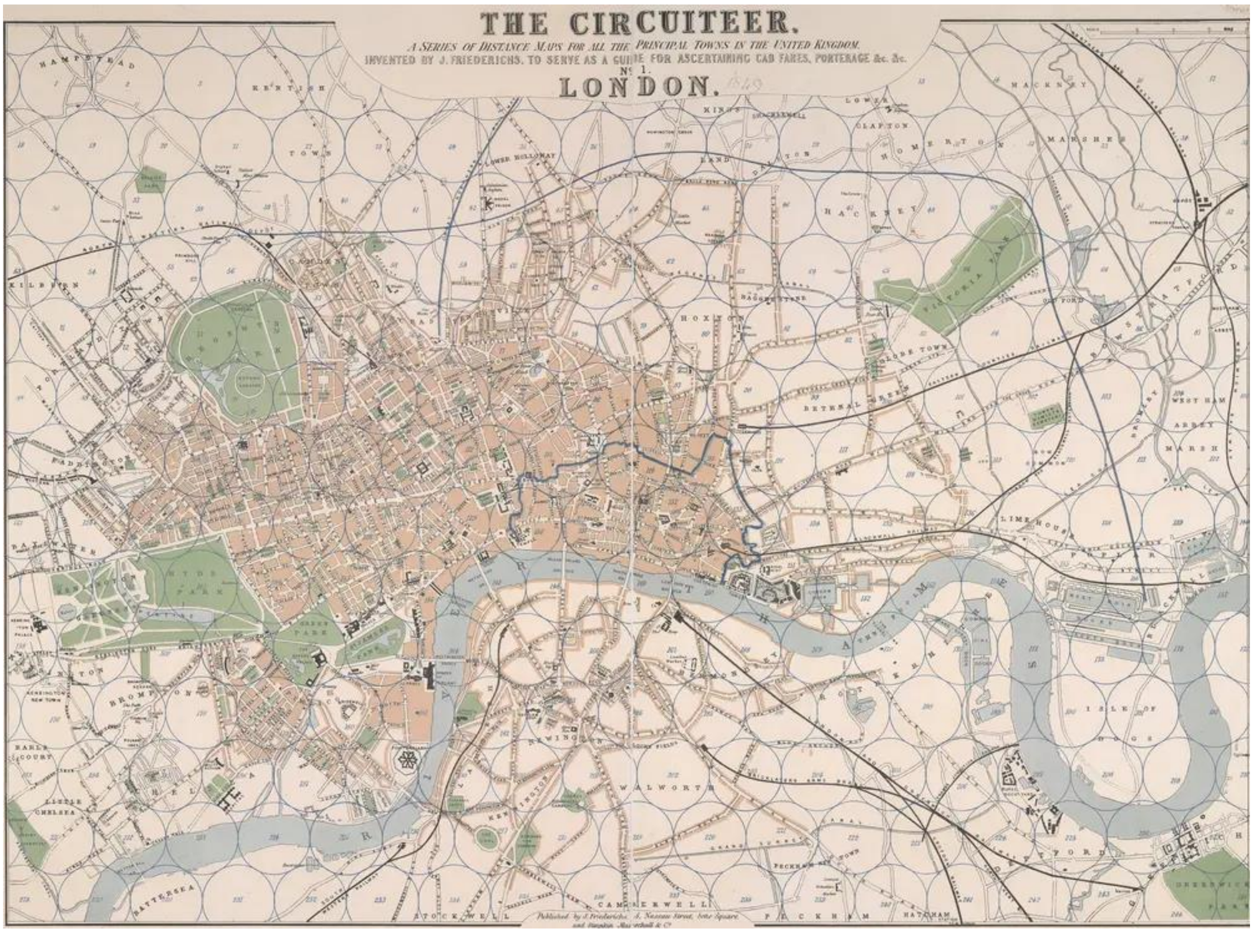
2.2.7. The outline construction programme for the proposed development, shown as indicative only in appendix 4 & 5, is to be agreed with successful contractor.

2.2.8. The full extent of the proposal will see the existing basement extended and a rear extension to match the footprint of the basement. The proposed works will be within the existing boundaries of the property. Due to this there will be an increase in the impermeable surface area.

## 2.3. London Borough of Camden

2.3.1. Camden Town is laid out as a Residential District from the year 1791. The land was previously used for Agricultural purposes.

2.3.2. In 1816, Regents Canal was constructed, precipitating Camden Towns expansion into a major centre.



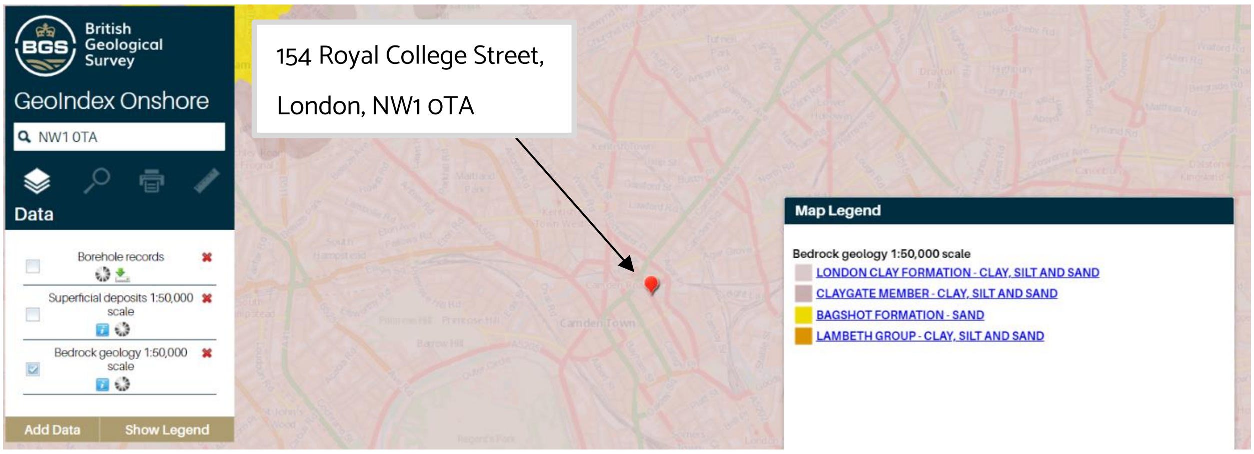

*1850 - THE CIRCUITEER. A SERIES OF DISTANCE MAPS FOR ALL THE PRINCIPAL TOWNS IN THE UNITED KINGDOM (Fredericks, J.)*

2.3.3. The London Borough of Camden was contained within the Metropolitan Borough of Saint Pancras between 1900 – 1965.

2.3.4. The general topography of the aera is flat, with a slight fall from Regents Park to Camden High Street.

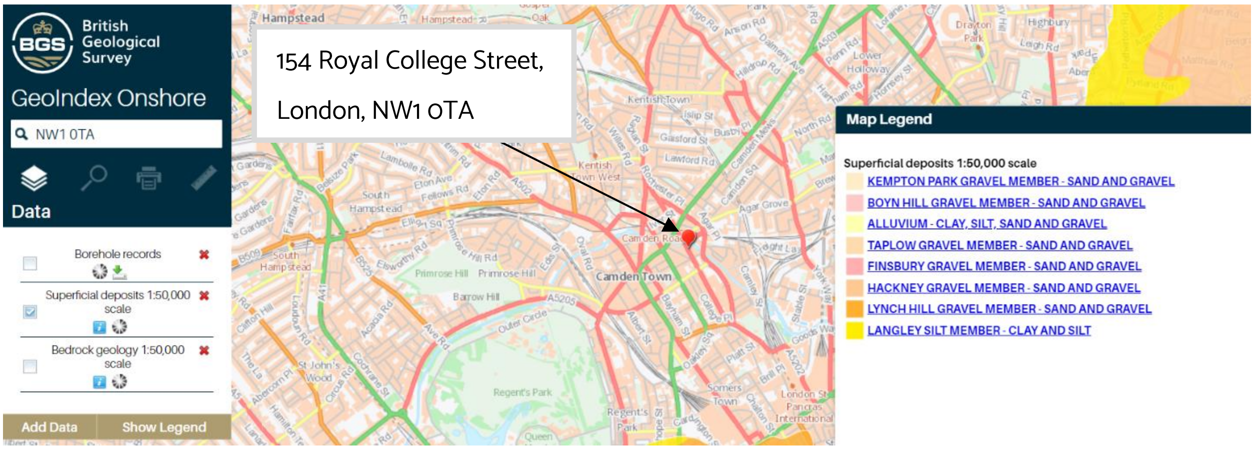
# 3.0 Site Geology

## 3.1. Bedrock Geology




3.1.1. The 1:50 000 scale geological map for this area, made available by the BGS, shows the sites bedrock geology to be London Clay Formation comprising of Clay, Silt and Sand.

## 3.2. Superficial Geology



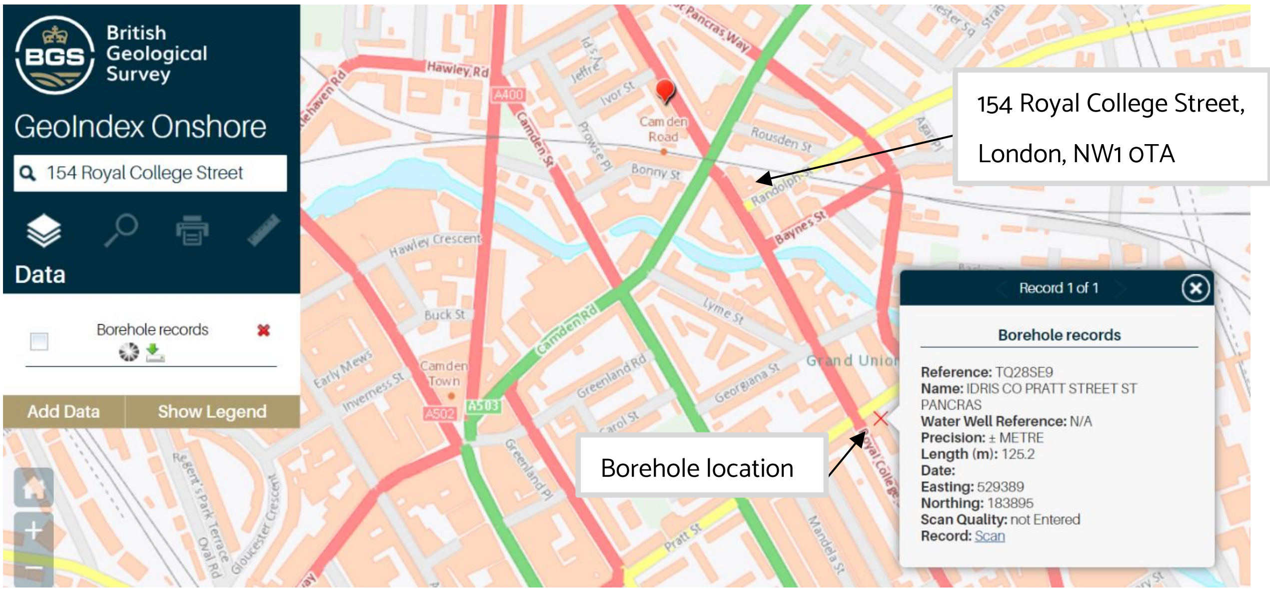

3.2.1. The superficial drift deposits are not recorded at this location, but based on the surrounding area we could expect this to be a mixture of clay, silt and sand or Langley silt member comprising of clay and silt.

3.2.2. Most of Camden is underlain with London Clay, significantly below this, a layer of chalk, which acts as the major aquifer of the London basin drained by the river Thames.

## 3.3. Boreholes

3.3.1. The borehole logs were provided by the BGS. The sample was taken from approx. 0.19 miles from site (IDRIS CO PRATT STREET ST PANCRAS, Reference: TQ28SE9), as can be seen on the map. The borehole data shows fair representation of the expected soil and ground conditions on site.

3.3.2. See Appendix for Borehole details.




3.3.3. Borehole log indicates clay to a depth of 35.36m, followed by Loam/Sand to a depth of 46.03m. The lowest Strata encountered was Chalk and Flints, as expected for the underlying Geology of London. Groundwater was encountered at a depth of 233 Ft. 6 Inches (68m Approx). Typical safe bearing capacity for firm clay is 75 – 150 kN/m2 and stiff clays ranges between 150 – 300 kN/m2 (Cobb, 2015).

# 4.0 Hydrology (By others via Secondary Appointment)

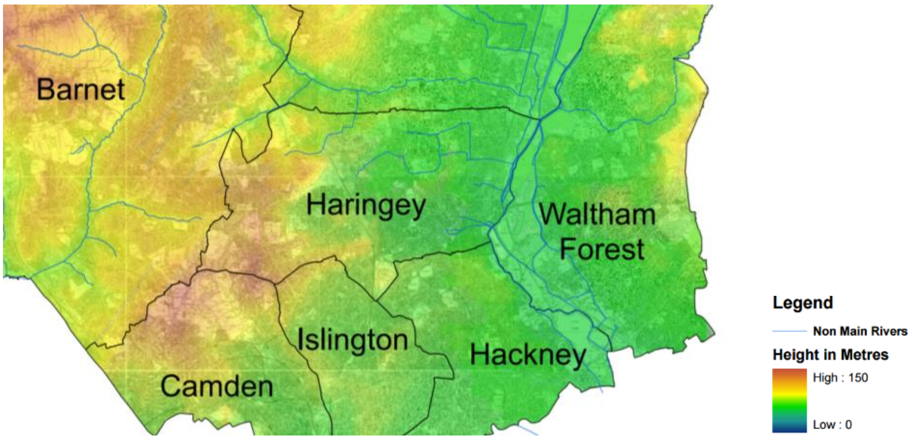
# 5.0 CPG4 Screening Flowcharts

For the purposes of this report reference has been made to Appendix E of the Arup document screening tools, which includes a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow.

## 5.1. Slope Stability

5.1.1. Does the existing site include slope, natural or man-made, greater than 7° (approximately 1 in 8)?

5.1.2. No. The following topography map shows flat ground around our area of interest in Camden.




5.1.3. Will the proposed re-profiling of landscaping at site change slopes at the property boundary to greater than 7 ° (approximately 1 in 8)?

5.1.4. No. The proposal does not include landscaping that affects the boundaries.

5.1.5. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?

5.1.6. No. The neighbouring sites are at a similar gradient.

5.1.7. Is the site within a wider hillside setting in which the general slope is greater than 7° (Approximately 1 in 8)?

5.1.8. No. The wider gradient is less than 1:8.

5.1.9. Is London Clay the shallowest stratum on the site?

5.1.10. Yes. London Clay is the shallowest stratum – carry forward to scoping stage.

5.1.11. Will any trees be felled as part of the proposed development and/or are there any proposed works within any tree protection zones where trees are to be retained?

5.1.12. No, trees are not to be felled. No, the proposed works are not within a tree protection zone.

5.1.13. **Is there a history of shrink swell subsidence in the local area and/or evidence of such effects at the site?**

5.1.14. No. There is no such evidence to the existing building or neighbouring properties.

5.1.15. **Is the site within 100m of a watercourse, or spring line?**

5.1.16. Yes. Watercourse is Regent's canal.

5.1.17. **Is the site within an area of previously worked ground?**

5.1.18. No. Historic records indicate that the site has only been built on in the late 17th Century & was built on land with agricultural or horticultural use prior to that.

5.1.19. **Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering will be required during construction?**

5.1.20. No– the site lays within an area that water level is not recorded. Presumed to be below basement formation level. Notify the engineer if otherwise.

5.1.21. **Is the site within 50m of any ponds?**

5.1.22. No. The site is outside a 50m zone of any ponds.

5.1.23. **Is the site within 5m of a public highway or pedestrian right of way?**

5.1.24. No, as shown by Google maps attached in the Appendix.

5.1.25. **Will the proposed basement significantly extend the differential depth of basements relative to neighbouring properties?**

5.1.26. Yes. The proposed basement may abut adjacent properties basements. Carry forward to scoping stage.

5.1.27. **Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?**

5.1.28. No – see TfL Transport Asset In Appendix.

## 5.2. Surface Flow and Flooding

5.2.1. Is the site within a catchment area?

5.2.2. No. The site is outside the catchment area. As shown on the map below

5.2.3. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run off) be materially changed from the existing route?

5.2.4. No. It will be largely unaffected.

5.2.5. Will the proposed basement development result in a change in the proportion of hard surfaces/paved external areas?

5.2.6. Yes. The extended Basement area will increase the impermeable area. The Basement area is covered by the Ground floor extension.

5.2.7. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?

5.2.8. No. There will be no change in the surface water flow off-site as a result of this proposal. Surface water will be discharged via existing connection.

5.2.9. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?

5.2.10. No. There will be no change in the surface water flow off-site as a result of this proposal.

5.2.11. Is the site in an area known to be at risk from surface water flooding? Or is the proposed basement below the static water level of a nearby surface water feature?

5.2.12. No. The site falls outside any floor risk zone.

## 5.3. Surface Water (Flood Risk Assessment)

5.3.1 The National Planning Policy Framework (NPPF) includes government policy on development and in this case meeting the challenge of climate change and flood risk. The policy states: *"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk…."*.

