



EUSTON TOWER

Flood Risk Assessment

December 2023



British Land Property Management Limited

Euston Tower

Flood Risk Assessment

Reference: 281835-ARP-XX-XX-RP-CD-0001

| 29th November 2023

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Contents

1.	Introduction	3
1.1	Scope of Report	3
1.2	Sources of Information	3
1.3	Consultation	4
1.4	Limitations	4
1.5	Report Structure	4
2.	Policy and Guidance	5
2.1	London Borough of Camden Local Plan 2017	5
2.2	LBC Strategic Flood Risk Assessment (July 2014)	5
2.3	LBC Surface Water Management Plan (June 2013)	6
2.4	Camden Planning Guidance Water and Flooding CPG (March 2019)	6
2.5	The London Plan (March 2021)	6
2.6	Thames Water Utilities Limited	7
3.	Environmental Setting	9
3.1	Site Location	9
3.2	Existing Site Use	9
3.3	Existing Topography	10
3.4	Existing Rivers/Water Bodies	10
3.5	Geology	10
3.6	Hydrogeology	10
3.7	Existing Drainage Infrastructure	11
4.	Proposed Development	13
4.1	Development Proposals	13
5.	Flood Risk Assessment	14
5.1	Fluvial & Tidal Flooding	14
5.2	Pluvial Sources	14
5.3	Groundwater Sources	16
5.4	Artificial Sources	17
5.5	Infrastructure Failure (Burst Water Main)	18
5.6	Historic Flooding	18
5.7	Flood Risk Summary	19
6.	Conclusion	20

Tables

Table 1: Flood risk summary	2
Table 2: Key Reports & Documents	3
Table 3: Flood Risk Summary	19

Figures

Figure 1: Site Location Map (Bing Maps – Indicative Red Line)	9
Figure 2: Existing Thames Water Sewers	11
Figure 3: Existing Thames Water Potable Water Mains	11
Figure 4: Proposed ground floor of development including landscaping	13
Figure 5: EA Mapping for Surface Water Flood Risk	15
Figure 6: Local Flood Risk Zones (SWMP)	16
Figure 7: LBC SFRA Increased Susceptibility to Elevated Groundwater	17
Figure 8: Thames Water Asset Mapping	18

Appendices

Appendix A	21
Relevant Policy	21
Appendix B	26
Topographical Survey	26
Appendix C	27
Masterplan Proposals	27

Glossary

Acronym	Definition
AEP	Annual Exceedance Probability
BGS	British Geological Society
EA	Environment Agency
CDA	Critical Drainage Area
FRA	Flood Risk Assessment
FRMS	Flood Risk Management Strategy
FZ	Flood Zone
LBC	London Borough of Camden
LFRZ	Local Flood Risk Zone
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	Meters Above Ordnance Datum
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
SFRA	Strategic Flood Risk Assessment
SPZ	(Groundwater) Source Protection Zone
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TWUL	Thames Water Utilities Ltd.

Executive Summary

Ove Arup and Partners Limited (“Arup”) has been commissioned by British Land Property Management Limited (hereafter British Land) to prepare a Flood Risk Assessment (FRA) in support of the detailed planning application associated with the proposed development at Euston Tower

After a comprehensive review of flood risk data and publicly available information, this report concludes that the risk of flooding from all sources is low in line with the requirements of:

- National Planning Policy Framework,
- The London Plan 2021,
- The City Plan 2019-2040

A summary of flood risk is provided below^[HSF1]^[RB2]:

Table 1: Flood risk summary

Flood Source	Pathway	Comment	*Risk
Fluvial and Tidal	River Thames is located 2.2km south of site	EA flood maps confirm the site is entirely located within Flood Zone 1.	Low
Groundwater	Through underlying strata when groundwater levels rise above surface levels.	The Site ^[HSF3] ^[RB4] is in area where perched groundwater may be present, however is unlikely to pose risk while in use. Measures may need to be taken during construction. No historic record of groundwater flooding at site or immediate site environment. Any minor changes to basements within the building are highly unlikely to cause wider significant changes to the local groundwater regime.	Low
Artificial Sources	No reservoirs or other artificial sources nearby site environment.	No other artificial sources of flooding near to the site.	Low
Pluvial	Overloading of sewers or overland flow	A vast majority of the site is shown to be at very low risk of surface water flooding; although, small sections of Euston Road are at high risk. This flooding will be kept within the underpass section of the highway and therefore do not pose a risk.	Low
Infrastructure Failure	Burst water main inundating local sewer network	Multiple water mains in adjacent road networks including trunk mains. Infrastructure failure to burst main could cause significant damage to the basement of the building. Residual risk to basement structures and measures to provide flood protection should be considered as part of detailed design.	Low

Based on our understanding of the Site setting and the proposals, it is considered that the development can be constructed and operated safely and will not increase flood risk elsewhere.

1. Introduction

Ove Arup & Partners Limited (“Arup”), has been commissioned by British Land to undertake a Flood Risk Assessment (FRA) for the proposed redevelopment works at Euston Tower, 286 Euston Road, London, NW1 3DP (thereafter referred to as “the Site”)

This FRA has been prepared in accordance with the requirements of the National Planning Policy Framework (NPPF) (specifically Chapter 14) and Technical Guidance of the NPPF and will be submitted to London Borough of Camden as the Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA).

This report should be read in conjunction with the Arup Drainage Strategy, report ref: 281835-ARP-XX-XX-RP-CD-0002.

1.1 Scope of Report

This report is written with reference to the National Planning Policy Framework (NPPF) and supporting Technical Guidance. It also draws upon both regional and local policy pertinent to surface water and flood risk management and uses publicly available data.

Although the Site is located wholly within Flood Zone 1 and under 1 hectare, under the requirements of the NPPF a detailed Flood Risk Assessment is still required as it is within a Critical Drainage Area (CDA) as highlighted within the London Borough of Camden (LBC) Strategic Flood Risk Assessment (SFRA)

Under the requirements of the NPPF, a detailed Flood Risk Assessment is required as:

- The Site is at risk of flooding from sources other than rivers and the sea;
- The Site is in an area which has critical drainage problems as notified by the Environment Agency.

The purpose of this report is to provide a summary of flood risk only, to demonstrate that the site is at low risk from all sources and will:

- Identify and assess potential sources of flooding to the site.
- Assess historical flood events associated with the site.

1.2 Sources of Information

The key updated reports/documents reviewed as part of this study are listed in [Table 2](#) below.

Table 2: Key Reports & Documents

 [HSF5][RB6]	Author	Date
London Borough of Camden Local Plan	London Borough of Camden	July 2017
Camden Planning Guidance – Water and Flooding CPG	London Borough of Camden	January 2021
London Borough of Camden Strategic Flood Risk Assessment Update (Final) – Revision 2	URS Infrastructure & Environment UK on behalf of London Borough of Camden	July 2014
London Borough of Camden Flood Risk Management Strategy (FRMS)	London Borough of Camden	2022

[HSF5][RB6]	Author	Date
London Borough of Camden Surface Water Management Plan	Halcrow Group Limited on behalf of London Borough of Camden	June 2013
Ordnance Survey Mapping	Ordnance Survey	2023

1.3 Consultation

No consultation with London Borough of Camden as the Lead Local Flood Authority (LLFA) or the Environment Agency has been carried out to inform this report. However, Thames Water Utilities Limited (TWUL) have been contacted as the drainage authority, details of which can be found in the Arup Drainage Strategy report (Ref: 281835-ARP-XX-XX-RP-CD-0002).

This assessment of flood risk has been compiled from a desk top study only, using publicly available records, mapping and information pertinent to flood risk at the site.

1.4 Limitations

This report has been prepared for the use of British Land (the Applicant) in relation to the proposed development[HSF7] at Euston Tower. It takes into account the Applicants particular instructions and requirements and addresses their priorities at the time. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party in relation to it, except as provided for in Arup's agreement with British Land.

Arup has based this report on the sources detailed within it and believes them to be reliable but cannot and does not guarantee the authenticity or reliability of third-party information. Reasonable skill and care have been exercised in preparation of this report in accordance with the technical requirements of the brief.

This report has been prepared based on current legislation, statutory requirements, planning policy and industry good practice at the time of writing. Any subsequent changes or new guidance may require the findings, conclusions and recommendations made in this report to be reassessed in light of the circumstances. Should the proposed layout or use of the site change, the assessments and conclusions presented in this report may need to be revised.

1.5 Report Structure

Policy relevant to flood risk and drainage matters associated with the development is addressed in Section 2. The environmental setting, focusing on the hydrological conditions and Site surroundings is outlined in Section 3[HSF8]. Section 4 describes the development proposals. The assessment of flood risk at the Site is presented in Section 5 and conclusions are provided in Section 6.

2. Policy and Guidance

The following section details specific local policy and guidance pertinent to flood risk and surface water drainage that are applicable to the proposals. This section does not outline National Legislation, Regulations or Guidance which is provided in Appendix A.

2.1 London Borough of Camden Local Plan 2017

The London Borough of Camden (LBC) Local Plan sets out the Council's planning policies ensuring Camden has an effective response to the changing circumstances of the borough. Published in 2017 it sets out the boroughs vision until 2031. The following policies directly relate to flood risk and climate change considerations.

