

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK

DESK STUDY & BASEMENT IMPACT ASSESSMENT REPORT

Holly Lodge,
43 RIDGEWAY,
HUTTON MOUNT,
ESSEX,
CM13 2LJ



Report Title: Desk Study & Basement Impact Assessment for Holly Lodge, 43 Ridgeway, Hutton Mount, CM13 2LJ

Report Status: Final

Job No: P4690J2911/SEJ

Date: 06 December 2023

Quality Control - Revisions

| Version | Date | Issued By |
|---------|------|-----------|
| | | |

Prepared by: JOMAS ASSOCIATES LTD For: BUILDFORCE (LONDON) LTD

Prepared by

Stuart Jones BSc (Hons), FGS



Geo-environmental Engineer

Reviewed by

Derek Grange BSc (Hons), MSc,
CGeol FGS RoGEP - Specialist



Senior Principal - Geotechnics

Approved by

James Field BSc (Hons) CGeol
FGS RoGEP - Professional

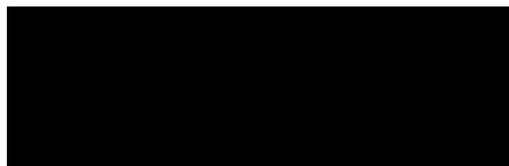


Associate Director

Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com



CONTENTS

| | Page |
|--|-----------|
| EXECUTIVE SUMMARY | V |
| 1 INTRODUCTION | 1 |
| 1.1 Terms of Reference | 1 |
| 1.2 Proposed Development | 1 |
| 1.3 Objectives | 1 |
| 1.4 Scope of Works | 1 |
| 1.5 Scope of Basement Impact Assessment | 2 |
| 1.6 Supplied Documentation | 2 |
| 1.7 Limitations | 3 |
| 2 SITE SETTING & HISTORICAL INFORMATION | 4 |
| 2.1 Site Information | 4 |
| 2.2 Walkover Survey | 4 |
| 2.3 Historical Mapping Information | 5 |
| 2.4 Past Land Use | 7 |
| 2.5 Landfill, Waste and Potentially Infilled Surface Ground Workings | 7 |
| 2.6 Current Industrial Land Use | 8 |
| 2.7 Tunnels and Railways | 9 |
| 2.8 Previous Site Investigations | 9 |
| 2.9 Planning Information | 9 |
| 2.10 Sensitive Land Uses | 10 |
| 2.11 Radon | 10 |
| 3 GEOLOGICAL SETTING & HAZARD REVIEW | 11 |
| 3.2 Solid and Drift Geology | 11 |

| | | |
|----------|---|-----------|
| 3.3 | British Geological Survey (BGS) Borehole Data | 11 |
| 3.4 | Geological Hazards | 11 |
| 4 | HYDROGEOLOGY, HYDROLOGY AND FLOOD RISK REVIEW | 14 |
| 4.1 | Hydrogeology & Hydrology | 14 |
| 4.2 | Flood Risk Review..... | 17 |
| 4.3 | Sequential and Exception Tests | 20 |
| 4.4 | Flood Resilience | 20 |
| 5 | SCREENING AND SCOPING ASSESSMENT..... | 22 |
| 5.1 | Screening Assessment | 22 |
| 5.2 | Scoping..... | 25 |
| 6 | PRELIMINARY BASEMENT IMPACT ASSESSMENT | 27 |
| 6.1 | Proposed Changes to Areas of External Hardstanding..... | 27 |
| 6.2 | Past Flooding..... | 27 |
| 6.3 | Geological Impact..... | 27 |
| 6.4 | Hydrology and Hydrogeology Impact | 28 |
| 6.5 | Impacts of Basement on Adjacent Properties and Pavement | 28 |
| 6.6 | Ground Movement..... | 29 |
| 7 | REFERENCES..... | 32 |

APPENDICES

APPENDIX 1 – FIGURES

APPENDIX 2 – GROUNDSURE REPORTS

APPENDIX 3 – OS HISTORICAL MAPS

APPENDIX 4 – QUALITATIVE RISK ASSESSMENT METHODOLOGY

APPENDIX 5 – BGS BOREHOLE RECORDS

Appendix 6 – MAP EXCERPTS

EXECUTIVE SUMMARY

Buildforce (London) Ltd (“The Client”) has commissioned Jomas Associates Ltd (‘Jomas’), to prepare a Stage 1 and 2 (Screening and Scoping) Basement Impact Assessment for a site referred to as Holly Lodge, 43 Ridgeway, Hutton Mount, CM13 2LJ.

The aim of this report is to assess whether the ground conditions within the local area represent an impediment to the proposed development.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

| Desk Study | |
|------------------------------|---|
| Current Site Use | The site comprises the remnant foundations of a pre-existing residential building with associated garden and driveway. The site is vacant, disused and overgrown with vegetation. |
| Proposed Site Use | The proposed development for this site is understood to comprise the construction of a 3-storey residential building with basement. Private gardens are expected to be retained. |
| Site History | <p>On the earliest available map (1872), the site is shown as undeveloped, part of open land presumably used for agricultural purposes. In 1920-21 the road ‘Ridgeway’ is constructed adjacent to the north of the site and by maps dated 1938-40 the site comprises a residential building with associated driveway and garden. Aside from an extension on the eastern side of the building by maps dated 1981-92, no significant changes occur until present day where the building is demolished by 2021.</p> <p>Historically, the surrounding area was largely undeveloped in the earliest maps, with mainly residential style development until the present day.</p> |
| Site Setting | <p>The British Geological Survey indicates that the site is directly underlain by solid deposits of the Claygate Member.</p> <p>The underlying Claygate Member is identified as a Secondary (A) aquifer.</p> <p>A review of the EnviroInsight Report indicates that there are no Environment Agency Zone 2 or Zone 3 flood zones within 50m of the site.</p> <p>No EA source protection zones are noted within 500m of the site.</p> <p>1No. historical groundwater abstraction is reported within 2km of the site for general farming & domestic use 1391m northwest.</p> <p>There are no surface water or potable abstractions reported within 2km of the site.</p> <p>6No. surface water features are reported within 250m of the site; nearest as inland river not influenced by normal tidal action 47m southeast.</p> |
| Potential Geological Hazards | <p>The Groundsure data identifies mostly negligible to very low risks for the potential hazards assessed.</p> <p>Shrink swell clays are noted to have a hazard rating of ‘Moderate’ risk at the site with ground conditions predominantly of high plasticity.</p> <p>The presence of Made Ground may be a source of elevated sulphate. If such levels are noted then sulphate resistant concrete may be required.</p> |

Desk Study

| | |
|--|---|
| | It is recommended that a geotechnical ground investigation is undertaken to inform foundation design. |
|--|---|

Screening and Scoping (Basement Impact Assessment)

| | |
|---------------------------------|--|
| Subterranean (Groundwater) Flow | A ground investigation is recommended to confirm the ground conditions and groundwater levels (if any) beneath the site. This can then confirm the relative depths of the basement to the groundwater levels. |
| Land Stability | The site, as with the surrounding area, is generally flat. The Groundsure report has noted that there is a “very low” risk of land instability issues for the site. The investigation should also determine the possibility of encountering groundwater and the possibility of Made Ground and/or clay. Atterberg Limits of the underlying clay should be determined by the ground investigation to establish shrink/swell potential. |
| Surface Flow and Flooding | The proposed development is to comprise the construction of a building with basement larger than the footprint of the previously existing building. The proportion of hard surfaces / paved areas may be increased. The use of SUDS will ensure the proposed development will not increase the potential risk of groundwater flooding. |

