LMB GEOSOLUTIONS LTD

BASEMENT IMPACT ASSESSMENT

53 GLENMORE ROAD, LONDON NW3

August 2017

DOCUMENT RECORD

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	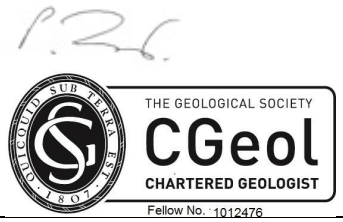

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TABLE OF CONTENTS

Contents

INTRODUCTION

Introduction

AUTHORISATION

LMB Geosolutions Ltd (LMB) was instructed Martin Arnold Ltd (Construction Consultants) on behalf of Central and Cecil (the Client) in February 2017 to complete a Basement Impact Assessment in relation to the proposed development at 53 Glenmore Road, London NW3 4DA (the Site).

PROJECT AND SITE DETAILS

Site Address	53 Glenmore Road, London NW3 4DA (the Site). A Site Location Plan is provided as **Figure 1**.
Proposed Development	The site comprises a three storey (including roof) residential terrace property with a cellar. It is understood that the Client wishes to redevelop the existing four storey terrace property into 4no. residential apartments, with the existing cellar being extended and deepened. The Construction Consultants suggest that an excavation of c. 985mm will be required to achieve a ceiling height in the cellar of 2.40m. A development schematic is provided in **Appendix A**.
Previous Assessments	LMB has completed the following report in relation to the site and propose development: • LMB Ground Investigation & Assessment. 53 Glenmore Road, London NW3 (ref. LMB.17.03.23_REPPIL_GI_53 Glenmore_v1.0, dated March 2017)

AIMS & OBJECTIVES

The information in this document aims to provide details of the local hydrological, geological and hydrogeological conditions beneath the site in the context of completing a Basement Impact Assessment suitable to support the planning application for the basement element of the proposed development.

SCOPE OF WORKS

The following scope of works has been completed:

- an appraisal of the geological and hydrogeological conditions based on the ground investigation data and desk based literature information;

  - consultation with potential below ground asset holders (e.g. Transport for London, Crossrail etc) to ascertain if the proposed basement development is in proximity to any of their below ground assets;
  - an appraisal of potential land contamination issues based on the ground investigation data environmental search data (Landmark Envirocheck report);
  - an appraisal of the hydrological conditions at the site based on literature information.
- A screening and scoping assessment in an appropriate form for submission to the London Borough of Camden (LBC).
- An appraisal of the potential impacts and provision of suitable mitigation measures.

CONTRIBUTORS

This report has been compiled by Philip Lewis, a hydrogeologist and chartered Geologist with over twenty years' experience as a geoscience professional, including over fifteen years' experience as a professional adviser (consultant) in hydrogeology, engineering geology and contaminated land.

Further specialist input has been provided in the form of a Flood Risk Assessment completed by Edward Bouet (Senior Flood Risk Consultant) and a Ground Movement Assessment completed by Corrado Candian (CEng, MICE).

LIMITATIONS

LMB has prepared this report solely for the use of the named Client and those parties with whom a warranty agreement and/or assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from LMB and the Client.

LMB accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) issue of this document to any third party with whom an agreement has not been executed.

The risk assessment and opinions provided, among other things, take in to consideration currently available guidance and best available techniques relating to acceptable contamination concentrations and interpretation of these values. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, if applied.

Baseline Data & Criteria

INTRODUCTION

This section provides the baseline (desk study) data used to complete the Basement Impact Assessment (BIA) in relation to the proposed development. Reference information used for this purpose is outlined below:

- British Geological Survey – 1:50,000 Geological Sheet 256, North London (Solid & Drift);
- British Geological Survey borehole archive records.
- Environment Agency Groundwater Vulnerability Mapping (1:100,000 series) Sheet 40, Thames;
- Environment Agency Internet database (www.environment-agency.gov.uk);
- River Basin Management Plan (RBMP). Thames River Basin District (2009);
- Barton, N.J. (1982). Lost Rivers of London.
- London Borough Camden Flood Risk Management Strategy (2013).
- URS (2014). London Borough of Camden Strategic Flood Risk Assessment.
- Halcrow (2011). London Borough of Camden Surface Water Management Plan.
- Landmark Envirocheck Report (ref. 115513363_1_1, 24th February 2017).

Guidance and Frameworks

The proposed development is located in the London Borough of Camden (LBC) and the guidance and policies outlined in the following documents are considered to be relevant:

- Camden Planning Guidance: Basements and Lightwells (CPG 4); and
- LBC: Camden geological, hydrogeological and hydrological study Guidance for subterranean development (Issue 01, November 2010).

The above documents provide information and a framework for undertaking a BIA within LBC. In summary, the key aim of the documents is to ensure that basement and underground development is only permitted where it does not:

- cause harm to the built and natural environment and local amenity;
- result in flooding; or
- lead to ground instability.

LBC require that a submission for a proposed basement development should include information relating to the above within a BIA which is site and development specific to the site.

BASELINE DATA & CRITERIA

About this Assessment

In the context of this assessment greatest emphasis has been placed on the requirements highlighted above relating to potential impacts on drainage, flooding from all sources, groundwater conditions and ground stability.

In accordance with the referenced guidance this report includes the following elements:

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

Regulatory Consultation

LBC Planning

The Construction Consultants consulted with LBC in November 2016 to gain pre-planning advice with a view to gaining an insight into the requirements for the proposed development. A pre-planning advice response was received on 30th November 2016 (ref. 2016/6039/PRE).

The pre-planning advice confirms that a Basement Impact Assessment is required in accordance with Camden guidance documents.

Copies of the correspondence are included in **Appendix B.**

SIGNIFICANCE CRITERIA

The assessment of potential effects from the proposed development has taken into account both the construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change due to the development proposals and the sensitivity of the effected receptor/receiving environment to change, as well as a number of other factors.

Assessment criteria developed from the guidance and frameworks referenced have been used to determine the significance of the potential effects as a result of construction and operation of the proposed development.

The significance of potential effects has been determined by considering the magnitude of the effect, in terms of a change in existing baseline conditions.

Significance Measures

The following terms have been used to define the significance of the effects identified:

- **Major effect**: where the proposed development could be expected to have a very significant effect (either positive or negative) e.g. significant risk of flooding effect, an improvement in water quality class, allowing

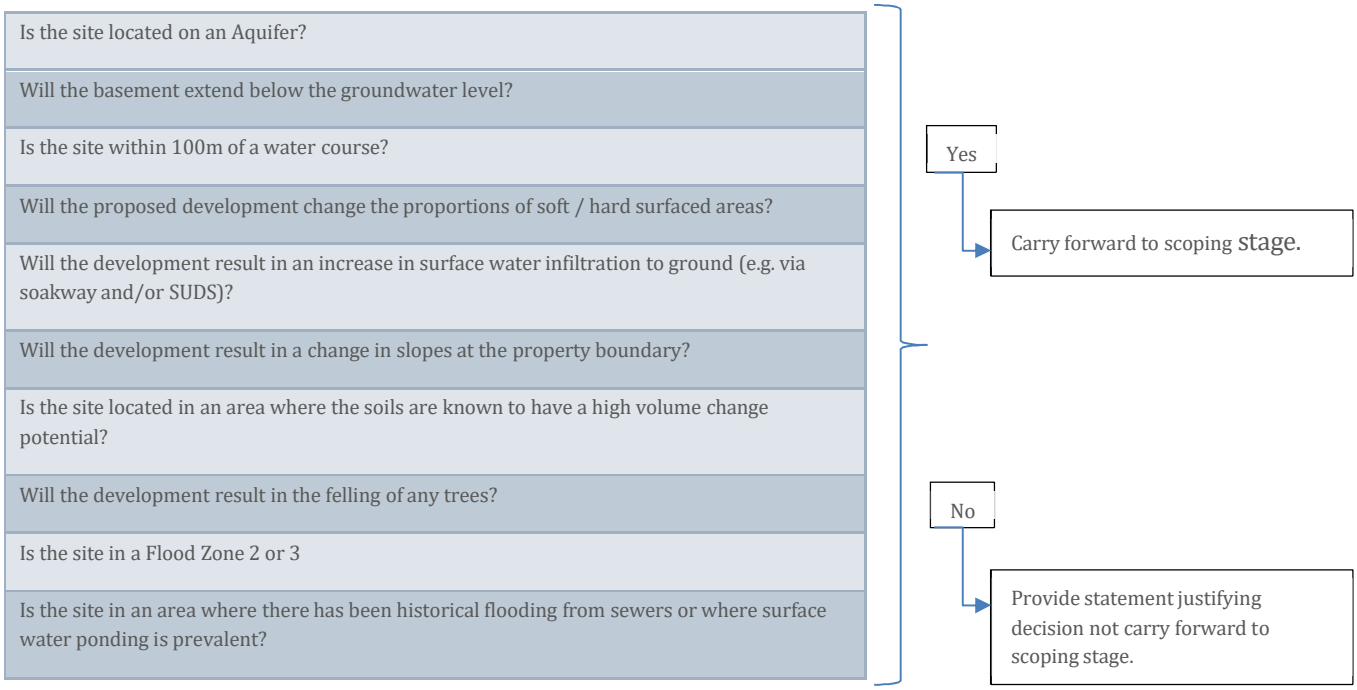
new uses to be made of the water resource (e.g. potable water supply) or impacts from contamination issued e.g. risk to groundwater or future site users;

- **Moderate effect**: where the proposed development could be expected to have a noticeable effect (either positive or negative) e.g. moderate flooding effect;
- **Minor effect**: where the proposed development could be expected to result in a small, barely noticeable effect (either positive or negative), but where current uses could still be maintained; and
- **Negligible**: where no discernible effect is expected as a result of the proposed development.

Screening Assessment

The information presented within the LBC guidance provides decision-making matrices to enable an initial screening assessment to be made in relation to potential impacts and issues related to proposed basement development.

