jms CIVIL & STRUCTURAL CONSULTING ENGINEERS

Basement Impact Assessment

20-21 King's Mews
London. WC1N 2JB

Structural & Civil Engineering Only.

Preamble

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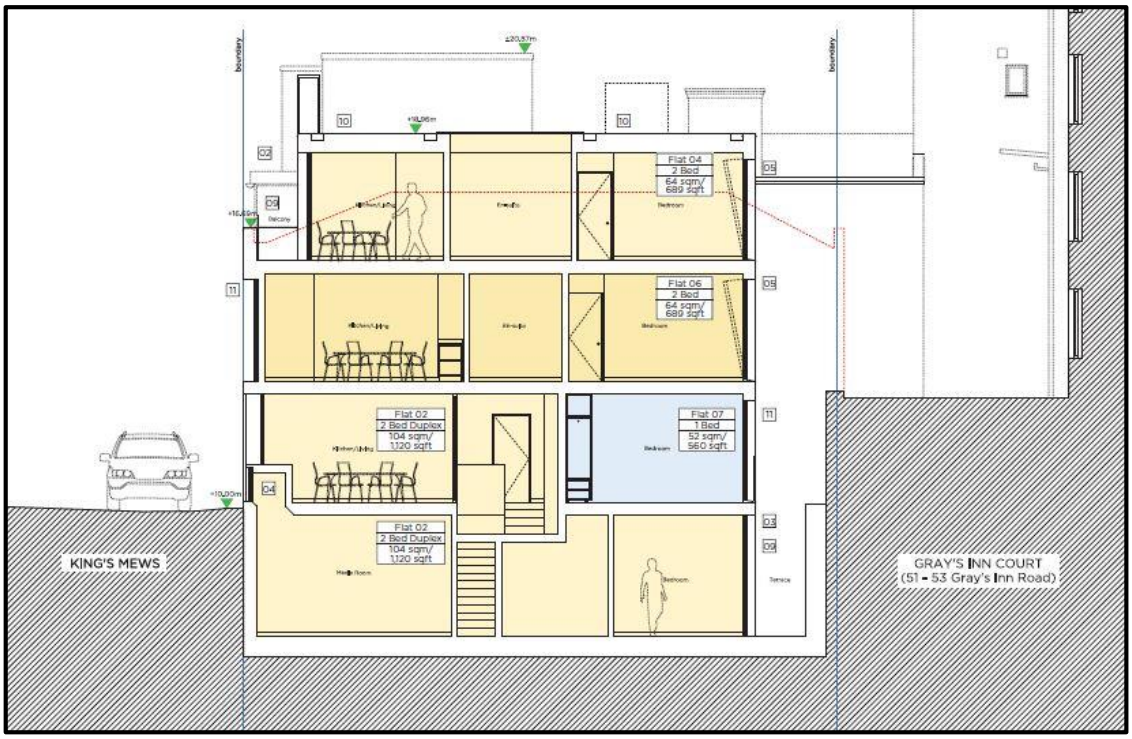
Structural stability analysis has been provided by JMS Engineers (London) Ltd – D Staines Structural Engineer
Surface flow & flooding analysis has been provided by JMS Engineers (East Anglia) Ltd. – R Wigzell. Civil Engineer



Contents.

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1.0 Introduction

1.1 This report has been prepared to set out the proposed design philosophy and construction method statement for the proposed basement construction at 20 – 21 King's Mews London. WC1N 2JB. It will summarise the basis of the structural and civil engineering design and will be issued to all relevant parties including the Client, Local Planning Authority and Design team members.

1.2 The proposal is for the demolition of existing garage structures and the construction of a new building to provide 6 flats over 3 floors plus a basement.

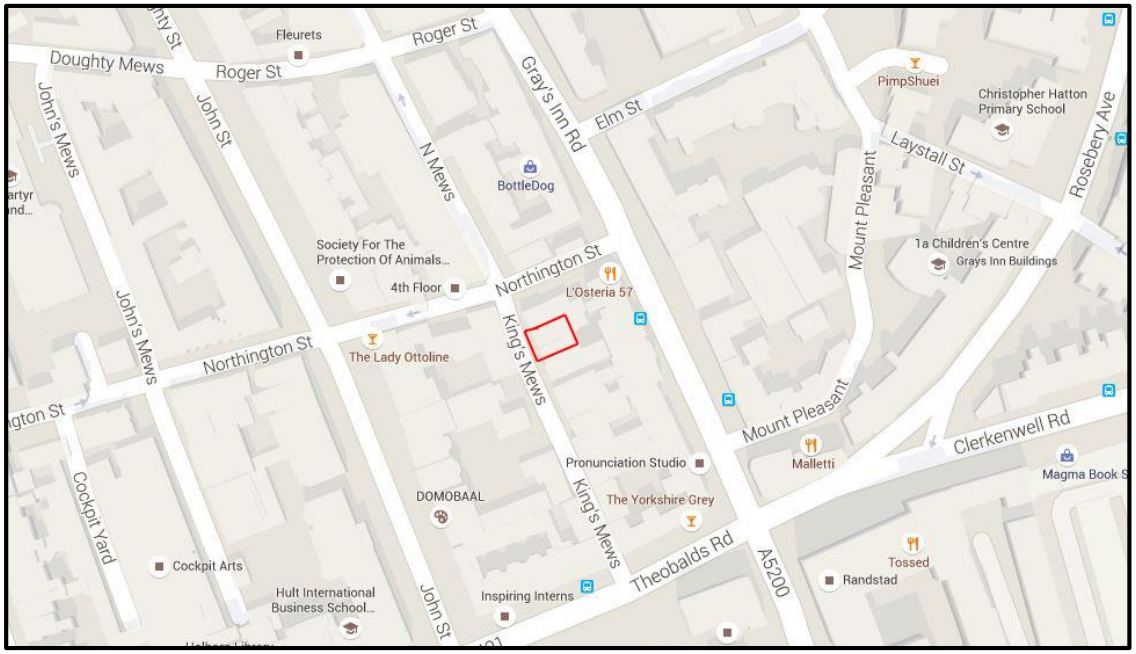
1.3 The report is based on the information produced by Marek Wojciechowski. and is intended to provide the basis for planning and may be subject to further design discussion and development with the successful Contractor.

1.4 This report is for the exclusive use of the Client and should not be used in whole or in part by any third parties without the express permission of JMS Consulting Engineers Ltd. in writing.

1.5 This report should not be relied upon exclusively by the Client for decision-making purposes and may require reading with other material or reports.

1.6 The work carried out comprises a Basement Impact Assessment, which is in accordance with the procedures specified in the London Borough of Camden Planning Guidance CPG4, and a Construction Method Statement. The aim of the work is to assess if the proposed basement will have a detrimental impact on the surroundings with respect to groundwater and land stability and in particular to assess whether the development will affect the stability of neighbouring properties, local and regional hydrogeology and whether any identified impacts can be appropriately mitigated by the design of the development.

