morphstructures

consulting structural & civil engineers

13 Regents Park Road, NW1 7TL

Basement Impact Assessment

Project no: 3036

March 2021

Contents

Revision	Date	Status
P1	19.03.2021	Planning

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Introduction

Morph Structures were instructed by Boyer Planning Consultants to consider the structural aspects of constructing a new single storey basement beneath the lower ground floor at 13 Regents Park Road, London NW1 7TL and to produce a Basement Impact Assessment in support of a planning application. This report will also consider the effects on local hydrology, geology and hydrogeology and potential impacts to neighbours and the wider environment.

This report covers the work undertaken during the initial stage of the project. A description of the main elements of the structure is given, plus aspects of the construction methodology which have influenced the structural design.

This report was prepared by Melanie Goodwin MEng and Marc Exley MEng, and checked by Dave Heeley MEng CEng MIStructE.

Non-technical Summary

This basement impact assessment has been produced to address the requirements as set out in the planning procedure for basements and lightwells adopted by London Borough of Camden and comprises the following elements:

- Desk Study
- Screening
- Scoping
- Site Investigation, monitoring, interpretation and ground movement assessment
- Impact Assessment

The existing building is a four storey semi-detached house, located in Camden, London. The project involves the refurbishment of the existing superstructure, the lowering of the existing lower ground floor, the addition of a subterranean extension in the front lightwell and a new basement below.

A desk study of the site was carried out. The street level is higher than the rear garden, hence the subterranean extension against the front boundary.

Ground investigations were carried out, including a 11m deep borehole. The borehole encountered Made Ground down to 1.2m depth overlying London Clay. No groundwater was encountered. The footings of the existing building were found to be shallow, with the walls bearing on mass concrete strip footings around 400mm to 500mm deep.

Relevant government maps indicate that there is no risk of flooding from rivers or reservoirs, however a high risk of flooding from surface water.

An envisaged construction sequence and methodology has been prepared to outline how to excavate the basement structure whil limiting the affects on the existing structure and neighbouring properties.

Based on the general overview, the proposed development is considered to have minimal impact on the stability of adjacent structures, and on the surrounding surface and subterranean water regimes.

BIA Components for Audit

Item provided		Yes/No or N/A	Name of BIA document/ appendix in which information is contained.	Comments
1	Description of proposed development.	Yes	This document	
2	Plan showing boundary of development including any land required temporarily during construction.	Yes	Appendix D	
3	Plans, maps and or photographs to show location of basement relative to surrounding structures.	Yes	Appendix A & D	
4	Plans, maps and or photographs to show topography of surrounding area with any nearby watercourses/waterbodies including consideration of the relevant maps in the Strategic FRA by URS (2014)	Yes	This document	
5	Plans and sections to show foundation details of adjacent structures.	Yes	Appendix A	
6	Plans and sections to show layout and dimensions of proposed basement.	Yes	Appendix A & D	
7	Programme for enabling works, construction and restoration.	No		Construction methodology sketches included. Contractor to provide programme
8	Identification of potential risks to land stability (including surrounding structures and infrastructure), and surface and groundwater flooding.	Yes	Appendix B	
9	Assessment of impact of potential risks on neighbouring properties and surface and groundwater.	Yes	Appendix B	
10	Identification of significant adverse impacts.	N/A		No significant adverse impacts stated in Ground Investigation Report
11	Evidence of consultation with neighbours.	No		Architect to confirm
12	Ground Investigation Report and Conceptual Site Model including - Desktop study - exploratory hole records - results from monitoring the local groundwater regime - confirmation of baseline conditions - factual site investigation report	Yes	Appendix B	
13	Ground Movement Assessment (GMA).	No		To follow on request
14	Plans, drawings, reports to show extent of affected area.	Yes	Appendix D	
15	Specific mitigation measures to reduce, avoid or offset significant adverse impacts.	N/A		No significant adverse impacts stated in Ground Investigation Report
16	Construction Sequence Methodology (CSM) referring to site investigation and containing basement, floor and roof plans, sections (all views), sequence of construction and temporary works.	Yes	This document	Construction methodology sketches included. Contractor to provide detailed methodology at construction stage
17	Proposals for monitoring during construction.	Yes	This document	
18	Confirmatory and reasoned statement identifying likely damage to nearby properties according to Burland Scale	Yes	This document	
19	Confirmatory and reasoned statement with supporting evidence that the structural stability of the building and neighbouring properties will be maintained (by reference to BIA, Ground Movement Assessment and Construction Sequence Methodology), including consideration of cumulative effects.	Yes	This document	
20	Confirmatory and reasoned statement with supporting evidence that there will be no adverse effects on drainage or run-off and no damage to the water environment (by reference to ground investigation, BIA and CSM), including consideration of cumulative effects.	Yes	Appendix B	
21	Identification of areas that require further investigation.	N/A		
22	Non-technical summary for each stage of BIA.	Yes	This document	

The Project

The existing property occupies the lower two floors of a four storey semi-detached Victorian villa located in the Primrose Hill Conservation Area in North London.

The existing structure is likely to comprise timber floor joists supported by a combination of loadbearing masonry, party and internal walls.

The proposed development involves the construction of a new single storey basement beneath the lower ground floor and a new subterranean extension to the front of the building. Comprehensive internal refurbishment is proposed to allow for internal reconfiguration of the space.

Site Photograph

The Site

4.1
Site Location

The property is located in Primrose Hill, North London, approximately 3.5 miles north of Central London. The site is in the London Borough of Camden. It is bounded by back gardens of properties on Prince Albert Road to the south, 15 Regents Park Road to the west and 11 Regents Park Road to the east.

