DESK STUDY &
BASEMENT IMPACT ASSESSMENT

SPROUGHTON,
COURTENAY AVENUE,
LONDON,
N6 4LR



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EXECUTIVE SUMMARY

Leonidas Polemis ("The Client") has commissioned Jomas Associates Ltd ('Jomas'), to prepare a Basement Impact Assessment for a site referred to as Sproughton, Courtenay Avenue, London, N6 4LR. 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	This site is occupied by two buildings situated on a grassy compound. The main building is three storeys whereas the secondary building is of a single storey. There is an outdoor swimming pool located towards the centre of the site.
Proposed Site Use	The proposed development for this site is understood to comprise the demolition of existing buildings and the construction of a three storey house with a two storey basement.
Site History	On the earliest available map (1863), the site is shown as undeveloped and is cut through by some trees outlining the borders of fields. By the map 1864, the site has been developed into a woodland, named Bishop's Wood . No significant changes occur on site until the map dated 1936, where buildings are shown to have been developed on site in a similar configuration to those currently present. The 1995 map shows that two buildings and a tennis court occupy the site. No observational changes then occur to the site until the most recent map dated 2023. Historically, the surrounding area has comprised mainly agricultural land use, with residential developments being constructed from 1930's.
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 identified as unproductive. A review of the EnviroInsight Report indicates that there are no Environment Agency Zone 2 or Zone 3 flood zones within 250m of the site. There are no source protection zones within 500m of the site. There are no surface water, groundwater and potable abstractions reported within 2km of the site. There are 2No detailed river entries and 4No surface water features reported within 250m and 500m of the site respectively.
Potential Geological Hazards	The Groundsure data identifies a negligible to moderate risks for the potential hazards assessed. The presence of Made Ground and London Clay Formation may 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, 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 will comprise a basement which slightly changes the proportion of impermeable areas on site. Hence, there will be a change in surface water run-off. As the underlying London Clay is of very low permeability, SUDS design is likely to incorporate above ground attenuation.

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 not be within 5m of a public pavement. It is also not laterally 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. 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, the above 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. Depending on the proposed depth of basement and the distance to neighbouring properties, a Ground Movement Assessment may be required.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Leonidas Polemis ("The Client") has commissioned Jomas Associates Ltd ('Jomas'), to prepare a Desk Study and a Basement Impact Assessment (Screening & Scoping) at a site referred to as Sproughton, Courtenay Avenue, London, N6 4LR.

1.1.2 Jomas' work has been undertaken in accordance with email proposal dated 15th May 2023.

1.2 Proposed Development

1.2.1 The proposed development for this site is understood to comprise the demolition of existing buildings and the construction of a three-storey house with a two-storey basement.

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 London Borough of Haringey. The council has published a document "Haringey Council Planning Regeneration & Economy, draft basement development guidance note (June 2012). This gives a lot of detail on the issues relevant to basements within the London Borough of Haringey, but does not go into detail as to how these issues should be assessed.

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 the 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 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 Form Structural Design 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	Sproughton
Address of Site	Sproughton, Courtenay Avenue, Hornsey, London, N6 4LR
Approx. National Grid Ref.	526979, 188037
Site Area (Approx)	0.47 hectares
Site Occupation	Residential
Local Authority	London Borough of Haringey
Proposed Site Use	Demolition of existing buildings and the construction of a three-storey house with two storey basement.

2.2 Walkover Survey

2.2.1 The site was visited by a Jomas Engineer on 23rd May 2023. The following information was noted while on site.

Table 2.2: Site Description

Area	Item	Details
On-site:	**Current Uses:**	This site is occupied by two buildings situated on a grassy compound. The main building is three storeys whereas the secondary building is of a single storey. There is an outdoor swimming pool located towards the centre of the site.
	Evidence of historic uses:	No evidence of historic uses observed on site.
	Surfaces:	The site consists of predominantly soft landscaping cover. The hardstanding areas on site include the existing buildings on site, driveway and around the swimming pool.

