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STAGE 1 & 2
BASEMENT IMPACT ASSESSMENT REPORT

30a GLENLOCH ROAD,
LONDON,
NW3 4DN

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EXECUTIVE SUMMARY

Alex Ferguson ("The Client") has commissioned Jomas Associates Ltd ('Jomas'), to prepare a Basement Impact Assessment for a site referred to as 30a Glenloch Road, London, NW3 4DN.

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 currently comprises a three-storey terraced residential property. There are 2No small existing basement rooms, both are understood to be at the same level.
Proposed Site Use	Small extension to an existing basement by both deepening and lateral amalgamation of two existing subterranean rooms. An existing light well is also proposed to be made larger.
Site History	On the earliest available maps (1870 – 1874), the site is shown to comprise undeveloped land located within Belsize Park. By 1915, a residential-style, terraced building with associated garden has been developed on the site. The site appears to be unchanged through to the most recent map, in 2021. Historically, the surrounding land has comprised mainly residential-style buildings, with significant development noted from the late 1800s through to the map dated 1915. There are no major surface water features noted in the site vicinity. No significant changes are noted to the surrounding land through to the most recent map, in 2021.
Site Setting	The British Geological Survey indicates that the site is directly underlain by solid deposits of the London Clay Formation. The underlying London Clay Formation is identified as unproductive strata. There are no surface water features reported within 250m of the site. The Fountains, culverted watercourse, is located 8m east of the site. This is considered to represent the lost River Tyburn which was culverted and incorporated into the Thames Water sewer network as "King's Scholar's Main Sewer". The site is located within an EA Flood Zone 1. The site is not within an area with a RoFRaS rating. The site is not within an area benefiting from flood defences. Groundsure states that the site is at negligible risk of both surface water and groundwater flooding.
Potential Geological Hazards	The Groundsure data identified a moderate risk of shrink swell clays beneath the site due to the underlying London Clay Formation. The presence of Made Ground may be a source of elevated sulphate results associated with plaster from the previous structures. In addition, the BGS notes disseminated pyrite within the London Clay Formation, which may also be a source of elevated sulphate. If such levels are noted, then sulphate resistant concrete may be required.

	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, slopes downwards towards the south-west. The Groundsure report has noted that there is a "very low" risk of land instability issues for the site. The recommended ground investigation should 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. Existing foundations should be established. 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 is strongly recommended.
Surface Flow and Flooding	The proposed basement will underlie the footprint of the existing building on site as well as existing hardstanding; there will be no significant change in surface water run-off. The presence of practically impermeable London Clay Formation directly underlying site should be confirmed by a ground investigation. 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.

Basement Impact Assessment	
Impact Assessment	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 be within 5m of a public pavement, and within 5m of neighbouring properties. 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.

	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. 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.

Recommended Further Work	
Works	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. A preliminary investigation could comprise a borehole drilled to at least 5m below the proposed depth of the basement. A Ground Movement Assessment is recommended.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Alex Ferguson ("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 30a Glenloch Road, London, NW3 4DN.

1.1.2 To this end a desk based assessment has been undertaken in accordance with Jomas' email proposal dated 23 August 2021.

1.2 Proposed Development

1.2.1 The proposed development for this site is understood to comprise a small extension to an existing basement by both deepening and lateral amalgamation of two existing subterranean rooms. An existing light well is also proposed to be made larger.

1.2.2 Plans of the proposed development are 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.

1.3 Objectives

1.3.1 The objectives of Jomas' investigation was 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;
- 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 As the site lies within the purview of the London Borough of Camden their document "Camden Planning Guidance Basements" (CPGB) (January 2021) has been used to form the methodology utilised in undertaking this BIA.

1.5.2 The CPGB differentiates between lower ground floors and basements, noting that storeys built partially below ground are common around London and especially in Camden, in particular in historic buildings. To be considered a lower ground floor and not a basement the storey must typically:

- Have a significant proportion above the prevailing ground level;
- Be accessible from the outside of the building at the front and rear of the property;
- Form part of the original fabric of a building, and Form part of the character of the area.

