Sustainable Drainage Strategy

20-23 Greville Street

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Revision: 02
Status: S2

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GENERAL NOTES

REVISION HISTORY

Revision	Status	Date	Author	Reviewer	Approver
00	Concept	15/11/17	KF	PD	AL
001	Stage 2	15/12/17	KF	PD	AL
002	Stage 2	21.12.2017	KF	PD	AL

1 SUMMARY

The following report reviews the implications of the planned commercial extension to 20-23 Greville Street in terms of a sustainable drainage strategy for surface water run-off in compliance with Camden's Local and the London Plan Policy 5.13 and Local Plan Policies CC1and CC2.

The report reviews the potential for flooding in the area of the development finding that there is no historical or forecast case for flooding.

An assessment establishes that in the unmitigated case for the new development, there is no additional surface water run-off to the existing case, this, since the planned extension is located on an existing hard standing.

The report reviews the proposed extension against Camden's planning guidance and in particular CPG3, and proposes an attenuation tank to store rainfall during the period of a storm retaining much of a 1:100 year storm event and attenuating outfall to below 5l/s, thus reducing the total run off from the site to below that of the existing case.

Under the condition allowing for increased rainfall as a result of Global Warming the resulting attenuated flow rate is improved by 30%.

2 INTRODUCTION

Webb Yates Engineers (WYE) have been appointed by Seaforth Land to undertake an assessment of the implications of extending an existing commercial development at 20-23 Greville Street in terms of developing a sustainable drainage strategy.

The scope of this report is to review proposed extension, initially to meet London Borough of Camden's planning requirements for refurbished and new-build offices, based on the Pre-application Design and Access Statement, and associated drawings, provided by Groupwork Architects.

The project involves the part demolition, refurbishment and extension of the existing building on Greville Street.

This sustainable drainage strategy report has been prepared in respect to this development to support the planning application in compliance with Local Plan Policies.

The first issue of this document precedes any site investigation works or opening up works on site, and as such will need to be developed to include implications of any findings.

The purpose of this report is to consider the various sustainable drainage strategies including attenuation options in and determine the preferred option for the new extension.

This report should be read in conjunction with the preliminary drainage drawing.

3 GENERAL DESCRIPTION OF SITE

The site is located within the borough of Camden and the specific address is 20-23 Greville Street, London EC1N 8SS. The building is situated between Bleeding Heart Yard, Greville Street and Saffron Hill.

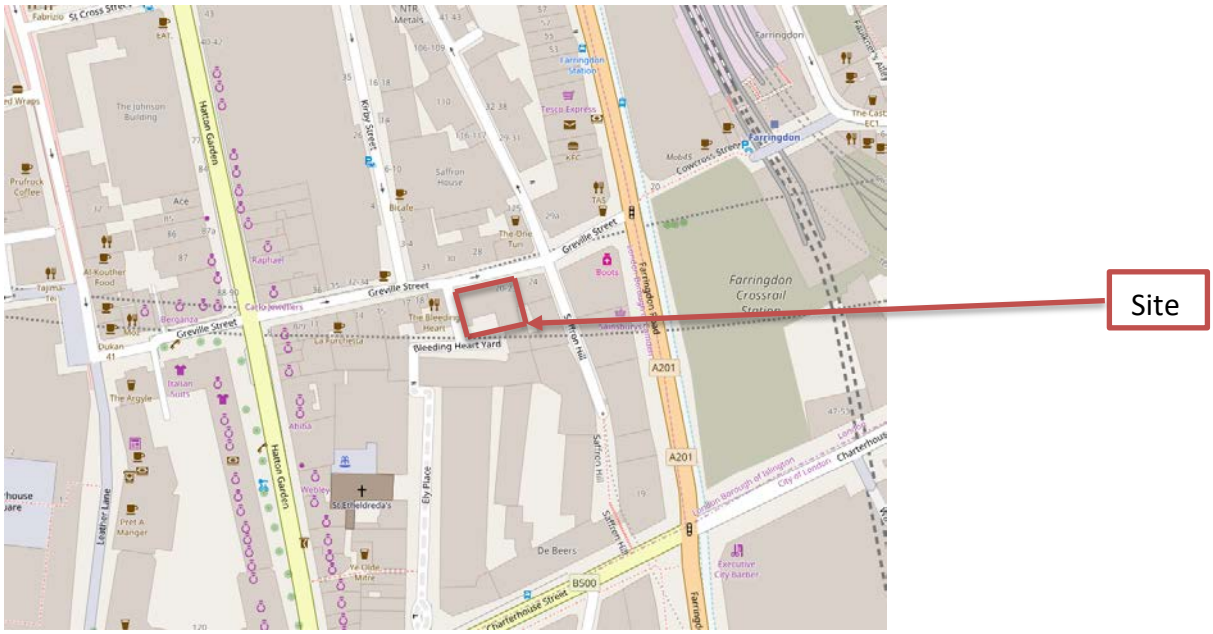

Figure 3.1 showing the approximate development boundary – Source: openstreetmap.org