The matrices specifically focus on Land Stability, Groundwater Movement and Surface flow and Flooding. An example of the type of matrix is presented below:



Baseline Conditions

General

A formal Preliminary Risk Assessment (desk study) for the site has been undertaken and is presented within the following report:

- LMB Ground Investigation & Assessment. 53 Glenmore Road, London NW3 (ref. LMB.17.03.23_REPPIL_GI_53 Glenmore_v1.0, dated March 2017).

It is assumed that persons reading this report are familiar with the findings of the above referenced report.

This section of the report uses **desk study** and site specific data to present the current conditions at the site (i.e. pre development) to enable a baseline to be established that can be used to predict the likely impact of the basement post construction.

SITE ENVIRONMENTAL SETTING

Relevant information relating to sites environmental setting, founded on desk based information and in the context of this assessment is summarised in the table below:

Site Description & Site Walkover	A representative of LMB completed a site walkover survey on Monday 13th February 2017 that included internal and external areas. **Please refer to LMB Ground Investigation & Assessment. 53 Glenmore Road, London NW3 (ref. LMB.17.03.23_REPPIL_GI_53 Glenmore_v1.0, dated March 2017) for a photographic record.** The site currently comprises the ground floor of a three-storey residential terrace building with cellar and front and rear gardens. The cellar can be accessed from the front garden area and from the internal area of the site. A pruned mature tree is present in the front garden area with the rear garden comprising a small patio and intended lawn with some fir trees at the rear boundary. In addition, reference to the London Borough of Camden website indicates that permission was granted in 2001 to fell a Chamaecyparis tree in the front garden. During the walkover, the existing building and boundary walls were inspected to note any indicators of possible structural damage e.g. cracks. Some minor cracking of paintwork and/or brickwork was observed on the external walls at the front and rear and on the interior walls of the basement area and front room of the ground floor.

BASELINE CONDITIONS

	There was evidence that basement extensions have been undertaken in a number of the neighbouring properties. The site is located on a residential street that slopes gently from north east to south west with a number of immature and mature trees located on the pavement. No obvious sources of potential contamination were observed during the site reconnaissance survey. The site is surrounded by residential properties with the various shops and amenities of Haverstock Hill located approximately 150m north east. Belsize Park London Underground (LUL) Station is located approximately 220m north east of the site.
Geology & Aquifer Designations	Reference to British Geological Survey (BGS) Map 256 (North London) and accessible information contained on the Environment Agency (EA) website indicates that the following geological units and aquifer designations are present at the site: • London Clay Formation (Unproductive Strata). Information within the Envirocheck report indicates that the site is located approximately 400m south east of an area susceptible to groundwater flooding. This area is likely to relate to the outcrop of the Claygate Member beds to the north west, which are not thought to outcrop or sub-crop beneath the site. In addition, it is possible that Alluvium associated within a culverted water course (see below) could outcrop at or near to the site. The geological sequence progresses with depth into the Lambeth Group (Secondary A Aquifer), Thanet Sands (Secondary A Aquifer) and Chalk (Principal Aquifer).
Hydrology	Reference to information on local mapping, the EA website and within the UK Hydrometric Register indicates that there are no surface water features within a 500m radius of the site. The closest known surface water features are Hampstead Ponds approximately 800m north. Reference to *Lost Rivers of London* (Barton, N.J, 1982) indicates that one of the branches of the former River Tyburn is located approximately 20m west-south-west of the site. This is confirmed by information within the Envirocheck report which highlights the presence of an extended culvert. Information relating to the Thames region within the UK Hydrometric Register indicates that the average annual rainfall in the region is 710mm. Publicly accessible information contained on the EA website indicates that the site is not located in an area at risk of flooding from rivers and sea.

	The information on the EA website also suggests that the property is located in an area with a low to medium risk from surface water flooding. However, it is not shown in CPG4 as one of the streets at risk of surface water flooding.
Resource Potential & Ecological Sensitivity	The groundwater in the London Clay Formation is designated Unproductive Strata and as such is not characterised as a groundwater body within the relevant River Basin Management Plan (RBMP). In addition, the Site is not located within an EA designated Source Protection Zone (SPZ). There are no surface water courses within 500m of the site that are included the within the relevant River Basins Management Plan (RBMP, Thames).

BELOW GROUND ASSETS

As part of the assessment the following organisations were contacted to ascertain if they held any below ground assets below or in close proximity to the site:

- Network Rail;
- Crossrail;
- London Underground Ltd / Transport for London.

Responses have been received from London Underground and Crossrail confirm they do not hold any below ground assets in the vicinity of the site. A response from Network Rail has not been received to date.

Copies of correspondence are included in **Appendix C**.

CAMDEN PLANNING PORTAL

A search of planning applications on the LBC website has been completed to review any existing and proposed development at and in the vicinity of the site.

The following planning decisions related to basement construction were identified:

- 51 Glenmore Road: *Details pursuant to condition 3 (appointment of structural engineer) of planning permission dated 02/04/12 (2012/0964/P) for the excavation of enlarged basement including enlargement of front basement light well and installation of staircase from light well to ground floor level all in connection with existing dwelling house (Class C3).*
- 49 Glenmore Road: *Excavation to create enlarged basement with window at front basement level, plus an enlarged front basement lightwell with staircase, to provide additional residential floorspace to existing dwellinghouse.*
- 57 Glenmore Road: *Variation of condition 3 (development built in accordance with approved plans) for minor material amendments to planning permission dated 02/08/11 (2011/2403/P) for the erection of*

ground floor level infill extension within the rear passageway, replacement of rear double doors with metal-framed doors and alterations to steps and landing to the front lightwell, namely alterations to the doors and windows at front basement level and rear ground floor level.

- 20 Glenmore Road: *Excavation to create enlarged basement with alterations to front lightwell, erection of single-storey infill extension at rear ground floor level (adjacent to closet wing) and single-storey conservatory all in connection with existing dwellinghouse (Class C3).*
- 18 Glenmore Road: *Additions and alterations to dwelling house at basement level including deepening of front lightwell.*

SUMMARY OF SITE & SURROUNDING HISTORICAL LAND USES

In addition, an appraisal of the historical site and surrounding land uses has been undertaken based on a review of historical maps.

The historical maps reviewed suggest that the site comprised open land and was part of the grounds of Belsize Park until c. 1915 when Glenmore Road was constructed and the site was occupied by the current terrace property.

The historical plans suggest that development of the surrounding land was generally coincidental with the site development. However, the residential developments along Belsize Grove and Belsize Park Gardens to the east and south commenced earlier (c. 1890s).

Mass residential development in the area occurred in the mid 1930s and a 'tank' (approximately 250m eas north-east) was recorded on historical plans c. mid 1950s.

ENVIRONMENTAL DATA

The table below provides a summary of the environmental data for the site and surrounding area such as regulatory permitting, local land uses and trade entries etc.

The data is based on a review of publicly available data on the EA website and information contained within the Envirocheck report.

Item	On Site	0 – 250m	Details
Local Authority Pollution Prevention Controls	0	2	These relate to two dry cleaners located approximately 200m north east of the site.
Contemporary trade entries	0	19	Of these entries 15no. are inactive and include furniture manufacturing, stationary manufacturing, cleaning services, boiler repair services and dry cleaners. The active entries

			include cleaning services (approx. 140m S), dry cleaners (approx. 200m NE) and garage services (approx. 250m SE).

SUMMARY OF POTENTIALLY CONTAMINATIVE LAND USES

A summary of potentially contaminative current and historical land uses has been completed through review of historical plans and the site specific Envirocheck report (ref. 115513363_1_1, 24th February 2017):

- Information within the Envirocheck report suggests there are no contaminated land register entries within 1km of the site;
- Information within the Envirocheck report suggests there are no pollution incidents, industrial pollution sites (legislated via Integrated Pollution Prevention and Control) or landfills (current and historical) recorded within 250m of the site.
- Information within the Envirocheck report indicates that a Petrol Filling Station (PFS) is located approximately 340m north and there is a record of radioactive substances licensed to the Royal Free Hospital approximately 510m north of the site.
- The nearest active trade entries are >140m from the site. Active and inactive entries for dry cleaners are potentially contaminative but given the distance from the site and the low permeability of the sub-surface geology (London Clay), potential impacts on the site and development are not anticipated.
- The review of historical land uses suggests that it was primarily open land prior to residential development and potential impacts on the site and development from historical land uses are not anticipated.

LOCAL HYDROLOGY, GEOLOGY & HYDROGEOLOGY

Local Hydrology

As outlined, the site is not shown to be located in a Flood Risk Zone and the closest known surface water feature (Hampstead Ponds) is 500m from the site. However, the property is located in an area with a low to medium risk from surface water flooding.

Reference to the Envirocheck report and *Barton, NJ* (Lost Rivers of London) indicates that the site is approximately 20m west south-west of one of the tributaries of the River Tyburn (now culverted).

The local area is primarily urban (residential) and as such the majority of surface water run-off is likely to be directed to the surface water (and possibly combined) drainage system. However, where rear gardens exist and areas of green space (such as Hampstead Heath to the north), rainfall run-off to drains is likely to be reduced and taken up by evapotranspiration and the soil moisture deficit, with the remainder potentially infiltrating to ground (although this may be more limited in areas where the London Clay outcrops due to its low permeability).

BASELINE CONDITIONS

The site primarily comprises hard surfacing but there are areas of soft landscaping and paving within the front and rear garden areas. On this basis, it has been assumed that currently the majority of rainfall run-off is directed to the local drainage system with some potential infiltration in the front and rear gardens.

Local Ground & Groundwater Conditions

The ground investigation works were undertaken on 3rd March 2017 and comprised the progression of 1no. borehole to a depth of 8.00m bgl using a modular dynamic (windowless) sampler rig and completion of 3no. hand excavated trial pit, with sampling of soil for laboratory testing.