Basement Impact Assessment

| | |
|-------------------|---|
| Impact Assessment | <p>The overall assessment of the site is that the creation of a basement for the existing development will not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction. The proposed basement excavation will not be within 5m of a public pavement. It is however anticipated to be within 5m of neighbouring properties.</p> <p>Unavoidable lateral ground movements associated with the basement excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground and any associated services.</p> <p>During the construction phase careful and regular monitoring will need to be undertaken to ensure that the property above, is not adversely affected. This may mean that the property needs to be suitably propped and supported.</p> <p>From the studies that have been undertaken so far, and subject to the findings of an intrusive investigation, it is concluded that the construction of the building will not present a problem for groundwater. The proposed development is not expected to cause significant problems to the subterranean drainage. However, should be confirmed by a ground investigation and a subsequently updated Basement Impact Assessment.</p> |
|-------------------|---|

Recommended Further Work

| | |
|-------|---|
| Works | <p>An intrusive ground investigation is recommended to confirm the ground conditions and groundwater levels (if any) beneath the site, as well as to inform foundation design.</p> <p>A preliminary investigation could comprise a cable percussive borehole drilled to at least 5m below the proposed depth of the basement.</p> <p>A Ground Movement Assessment is also considered prudent.</p> |
|-------|---|

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Buildforce (London) Ltd (“The Client”) has commissioned Jomas Associates Ltd (‘Jomas’), to prepare a Stage 1 & 2 Basement Impact Assessment (Screening & Scoping) at a site referred to as Holly Lodge, 43 Ridgeway, Hutton Mount, CM13 2LJ.

1.1.2 Jomas’ work has been undertaken in accordance with email proposal dated 31 August 2023.

1.2 Proposed Development

1.2.1 The proposed development for this site is understood to comprise the construction of a 3-storey residential building with basement. Private gardens are expected to be retained.

1.2.2 A plan of the proposed development is included in Appendix 1.

1.2.3 For the purpose of geotechnical assessment, it is considered that the project could be classified as a Geotechnical Category (GC) 2 site in accordance with BS EN 1997 Part 1.

1.2.4 This will be reviewed at each stage of the project.

1.3 Objectives

1.3.1 The objectives of Jomas’ investigation were as follows:

To present a description of the present site status, based upon the published geology, hydrogeology and hydrology of the site and surrounding area;

To review readily available historical information (i.e., Ordnance Survey maps and database search information) for the site and surrounding areas;

To assess the potential impacts that the proposal may have on ground stability, the hydrogeology and hydrology on the site and its environs.

1.4 Scope of Works

1.4.1 The following tasks were undertaken to achieve the objectives listed above:

A walkover survey of the site;

A desk study, which included the review of a database search report (GeoInsight Report, attached in Appendix 2) and historical Ordnance Survey maps (attached in Appendix 3);

A basement impact assessment (BIA);

The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations.

- 1.5 Scope of Basement Impact Assessment
- 1.5.1 The site lies within the remit of the Brentwood Borough Council. The council has not provided documents pertaining to basement impact assessments or how they should be carried out.
- 1.5.2 Consequently, Jomas has based the methodology of the BIA on the guidance given in the London Borough of Camden document “Camden Planning Guidance Basements” (CPGB) (January 2021). This document has been used as it is generally accepted that this gives the best available guidance on the practicalities regarding how to undertake a BIA.
- 1.5.3 Jomas’ BIA covers most items required under CPGB, with the exception of;
- Plans and sections to show foundation details of adjacent structures – no access to adjacent properties was possible.
 - Programme for enabling works, construction and restoration.
 - Evidence of consultation with neighbours.
 - Ground Movement Assessment (GMA), to include assessment of significant adverse impacts and specific mitigation measures required, as well as confirmatory and reasoned statement identifying likely damage to nearby properties according to the Burland Scale.
 - Construction Sequence Methodology.
 - Proposals for monitoring during construction.
 - Drainage assessment.
- 1.5.4 This Jomas BIA also takes into account the Campbell Reith pro forma BIA produced on behalf of and published by the London Borough of Camden as guidance for applicants to ensure that all of the required information is provided.
- 1.5.5 A number of the requirements set out in the London Borough of Camden document CPGB would need to be addressed in a construction management plan, this stage is not within the scope of work that Jomas Associates have been commissioned.
- 1.6 Supplied Documentation
- 1.6.1 Jomas Associates have not been supplied with any previously produced reports at the time of writing this report.

- 1.7 Limitations
- 1.7.1 Jomas Associates Ltd has prepared this report for the sole use of Buildforce (London) Ltd in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.
- 1.7.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas has actual knowledge to the contrary, information obtained from public sources or provided to Jomas by site personnel and other information sources, have been assumed to be correct. Jomas does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.
- 1.7.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.
- 1.7.4 This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.

2 SITE SETTING & HISTORICAL INFORMATION

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

Table 2.1: Site Information

| | |
|----------------------------|--|
| Name of Site | Holly Lodge |
| Address of Site | 43 Ridgeway, Hutton Mount, Essex, CM13 2LJ |
| Approx. National Grid Ref. | 561749, 194143 |
| Site Area (Approx) | 0.1 hectares |
| Site Occupation | Residential |
| Local Authority | Brentwood Borough Council |
| Proposed Site Use | Residential with a basement located within the footprint of the building |

2.2 Walkover Survey

2.2.1 The site was visited by a Jomas Engineer on 15th November 2023. The following information was noted while on site.

Table 2.2: Site Description

| Area | Item | Details |
|----------|----------------------------|--|
| On-site: | Current Uses: | The site comprises the remnant foundations of a pre-existing residential building with associated garden and driveway. The site is vacant, disused and overgrown with vegetation. |
| | Evidence of historic uses: | No evidence of historic uses observed on site. |
| | Surfaces: | The footprint of the house, pre-existing driveway and a small section of what was once the rear garden consist of hardstanding brick, concrete and concrete slabs. The rear of the site and a small section of the front of site comprise soft cover (grass) which makes up the remaining 55%. |
| | Vegetation: | There are several large trees (10m-17m) around the perimeter of the site, as well as on neighbouring sites. The rear of the site has bushes and brambles along the eastern and northern perimeter of site which have become overgrown. |

| Area | Item | Details |
|--------------------|-------------------------------|--|
| | Topography / Slope Stability: | The site is observed to be generally flat and level. |
| | Drainage: | Site appears to be connected to normal drainage facilities with no issues noted. |
| | Services: | Services seen onsite include 2 electricity boxes along the eastern perimeter, and a blue pipe which is assumed to be a water pipe. It is unclear if services are still active. |
| | Controlled waters: | No controlled waters were observed on site. |
| | Tanks: | No tanks were observed on site. |
| Neighbouring land: | North: | Low density residential area |
| | East: | Low density residential area |
| | South: | Low density residential area and the road, Ridgeway |
| | West: | Low density residential area |

2.2.2 Photos taken during the site walkover are provided in Appendix 1.

2.3 Historical Mapping Information

2.3.1 The historical development of the site and its surrounding areas was evaluated following the review of a number of Ordnance Survey historic maps, procured from Groundsure, and these are provided in Appendix 3 of this report.