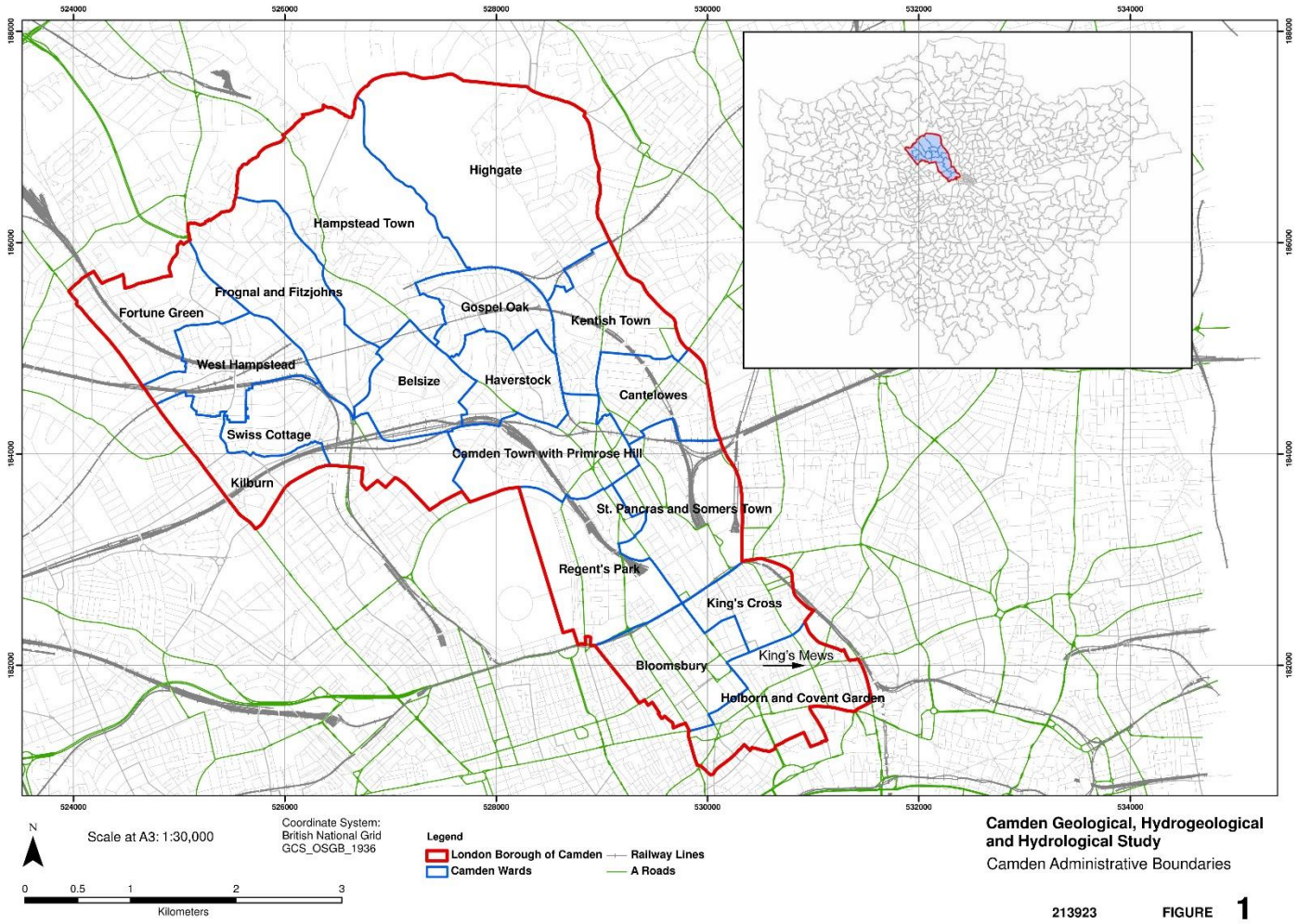
1.7 The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside of the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by Substructural Ltd.



© Google

2.0 The Site & Area

2.1 King's Mews lies within the Holborn & Covent Garden ward of the London Borough of Camden.



Not to be confused with King's Mews, Charing Cross, where the National Gallery now stands
It is in the south-east of Bloomsbury, running north from King's Road to Little James Street and lays in part of the Doughty Estate.
It was developed towards the end of the eighteenth century; it appears on Horwood's map of 1799, but not on Rocque's map of 1746. Rocque's map of 1746 shows gardens in this area
It was named as the Mews for King's Road
Horwood's map of 1819 shows the buildings as non-residential and unnumbered
In 2008 many of its old mews buildings were demolished and replaced with luxury apartments

About the Doughty Estate
The Doughty estate in the south-east of Bloomsbury was part of extensive lands owned by the Doughty and Tichborne families, mainly outside London (Survey of London, vol. 24, 1952)
Its proximity to the Foundling Estate meant that in the late eighteenth century it was involved in exchanges of land to enable the Foundling Estate to connect its new residential developments with the rest of London (Survey of London, vol. 24, 1952)
This also prompted the Doughty estate owners to begin developing their land (Survey of London, vol. 24, 1952)

The estate is sometimes also known as the Brownlow–Doughty estate, after William Brownlow, who built the streets in the late seventeenth century, and Elizabeth Brownlow, who had married into the Doughty family

In 1867 the estate was embroiled in the celebrated Tichborne case, when a claimant came forward asserting his identity as Sir Roger Charles Doughty-Tichborne, which would have entitled him to the Doughty estate in Bloomsbury along with other property (Oxford Dictionary of National Biography, entry for Tichborne claimant)

Sir Edward Doughty, né Tichborne, came into possession of the Doughty estate in 1826 from his cousin, Mrs Elizabeth Doughty, daughter of George Brownlow-Doughty and granddaughter of the fourth Baronet Tichborne; he changed his name to Doughty as a condition of the settlement (Gentleman's Magazine, vol. 193, May 1853)

Prior to this, it was Henry Doughty who had been negotiating land deals with the Foundling Estate on behalf of the Doughty Estate (Survey of London, vol. 24, 1952)

The entire estate was sold off in 1921; Joseph Henry Bernard Doughty Tichborne, The Doughty Estate, Holborn (1921) has details and plans of the property included in the sale

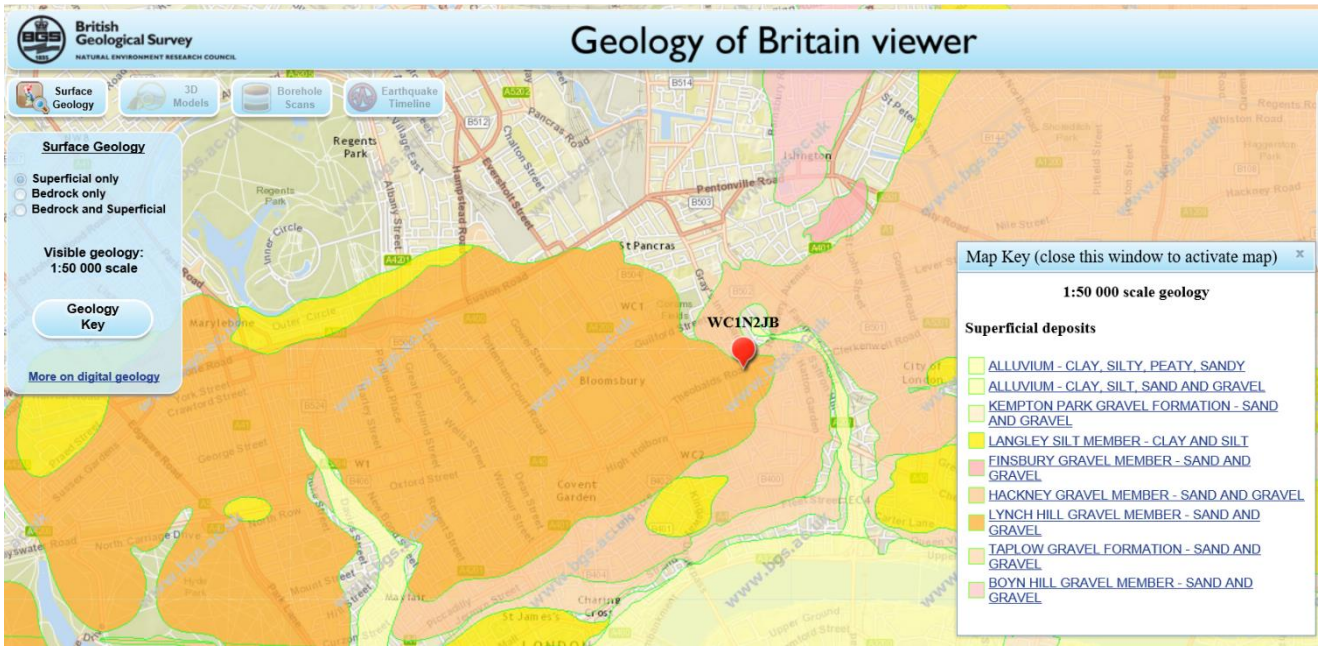
A mapp of St. Andrews Holborn parish as well within the Liberty as without (1720)