The table below provides a summary of ground conditions encountered with full descriptions provided in the associated exploratory hole logs (ref. LMB.17.03.23_REPPIL_GI_53 Glenmore_v1.0, dated March 2017):

Strata	Depth Range to Top (m bgl)	Depth Range to (Base (m bgl)	Summary Description
Made Ground	Ground Level	0.50 – 0.95	The ground surface in the existing cellar area was found to comprise concrete hardstanding. In external areas, the ground surface was found to comprise floor pavers and soft surfacing (soil). The Made Ground soils were generally found to comprise gravelly, clayey sand and sandy clay with varying proportions of brick, brick cobbles and concrete.
London Clay Formation	0..50 – 0.95	8.00(1)	In the borehole, the London Clay was found to comprise an upper weathered surface (0.65m) of soft to firm clay which in turn overlies frim becoming stiff closely and very closely fissured clay.

(1) Base of the London Clay was not determined.

Groundwater monitoring was undertaken following completion of site works on 15th March 2017.

No groundwater was observed during the site investigation works but groundwater was recorded at a depth of 5.66m bgl during return monitoring.

Recording of groundwater in monitoring installations constructed within the London Clay is common. However, rather than being representative of a permanent and laterally continuous aquifer unit, the groundwater is present as discrete units within (for example) micro fissures and local mudstone horizons and the recorded groundwater level will most likely be reflective of the pore water pressure in these discrete features.

BASELINE CONDITIONS

Soil Infiltration

The London Clay Formation in this area comprises low permeability clay soils and reference to the CIRIA SUDS Manual and BGS data confirms that coefficients of infiltration through these soils are very low.

Summary

The information provided in the above sections has been used to compile a summary of the local conditions which are presented in the table below:

Strata	Proven Thickness Range (m bgl) (1)	Depth to Groundwater (m bgl) (1)	Aquifer Designation	Infiltration Coefficient Range (m/d) (2)
Made Ground	0.95	None encountered	Not Applicable	-
London Clay Formation	7.05	5.66	Unproductive Strata	2.60E-04 to 2.60E-06

(1) Site data.

(2) British Geological Survey (BGS), WN97/27. (Forster, 1997). The Engineering Geology of the London Area & SUDS Manual.

Screening & Scoping Assessment

SCREENING ASSESSMENT

The decision-making matrices presented in the Screening Assessment below have been completed based on the information presented in the previous sections.

Groundwater Flow

Is the site located on an Aquifer?	No The ground conditions comprise Made Ground overlying London Clay. The London Clay Formation is designated Unproductive Strata.
Will the basement extend below the groundwater level?	No Groundwater was encountered in the London Clay Formation but it is designated Unproductive Strata and the recorded level is below the formation level of the basement.
Is the site within 100m of a water course, well or potential springline?	No There are no known surface water courses within 250m of the site. The site is located approximately 20m west south-west of one of the tributaries of the River Tyburn (now culverted).
Will the proposed development change the proportions of soft / hard surfaced areas?	No The extension and deepening of the cellar to form a basement will be beneath approximately 50% of the building footprint and none of the development will extend into external areas. As such the proportion of soft / hard surface cover will not alter following development.
Will the development result in an increase in surface water infiltration to ground (e.g. via soakaway and/or SUDS)?	No The site is located over relatively low permeability London Clay and surface water infiltration is unlikely to be a viable solution.
Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.	No There are no known surface water courses within 250m of the site.

Land Stability

Does the existing site include slopes, natural or manmade, greater than 7°?	No Observations during a site walkover and reference to proposed development schematics and information within Camden guidance (Figure 16) confirms that there are no slopes > 7°.
Will the proposed re-profiling or landscaping at the site change slopes at the property boundary to more than 7°?	No Reference to proposed development schematics confirms that there will be no slopes > 7° following development.
Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No Observations during a site walkover and reference to proposed development schematics indicates that there are no slopes > 7°.
Is the site within a wider hillside setting in which the general slope is greater than 7°?	No The site is located on the lowland section of hill falling from a high point near Parliament Hill approximately 1.5km to the north. However, reference to Camden guidance (Figure 16) confirms that there are no slopes > 7° in the wider area.
Is the London Clay the shallowest strata at the site?	No Made Ground deposits have been recorded to 0.95m bgl.
Will any trees be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	No There is no plan to feel trees to enable the development.
Is there a history of seasonal shrink swell subsidence in the local area and/or evidence of such effects at the site?	**Unknown** Visual evidence of cracking etc was observed on the existing structure. It was not clear whether this is associated with shrink/swell subsidence. The London Clay is known to have a high volume change potential on change of moisture content.
Is the site within 100m of a water course or potential springline?	No There are no known surface water courses within 250m of the site. The site is located approximately 20m west south-west of one of the tributaries of the River Tyburn (now culverted).
Is the site in an area of previously worked ground?	No Ground investigation identified <1.0m of Made Ground and no previous site uses such as 'old pit' have been identified.
Is the site within an aquifer?	No

	The ground conditions comprise Made Ground overlying London Clay. The London Clay Formation is designated Unproductive Strata.
Is the site within 50m of Hampstead Heath ponds?	No There are no known surface water courses within 250m of the site (including Hampstead Heath ponds).
Is the site within 5m of a highway or pedestrian right of way?	**Yes** Part of the site is within 5.0m of a pavement with a public highway beyond.
Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No There is an existing basement development at the adjacent property to the north east (no. 51) which is single storey and the proposed development is not anticipated to result in deeper foundation. There is an existing cellar in the adjacent property to the south west (no. 55) and the depth to foundation is likely to be lower. However, the proposed development will result in a maximum excavation depth of c. 985mm and as such there is not anticipated to be a significant increase in differential depth.
Is the site over any tunnels e.g. railway lines?	No Enquiries with assets holders have also been undertaken and to date Network rail have confirmed that they have no below ground assets in proximity to the site. Responses from Tfl and Crossrail are pending, but reference to local mapping and previous BIA in the area indicates that the site is not located over any rail tunnels.

Surface Flow and Flooding

Is the site within the catchment if the pond chains on Hampstead Heath?	No The site is >1km from the catchment.
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?	No Although the drainage design is not finalised, the development will not alter the external areas and drainage and surface water flow should not alter significantly.
Is the site within 100m of a water course, well or potential springline?	No There are no known surface water courses or springs within 250m of the site.
Will the proposed development change the proportions of soft / hard surfaced areas?	No The extension and deepening of the cellar to form a basement will be beneath approximately 50% of the building footprint and none of the

	development will extend into external areas. As such the proportion of soft / hard surface cover will not alter following development.
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?	No There are no proposals to alter the site drainage and surface water flows following development and there is not anticipated to be any significant alteration to the profile of inflows being received downstream of the site.
Is the site in an area known to be at risk from surface water flooding?	**Yes.** The site is not located in an area identified in CPG4 as being a 'primary' or 'secondary' area where historical surface water flooding has occurred. However, reference to the Envirocheck report and reference to the EA website indicates that the site is located in an area at a low to medium risk from surface water flooding.

Summary

Based on the Screening Assessment presented above, the following potential issues have been carried forward to the scoping stage of the assessment:

- The site is located in an area at a low to medium risk from surface water flooding.
- The London Clay is known to have a high volume change potential on change of moisture content and as such there is potential for seasonal effects.
- Parts of the site and proposed development are within 5.0m of a pavement with a public highway beyond.
- The proposed basement will extend over approximately 50% of the building footprint and will be single storey with a maximum excavation depth of c. 985mm. The depth to foundation is likely to be similar to the basement in No. 51 Glenmore Rd but slightly lower than in the existing cellar of no.55 Glenmore Road. Although the differential depth is not anticipated to be significant, this will be carried forward to the scoping stage.

SCOPING ASSESSMENT

The potential issues identified within the screening assessment are considered within the following scoping sub-sections:

Flooding & Drainage

The development will not result in a net increase in hard surfacing over the area of the site and given the relatively low permeability of the soils underlying the site, it is likely that infiltration to ground would be minimal.

The development is not anticipated to alter the site drainage and surface water flows or the profile of inflows being received downstream of the site.

The site is located in an area at a low to medium risk from surface water flooding and in accordance with LBC a Flood Risk Assessment has been completed under separate cover (ref. 87059-LMB-GlenmoreRd, March 2017).

Land Stability

The London Clay is known to have a high-volume change potential on change of moisture content and there is evidence of some minor damage to brickwork/render at the subject property. However, the anticipated formation level for the proposed basement development is approximately 2.80m bgl. This is within the firm to stiff London Clay and is likely to be beyond the depth profile of seasonal shrink/swell effects.

The site and proposed basement development are within 5.0m of a pavement in a relatively flat lying area and the existence of a basement (no.51) and existing cellar (no. 55) suggest the differential depth of foundations will not be significant.

However, the removal of overburden could result in inward yielding and the properties of the London Clay mean there is potential for short and long term heave. As such a Ground Movement Assessment (GMA) has been undertaken to appraise the potential impacts on neighbouring properties.

The GMA is provided in the following sections, with the calculation worksheets provided in **Appendix D.**

Details of the structural design and construction sequencing will be provided under separate cover within a Construction Method Statement and related documents.

Ground Movement Assessment

INTRODUCTION

There is the potential for ground movements due to the proposed development from the wall installation and from the excavation process.

The magnitude and extent of ground movements resulting from installation of a wall and excavation in front of such a wall are typically estimated based on the guidance given in the CIRIA publication C580 Embedded Retaining Walls – Guidance for Economic Design. The guidance in the CIRIA publication is based on the behaviour of embedded walls at numerous sites in London, which are predominantly walls embedded in London Clay, though typically with some near surface deposits consisting of for example River Terrace Deposits and Made Ground.