The neighbouring properties appear to be of a similar age and construction.

The National Grid Reference for the site is TQ 28398 83722 . The ground level is approximately 37m above sea level.

The street level is between the lower ground and ground floor, as such, there are short retaining walls forming the front lightwell and under teh main steps to the property.

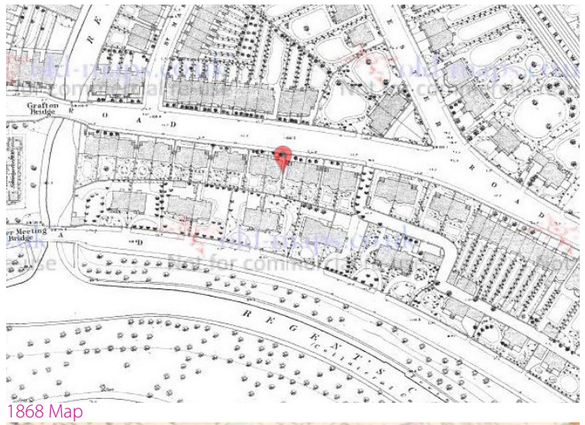
4.2
Site History

The earliest maps available for the area date back to 1850 when several adjacent roads were present, but no building development in or around the site. This section of Regents Park Road was, at the time, called Queens Road.

By 1873 the road has been renamed as Regents Park Road and housing is evident along both sides and the surrounding roads, including the current property.

From historic bomb maps it can be seen that this area suffered from attacks during the Second World War. There is evidence of bomb damage to houses on the north side of Regents Park Road directly opposite the site. There is also evidence of damage to properties directly to the east of the site. No. 10 was demolished and replaced by flats (Erno Goldfinger Grade II listed)

1850 Map



1868 Map

WW2 Bomb Map

4.3
Geotechnical Data

Published geotechnical maps from the British Geological Survey indicate that the local geological strata comprises London Clay Formation with no recorded superficial deposits.

The nearest available borehole from the British Geological Survey is located on Prince Albert Road and shows approximately 0.5m of made ground over 10m brown clay and then unbattered blue clay.

An intrusive geotechnical investigation has been undertaken by GEA Ltd. The report is attached in Appendix B.

The investigation has confirmed the published geological data. The borehole encountered Made Ground down to 1.2m depth overlying London Clay to the base of the 11m borehole. Groundwater was encountered during the initial investigations, however these likely represent localised seepages as the monitoring standpipe did not signify a groundwater level.

4.4
Flooding / Watercourses

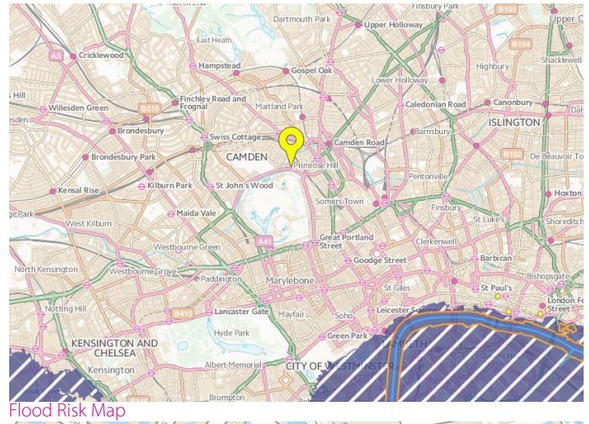
A desk study of available Environment Agency/ Government flood information reveals no risk of flooding from rivers or reservoirs.

The site is located within 100m of Regents Canal and 1.25km of The River Tyburn and 1km of River Fleet. According to LB Camden's SFRA Regents Canal is not considered to be a flood risk, and the rivers Fleet and Tyburn have been culverted and incorporated into the TWUL sewer network and therefore considered to carry no fluvial flood risk. All of LB Camden is located within Flood Zone 1.

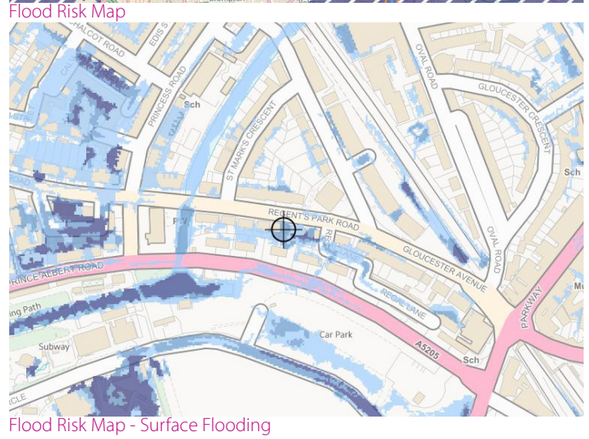
LB Camden's SFRA document records Primrose Hill as a local flood risk zone within the critical drainage area as Group3-003. It notes low to medium risk of surface water flooding. Gov.uk says high risk for surface water flooding.

The Primrose Hill area was affected by flooding during an extreme rainfall event in August 1975.

The flood hazard is recorded as danger for most 1 in 1000 year event. It is noted as having opportunities for bespoke infiltration SuDS in terms of drainage potential. A couple of Environment Agency groundwater flood incidents are recorded in the vicinity, but none on Regents Park Road. No record of internal or external sewer flooding within the last 10 years.