2.3.2 A summary produced from the review of the historical map is given in Table 2.3 below. Distances are taken from the site boundary.

Table 2.3: Historical Development

| Dates and Scale of Map | Relevant Historical Information | |
|--------------------------------|---|--|
| | On Site | Off Site |
| 1872-75 1:2,500 1:10,560 | The site is undeveloped and is part of open land presumably used for agricultural purposes. | The surrounding area comprises mostly open undeveloped land assumed to be for agricultural purposes. Several areas of wooded land are within 1km of the site. Several ponds are shown to be present within 500m of the site, including two large ponds approximately 400m southeast of the site. |
| 1895-97 1:2,500 1:10,560 | No significant changes. | A roadway has been constructed 100m to the northwest. A large pond is shown 20m northwest of the site. A 'Clay Pit' is noted 500m to the west. |

| Dates and Scale of Map | Relevant Historical Information | |
|---|--|---|
| | On Site | Off Site |
| 1920-21 1:2,500 1:10,560 | The road 'Ridgeway' has been constructed adjacent to the north and vegetation including trees are noted in the north of the site alongside the road. | Residential development has begun, with several buildings constructed south and north of the site, with associated roadways. Clay pit is now labelled as 'old clay pit'. |
| 1938/40 1:2,500 1:10,560 | The site now comprises a residential building with associated driveway and garden. | Adjacent sites now comprise residential buildings. |
| 1950-56 1:1,250 1:2,500 | No significant changes. | The pond 20m NW has been potentially infilled and is no longer present. No other significant changes. A 'Drain' is noted approximately 100m W. |
| 1957-60 1:1,250 1:10,560 | No significant changes. | Residential style development has continued in the area. Woodland 300m west of the site has been mostly felled to make way for residential development. Large ponds at Gipsy Corner (400m to the southeast) no longer shown. Drain (oriented east-west) shown approximately 100m to the west. Old clay pit no longer shown. |
| 1964-69 1:1,250 1:10,560 | No significant changes. | Most of the surrounding area now comprises residential style housing with occasional green areas. |
| 1968-78 1:1,250 1:2,500 1:10,000 | No significant changes. | Further residential style development has occurred 200m SW. |
| 1981-92 1:1,250 1:10,000 | The building has had an extension on the eastern side. | Further residential style development has occurred. |
| 2001-03 1:1,250 1:10,000 | No significant changes. | No significant changes. |
| 2010 1:10,000 | No significant changes. | No significant changes. |
| 2023 1:10,000 | No significant changes. | No significant changes. |

2.3.4 Aerial photographs supplied as part of the Groundsure Enviro+GeoInsight report range from 1999 to 2021. These generally align with the above mapping review,

showing the residential building with associated garden and driveway until the photograph dated 31/05/2021 where the building appears partially demolished.

2.4 Past Land Use

2.4.1 Groundsure provide some information on past land use on and in the vicinity of the site. Table 2.4 below summarises the information provided, which is presented in further detail in the Enviro+Geoinsight in Appendix 2. Where the identified features have appeared on more than one map they have been counted multiple times and therefore the reported numbers may be higher than the actual count.

Table 2.4: Past Land Use

| Type of Use | On site | Off-site (within 500m of site, unless stated otherwise) | Potential to Impact Site* |
|---------------------------------|---------------|--|---------------------------|
| Historical Industrial Land Uses | None reported | 14No. reported; nearest significant as Nurseries 254m South (1960), Brick Works 269m West (1921) | X |
| Historical Tanks | None reported | 1No. reported as Tanks 338m to the northeast (1950) | X |
| Historical Energy Features | None reported | 8No. reported; nearest is Electricity Substation 256m to the northeast (1969-90). | X |
| Historical Petrol Stations | None reported | None reported | X |
| Historical Garages | None reported | None reported | X |
| Historical Military Land | None reported | None reported | X |

* From a land contamination/site development perspective

2.5 Landfill, Waste and Potentially Infilled Surface Ground Workings

2.5.1 The Groundsure Enviro+Geoinsight Report provides information on active and historical landfills and waste sites. It also provides information on historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface; these features may or may not have been subsequently infilled. The following section summarises the information collected from the available sources.

Table 2.5: Landfill, Waste and Potentially Infilled Ground Surface Workings

| Type of Consent/Authorisation | On site | Off-site (within 500m of site, unless stated otherwise) | Potential to Impact Site* |
|-------------------------------|---------------|--|---------------------------|
| Active or Recent Landfill | None reported | None reported | X |
| Historical Landfill | None reported | None reported | X |
| Historical Waste Sites | None reported | None reported | X |
| Licensed Waste Sites | None reported | None reported | X |

| Type of Consent/Authorisation | On site | Off-site (within 500m of site, unless stated otherwise) | Potential to Impact Site* |
|--|---------------|---|---------------------------|
| Waste Exemptions | None reported | 1No. reported for Burning waste in the open 244m southeast of the site. | X |
| Potentially Infilled Surface Ground Workings | None reported | 3No. reported; nearest as Pond 22m north (1938) | X |

* From a land contamination/site development perspective

2.6 Current Industrial Land Use

2.6.1 The Groundsure Enviro+Geoinsight Report also provides information on various records relating to current industrial land use on and in the vicinity of the site. The following section summarises the information collected from the available sources.

Table 2.6: Current Industrial Land Use

| Type of Consent/Authorisation | On site | Off-site (within 500m of site, unless stated otherwise) | Potential to Impact Site* |
|---|---------------|--|---------------------------|
| Recent Industrial Land Uses | None reported | 1No. reported as Electricity Substation 117m W | X |
| Current or Recent Petrol Stations | None reported | None reported | X |
| High Voltage Electricity Cables | None reported | None reported | X |
| High Pressure Gas Pipelines | None reported | None reported | X |
| Sites Determined as Contaminated Land | None reported | None reported | X |
| Control of Major Accident Hazards (COMAH) and Notification of Installations Handling Hazardous Substances (NIHHS) Sites | None reported | None reported | X |
| Regulated Explosive Sites | None reported | None reported | X |
| Hazardous Substance Storage/Usage | None reported | None reported | X |
| Historical Licensed Industrial Activities | None reported | None reported | X |
| Licensed Industrial Activities | None reported | None reported | X |
| Licensed Pollutant Release | None reported | None reported | X |
| Radioactive Substance Authorisations | None reported | None reported | X |
| Licensed Discharge to Controlled Waters | None reported | None reported | X |
| Pollutant Release to Surface Waters (Red List) | None reported | None reported | X |
| Pollutant Release to Public Sewer | None reported | None reported | X |

| Type of Consent/Authorisation | On site | Off-site (within 500m of site, unless stated otherwise) | Potential to Impact Site* |
|--|---------------|--|---------------------------|
| List 1 and List 2 Dangerous Substances | None reported | None reported | X |
| Pollution Incidents | None reported | None reported | X |
| Pollution Inventory Substances | None reported | None reported | X |
| Pollution Inventory Waste Transfers | None reported | None reported | X |
| Pollution Inventory Radioactive Waste | None reported | None reported | X |

* From a land contamination/site development perspective

2.7 Tunnels and Railways

2.7.1 The Groundsure Enviro+Geosight Report provides information on railway tunnels and railways on and within the vicinity of the site, as summarised in the table below.