5.3.2 The location of new developments should consider climate change by planning to avoid increasing the vulnerability on development from the impacts of climate change. Where locations are considered vulnerable from the impacts of climate change, these risks should be managed and where possible mitigated to limit the risk.

5.3.3 Development in areas at risk of flooding should be made safe without increasing the flood risk elsewhere. Local Plans should be based on evidence, through a Sequential Test, in selecting the appropriate location for new development within the plan period and thus avoiding where possible flood risk to people and property.

| Flood Zones | Definition |
|---|---|
| Zone 1<br>Low<br>Probability | Land having a less than 1 in 1,000 annual probability of river or sea flooding.<br>(Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3) |
| Zone 2<br>Medium<br>Probability | Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or<br>Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.<br>(Land shown in light blue on Flood Map) |
| Zone 3a<br>High<br>Probability | Land having a 1 in 100 or greater annual probability of river flooding; or<br>Land having a 1 in 200 or greater annual probability of sea flooding<br>(Land shown in dark blue on the Flood Map) |
| Zone 3b<br>The Functional<br>Floodplain | **This zone comprises land where water must flow or be stored in times of flood.**<br>Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.<br>(Not separately distinguished from Zone 3a on the Flood Map) |

*Figure 1 - Flood Zone Definitions*

5.3.4 Development priorities are based on the specific flood risk zones outlined within Table 1 of the technical guidance, as per *Figure 4* below. For Flood Zone 1 – Low Probability, where land having a less than 1 in 1,000 annual probability of river flooding, as defined by the Environment Agency Flood maps.

5.3.5 The Environment Agency (EA) website confirms the site location to be within Flood Zones 1.

5.3.6 Further guidance in NPPF classifies residential development schemes to be a 'more vulnerable' land class use in terms of flood risk.

| Flood Risk Vulnerability Classification: More Vulnerable |
|---|
| Hospitals |
| Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. |
| Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. |
| Non-residential uses for health services, nurseries and educational establishments. |
| Landfill and sites used for waste management facilities for hazardous waste |
| Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuations plan. |

*Figure 2 - Flood Risk Vulnerability Classifications*

5.3.7 NPPG Table 3 (para 67 ID 7-067-20140306) determines the appropriate uses by flood zone, in this case a less vulnerable use is appropriate for a Zone 1 as summarised in PPS25, table D.1.

| Flood Zones | Flood Risk Vulnerability Classification | | | | |
|---|---|---|---|---|---|
| | Essential Infrastructure | Highly Vulnerable | More Vulnerable | Less Vulnerable | Water Compatible |
| **Zone 1** | √ | √ | √ | √ | √ |
| **Zone 2** | √ | Exception Test Required | √ | √ | √ |
| **Zone 3a** | Exception Test Required | x | Exception Test Requires | √ | √ |
| **Zone 3b** | Exception Test Required | x | x | x | √ |
| √ Development is appropriate x Development should not be permitted | | | | | |

*Figure 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'*

5.3.8 Therefore, given the land use and Flood Zone, it is concluded that it meets the requirements of NPPF.

5.3.9 Consideration for the EA document *Rainfall runoff management for developments* report SC030219 has been made.

## 5.4. Fluvial Flood Risk

3.1.1 Fluvial flooding is a result of the capacity of rivers being exceeded by river flow. In general, rivers have a natural flood plain which can be encroached upon by development in specific circumstances.

3.1.2 Tidal flooding is a result of high tides and storm surfaces that raise water levels above the shore or riverbank. These can be sudden and severe.

3.1.3 In the case of the proposed development, the developable site is located within flood zone 1, therefore no resilience or mitigation measures are proposed to the buildings

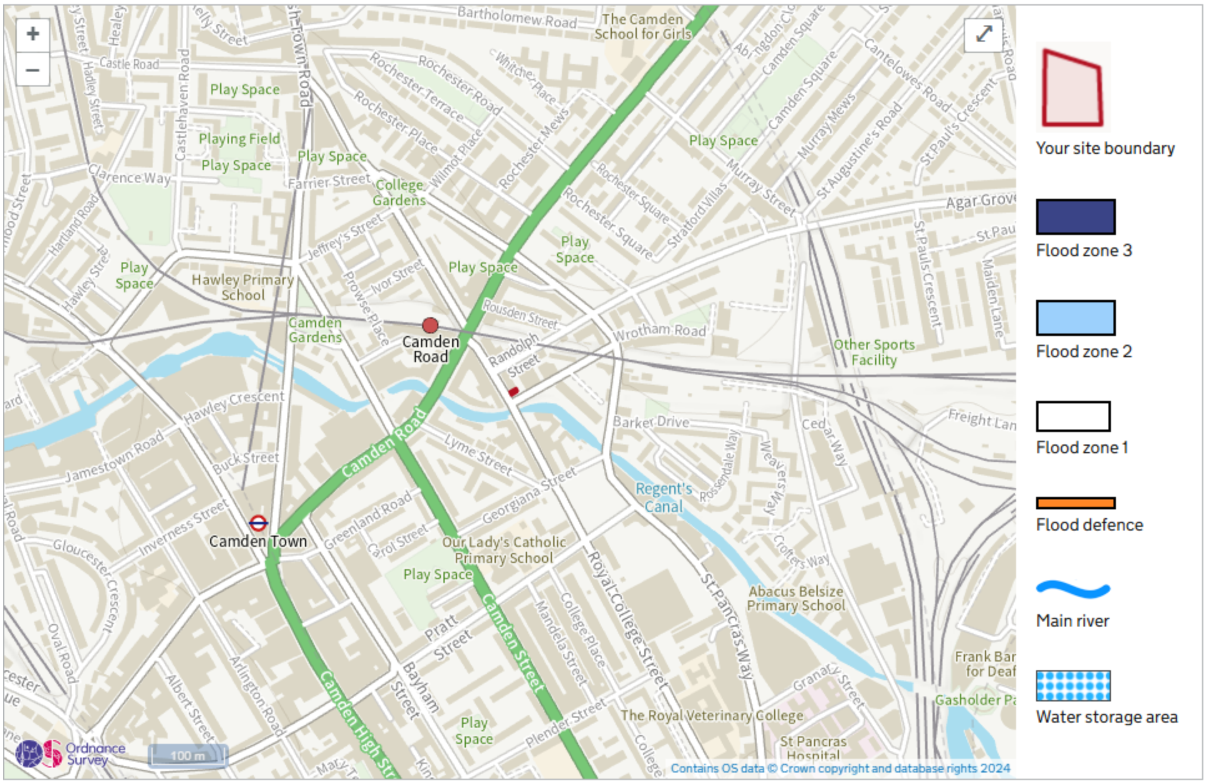



*Figure 4 Flood map for planning*

## 5.5. Pluvial Flood Risk

3.2.1 Pluvial flooding refers to the flooding event of extreme rainfall which cannot be absorbed within the ground, or when urban drainage systems become overwhelmed. Overland flooding is present at the site as shown in the Figure below.

3.2.2 As displayed on *Flood map for planning;* surface water flood risk is low within the developable area of the site.

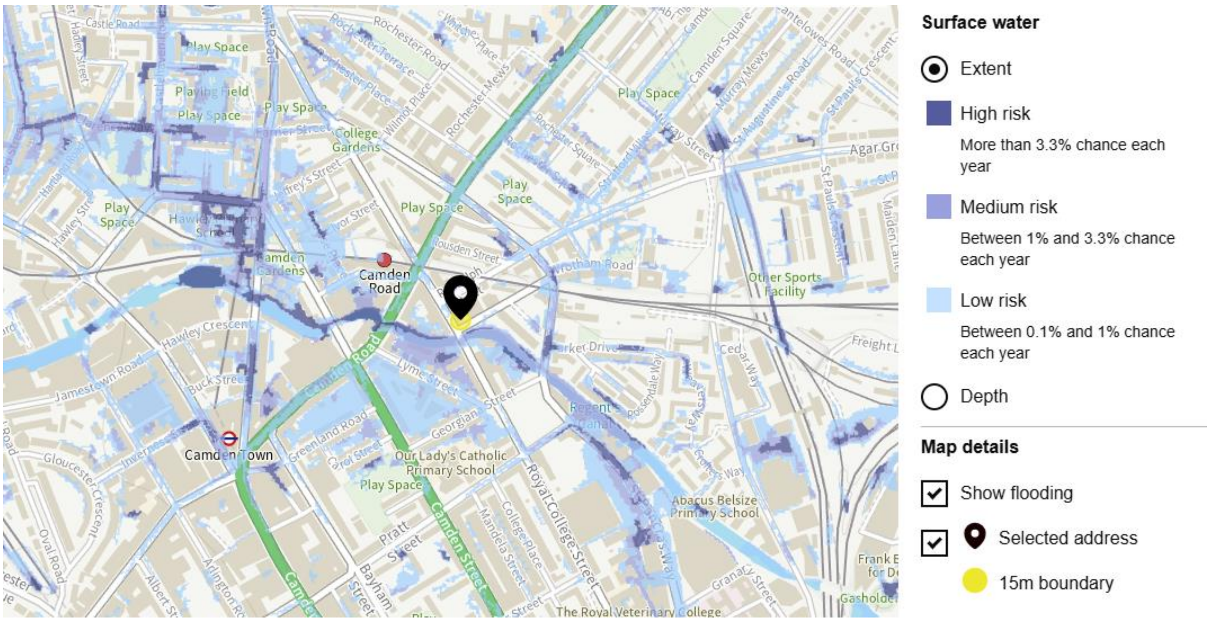


*Figure 5 Extent of surface water flooding*

3.2.3 It can be concluded that flood risk is low, the site location is outside of the recorded at risk areas as above.

## 5.6. 3.3 Climate Change

3.3.1 The appended drainage calculation allows for a 1:100-year storm plus 45% climate change, this has been sourced from the DEFRA Hydrology Data Explorer for Climate Change Allowances, as below.

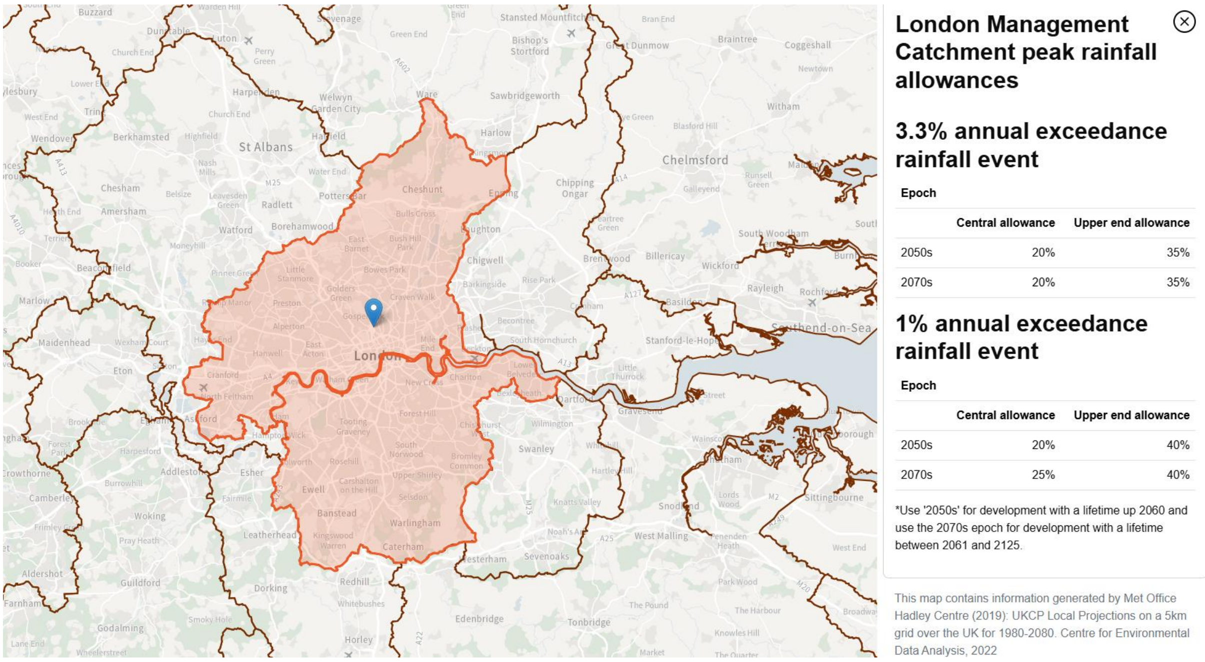



*Figure 6 climate change allowances for peak rainfall in England by catchment area*

## 5.7. SUDs Considerations

5.7.1. Consideration of SuDS is a planning requirement for major developments in order to provide betterment to the runoff regime post-development. SuDS are designed to replicate the natural course of drainage as closely as possible with a view to reducing the impact of flooding, removing pollutants at source and combining water management with green space. Any solution needs to be agreed with appointed Civil/Drainage Engineer.

5.7.2. The following hierarchy for surface water disposal is considered where reasonably practicable:

- Into ground (infiltration);
- To a surface water body;
- To a surface water sewer;
- To a combined sewer.

5.7.3. For this development the London Borough of Camden Council has been identified as the Lead Local Flood Authority (LLFA) and as such are responsible for the approval of SUDs proposals. The requirements are set out in the London Borough of Camden guidance document. In accordance with the guidance, the surface water design follows the criteria and incorporates SuDS wherever practicable.

## 5.8. SUDs Incorporation and Maintenance

5.8.1. The site geology is generally clay; therefore it is unlikely that surface water can be disposed of via infiltration. A flow control and attenuation system is proposed in order to restrict the rate of run-off to the equivalent greenfield runoff rate. The final system will be agreed once the planning layout will be approved, in order to evaluate the opportunity for SUDs features that maximise amenity and biodiversity benefits.

5.8.2. Maintenance of the system shall include for regular inspections at varying intervals depending on the system requirements. In this case, the responsibility for maintaining system will be with the property owner.

## 5.9. Surface Water Strategy

5.9.1. The surface water strategy is based upon the SuDS implementation as outlined above and the hierarchy for surface water disposal as follows:

- Store rainwater for later use - rain water storage to be utilised where possible.
- Use infiltration techniques, such as porous surfaces in non-clay areas - infiltration is unlikely owing to the general geology in the area which is predominantly clay.
- Attenuate rain water in ponds or open water features for gradual release - although attenuation is proposed for this scheme the approved planning layout does not provide sufficient area for open water features.
- Surface water runoff is restricted before discharging to the public sewer at a reduced rate. The equivalent greenfield runoff rate found is minimal and therefore impractical to restrict to such a rate, mainly due to blockage potential. Therefore, proposals are to reduce flows to a rate which is considered reasonably practical which can be determined by using a typical SUDs Evaluation Sheet. Flow rate will be controlled by the rump rate with chamber sized to attenuate flows for the worst case duration of the 1:100 year storm event, inclusive of climate change.
- Direct rainwater direct to the watercourse – N/A
- Discharge rainwater to a surface water sewer/drain – N/A

# 6.0 Scoping Stage

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential consequences are assessed for each of the identified potential impact factors.

It is considered that the scope of the investigation complies with the guidance issued by the Council and is therefore a suitable basis on which to assess the potential impacts.

## 6.1. Groundwater Flow

6.1.1. From previous excavations carried out in this area, it has been established that ground water levels are below that of the proposed excavation depth and is reinforced by the findings of historic boreholes.

## 6.2. Slope Stability

6.2.1. London Clay is the shallowest stratum on this site and the structural design of the retaining walls and slabs will take this into account accordingly.

6.2.2. The site lies within an area identified as a secondary aquifer. The nearby bore-hole records suggest that the water table is lower than the basement and associated works.

6.2.3. The existence of basements in adjoining buildings is presumed to be absent. However, the structural engineering proposal for this scheme involves the use of underpinning to form the structural box below ground which should have no negative effect on neighbouring properties.

6.2.4. Due to the limited soils information available the following parameters are to assumed within the designs: Using ko, the earth pressures are considered 'at rest'. Active pressure (ka) will be mobilised if the wall moves 0.25-1% of the wall height, while passive pressures (kp) will require movements of 2-4% in dense sand or 10-15% in loose sand/fill.

ko values adopted:

- 0.50-0.60 for normally consolidated clay,
- 0.35 for dense sand,
- 0.6 for loose sand/fill
- 1.0-2.8 for over-consolidated clays such as London clay.

(source: Structural Engineer's Pocket Book, Eurocodes by Fiona Cobb)

# 7.0 Construction Methodology/ Engineering Statements

## 7.1. Outline Temporary and Permanent Works Proposals

7.1.1. This method statement has been prepared to provide information on the likely methods for Basement Construction, subject to confirmation of details and final input from the successful contractor.

7.1.2. The final methods will be subject to the limitations and constraints noted in this document. Any revised matters associated with the Method Statement will be issued for review and comment prior to any site construction works.

7.1.3. The method of construction is to be agreed by all parties, with specific reference to the potential for vibrations and noise from the basement construction.

7.1.4. A detailed method statement for means of access, site logistics and intended vehicle movements, particularly spoil removal, will be agreed with the main contractor prior to commencing any site works and any variations reported accordingly.

7.1.5. All services surveys, diversion agreements and temporary supply requirements will be agreed, and approvals will be in place prior to commencement of works.