Policy CC2: *Adapting to Climate Change*

Policy CC2 states all development should adopt appropriate climate change adaptation measures such as:

- *the protection of existing green spaces and promoting new appropriate green infrastructure*
- *not increasing, and wherever possible reducing, surface water run-off through increasing permeable surfaces and use of Sustainable Drainage Systems*
- *incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and*
- *measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.*

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement.

Policy CC3: *Water and Flooding*

Specifically, policy CC3 states the following requirements for developments:

- *incorporate water efficiency measures*
- *avoid harm to the water environment and improve water quality*
- *consider the impact of development in areas at risk of flooding (including drainage)*
- *incorporate flood resilient measures in areas prone to flooding*
- *utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible*
- *not locate vulnerable development in flood-prone areas.*

Where an assessment of flood risk is required, developments should consider surface water flooding in detail and groundwater flooding where applicable.

2.2 LBC Strategic Flood Risk Assessment (July 2014)

The LBC SFRA July 2014 is a planning tool that enables the council to select and develop sustainable Site allocations away from vulnerable flood risk areas and inform strategic land use planning.

The document collates and presents the most up to date flood risk information for use by LBC to inform the preparation of robust planning documents as part of the Local Plan.

The SFRA provides mapping data for various sources of flooding which are replicated within this report where noted. Chapter 7 specifically advocates the use of Sustainable Drainage Systems (SuDS) and promotes implementation of the SuDS hierarchy.

2.3 LBC Surface Water Management Plan (June 2013)

The LBC Surface Water Management Plan (SWMP) June 2013 study forms part of the wider Drain London Tier 2 project and builds on previous studies by the Borough in its role as a LLFA. It outlines the predicted risk and preferred surface water management strategy.

2.4 Camden Planning Guidance Water and Flooding CPG (March 2019)

CPG provides advice and information on how LBC apply planning policies. The adopted CPG documents are 'material considerations' in planning decisions. A number of CPG documents were adopted in March 2019 including "Water and Flooding CPG".^[HSF9]

The Water and Flooding CPG encourages Sites to meet London Plan runoff reduction targets (discussed further below) and drainage designs to accommodate all storm events up to and including the 1 in 100-year 6 hour storm event (including allowances for climate change).

It also continues to promote the use of the SuDS hierarchy when considering management of surface water and rainwater harvesting tanks and green roofs are preferred over other SuDS ranked lower down, such as attenuation tanks.

Specifically, the Water and Flooding CPG states that LBC expect the following to support planning:

"A drainage report is required for all major applications, basement development, and vulnerable development in areas identified as at risk of flooding (details of what this should include can be found in paragraph 8.67 of the Local Plan). The Council will expect plans and application documents to describe how water will be managed within the development, including an explanation of the proposed SuDS, the reasons why certain SuDS have been ruled out and detailed information on materials and landscaping. The Council will expect developments to achieve a greenfield surface water run-off rate where feasible once SuDS have been installed."

2.5 The London Plan (March 2021)

The London Plan is a broad plan to shape the way London develops over the next 20-25 years.

Policy SI 12 – Flood Risk Management and Policy SI 13 – Sustainable Drainage (extracted below) are pertinent in the content this report.

2.5.1 Policy SI 12 – Flood Risk Management

The key aims of Policy SI 12 are replicated below:

- a. *Current and expected flood risk from all sources across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.*
- b. *Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should co-operate and jointly address cross-boundary flood risk issues including with authorities outside London.*
- c. *Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.*

- d. *Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.*
- e. *Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.*
- f. *Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.*
- g. *Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.*

2.5.2 Policy SI 13 – Sustainable Drainage

The key aims of Policy SI 13 are replicated below:

- a. *Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks. Increases in surface water runoff outside these areas also need to be identified and addressed.*
- b. *Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:*
 - *rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)*
 - *rainwater infiltration to ground at or close to source*
 - *rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)*
 - *rainwater discharge direct to a watercourse (unless not appropriate)*
 - *controlled rainwater discharge to a surface water sewer or drain*
 - *controlled rainwater discharge to a combined sewer.*
- c. *Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.*
- d. *Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.*

2.6 Thames Water Utilities Limited

In accordance with the Building Act 2000 Clause H3.3, positive connections to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable.

The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.

Only when it can be proven that soakage into the ground or a connection into an adjacent watercourse is not possible would TWUL consider a restricted discharge into the public surface water sewer network.

TWUL request that every attempt should be made to use flow attenuation and SUDS/storage to reduce the surface water discharge from the Site as much as possible.

If they are consulted as part of any planning application, TWUL Planning team would ask to see why it is not practicable to attenuate the flows to Greenfield run-off rates i.e. **5l/s/hectare** of the total Site area (or if the Site is less than 1 hectare in size then the flows should be reduced by 95% of existing flows).

3. Environmental Setting

3.1 Site Location

Euston Tower is situated within the LBC, and the ward of Regent's Park. The Site is bounded by Euston Road (south), Hampstead Road (east), Brock Street (north) and Regent's Place (west). The Site covers an area of 8,079sqm, comprised of a single, ground plus an existing 36-storey tower.

Ordnance Survey co-ordinates for the site are approximately: 529181E, 182344N and the approximate boundary of the site is shown in red in Figure 1 below.

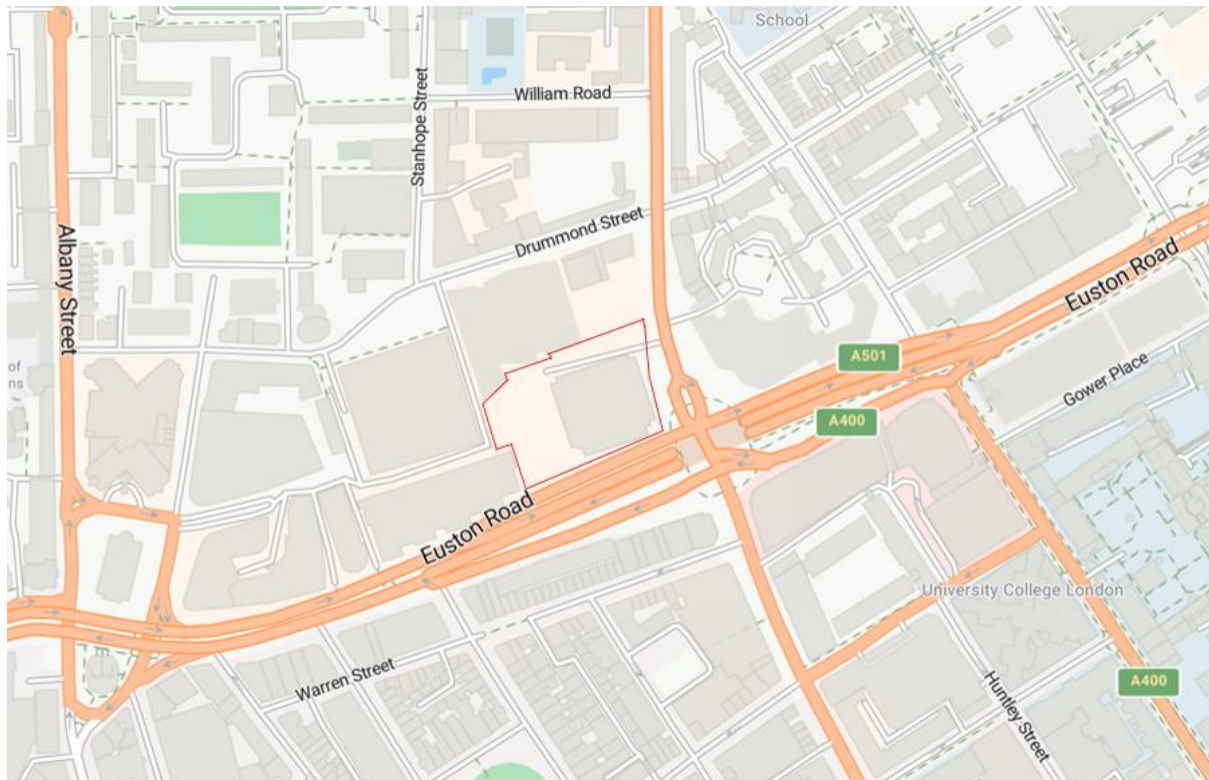


Figure 1: Site Location Map (Bing Maps – Indicative Red Line)

3.2 Existing Site Use

The tower has been largely vacant for several years, predominantly comprising office uses on the upper floors, however there are still retail uses currently in operation at ground floor level. The Site does not fall within a conservation area; however, Fitzroy Square CA and Bloomsbury CA are both located in close proximity (south). There are no elements of the Site that are statutory or locally listed. A Certificate of Immunity from listing has been submitted and at the time of submission is still pending in respect of the existing tower.

The building is made up of 4,395m² retail space on the ground & first floor, and 31,271m² of office space across the existing floors 2-36. Access to retail units is from ground level either within the building or from the street.