3.1 TOPOGRAPHY

The development is located on flat lying land within Central London. A topographical/dimensional survey is still to be conducted.

3.2 GEOLOGY

The site has a bedrock geology of London Clay which is overlaid with Hackney and Kempton Park Gravel Member. The Current depths of each are unknown.

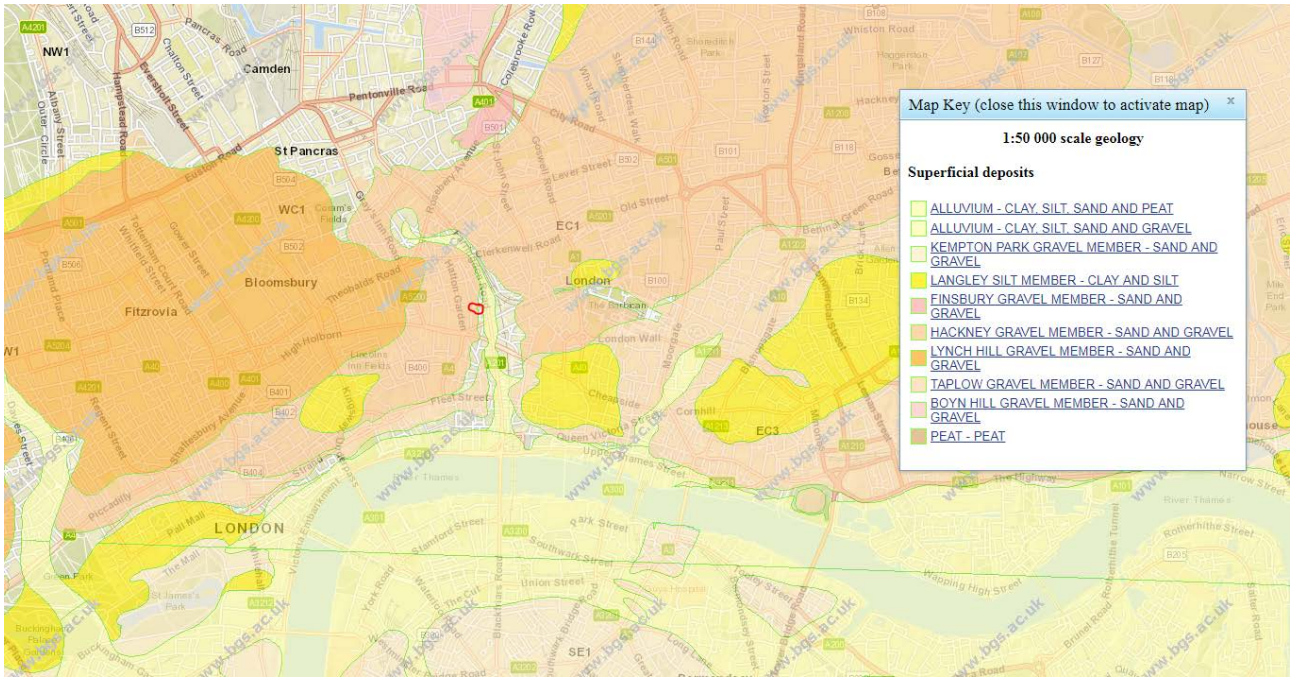

Image 3.2: Superficial Geology – Source: British Geological Survey

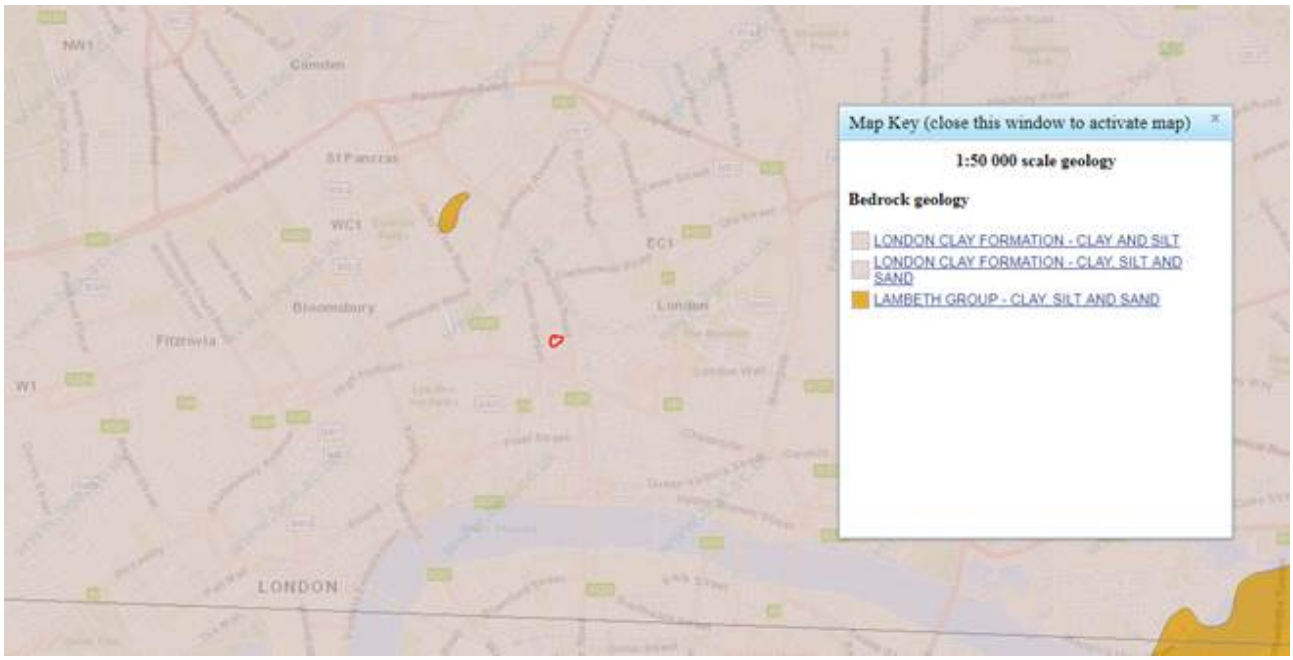

Image 3.3: Bedrock Geology – Source: British Geological Survey

3.3 HYDROLOGY AND HYDROGEOLOGY

The existing known water courses near the site are the Thames River which is located approximately 950m south west of the site and City Road Basin approximately 1.35km north east of the site.

Fleet River use to flow approximately 100m east of the site but has since been redirected by Thames Water and now has a controlled discharge close to the ponds at Hampstead Heath (camden.gov.uk).

There are no ground water protection zones or aquifers identified near this site.