A New PLAN of the CITY and LIBERTY of WESTMINSTER, Exhibiting all the New Streets & Roads, with the Residences of the Principal Nobility, Public Offices, &c. Not extant in any other Plan.

Ancient maps of 1720 and 1754 which show the land undeveloped and in use as gardens but maps from the 1790s show the development of the area including King's Mews.

3.0 Site Geology

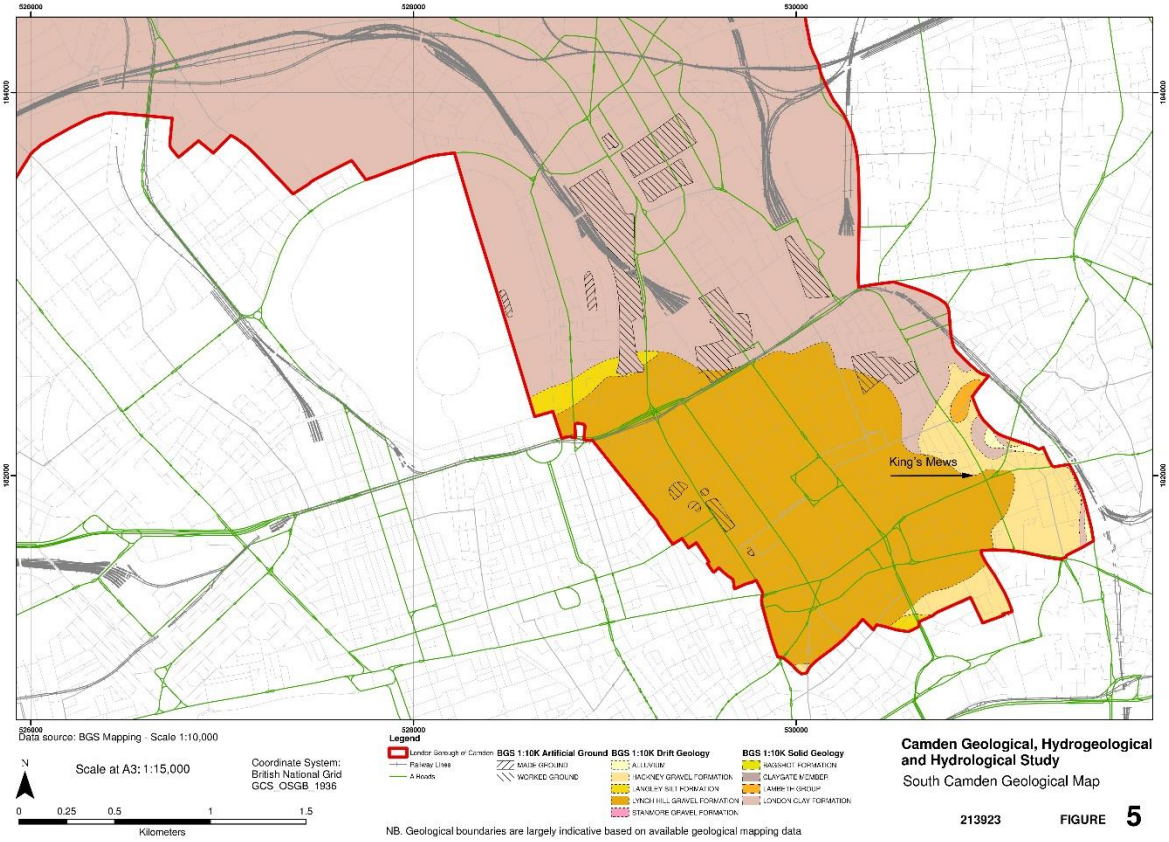
3.1 The 1:50 000 scale geological map for this area, made available by the BGS, shows the site to be bedrock geology to be London Clay Formation comprising Clay, Silt and Sand. The superficial drift deposits are indicated as Lynch Hill Gravels and the ARUP report for LB Camden indicates a depth of circa 1.5 m in this location.