1.5.3 The proposed development does not meet these criteria so would be deemed a basement and require a BIA.

1.5.4 Jomas' BIA covers most items required under CPGB, with the exception of;

- Plans and sections to show foundation details of adjacent structures
- 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.

1.5.5 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.

1.5.6 A number of the requirements set out in the London Borough of Camden document CPGB will 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 Alex Ferguson 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	-
Address of Site	30a Glenloch Road, London, NW3 4DN
Approx. National Grid Ref.	527185, 184987
Site Area (Approx)	0.02ha
Site Occupation	Residential
Local Authority	London Borough of Camden
Proposed Site Use	Residential – extension of existing basement storage rooms to provide full height habitable space.

2.2 Walkover Survey

2.2.1 A site walkover survey was undertaken by Jomas Associates on 27 October 2021.

Table 2.2: Site Description

Area	Item	Details
On-site:	**Current Uses:**	Site consists of a three-storey Victorian terraced residential property. There are 2No basements understood to be at the same level; 1No of which is accessed from external stairs and the other internally through Flat 30a. It was noted that the neighbouring property adjacent to the south-west of site also has a basement.
	Evidence of historic uses:	No evidence of historic uses observed on site.
	Surfaces:	Roughly 95% of the site is covered by the footprint of the building and hardstanding concrete. The other ~5% comprises artificial grass.
	Vegetation:	Small plants and shrubs were identified along the boundaries of the garden. 6No trees between 20m and 30m in height are located in the vicinity of the rear garden, but not within the site boundary. 4No trees between 8m and 15m in height are located in front of the site on Glenloch Road.

Area	Item	Details
	Topography / Slope Stability:	Glenloch Road slopes downwards towards the south-west. The site is stepped throughout and sits at various different levels, but each level is flat. A lightwell is present at the front of site.
	Drainage:	Site appears to be connected to normal drainage facilities with no issues noted. Storm drains located on Glenloch Road.
	Services:	Site appears to be connected to all usual residential utilities which are in use.
	Controlled waters:	No controlled waters were observed on site.
	Tanks:	No tanks were observed on site.
Neighbouring land:	**North:**	Residential properties (Tudor Close, Hillfield Court).
	East:	Residential properties (Tudor Close, Glenloch Road, Glenmore Road).
	South:	Residential properties (Glenloch Road).
	West:	Residential properties (Tudor Close).

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**
1870 – 1871 1:2,500 **1871** 1:1,056 **1873 – 1874** 1:10,560	The site is undeveloped and is located within Belsize Park.	*Incomplete map data.* The surrounding land comprises undeveloped park land and residential-style development. A small, **circular water body** is located roughly 80m north-west of the site, with another **larger pond** roughly 300m west of site. A **railway tunnel** is indicated to run roughly east to west, approximately 150m north of the site, with an associated ventilation shaft located 240m north-east of site.