Area	Item	Details
	Vegetation:	There are trees and shrubs which border the perimeter of the site. This vegetation border extends approximately three metres from the property boundary. The trees on site range approximately between 10 and 20m in height.
	Topography / Slope Stability:	The site is generally observed to be flat; However, there is a slight west to southeast slope present at the back garden lawn, down to the swimming pool. There were some low retaining walls next to the building for decorative flowerbeds. There was a low retaining wall separating the pool area from the back lawn area which had a height of 49cm.
	Drainage:	Site appears to be connected to normal drainage facilities with no issues noted. There were three soakaways observed on site.
	Services:	Site appears to be connected to services.
	Controlled waters:	Two ponds, a disused fountain, and a swimming pool.
	Tanks:	No tanks were observed on site.
Neighbouring land:	**North:**	Residential
	East:	Golf course (Highgate golf club)
	South:	Residential
	West:	Residential

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
1863 1:2,500	The site is undeveloped and is cut through by some trees outlining the borders of fields.	There appears to be a residential property roughly 150m the west of the site.
1864 1:2,500	The site has been developed into a woodland, named Bishop's Wood	The surrounding area has also been developed into a woodland.

Dates and Scale of Map	Relevant Historical Information	
	On Site	Off Site
1873 - 1979 1:10,560	No significant changes	A railway line runs southeast to northwest roughly 1000m northeast of the site.
1894 1:10,560	No significant changes	Roughly 100m to the west of the site the road Bishop's Avenue has been developed. A **pond** is noted approximately 600m northwest of the site.
1896 1:10,560	No significant changes	Approximately 400m southwest of the site there is a **farm** bordering on a recreational golf course. Further southwest, beyond Turner's Wood there is a body of water roughly 770m from the site. There are also several farms in this area. East of the site there are four small ponds. Further south beyond 750m from the site there are seven larger bodies of water. To the northeast of the site approximately 1000m away there is a **carriage shed** and East Finchley station.
1915 1:2,500	No significant changes	To the south/southwest of the site between 100-250m there have been building developments.
1920 1:10,560	No significant changes	Cuttings are shown at Ken Wood, approximately 650m south of the site.
1936 1:2,500	Buildings developed on site, in a similar configuration to those currently present on the site.	Residential development observed in the area to the south/southeast of site. Courtenay Avenue has been developed immediately south of the site running north to south. North of the site some residential development has occurred. To the north of the site, roughly 100m away, several **ponds** and weirs are observed. Approximately 250m north of the site, several **ponds** are shown in the grounds of residential houses.
1951 1:1,250	No significant changes	No significant changes
1958 1:10,560	No significant changes	Further residential development in the surrounding area.
1959 1:1,250	No significant changes	Property Immediately west of the site is now shown as a hospital (North Middlesex Hospital Maternity Annexe). A tennis court and a small **pond** are also shown in this area.

Dates and Scale of Map	Relevant Historical Information	
	On Site	Off Site
1965 1:10,560	No significant changes	No significant changes.
1970 1:2500	A tennis court has been developed on site.	The small **pond** immediately west of the site has been infilled. Electricity transformer also located immediately west of the site.
1975 1:10,000	No significant changes	No significant changes
1991 1:1,250	No significant changes.	No significant changes.
1995 1:1,250	No significant changes.	Electricity transformer located immediately west of site has been renamed as substation. A small **pond** is observed immediately south of the site.
2001 1:10,000	No significant changes	There is an electricity substation located 450m east of the site at the golf course. Approximately 600m southeast of the site a **nursery** has been developed off Hampstead Lane.
2010 1:10,000	No significant changes	Private hospital located approximately 750m east of the site. The **small pond** observed immediately south of the site appears to have been infilled.
2023 1:10,000	No significant changes	No significant changes

Potentially polluting/contaminating uses/activities shown in **bold**

2.3.3 Aerial photographs supplied as part of the GroundSure Enviro+GeoInsight report range from 1999 to 2021. These show the site to be occupied by 2 buildings, a driveway and a swimming pool. The site is a residential area with a golf course to the east. No significant changes are shown between photographs.

2.4 Previous Site Investigations

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

2.5 Planning Information

2.5.1 A review of the local authority's planning portal was undertaken on 24th May 2023 at https://www.haringey.gov.uk/planning-and-building-control/planning/planning-application.

2.5.2 No reports relating to ground conditions or flood risk could be found within the same postcode as the study site.

2.6 Sensitive Land Uses

2.6.1 Hampstead Heath Woods, a Site of Special Scientific Interest (SSSI) is located 408m south of the site.

2.6.2 The nearest listed building is located 212m southwest of the site.

2.6.3 The nearest designated ancient woodland is located 715m southwest of the site.

2.6.4 The site lies within a conservation area.

2.6.5 There are 33No habitats of principal importance recorded within 250m of the site. Deciduous woodland is reported on site.