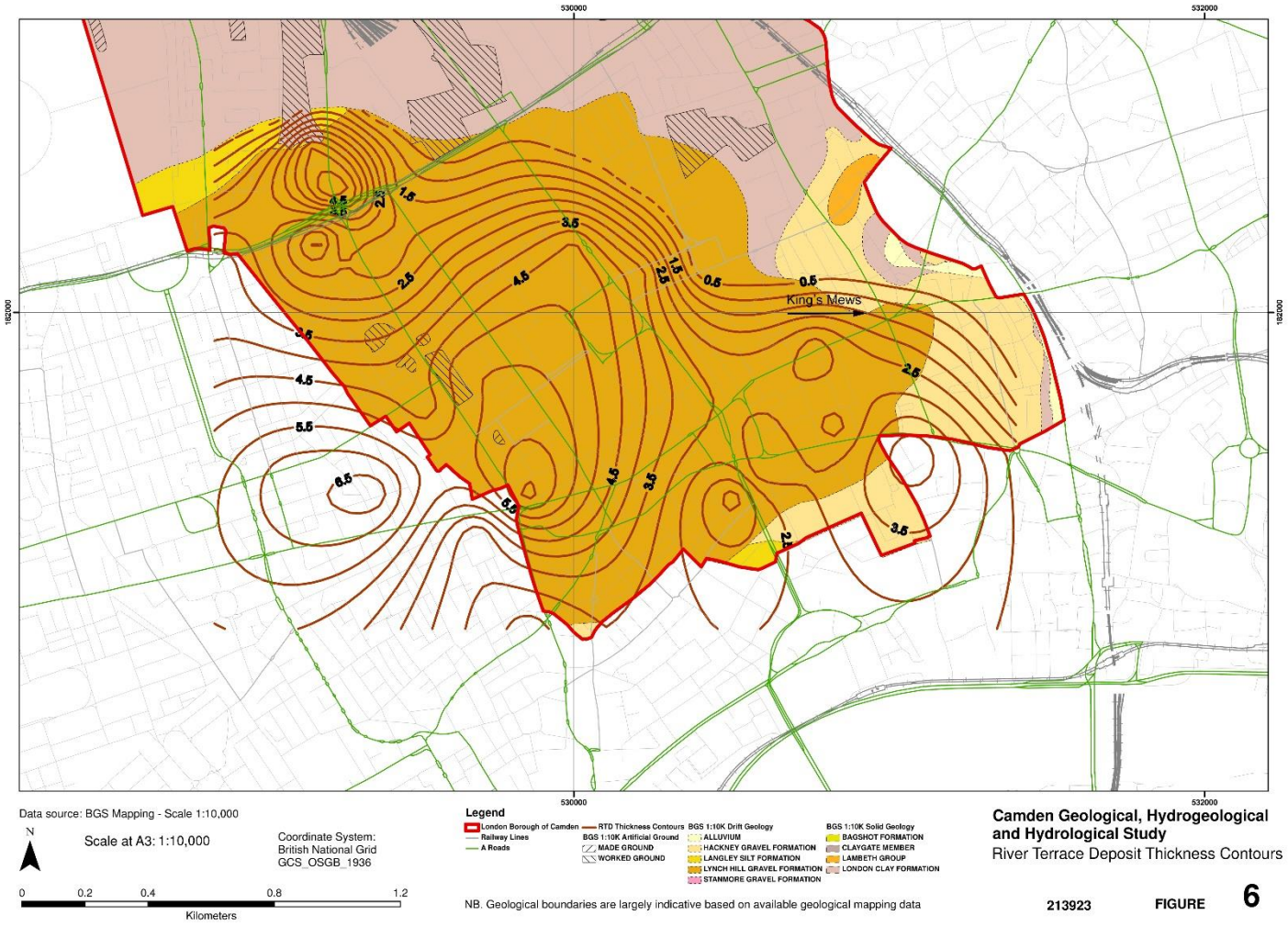


Contains British Geological Survey materials © NERC

The proposed construction of the basement will result in an unloading of the London Clay at formation level. The excavations will result in approximate unloading of the soil, which will result in an elastic heave and long term swelling of the London Clay. These movements will be mitigated to some extent by the applied structural loads but the basement floor slab will need to be designed to accommodate heave movements or suspended accordingly.

This is supported by the LB Camden report produced by Arup.





Historic Borehole records provide further support to the site geology as per the borehole record appended below which relates to a location to the North of this site.

TQ38SW 2550

Contract: GRAYS INN ROAD
Client: Taylor Woodrow Developments Ltd

Borehole No. 1
Sheet No. 1 Of 3.
Depth 0 to 10 metres.

Equipment and Methods :-
Light cable percussion boring 150mm diameter

Orientation : Vertical

Ground Level : (m.O.D.)

Coordinates :

Job Number : S39\644

Location :

Dates : 11/9/89 12/9/89

Daily Prog.	Water Levels	Remarks	In Situ Tests	Samples Taken	Depth (Thick)	Reduced Level	Description	Legend
				B 100	0.00			
					(0.70)		MADE GROUND (concrete)	
					0.70			
			S 6	J 101			MADE GROUND (brown silty sandy clay, gravel and brick)	
				B 102				
			S 9	J 103	(2.30)			
				B 104				
			S 2	J 105	3.00			
				U 106			Soft to firm orange brown silty CLAY with occasional rounded gravel	
				J 107	(1.50)			
				J 108				
				U 109	4.50			
		Vertical Worm tubes? infilled with tufa 4.60m to 5.00m.		J 110			Soft to firm orange brown silty sandy CLAY with occasional thin bands of sand	
				J 111	(1.70)			
				U 112				
11/9				J 113				
				J 114	6.20			
				U 115			Firm to stiff fissured brown and grey CLAY with small pockets and partings of orange brown fine sand and silt (London Clay)	
				J 116	(0.80)			
				J 117	7.00			
				U 118			Firm to stiff becoming stiff fissured dark brownish grey silty CLAY with numerous small pockets and partings of fine sand and silt (London Clay)	
				J 119				
				J 120				
				U 121				
				J 122	(7.00)			
				J 123				
				U 124				
				J 125				
					10.00		Continued	

Operator GW

General Remarks:

Appendix 1

Scale 10m/sheet

Sheet No. 1

4.0Hydrogeology

This is not addressed as it is subject to a separate report for the client.

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CPG4 Screening Flowcharts

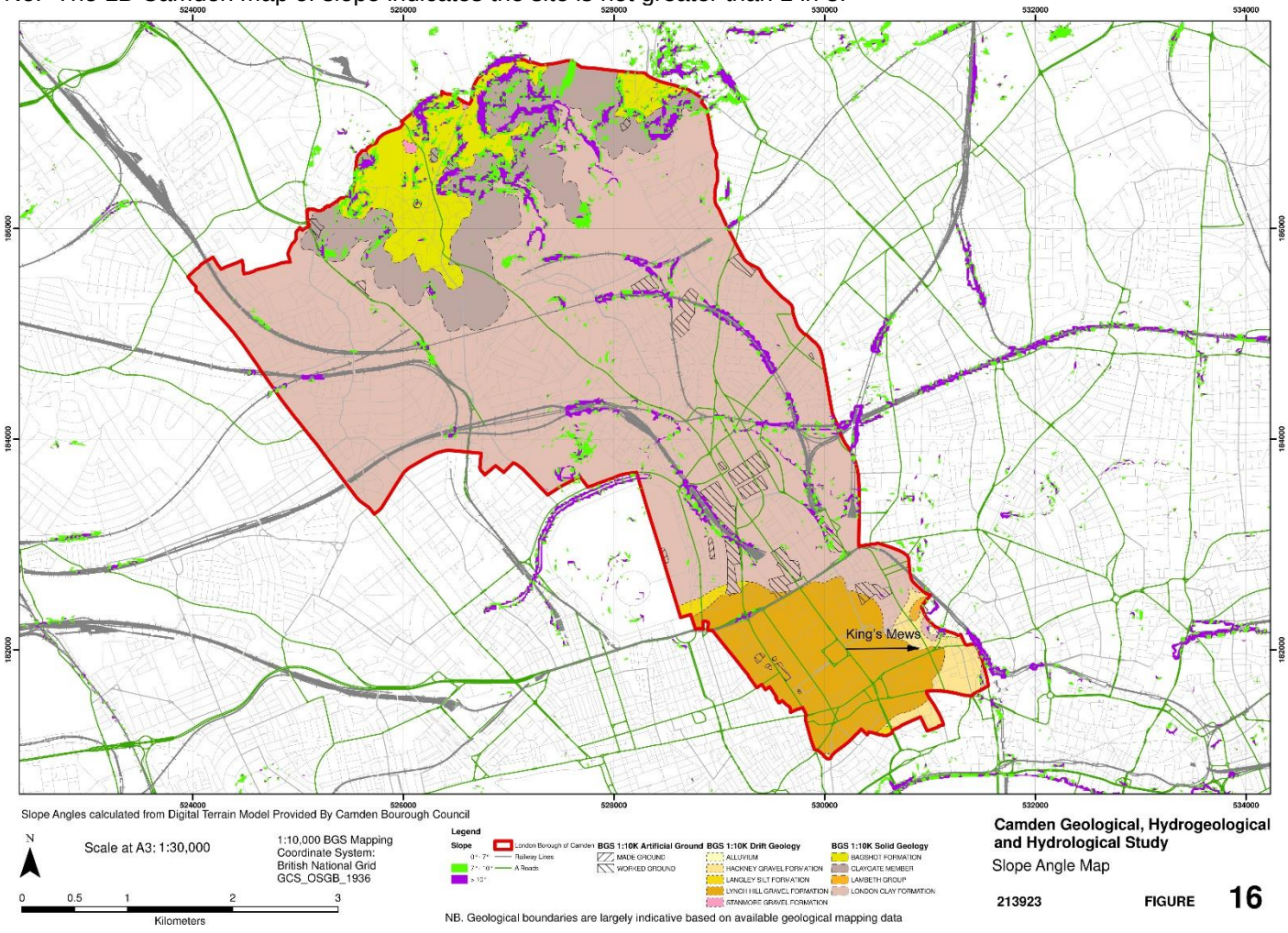
For the purposes of this report reference has been made to Appendix E of the Arup document screening tools, which includes a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow.