		A chain of large water bodies labelled **Hampstead Ponds (waterworks reservoirs)** are located as close as ~650m north.
1879 – 1882 1:10,560	*No map data.*	*Incomplete map data.* No significant changes noted.
1894, 1896 1:10,560 **1896** 1:1,056 1:2,500	No significant changes noted.	Large-scale residential-style development has taken place in the site vicinity, but not within 100m of the site. The nearest of the **Hampstead Ponds** appears to have been infilled, so the closest is now >750m from site. A second air shaft is shown 260m north-east of site.
1915 1:2,500 **1919** 1:1,056 **1920** 1:10,560	A residential-style, terraced building now covers the majority of the site, with associated garden in the north-west. This resembles the modern-day site configuration.	Further residential-style development has taken place in the site vicinity. The **circular water body** ~80m from site is no longer present, and the land has been developed; the pond has likely been infilled. A **tube station** is located roughly 200m north-east of site.
1935 1:2,500 **1938** 1:10,560	No significant changes noted.	*Incomplete map data.* Further residential development of area to north and west of site. Tudor Close and Hillfield Court are shown, along with a cinema.
1951 1:10,560 **1953, 1954** 1:1,250 **1953 – 1955** 1:2,500	No significant changes noted.	Another **railway tunnel** is shown approximately 250m north of site.
1957 – 1958 1:10,560	No significant changes noted.	No significant changes noted.
1965, 1969 – 1970 1:2,500 **1966 – 1969** 1:1,250 **1965 – 1968** 1:10,560	No significant changes noted.	No significant changes noted.
1973 – 1974 1:10,000 **1974 – 1977** 1:1,250	*Poor map quality.* No significant changes noted.	No significant changes noted.
1985 – 1994 1:1,250 **1989**	No significant changes noted.	*Incomplete map data.* No significant changes noted.

1:10,000		
2001 1:10,000 **2003** 1:1,250	No significant changes noted.	No significant changes noted.
2010, 2021 1:10,000	No significant changes noted.	No significant changes noted.

2.3.4 Aerial photographs supplied as part of the Groundsure Enviro+GeoInsight report range from 1999 to 2019. These generally show the site and surrounding land to be in the same configuration as the historical maps from around the same time.

2.4 Previous Site Investigations

2.4.1 Jomas Associates are not aware of any previous site investigations undertaken at the site prior to the writing of this report.

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 London Clay Formation. An extract of the BGS description is provided below:

> *"…bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places."*

3.2.2 No artificial deposits are reported on site but given the site's 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 4.

3.3.2 The nearest such record was located approximately 125m south-west of the site, drilled in June 2021.

3.3.3 This showed the underlying ground conditions to comprise "Made Ground" to a depth of 1.5mbgl. This was underlain by "London Clay" to 90mbgl, beneath which were "various coloured clays" to 105mbgl. These were underlain by "running sands" to the base of the borehole, at 110mbgl.

3.3.4 No groundwater data was recorded.

3.4 Geological Hazards

3.4.1 The following are brief findings extracted from the Groundsure 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
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 As outlined in Table 3.1 above, Groundsure identify there to be a moderate risk of shrink swell deposits existing immediately beneath the site. A ground investigation is recommended to further assess this risk.

3.4.3 In addition, the Enviro+GeoInsight report notes the following:

- 67No historical underground working features are reported within 1km of the site; the nearest 5No. entries all relate to a tunnel located 132-133m north of site, dated 1866-1995.
- No other features relating to mining, ground working or natural cavities were reported with 250m of the site.

3.4.4 Foundations should not be formed within Made Ground or organic rich materials (e.g Topsoil) 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. In addition, the BGS notes disseminated pyrite within the London Clay Formation, which may also be a source of elevated sulphate. If such levels are noted, then sulphate resistant concrete may be required.

3.4.6 It is recommended that a geotechnical ground investigation is undertaken to inform design and assess the identified 'moderate' shrink swell hazard.

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 and Groundsure report.

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 London Clay Formation. Groundwater is not expected to be present within this unproductive stratum.

Hydrology

4.1.6 The hydrology of the site and the area covers water abstractions, rivers, streams, other water bodies and flooding.

4.1.7 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.

4.1.8 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.)

4.1.9 These two areas show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

4.1.10 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.)

4.1.11 Some areas benefit from flood defences and these are detailed on Environment

Agency mapping.