Table 2.7: Tunnels and Railways

| Feature | On site | Off-site (within 250m of site, unless stated otherwise) | Potential to Impact Site* |
|--|---------------|--|---------------------------|
| Underground Railways (London) | None reported | None reported | X |
| Underground Railways (Non-London) | None reported | None reported | X |
| Railway Tunnels | None reported | None reported | X |
| Historical Railway and Tunnel Features | None reported | None reported | X |
| Royal Mail Tunnels | None reported | None reported | X |
| Railways, Crossrail and HS2 | None reported | None reported | X |

* From a land contamination/site development perspective

2.8 Previous Site Investigations

2.8.1 No previous site investigation reports were provided at the time of writing.

2.9 Planning Information

2.9.1 A review of the local authority's planning portal was undertaken on 30 November 2023 at <https://publicaccess.brentwood.gov.uk/online-applications/pagedSearchResults.do?action=page&searchCriteria.page=1>.

2.9.2 A number of applications were found to have been made in the vicinity of the study site, mostly regarding extensions to houses, demolition of garages and tree alterations. No documents pertaining to land contamination or ground conditions could be found.

- 2.10 Sensitive Land Uses
- 2.10.1 The site is located within a Nitrate Vulnerable Zone for the River Chelmer.
- 2.10.2 A Nitrate Vulnerable Zone (NVZ) is a conservation designation of the Environment Agency for areas of land that drain into nitrate polluted waters, or waters which could become polluted by nitrates. Nitrate Vulnerable Zones were introduced by the UK government in response to the EU mandate that all EU countries must reduce the nitrate in Drinking Water to a maximum of 50 mg/l.
- 2.10.3 The NVZs cover large areas of land that have been identified as exceeding or being at risk of exceeding 50 mg NO₃/l.
- 2.10.4 The nearest designated ancient woodland is located 290m south of the site.
- 2.10.5 The London Brentwood green belt lies 344m southwest of the site.
- 2.10.6 The site is located within a SSSI Impact Risk Zone, however this type of residential development is not listed as required consultation in this regard.
- 2.10.7 No other sensitive land use was identified within 1km of the site.
- 2.11 Radon
- 2.11.1 As reported, the site is not within a radon affected area, as less than 1% of properties are above the action level.
- 2.11.2 Consequently, no radon protective measures are necessary in the construction of new dwellings or extensions as described in publication BR211 (BRE, 2023).
- 2.11.3 It should be noted however that a growing number of Local Authorities are adopting Public Health England guidance as outlined in their 'UK National Radon Action Plan' (PHE, 2018), which states that Radon measurements should be made in regularly occupied basements of properties irrespective of their geographical location. Therefore, such an assessment, or radon protection measures may be required by Brentwood Borough Council.

3 GEOLOGICAL SETTING & HAZARD REVIEW

3.1.1 The following section summarises the principal geological resources of the site and its surroundings. The data discussed herein is generally based on the information given within the Groundsure Report (in Appendix 2).

3.2 Solid and Drift Geology

3.2.1 Information provided by the British Geological Survey (BGS) indicates that the site is directly underlain by solid deposits of the Claygate Member. An extract of the BGS description is provided below:

“The Claygate Member comprises dark grey clays with sand laminae, passing up into thin alternations of clays, silts and fine-grained sand, with beds of bioturbated silt. Ferruginous concretions and septarian nodules occur in places.”

3.2.2 Superficial deposits of the Lowestoft Formation are reported 41m south of the site and as such may encroach onto the site.

3.2.3 No Made Ground is reported on site but given the sites identified history, a depth of Made Ground should be expected.

3.3 British Geological Survey (BGS) Borehole Data

3.3.1 As part of the assessment, publicly available BGS borehole records were obtained and reviewed from the surrounding area. The local records obtained are presented in Appendix 5.

3.3.2 The nearest such record was located approximately 171m north of the site, from December 2002.

3.3.3 This showed the underlying ground conditions to comprise vegetation over dark grey brown topsoil with roots and rootlets, over firm mottled orange brown and light grey sandy silty clay with occasional pockets and partings of orange brown silty and fine sand, which became stiff with depth, terminating at 1.35m bgl. This is considered likely to represent the Claygate Member deposits.

3.3.4 All depths and measurements should be viewed as approximate, due to the age of the borehole, and distance from site.

3.4 Geological Hazards

3.4.1 The following are brief findings extracted from the Groundsure Enviro+GeoInsight Report, that relate to factors that may have a potential impact upon the engineering of the proposed development.

Table 3.1: Geological Hazards

| Potential Hazard | Site check Hazard Rating | Details | Further Action Required? |
|----------------------------------|--------------------------|---|----------------------------|
| Shrink swell clays | Moderate | Ground conditions predominantly high plasticity. | Yes – Ground investigation |
| Running sands | Very low | Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly. | No |
| Compressible deposits | Negligible | Compressible strata are not thought to occur. | No |
| Collapsible Deposits | Very low | Deposits with potential to collapse when loaded and saturated are unlikely to be present. | No |
| Landslides | Very low | Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered. | No |
| Ground dissolution soluble rocks | Negligible | Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present. | No |
| Coal mining | None | The study site is not located within the specified search distance of an identified coal mining area. | No |
| Non-coal mining | None | The study site is not located within the specified search distance of an identified non-coal mining area. | No |

3.4.2 In addition, the Enviro+GeolInsight report notes the following:

3No. historical surface ground working features are reported within 250m of the site as ponds 22m north, 23m northwest and 25m north from 1921 to 1938.

No historical underground working features are reported within 1km of the site.

3.4.3 The clearance of the site, including removal of foundations and services is likely to increase the depth of Made Ground on the site.

3.4.4 Foundations should not be formed within Made Ground or organic rich materials (i.e. Topsoil and potentially may include superficial deposits if encountered) due to the unacceptable risk of total and differential settlement.

3.4.5 The presence of Made Ground derived from demolition material may be a source of elevated sulphate results associated with plaster from the previous structures.

3.4.6 The potential impacts of shallow groundwater should be considered during foundation design. The affects that this may have include (but are not limited to):

Permanent excavations – i.e. for items such as basements and drainage. This is likely to need waterproofing / tanking and may have flotation issues.

Temporary excavations – likely to affect side stability especially where the excavations are formed in granular materials.

Soakaways – likely to affect the permeability and therefore the effective use of soak-away drainage.

Concrete classification on the site (in accordance with BRE SD-1) due to the potential for a mobile groundwater table.

May require dewatering or groundwater exclusion techniques to be used.

Foundation design – likely to reduce the allowable bearing capacity that could be achieved in the superficial deposits.

3.4.7 It is recommended that a geotechnical ground investigation is undertaken to inform design.

4 HYDROGEOLOGY, HYDROLOGY AND FLOOD RISK REVIEW

4.1 Hydrogeology & Hydrology

4.1.1 General information about the hydrogeology of the site was obtained from the MAGIC website.

Groundwater Vulnerability

4.1.2 Since 1 April 2010, the EA's Groundwater Protection Policy uses aquifer designations that are consistent with the Water Framework Directive. This comprises;

Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;

Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Principal Aquifer – this is a formation with a high primary permeability, supplying large quantities of water for public supply abstraction.

Unproductive Strata - These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Source Protection Zones (SPZ)

4.1.3 In terms of aquifer protection, the EA generally adopts a three-fold classification of SPZs for public water supply abstraction wells.