Located within the basement are plant rooms, services, transformer chambers (which are not accessible to the public), as well as a larger carpark which is accessible to the public.

3.3 Existing Topography

A topographical survey undertaken in June 2018 by Plowman Craven (ref 34979T-01-4 issue I and 34979T-01-2 issue I within Appendix B) shows that the current site levels are predominantly flat, ranging between approximately 27.0 and 28.0 metres Above Ordnance Datum (mAOD). The level immediate adjacent to the existing building is consistently 27.8mAOD.

Euston Road runs from west to east of the building, with a high point located at the junction of Hampstead and Euston Road of 27.70m AOD and a low point of 27.40m AOD further south-west of Euston Tower. Brock Street to the north of the building is also similarly level, ranging from 27.62mAOD north-east of the Site to 27.69m AOD on the north-west.

3.4 Existing Rivers/Water Bodies

The nearest major watercourse is the river Thames which is location 2.2km to the southeast of the Site.

The nearest surface water body identified is the Boating Lake in Regent's Park which is approximately 1.0km to the west of the site.

3.5 Geology

The British Geological Society (BGS) 1:50,000 geological mapping indicates that the Site is underlain with London Clay Formation with Clay, Silt, and Sand.

BGS 1:50,000 geological mapping indicates that the Site is underlain with superficial deposits of Lynch Hill Gravel with sand and gravel.

Made Ground is expected to be encountered below the surface and will be variable in composition. It is associated with the historical site development.

3.6 Hydrogeology

Shallow or perched ground water above the London Clay is expected to be present at this site.

There are no groundwater source protection zones within 1 km radius from the site.

3.7 Existing Drainage Infrastructure

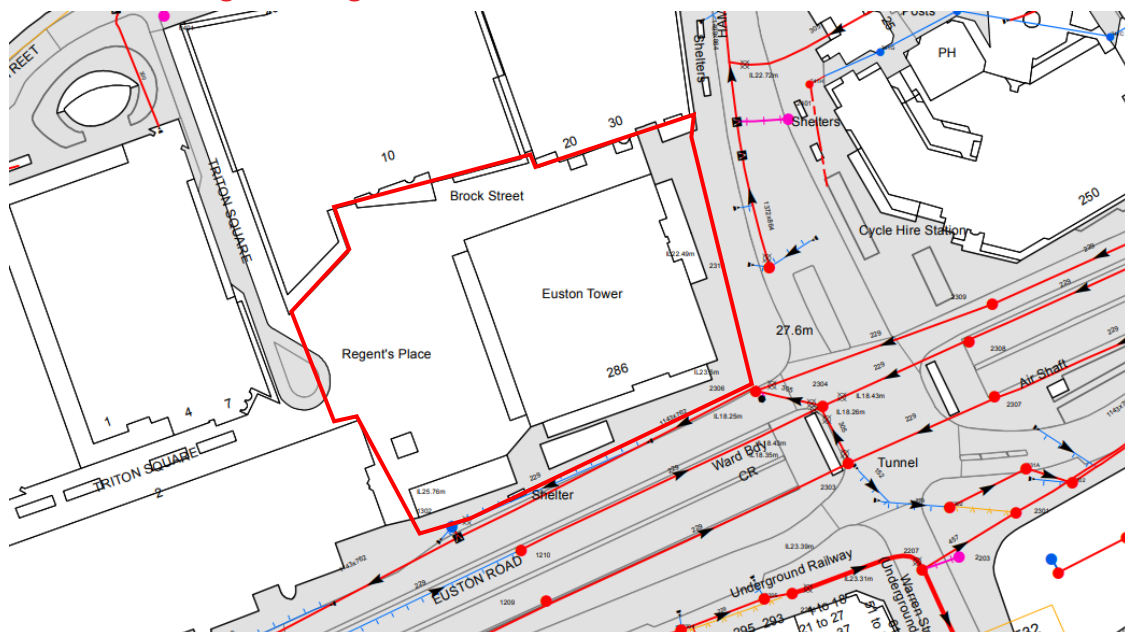


Figure 2: Existing Thames Water Sewers

As shown in ~~Figure 2~~Figure 2 above, Thames Water asset mapping identifies the following existing combined sewers within proximity to the Site:

- 1143 x 762 combined sewer in Euston Road immediately south of the Site draining east to west.
- 2no. 229 dia. combined sewers further south within Euston Road draining west to east.
- 1372 x 864 in Hampstead Road to the east of the Site draining in a northerly direction.

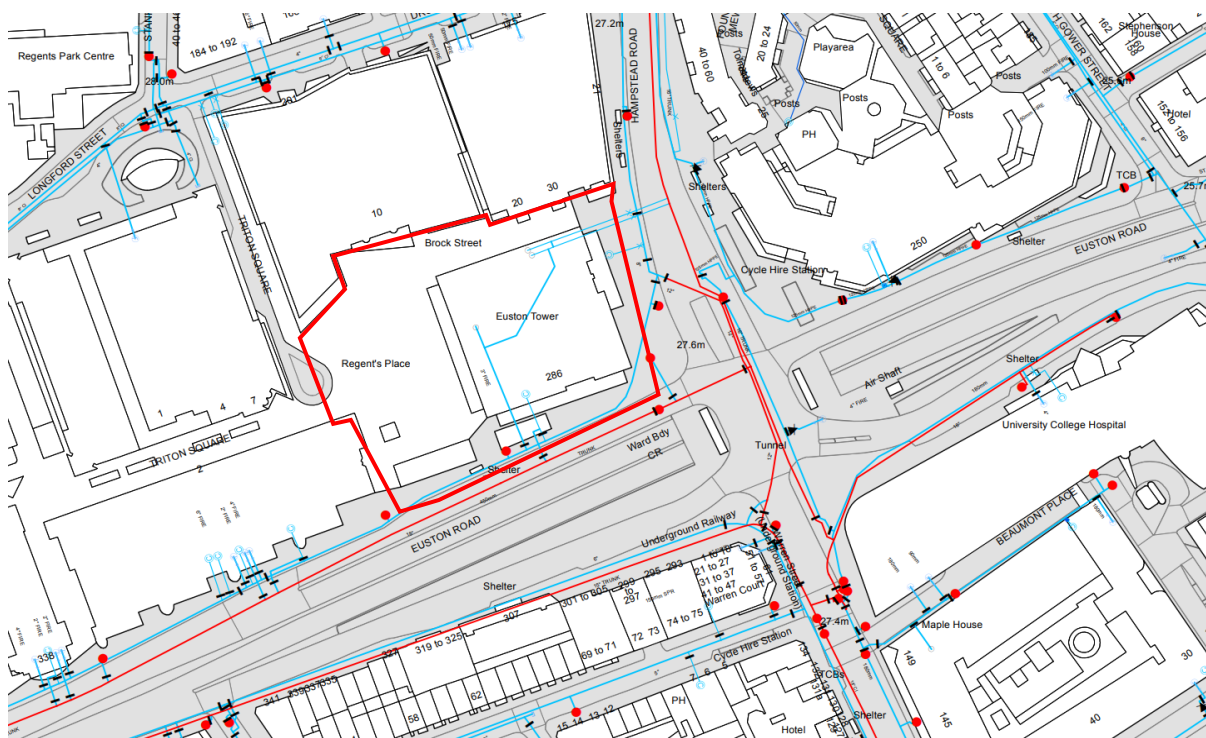


Figure 3: Existing Thames Water Potable Water Mains

As shown in Figure 3 above, Thames Water asset mapping identifies the following existing water mains within close proximity to the Site:

- 4inch water mains running within Euston Road, Hampstead Road and across the development site.
- 16inch trunk mains running in Euston Road and Hampstead Road

4. Proposed Development

4.1 Development Proposals

Redevelopment of Euston Tower, including the partial retention (retention of existing core, foundations and basement), disassembly, reuse and extension of the existing building, to provide a 32-storey building for use as offices and research and development floorspace (Class E(g)) and office, retail, café and restaurant space (Class E) and learning and community space (Class F) at ground, first and second floors, and associated external terraces. Provision of public realm enhancements, including new landscaping, and provision of new publicly accessible steps and ramp. Provision of short and long stay cycle storage, servicing, refuse storage, plant and other ancillary and associated works.