7.1.6. Existing building condition surveys will be carried out prior to commencing any works, of neighbouring property.

## 7.2. Sequence of works

7.2.1. Establish site access & hoarding.

7.2.2. Investigatory works as required for full detailed design.

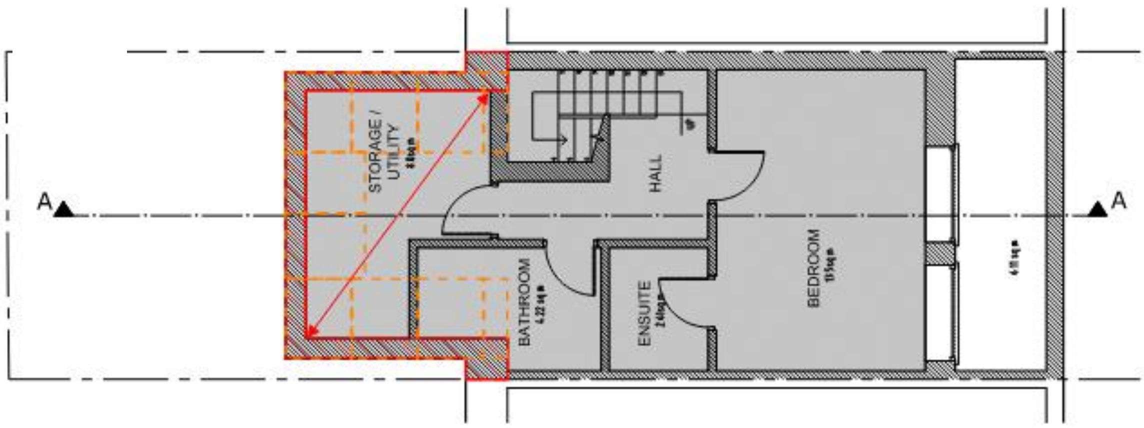
7.2.3. It is presumed that all the temporary works to ensure stability to adjacent properties are provided during demolition as designed and specified by contractor.

7.2.4. It is the contractor's responsibility to take all necessary steps to ensure that the structure is adequately propped, shored and braced to ensure that during the progress of the works excessive deflections and deformation of the structure do not occur. Therefore, the contractor shall discuss with the engineer any proposals for temporary works. It is frequently necessary for the contractor to brace or prop existing openings so that isolated load bearing piers may be underpinned. The contractor is to allow in his tender price for all propping, shoring and bracing to ensure that the works may be safely undertaken with no undue disruption to the structure.

7.2.5. In addition, no floors are to be removed to allow the excavation of the basement until adequate propping has been provided to ensure continuity of support of opposing walls. Propping system to remain insitu until new floor has been fully installed and strapped. Design of propping is a contractor designed item, unless instructed otherwise.

7.2.6. The sequence of works shall be based on a maximum leg length of approx. 1.0m. and max. of 1.2m. The agreed sequence of operations shall be strictly adhered to. In case the contractor wishes to alter any sequence, it must be discussed in prior with the engineer and/or local authorities and any amendment must be confirmed in writing.

7.2.7. Sequenced underpinning/sequenced construction sections can take place as per indicative sketch below. Underpinning to be connected to central slab and existing basement slab with dowel bars (to SE specification).




7.2.8. During the excavation, the contractor shall take all the necessary steps to prevent softening of the ground. The contractor shall also endure that the base of the excavation shall not become contaminated by loose material falling into the excavation. The contractor shall take steps to ensure that the size of the excavation loosely matches the required size agreed with the engineer /local authorities. Excessive overbreak will not be permitted and the contractor shall provide all necessary trench sheeting and strutting to prevent overbreak. The contractor might be required to provide sheeting and strutting to prevent any ingress of loose material beneath the existing floor.

7.2.9. Prior to concreting, the contractor shall incorporate shear keys to permit shear transfer between adjacent retaining wall legs. Where necessary, projecting dowel bars should be cleaned of all loose dirt prior to concreting.

7.2.10. The underside of all existing footings (where exposed by excavation in preparation for underpinning) shall be cleaned of all loose soil and fragments. Any major projections or inclusions such as bricks, broken concrete or boulders shall be broken away from the underside of the existing footing. Prior to concreting the underpinning leg, the existing footing should be clean and firm and level, so the dry packing may be accomplished satisfactorily.

7.2.11. All concrete shall be grade C35 (unless specified otherwise) and strictly operated according to the concrete specifications contained in BS8110:Part 1:1985. It should be noted that the concrete should be adequately compacted with a vibrator poker to ensure adequate density. The concrete for the retaining wall legs should be brought up to 75mm from the underside of the existing footing.

7.2.12. Once the retaining wall legs have set (at least 3 days after concrete placement) the gap between the underside of the existing footing and the top of the new footing is to be packed with dry concrete. Mix proportions for the dry concrete are to be by weight 1:3 (cement: zone 2 sharp sand) with combex non-shrink admixture added in accordance with manufacturers recommendation. The constituents are to be mixed dry and small volume of water is to be added that such that when compressed, a small bar of the mixture retains its shape. The dry packing concrete is then to be rammed solid into the gap between the underside of the existing footing and the top of the new footing using a steel bar.

7.2.13. A sufficient time should elapse between the completion of dry packing and the excavation of any retaining wall legs in the vicinity. The curing time shall be 72h between adjacent bays, unless stated otherwise.

7.2.14. Internal waterproofing membranes, screeds and finishes are to be placed at completion of the retaining wall boxes and ground floor slab.

7.2.15. The final sequence of working in detail will be agreed with the successful main contractor and any variations reported accordingly. It is worth mentioning that retaining wall legs may be punctured by the services entering the building. The means of "sleeving" these services shall be agreed with the engineer during the progress of the works.

7.2.16. Based on the size of the proposed development, it is presumed that is it likely that the bays construction will be undertaken on "top down" construction method can be constructed in one pour, to be confirmed by the successful contractor.

7.2.17. Based on the size of the proposed development, and the proposed levels, the underpinning depth is between 2.4m-3.0m which is likely to be constructed in one pour. This is to be confirmed by the successful contractor and by the finalized architectural layouts.

7.2.18. Refer to Appendix 3 for typical details and notes for underpinning construction in multi-stages pouring. (Note: details are INDICATIVE only, shown only for illustrative purposes.) contractor to advise.

7.2.19. It is to the successful contractor's discretion to finalise appropriate methodology based on site accessibility and resources.

## 7.3. Establish Access & Hoarding

7.3.1. The hoarding will be located around the property to enclose all works.

7.3.2. A plywood hoarding will be erected with vertical standards, anchored to the ground. The hoarding will be fully secure with a lockable door for access. Suitable heights and colours will be in accordance with the Local Authority requirements.

## 7.4. Waterproofing System and Screed

7.4.1. For all basement areas, the Architect will prepare design details in conjunction with a specialist contractor. The waterproofing system will be installed in accordance with the Architects details in conjunction with the specialist contractor technical specifications once the basement slab is complete.

7.4.2. The floor finishes, which may include insulation and under floor heating, can then be laid in accordance with the Architects details. A cement and sand screed will be applied on the slab surface.

7.4.3. The height of the basement and relative level of the water table determines that Types A (barrier), B (structurally integrated) or C(drained) protection against ingress of water will be satisfactory, as defined by BS 8102:2009. The basement will be constructed and detailed to achieve a Grade 3 Level of Performance, as defined by BS 8102:2009.

7.4.4.

Table 2 **Grades of waterproofing protection**

| Grade | Example of use of structure [A)] | Performance level |
|---|---|---|
| 1 | Car parking; plant rooms (excluding electrical equipment); workshops | Some seepage and damp areas tolerable, dependent on the intended use [B)]<br>Local drainage might be necessary to deal with seepage |
| 2 | Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas | No water penetration acceptable<br>Damp areas tolerable; ventilation might be required |
| 3 | Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres | No water penetration acceptable<br>Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use |

A) The previous edition of this standard referred to Grade 4 environments. However, this grade has not been retained as its only difference from Grade 3 is the performance level related to ventilation, dehumidification or air conditioning (see BS 5454 for recommendations for the storage and exhibition of archival documents). The structural form for Grade 4 could be the same or similar to Grade 3.

B) Seepage and damp areas for some forms of construction can be quantified by reference to industry standards, such as the ICE's *Specification for piling and embedded retaining walls* [1].

*Figure 7: Grades of waterproofing protection*

7.4.5. To achieve Grade 3 Performance, we propose either a drained cavity installed in front of the concrete wall; or an applied waterproofing membrane applied and bonded to the internal faces of the pins. Waterproof concrete will also be employed.

## 7.5. Ground Movement and Damage Impact Assessment

7.5.1. At this site unloading of the London Clay as a result of the basement excavation, the reduction in vertical stress will cause heave to take place. Values of stiffness for the soils at this site are readily available from published data and the creation of the basement will result in a net unloading of about approximately 50 $kN/m^2$.

7.5.2. Such a reduction would mean that by the time the basement construction is complete, approximately <10 mm of heave is likely to have taken place at the centre of the proposed excavations, reducing to less than 5 mm at the edges. In the long term, following completion of the basement construction, a further 8 mm of heave (at the centre) is estimated as a result of long term swelling of the underlying London Clay.

7.5.3. It is, however, important to bear in mind that such figures are based on an unrestrained excavation as computer models are unable to take account of the mitigating effect of existing structures, the stiffness of the proposed floor slab and proposed underpins which in reality will combine to restrict these movements within the basement excavation.

7.5.4. The movements predicted at or just beyond the site boundaries are unlikely to be fully realised and should not therefore have a detrimental impact upon any nearby structures.

7.5.5. In order to mitigate the effects of heave on the new building, the basement should be designed to transmit heave forces into the walls.

7.5.6. Alternatively, a void or layer of compressible material could be introduced beneath the slab designed to be able to resist the potential uplift forces generated by the ground movements. In this respect potential heave pressures to be accommodated are typically taken to equate to around 30% to 40% of the total unloading pressure.

7.5.7. In addition to the above assessment of the likely movements that will result from the proposed development, some of the neighbouring structures have been considered as sensitive structures, requiring Building Damage Assessments, on the basis of the classification given in Table 2.5 of C580.

7.5.8. The potential heave movements predicted have been included in the assessment section, which can therefore be considered as conservative, as these movements are likely to have a mitigating effect on the downward settlement due to the increase in load.

7.5.9. Subsequently, it is predicted that the damage to the adjoining and nearby structures would generally be Category 0 (negligible), with limited areas of Category 1 (Very Slight) damage due to differential movement from inconsistent loadings. On this basis, the damage that would inevitably occur as a result of such an excavation would fall well within the acceptable limits.

7.5.10. Note that these predictions are based on the presumption of the quality of the work and the construction tolerances adopted on site will comply with BS8000: Workmanship on construction site

## 7.6. Existing Drainage

7.6.1. Should existing public sewers be found within 3m of the development then a formal build-over/diversion application will be made. All necessary documentation required to form the application will be compiled. Submission will be made to Thames Water and consultation undertaken so secure Technical approval.

# 8.0 Conclusion

8.1.1. The proposed re-development of 154 Royal College Street, London NW1 0TA can be achieved using standard construction techniques and materials.

8.1.2. Where mechanical means are necessary to construct permanent works, these can be of a type that generates low vibrations to which the surrounding buildings have a form and construction that is robust and resistant to.

8.1.3. We can therefore conclude with confidence that the construction of the proposed development generally, and the subterranean basement in particular, will not affect the integrity of the surrounding building stock or overload the near-surface geology.

8.1.4. There are no critical utilities beneath the site that cannot be relocated easily to accommodate the construction and, as there is no change in use proposed there will be no significant increase in foul discharge to the sewer despite the increase in level of accommodation.

8.1.5. The techniques proposed for the subterranean element of the building and the nature of the underlying geology minimises the risk of instability, ground slip and movement.

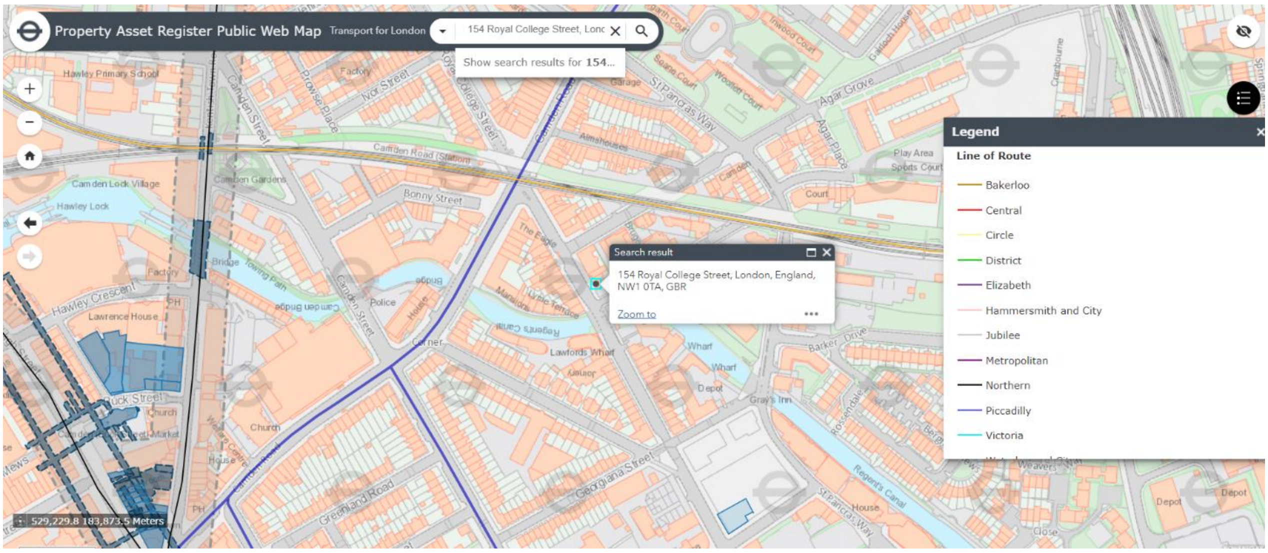
8.1.6. The review of the proposals has concluded that the predicted damage to the neighbouring properties would generally be 'Negligible', with some limited areas of 'Very Slight'.

8.1.7. On this basis, the damage that would inevitably occur as a result of such an excavation of the proposed basement, will in practice be separated by a number of weeks during which time construction will take place. This will provide an opportunity for the ground movements during and immediately after excavation to be measured and reviewed so that propping arrangements can be adjusted if required.

8.1.8. Given the development lies outside any flood zone and is not subject to overland flooding, no special construction features are required to mitigate fluvial flooding.

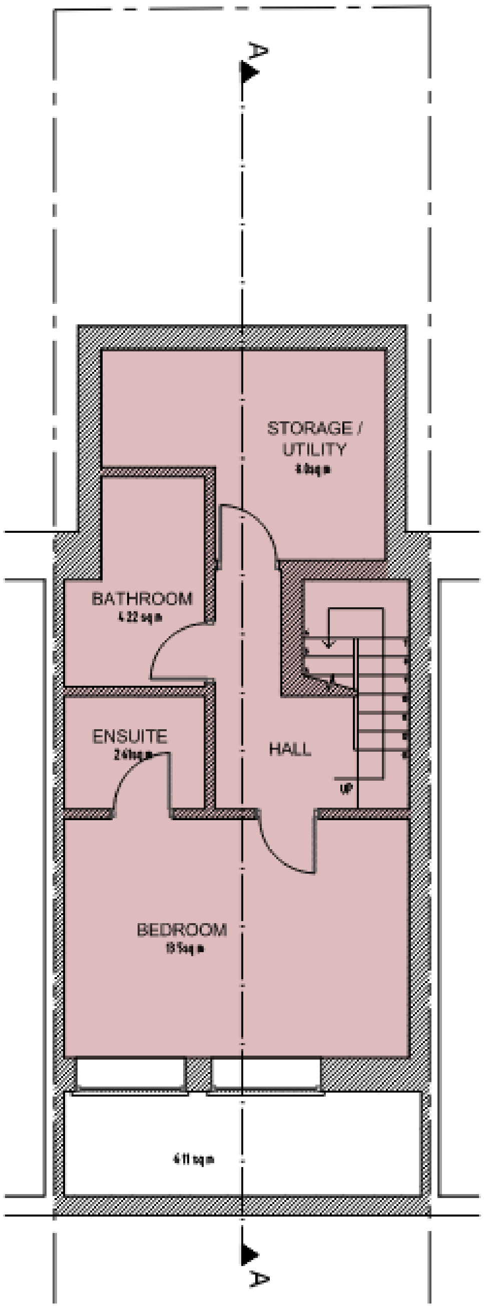
8.1.9. The proposal increases the coverage of impermeable areas and therefore contributes to increased overland flows. As part of a site specific FRA for new developments, an assessment of surface water runoff and temporary flood storage on the site should be undertaken. Development should seek to reduce surface water runoff rates through the appropriate application of Sustainable Drainage Systems (SuDS).