Zone I - or 'Inner Protection Zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source.

Zone II - or 'Outer Protection Zone' is defined by a 400-day travel time to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants.

Zone III - or 'Total Catchment' is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.

Hydrogeology

- 4.1.4 The baseline hydrogeology of the site is based on available hydrogeological mapping, including the BGS online mapping, and generic information obtained from the Groundsure report.
- 4.1.5 The available data indicates that the geology of the area consists of the Claygate Member. It would be expected that a groundwater table would be encountered at a relatively shallow level within this stratum.
- 4.1.6 A watercourse is reported 47m southeast of the site as an inland river not influenced by normal tidal action.

Hydrology

- 4.1.7 The hydrology of the site and the area covers water abstractions, rivers, streams, other water bodies and flooding.
- 4.1.8 The Environment Agency defines a floodplain as the area that would naturally be affected by flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas.
- 4.1.9 There are two different kinds of area shown on the Flood Map for Planning. They can be described as follows:

Areas that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

from the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year;

or from a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year.

(For planning and development purposes, this is the same as Flood Zone 3, in England only.)

The additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.

(For planning and development purposes, this is the same as Flood Zone 2, in England only.)

- 4.1.10 These two areas show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.
- 4.1.11 Outside of these areas flooding from rivers and the sea is very unlikely. There is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. The majority of England and Wales falls within this area. (For planning and development purposes,

this is the same as Flood Zone 1, in England only.)

4.1.12 Some areas benefit from flood defences and these are detailed on Environment Agency mapping.

4.1.13 Flood defences do not completely remove the chance of flooding, however, and can be overtopped or fail in extreme weather conditions.

Table 4.1: Summary of Hydrogeological & Hydrology

| Feature | On Site | Off Site | Potential Receptor? | |
|------------------------|--|---|--|---|
| Aquifer | Superficial: | None | 3No. reported within 500m of the site; nearest as Secondary Undifferentiated 41m south. | |
| | Solid: | Secondary A | No other reported within 500m of the site. | X |
| Source Protection Zone | None | None reported within 500m of the site. | X | |
| Abstractions | Groundwater | None | 1No. reported within 2km of the site as historical for general farming & domestic use 1391m northwest. | X |
| | Surface water | None | None within 2km of the site. | X |
| | Potable water | None | None within 2km of the site. | X |
| Surface Water Features | None | 6No. surface water features reported within 250m of the site; nearest as inland river not influenced by normal tidal action 47m to the southeast. | X | |
| Discharge Consents | None | No records within 500m of the site. | X | |
| Flood Risk | EA Flood Zone 2 | No | None reported within 50m of the site. | X |
| | EA Flood Zone 3 | No | None reported within 50m of the site. | X |
| | RoFRaS | None | None reported within 50m of the site. | X |
| | Historical Flood Events | None reported within 250m of site. | | |
| | Flood Defences | There are no areas benefiting from Flood Defences within 250m of the study site | | X |
| | Surface Water Flooding | Highest risk on site is 'Negligible'. Highest risk within 50m of the site is 'Negligible'. | | X |
| Groundwater Flooding | Highest risk on site is 'Negligible'. Highest risk within 50m of the site is 'Negligible'. | | X | |

4.2 Flood Risk Review

4.2.1 In accordance with the NPPF Guidance, below is a review of flood risks posed to and from the development and recommendations for appropriate design mitigation where necessary. Specific areas considered are based on the requirements laid out in the “Camden Guidance for Subterranean Development” as this document is generally considered to be the most comprehensive Local Authority Guidance in the London area.

Table 4.2: Flood Risk Review

| Flood Sources | Site Status | Comment on flood risk posed to / from the development |
|--------------------------------|--|--|
| Fluvial / Tidal | Site is not within 250m of an Environment Agency Zone 2 or zone 3 floodplain. Risk of flooding from rivers and the sea (RoFRaS) rating is not reported. | Proposed basement development will be larger than the previously existing building footprint, however still considered low risk. |
| Groundwater | The BGS considers the highest risk of groundwater flooding onsite and within 50m of the site to be negligible. | As SUDS will be required by NPPF, PPG and LLFA policy requirements, this is likely to be provided by surface and above ground attenuation before releasing to the existing sewer network. This will ensure that the proposed development will not increase the potential risk of groundwater flooding. Basement will be fully waterproofed as appropriate to industry standard. Low Risk |
| Artificial Sources | None reported. | Low Risk |
| Surface Water / Sewer Flooding | 7No. surface water features within 250m of site, all as inland rivers not influenced by normal tidal action. Condition, depth and location of surrounding infrastructure uncertain. | As SUDS will be required by NPPF, PPG and LLFA policy requirements, these are likely to include attenuation before releasing to the existing sewer network. If permeable paving is used this would likely reduce the risk of surface water flooding. Combined, these are likely to reduce the risk of both surface and sewer flooding to both the site and surrounding properties. Basement will be fully waterproofed as appropriate to industry standard. Low Risk |
| Climate Change | Site not within climate change flood extent area | Development will not significantly increase the peak flow and volume of discharge from the site. Low risk posed to and from the development |

4.2.2 Information about the risk to the study site from flooding has been obtained from the following documents produced for Brentwood Borough Council: Strategic Flood Risk Assessment Level 1 (Amec Foster Wheeler Environmental & Infrastructure UK Ltd,

2018); Surface Water Management Plan (JBA Consulting, 2015), and from available flood mapping at the website 'flood.essex.gov.uk'. Potential impacts to the site are discussed below.

Flooding from Fluvial/Tidal Sources

- 4.2.3 The nearest water network is located approximately 730m north-west of site identified as the River Wid. Approximately 6No. EA historic flooding events are shown within 500m of site, the nearest being approximately 200m north-west from fluvial source.
- 4.2.4 The nearest main river is reported approximately 780m to the northwest (River Wid).
- 4.2.5 No EA recorded flood outlines or EA historic flooding events are shown within 250m of site. Figure 4.1 of the Level 1 SFRA reports Flood Zones 2 and 3 located within 100m of the site. The SWMP indicates the nearest fluvial flood incidents 200m northwest of the site.
- 4.2.6 Given this significant distance from a main river, and the fact that the site does not lie within an EA Flood Zone, it is considered there is a very low risk from fluvial flooding to occur at the subject site.

Groundwater Flooding

- 4.2.7 Groundwater flooding occurs when water levels in the ground rise above surface levels or into subterranean property such as basements. Rises in groundwater level close to or above ground level can result in interference to property and infrastructure.
- 4.2.8 The surface water management plan (SWMP) for Brentwood Borough states that there are no reported incidents of groundwater flooding in the area. The site is underlain by deposits of the Claygate Member which is designated a Secondary A aquifer. The SWMP also stated that soils within the Brentwood Borough are predominantly slowly permeable clayey soils with areas of impeded drainage.
- 4.2.9 The risk of groundwater flooding is considered to be low.

Surface Water Flooding

- 4.2.10 Surface water flooding occurs when rainwater does not drain away through drainage systems or soak into the ground, but lies on or flows over the ground instead. This happens following prolonged rainfall resulting in saturated ground and sewers/drainage being at full capacity, or, following a 'flash flood', rainwater may not have time to flow into sewers or soak into the ground due to the intensity of the rainfall. Water can re-emerge from surface water flow routes when connected pipes or watercourses experience high levels causing water to flow in the other direction and back onto the surface.