4.1.12 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
Aquifer	**Superficial:**	-	None reported within 500m of site.
	Solid:	Unproductive	Secondary 'A' Aquifer, 311m north-west
Surface Water Features		None reported	1No Water Network (OS MasterMap) reported within 250m; recorded as The Fountains, underground inland river, located 8m east No surface water features reported within 250m of site
Discharge Consents		None reported	None reported within 500m of site
Flood Risk	**EA Flood Zone 2**	No	Not reported within 50m of site.
	EA Flood Zone 3	No	Not reported within 50m of site.
	RoFRaS	None	Not reported within 50m of site.
	Historical Flood Events	None reported within 250m of site	
	Flood Defences	There are no areas benefiting from flood defences reported within 250m of the study site	
	Surface Water Flooding	Negligible	Highest risk within 50m is 'negligible'
	Groundwater Flooding	Negligible	Highest risk within 50m is 'negligible'

4.1.14 According to "The Lost Rivers of London" (Barton 1992), the site is close to the source of a tributary of the lost river Tyburn. This is possibly the underground inland river identified as 'The Fountains' reported 8m east of site. However, Figure 2 of the Camden Strategic Flood Risk Assessment (URS, 2014) shows this feature to be a culverted watercourse running southwards from Hampstead No.1 Pond.

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".

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 none/negligible.	Low risk.
Groundwater	The BGS considers that the site is at negligible risk from groundwater flooding.	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	No surface water features within 250m of site.	Low risk.
Surface Water / Sewer Flooding	No surface water features within 250m of site. Condition, depth and location of surrounding infrastructure uncertain. An underground watercourse (The Fountains) is located 8m east of the site; likely linked with the Lost River Tyburn. which the Camden Strategic Flood Risk Assessment (URS, 2014) indicated was culverted and incorporated into the Thames Water sewer network. This feature could therefore be associated with sewer flooding.	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. Development unlikely to significantly increase the peak flow/volume of discharge from the site. Basement will be fully waterproofed as appropriate to industry standard. Low risk.
Climate Change	Included in the flood modelling extents. 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 London Borough of Camden: London Borough of Camden Strategic Flood Risk Assessment (URS, July 2014); Preliminary Flood Risk Assessment for London Borough of Camden (Halcrow, 2011); and Surface Water Management Plan for London Borough of Camden (Halcrow, 2011). Potential impacts to the site are discussed below.

Flooding from Fluvial/Tidal Sources

4.2.3 The nearest water network is located approximately 8m east of the site, identified as a culverted watercourse (The Fountains). Figure 2 of the Camden Strategic Flood Risk Assessment (URS, 2014) shows this feature to be a culverted watercourse running southwards from Hampstead No.1 Pond.

4.2.4 According to "The Lost Rivers of London" (Barton 1992), the site is close to the source of a tributary of the lost river Tyburn. This is likely the culverted watercourse identified close to site. The SFRA confirms that the River Tyburn was culverted and incorporated into King's Scholar's Main Sewer, outfalling into the River Thames at Pimlico near Vauxhall Bridge.

4.2.5 The SFRA states that all main rivers historically located within the borough are now culverted and incorporated into the TWUL (Thames Water) sewer network and therefore there is no fluvial flood risk within the borough.

Groundwater Flooding

4.2.6 Figure 4e of the SFRA shows the site is not within an area designated as having an increased susceptibility to elevated groundwater. The nearest EA groundwater flood incident is shown 500m north of site and the nearest LBC groundwater flood incident is shown approximately 1000m south-west of site.

4.2.7 The site (and most of the Borough) is underlain by unproductive strata of London Clay Formation. Groundsure report the site to be at negligible risk of groundwater flooding.

Sewer/Artificial Flooding

4.2.8 Figures 5a and 5b of the SFRA show the number of sewer flooding events for 4-digit postcode prefixes across the borough. For the postcode "NW3 4--" where the site is situated, only 1No. property has been impacted by internal sewer flooding and no properties have been affected by exterior sewer flooding. The London Borough of Camden SWMP states the postcodes at the highest risk of sewer flooding based on historic events, of which "NW3 4--" is not included.