Flood Risk Map



Flood Risk Map - Surface Flooding

The Site

4.5
The Existing Building

The existing building is a four storey semi-detached Victorian villa which has been split into flats. The property occupies the ground and lower ground floors. The suspended floors comprise timber joists spanning front to back, supported by perimeter masonry walls and an internal loadbearing timber spine wall.

The upper floors have not been surveyed, but are assumed to also match the arrangement outlined above.

Intrusive investigative were undertaken to confirm the composition of the existing structure, particularly retaining walls and foundations as well as the presence of internal timber spine walls in the superstructure which will be incorpoated in the detailed design drawings.

It could be seen that a number of alterations have been undertaken previously including an opening in the central spine wall, and the strengthening of timber floor joists possibly replacing an insufficient bearing connection.

The general condition of the structure appears in good condition with no evidence of significant movement to external walls.

4.6
Presence of Trees

There are three trees in the vicinity of the property as outlined in Southern Beeches Ltd's tree survey report. See appendix C.

One tree is to be removed from the front lightwell in the position of the subterranean extension. This was deemed to be in an unsuitable position, the size of the tree should not impact the foundations of the proposed structure due to the depth of excavation already required for the extension.

The london plane tree located in the footpath to the front of the property has a large root protection area which would interact with the majority of the subterranean extension. However as advised by the arboriculturalist, existing site features such as roads, retaining walls and foundations will likely have modified the root patterns, therefore the proposed design impact is far less onerous.

Finally a large horse chestnut tree is located at the end of the neighbours rear garden. The tree root protection area does not coincide with the proposed basement structure, however will be require consideration before any landscaping works to the rear garden

4.7
Neighbouring Properties

The site is in a built-up area. To the north of the property the original building was damaged by bomb blast and has been replaced by a 1950s Grade II listed small block of flats. The properties to the immediate east and west appear to be of the same age and construction as no.13

To the south are the gardens of no. 10 Prince Albert Road.

From a visual inspection, 13 Regents Park Road and its neighbouring buildings appear to be in good condition with no evidence of movement or subsidence.

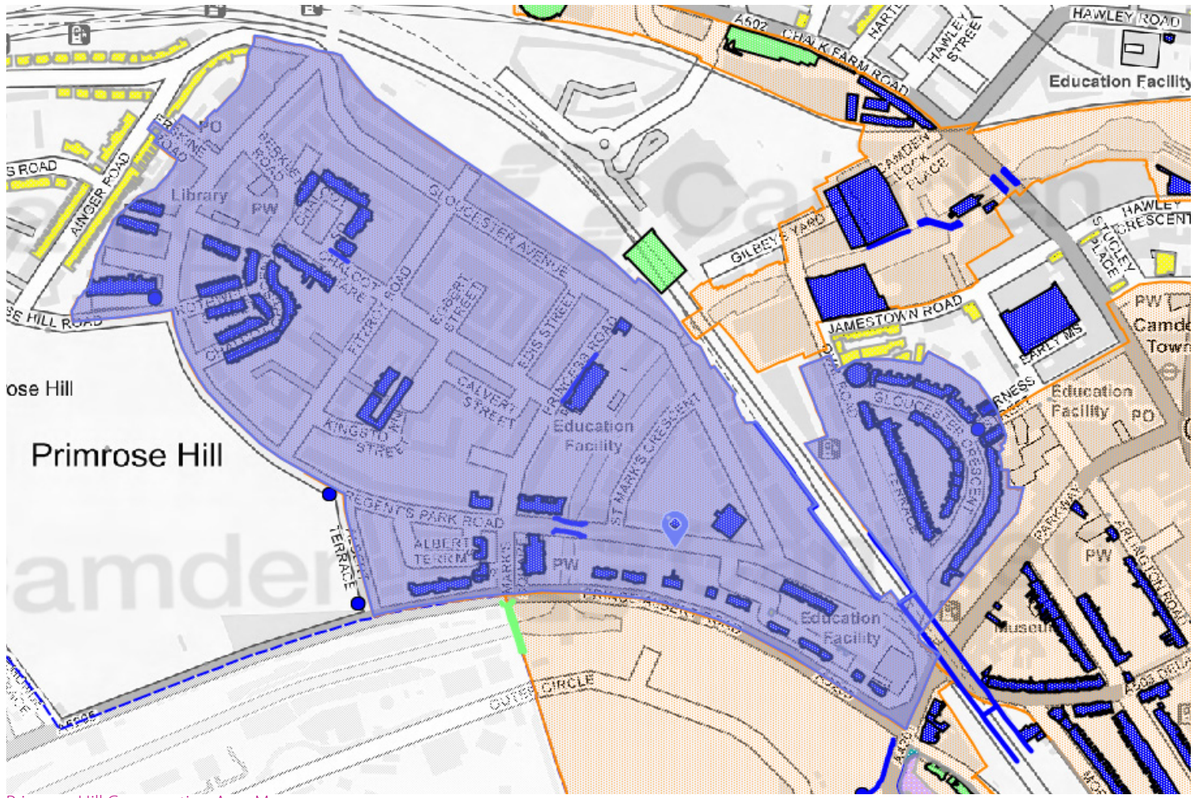
4.8
Underground features

A TFL asset search shows there are no recorded underground tunnels in the vicinity of the property with the nearest being the Northern Line running across to the north-east approximately 0.5km away between Chalk Farm and Camden Town.