2.6.6 The site is located within a SSSI Impact Risk Zone. The proposed development is unlikely to require consultation.

2.6.7 No sensitive land use was identified within 1km of the site.

2.7 Radon

2.7.1 The site is reported not to lie within a Radon affected area, as less than 1% of properties are above the action level.

2.7.2 Consequently, no radon protective measures are necessary in the construction of new dwellings or extensions as described in publication BR211 (BRE, 2015).

2.7.3 It should be noted however that a growing number of London Boroughs 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 the London Borough of Haringey.

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."*

3.2.2 Solid deposits of the Claygate Member are indicated 44m to the south of the site, and may impinge on 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 2No BGS borehole records were available within 250m of the site.

3.3.2 The nearest such accessible record was located 149m south of the site, in February 1992.

3.3.3 This showed the underlying ground conditions to comprise 'Topsoil' to a depth of around 0.3mbgl. The Topsoil was overlying 'firm to stiff orange-brown and light grey silty slightly sandy clay' (representing the Claygate Member) to a depth of 4.05mbgl, overlying 'firm to stiff mid-grey very silty slightly sandy clay' (representing the Claygate Member) to a depth of 8mbgl. This in turn was overlying 'stiff becoming very stiff mid-grey silty clay' (London Clay Formation) to the base of the borehole, at approximately 15mbgl.

3.3.4 During the drilling of the borehole groundwater was first struck at ~3.5mbgl.

3.3.5 All depths and measurements should be viewed as approximate.

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 In addition, the GeoInsight report notes the following:

- 5No historical surface ground working features are reported within 250m of the site. The nearest is identified as a pond reported 28m northeast of the site.
- 3No. historical underground working features are reported within 1km of the site. All are reported 443m northeast as an “Unspecified Shaft”.

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) 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 BGS notes disseminated pyrite within the London Clay Formation and as such may be a source of elevated sulphate. If such levels are noted, then sulphate resistant concrete may be required.

3.4.7 Based on the underlying geology, a shallow groundwater table is not anticipated.

3.4.8 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 London Clay Formation. It would be expected that a groundwater table would not be encountered within this stratum due to its impermeable nature.

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	None
	Solid:	Unproductive	Secondary A, 44m south
Source Protection Zone		None	None
Abstractions	Groundwater	None	None within 2000m
	Surface water	None	None within 2000m
	Potable water	None	None within 2000m
Surface Water Features		"Inland river not influenced by normal tidal action"	4No surface water features within 250m of site. 20No detailed river networks within 500m of site.
Discharge Consents		None	1No reported 368m northeast of the site.
Flood Risk	**EA Flood Zone 2**	No	No records within 50m
	EA Flood Zone 3	No	No records within 50m
	RoFRaS	None	No records within 50m
	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.	
	Surface Water Flooding	Highest risk on site is 'Negligible'. Highest risk within 50m of the site is 1 in 30 years, 0.1m – 0.3m.	
	Groundwater Flooding	High risk on site and within 50m of the site is 'Negligible'.	

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 very low.	Very low risk of flooding from fluvial and tidal sources.
Groundwater	Groundsure reports a "negligible" risk of groundwater flooding on, and within 50m of site.	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	Two ponds, a disused fountain, and a swimming pool are located on site.	Low Risk
Surface Water / Sewer Flooding	21No Water Network records within 250m. The nearest is reported as an 'inland river not influenced by normal tidal action' 43m northeast. 4No surface water features within 250m of site. 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	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 Haringey: Surface Water Management Plan (Capita Symonds, 2011), Haringey Council: Strategic Flood Risk Assessment Draft report (JBA Consulting, 2015); Haringey Council Draft Basement Development Guidance Note (Haringey Council, 2012); and North London Strategic Flood Risk Assessment (Mouchel, 2008). Potential impacts to the site are discussed below.

Flooding from Fluvial/Tidal Sources

4.2.3 The nearest water network is located in close proximity to the north of the site identified as the Upper Mutton Brook.

4.2.4 Figures 2.1 and 2.2 of the London Borough of Haringey Strategic Flood Risk Assessment (SFRA) are provided as Figures 5 and 6 within the appendices of this report. The figures indicate that the culverted Upper Mutton Brook Stream may run in close proximity to the site.