4.2.9 The site is located >750m from the nearest reservoir – Hampstead No.1 Pond. In addition, this pond has the highest standard of protection of all the reservoirs in the borough (1 in 10,000-year rainfall event where overtopping occurs).

Surface Water Flooding

4.2.10 Figure 3iv of the SFRA indicates that risk of flooding from surface water at the site is very low (<1 in 1000 year). Figure 3ix also shows the flood hazard at site to be <0.75m (low).

4.2.11 In addition to this, the site lies within an EA Flood Zone 1. Based on EA mapping, the site and highways surrounding the site are not within an area identified as a high risk for surface water flooding potential; site itself not likely to be inundated.

Critical Drainage Areas (CDAs) and Local Flood Risk Zones (LFRZs)

4.2.12 A CDA is defined in the LBC SWMP as "*A discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more LFRZ during severe weather thereby affecting people, property or local infrastructure*".

4.2.13 A LFRZ is defined in the LBC SWMP as "*A discrete area of flooding that does not exceed the national criteria for a Flood Risk Area but affects houses, businesses and/or local infrastructure. The boundary is defined as the actual spatial extent of predicted flooding in a single location"*.

4.2.14 According to Figure 6 (Rev 2) of the SFRA, the site is situated within CDA Groupo3_005 and is therefore within a catchment area which contributes to a flooding hotspot.

4.2.15 However, the site itself is not within a LFRZ. The closest LFRZ within the CDA (South East Regents Park) is located approximately 2.7km south-east of the site.

Sustainable Drainage Systems (SuDS)

4.2.16 The basement is defined by the approximate footprint of the existing building and existing hardstanding; it is unlikely to significantly change the impermeable areas on site.

4.2.17 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.

4.2.18 Given the expected underlying ground and hydrogeological conditions it is considered that infiltration drainage would likely be impracticable.

4.2.19 It is likely that infiltrations SuDS would be restricted by the small size of the site and proximity to buildings and boundary walls. Therefore, SUDS are likely to comprise attenuation.

Conclusion

4.2.20 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.

4.2.21 Selected maps form the SFRA are provided in Appendix 5.

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 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?	No	The site is directly underlain by the London Clay Formation, which is classified as unproductive strata.
1b) Will the proposed basement extend below the surface of the water table?	Unknown	Due to the presence of unproductive, practically impermeable London Clay Formation reported to underlie the site, it is unlikely that groundwater will be encountered. However, 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?	No	A culverted watercourse (The Fountains), is located 8m east of the site. However, this is now part of Thames Water sewer network (King's Scholar's Main Sewer). No surface water features within 250m of site.
3) Is the site within the catchment of any surface water features?	No	No surface water features within 250m of site.
4) Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	No	The proposed development will comprise extension of the existing basement within existing areas of building footprint and hardstanding.
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)?	No	The proposed development will comprise extension of the existing basement within existing areas of building footprint and hardstanding. Infiltration SUDS/soakaways are unlikely to be feasible given the small size of site.
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?	No	No surface water features within 250m of site.
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 generally 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)	No	Re-profiling of change of slopes is not anticipated as part of the proposed development.

Query	Y / N	Comment
3) Does the developments' neighbouring land include railway cuttings and the like, with a slope greater than 7 degrees? (approximately 1 in 8)	No	There are no above-ground railways within 250m of the site. The nearest railway tunnel is located 132m north of site. Other land uses within the surrounding area are primarily residential.
4) Is the site within a wider hillside setting in which the general slope is greater than 7 degrees? (approximately 1 in 8)	Yes	Glenloch Road slopes downwards towards the south-west.
5) Is the London Clay the shallowest strata at the site?	Yes	The site is directly underlain by solid deposits of the London Clay Formation.
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?	No	No trees were noted on site during the walkover.
7) Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	Unknown	No obvious evidence of the effects of shrink-swell subsidence was noted on site. However, the site is directly underlain by the London Clay Formation and 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?	No	A culverted watercourse (The Fountains), is located 8m east of the site. However, this is now part of Thames Water sewer network (King's Scholar's Main Sewer). No surface water features within 250m of site.
9) Is the site within an area of previously worked ground?	No	Site has only had the current 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?	No	The site is directly underlain by unproductive strata of the London Clay Formation.
11) Is the site within 50m of the Hampstead Heath ponds (or other waterbody)?	No	No surface water features within 250m of site.
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 south-eastern side.
13) Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Unknown	Neighbouring foundations are unknown, however, during the walkover it was noted that the neighbouring property adjacent to the south-west of site also has a basement.
14) Is the site over (or within the exclusion of) any tunnels e.g. railway lines?	No	The nearest tunnel is located 132m north of site.