The report on hydro-geology has been commissioned as a separate study.

Fig 2. Slope Stability

1: Does the existing site include slopes, natural or man-made, greater than 7 ° (approximately 1 in 8)?

No. The LB Camden map of slope indicates the site is not greater than 1 in 8.



2: Will the proposed re profiling of landscaping at site change slopes at the property boundary to greater than 7 ° (approximately 1 in 8)?
No. The proposal does not include landscaping that affects the boundaries.

3: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 °?
No. The neighbouring sites are at a similar gradient.

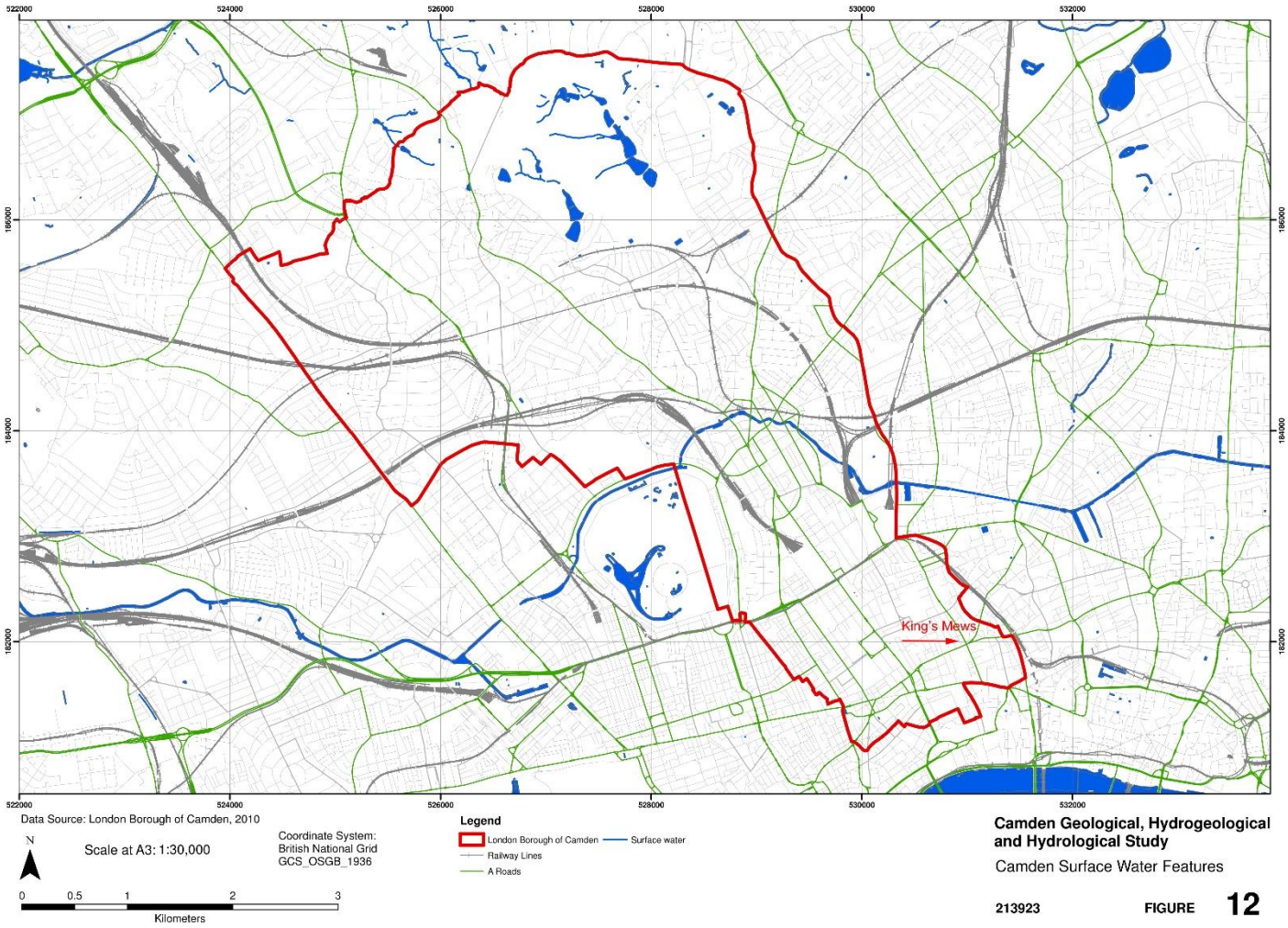
4: Is the site within a wider hillside setting in which the general slope is greater than 7° (Approximately 1 in 8)?
No. The wider gradient is less than 1:8.

5: Is London Clay the shallowest stratum on the site?
Yes. London Clay is the shallowest stratum – carry forward to scoping stage.

6: Will any trees be felled as part of the proposed development and/or are there any proposed works within any tree protection zones where trees are to be retained?
No. No trees are to be felled.

7: Is there a history of shrink swell subsidence in the local area and/or evidence of such effects at the site?
No. There is no such evidence to the existing building or neighbouring properties.