SUMMARY OF FOUNDATION PROPOSALS

The following information in relation to the proposed basement development and foundation solutions has been assumed:

- The basement will be single storey with a formation level of c. 2.80m below ground level.
- Traditional spread foundation underpins will be utilised and formed on the firm to stiff London Clay deposits.
- The foundation design has considered an allowable bearing pressure of 130kN/m^2.
- The basement support will be of high stiffness in both the temporary and permanent state.

In addition, it has been assumed that the excavation will be undertaken using the traditional method of underpinning formed in a 'hit and miss' sequence up to a depth of approximately 2.80m. An appropriate propping system will be utilised to provide high stiffness support.

To provide some basis of estimating likely movements and damage resulting from excavating the basement in front of the underpinning, and in the absence of underpinning specific guidance, the underpinned sections of the new basement have been treated as piles.

A Construction Method Statement will be produced under separate cover.

BUILDING DAMAGE ASSESSMENT

C580 provides curves estimating horizontal and vertical ground surface movements due to piled wall installation and to excavation in front of wall. Total ground movements resulting from the excavation will be the combination of the installation movements and the excavation movements.

The method provided within Box 2.5 in CIRIA C580 has been used to inform the assessment. CIRIA 580 curves were used to make a prediction of ground movement considering a high support stiffness wall.

GROUND MOVEMENT ASSESSMENT

Ground Movements – Wall Installation

The movements resulting from excavation in front of the underpins incorporate the movements resulting from the construction (i.e. installation) of the underpins, since, unlike for the piles, the construction process requires an excavation prior to the pins being formed. However, the analysis has conservatively adopted the values for 'installation of a planar diaphragm wall' to represent the installation of the underpins (Fig. 2.9a and Fig. 2.9b in CIRIA C580).

Ground Movements – Excavation in Front of Wall

Ground movements arising from excavation in front of wall have been based on Fig. 2.11a and Fig. 2.11b of CIRIA C580 assuming a high support stiffness wall.

Summary of Results

Using these predicted movements, estimates of possible damage have been made for the surrounding structures, based on the Damage Classification Scheme proposed by Burland and Wroth (1974).

Copies of worksheets calculations and graphical representation of the results are presented in **Appendix D** and are summarised in the table below:

Nearby Building / Structure	Estimated Damage Category No.	Category of Damage	Comments
55 Glenmore Road	0	Negligible	Hairline cracks of <0.1mm
51 Glenmore Road	1	Very Slight	Fine cracks that can easily be treated during normal decoration.
22 Glenmore Road	n/a	n/a	Outside zone of influence of ground movement.
52 Howitt Road	n/a		

The ground movement assessment undertaken indicates that damage to surrounding properties will be Burland Category 0 (Negligible) to 1 (Very Slight).

Anticipated vertical movements provide a maximum tilt of about 1 in 25000, which is well within generally tolerable differential movement.

ADDITIONAL CONSIDERATIONS

Heave

The excavation of c. 2.80m thickness of soil will generate a maximum unloading of around 50-60kN/m^2.

This will result in a measure of short term heave and long term swelling of the underlying London Clay, which theoretically takes a number of years to complete. The new basement slab will be designed to withstand the potential heave forces and movements. About 50% of total movement would normally be expected to occur prior to construction of the slab (for a normal construction programme).

The excavation depth and modest dimensions of the site are such that heave associated with unloading of the clay is unlikely to exceed a few millimetres or to have any significant impact on the surrounding structures. Any movement that does occur will be further mitigated by the necessarily slow rate of the excavation and construction.

Ground Movement & Construction

The predicted building damage during construction is based on a conservative approach and it is recommended that the contractor gives consideration to the Association of Specialist Underpinning Contractors (ASUC) guidelines which should provide some mitigate and reduce the potential movements.

Ground Movements Monitoring

As a minimum, it is recommended that movement monitoring should be undertaken with surveying points set up using a total station (or similar) prior to commencement of the works and it is recommended that monitoring be undertaken at weekly intervals. It is recommended that trigger values for monitoring are based on the predicted ground movements to ensure conservatism and that they are agreed under the Party Wall Act.

References

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3. Peck, R.B. Deep excavations and tunnelling in soft ground. Proceedings of the 7th International Conference on Soil Mechanics. Mexico, State of the Art, pp. 225-290, 1969.
4. Clough, G.W. and Davidson, R.R. Effects of construction on geotechnical performance. Proceedings of the 9th International Conference on Soil Mechanics. Tokyo, Specialty Session, p. 3, 1977.
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Impact Assessment & Mitigation Measures

SUMMARY OF POTENTIAL IMPACTS & MITIGATION MEASURES

The table below provides a summary of the potential impacts and mitigation measures adopted to ensure that residual risks are minimised:

Description of Potential Impact		**Significance of Impact**	**Summary of Mitigation Measures**	**Residual & Cumulative Effects following Mitigation**
Land Stability	Seasonal subsidence	Minor negative	• The basement foundation formation level is approximately 2.80m bgl, which is likely to be below the depth of influence of tree roots. • Heave protection measures will be adopted. • Surveying and monitoring of surrounding buildings / structures will be undertaken.	Negligible
	Impact on local properties/structures	Minor negative	• Adoption of appropriate management procedures for basement excavation/ construction within the Construction Method Statement. • Surveying and monitoring of surrounding buildings / structures will be undertaken. • Repair and maintenance in accordance with C580.	Negligible
Surface water flooding & Drainage	Flooding from surface water	Moderate negative	• Completion of a Flood Risk Assessment (FRA) and adoption of recommendations therein,	Negligible

Description of Potential Impact		Significance of Impact	Summary of Mitigation Measures	Residual & Cumulative Effects following Mitigation
			including raising of site ground floor and basement entry levels by 300mm, as per advice within the FRA.	

Conclusions and Recommendations

CONCLUSIONS

The proposed basement will comprise a single storey structure utilised as residential space and will extend beneath approximately 50% of the existing footprint of the building but will be extended only c. 3m^2.

The assessment completed indicates that there is potential for the proposed basement development to result in minor impacts in relation to land stability and local surface water flooding.

However, following adoption of appropriate mitigation measures to be included within the design, the residual and cumulative impacts of the proposed development are assessed to be negligible.

RECOMMENDATIONS

Based on the assessment completed and with regard to the proposed development in general it is recommended that the mitigation measures to minimise impacts associated with potential land stability and local surface water flooding are adopted within development design.

Further recommendations specific to the geotechnical appraisal, potential foundations options and in consideration of retaining wall design are provided in the LMB Ground Investigation and Assessment report (ref. LMB_17.03.23_REPPIL_PRA&GI_53_Glenmore_v1.1).

REFERENCES & GUIDANCE

1. Environment Agency/Defra (2002). Model procedures for the Management of Land Contamination (CLR 11)
2. Environment Agency/Defra (April 2012). Contaminated Land Statutory Guidance.
3. BS 10175 (2011) Investigation of Potentially Contaminated Sites. Code of Practice.
4. BS5930 (2007) Code of Practice for Site Investigations.
5. BS 5667-11:2009. Water quality sampling. Part 11: Guidance on sampling of groundwaters.
6. BS 8002 (1994) Code of Practice for Earth Retaining Structures
7. Tomlinson, M.J. (1986) Foundation Design and Construction.
8. Department of the Environment Industry Profiles.
9. Environment Agency/Defra (2002). Sampling strategies for contaminated land (CLR4)1
10. Environment Agency/Defra (2002). Priority Contaminants for the Assessment of Land (CLR8)2
11. CIRIA (2007). Assessing risks posed by hazardous ground gases to buildings
12. BS 8485:2007. Code of Practice for the Characterisation and Remediation from Ground Gas in affected Development.
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18. Environment Agency (2008a), Compilation of Data for Priority Organic Pollutants, Report SC050021/SR7, November 2008;
19. Environment Agency (2009a), Human Health Toxicological Assessment of Contaminants in Soil, Report SC050021/SR2, January 2009;
20. Environment Agency (2009b), CLEA Software (Version 1.04) Handbook (and Software), Report SC050021/SR4, January 2009;
21. Environment Agency (2009c), Updated Technical Background to the CLEA Model, Report SC050021/SR3, January 2009;
22. Environment Agency (2009d), A Review of Body Weight and Height Data Used in the CLEA Model, Report SC050021/Final Technical Review 1, January 2009;

[1] This document has been withdrawn but is considered to remain useful in proving technical background for designing ground investigation works.

[2] This document has been withdrawn but is considered to remain useful in proving technical background for designing ground investigation works.