## Appendix 1: Transport for London Property Asset Register



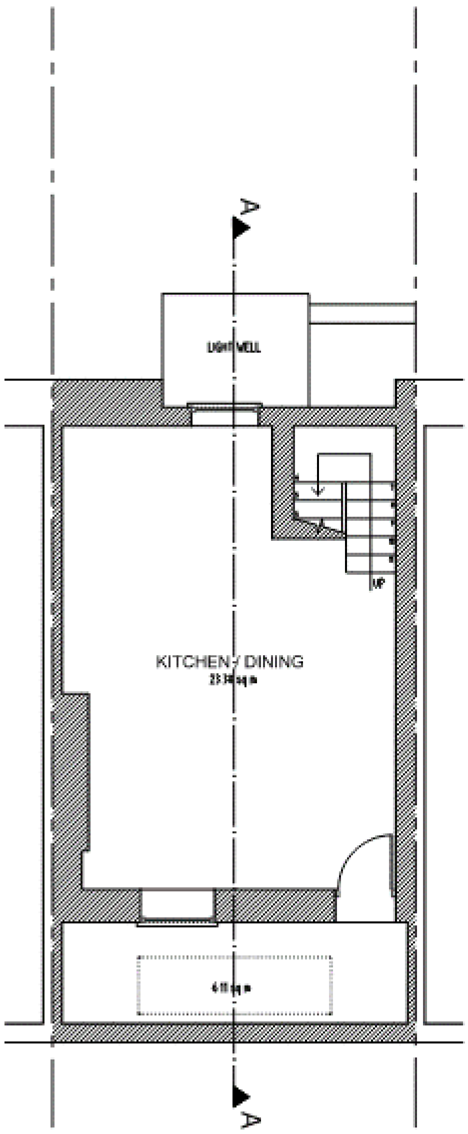
## Appendix 2: Existing Proposed Plans

Proposed Basement floor Plan



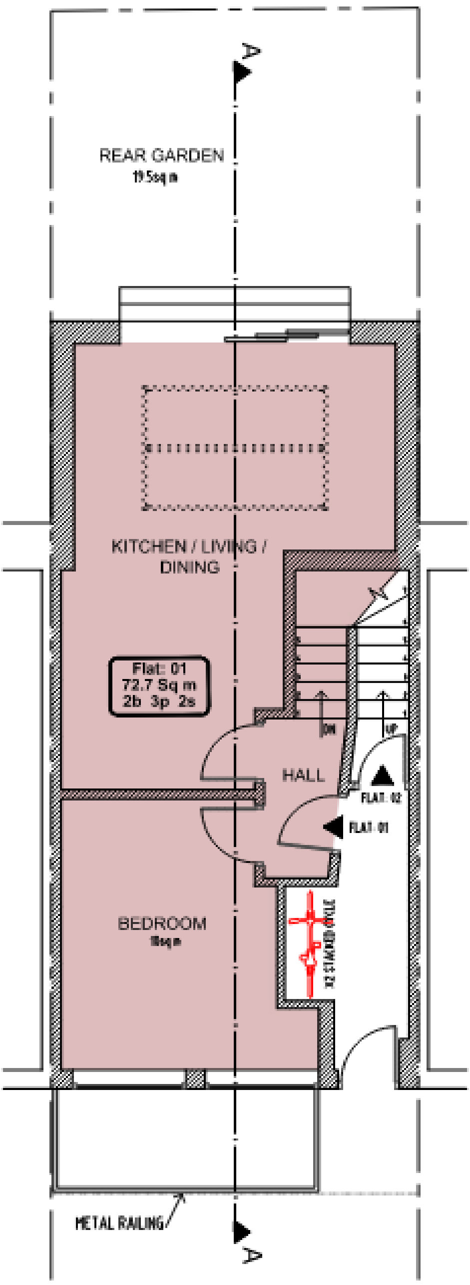

*Proposed Basement Floor*
*Scale 1:100*

Existing Basement floor Plan



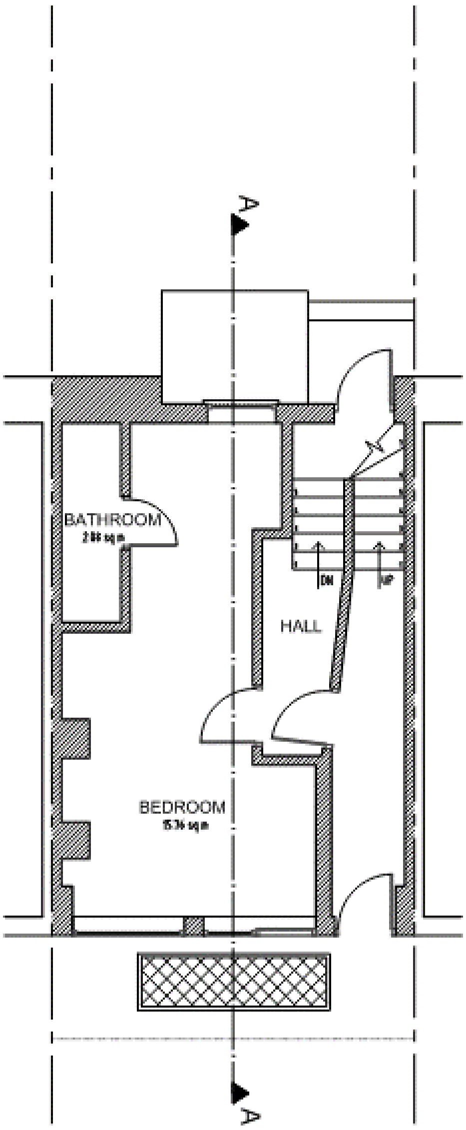

*Existing Basement Floor*
*Scale 1:100*

Proposed Ground floor Plan




*Proposed Ground Floor*
*Scale 1:100*

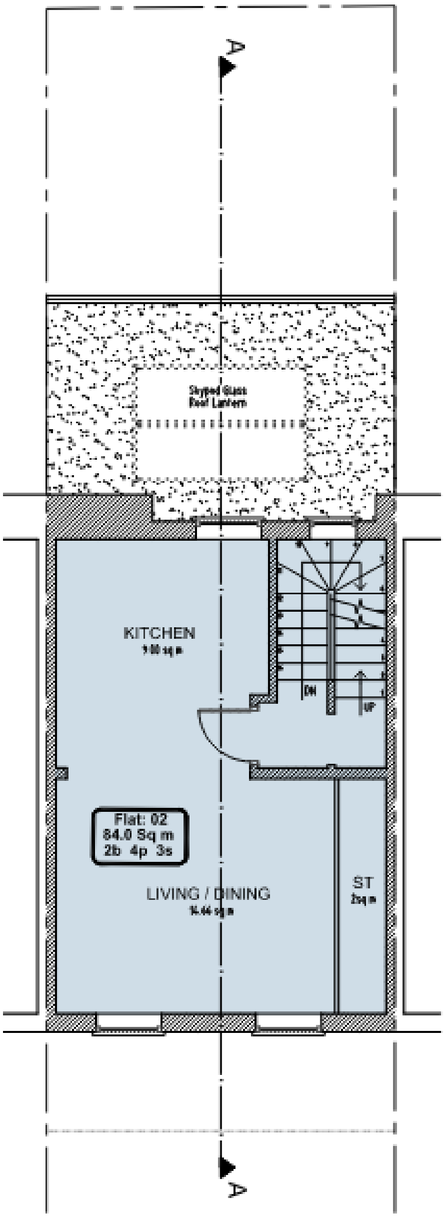
Existing Ground floor Plan



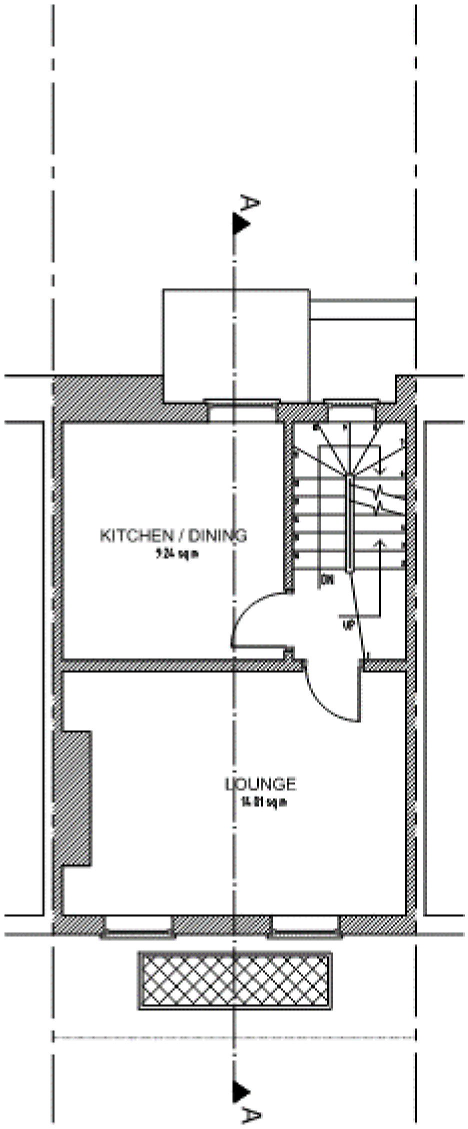

*Existing Ground Floor*
*Scale 1:100*

Proposed First floor Plan

Existing First floor Plan



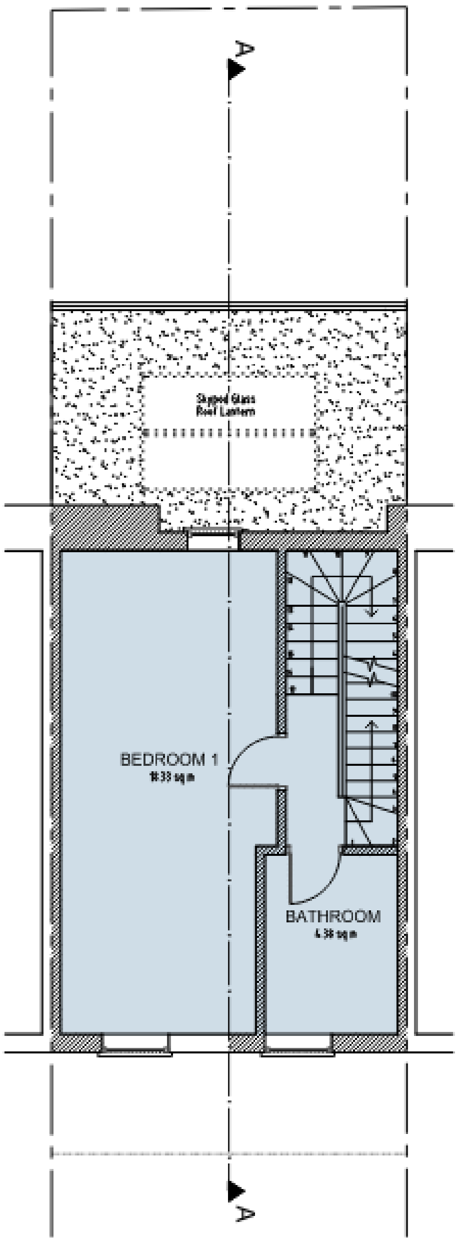

*Proposed First Floor*
*Scale 1:100*



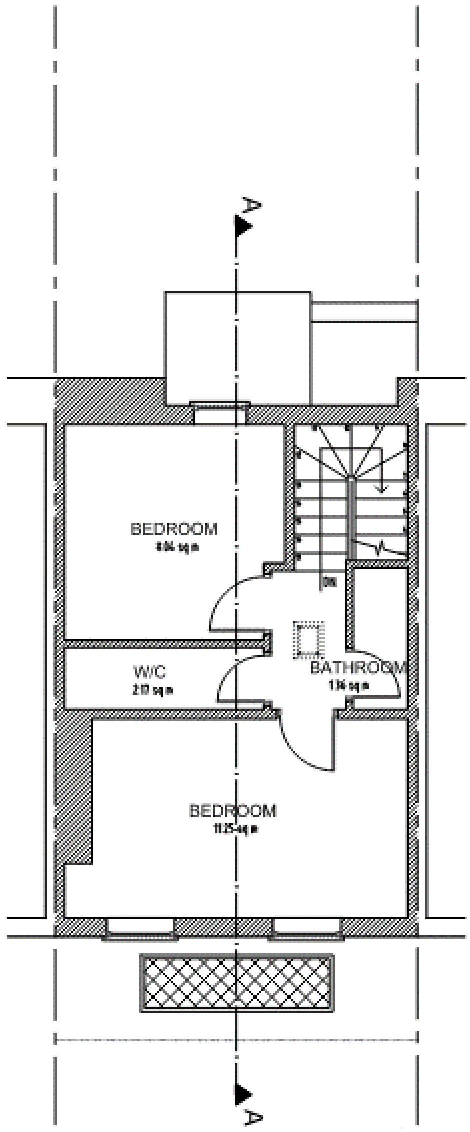

*Existing First Floor*
*Scale 1:100*

Proposed Second floor Plan

Existing Second floor Plan

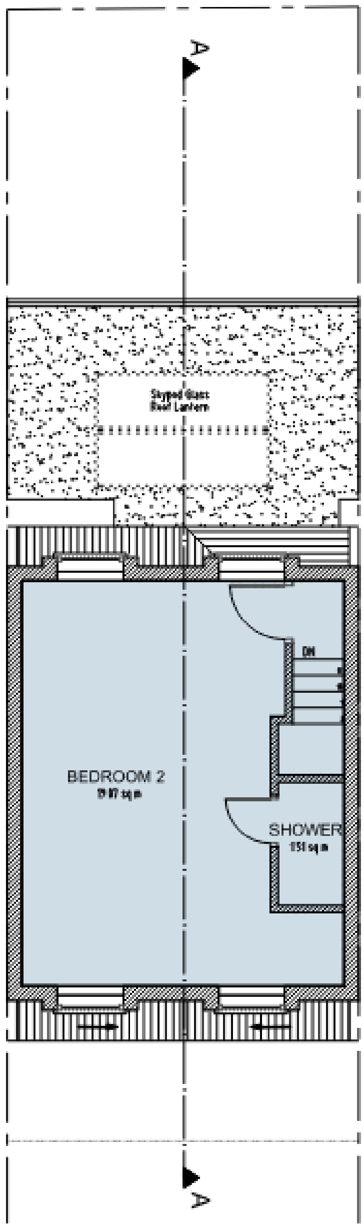



*Proposed Second Floor*
*Scale 1:100*




*Existing Second Floor*
*Scale 1:100*

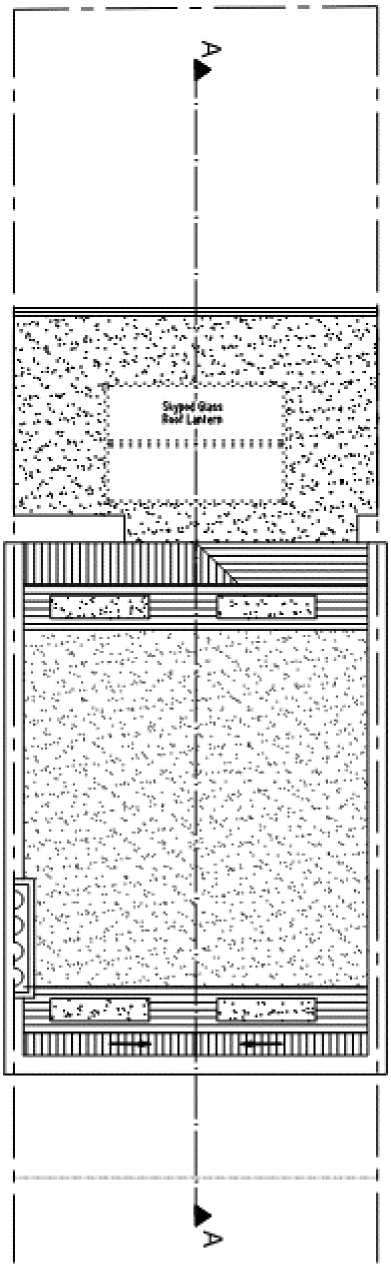
Proposed Loft Floor



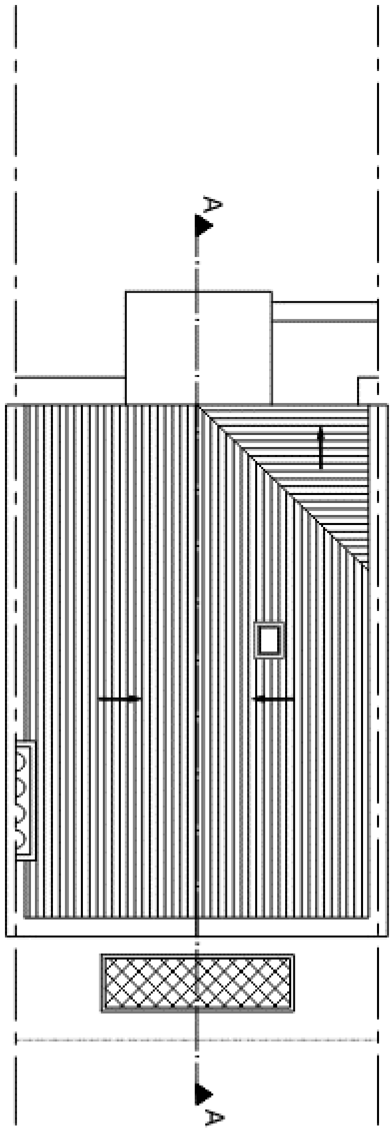

*Proposed Loft Floor*
*Scale 1:100*

Proposed Roof Plan

Existing Roof Plan



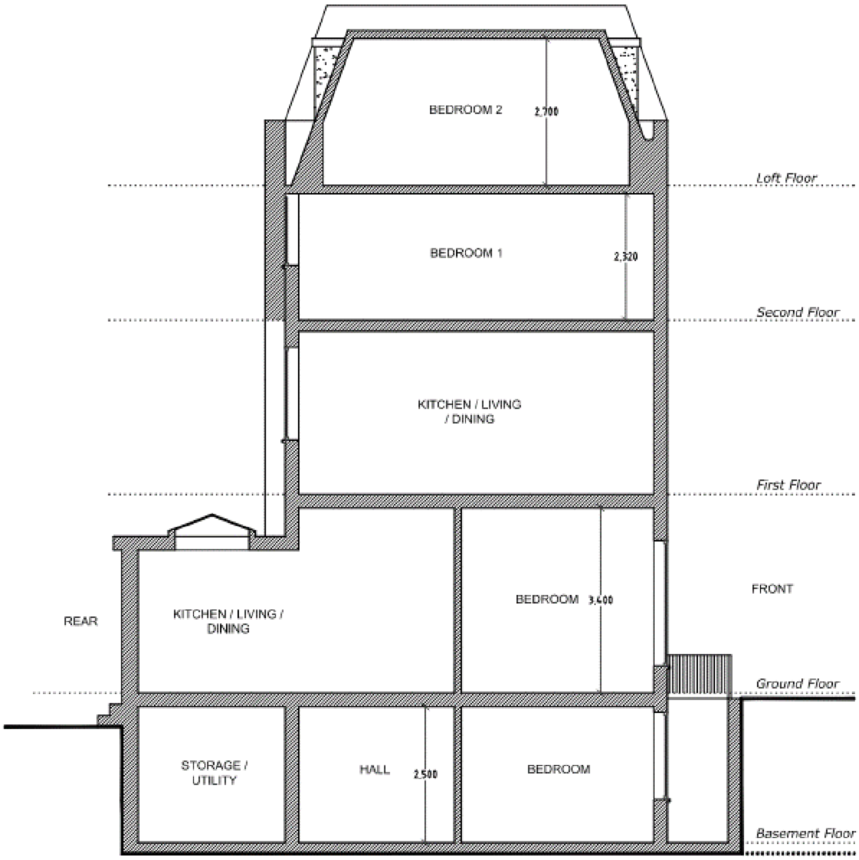

*Proposed Roof Plan*
*Scale 1:100*




*Existing Roof Plan*
*Scale 1:100*

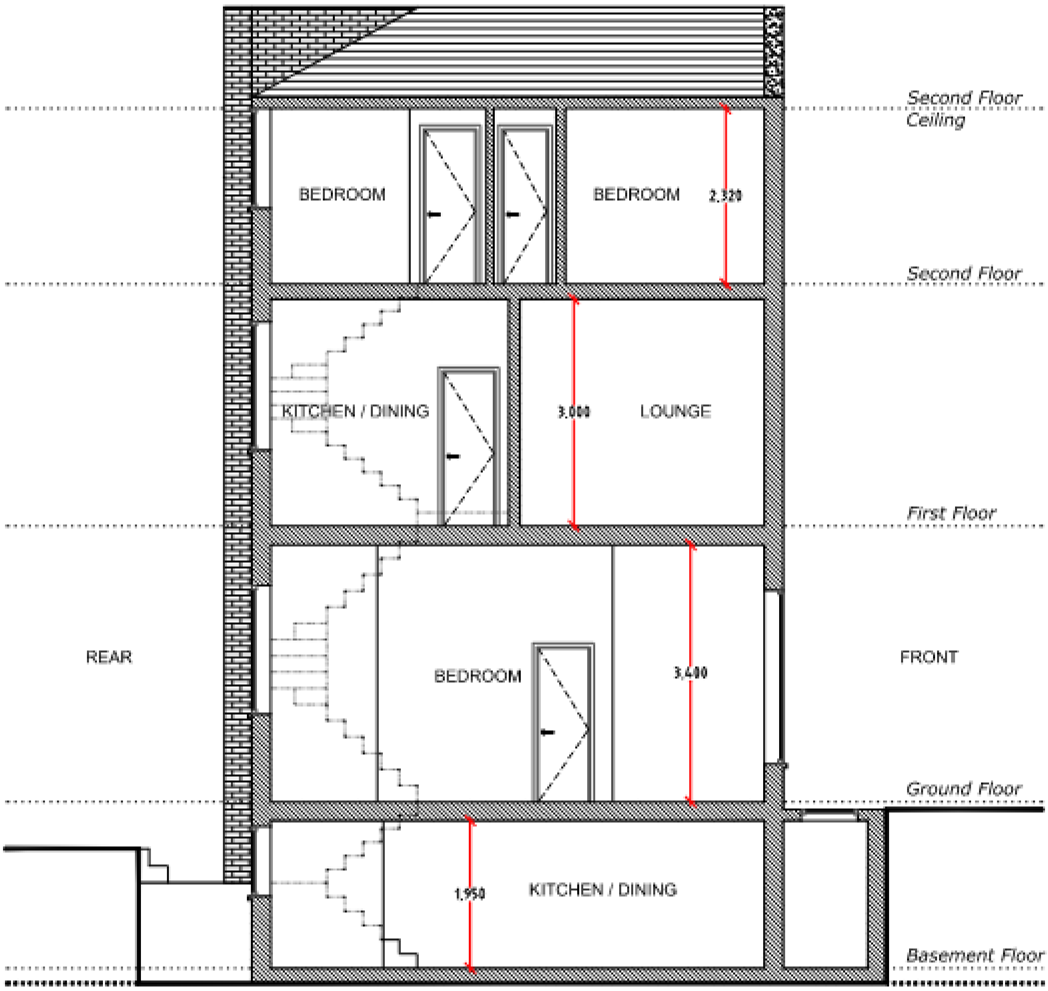
# Appendix 3: Proposed Sections and Elevations