The below ground drainage appears to culminate in a manhole at lower ground floor level under the main entrance stairs. As this is the final gravity fed manhole before the public sewer, the floor level in this area is limited by the drainage pipe invert level

Existing Beam and Joist Strengthening

Existing Manhole in Undercroft



Primrose Hill Conservation Area Map

The Proposed Development

5.1
Superstructure

There are to be some internal refurbishment to the existing ground and lower ground floors to allow for a reconfiguration of the spaces. This will involve the removal of some loadbearing elements that will be replaced by steel beams and columns. The internal stairs are to be reconfigured to facilitate the proposals, along with the lowering of some areas of the lower ground floor.

5.2
Subterranean Extension

A single storey extension is to be contstructed in the front lightwell to provide a utility area and a steam room. The floor level will be lower than the existing lower ground floor to provide a new lightwell into the proposed basement

RETAINING WALLS

The existing boundary wall will be demolished to allow a new reinforced concrete retaining wall to be constructed along the boundary line. Due to the proximity of the footpath, the wall will be constructed in 1m sections in an underpinning style sequence to avoid any undermining.

The wall will be designed as propped by the slabs at the top and bottom, requiring temporary propping in the temporary case until these are formed.

FLOOR

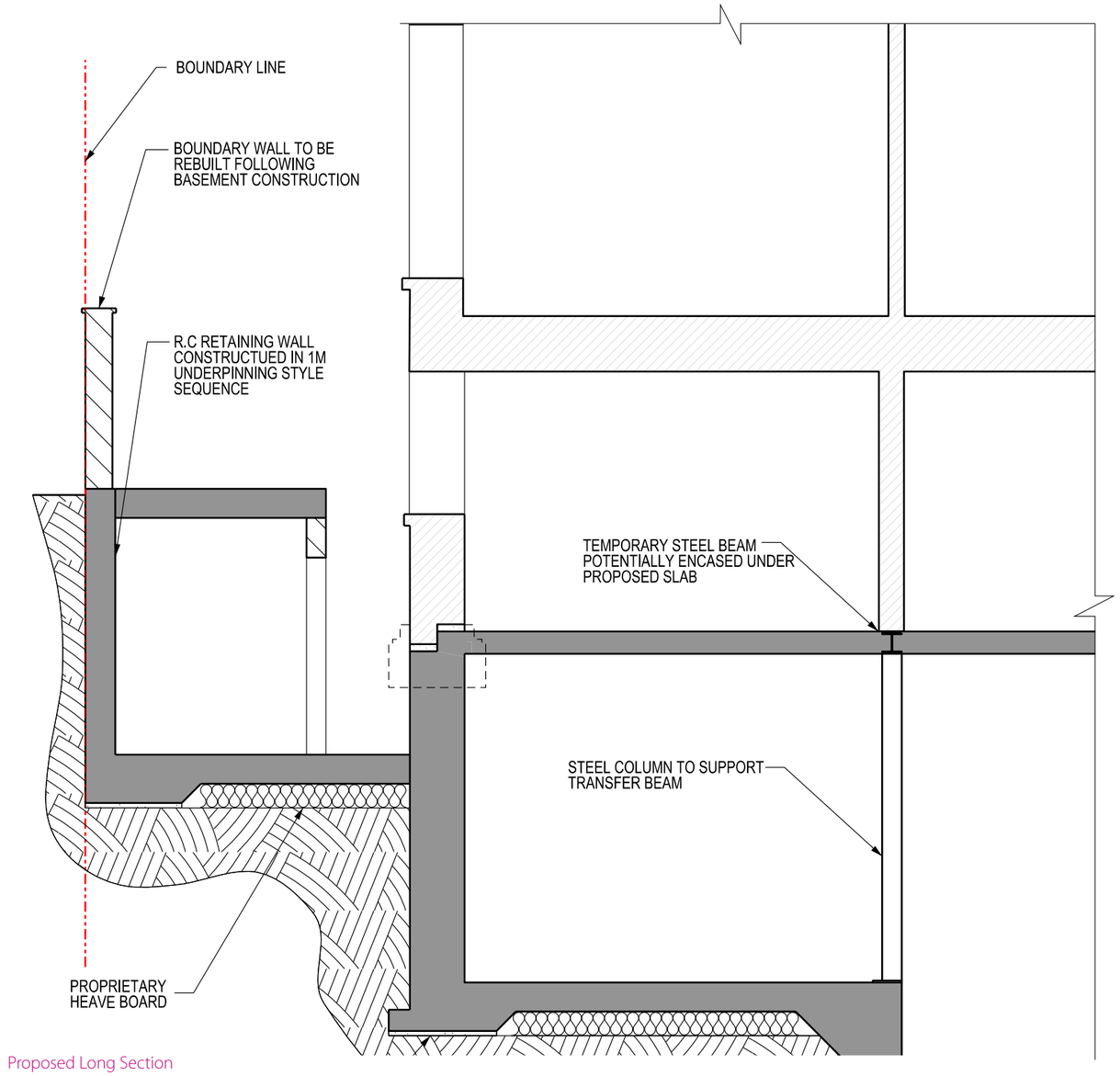
The new extension floor will comprise an RC slab, also constructed in sections to coincide with the retaining wall. It is envisaged that this slab will be suspended between a thickening along the boundary line and the proposed basement to avoid a surcharge the basement retaining wall.

ROOF

Since the retaining wall requires propping at the top, the roof slab will also comprise a reinforced concrete slab to act as a restraint. This will be designed to transfer the lateral loads to the return walls at either end of the extension.