REFERENCES & GUIDANCE

23. Nathanial et. al., (2009), The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd edition), Land Quality Press, Nottingham, ISBN 0-9547474-7-X
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25. Environment Agency (2012). Groundwater Protection: Principles and Practice (GP3)
26. Water Framework Directive (2000/60/EC)
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28. Drinking Water Quality Standards England & Wales 2000 (Amended 2004, DWS).
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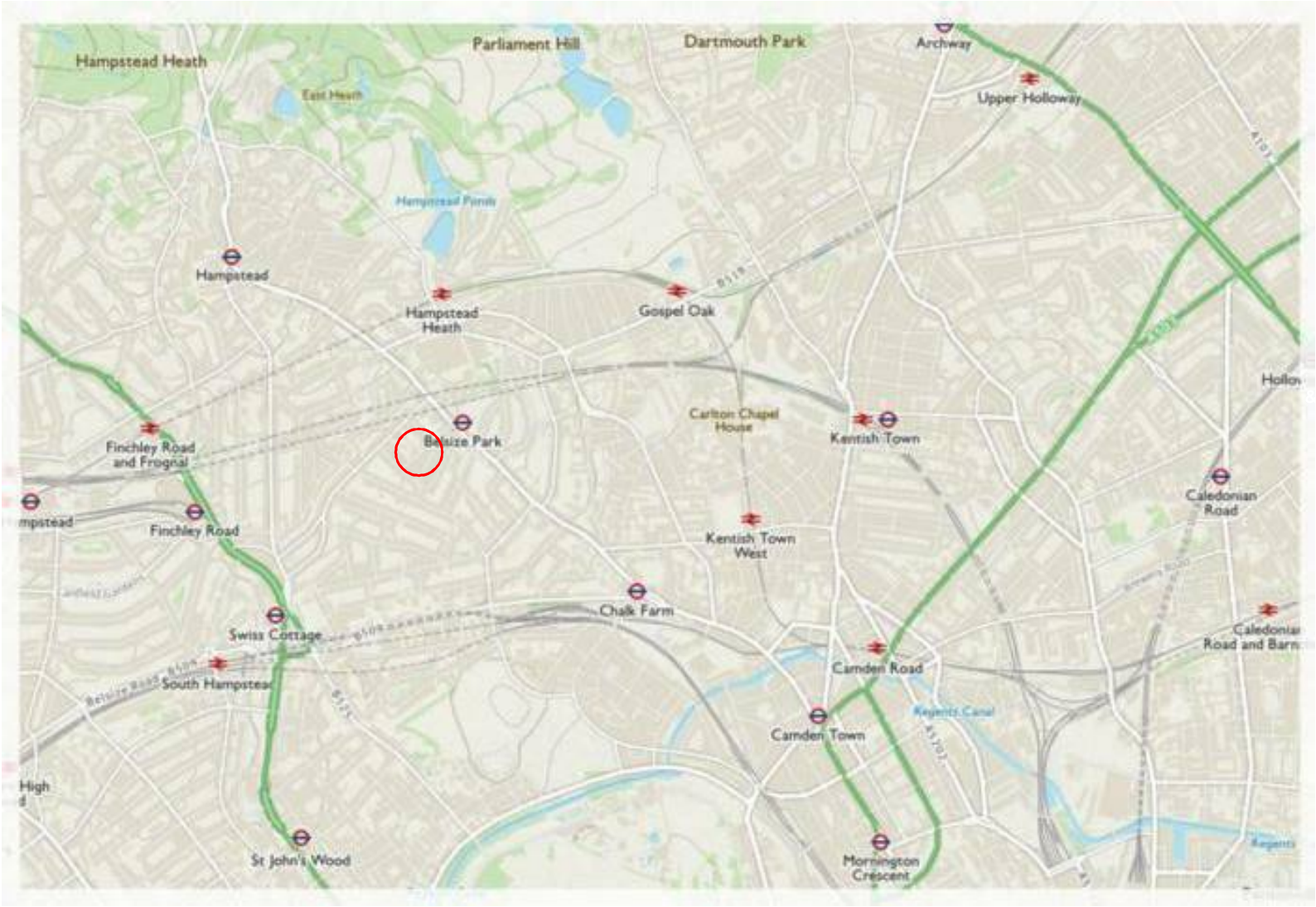
31. Environment Agency (2006). Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination.
32. Environment Agency (2013). Technical Guidance WM2 (v3). Interpretation of the definition and classification of hazardous waste.

FIGURES



Key:

Approximate site location

IMPORTANT – Please Read

This drawing is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details below. LMB accepts no liability for the mis-interpretation or use of this illustration by any other parties.

LMB

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

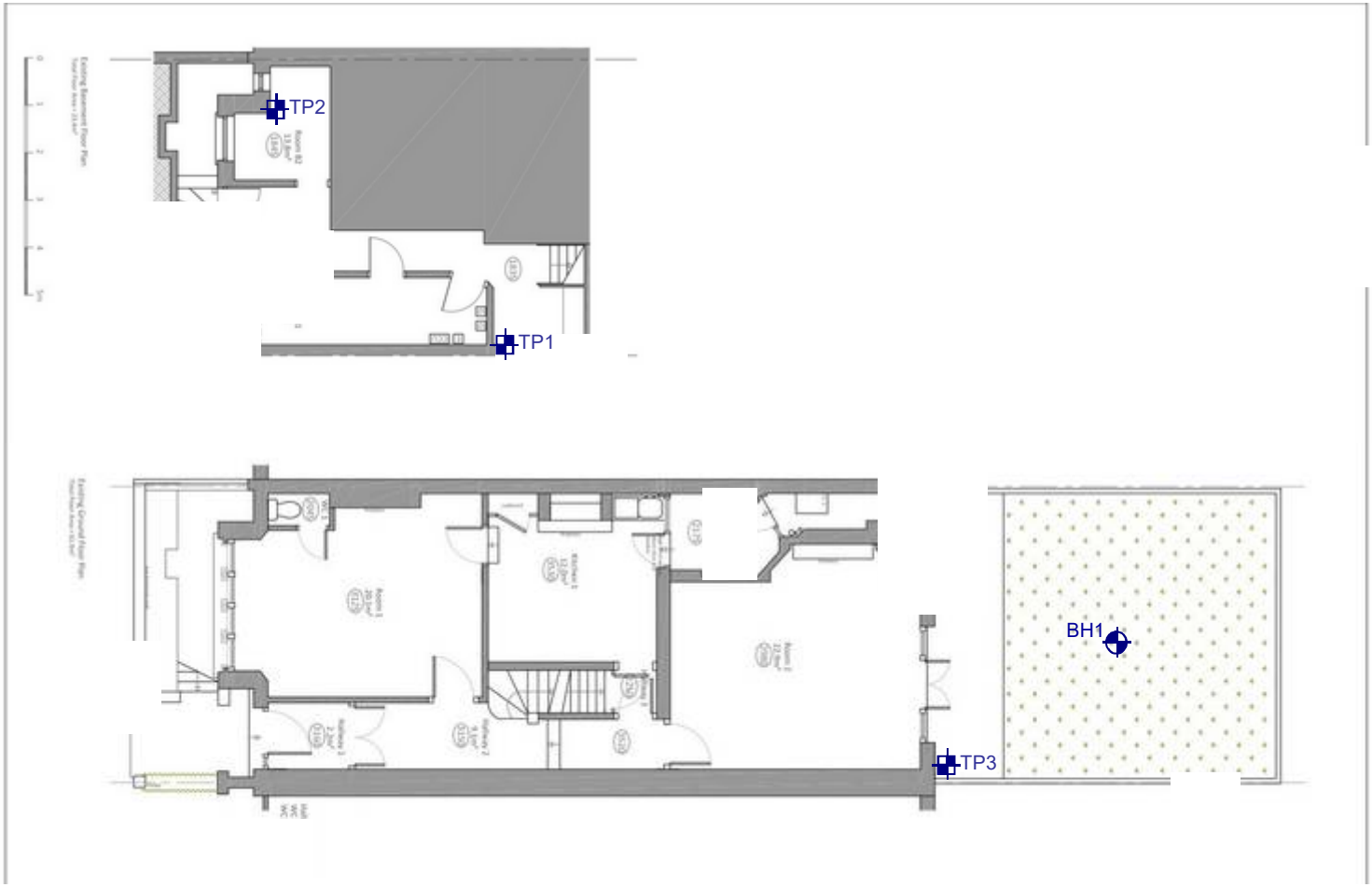
Site: 53 Glenmore Road, London NW3

Figure Number: Figure 1

Title: Site Location Plan

Project No:	Created By:	Date:
	PIL	March 2017

Client: Central & Cecil



Key:

BH Borehole location

TP Trial Pit location

IMPORTANT – Please Read

This drawing is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details below. LMB accepts no liability for the mis-interpretation or use of this illustration by any other parties.

LMB

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Site: 53 Glenmore Road, London NW3