Proposed Section A-A




*Proposed Section A-A*
*Scale 1:100*

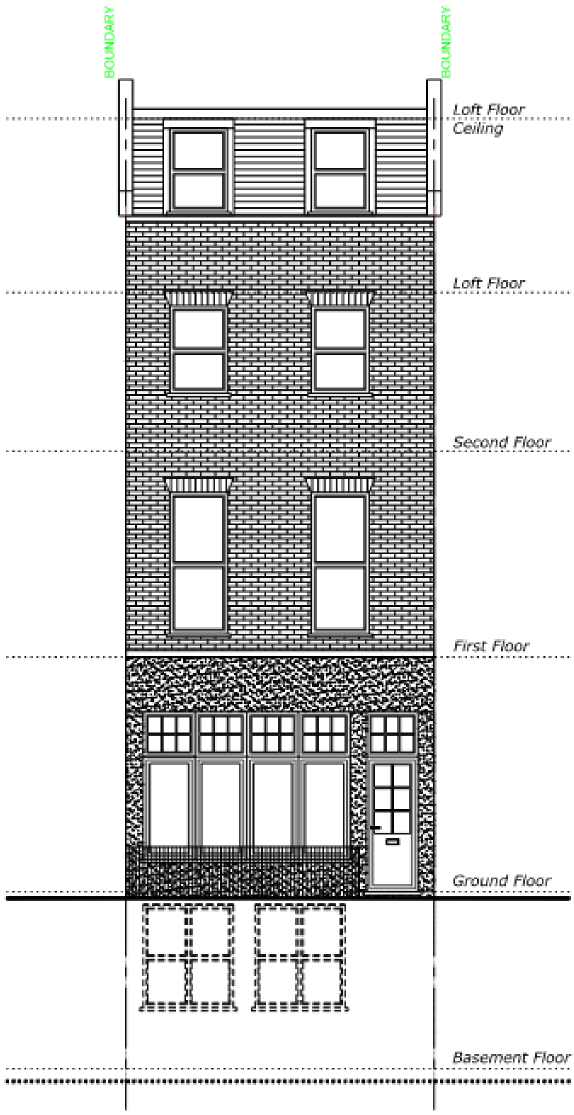
Existing Section A-A




*Existing Section A-A*

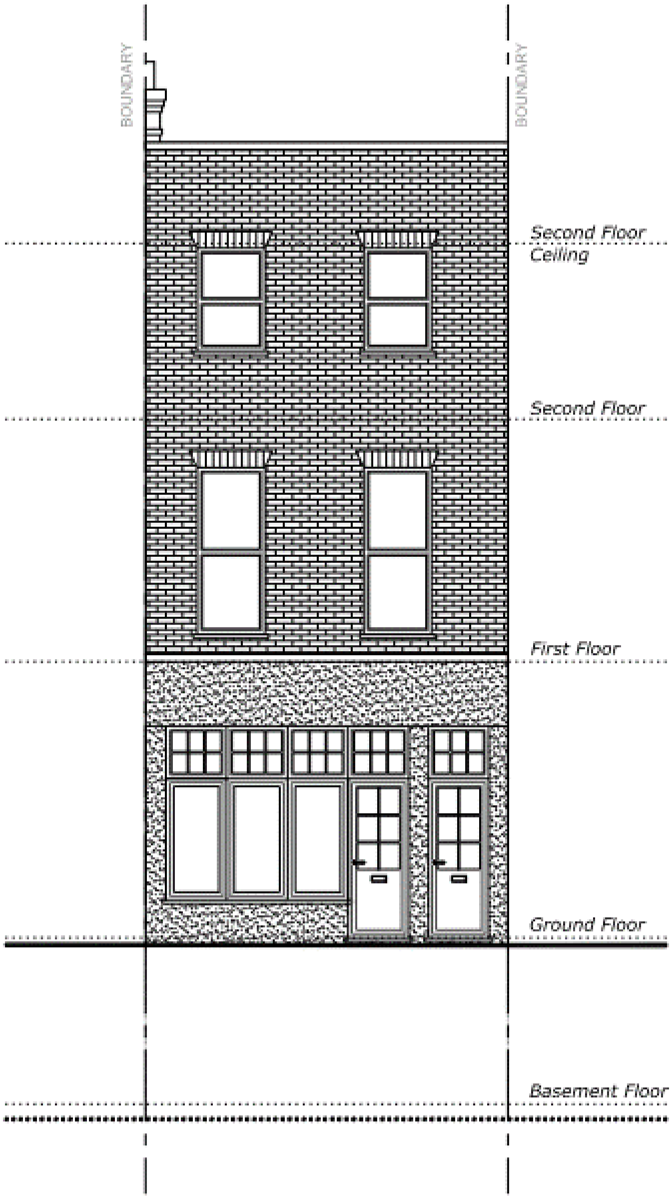
*Scale 1:100*

Proposed Front Elevation



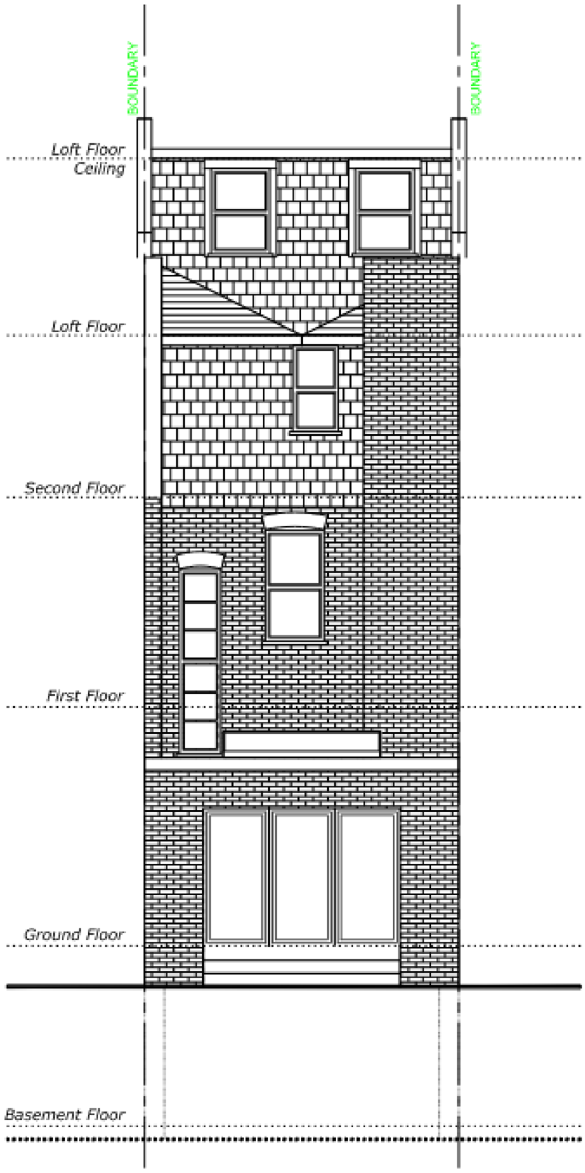

*Proposed Front Elevation*
*Scale 1:100*

Existing Front Elevation



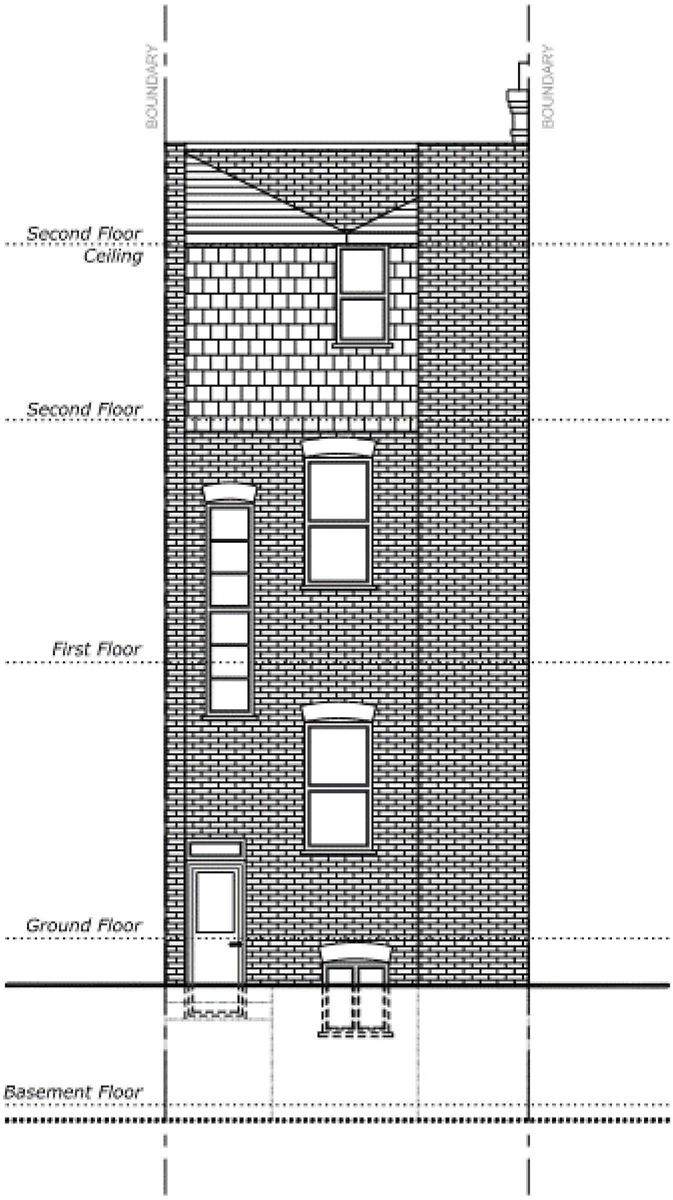

Existing Front Elevation
Scale 1:100

Proposed Rear Elevation



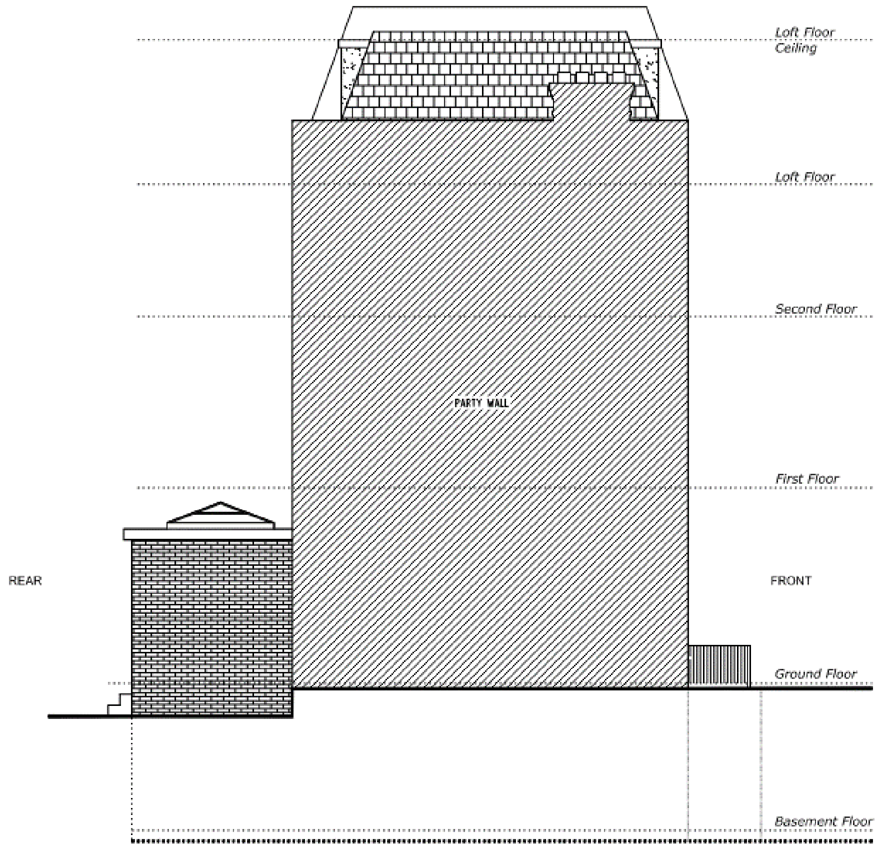

Proposed Rear Elevation
Scale 1:100

Existing Rear Elevation



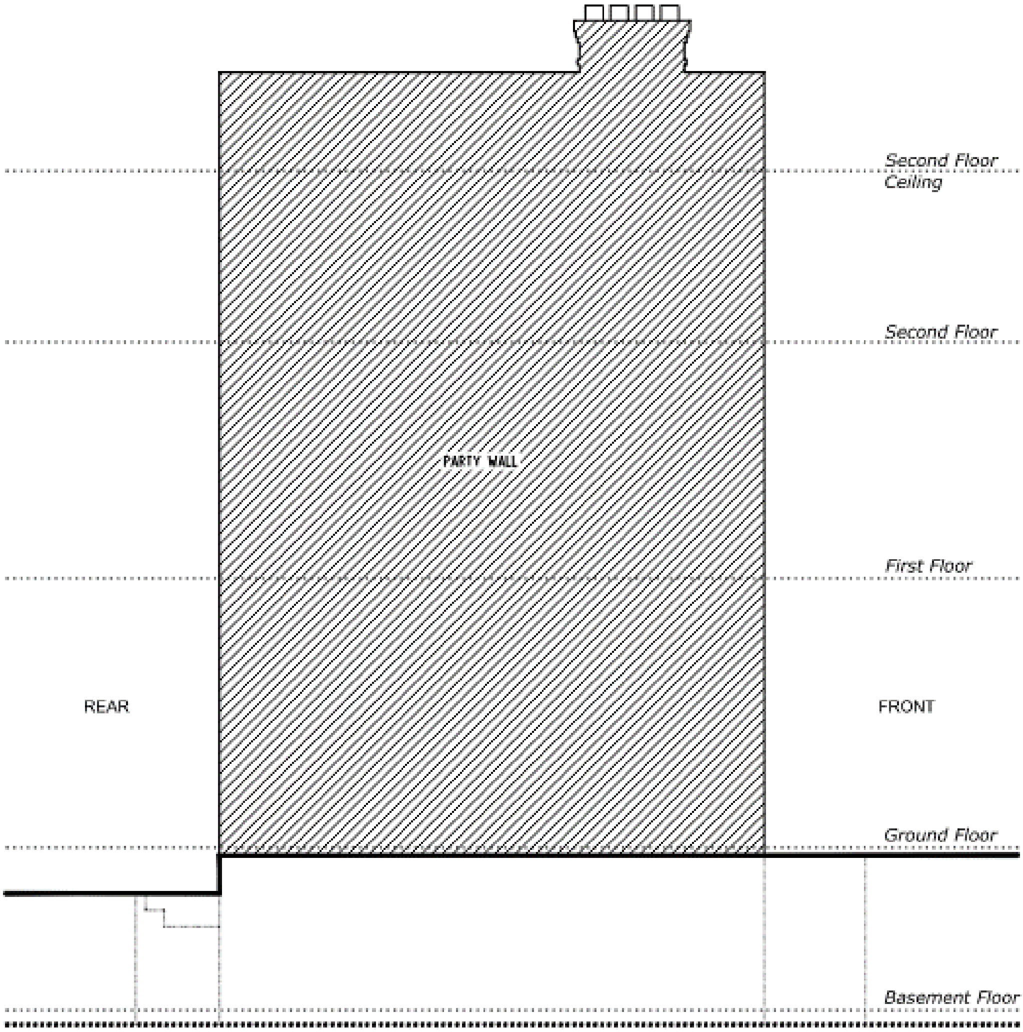

*Existing Rear Elevation*
*Scale 1:100*

Proposed Side 1 Elevation



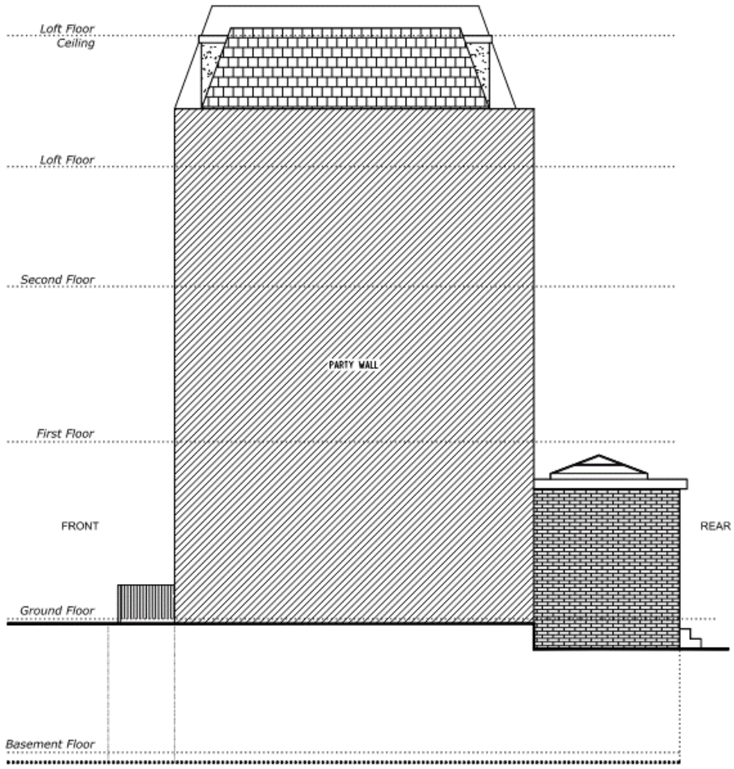

*Proposed Side 1 Elevation*
*Scale 1:100*