WALLS

The wall facing the lightwell will be designed to take the weight of the RF roof slab. This could comprise either a masonry wall build-up or an RC wall/frame depending on the contractors preferred methodology.



Proposed Long Section

The Proposed Development

5.3
Basement

The proposal is to form a 4.5m deep basement under the majority of the existing building footprint. The front and rear retaining walls align with the existing external walls above, the southern wall is aligned with side elevation of the house at first floor and Northern wall steps in away from the party wall line after the stairwell.

LOWER GROUND FLOOR

The existing lower ground floor will be lowered by approximately 340mm to improve the floor to ceiling heights, which are currently restrictive. A new 250mm RC suspended flat slab will be formed at a lower level. The slab will span onto the new perimeter walls and act as a diapragm restraining the tops of the retaining walls.

The existing spine wall is to be resupported in the permanent case by the new floor structure. However in the short term a steel beam may be required to transfer the load during excavation, which could be cast into the new lower ground floor slab.

NEW BASEMENT FLOOR

The new basement slab will be suspended between slab thickening along the perimeter.

Due to the presence of clay below the Made Ground, the excavation of the basement has the potential to cause heave to the basement slab. A proprietary compressible void former will be used under the suspended basement slab to accommodate this withough overstressing the slab.

Internally, a column will support the new transfer beam above and take the load to thickening integral to the slab.

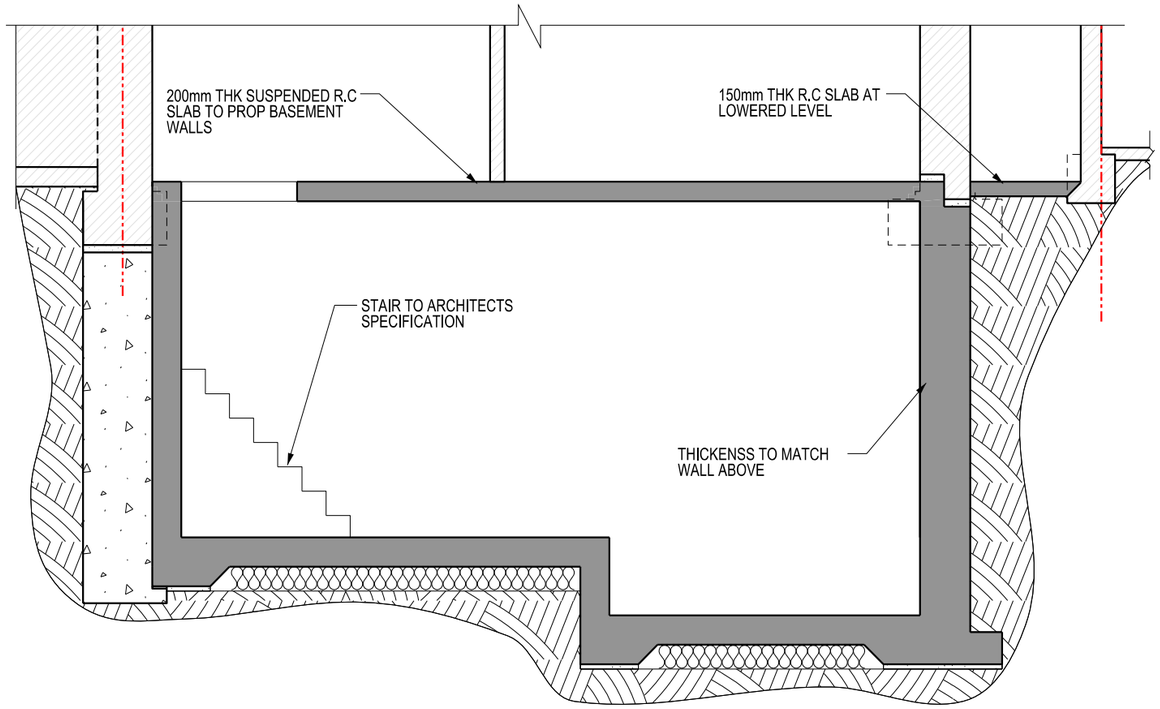
RETAINING WALLS

The party wall with 15 Regents Park Road will require underpinning to transfer the vertical load to the lower level and avoid surcharging the new walls. This will be formed in a sequence to ensure support is always provided to at least two thirds of the wall. The new retaining wall will then be constructed infront to resist the lateral earth pressures as shown below.

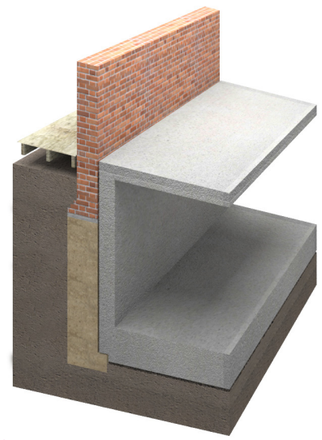
The rest of the retaining walls will be formed in 1m reinforced underpins cast in sections. These RC elements act as propped cantilever retaining walls, restrained by the lower ground and basement slab levels.

The walls will be a minimum 250mm thick, but in the majority of cases will match the thickness of the masonry walls above, to avoid corbelling details and simplify construction.

Only localised seepages of groundwater were found in the borehole investigations, however the basement retaining walls will be conservatively designed for the presence of water.



Proposed Short Section



Party Wall Detail

Site Investigations

6.1
Geotechnical Investigation

GEA were appointed to carry out a geotechnical investigation of the site including trial pits and 10m borehole

Trial pits were dug by hand to establish position, size and depth of existing foundations

The soil was tested using in-situ SPT and Hand Shear Vane tests. Samples were collected and used in laboratory tests.