4.2.5 Figure 7 of the LB Haringey SWMP, shown as Figure 7 within the appendices of this report, shows no historical flood outlines from fluvial flooding incidents. There are no historical flood outlines within 2km of the site. The nearest fluvial flood incident is reported over 2km east of the site.

4.2.6 According to the Groundsure Enviro+GeoInsight report, there are no RoFRAS records within 50m of the site.

Groundwater Flooding

4.2.7 The North London Strategic Flood Risk Assessment (SFRA) reports that Haringey is not at risk of groundwater or tidal flooding.

4.2.8 According to the Groundsure Enviro+GeoInsight report, the risk of groundwater flooding at the site as 'Negligible'.

4.2.9 Figure 10 of the LB Haringey SWMP, shown as Figure 8 within the appendices of this report, does not show the site within an area of permeable superficial deposits. The nearest groundwater flood incident is reported approximately 1km east of the site.

Surface Water Flooding

4.2.10 Figure 4 of the LB Haringey SWMP, shown as Figure 9 within the appendices of this report, shows the site approximately 250m away from a 200yr surface water flooding event (deep).

4.2.11 Figure 5 of the LB Haringey SWMP, shown as Figure 10 within the appendices of this report shows the site within an area of 0.1m-0.25m depth of surface water flowing, this is the 2nd lowest depth band. No surface water flooding incidents are shown within 2km of the site.

4.2.12 According to the Groundsure Enviro+GeoInsight report, the risk of surface water flooding at the site as 'Negligible'.

Sewer/Artificial Flooding

4.2.13 The SFRA shows the site located within an area supported by surface water sewer systems.

4.2.14 Figure 9 of the LB Haringey SWMP, shown as Figure 11 within the appendices of this report, shows the number of sewer flooding records for the postcode N6 4 as, 1No to 5No.

4.2.15 This number is relatively low for the London Borough of Haringey, with the highest reported as 21No to 50No.

4.2.16 However, Figure 9 does not show any sewer flooding incidents within the borough.

4.2.17 The site is not shown within the maximum extent of flooding of reservoirs.

Critical Drainage Areas (CDAs)

4.2.18 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".

4.2.19 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.

4.2.20 8No Critical Drainage Areas (CDA) are located wholly within the London Borough of Haringey Surface Water Management Plan (SWMP). The site is not located within a Critical Drainage Area (CDA).

4.2.21 Figure 19 of the LB Haringey SWMP, shown as Figure 12 within the appendices of this report, indicates the degree of critical flood hazard for the site area as 'moderate'. This can be interpreted as a flood zone with deep or fast flowing water.

Sustainable Drainage Systems (SuDS)

4.2.22 The proposed development will comprise a basement which slightly changes the proportion of 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 Figure 11 of the LB Haringey SWMP, shown as Figure 13 within the appendices of this report, shows the site within an area where infiltration SuDS are potentially unsuitable.

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

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 the London Borough of Haringey 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?	No	The site is directly underlain by the London Clay Formation.
1b) Will the proposed basement extend below the surface of the water table?	Assumed No	No extensive groundwater table anticipated within the London Clay Formation.
2) Is the site within 100m of a watercourse, well (disused or used) or a potential spring line?	Yes	1No "Inland river not influenced by normal tidal action" reported on site. 4No surface water features within 250m of site. 20No detailed river networks within 500m of site.
3) Is the site within the catchment of any surface water features?	Yes	The Dollis Brook and Upper Brent surface water body catchment is reported on site.
4) Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	Yes	The proposed development will comprise a basement which slightly changes the proportion of impermeable areas on site.
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)?	Assumed Yes	The proposed development will comprise a basement which slightly changes the proportion of impermeable areas on 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?	Yes	River reported on site. However, this wasn't observed during the walkover. There is a pond reported 28m northeast of the site. The mean level of the pond or the river 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)	Yes	The back garden lawn had a slope greater than 7 degrees.
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 based on proposed drawings.
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 railway line entries reported within 250m of site. Other land uses neighbouring site are residential.
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.