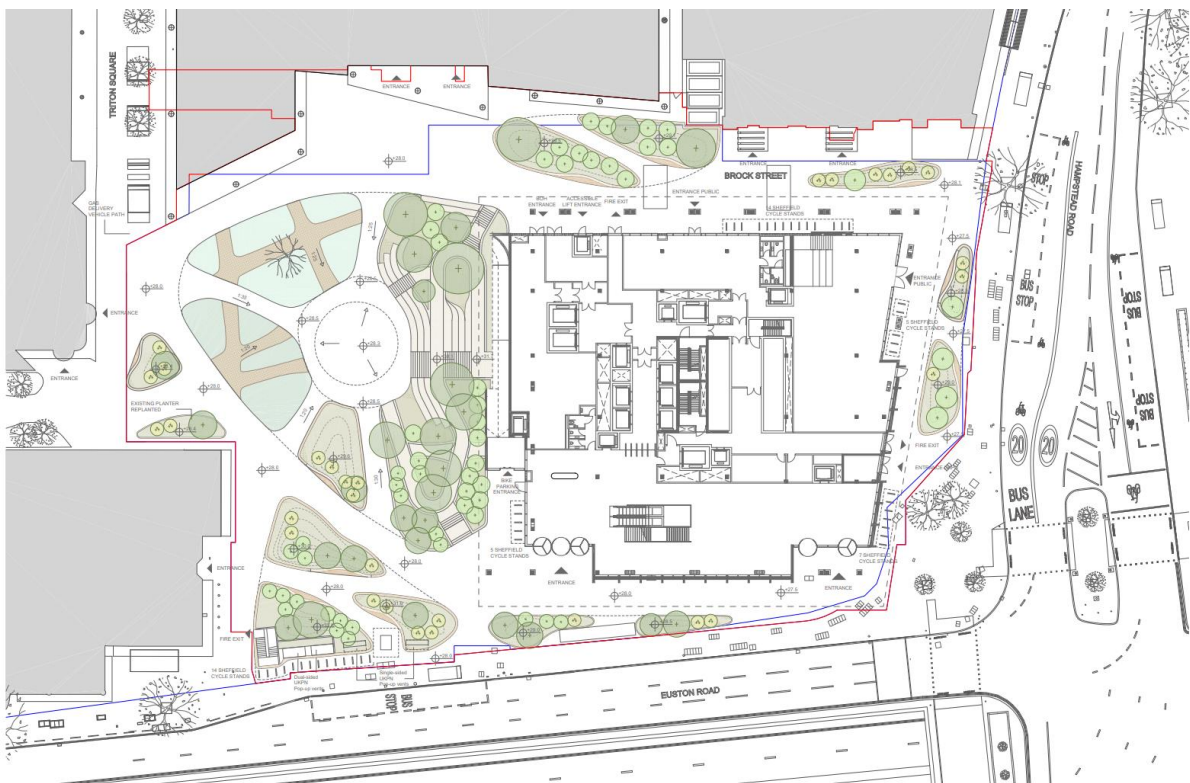


Figure 4: Proposed ground floor of development including landscaping

As shown above, the public realm surrounding the development will also be significantly redeveloped to include vegetated areas, wetlands and areas for surface water filtration. In turn also reducing overall impermeable surfaces.

For detailed layout proposals see 3XN drawings included within Appendix C.

5. Flood Risk Assessment

The [Technical Guidance of the NPPF [HSF10]](section 2) requires flood risk from the following sources to be assessed:

- Fluvial & Tidal Sources
- Pluvial (surface water)
- Groundwater
- Artificial Sources, Canals, Reservoirs etc
- Historic Flooding

5.1 Fluvial & Tidal Flooding

Environment Agency (EA) Flood Maps confirm that the site is wholly located within Flood Zone 1 (FZ1), defined as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%) – very low.

The Site is therefore at **negligible** risk of fluvial or tidal flooding.

5.2 Pluvial Sources

Flooding attributable to surface water/overland flows typically arises when surface water is unable to discharge directly to a sewer or watercourse.

The EA's Flood Maps for Surface Water provide a general indication of areas that may be at risk of surface water flooding. They take a broad account of underground drainage, topography and typical storms which are likely to cause flooding. EA mapping shows the extent of surface water flooding at the site for the 1 in 30-year annual probability (high risk), between 1 in 30-year and 1 in 100-year annual probability (medium risk), between 1 in 100-year and 1 in 1000-year probability (low risk) and then in excess of the 1 in 1000-year probability (very low).

EA mapping below indicates that the site is at very low risk of surface water flooding, with the area at less than 0.1% chance of flooding every year. [Figure 5](#) below highlights the very low extent of flooding on the site and surrounding areas.

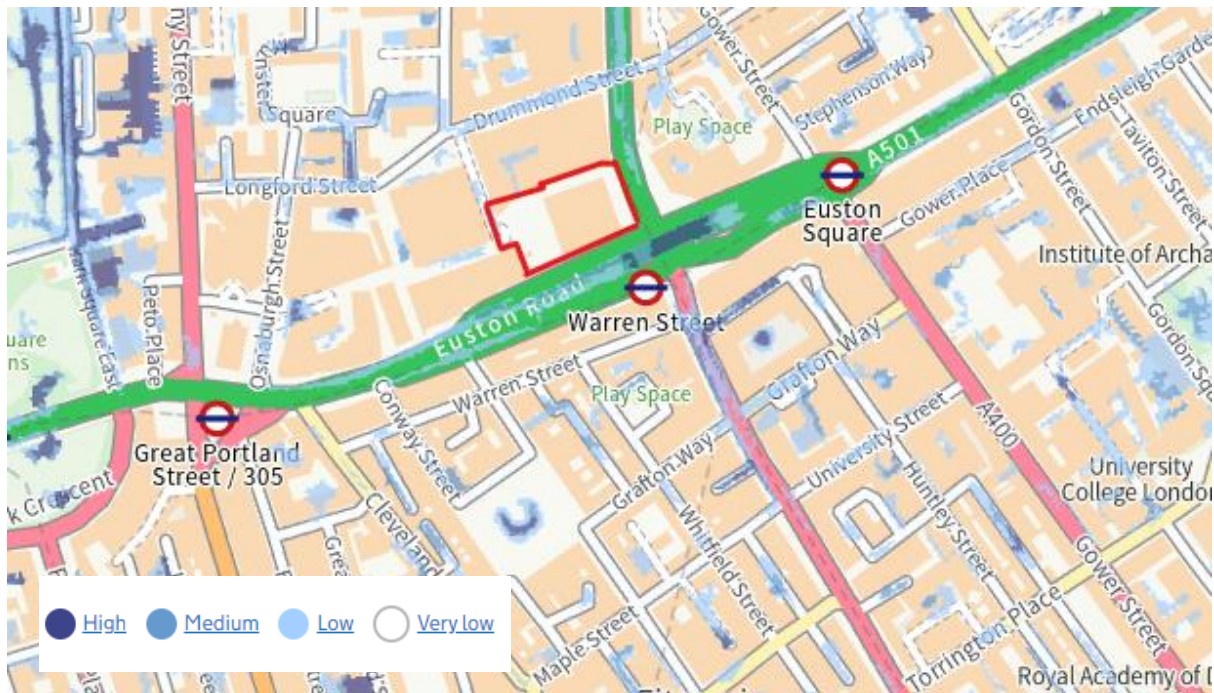


Figure 5: EA Mapping for Surface Water Flood Risk

Euston Road south of the Site shows flooding accumulates at the topographic low point in the middle of the highway and is classed as High Risk, meaning it is at greater than 3.3% chance of surface water flooding. However, the high flood risk at this location relates to the existing underpass which acts as a topographic low point and therefore does not pose a risk to the site.

Hence, the development is at low risk of flooding from surface water flooding.

[Figure 6](#) demonstrates the Site is not located within a Local Flood Risk Zones (LFRZ).