Figure Number: Figure 2

Title: Exploratory Hole Location Plan

Project No:	Created By:	Date:
	PIL	March 2017

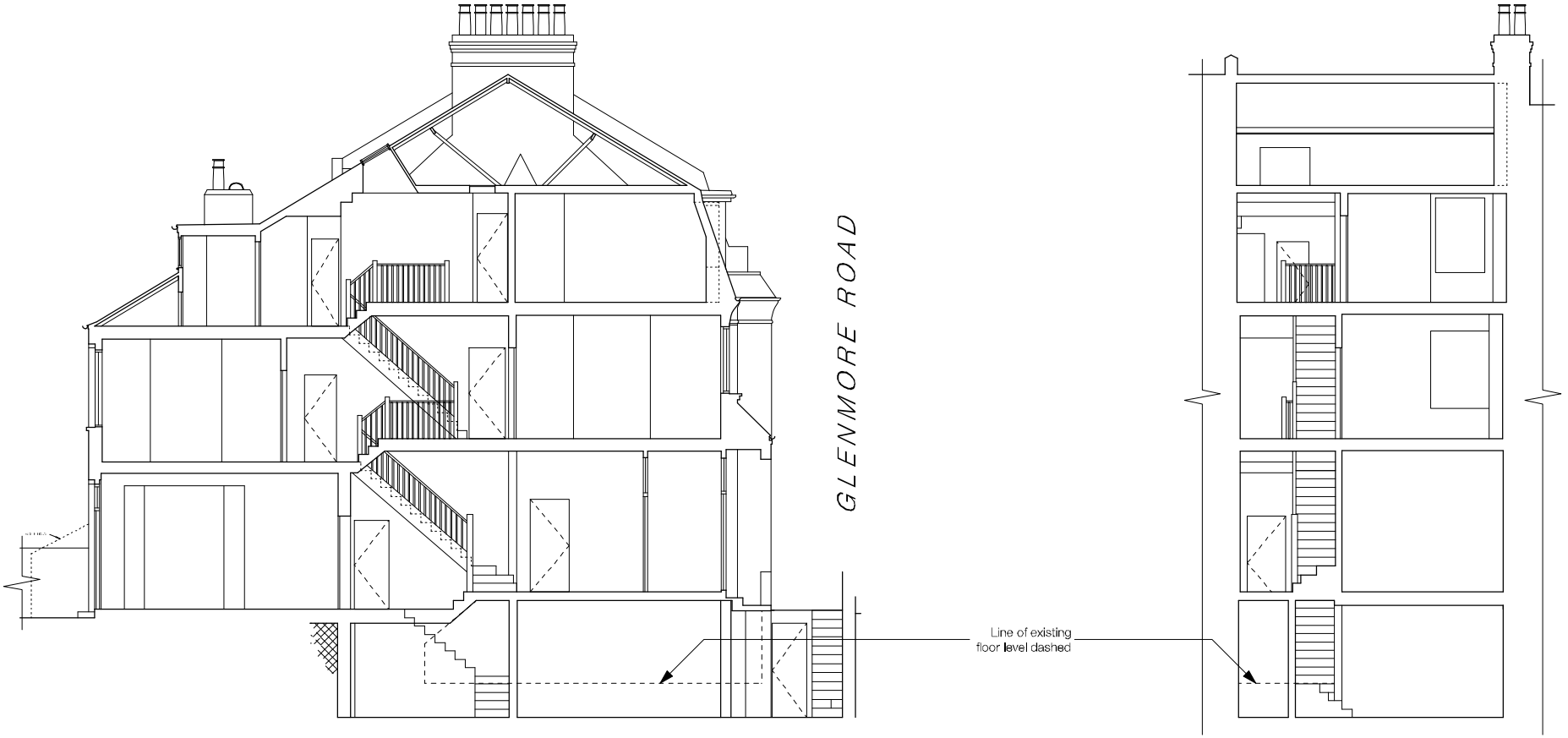
Client: Central & Cecil

APPENDICES

Appendices

APPENDIX A DEVELOPMENT SCHEMATIC

SECTIONS (PROPOSED)



SECTION A-A

SECTION B-B

0M 2M 4M 6M 8M 10M

Notes
All drawings, specifications and related documents are the copyright property of Robert Hirschfield and must be returned upon request.

Reproduction of drawings, specifications and related documents in part or in whole is forbidden without the written permission of Robert Hirschfield.

General notes
1. Do not scale from this drawing.
2. All dimensions are in millimeters unless noted otherwise.
3. All dimensions shall be verified on site before proceeding with the work.
4. Robert Hirschfield shall be notified in writing of any discrepancies.

Party Wall Act 1996
Note: If the project progresses onto site without the involvement of Robert Hirschfield, the Client must seek advice prior to commencement of the planned works as detailed on the drawings to establish whether the works fall within the scope of the Act which required adjoining property owners to be served with a statutory notice.

C.D.M. Regulations 2007
These drawings have been produced for the purpose of applying for Planning and Building Regulations only. If the project progresses on to site without the involvement of Robert Hirschfield, the Client and Contractor must ensure that they fulfil the duties in respect of the Construction (Design and Management) Regulations 2007.

Issue / Amendment	Date	Rev
Submitted for planning	16.02.12	-

Chartered Architect

Robert Hirschfield
10-12 Perrins Court, London NW3 1QS
Robert Hirschfield RIBA
+44 (0)7730 983 355
studio@roberthirschfield.com

Project: 51 Glenmore Road, London NW3 4DA
Drawing Title: Proposed Sections
Scale: 1:100 | Original Size: A3 | Drawn: RH | Checked: RH
☒ Information ☐ Tender ☐ Construction
Project No.: 122
Drawing No.: A PL S B 01
Revision No.: -

APPENDICES

APPENDIX B PRE PLANNING CORRESPONDENCE

Regeneration and Planning
Culture and Environment
London Borough of Camden
Level 2
5 Pancras Square
5 Pancras Square
London N1C 4AG

Tel 020 7974 5613
Fax 020 7974 1975
planning@camden.gov.uk
www.camden.gov.uk/planning

Date: 30th November 2016
Our Ref: 2016/6039/PRE
Contact: Tessa Craig
Direct Line: 020 7974 6750
Email: Tessa.Craig@camden.gov.uk

Dear Mr Theaker,

2016/6039/PRE: 53 GLENMORE ROAD, NW3 4DA
SUBDIVISION OF 2NO 2 BEDROOM PARTIALLY SELF CONTAINED FLATS TO FULLY SELF CONTAINED FLATS, BASEMENT EXCAVATION, SIDE INFILL EXTENSION

Thank you for your request dated 2nd November 2016 for pre-application advice in respect of 53 Glenmore Road, NW3 4DA. This letter is based on drawings 2674-MA-E-ZZ-DR-2100-C00 and 2674-MA-N-ZZ-DR-2701-OP2-C00 and a site visit carried out on 25th November 2016.

This document represents an initial informal officer view of your proposals based on the information available to us at this stage and would not be binding upon the Council, nor prejudice any future planning application decisions made by the Council.

Proposal
Subdivision of 2no one bedroom partly self-contained flats to be fully self-contained with basement excavation to provide 1no 2 bed and 1no 1 bed flats. Excavation to increase basement level and side infill extension as part of internal rationalisation.

Site description
The subject site is located on the south side of Glenmore Road and is a two storey terraced brick property with a large front dormer and an existing part height lower ground floor level.

The property is not listed but is within the Belsize Park conservation area and makes a positive contribution to the character of the area. The application site has subterranean (groundwater) flow and slope stability site constraints.

The property is arranged as two one bedroom non self-contained flats and one self-contained two-bedroom flat to the second floor. The existing property comprises vacant storage space within the basement level (low head height), a lounge, bedroom, bathroom and kitchen on ground floor, two bedrooms, kitchen, bathroom and WC at first floor and two bedroom, bathroom, kitchen and living room at second floor (self-contained).

Planning history
None

Comments on proposal
Subdivision and internal layout
Policy 3.5 of the London Plan promotes high quality design of housing development that takes into account its physical context, local character, density, tenure and land use mix and relationship with, and provision for public, communal and open spaces taking into account the needs of children and older people.

In principle, the proposal to provide additional housing is in accordance with policies CS6 and DP2 of Camden's Local Development Framework (LDF). The Dwelling Size Priority Table accompanying Policy DP5 identifies two bedroom market units as being of 'Very High Priority'.

New residential units should provide a high standard of living accommodation for the prospective occupiers whilst maintaining the amenities of the neighbouring residential properties. In line with the Nationally Described Space Standard introduced in March 2015: 2 bedroom, 4 person units over two floors should be at least 79sqm with 2sqm of in built storage (lower ground and ground). 1 bedroom 2 person 50sqm with 1.5sqm storage (first floor) and a 2 bedroom, 3 person 61sqm with 2sqm storage (second floor existing). More information on the technical standards can be found here.

The lower ground and ground floor flat would be at least 80sqm with adequate storage and dual aspect. The first floor flat would be over 50sqm with adequate space for storage and the second floor flat would be 59sqm (slightly below space requirements but this is an existing situation). The resulting flats are considered to result in a good quality of accommodation and the rearrangement is considered acceptable. At application stage, GIA for each flat should be stated.

Side extension
The Council's design policies are aimed at achieving the highest standard of design in all developments. The following considerations contained within policy DP24 are relevant to the application: development should consider the character, setting, context and the form and scale of neighbouring buildings, and the quality of materials to be used. Policy DP25 'Conserving Camden's Heritage' states that within conservation areas, the Council will only grant permission for development that 'preserves and enhances' its established character and appearance.

The proposed side extension is a modest infill which rationalises the narrow alleyway. The extension is sympathetic and subordinate to the main property and matches the neighbouring development.

Materials
The Council favours traditional materials (such as brick and timber) which match the main property. Where non-traditional materials are proposed the applicant should provide material samples, manufacturing details and examples of the material on other products. The success of non-traditional materials depends on the ability to be sympathetic to the main property and how the material would weather.

Basement

In determining proposals for basement and other underground development, the Council will require an assessment of the scheme's impact on drainage, flooding, groundwater conditions and structural stability, where appropriate. The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity, and does not result in flooding or ground instability.

You are advised to thoroughly examine the requirements for Basement Impact Assessment as per DP27 and CPG4 prior to submission. You are advised to submit a comprehensive and accurate Basement Impact Assessment demonstrating no significant harm to the application site, neighbouring sites or those surrounding.

The BIA will include the following stages:

- Stage 1 - Screening;
- Stage 2 - Scoping;
- Stage 3 - Site investigation and study;
- Stage 4 - Impact assessment; and
- Stage 5 - Review and decision making.

Further detail on BIAs can be found in Camden Planning Guidance 2013 (CPG4 Basements). At each stage in the process the person(s) undertaking the BIA process should hold qualifications relevant to the matters being considered. The Council will only accept the qualifications set out in paragraph 2.11 of CPG4.

Independent verification of Basement Impact Assessments, funded by the applicant, is now also required (since CPG4 was updated in September 2013) in the following situations:

- Where a scheme requires applicants to proceed beyond the Screening stage of the Basement Impact Assessment (i.e. where a matter of concern has been identified which requires the preparation of a full Basement Impact Assessment);

- Where the proposed basement development is located within an area of concern regarding slope stability, surface water or groundwater flow; or

- For any other basement applications where the Council feels that independent verification would be appropriate (e.g. where conflicting evidence is provided in response to a proposal).

A full scoping study is required as part of any application, identifying the potential impacts for each of the matters of concern. When an audit is required, Campbell Reith (external auditor) charge a fixed fee dependant on the category of basement audit, outlined in appendix A of Camden's BIA audit service terms of reference.

Camden Planning Guidance CPG4 provides specific guidance on basements and lightwells. It should be noted sufficient margins should be left between the site boundaries and any basement construction to enable natural processes to occur and for vegetation to grow naturally.

The proposed basement would not have any additional external manifestations given there are already windows at lower ground level in the front elevation which provide light. The increase is modest in size and provided the BIA is satisfactory, there are no concerns with this element of the development.

Amenity

CPG6 Amenity states: “Development should be designed to protect the privacy of both new and existing dwellings to a reasonable degree. Spaces that are overlooked lack privacy. Therefore, new buildings, extensions, roof terraces, balconies and the location of new windows should be carefully designed to avoid overlooking. The degree of overlooking depends on the distance and the horizontal and vertical angles of view. The most sensitive areas to overlooking are:

- Living rooms;
- Bedrooms;
- Kitchens; and
- The part of a garden nearest to the house.”