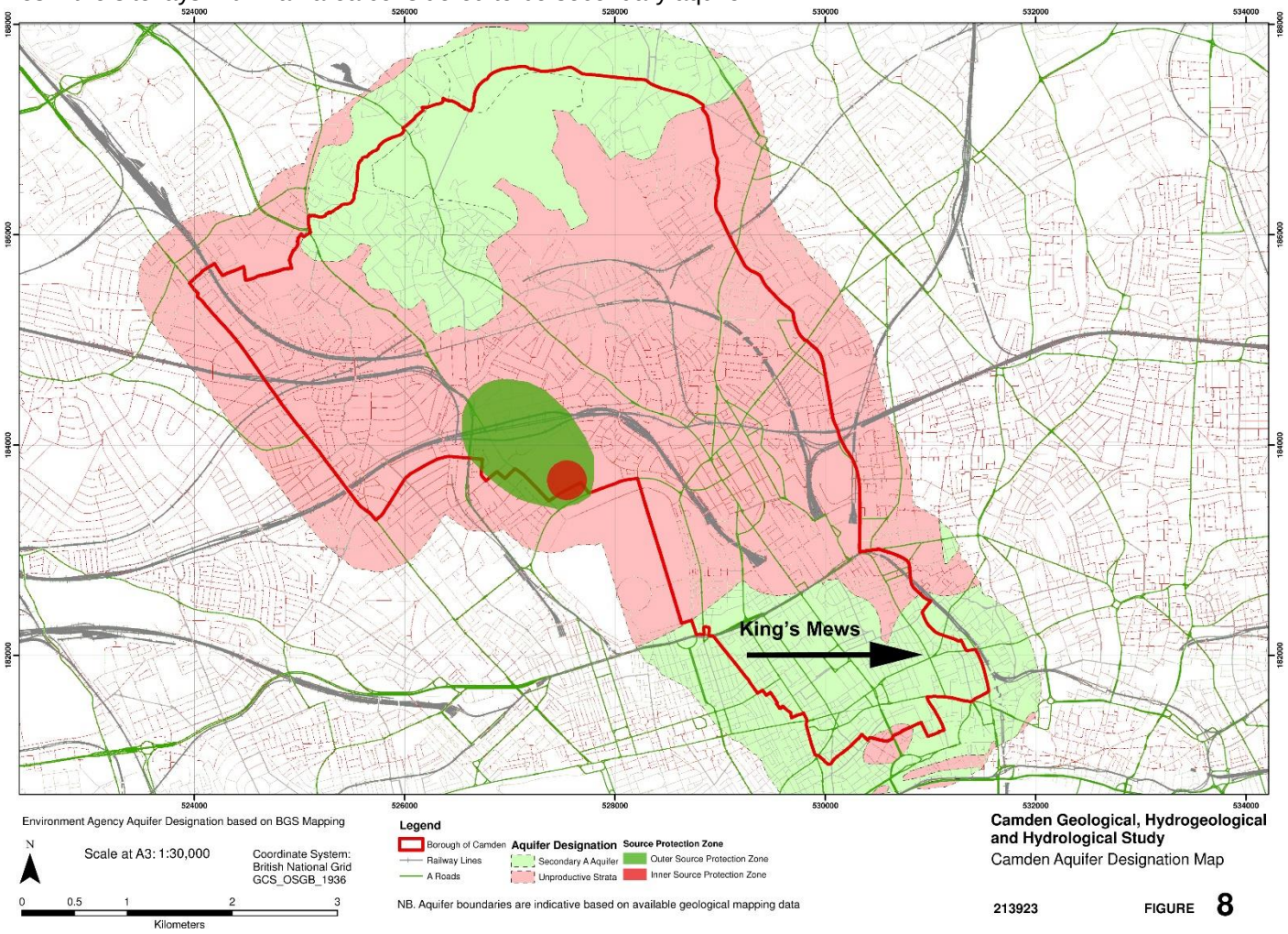
8: Is the site within 100m of a watercourse, or spring line?
No. Map 12 of the LB Camden report produced by ARUP indicates no such features within 100 metres.



9: Is the site within an area of previously worked ground?
No. Historic records indicate that the site has only been built on in the late 18th Century & was built on land with an agricultural or horticultural use prior to that.

10: Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering will be required during construction?

Yes – the site lays within an area considered to be secondary aquifer.

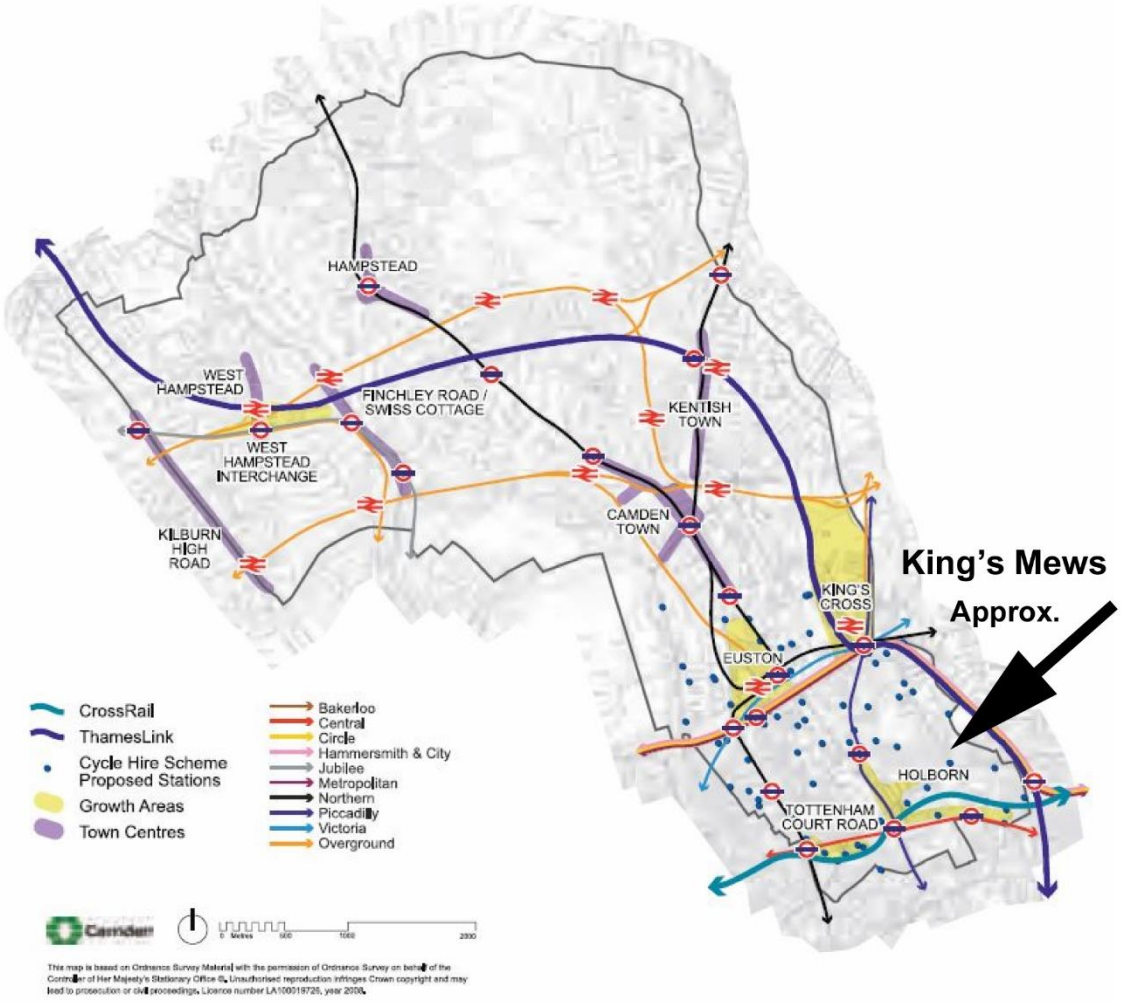


11: Is the site within 50m of the Hampstead Heath ponds?
No. The site is outside of a 50m zone of the ponds.

12: is the site within 5m of a public highway or pedestrian right of way?
Yes it abuts the public highway. Carry forward to scoping stage

13: Will the proposed basement significantly extend the differential depth of basements relative to neighbouring properties?
Yes. The proposed basement does not abut existing cellars. – carry forward to scoping stage.

14: Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?
No – see LB Camden Critical Infrastructure Map below:



Source - London Borough of Camden, January 2010. *Camden Core Strategy Proposed Submission*.

Camden Geological, Hydrogeological and Hydrological Study
Transport Infrastructure

213923 **FIGURE 18**

Fig 3.Surface Flow and Flooding

1***: Is the site within the catchment of the pond chains on Hampstead Heath?***

No. The site is outside the catchment area.

2: ***As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run off) be materially changed from the existing route?***

No. It will be largely unaffected.

3: Will the proposed basement development result in a change in the proportion of hard surfaces/paved external areas?