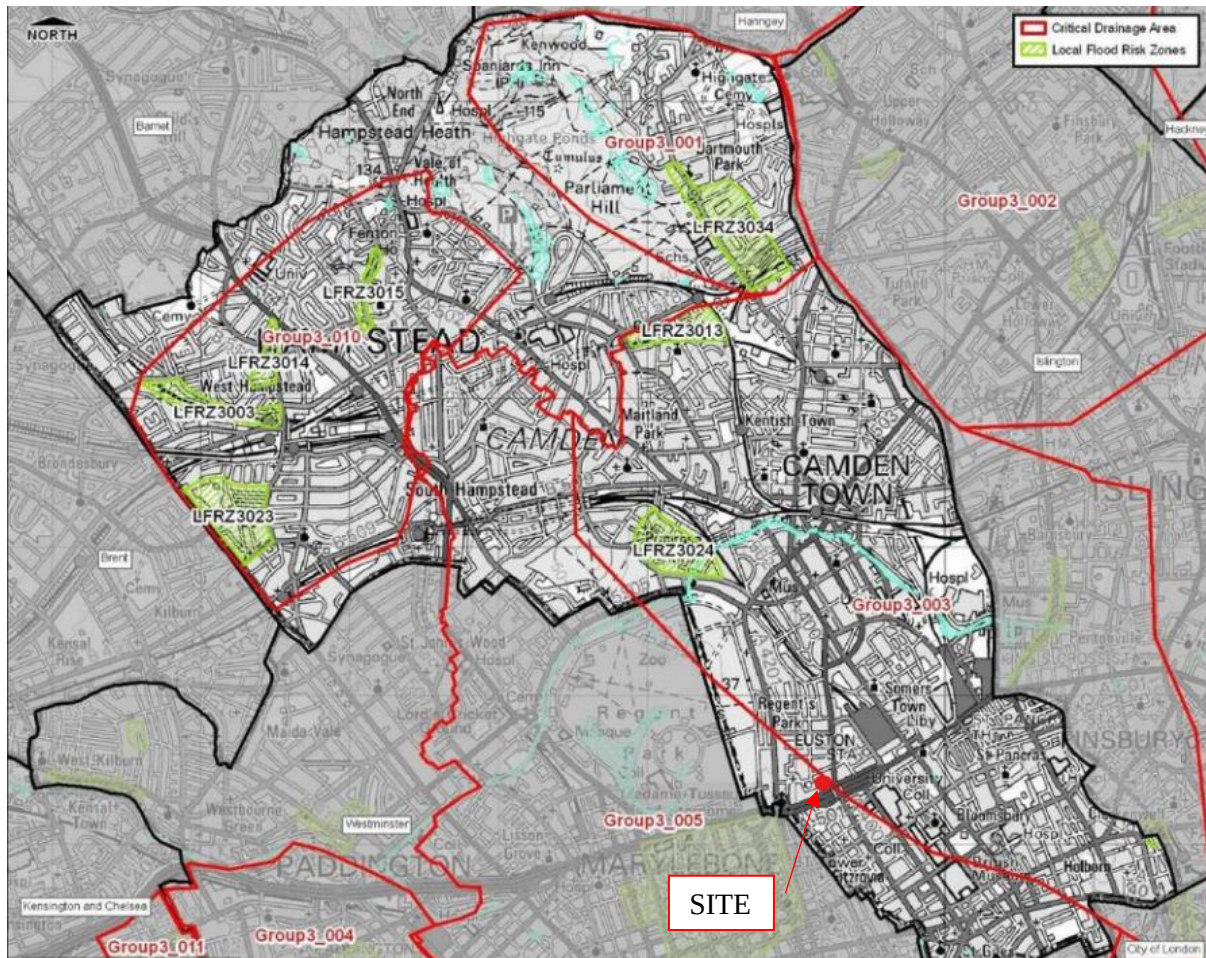


Figure 6: Local Flood Risk Zones (SWMP)

5.3 Groundwater Sources

Groundwater flooding typically occurs in areas underlain with aquifers or permeable rock/superficial deposits that permits groundwater to rise to the surface during high/long rainfall events. Low lying areas are particularly susceptible given that the water table is usually at a much shallower depth.

Within London, the primary mechanisms for elevated groundwater are associated with:

- Above average rainfall for a number of months in chalk outcrop areas;
- Shorter period of above average rainfall in permeable superficial deposits;
- Permeable superficial deposits in hydraulic continuity with high river water levels;
- Interruption of groundwater flow paths; and
- Cessation of groundwater abstraction causing groundwater rebound.

The LBC SFRA provides Susceptibility to Groundwater Flood Mapping ([Figure 7](#)) which shows that the site is located near areas of susceptibility to increased groundwater.

The level of susceptibility can be attributed partially to the superficial deposits of Lynch Hill Gravel. Within this lies superficial drift secondary aquifers and so has permeability and the ability to temporarily store water. This sits upon an impermeable London Clay bedrock meaning following a heavy rainfall event, perched water is a possibility.

There have been very few cases of groundwater flooding within the borough, with the closest incident of previous flooding located roughly 830m away. To this end, groundwater flooding is anticipated to be low risk.

If significant groundwater is encountered during the works, reference should be made to the recommendations within the Surface Water Management Plan and LBC SFRA, such as appropriate design and waterproofing of the basement structure. Permission to discharge or abstract may be required, as well as groundwater vulnerability assessment.

Appropriate mitigation (dewatering) against localised groundwater ingress during construction/excavation works below basement level may be required. Best practice techniques should be used and identified in the Construction Environmental Management Plan (CEMP) if required.

To mitigate the risk of ground water flooding to the Site, structural amendments to the existing basements will be impermeably lined.

The risk of groundwater flooding to the Site is **low** during operation and **low** with suitable mitigation during construction.

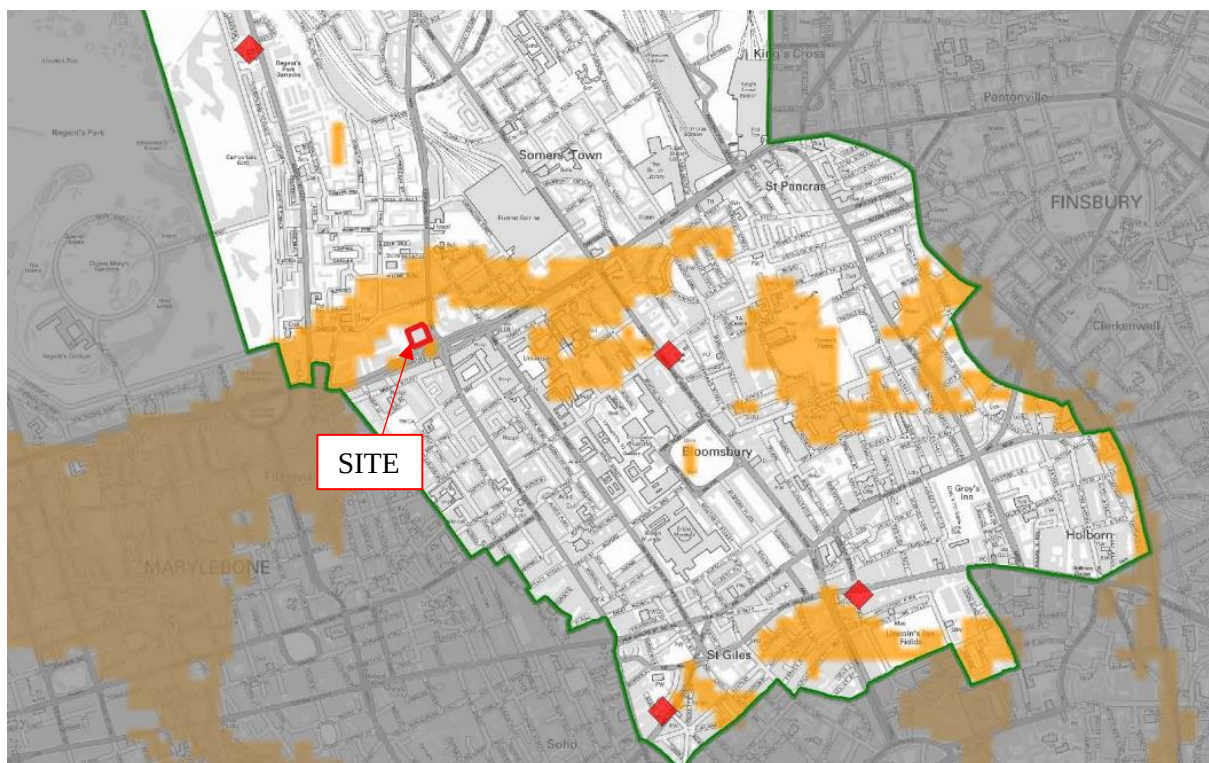


Figure 7: LBC SFRA Increased Susceptibility to Elevated Groundwater

5.4 Artificial Sources

In general, reservoir flooding is extremely unlikely to occur and there has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the EA ensures that reservoirs are inspected regularly, and essential safety work is carried out.

EA flood maps confirm that the Site is not at risk of reservoir flooding and there are no canals or other artificial sources which will influence flooding at the Site.

As a result of the above, the risk of flooding from artificial sources is **negligible**.

5.5 Infrastructure Failure (Burst Water Main)

The risk of flooding due to burst water main could be significant due to the flat nature of the existing topography. In addition to this, flood waters could flow into the existing basement. The existing entrance to the basement is proposed to be retained (location shown below). TWUL asset mapping below shows there are two 4inch water mains located within close proximity to the entrance which could cause issue. Therefore, appropriate mitigation measures to reduce the risk of flooding from burst water mains would potentially include:

- Raising entrance thresholds levels to basements making it less likely that basements would be flooded.
- Ensuring that critical infrastructure within basements are suitably protected for instance are at a raised level or are otherwise protected.
- Providing safe, non-mechanical means of escape from basements. [HSF11] [RB12]

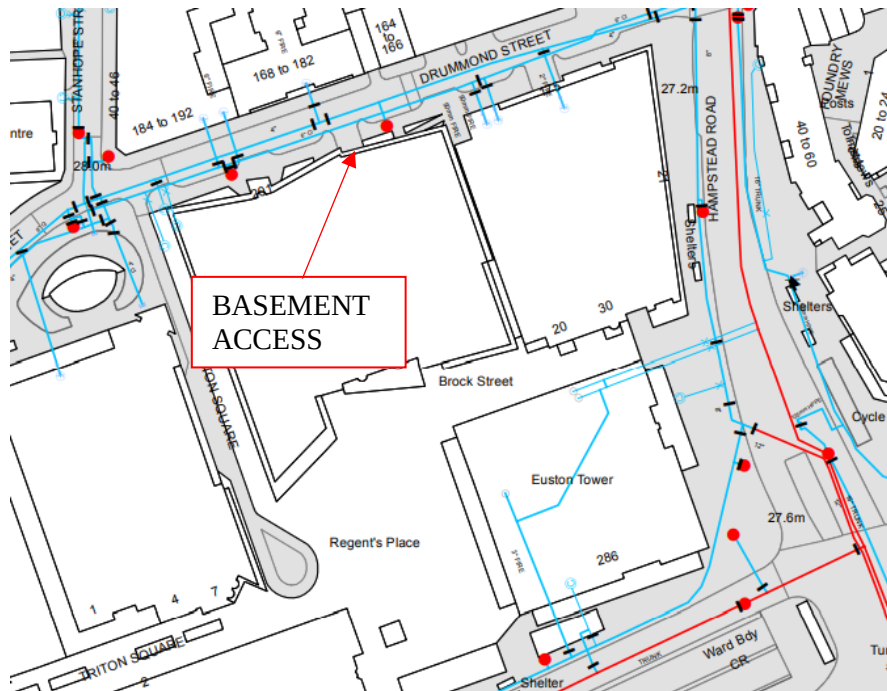


Figure 8: Thames Water Asset Mapping

5.6 Historic Flooding

Historic Flood records indicate two [HSF13] large surface water flooding events have occurred in the borough in 1975 and 2002 causing widespread damage due to extreme weather events. The 1975 flood was caused by a severe storm leading to flooding in West & South Hampstead (roughly 3.5km from the site). This was due to the drainage capacity of the sewer network being reached leading to surface and sewer flooding.