Existing Side 1 Elevation



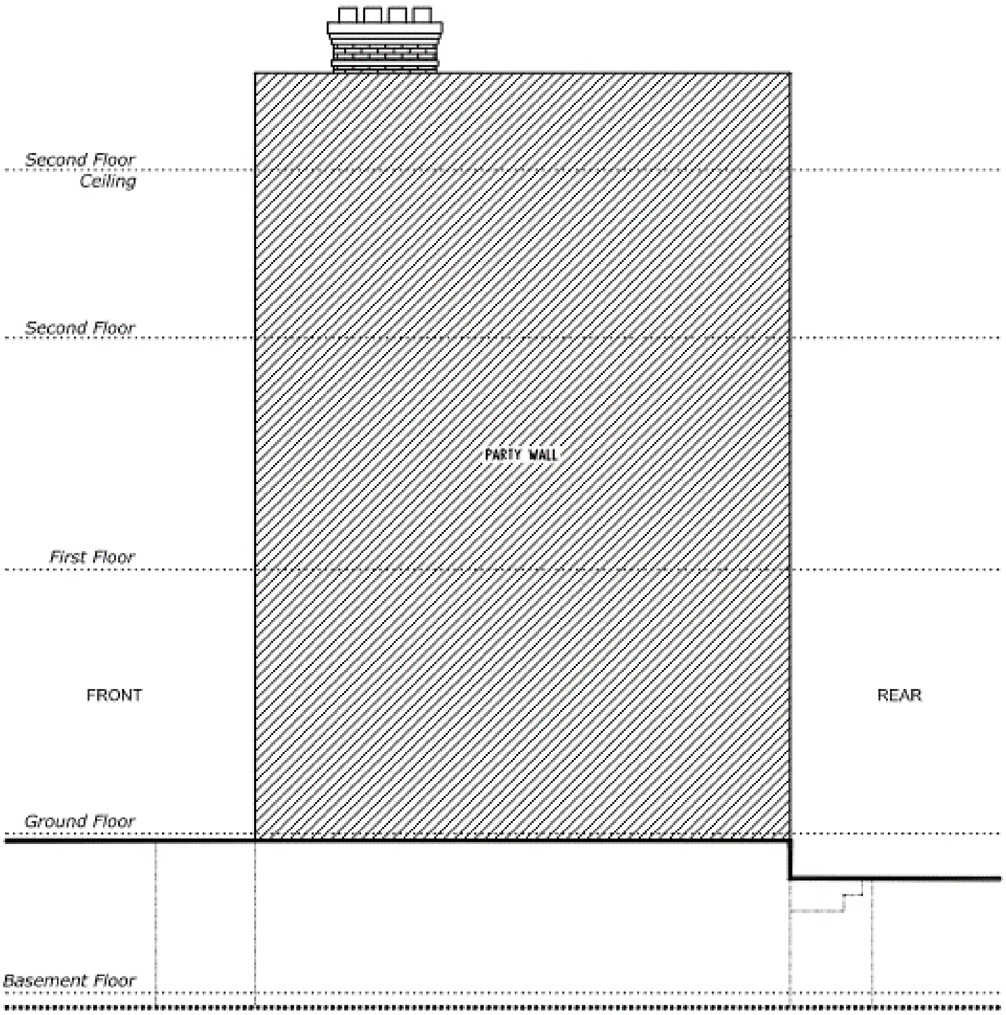

*Existing Side 1 Elevation*
*Scale 1:100*

Proposed Side 2 Elevation




*Proposed Side 2 Elevation*
*Scale 1:100*

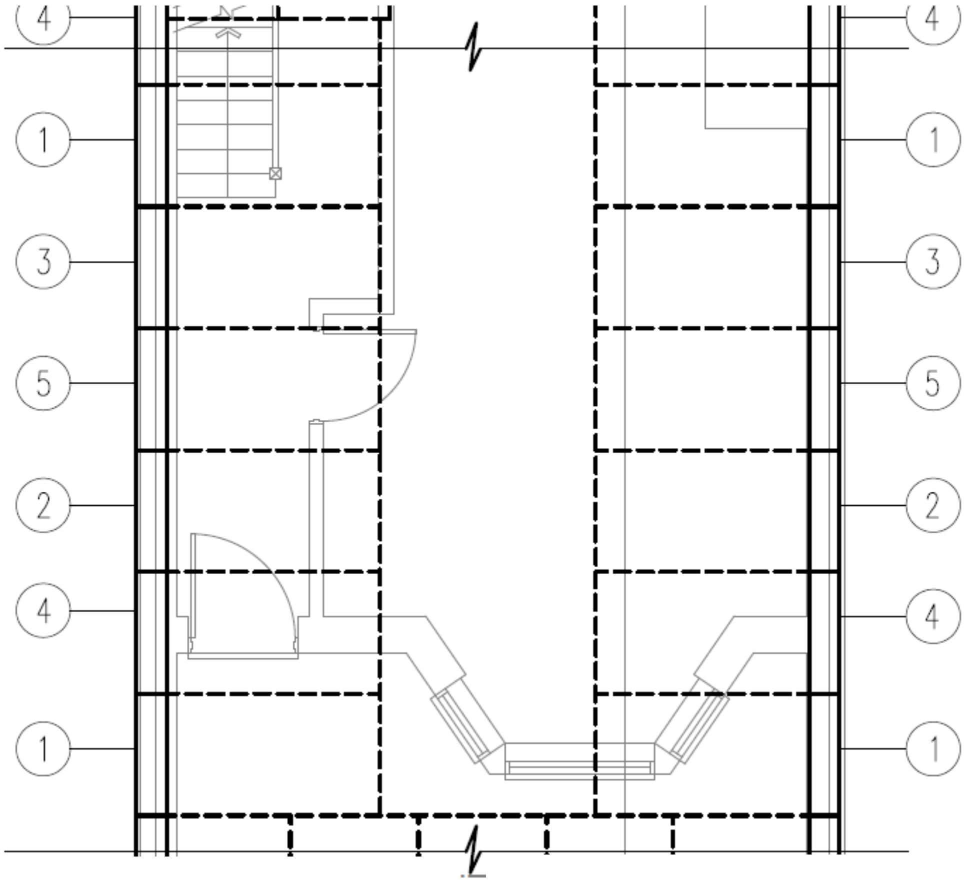
Existing Side 2 Elevation




*Existing Side 2 Elevation*
*Scale 1:100*

## Appendix 4: Plan on envisaged basement works

***INDICATIVE ONLY***




**TYPICAL SEQUENCE OF UNDERPINNING**

A. EXCAVATE BAYS MARKED (1)

B. CONCRETE BAYS MARKED (1)

C. 3 DAY'S TO ALLOW CONCRETE UNDERPINNING TO SET & SHRINK

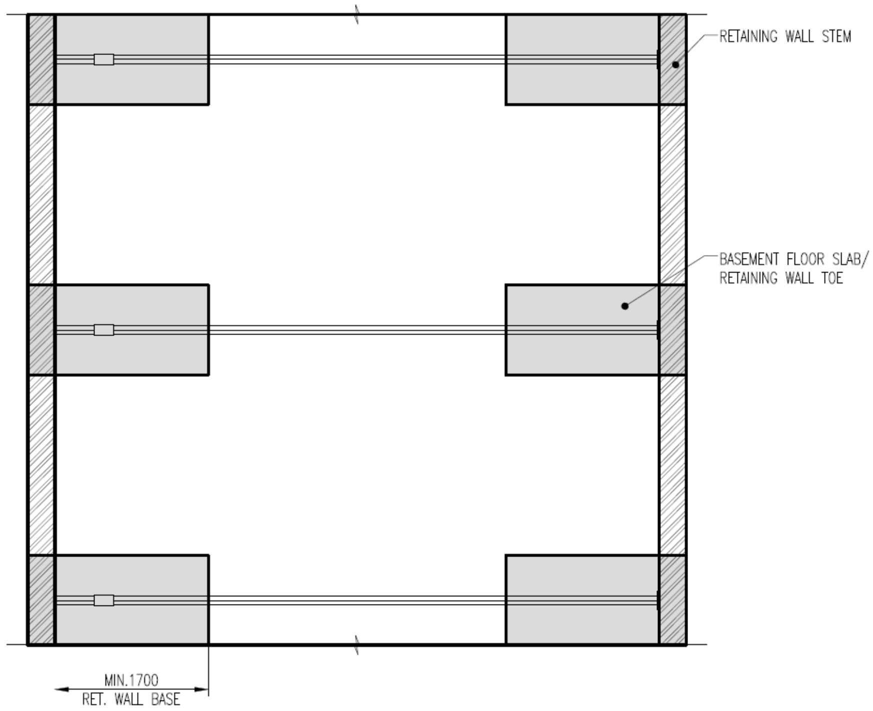
D. DRY PACK BETWEEN UNDERPINNING & ORIGINAL FOUNDATION

E. 24Hrs. TO ALLOW DRY PACK MORTAR TO GAIN STRENGTH

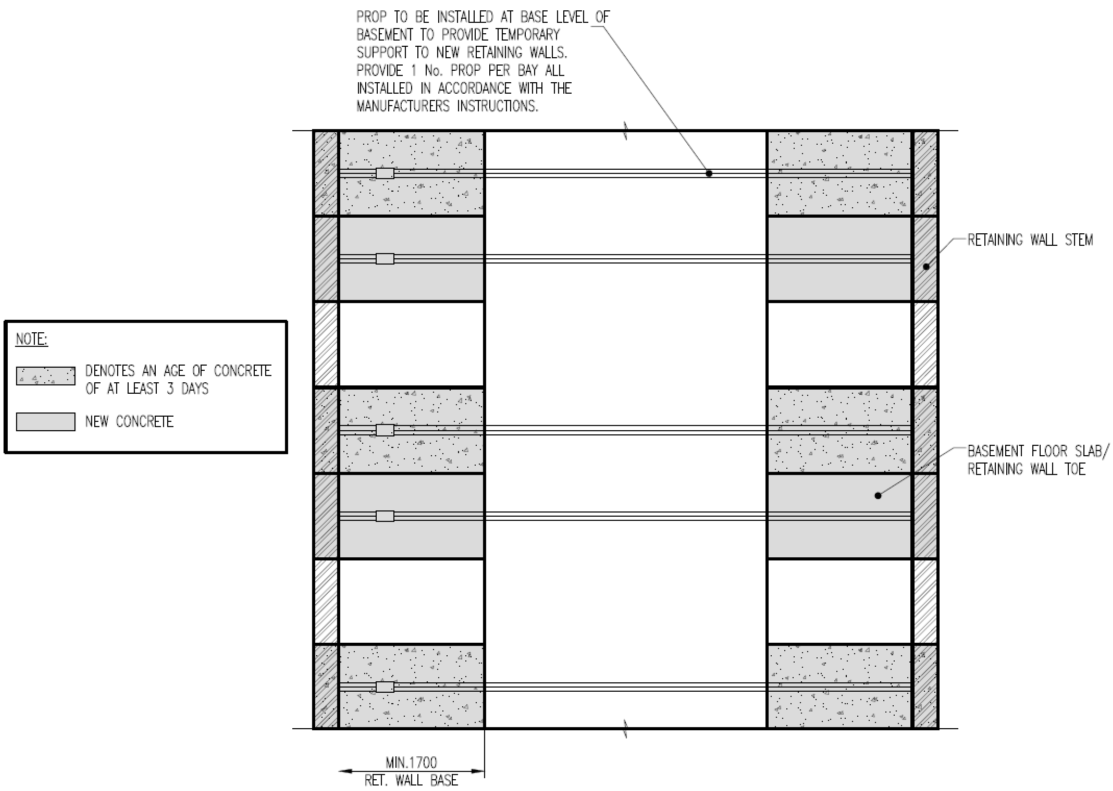
F. EXCAVATE BAYS MARKED (2)