The key conclusions were:

- The ground conditions are 1.2m Made Ground / over London Clay Formation becomming stiffer at depth to at least 10m deep.
- The borehole was monitored for groundwater and found to be dry.
- Heave protection is required due to high plasticity and high volume change potential.
- The allowable bearing pressure at formation level is 160kN/m2 at 3m BGL
- The concrete design class is DS3 / AC-2s for foundations in the weathered London Clay Formation.

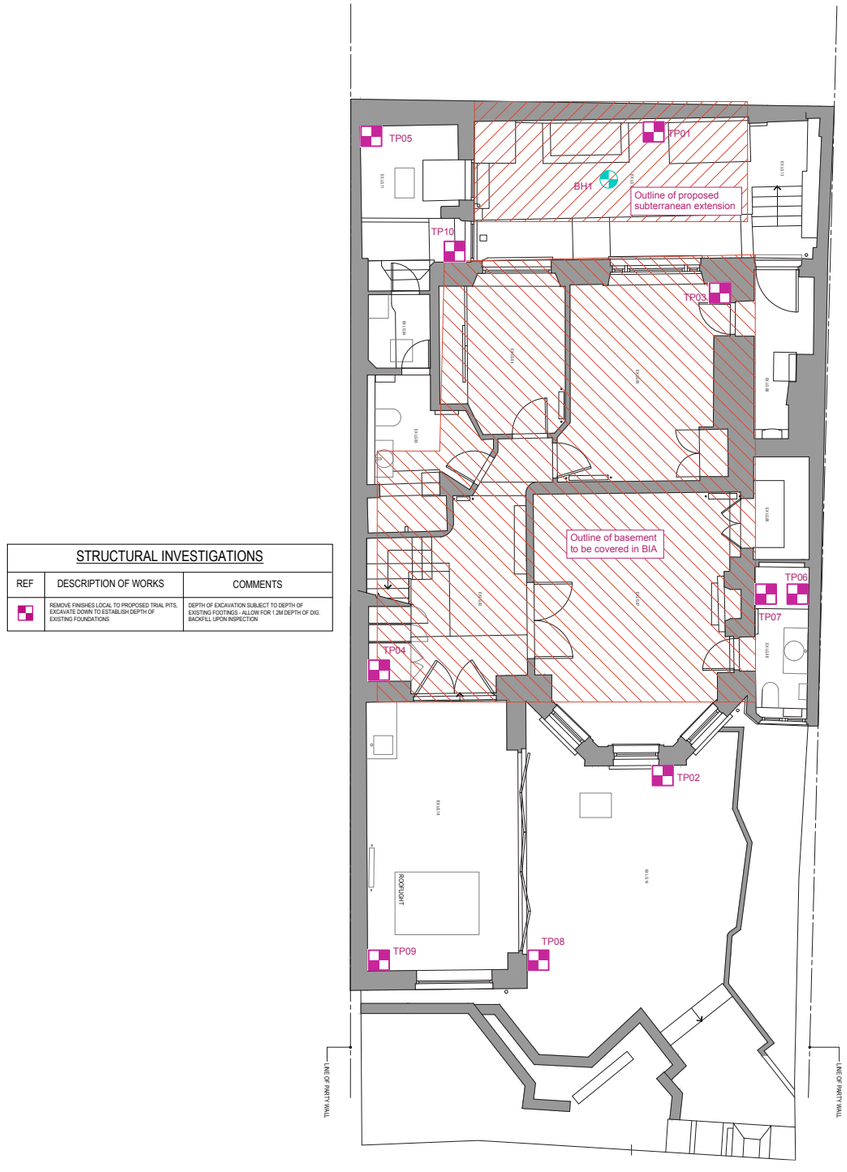
Please refer to appendix B for GEA's detailed report

6.2
Aboricultural Report

Southern Beeches Ltd's carried out an initial survey to log the surrounding trees which may have an impact on the basement design.