In 2002 flooding was less severe but saw a 1 in 100 year rainfall event occur, leading to flooding in West and South Hampstead, and parts of Kentish Town (roughly 2.5km away). Evidence therefore suggests that during extreme weather events the TWUL sewer network reaches capacity very quickly resulting in surcharging of sewers. The sites of flooding however are comparatively far from Euston Tower.

Whilst public sewers are now typically designed to accommodate rainfall events up to the 1 in 30 year storm event, the LBC SFRA identifies that the sewer network within some parts of Camden is particularly old with some sewers potentially only designed to accommodate the 1 in 10 year storm

event. Notwithstanding the above the LBC SFRA confirms that exterior sewer flooding records are all concentrated at the north west of the borough.

There are no records of flooding from groundwater sources within Westminster, according to the Local Flood Risk Management Strategy 2017-2022.

5.7 Flood Risk Summary

A summary of flood risk is provided below following the above assessment from all sources. The level of risk is defined as low, medium or high and as described by the following:

- Low:** Probability of flooding is low-negligible and risk to people or property should not form a material consideration for development. There is little or no residual risk.
- Medium:** Whilst probability of flooding is low, residual risk to people or property may be severe and require the development proposals to consider mitigation or further investigation. Mitigation may include flood resilience measures or protection of key infrastructure.
- High:** Flooding is likely to occur and should be specifically addressed as part of the development proposals. There is a significant risk to people or property and a flood management plan, evacuation plan/safe refuge plan or permanent flood prevention measures should be provided. May require further modelling, investigation, survey or consultation with LLFA/EA/Drainage Authority.

Table 3: Flood Risk Summary

Flood Source	Pathway	Comment	*Risk
Fluvial and Tidal	River Thames is located 2.2km south of site	EA flood maps confirm the site is entirely located within Flood Zone 1.	Low
Groundwater	Through underlying strata when groundwater levels rise above surface levels.	Site is in area where perched groundwater may be present, however is unlikely to pose risk while in use. Measures may need to be taken during construction. No historic record of groundwater flooding at site or immediate site environment. Any minor changes to basements within the building are highly unlikely to cause wider significant changes to the local groundwater regime.	Low
Artificial Sources	No reservoirs or other artificial sources nearby site environment.	No other artificial sources of flooding near to the site.	Low
Pluvial	Overloading of sewers or overland flow	A vast majority of the site is shown to be at very low risk of surface water flooding; although, small sections of Euston Road are at high risk. This flooding will be kept within the underpass section of the highway and therefore do not pose a risk.	Low
Infrastructure Failure	Burst water main inundating local sewer network	Multiple water mains in adjacent road networks including trunk mains. Infrastructure failure to burst main could cause significant damage to the basement of the building. Residual risk to basement structures and measures to provide flood protection should be considered as part of detailed design.	Low

6. Conclusion

This FRA is based on observations, a review of published data and hydraulic modelling. The following points are considered pertinent to the proposed development's suitability for this Site:

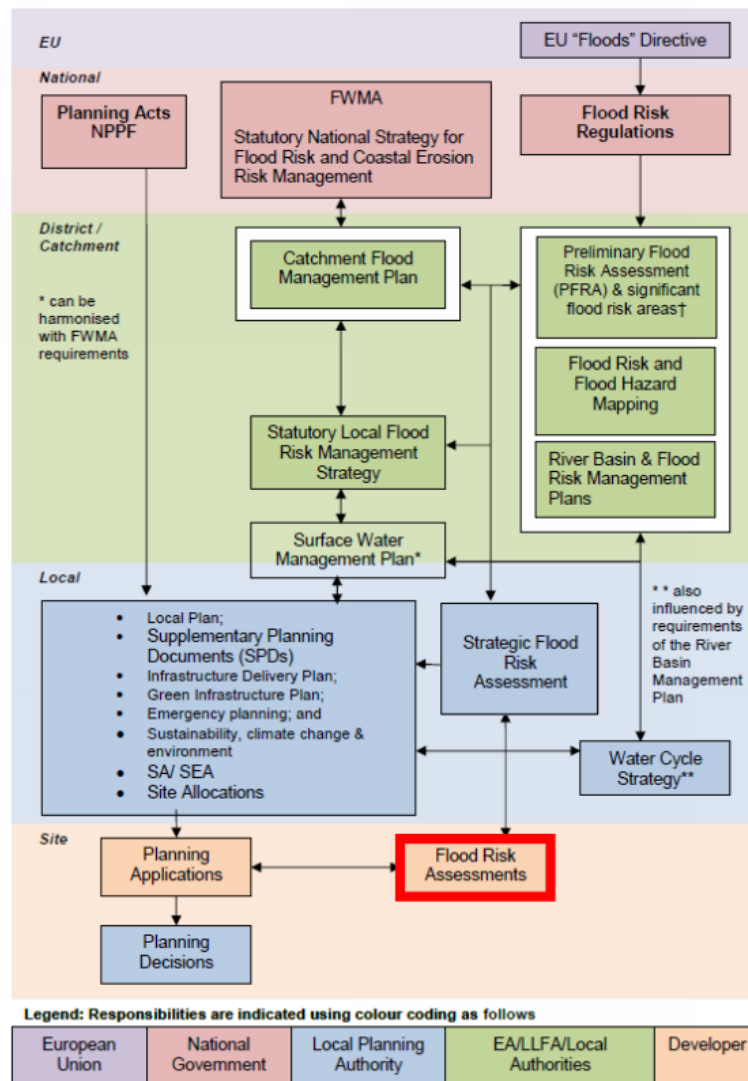
- The site is located within Flood Zone 1.
- Flood risk from tidal/fluviat sources, pluvial sources, groundwater, artificial sources and infrastructure failure are all considered to be low.
- In accordance with the requirements of Chapter 14 of the NPPF consideration has been given both to risk to the site, and to potential offsite risk as a result of the proposed development.
- Based on our understanding of the site setting and the proposals, it is considered that the development can be constructed and operated safely and will not increase flood risk elsewhere^[HSF14].

Appendix A

Relevant Policy

National Legislation, Regulations, and Flood Risk Guidance

The overarching aim of development and flood risk planning policy in the UK is to ensure that the potential risk of flooding is considered at every stage of the planning process. The following diagram outlines the key planning policy for flood risk management and associated documents.



International Planning Policy

Water Framework Directive (2000/60/EC)

The Water Framework Directive (WFD) sets out objectives prioritising future water protection across the European Union, with the aim of achieving improvements in the quality of polluted water bodies and maintaining the quality of clean water bodies.

Member states were required to transpose the Water Framework Directive (WFD) into domestic law by December 2003. This took place in England and Wales through the WFD England and Wales

Regulations 2003 (WFD Regulations). In the UK, the Environmental Agency (EA) is the ‘competent authority’ under the WFD Regulations.

Member water bodies are categorised as: ‘rivers’; ‘lakes’; ‘transitional waters’; ‘coastal waters’; or ‘groundwaters’. Each is identified within each category as being ‘at risk’; ‘probably at risk’; ‘probably not at risk’; or ‘not at risk’ of failing WFD objectives with regard to ‘water abstraction and flow regulation’; ‘physical or morphological alteration’; or ‘alien species’.

Under the WFD Regulations, each river basin district must have a river basin management plan in place which sets out environmental objectives for the district and a programme of measures to be applied in order to achieve those objectives. Water in rivers, estuaries, coasts and aquifers will improve as a result of the measures set out in the river basin management plans.

EU Floods Directive (2007/60/EC)

The aim of the Directive is to provide a consistent approach across the European Union to reducing and managing the risks posed by flooding to human health, the environment, cultural heritage and economic activity. The Floods Directive is to be delivered in conjunction with the objectives of the Water Framework Directive (2000/60/EC) to deliver a better water environment through river basin management.

In the UK, the Floods Directive is transposed into law via the Flood Risk Regulations by setting out the duties of local government in assessing flood risk to their area.