- 4.2.11 According to Figure A3d of the Brentwood SFRA, the site is not within surface water flood risk extents. Figure A4 shows an area of low risk is located adjacent to the north of the site. According to the SWMP, the nearest surface water flooding incident is approximately 950m to the northwest.
- 4.2.12 The site does not lie within an EA Flood Zone.
- 4.2.13 According to the Brentwood SFRA, the site is not within surface water flood risk extents. An area of low risk is located adjacent to the north of the site.
- 4.2.14 The risk of surface water flooding is therefore considered to be low.

Sewer/Artificial Flooding

- 4.2.15 The SWMP (2015) reports 1No. instance of sewer flooding in the borough in the Ingatestone area approximately 5km northeast of the site. The Brentwood SRFA also reports that no significant water bodies exist within the borough.
- 4.2.16 No artificial water sources were identified within 100m of site and the site is not indicated to be within the maximum extent of flooding of reservoirs.
- 4.2.17 The Brentwood SWMP shows the number of sewer flooding events for the area in the past 100 years. Over this period, 2-5 properties in the area were impacted by sewer flooding.
- 4.2.18 The risk of sewer flooding is considered to be low.

Critical Drainage Areas (CDAs)

- 4.2.19 A Critical Drainage Area is defined in the Town and Country Planning (General Development Procedure) (Amendment) (No. 2) (England) Order 2006 as “an area within Flood Zone 1 which has critical drainage problems and which has been notified... [to]...the local planning authority by the Environment Agency”.
- 4.2.20 They are where man made drainage infrastructure has been identified as at critical risk of failure, resulting in flooding. Such areas can be completely different or similar, to the areas identified by the Environment Agency as at risk of natural watercourse, river and sea flooding.
- 4.2.21 The SWMP (2015) reports a number of CDAs in the borough however a list could not be found. Available mapping at ‘flood.essex.gov.uk’ indicates the site lies within CDA ‘NBTW_004’.

Sustainable Drainage Systems (SuDS)

- 4.2.22 The basement is indicated to be larger than the previous property and is larger than the ground floor area of the proposed house. However, it is unlikely to significantly change the impermeable areas on site.

- 4.2.23 In accordance with the NPPF, PPG and LLFA policy requirements, sustainable drainage systems (SUDS) should be incorporated wherever possible to reduce positive surface water run-off and flood risk to other areas.
- 4.2.24 Given the expected underlying ground and hydrogeological conditions it is considered that infiltration drainage is unlikely to be suitable, and this is supported by Figure A8 of the level1 SFRA. However, the SWMP indicates that the site is in an area probably compatible for infiltration SUDS. Therefore, this should be confirmed by a ground investigation.
- 4.2.25 Attenuation drainage measures are likely to be required. This may include the replacement of hard cover with permeable hardstanding and surface / above-ground attenuation prior to discharge to storm sewers.

Conclusion

- 4.2.26 Based on the available data, the site is considered to be at low risk from identified potential sources of flooding. The basement can be constructed and operated safely in flood risk terms without increasing flood risk elsewhere and is therefore considered NPPF compliant.

4.3 Sequential and Exception Tests

- 4.3.1 The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available.

Sequential Test: within FZ1 hence pass by default.

- 4.3.2 Paragraph 19 of PPS25 recognizes the fact that wider sustainable development criteria may require the development of some land that cannot be delivered through the sequential test. In these circumstances, the Exception Test can be applied to some developments depending on their vulnerability classification (Table D.2 of PPS25). The Exception Test provides a method of managing flood risk while still allowing necessary development to occur.

Exception Test: FZ1 hence pass by default and low risk posed to and from other sources.

4.4 Flood Resilience

- 4.4.1 In accordance with general basement flood policy and basement design, the proposed development will utilize the flood resilient techniques recommended in the NPPF Technical Guidance where appropriate and also the recommendations that have previously been issued by various councils.

- 4.4.2 These include:

Basement to be fully waterproofed (tanked) and waterproofing to be tied in to the ground floor slab as appropriate: to reduce the turnaround time for returning the property to full operation after a flood event.

Plasterboards will be installed in horizontal sheets rather than conventional vertical installation methods to minimise the amount of plasterboard that could be damaged in a flood event.

Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property.

Any wood fixings on basement / ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event.

The basement waterproofing where feasible will be extended to an appropriate level above existing ground levels.

The concrete sub floor as standard will likely be laid to fall to drains or gullies which will remove any build-up of ground water to a sump pump where it will be pumped into the mains sewer. This pump will be fitted with a non-return valve to prevent water backing up into the property should the mains sewer become full.

Insulation to the external walls will be specified as rigid board which has impermeable foil facings that are resistant to the passage of water vapour and double the thermal resistance of the cavity.

5 SCREENING AND SCOPING ASSESSMENT

5.1 Screening Assessment

- 5.1.1 Screening is the process of determining whether or not there are areas of concern which require a BIA for a particular project. This was undertaken in previous sections by the site characterisation. Scoping is the process of producing a statement which defines further matters of concern identified in the screening stage. This defining is in terms of ground processes in order that a site specific BIA can be designed and executed by deciding what aspects identified in the screening stage require further investigation by desk research or intrusive drilling and monitoring or other work.
- 5.1.2 The scoping stage highlights areas of concern where further investigation, intrusive soil and water testing and groundwater monitoring may be required.
- 5.1.3 This Jomas BIA also takes into account the Campbell Reith pro forma BIA produced on behalf of and published by the London Borough of Camden as guidance for applicants to ensure that all of the required information is provided. Within the pro forma a series of tables have been used to identify what issues are relevant to the site.
- 5.1.4 Each question posed in the tables is completed by answering “Yes”, “No” or “Unknown”. Any question answered with “Yes” or “Unknown” is then subsequently carried forward to the scoping phase of the assessment.
- 5.1.5 The results of the screening process for the site are provided in Table 5.1 below. Where further discussion is required the items have been carried forward to scoping.
- 5.1.6 The numbering within the questions refers the reader to the appropriate question / section in the London Borough of Camden BIA pro forma.
- 5.1.7 It should also be noted that Brentwood Borough Council may not place the same importance on the issues identified in the London Borough of Camden’s guidance documents. It should be noted that the pro forma is mainly concerned with the pond chain on Hampstead Heath, if other ponds / waterbodies may similarly affect the development Jomas will indicate this.
- 5.1.8 A ground investigation is undertaken where necessary to establish base conditions and the impact assessment determines the impact of the proposed basement on the baseline conditions, taking into account any mitigating measures proposed.