Query	Y / N	Comment
5) Is the London Clay the shallowest strata at the site?	Yes	The site is reported to be 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	Trees were noted along the perimeter of the property, however, proposed plans suggest the trees will be retained.
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. No evidence of structural distress caused by seasonal shrink/swell was noted during the external walkover.
8) Is the site within 100m of a watercourse or a spring line?	Yes	1No "Inland river not influenced by normal tidal action" reported on site. 4No surface water features within 250m of site. 20No detailed river networks within 500m of site.
9) Is the site within an area of previously worked ground?	No	The 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 solid deposits of the London Clay Formation.
11) Is the site within 50m of the Hampstead Heath ponds (or other waterbody)?	Yes	A pond is reported 28m to the northeast of the site.
12) Is the site within 5m of a highway or pedestrian 'right of way'?	No	-
13) Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Unknown	Neighbouring foundations are unknown. The property is detached and therefore foundations are independent of neighbouring properties.
14) Is the site over (or within the exclusion of) any tunnels e.g. railway lines?	No	No tunnels are reported within 250m of 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 a basement which slightly changes the proportion of impermeable areas on site. Hence, surface water flow may be affected.

Query	Y / N	Comment
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 a basement which slightly changes the proportion of impermeable areas on site.
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?	Yes	The proposed development will comprise a basement which slightly changes the proportion of impermeable areas on site. Hence, surface water flow may be affected.
5) Will the proposed basement result in changes to the quality of surface waters being received by adjacent properties or downstream watercourses?	No	Surface water quality is unlikely to be significantly 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	Site is not located within an EA flood zone, and negligible to low risk of flooding from sources outlined in Section 4.2.

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 Except for the slope situated in the back garden lawn, 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 may be required, depending on the proposed depth of the basement excavation and the distance to the nearest property.

Surface Flow and Flooding

5.2.7 The proposed development will comprise a basement which slightly changes the proportion of impermeable areas on site. Hence, surface water flow may be affected; there will be change in surface water run-off.

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.

5.2.9 Plan showing the topography of the site and surrounding area is included as Figure 14.

6 PRELIMINARY BASEMENT IMPACT ASSESSMENT

6.1 Proposed Changes to Areas of External Hardstanding

6.1.1 Existing areas of hardstanding includes the existing buildings on site, driveway and around the swimming pool. The proposed development for this site is understood to comprise the demolition of existing buildings and the construction of a three storey house with double height basement. A new pond will also be built at the southeast of the site.

6.1.2 As SUDS will be required by NPPF, PPG and LLFA policy requirements, where practicable, the remaining hard surfaces will likely be replaced with permeable paving. Positive drainage and attenuation is likely to be required for this, due to the very low permeability of the underlying London Clay Formation.

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 Figure 9 of the LB Haringey SWMP shows the number of sewer flooding records for the postcode N6 4 as, 1No to 5No.

6.2.4 This number is relatively low for the London Borough of Haringey, with the highest reported as 21No to 50No.

6.2.5 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 solid deposits of the London Clay Formation. This will be confirmed by the intrusive investigation.

6.3.2 At the depths that the basement would be constructed at the London Clay is unlikely to be prone to seasonal shrinkage and swelling that arises due to changing water content in the soil.

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 negligible. The proposed basement is unlikely to have a detectable impact on the local groundwater regime.

6.4.2 Appropriate water proofing measures should be included within the whole of the proposed basement wall/floor design as a precaution.

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

6.4.4 There are 4no surface water features on or within 250m of the site. The groundsure also reports 21no water networks within 250m of the site with the nearest one reported on site as “inland river not influenced by normal tidal action”.

6.4.5 This site is not located within a Critical Drainage Area.

6.4.6 The information available indicates that the site lies in an area that is at negligible risk of surface water and groundwater 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 also not 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 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.

6.5.5 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 Haringey.

6.6 Cumulative Impacts

6.6.1 The above individual effects could interact to form a greater issue.

6.6.2 The site has been identified as being directly underlain by very low permeability London Clay Formation.

6.6.3 Such materials would prevent the movement of groundwater and the ingress of surface water into the ground.

6.6.4 The development of the basement would not significantly affect the groundwater flow through the ground due to the very low permeability London Clay Formation.

6.6.5 The construction of the proposed basement would not reduce the groundwater flow through the general area due to the impermeability of the natural materials.

6.7 Ground Movement

6.7.1 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.

6.7.2 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	

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

6.7.4 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.

6.7.5 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.

6.7.6 This advice is provided based on the limited ground investigation undertaken and is not a full Ground Movement Assessment.

7 REFERENCES

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APPENDICES

APPENDIX 1 – FIGURES

APPENDIX 2 – GROUNDSURE REPORTS

APPENDIX 3 – OS HISTORICAL MAPS

APPENDIX 4 – BGS BOREHOLE RECORDS

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