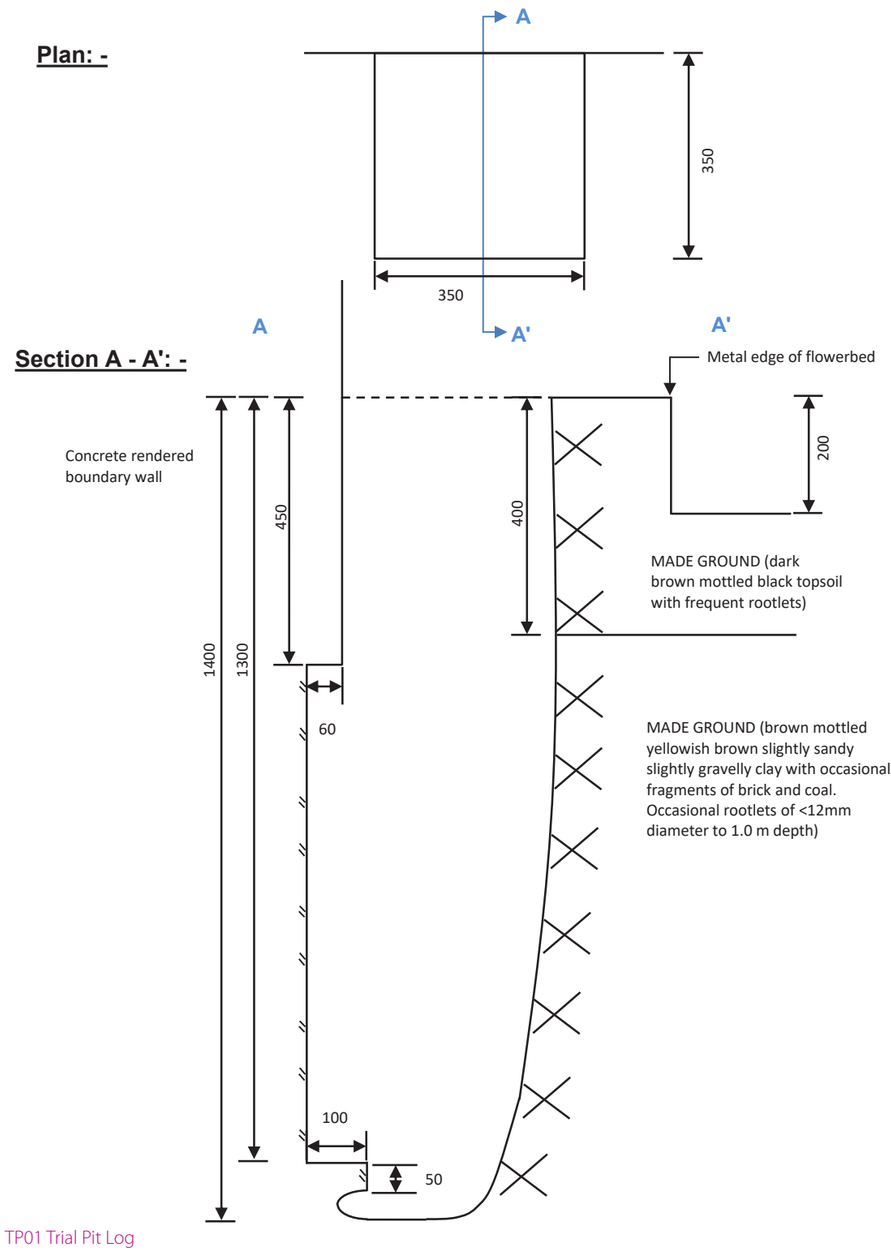
TP01 found that the existing boundary wall foundations were over 1.3m below pavement level. This is likely to have modified the tree roots zone and thus will have a reduced impact on the basement design.

See appendix C for Southern Beeches Ltd's tree survey



STRUCTURAL INVESTIGATIONS		
REF	DESCRIPTION OF WORKS	COMMENTS
	REMOVE FINISHES LOCAL TO PROPOSED TRIAL PITS. EXCAVATE DOWN TO ESTABLISH DEPTH OF EXISTING FOUNDATIONS	DEPTH OF EXCAVATION SUBJECT TO DEPTH OF EXISTING FOOTINGS - ALLOW FOR 1.2M DEPTH OF DIG. BACKFILL UPON INSPECTION

Geotechnical Investigations Plan



TP01 Trial Pit Log

Construction Methodology

It is currently proposed that the construction of the basement is undertaken using a traditional underpinning sequence, with a bottom-up methodology.

The party wall will be underpinned in sequence with mass concrete, then propped in the temporary case until an RC lining wall is formed infront to retain the earth pressures.

The remaining existing external walls will be underpinned with reinforced concrete to act as retaining walls for the new basement. These will be formed in sections in the same underpinning style sequence whilst propping the walls throughout.

The basement slab will then be cast, with perimeter thickenings to support the walls above and allow the slab to be suspended between them. The lower ground floor slab will then be installed, after which the propping will be removed.