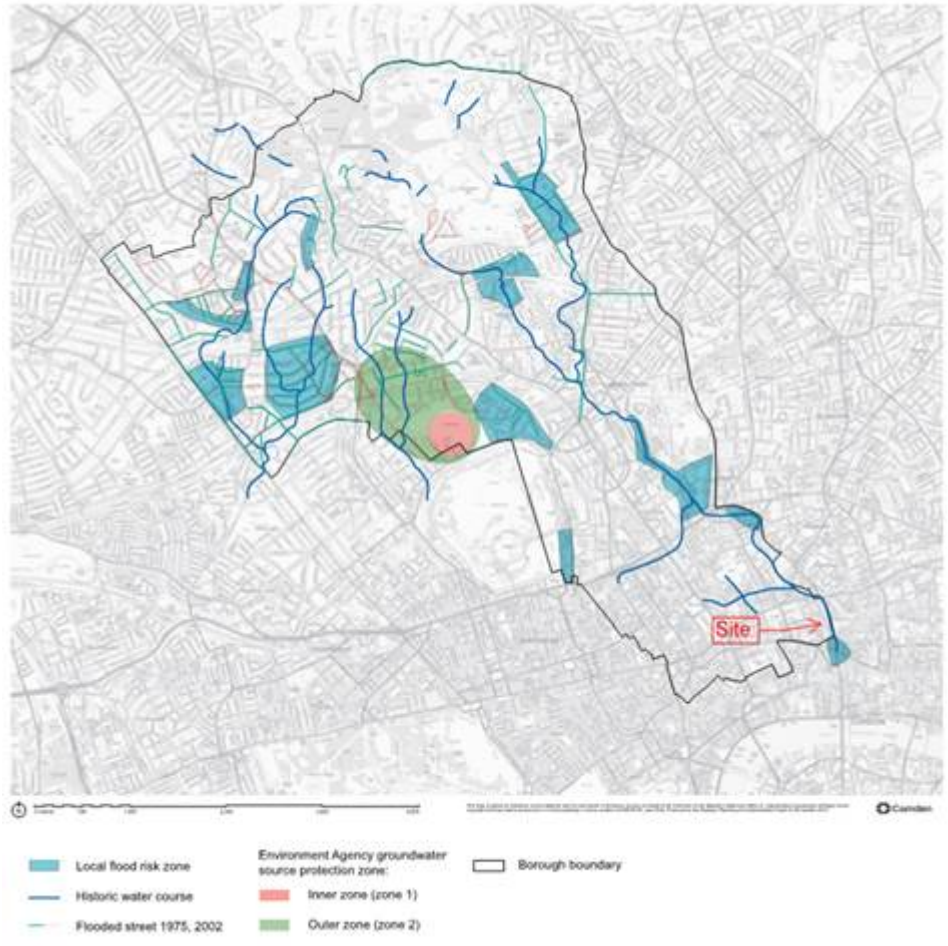

Image 3.4: Historic Flooding and Local Flood Risk Zones – Source: Camden Council

4 FLOOD RISK

At present there is no history of flooding at the site (see image 2.3 above).

4.1 SURFACE WATER FLOODING

There is currently a very low risk of surface water flooding at the site which implies there is a less than 0.1% chance of flooding occurring in any given year. The main in Greville Street has low risk of surface water flooding suggesting that there is a 0.1% to 1% chance of surface water flooding occurring in any given year.

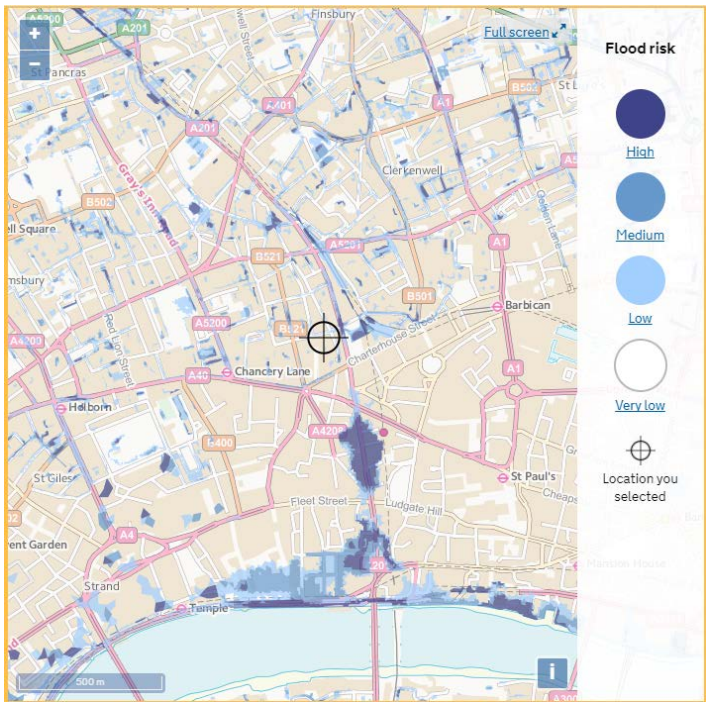

Image 4.1: Surface Water Flood Map – Source: Environment Agency.

4.2 RIVER AND SEA FLOODING

There is currently a very low risk of river or sea water flooding (Environmental Agency Flood Zone 1) at the site which implies there is a less than 0.1% chance of flooding occurring in any given year. There are currently flood defences along the River Thames at the point which is closest to the site.