National Policy and Guidance

Environmental Permitting Regulations (2016)

The Environmental Permitting Regulations 2016 consolidate and replace the 2010 Regulations and subsequent amendments. The permitting regime covers a range of activities that release emissions to land, air and water, or that involve waste.

Schedule 21 relates to water discharge activities and Schedule 25 relates to flood risk activities. Schedule 22 relates to groundwater activities and the regulations place a duty on regulating authorities to implement the Water Framework Directive.

The Water Resources Act (1991) and Water Acts (2003, 2014)

The Water Resources Act 1991 provides legislation for the control of the pollution of water resources. Under this Act, offences of polluting controlled waters occur if a person knowingly permits any poisonous, noxious or polluting matter or any solid waste matter to enter any controlled waters. The Water Resources Act 1991 also provides an all-embracing system for the licensing of the abstraction of water for use, which is administered by the EA. The Water Acts (2003, 2014) modernise water legislation and amend the Water Resources Act 1991 to improve long-term water resource management.

Flood Risk Regulations (2009)

The Flood Risk Regulations 2009 transpose the Floods Directive (2007/60/EC) into law in England and Wales.

The regulations required the Lead Local Flood Authority (LLFA), to produce:

- A Preliminary Flood Risk Assessment (PFRA) by December 2011;
- Flood hazard and flood risk maps by December 2013; and
- A Local Flood Risk Management Strategy by December 2015.

The Flood and Water Management Act (2010)

The Flood and Water Management Act 2010 (FWMA), which received Royal Assent on 8 April 2010, takes forward some of the proposals in three previous documents published by the UK Government:

- Future Water;
- Making Space for Water; and
- The Government's Response to the Sir Michael Pitt's Review of the summer 2007 Floods.

The FWMA gives the EA a strategic overview of the management of flood and coastal erosion risk in England. In accordance with the Government's Response to the Pitt Review, it also gives upper tier local authorities in England responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.

Land Drainage Acts (1991, 1994)

The water quality and flood risk management of controlled waters including rivers and aquifers is protected by legislation under the Land Drainage Acts (1991, 1994).

National Planning Policy Framework (2019)

The NPPF includes policies on flood risk and minimising the impact of flooding under Section 14, Meeting the challenge of climate change, flooding and coastal change (Paragraphs 155 – 165). The NPPF supersedes the Planning Policy Statement 25 (PPS25).

The NPPF states that:

Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and develop policies to manage flood risk from all sources, taking account of advice from the EA and other relevant flood risk management bodies, such as LLFAs and internal drainage boards.

Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change.

When determining planning applications, Local Planning Authorities (LPAs) should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- *within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and*
- *development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of Sustainable Urban Drainage Systems (SuDS).*

National Planning Policy Framework (20)

The NPPF includes policies on flood risk and minimising the impact of flooding under Section 10, Meeting the challenge of climate change, flooding and coastal change (Paragraphs 152 – 173). The NPPF states that:

Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas

susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.

When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- d) any residual risk can be safely managed; and
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

Sewerage Section Guidance Appendix C – Design and Construction Guidance (2020)

[Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code")]

Adopted drainage networks need to meet the criteria outlined in the Design and Construction Guidance (2020). A piped drainage system is required to not surcharge for a 1 in 1-, 1 in 2-, or 1 in 5-year event depending on site conditions or flood the ground in a 1 in 30-year event using a design storm with the critical duration relevant to the site (i.e. the worst-case for a given return period). Private drainage systems also tend to use these criteria as a basis for design. Adoption of new sewers or abandonment of old sewers should take place in accordance with the Water Industry Act 1991, Sections 104 and 116 respectively.

DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems (2015)

The DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems provides guidance on:

- Flood risk outside the development;
- Peak Flow Control;
- Volume Control;
- Flood Risk within the development;
- Structural Integrity;
- Designing for Maintenance Considerations
- Construction

Key extracts from this document are provided below:

Peak flow control

S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

Volume control

S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.

S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

Flood risk within the development

S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.

S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.

The standards are supported by Practice Guidance prepared by the Local Authority SuDS Officer Organisation (LASOO).

Appendix B

Topographical Survey

Electro-detection techniques have been used in the location of underground services in some areas. The results are not infallible and trial excavations must be carried out to confirm service identification, position and particularly depths.

Although all reasonable effort has been made in searching available record drawings the completeness of the underground services information cannot be guaranteed.

Unless otherwise stated, drainage pipes are 100mm diameter.

SHEET LAYOUT	
42746T-01-1	42746T-01-2
42746T-01-3	42746T-01-4

This survey is commensurate with band F accuracy, as outlined in the RICS survey detail accuracy banding table

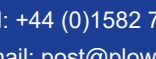
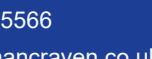
All levels are in metres and are above Ordnance Survey Newlyn Datum derived by multiple network RTK GPS observations

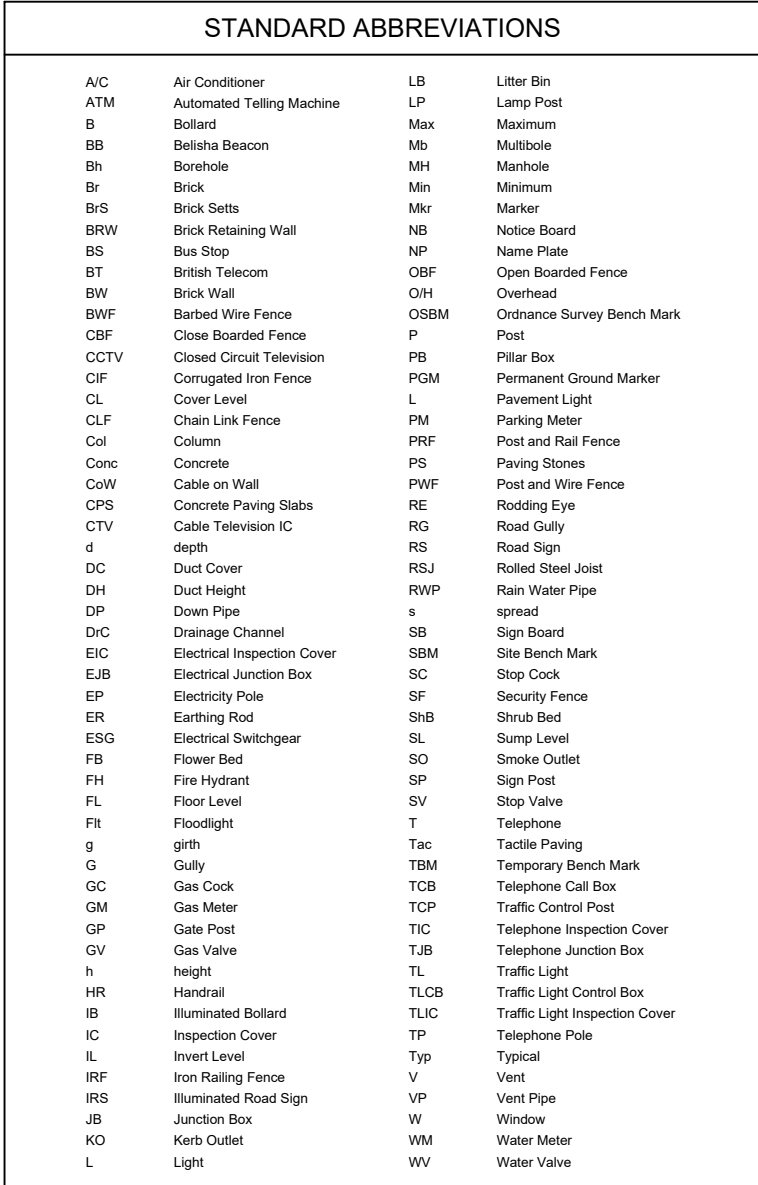
The survey grid shown on this drawing is positioned on Ordnance Survey (OS) National Grid, obtained by multiple network RTK GPS observations

Unless otherwise stated, levels have been taken to finished floor surface

All quoted dimensions are in metres

Drawing units are metres

Regents Place London, NW1	
3D Topographic Survey	
PRESENTATION SCALE	1:200 @ A0
DATE OF ORIGINAL SURVEY	June 2018
PC PROJECT No. 42746	CHECKED GH
DRAWING No.	ISSUE
42746T-01-2	I
Plotman Craven	
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Tel: +44 (0)1582 765566	
Email: post@plotmancraven.co.uk	
Web: www.plotmancraven.co.uk	
Tel: +44 (0)204 930 7700	
	
	



SERVICE LEGEND

FOUL DRAINAGE	
SURFACE WATER DRAINAGE	
WATER	
GA5	
ELECTRIC	
TFL	
VERIZON	
COLT	
CENTURY LINK	
ZAYO GROUP	
VODAFONE	
BRITISH TELECOM	
VIRGIN MEDIA	
UNKNOWN SERVICE	
UNDERGROUND CHAMBER	