CONSTRUCTION GENERALLY

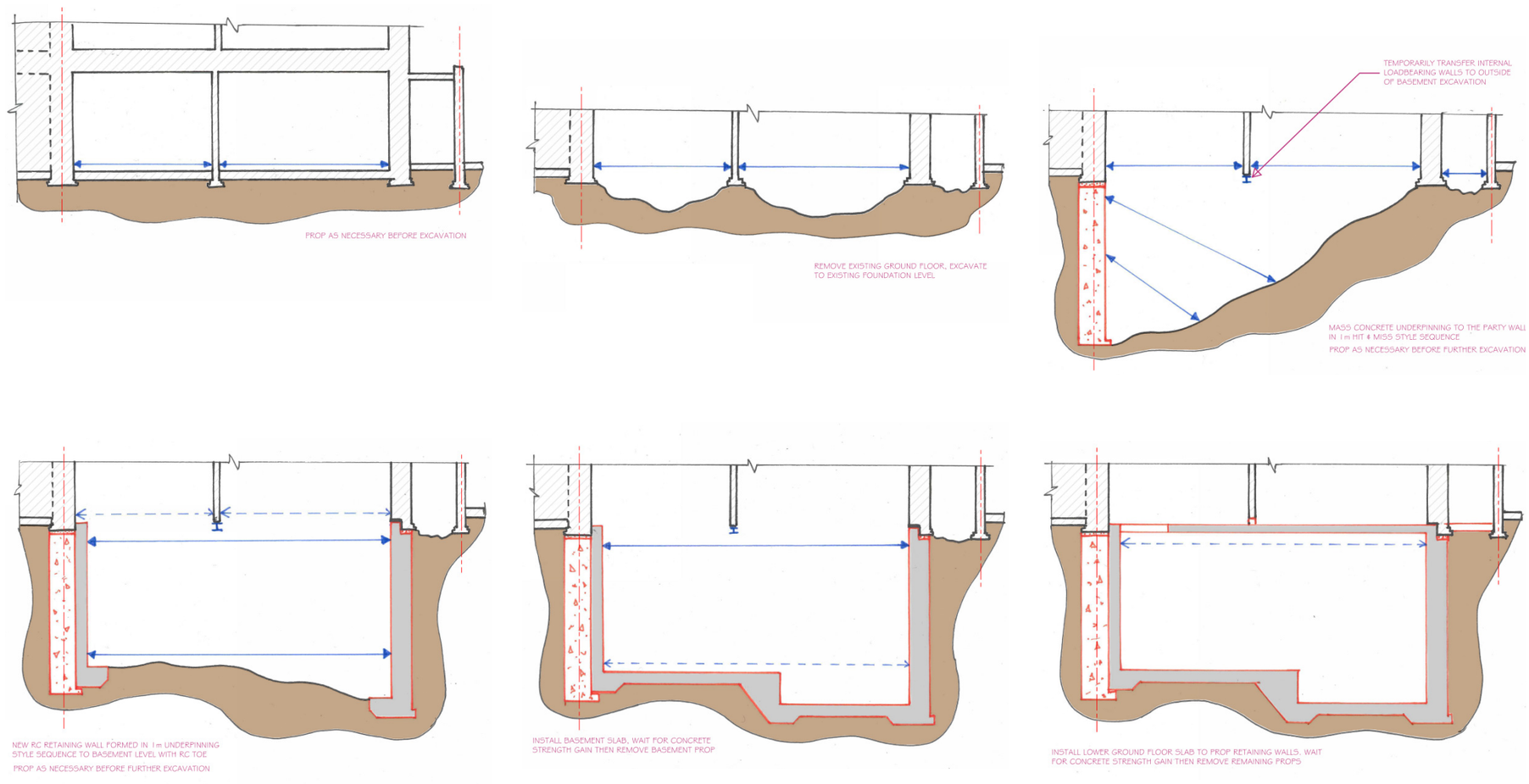
The works are required to be undertaken in accordance with all statutory legislation relating to construction works.

The Contractor will be required to demonstrate a positive attitude and commitment toward minimising environmental disturbance to local residents and will be required to be registered with the Considerate Contractors Scheme.

Noise, dust and vibration will be controlled by employing Best Practicable Means (BPM) as prescribed in the following legislative documents and the approved code of practice BS 5228:

- The Control of Pollution Act 1972
- The Health & Safety at Work Act 1974
- The Environmental Protection Act 1990
- Construction (Design and Management) Regulations 1994
- The Clean Air Act 1993

General measures to be adopted by the Contractor to reduce noise, dust and vibration.



Construction Methodology Sketches

Surrounding Structures

8.1
Ground Movement Assessment

According GEA's investigative report; the basement excavation will result in a differential net unloading of around 85kN/m^2, which will result in differential heave of the underlying London Clay.

This will comprise immediate elastic movement, which will account for approximately 40% of the total movement and be expected to be complete during the construction period, and long term movements, which will theoretically take many years to complete.

A quantative assessment of the potential ground movements arising from the basement excavation and construction will need to be carried out during the construction design.

Soil parameters and ground assessment as stated in the ground investigation report should be referenced.

Please refer to appendix B for GEA's detailed report

8.2
Control of Construction Works

The neighbouring properties and their adjoining retaining walls are assumed to be of traditional load bearing masonry with timber floor construction

Post-planning, as part of the party wall process, a more detailed structural inspection of the adjacent properties including internal inspections will be undertaken prior to completing any detailed designs.

PARTY WALL CONSIDERATIONS

The works comprise the excavation for a single storey basement within close proximity of adjacent properties. These works will fall under The Party Wall etc. Act 1996.

The structural scheme adopted has been designed with due regard to maintaining the structural stability and integrity of neighbouring buildings & structures and surrounding land. The method of construction has been developed to ensure that lateral deflections, and associated ground movements, are kept within acceptable limits during and post construction.

ADJACENT BUILDINGS

It is unclear whether the adjacent neighbouring buildings have basements of their own. Conservatively, it has been assumed that no basements exist nearby and therefore the maximum amount of excavation and retention has been considered.

MONITORING OF NEIGHBOURING PROPERTIES

The category of damage to adjacent buildings, as classified under Burland et al, anticipated from the proposed construction of the new basement is expected to be category 1 or less . The Contractor will be required to monitor ground movements during the works to check the validity of the ground movement analysis and the performance of the temporary works and working methods. A 'traffic light' system of green, amber, red trigger values will be set with specific Contractor actions set against each trigger values.

The monitoring method is to be developed further during detailed design but may take the form of precise levelling, geospatial surveying, crack width gauges, strain gauges, inclinometers, or extensometers or a combination of these methods. The monitoring will be undertaken prior to demolition and continue through to completion of the structure.

SUPERVISION OF WORKS

The construction of the basement will be montored at key stages by a suitably qualifed engineering professional.

Detailed contractor temporary works methodologies and calculations for all major elements of the works will be produced by the contractor and reviewed by this qualifed person prior to any works taking place.

TRAFFIC LIGHT	TRIGGER VALUE (mm)	CONTRACTOR ACTION
Green	<8	No action required
Amber	8-12	Notify the CA and Party Wall Surveyor(s). Increase frequency of monitoring. Implement contingency measures if movement continues.
Red	>12	Notify the CA and the Party Wall Surveyor(s). Implement measures to cease movement and stop work.

Indicative Ground Movement Trigger Values

Appendix A

Structural Drawings