Table 5.1: Screening Assessment

| Query | Y / N | Comment |
|--|---------|--|
| Subterranean (Groundwater) Flow (see London Borough of Camden BIA Pro Forma Section 4.1.1) | | |
| 1a) Is the site located directly above an aquifer? | Yes | The site is directly underlain by the Claygate Member, a Secondary (A) aquifer. |
| 1b) Will the proposed basement extend below the surface of the water table? | Unknown | The basement may potentially extend below a water table within the superficial deposits. This should be confirmed by a ground investigation. |
| 2) Is the site within 100m of a watercourse, well (disused or used) or a potential spring line? | Yes | 3No. surface water features are reported within 100m of site; nearest as inland river not influenced by normal tidal action 47m southeast. No detailed river networks within 500m of site. |
| 3) Is the site within the catchment of any surface water features? | Yes | 1No. reported as catchment for Haverings Grove Brook. |
| 4) Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas? | Yes | The proposed development will comprise the construction of a building with basement larger than the footprint of the previously existing building. |
| 5) As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)? | Yes | The proposed development will comprise the construction of a building with basement larger than the footprint of the previously existing building. |
| 6) Is the lowest point of the proposed excavation (allowing of 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)? | Unknown | 3No. surface water features are reported within 100m of site; nearest as inland river not influenced by normal tidal action 47m southeast. These are anticipated to be drainage ditches and the water level is unknown. |
| Slope Stability ((see London Borough of Camden BIA Pro Forma Section 4.2) | | |
| 1) Does the existing site include slopes, natural or manmade, greater than 7 degrees? (approximately 1 in 8) | No | The site is flat and level with the main road. |
| 2) Will the proposed re-profiling of landscaping change slopes at the property to more than 7 degrees? (approximately 1 in 8) | Unknown | Re-profiling of change of slopes is not anticipated. |
| 3) Does the developments' neighbouring land include railway cuttings and the like, with a slope greater than 7 degrees? (approximately 1 in 8) | No | No reported railway lines near to the site. Other land uses neighbouring site are residential. |

SECTION 5

SCREENING AND SCOPING ASSESSMENT

| Query | Y / N | Comment |
|--|---------|---|
| 4) Is the site within a wider hillside setting in which the general slope is greater than 7 degrees? (approximately 1 in 8) | No | Surrounding area is generally flat. |
| 5) Is the London Clay the shallowest strata at the site? | No | The site is directly underlain by deposits of the Claygate Member. |
| 6) 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? | Unknown | Several large trees were noted during the walkover survey around the perimeter of the site. These are anticipated to be retained during the development. |
| 7) Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site? | Unknown | The site is reported to be in area at moderate risk from shrink-swell clays. |
| 8) Is the site within 100m of a watercourse or a spring line? | Yes | 3No. surface water features are reported within 100m of site; nearest as inland river not influenced by normal tidal action 47m southeast. No detailed river networks within 500m of site. |
| 9) Is the site within an area of previously worked ground? | No | Site has only had the recently demolished development in place. |
| 10) Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction? | Unknown | The site is directly underlain by Secondary (A) aquifer of the Claygate Member, underlain by unproductive London Clay. Ground water level should be assessed by a ground investigation prior to construction to confirm its presence. |
| 11) Is the site within 50m of the Hampstead Heath ponds (or other waterbody)? | No | - |
| 12) Is the site within 5m of a highway or pedestrian 'right of way'? | Yes | The site faces onto a pavement and road on the north. |
| 13) Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties? | Unknown | Neighbouring foundations are unknown. |
| 14) Is the site over (or within the exclusion of) any tunnels e.g. railway lines? | No | No tunnels are reported near the site. |
| Surface Flow and Flooding (see London Borough of Camden BIA Pro Forma Section 4.3) | | |
| 1) Is the site within the catchment of the pond chains on Hampstead Heath? | No | - |
| 2) As part of the site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially different from the existing route? | Yes | The proposed development will comprise the construction of a building with basement larger than the footprint of the previously existing |

| Query | Y / N | Comment |
|--|-------|---|
| | | building, therefore surface water flow may be affected. Replacement of the proposed hardstanding areas with permeable paving as part of the likely required SUDs would increase the amount of water that would be discharged to the ground. |
| 3) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas? | Yes | The proposed development will comprise the construction of a building with basement larger than the footprint of the previously existing building. Replacement of the proposed hardstanding with permeable paving as part of the likely required SUDs would reduce the amount of hardstanding / impermeable paved areas. |
| 4) 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 | No surface waters in the area to be impacted. |
| 5) Will the proposed basement result in changes to the quality of surface waters being received by adjacent properties or downstream watercourses? | No | No surface waters in the area to be impacted. |
| 6) Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature? | No | 3No. surface water features are reported within 100m of site; nearest as inland river not influenced by normal tidal action 47m southeast. However, the site does not lie within a flood zone 2 or 3. The site is deemed to be at 'negligible' risk from groundwater flooding in the GroundSure report. |

5.2 Scoping

5.2.1 Scoping is the activity of defining in further detail the matters to be investigated as part of the BIA process. Scoping comprises of the definition of the required investigation needed in order to determine in detail the nature and significance of the potential impacts identified during screening.

5.2.2 The potential impacts for each of the matters highlighted in Table 5.1 above are discussed in further detail below together with the requirements for further investigations. Detailed assessment of the potential impacts and recommendations are provided where possible.

Subterranean (Groundwater) Flow

- 5.2.3 A ground investigation is recommended to confirm the ground conditions and groundwater levels (if any) beneath the site. This can then be used to confirm the relative depths of the basement to the groundwater levels.

Land Stability

- 5.2.4 The site, as with the surrounding area, is generally flat. The Groundsure report has noted that there is a “very low” risk of land instability issues for the site.
- 5.2.5 The recommended ground investigation should also determine the possibility of encountering groundwater and the possibility of Made Ground and/or clay. Atterberg Limits of the underlying clay should be determined by the ground investigation to assess shrink/swell potential of the soils.
- 5.2.6 It is noted that the London Borough of Camden’s guidance documents requires a Ground Movement Assessment to be undertaken as part of the Basement Impact Assessment. Such an assessment uses a ground model based on a zone of influence equivalent of four times the proposed depth of excavation. Consequently, such a study would be prudent.

Surface Flow and Flooding

- 5.2.7 The proposed development is to comprise the construction of a building with basement larger than the footprint of the previously existing building. The proportion of hard surfaced / paved areas may be increased.
- 5.2.8 As SUDS will be required by NPPF, PPG and LLFA policy requirements, this will be provided by surface and above ground attenuation before releasing to the existing sewer network. This will ensure that the proposed development will not increase the potential risk of groundwater flooding.

6 PRELIMINARY BASEMENT IMPACT ASSESSMENT

6.1 Proposed Changes to Areas of External Hardstanding

6.1.1 The site comprises the remnant foundations of a pre-existing residential building with associated garden and driveway. The proposed development will comprise the construction of new 3-storey building with basement, which will be slightly larger than the proposed ground floor area of the development, but largely within the footprint of the previous building. Overall, there is likely to be a slight increase in areas of external hardstanding.

6.1.2 As SUDS will be required by NPPF, PPG and LLFA policy requirements, where practicable, the designed hard surfaces will likely be replaced with permeable paving.

6.2 Past Flooding

6.2.1 The National Planning Policy Framework sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow.

6.2.2 When assessing the site-specific flood risk and the potential for historic flooding to reoccur the above guidance recommends that, historic flooding records and any other relevant and available information including flood datasets (e.g. flood levels, depths and/or velocities) and any other relevant data, which can be acquired are assessed.

6.2.3 The SWMP reports that there are no groundwater flood incidents reported within 1km of the site.

6.2.4 No EA recorded flood outlines are shown within 250m of site. The SWMP reports a fluvial flood incident approximately 200m northwest of the site.

6.2.5 The Brentwood SWMP reports no surface water flood incidents within 500m of the site.

6.2.6 The SWMP reports that 2-5 residential properties have been affected by sewer flooding within the area surrounding the site in the past 100 years.