G. PROCEED AS FOR B. – E. ABOVE FOR BAYS MARKED (2)

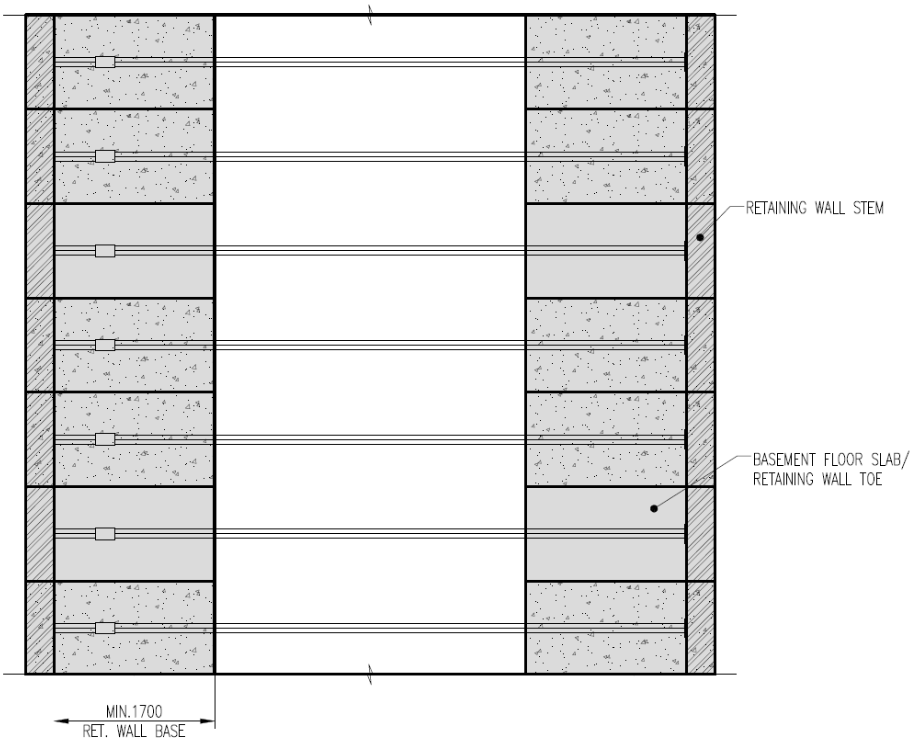
H. REPEAT PROCESS F. – G. FOR REMAINING BAYS IN SEQUENCE MARKED ON PLAN



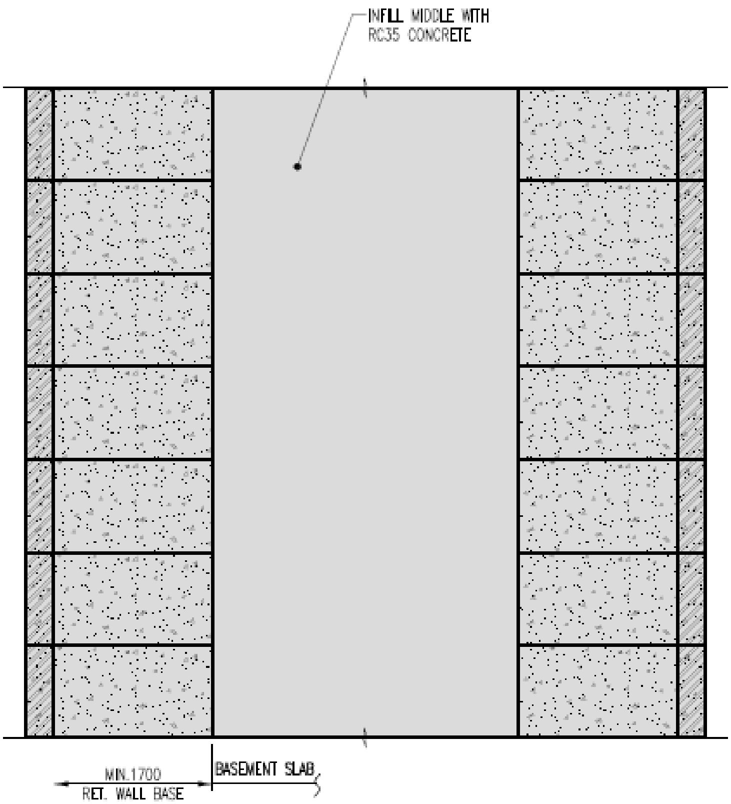

PLAN ON BASEMENT WORKS




PLAN ON BASEMENT WORKS

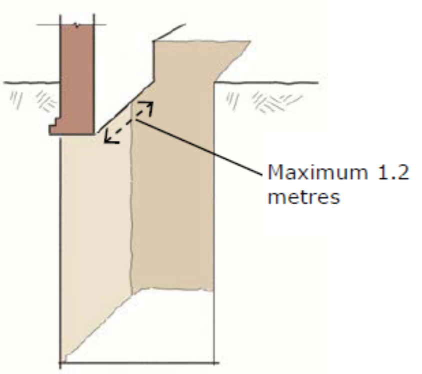



PLAN ON BASEMENT WORKS



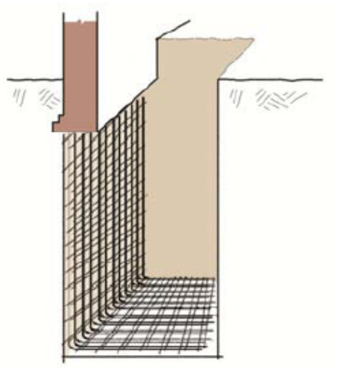

PLAN ON BASEMENT WORKS
SCALE 1:50

# Appendix 5: Typical Underpinning sequence (ASUC Guideline)



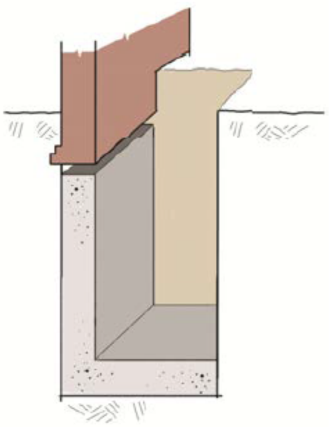

1. Excavation must be fully supported by props and shoring.
2. Edge protection to prevent falls into the excavation must be installed.
3. A temporary vertical prop or support may be placed under the wall to keep any loose bricks or masonry in place.
4. The main load from the existing wall will span onto the wall and foundations on either side of the excavation.

<u>Stage 1. Excavation</u>



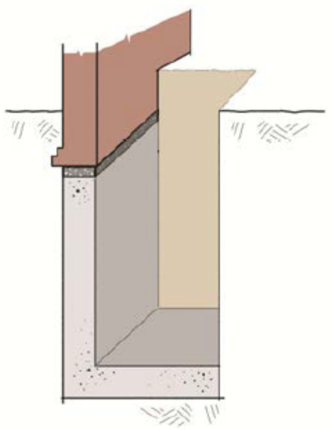
1. Reinforcement is fixed into position.
2. Reinforcement details are given in the engineering design. It is critical that the reinforcement is installed as detailed in the design
3. The design will usually require a shear connection between adjacent underpins. This is generally achieved using dowel bars between adjacent pins or by building sheer keys in the concrete underpin walls.

<u>Stage 2. Reinforcement</u>



1. Concrete is placed in the toe first.
2. Once the toe is sufficiently cured the concrete wall is poured.
3. Shuttering, usually timber, is used to hold the concrete for the wall in place while it is placed.
4. Gap of approximately 75mm left between the top of the concrete and the underside of the existing foundation.

<u>Stage 3. Concrete placement</u>



1. After a minimum of 24 hours dry-pack is rammed into the 75mm void that has been left above the new underpin.
2. Dry-pack is a mix of sharp sand and cement. It is easy to handle and has a low shrink volume, minimising settlement of the wall onto the new underpin foundation.
3. The completed underpin must be supported horizontally either by horizontal propping or by backfilling the excavation until the ground slab and possibly other permanent works are constructed.

<u>Stage 4. Dry packing</u>

# Appendix 6: Flood Risk Maps

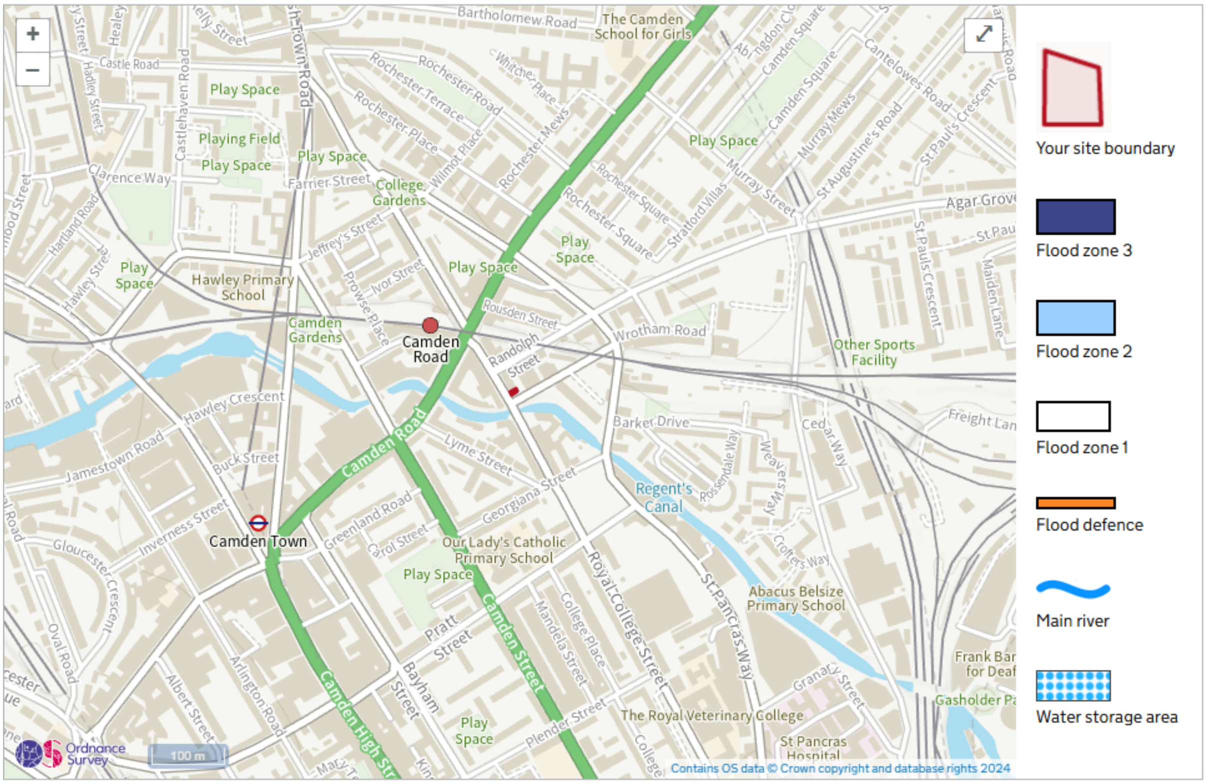



*Figure 8 Flood map for planning*

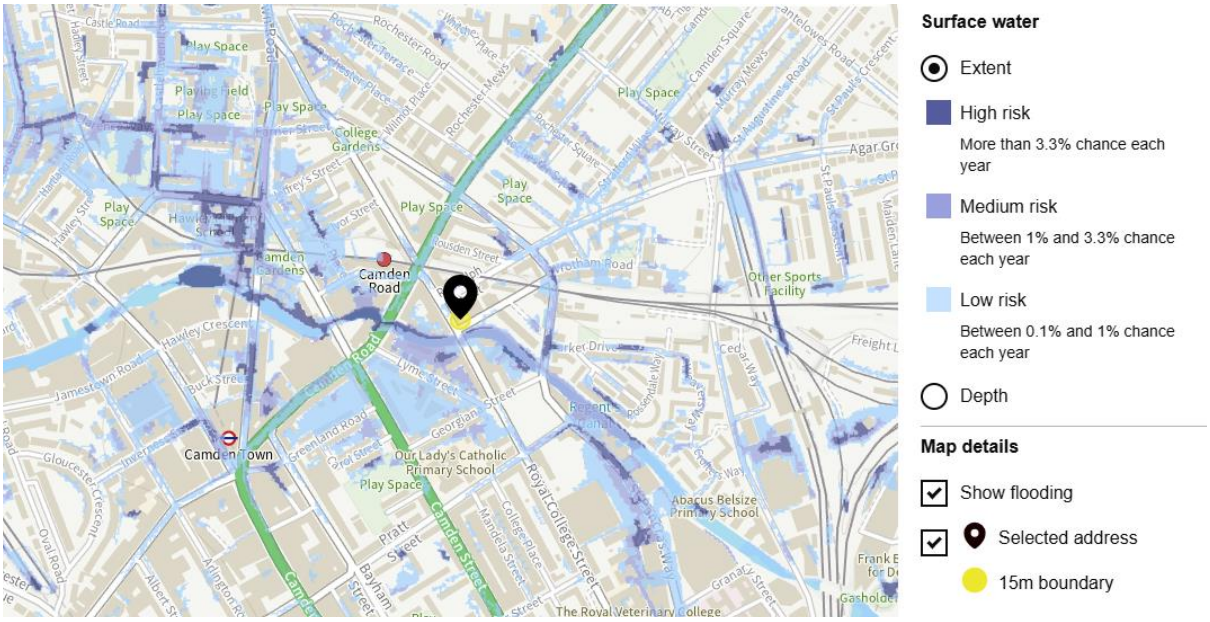
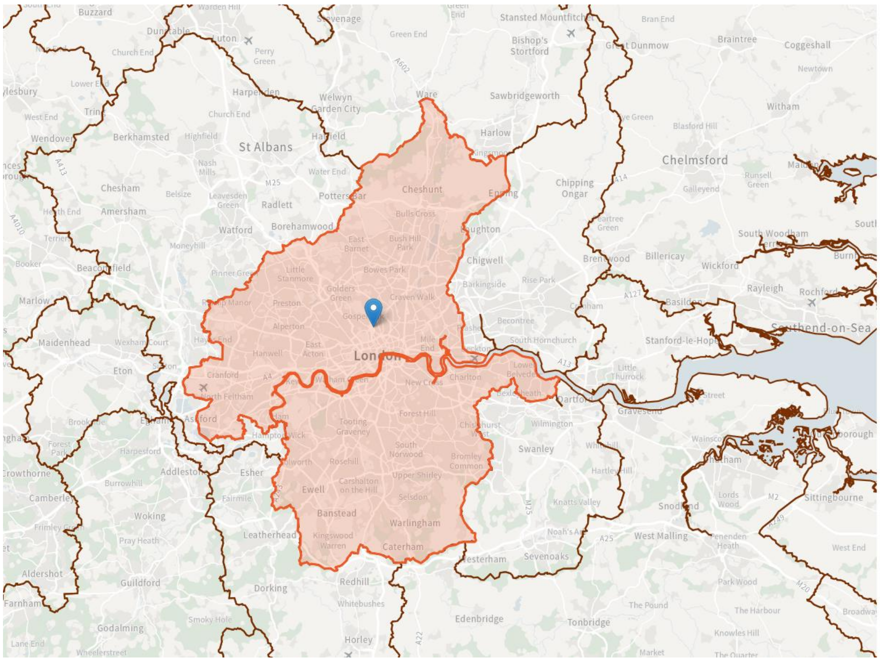



*Figure 9 Extent of surface water flooding*




**London Management Catchment peak rainfall allowances**

**3.3% annual exceedance rainfall event**

| Epoch | Central allowance | Upper end allowance |
|---|---|---|
| 2050s | 20% | 35% |
| 2070s | 20% | 35% |

**1% annual exceedance rainfall event**

| Epoch | Central allowance | Upper end allowance |
|---|---|---|
| 2050s | 20% | 40% |
| 2070s | 25% | 40% |

*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

This map contains information generated by Met Office Hadley Centre (2019): UKCP Local Projections on a 5km grid over the UK for 1980-2080. Centre for Environmental Data Analysis, 2022

*Figure 10 climate change allowances for peak rainfall in England by catchment area*

# Appendix 7: Borehole details

British Geological Survey

BGS ID: 591493 : BGS Reference: TQ28SE9
British National Grid (27700) : 529389,183895

Institute of Geological Sciences

RECORD OF SHAFT OR BOREHOLE

6-inch or 1:10 000 Map Registration No. TQ/28SE/9

Name and Number of Shaft or Borehole:

National Grid Reference 29389 83895

For whom made

Town or Village — County London.