Query	Y / N	Comment
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	The site is located over 750m from the Hampstead Heath Ponds.
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?	No	The proposed development will comprise extension of the existing basement. The basement will primarily stay within the existing footprint of the building, with the exception of the extension of the light well at the front of the site beneath existing hardstanding. Therefore, surface water flow is unlikely to be affected.
3) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	The proposed development will comprise extension of the existing basement. The basement will primarily stay within the existing footprint of the building, with the exception of the extension of the light well at the front of the site beneath existing hardstanding. Therefore, there will be no change in proportion of hardstanding.
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 water features within 250m of site.
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 water features within 250m of site.
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	No surface water features within 250m of site. Site is located within an EA Flood Zone 1.

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, slopes downwards towards the south-west. 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 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 Existing foundations should be established.

5.2.7 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 is strongly recommended.

Surface Flow and Flooding

5.2.8 The proposed basement will underlie the footprint of the existing building on site as well as existing hardstanding; there will be no significant change in surface water run-off.

5.2.9 The presence of practically impermeable London Clay Formation directly underlying site should be confirmed by a ground investigation.

5.2.10 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 Existing areas of hardstanding include the existing building on site which covers the majority of the site, as well as some external hardstanding. The proposed development will comprise a basement within the existing footprint of the building and beneath external hardstanding.

6.1.2 As a result, there is unlikely to be an increase in the proportion of hardstanding areas and it is not considered necessary to undertake further assessment in relation to the proposed changes to areas of external hardstanding.

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 nearest EA groundwater flood incident is shown 500m north of site and the nearest LBC groundwater flood incident is shown approximately 1000m south-west of site.

6.2.4 For the postcode “NW3 4--” where the site is situated, only 1No. property has been impacted by internal sewer flooding and no properties have been affected by exterior sewer flooding.

6.2.5 There are no historical flood events reported by Groundsure within 250m of the site.

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

6.3 Geological Impact

6.3.1 With reference to British Geological Survey (BGS) mapping, the geology of the site is anticipated to comprise the London Clay Formation. Given that the site has been developed previously, a thickness of Made Ground could also be present overlying the natural soils. The ground conditions should be confirmed by an intrusive investigation.

6.3.2 The underlying solid geology (London Clay Formation) poses a moderate risk of shrink swell, and a ground investigation should be carried out to determine what considerations should be taken into account for basement design in this regard.

6.3.3 Due to the practically impermeable nature of the London Clay Formation, a shallow groundwater table is not anticipated. There is, however, the potential for perched groundwater to be encountered at the interface between the Made Ground and London Clay Formation, though significant volumes of water are not anticipated.

6.4 Hydrology and Hydrogeology Impact

6.4.1 Based on the information available at the time of writing, the risk of flooding from groundwater is considered to be very low. The proposed basement is unlikely to have a detectable impact on the local groundwater regime. Appropriate water proofing measures should be included within the whole of the proposed basement wall/floor design as a precaution.

6.4.2 The proposed development will lie outside of flood risk zones and is therefore assessed as being at a low probability of fluvial flooding.

6.4.3 There are no surface water features on or within 250m of the site. It is therefore not anticipated that the site will make any impact upon the hydrology of the area.