6.2.7 The site is therefore considered to be at low risk of flooding based on historic flooding.

6.3 Geological Impact

6.3.1 The published geological maps indicate that the site is directly underlain by the Claygate Member. This will be confirmed by the intrusive investigation.

6.3.2 At the depths that the basement would be constructed at the Claygate Member may be prone to seasonal shrinkage and swelling that arises due to changing water content in the soil.

- 6.3.3 A ground investigation should be undertaken to determine the expected ground conditions and the depth of the groundwater table.
- 6.4 Hydrology and Hydrogeology Impact
- 6.4.1 The proposed development will lie outside of flood risk zones and is therefore assessed as being at low probability of fluvial flooding.
- 6.4.2 The risk of flooding from groundwater is considered to be low. The proposed basement is unlikely to have a detectable impact on the local groundwater regime.
- 6.4.3 Appropriate water proofing measures should be included within the whole of the proposed basement wall/floor design as a precaution.
- 6.4.4 There are 6No. surface water features within 250m of the site. However these are anticipated to be drainage ditches and therefore not in hydraulic continuity with the groundwater.
- 6.4.5 The SWMP (2015) reports a number of critical drainage areas (CDAs) in the borough. Available mapping at 'flood.essex.gov.uk' indicates the site lies within CDA 'NBTW_004'. As these are related to man-made drainage (i.e. sewers), the installation of attenuation to reduce the rate of peak flow into the sewers (i.e. as part of SUDS requirements) would reduce the chance of sewer flooding to occur.
- 6.4.6 The information available suggests that the site lies in an area that is at low risk of surface water flooding.
- 6.4.7 The proposed basement construction is considered unlikely to create a reduction of impermeable area in the post development scenario.
- 6.4.8 No risk of flooding to the site from artificial sources has been identified.
- 6.5 Impacts of Basement on Adjacent Properties and Pavement
- 6.5.1 The proposed basement excavation will not be within 5m of a public pavement. It is however anticipated to be within 5m of neighbouring properties.
- 6.5.2 Unavoidable lateral ground movements associated with the basement excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground, any associated services and structures.
- 6.5.3 It is recommended that the site is supported by suitably designed temporary support with a basement box construction. This will ensure that the adjacent land is adequately supported in the temporary and permanent construction. Alternatively, the excavation should proceed in a manner that maintains the integrity of the ground on all sides.

- 6.5.4 Careful and regular monitoring of the structure will need to be undertaken during the construction phase to ensure that vertical movements do not adversely affect the above property. If necessary, the works may have to be carried out in stages with the above structure suitably propped and supported.
- 6.5.5 It will be necessary to ensure that the basements are designed in accordance with the NHBC Standards and take due cognisance of the potential impacts highlighted above. This may be achieved by ensuring best practice engineering and design of the proposed scheme by competent persons and in full accordance with the Construction (Design and Management) Regulations. This will include:
- Establishment of the likely ground movements arising from the temporary and permanent works and the mitigation of excessive movements;
 - Assessment of the impact on any adjacent structures (including adjacent properties and the adjacent pavement with potential services);
 - Determination of the most appropriate methods of construction of the proposed basements;
 - Undertake pre-condition surveys of adjacent structures;
 - Monitor any movements and pre-existing cracks during construction;
 - Establishment of contingencies to deal with adverse performance;
 - Ensuring quality of workmanship by competent persons.
- 6.5.6 Full details of the suitable engineering design of the scheme in addition to an appropriate construction method statement should be submitted by the Developer to the Brentwood Borough Council.
- 6.6 Ground Movement
- 6.6.1 CIRIA C580 Table 2.5 uses information on the damage to walls of buildings based on Burland et al (1977), Boscardin and Cording (1989) and Burland (2001) to categorise damage into 5 categories. A summary of Table 2.5 from CIRIA C580 is provided below.
- 6.6.2 It would be generally good practise to ensure that the design and construction should aim to limit damage to all buildings to a maximum of Category 2 (Slight) as set out in CIRIA Report 580.

Table 6.1: Summary of CIRIA C580 Table 2.5 (after Burland et al (1977), Boscardin and Cording (1989) and Burland (2001))

| Category of damage | | Description of Typical Damage | Approximate crack width (mm) | Limiting tensile strain (%) |
|--------------------|-------------|---|---|-----------------------------|
| 0 | Negligible | Hairline cracks of less than about 0.1mm are classes as negligible. | < 0.1 | 0.0-0.05 |
| 1 | Very Slight | Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection. | <1 | 0.05-0.075 |
| 2 | Slight | Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weather tightness. Doors and windows may stick slightly | <5 | 0.075-0.15 |
| 3 | Moderate | The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather-tightness often impaired. | 5-15 or a number of cracks >3 | 0.15 – 0.3 |
| 4 | Severe | Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floors sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted. | 15-25 but also depends on number of cracks | >0.3 |
| 5 | Very Severe | This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability. | Usually >25 but depends on number of cracks | |

6.6.3 The first three categories (namely Negligible, Very Slight and Slight categories) are generally regarded as acceptable for buildings where no structural damage is permissible.

6.6.4 Assuming cantilever retaining walls are formed in short sections, it is considered that in the short term maintaining the category of damage to Category 1 could be relatively easily achieved. It would be recommended that a full inspection of the neighbouring properties should be undertaken prior to starting work and a watching brief of the structure, the excavations and the adjacent properties is maintained during the works.

- 6.6.5 In the long term a suitably designed and constructed retaining wall should provide sufficient support to ensure that post construction movement is minimal and the damage classification post construction of any cracks caused in the short term should not get worse. It is considered unlikely that new cracks would occur post construction.
- 6.6.6 This advice is provided based on the limited data currently available and is not a full Ground Movement Assessment.

7 REFERENCES

Groundsure Enviro+GeoInsight Report Ref JOMAS-DHA-MX3-YQU-8MZ November 2023

Environment Agency (2020); Land Contamination Risk Management (LCRM). <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

Ministry of Housing, Communities & Local Government: National Planning Policy Framework. February 2019

Investigation of Potentially Contaminated Sites – Code of Practice BS10175: 2011

BRE Report BR211; Radon: Guidance on protective measures for new buildings, 2023

British Standards Institution (2015) BS 5930:2015 Code of practice for ground investigations. Milton Keynes: BSI

CIRIA C580, Embedded retaining walls – guidance for economic design

Department of Environment Industry Profiles (1996) - Miscellaneous Land ISBN 1 85112 313 X

London Borough of Camden (January 2021) “Camden Planning Guidance Basements”

Campbell Reith (March 2018) “Pro Forma Basement Impact Assessment”, London Borough of Camden

APPENDICES

APPENDIX 1 – FIGURES

APPENDIX 2 – GROUNDSURE REPORTS

APPENDIX 3 – OS HISTORICAL MAPS

APPENDIX 4 – QUALITATIVE RISK ASSESSMENT METHODOLOGY

APPENDIX 5 – BGS BOREHOLE RECORDS

APPENDIX 6 – MAP EXCERPTS

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK



JOMAS ASSOCIATES LTD

24 Sarum Complex
Salisbury Road
Uxbridge
UB8 2RZ

CONTACT US

Website: www.jomasassociates.com
Tel: 0333 305 9054
Email: info@jomasassociates.com