The proposed development is not likely to be harmful in terms of loss of light or privacy given the basement excavation is at lower ground level and the side infill will match the neighbouring development.

Conclusion

The revised internal layout is considered acceptable. The basement excavation would require a BIA assessment. The side extension is modest and likely to be considered acceptable.

For a valid planning application, I would advise you to submit the following:

· Completed form – full planning permission;
· An ordnance survey based location plan at 1:1250 scale denoting the application site in red;
· Floor plans at a scale of 1:50 labelled ‘existing’ and ‘proposed’;
· Elevation drawings at a scale of 1:50 labelled ‘existing’ and ‘proposed’;
· Section drawings at a scale of 1:50 labelled ‘existing’ and ‘proposed’;
· Basement Impact Assessment;
· Draft Construction Management Plan;
· The appropriate fee (£339).

Please see supporting information for planning applications for more information. You are advised to contact your neighbours prior to submission, to discuss the proposals.

We are legally required to consult on applications with individuals who may be affected by the proposals. We would notify neighbours by a notice on or near the site and, advertise in a local newspaper. The Council must allow 21 days from the consultation start date for responses to be received.

Once you submit an application, please let me know the planning portal reference number so that I can process the application. If you have any queries about the advice please do

not hesitate to contact Tessa Craig on 020 7974 6750. Thank you for using Camden's pre-application advice service.

It is important to us to find out what our customers think about the service we provide. To help, we would be very grateful if you could take a few moments to complete our pre application enquiry survey. We will use the information you give us to monitor and improve our services.

Regards,

Tessa Craig
Planning Officer

Telephone: 020 7974 6750

APPENDICES

APPENDIX C CONSULTATION WITH BELOW GROUND ASSET HOLDERS

Transport for London
London Underground

London Underground
Infrastructure Protection

3rd Floor
Albany House
55 Broadway
London SW1H 0BD

www.tfl.gov.uk/tube

Your ref:
Our ref: 20403-SI-9-290317

Philip Lewis
LMB Geosolutions Limited
philip@lmbgeosolutions.com

29 March 2017

Dear Philip,

53 Glenmore Road London NW3 4DA

Thank you for your communication of 23rd March 2017.

I can confirm that London Underground has no assets within 50 metres of your site as shown on the plan you provided.

If I can be of further assistance, please contact me.

Yours sincerely

Shahina Inayathusein
Information Manager
Email: locationenquiries@tube.tfl.gov.uk
Direct line: 020 3054 1365

philip lewis

From: Purser Richard <Richard.Purser@networkrail.co.uk> on behalf of OP Buried Services Enquiries <OPBuriedSE@networkrail.co.uk>
Sent: 24 March 2017 11:20
To: philip lewis
Subject: RE: Development at 53 Glenmore Rd, London NW3 4DA

Dear Sir/Madam,

With regards to your enquiry, Network Rail does not believe there is any Network Rail owned apparatus or underground services within the area you have defined. As there is always the possibility that new works could be planned and undertaken in this area by Network Rail this information is valid as at today's date and is supplied for general guidance only.

Please be aware that this response is based on Network Rail's records and knowledge and no guarantee can be given regarding accuracy or completeness. CAT scans, safe digging practices (as contained in HSE publications) and other appropriate investigative techniques should always be carried out.

There may be other apparatus or underground services owned or operated by Utility Companies and accordingly you should contact individual utilities for information.

If, in connection with your investigations and/or work, you become aware of Network Rail apparatus or underground services within your area of work, please ensure these are notified to our Asset Protection team via the following link as a matter of urgency so that appropriate measures for avoidance of risk and damage can be put in place.

http://www.networkrail.co.uk/aspx/1758.aspx?cd=1

If you require any further clarification on any of the information please contact opburiedservicesenquiries@networkrail.co.uk.

Regards,

Richard Purser
Distribution Administrator (Underground Services), Asset Information Services

Asset Information Services: to inspire & enable through the power of data
National Records Group, Audax Road, Clifton Moor York YO30 4US

T: 01904 386 388
E: richard.purser@networkrail.co.uk

From: philip lewis [mailto:philip@lmbgeosolutions.com]
Sent: 23 March 2017 14:25
To: OP Buried Services Enquiries
Subject: Development at 53 Glenmore Rd, London NW3 4DA
Importance: High

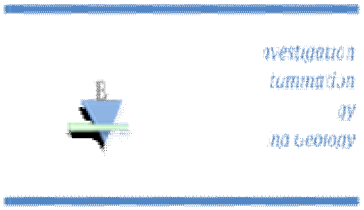
Dear Sir/Madame
We are currently undertaking some works at the above property in support of a basement development. We would be interested in finding out if you have any below ground assets in the nearby vicinity.

I have attached site location plans for your information.

Best regards,

Philip Lewis
Bsc (Hons), Msc, FGS, CGeol
Director
LMB Geosolutions Ltd
Tel. +44 7739735097

Home - LMB Geosolutions Ltd
Connect with me on
LinkedIn



APPENDICES

APPENDIX D GMA CALCULATION WORKSHEET

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Calc No.	Sheet No.	Rev
	1	A

Calculation Sheet

Project	Ground Movement Assessment	Made by	CC
Location	53 Glenmore Road - London NW3 4DA	Date	27.03.17

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Calc No.	Sheet No.	Rev
	2	A

Calculation Sheet

Project	Ground Movement Assessment	Made by	CC
Location	53 Glenmore Road - London NW3 4DA	Date	27.03.17

Assumptions

Mass Concrete Underpinning
Propping System will be utilised

Max Excavation Depth 2.80 m
Wall Depth 2.85 m

Nearby Structure	Note	Point	Distance from wall (m)	Ground movements arising from wall installation					Ground movements arising from excavation in front of wall				
				Distance from wall / wall depth	Horizontal movement / wall depth (%) Fig. 2.9a	Horizontal movement (mm)	Settlement / wall depth (%) Fig. 2.9b	Vertical movement (mm)	Distance from wall / max excavation depth	Horizontal movement / max excavation depth (%) Fig. 2.11a	Horizontal movement (mm)	Settlement / max excavation depth (%) Fig. 2.11b	Vertical movement (mm)
55 Glenmore Road	Underpinning	A	2.5	0.9	0.018	0.5	0.01	0.3	0.9	0.11	3.1	0.065	1.8
		B	8.9	3.1	0	0.0	0	0.0	3.2	0.04	1.1	0.009	0.3
51 Glenmore Road	Underpinning	C	0.0	0.0	0.05	1.4	0.05	1.425	0.0	0.15	4.2	0.04	1.1
		D	6.4	2.2	0	0	0	0	2.3	0.06	1.7	0.024	0.7

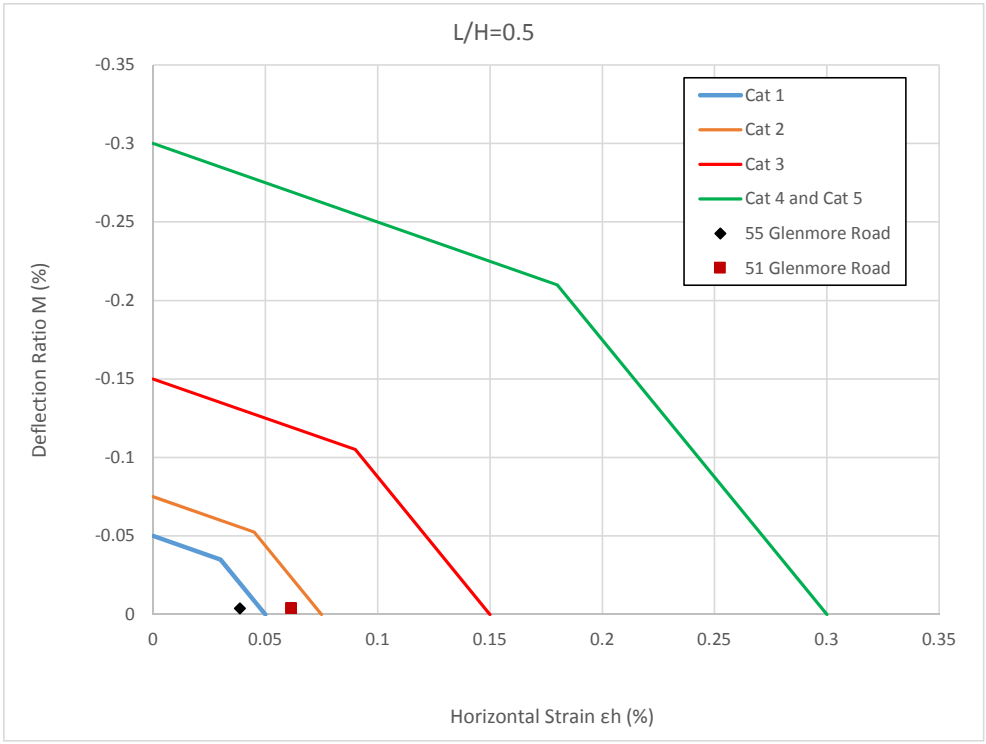
Nearby Structure	Total Movements											
	Corner Effect	Total horizontal movement (mm)	Total vertical movement (mm)	L (m)	H (m)	L/H	Δ (mm)	Tilt (1/x)	M=Δ/L (%)	δh (mm)	εh=δh/L (%)
55 Glenmore Road	N	3.6	2.1	6.4	12.0	0.5	0.3	25600	0.004	2.5	0.039
		1.1	0.3								
51 Glenmore Road	N	5.6	2.5	6.4	12.0	0.5	0.3	25600	0.004	3.9	0.062
		1.7	0.7								

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Calc No.	Sheet No.	Rev
	3	A

Calculation Sheet

Project	Ground Movement Assessment	Made by	CC
Location	53 Glenmore Road - London NW3 4DA	Date	27.03.17