6.4.4 The lost River Tyburn has been culverted and incorporated into King's Scholar's Main Sewer (part of the Thames Water sewer network). This feature is located approximately 8m east of site, but it is not considered this will be impacted by the proposed basement extension.

6.4.5 The site is situated within CDA Groupo3_005 and is therefore within a catchment area which contributes to a flooding hotspot. However, the site is not within a LFRZ. The closest LFRZ within the CDA (South East Regents Park) is located approximately 2.7km south-east of the site.

6.4.6 The London Borough of Camden SWMP indicates that overall groundwater flooding across the Borough is considered to be a relatively low risk.

6.4.7 The information available suggests that the site lies in an area that is at low risk of surface water flooding.

6.4.8 The proposed basement construction is considered unlikely to create a reduction of impermeable area in the post development scenario.

6.4.9 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 be within 5m of a public pavement, and 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.

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 London Borough of Camden.

6.6 Accumulative Impacts

6.6.1 The site is reported to be directly underlain by practically impermeable London Clay Formation. Such materials would prevent both the movement of groundwater and the ingress of surface water into the ground.

6.6.2 SUDS will be required at the site; this will likely comprise an above or below ground attenuation tank before release.

6.6.3 The proposed development is therefore unlikely to have an accumulative impact on the local hydrology.

6.6.4 The ground and hydrology conditions will be confirmed by an intrusive investigation.

6.7 Size of Basement

6.7.1 The London Borough of Camden document "Camden Planning Guidance Basements" (January 2021) outlines how Local Plan Policy A5 on basements limits the size of basement developments.

Table 5.2: Screening Assessment

Criterion from LBC Policy A5	Jomas Comments on the Proposed Development in relation to LBC Policy A5
f. not comprise of more than one storey;	The proposed basement is only a single storey.
g. not be built under an existing basement;	The proposed development will comprise the lateral extension of an existing basement within the building footprint and hardstanding, and not beneath an existing basement.
h. not exceed 50% of each garden within the property;	The Camden guidance notes that this applies to the front garden, the rear garden and gardens to the side of the property individually, rather than calculated as an aggregated garden area for the whole property. The proposed basement will not extend beneath the existing rear garden, and will not exceed 50% of garden space.
i. be less than 1.5 times the footprint of the host building in area;	The proposed basement is very small in comparison to the footprint of the building, with the basement footprint being less than a third of the size of the main building footprint.
j. extend into the garden no further than 50% of the depth of the host building measured from the principal rear elevation;	The proposed basement will not extend beneath the existing garden, and is contained to the footprint of the existing building and part of the existing hardstanding at the front of the property.
k. not extend into or underneath the garden	The proposed basement will not extend beneath the existing garden, and is contained to the footprint of

Criterion from LBC Policy A5	Jomas Comments on the Proposed Development in relation to LBC Policy A5
further than 50% of the depth of the garden;	the existing building and part of the existing hardstanding at the front of the property.
l. be set back from neighbouring property boundaries where it extends beyond the footprint of the host building;	The proposed basement extension will not extends beyond the footprint of the host building.
m. avoid the loss of garden space or trees of townscape or amenity value	The proposed basement will not extend beneath the existing garden, and is contained to the footprint of the existing building and part of the existing hardstanding at the front of the property

7 REFERENCES

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

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Halcrow (2011) "*Preliminary Flood Risk Assessment, London Borough of Camden*"

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URS (July 2014) *"London Borough of Camden Strategic Flood Risk Assessment"*

APPENDICES

APPENDIX 1 – FIGURES

APPENDIX 2 – GROUNDSURE REPORT

APPENDIX 3 – OS HISTORICAL MAPS

APPENDIX 4 – BGS BOREHOLE RECORDS

APPENDIX 5 – SELECTED LONDON BOROUGH OF CAMDEN SFRA MAPS

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