1-in or 1:50 000 New Series Map No. 256

Enter 'C' if Confidential

Exact site (reference to a fixed point on 1-in or 1:50 000 Map)
Idris & Co. Junction of St. Pancras Way. and Pratt St. Camden Town.

Purpose for which made

Ground level at shaft/bore relative to O.D. — m. If not ground level give O.D. of beginning of shaft/bore — m.

Made by — Date of sinking

Information from L C C. — Examined by

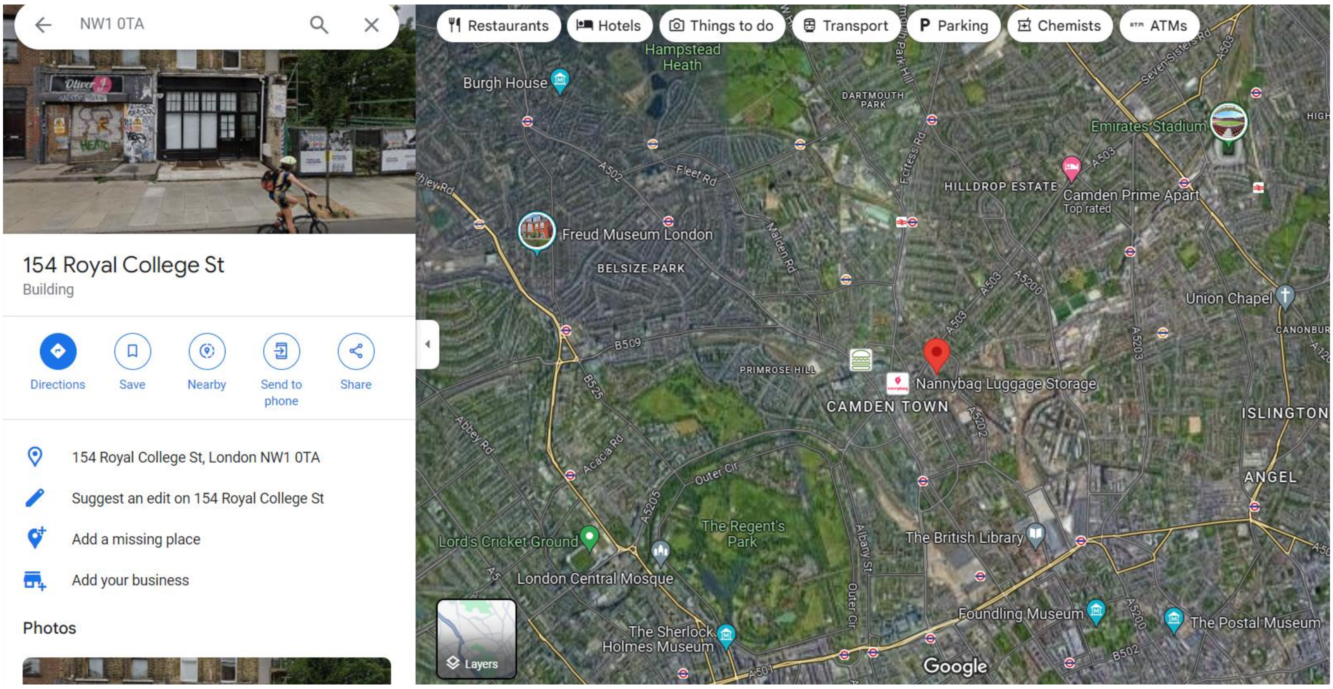
Specimen Numbers and Additional Notes

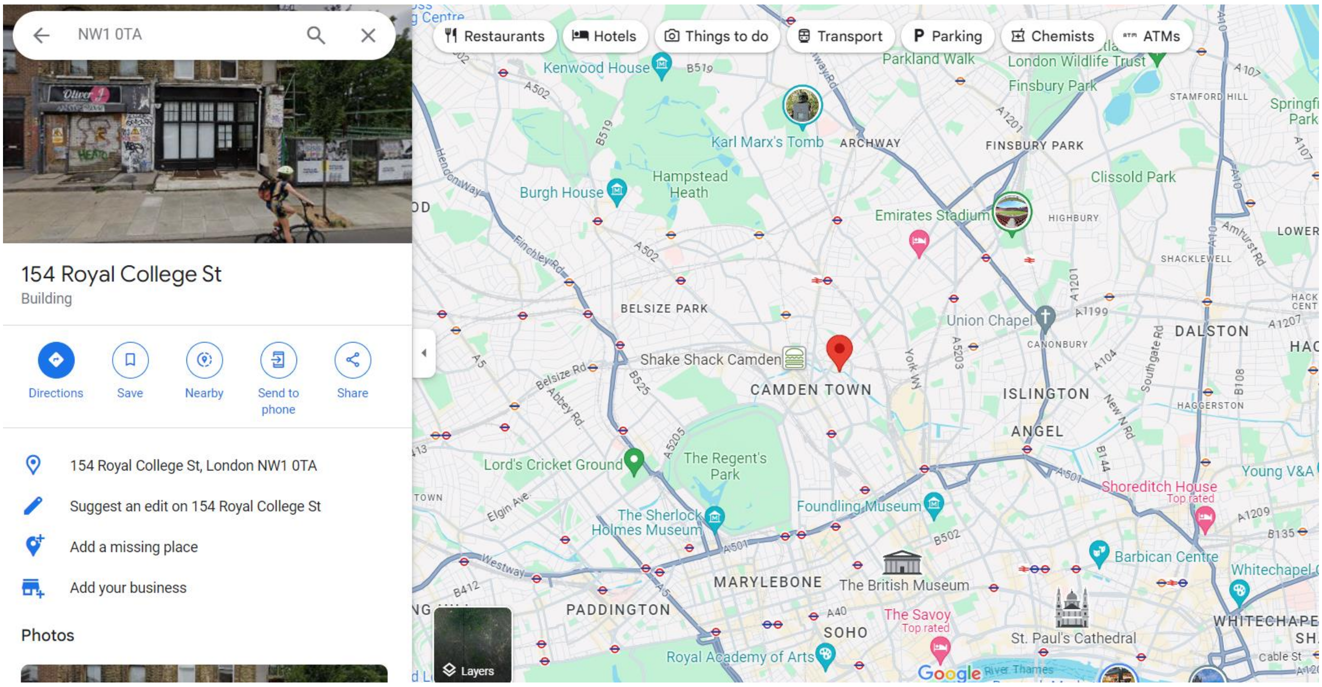
| Geological Classification | Description of Strata | Thickness metres | Depth metres |
|---|---|---|---|
| | Yellow clay. | 4.42 | 4.42 |
| LC | Blue clay. | | 29.26 |
| WRB | Mottled clay. | | 35.36 |
| | Sandy Loam. | | 38.40 |
| | Greensand. | | 42.06 |
| TAB | Grey sand. | | 46.03 |
| | Chalk and Flints. | | 53.34 |
| | Chalk. | | 59.13 |
| CK | Chalk and Flints. | | 110.95 |
| | Chalk Boulders. | | 118.26 |
| | Hard Chalk. | | 125.20 |
| | | | |
| | | | |
| | Steel lining tubes driven 24 feet into the Chalk. | | |
| | Water pumped from a depth of 233 ft. 6 inches. | | |

IGS 2489 (1789) 10 000 2/79

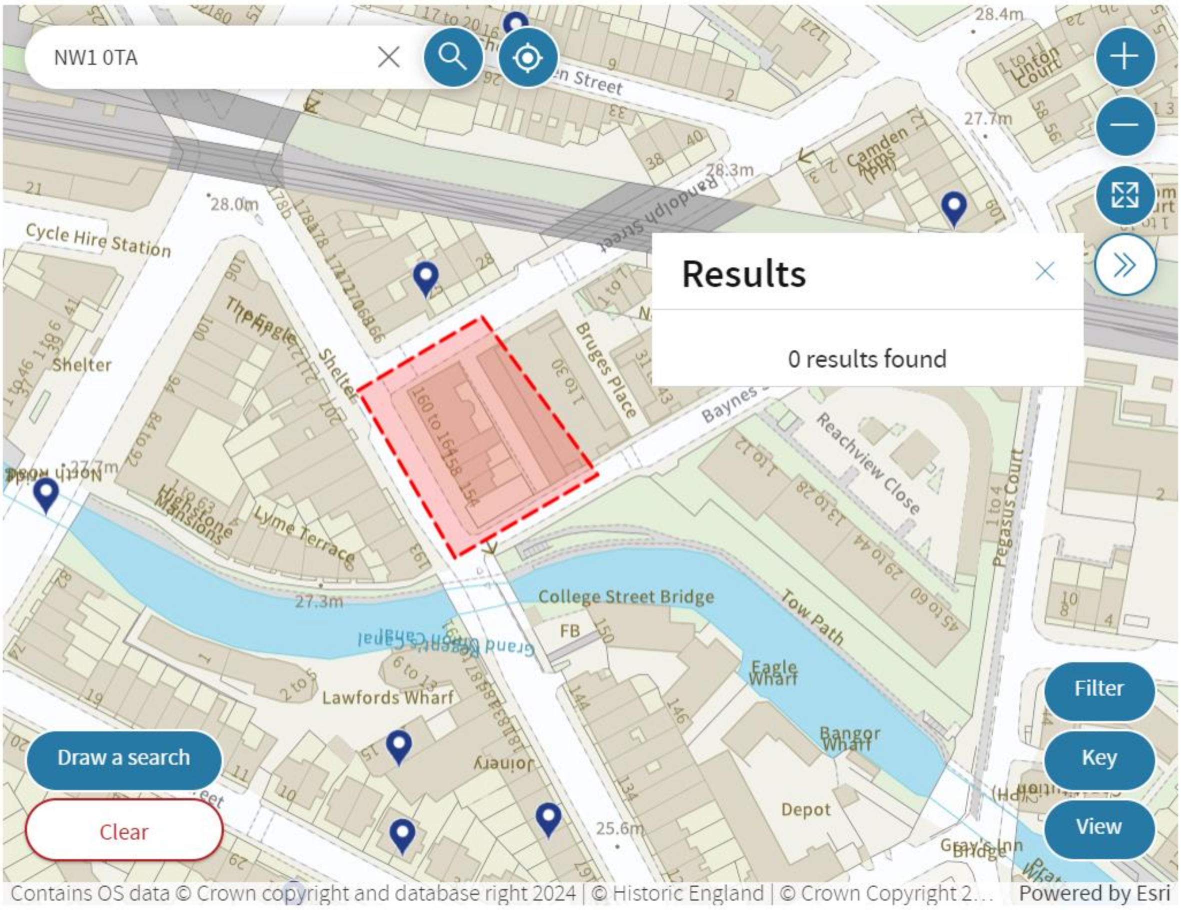
Contact BGS: ngdc@bgs.ac.uk

# Appendix 8: Google Maps/Camden Maps



## Appendix 9: Map of Listed Buildings (Source: Historic England website)



# Appendix 10: Map of Local Flood Risk Zones and Critical Drainage Areas

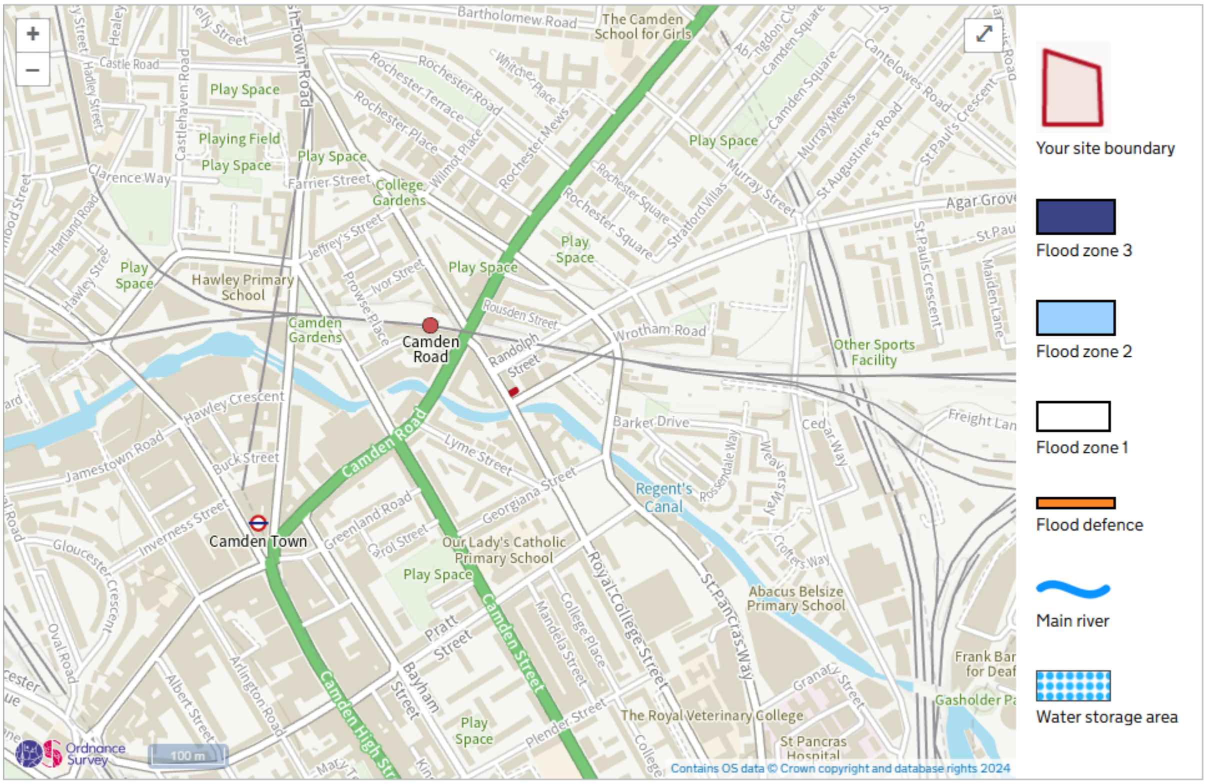



*Figure 11 Flood map for planning*

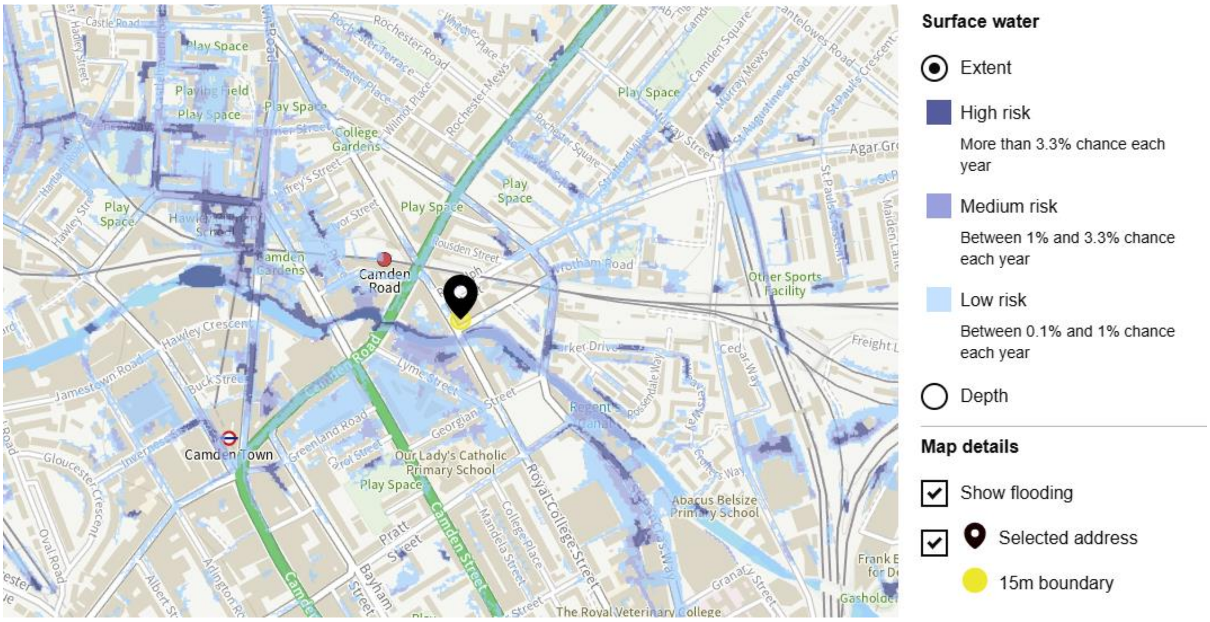



*Figure 12 Extent of surface water flooding*

## Appendix 12: Map showing Trees Preservation Order (TPO)

N/A – Direct inquiry via Tree and Landscape Officer (Camden Council) required:

Contact details

**Telephone**

020 7974 4444
Fax: 020 7974 1930

**E-mail**

planning@camden.gov.uk

**Website**

www.camden.gov.uk/planning

# Appendix 13: Map showing the recorded bomb location of WW2


Bomb density indicates a Moderate/High risk zone, however no Bombs have been found within the immediate vicinity. Sevral site with Un-Exploded Ordinance are recorded so caution when conducting excavation is neccesary.