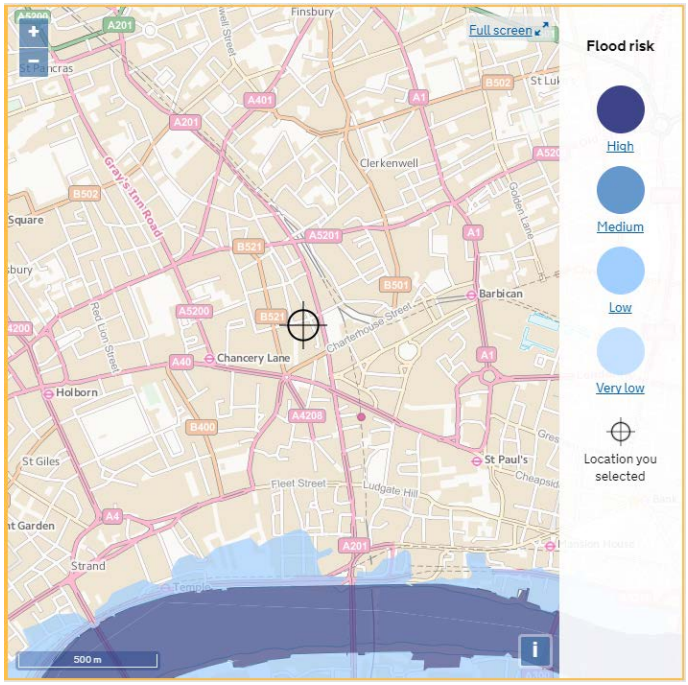

Image 4.3: River and Sea Flood Map – Source: Environment Agency.

4.3 RESERVOIR FLOODING

There is currently no risk or reservoir flooding at the site.

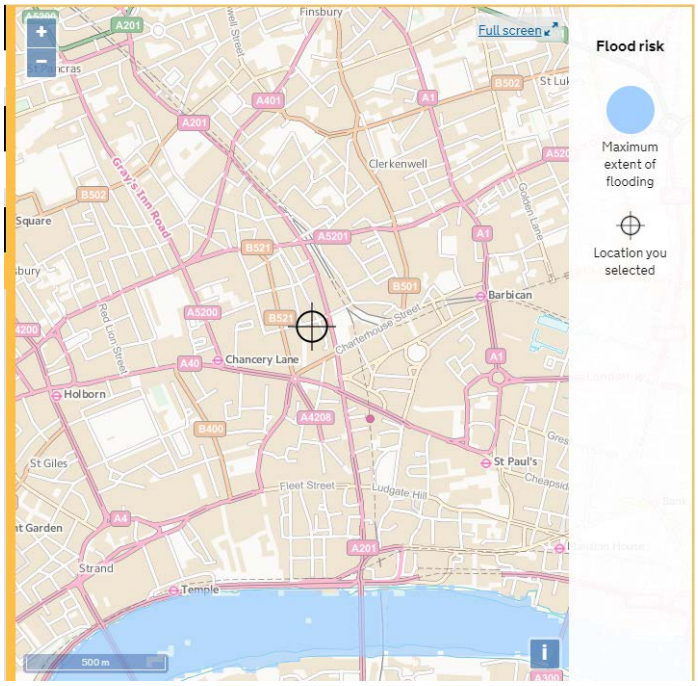

Image 4.3: Reservoir Flood Map – Source: Environment Agency.

4.4 GROUNDWATER FLOODING

At the time of writing this report a site investigation had not been conducted so there is no current information regarding existing groundwater levels for the site. The most common cause of groundwater flooding within the borough of Camden is from perched groundwater which is lodged between the surface and London Clay strata rising due to prolonged periods of rain. The following assessment determines the level of vulnerability associated with the site.