NO. The amount and proportion of hard standing areas will remain unchanged

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. There will be no change in the surface water flow off-site as a result of this proposal. Surface water will be discharged via existing connection.

5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?

No. There will be no change in the surface water flow off-site as a result of this proposal.

6: Is the site in an area known to be at risk from surface water flooding, such as Hampstead Heath, Gospel Oak and King's Cross, 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 the ARUP report identifying the areas affected by the two major flood events modelled indicate this location to have been unaffected. See fig below:

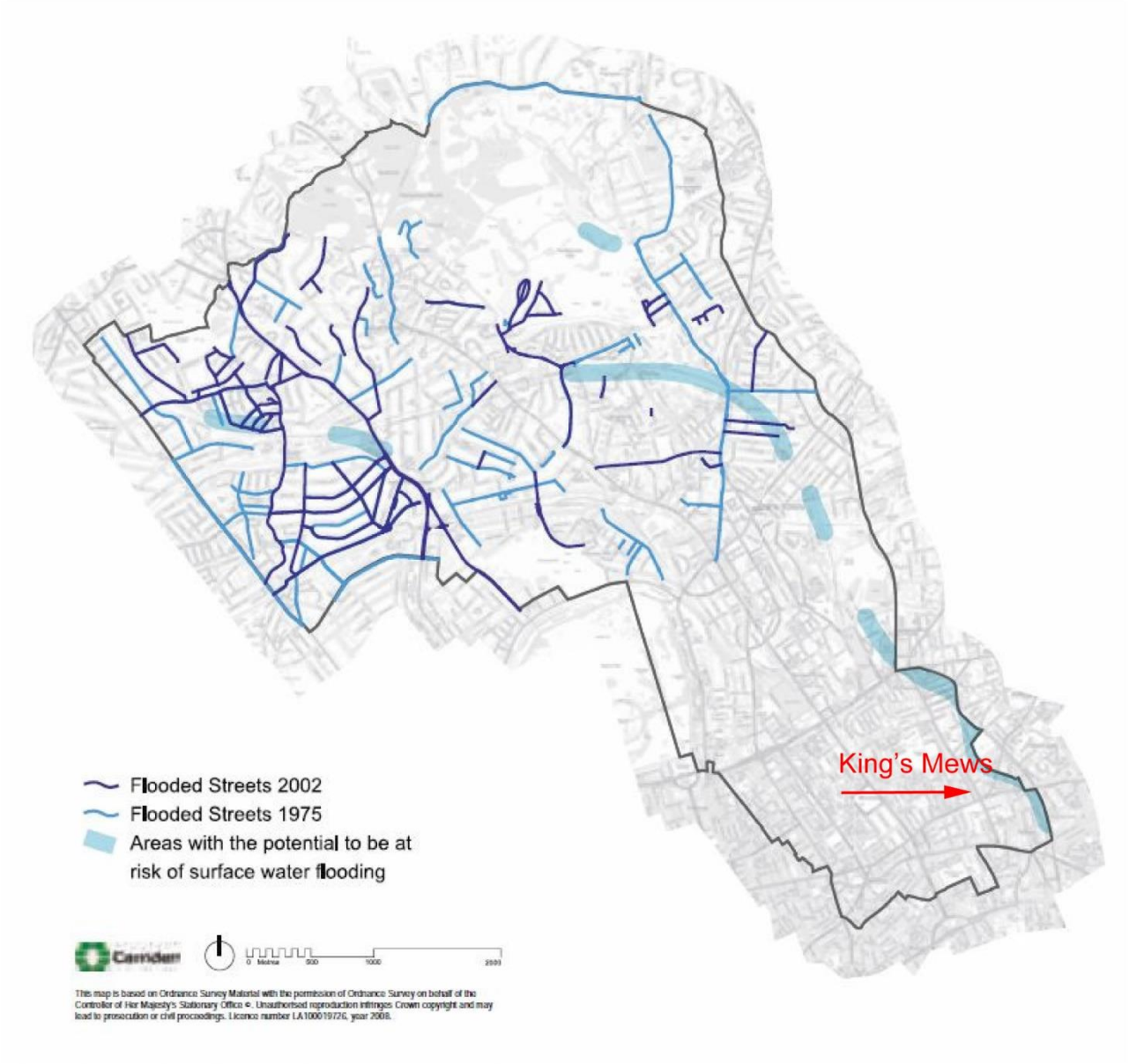
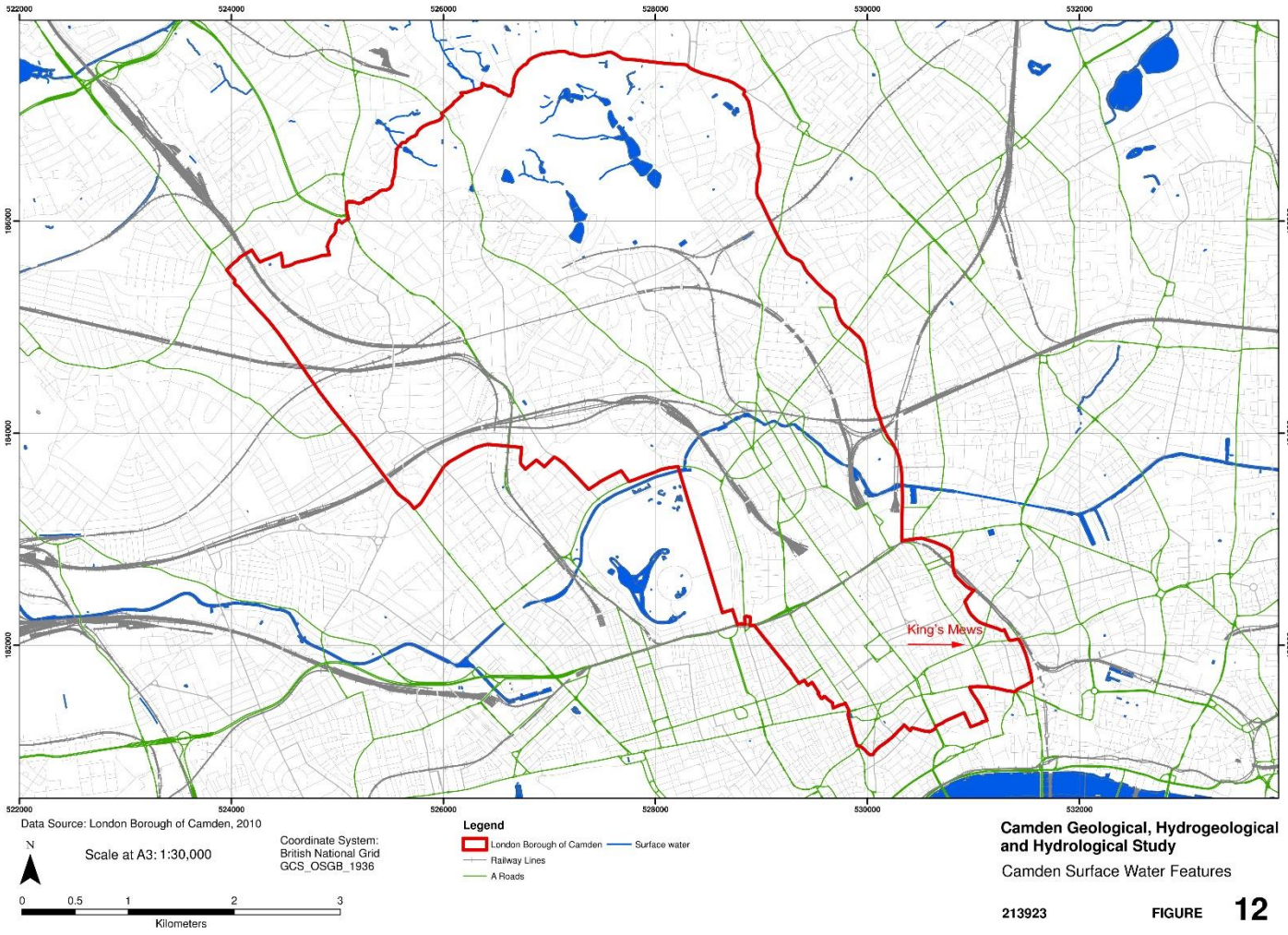