SERVICE ABBREVIATIONS			
(AC)	Assumed Connection	LV	Insert Level
(A)	Assumed Route	LY	Low Voltage
C	Cast Iron	(NF)	No Further Information
CD	Depth to top of cable	(NP)	No Piles Included
d	Depth of service (appears)	(P)	Depth to top of pipe
DD	Depth to top of duct	(Pc)	Polychlorine
D	Dustline	(Pn)	Pipe Records
EN	Enrich Depth	(Pv)	Service valve
ENH	Enrich high voltage	(S)	Scum Depth
HB	Heath Box	(U/L)	Unable to Lift without damage
HDB	Heath Box Depth	(UT)	Unable to Insert
HV	High Voltage	WC	Wap Cost
		WD	Water Level

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The identification of service covers in some locations has been made by a surface inspection only - critical identifications should be verified by the lifting of covers or a full utilities survey

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SHEET LAYOUT

42746T-01-1	42746T-01-2
42746T-01-3	42746T-01-4

ISSUES & REVISIONS			
Issue	Details	By	Date
A	Original Issue	PCL	04/04/2016
B	Underground Services Added	PCL	12/05/2016
C	St. Anne's Church Details Updated	PCL	10/07/2017
D	Trinton Sq Underground services added	PCL	30/08/2017
E	Topo extended and layout amended	PCL	11/07/2018
F	Topo extended and additional levels added	PCL	18/07/2018
G	Additional Underground Services Added	PCL	21/02/2019
H	Basement Extends Added	PCL	18/07/2019
I	Underground services (Hampstead Road and Euston Road) added.	PCL	18/11/2019

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The survey grid shown on this drawing is positioned on Ordnance Survey (OS) National Grid, obtained by multiple network RTK GPS observations.

Unless otherwise stated, levels have been taken to finished floor surface.

Drawing units are metres

CLIENT

British Land

York House

45 Seymour Street

London
W1H 7LX

PROJECT TITLE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1

Regents Place

London, NW1

3D Topographic Survey

PRESENTATION 1,222 © 12

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY June 2018

PC PROJECT No. 42746 CHECKED GH

DRAWING No.	ISSUE

42746T-01-3 |

Blowman Craven

Florian Craven

Plowman Craven House 115 Southwark Bridge Road
2 Lea Business Park London

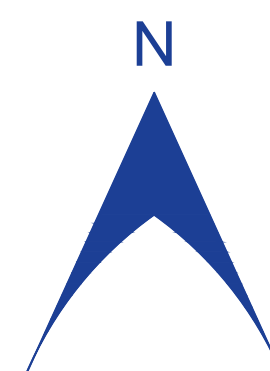
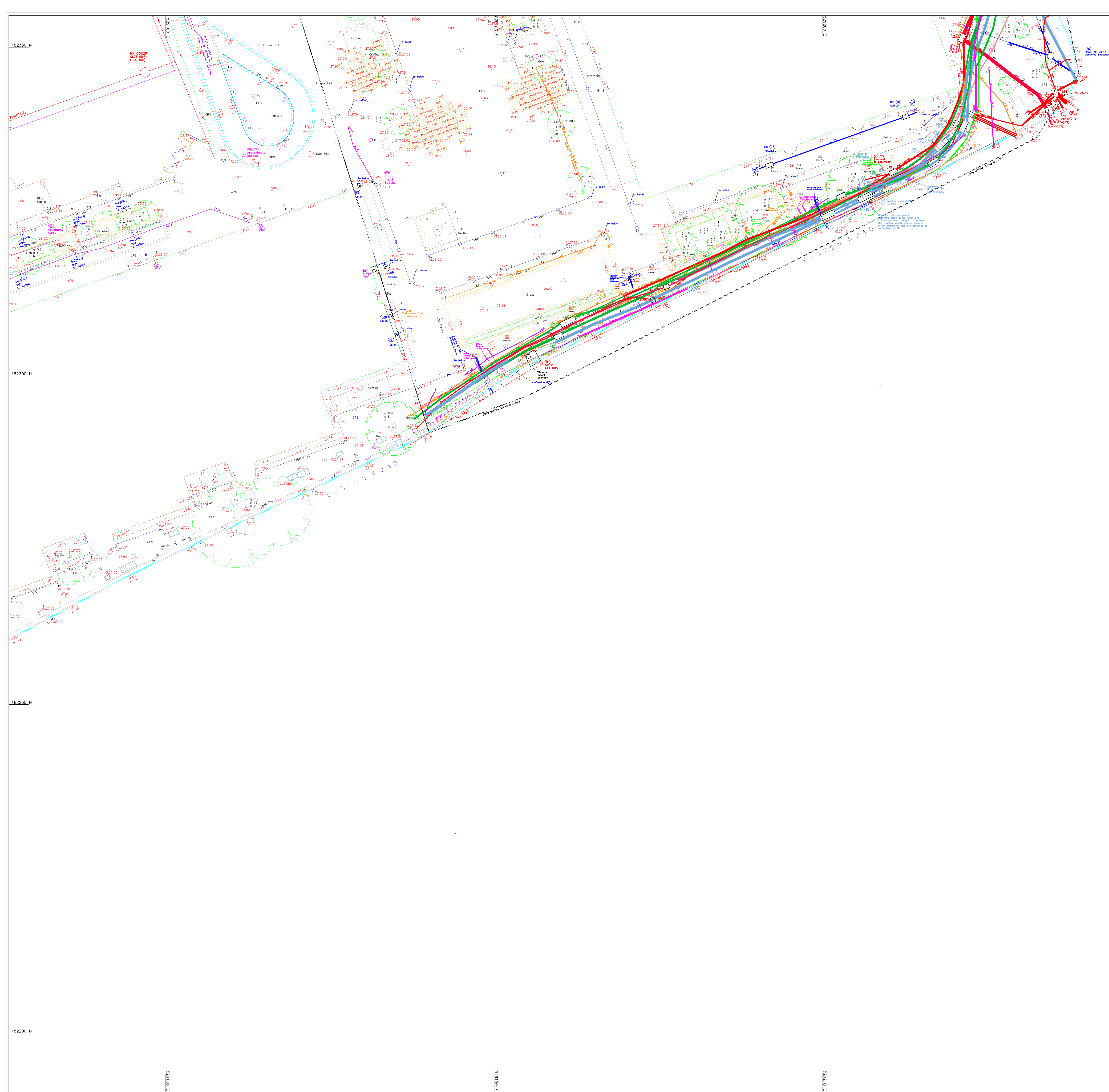
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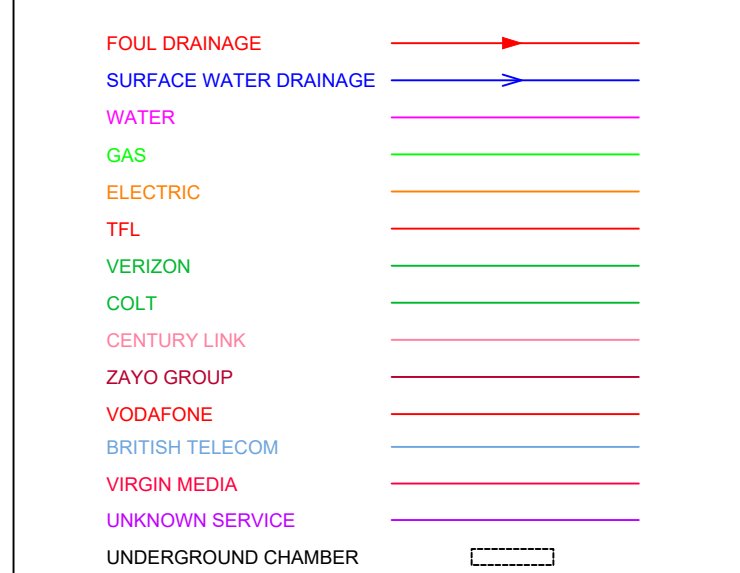


[illegible]

LEG

→ Stair/step arrows point up
Assumed detail

SERVICE LEGEND



SERVICE ABBREVIATIONS

(AC)	Assumed Connection	IL	Invert Level
(AR)	Assumed Route	LV	Low Voltage
CI	Cable Iron	(NF)	No Further Information
CD	Depth to top of cable	(NFV)	No Pipes Visible
d	Depth of service (approx)	DP	Depth to top of pipe
DD	Depth to top of duct	P	Polyethylene
DI	Ductile Iron	(F)	From Records
(E)	Empty Duct	(S)	Service cable
(EH)	Extra High Voltage	SD	Sump Depth
HN	Hotch Hole	(ULT)	Unable to Lift without damage
hSD	Hotch Hole Depth		Unable to Thru
HW	High Voltage	WD	Weg Duct
		WL	Water Level

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SHEET LAYOUT

42746T-01-1	42746T-01-2
42746T-01-3	42746T-01-4

ISSUES & REVISIONS

Issue	Details	By	Date
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Drawing units are metres

1. *Journal of the American Medical Association*, 2000; 284: 1012-1016.

CLIENT

British Land
York House
45 Seymour Street
London
W1H 7LX

PROJECT TITLE

Regents Place
London, NW1

3D Topographic Survey

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY June 2018

PC PROJECT No.	42746	CHECKED	GH
DRAWING No.		ISSUE	

42746T-01-4

Plowman Craven

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Appendix C

Masterplan Proposals