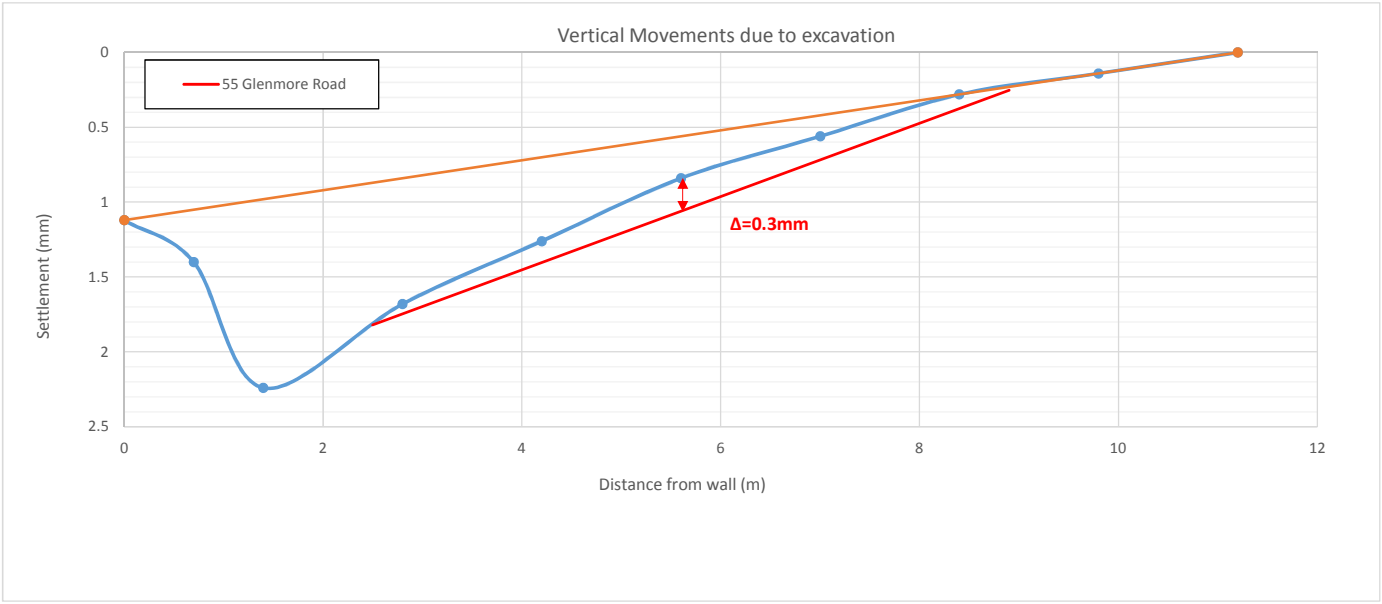


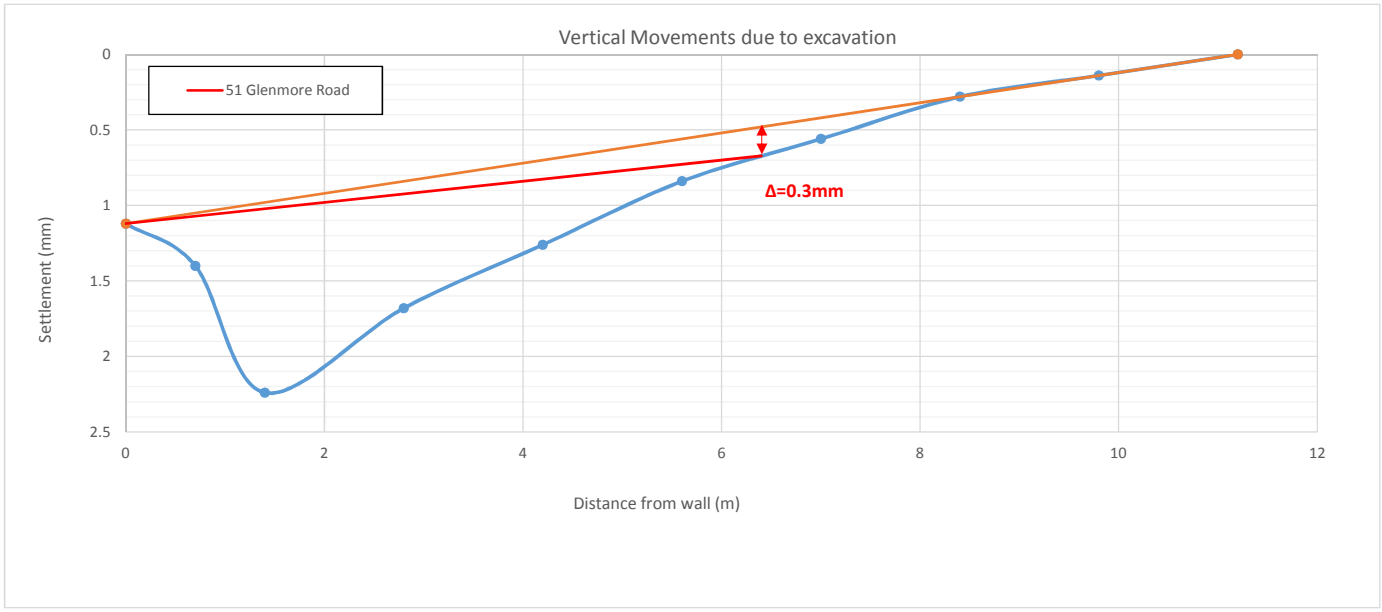
Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Calc No.	Sheet No.	Rev
	4	A

Calculation Sheet

Project	Ground Movement Assessment	Made by	CC
Location	53 Glenmore Road - London NW3 4DA	Date	27.03.17





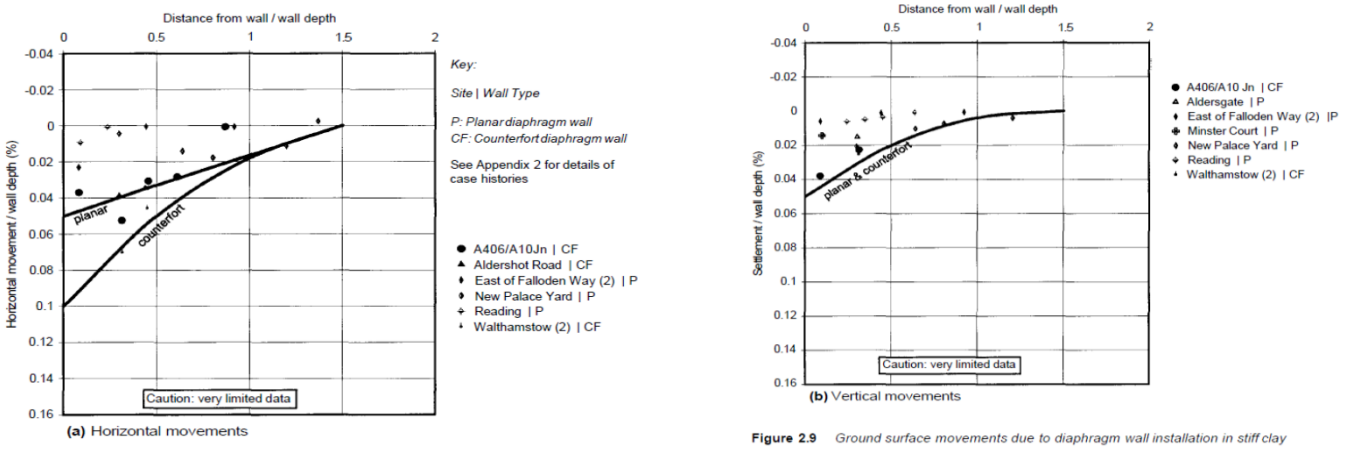


Figure 2.9 *Ground surface movements due to diaphragm wall installation in stiff clay*

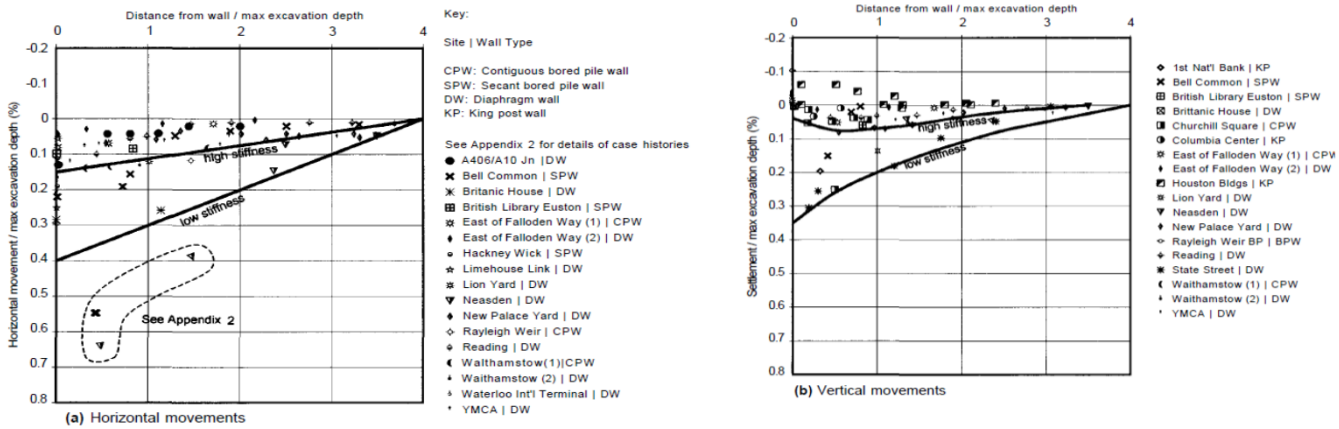


Figure 2.11 *Ground surface movements due to excavation in front of wall in stiff clay*