Figure 5 from Core Strategy, London Borough of Camden

Camden Geological, Hydrogeological and Hydrological Study
Flood Map

213923 **FIGURE 15**



Data Source: London Borough of Camden, 2010

N

Scale at A3: 1:30,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

London Borough of Camden
Surface water
Railway Lines
A Roads

Camden Geological, Hydrogeological and Hydrological Study

Camden Surface Water Features

213923 **FIGURE 12**

6.0 Scoping Stage

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential consequences are assessed for each of the identified potential impact factors.
It is considered that the scope of the investigation complies with the guidance issued by the Council and is therefore a suitable basis on which to assess the potential impacts

6.1 Groundwater Flow

This is addressed within the independent report on hydro-geology and should be read in association with this report.

6.2 Slope Stability

5 London Clay is the shallowest stratum on this site and the structural design of the retaining walls and slabs will take this into account accordingly.

10. The site lies within an area identified as a secondary aquifer. The nearby bore-hole records suggest that the water table is lower than the basement and it's associated works .

12. The existence of basements in adjoining buildings is presumed to be absent. However, the structural engineering proposal for this scheme involves the use of underpinning to form the structural box below ground which should have no negative effect on neighbouring properties.

7.0 Structural Damage

By installing adequate temporary propping and new permanent works the anticipated movements caused by the development are to be limited to not exceed 5mm at any location within the adjacent properties.
This will keep the movements within the Slight category as defined by Burland, and may include some or all of the following:-

- slight cracks, easily filled,
- redecoration probably required,
- several slight fractures showing inside of building,
- cracks visible externally, some re-pointing required externally to ensure weather-tightness,
- doors and windows may stick slightly.

8.0 Construction Method Statement

This method statement has been prepared to provide information on the likely methods for Basement Construction for the Basement, subject to confirmation of details and final input from the successful contractor.
The final methods will be subject to the limitations and constraints noted in this document. Any revised matters associated with the Method Statement will be issued for review and comment prior to any site construction works.

8.1 Prior to Commencement of Work
8.1.1 The method of construction is to be agreed by all parties, with specific reference to the potential for vibrations and noise from the underpinning process.
8.1.2 A detailed method statement for means of access, site logistics and intended vehicle movements, particularly spoil removal, will be agreed with the main contractor prior to commencing any site works and any variations reported accordingly.
8.1.3 Agreed working zones in relation to the Highways will be agreed prior to commencing any site works.
8.1.4 All services surveys, diversion agreements and temporary supply requirements will be agreed and approvals will be in place prior to commencement of works.
8.1.5 Existing building condition surveys will be carried out prior to commencing any piling works, of neighbouring property.

8.2 Sequence of Work
8.2.1 The key stages forming the core of the Construction Method Statement are :
• Establish site access & hoarding..
• Investigatory works as required for full detailed design.
• Installation of underpinning in reinforced concrete pins according to structural engineers design
• Excavation for and construction of basement levels slab.
• Internal waterproofing membranes, screeds and finishes
The final sequence of working in detail will be agreed with the successful main contractor and any variations reported accordingly. The foregoing is an indication of the likely process for the substructure works, subject to completion of all intrusive surveys, all agreements being in place and selection of the agreed final construction process subject to those intrusive site findings.

8.2.2 Establish Access & Hoarding
The hoarding will be located around the property to enclose all works.
All set up works to facilitate access will take account of the Method Statement for the project.
A plywood hoarding will be erected with vertical standards, anchored to the ground. The hoarding will be fully secure with a lockable door for access. Suitable heights and colours will be in accordance with the Local Authority requirements.

8.2.3 Investigation Works
The excavation to approximately 3.5m deep for basement construction will result in a formation level in the stiff London Clay. The detailed design will be based on the findings of the soil investigation report.
Prior to construction, further investigation works will be required in order that heave movements may be checked for further analysis based on final loadings and levels. It would also be prudent to carry out a number of additional trial excavations, to depths as close to the full basement depth as possible to confirm the groundwater conditions and the potential for perched water.

8.3 Waterproofing Systems and Screed

For all basement areas, the Architect will prepare design details in conjunction with a specialist contractor.
The waterproofing system will be installed in accordance with the Architects details in conjunction with the specialist contractor technical specifications once the basement slab is complete.
The floor finishes, which may include insulation and under floor heating, can then be laid in accordance with the Architects details. A cement and sand screed will be applied on the slab surface.
The height of the basement and relative level of the water table determines that Types A (barrier), B (structurally integrated) or C(drained) protection against ingress of water will be satisfactory, as defined by BS 8102:2009. The basement will be constructed and detailed to achieve a Grade 3 Level of Performance, as defined by BS 8102:2009.

Table 2 **Grades of waterproofing protection**

Grade	Example of use of structure[A)]	Performance level
1	Car parking; plant rooms (excluding electrical equipment); workshops	Some seepage and damp areas tolerable, dependent on the intended use[B)] Local drainage might be necessary to deal with seepage
2	Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas	No water penetration acceptable Damp areas tolerable; ventilation might be required
3	Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres	No water penetration acceptable Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use

A) The previous edition of this standard referred to Grade 4 environments. However, this grade has not been retained as its only difference from Grade 3 is the performance level related to ventilation, dehumidification or air conditioning (see BS 5454 for recommendations for the storage and exhibition of archival documents). The structural form for Grade 4 could be the same or similar to Grade 3.

B) Seepage and damp areas for some forms of construction can be quantified by reference to industry standards, such as the ICE's S*pecification for piling and embedded retaining walls* [1].

To achieve Grade 3 Performance we propose either a drained cavity installed in front of the concrete wall; or an applied waterproofing membrane applied and bonded to the internal faces of the pins. Waterproof concrete will also be employed.

9.0 Conclusion

The proposed re-development of 20-21 King's Mews can be achieved using standard construction techniques and materials
Where mechanical means are necessary to construct permanent works these can be of a type that generates low vibrations to which the surrounding buildings have a form and construction that is robust and resistant to.
We can therefore conclude with confidence that the construction of the proposed development generally, and the subterranean basement in particular, will not affect the integrity of the surrounding building stock or overload the near-surface geology.
There are no critical utilities beneath the site that cannot be relocated easily to accommodate the construction and, as there is no change in use proposed there will be no significant increase in foul discharge to the sewer despite the increase in level of accommodation.
The techniques proposed for the subterranean element of the building and the nature of the underlying geology minimises the risk of instability, ground slip and movement.

On Behalf Of
JMS Consulting Engineers Ltd

Daniel Staines MIStructE CEng BEng PgDip (Const. Management)

End of Report