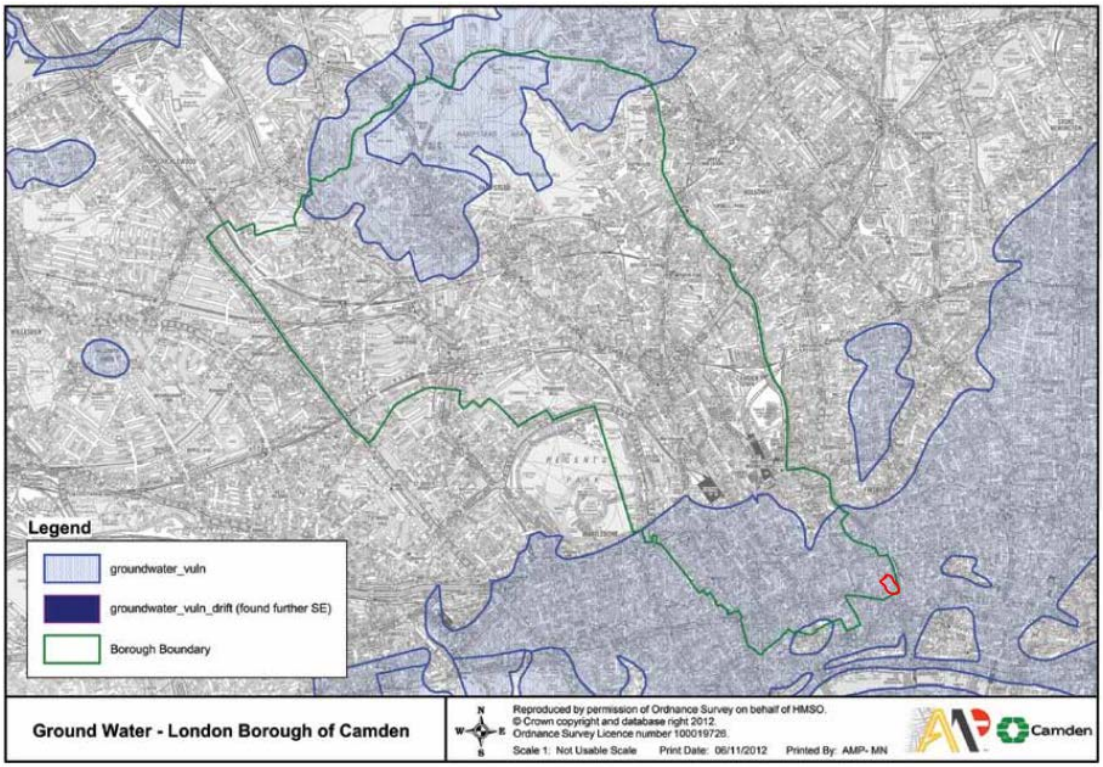

Image 4.4: Camden Ground Water Vulnerability Map – Source: Camden Council

4.5 FLOOD RISK VULNERABILITY TABLE

The development is considered to be in the less vulnerable category: Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions are not included in the 'more vulnerable' class.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Key:

✓ Development is appropriate

X Development should not be permitted.

Image 4.5: Flood Risk Vulnerability Classification – Source: Department for Communities and Local Government

4.6 EXISTING DRAINAGE

The existing external area is impermeable with rainwater currently draining away from the building towards road gullies within the Bleeding Heart Yard. A drainage survey identifies a surface water gully connected from a lower ground floor plant area discharging rainwater directly into a sewer also located in Bleeding Heart Yard. A further single 150mm connection to a sewer on the west side of the building into the access road leading to Bleeding heart yard.

A CCTV survey for the existing drainage system confirms the site drains into a localised combined system which is gravity fed to the public sewer. The existing system is freely discharging with no records of on-site public sewer or private drain flooding.

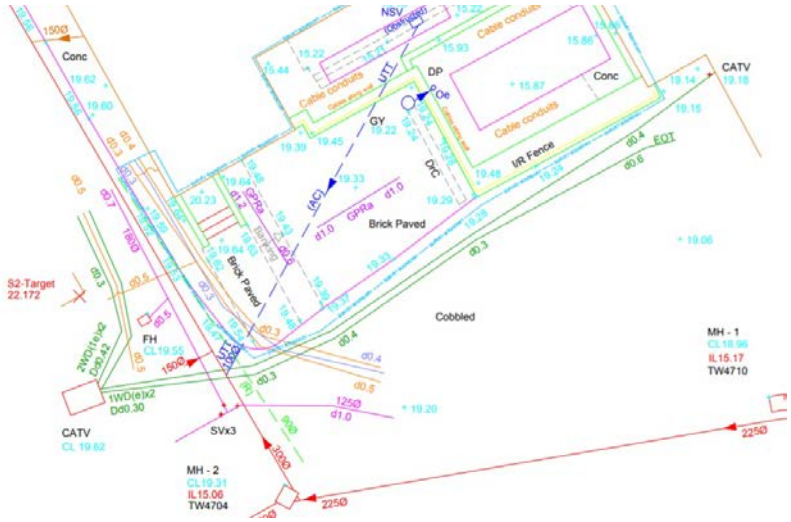

Image 4.6. Drainage Survey showing surface and combined drainage connections to sewer in Bleeding Heart Yard

5 PROPOSED DEVELOPMENT

It is proposed to convert the existing external areas to a building extension which will rise to the new 5th floor Mezzanine roof level. The proposal will seek to incorporate a green roof covering the plan area of the extension. This will have the effect of reducing the existing discharge rate for the roof area to 1l/s in accordance with UKSuDS recommendation. The soil depth and nature of vegetation information is to be confirmed during technical design.

The extension was previously occupied by three private parking spaces and a lower ground floor external plant area.

Image 5.1: Existing external area (approximately 95m²) – Source: Google Maps

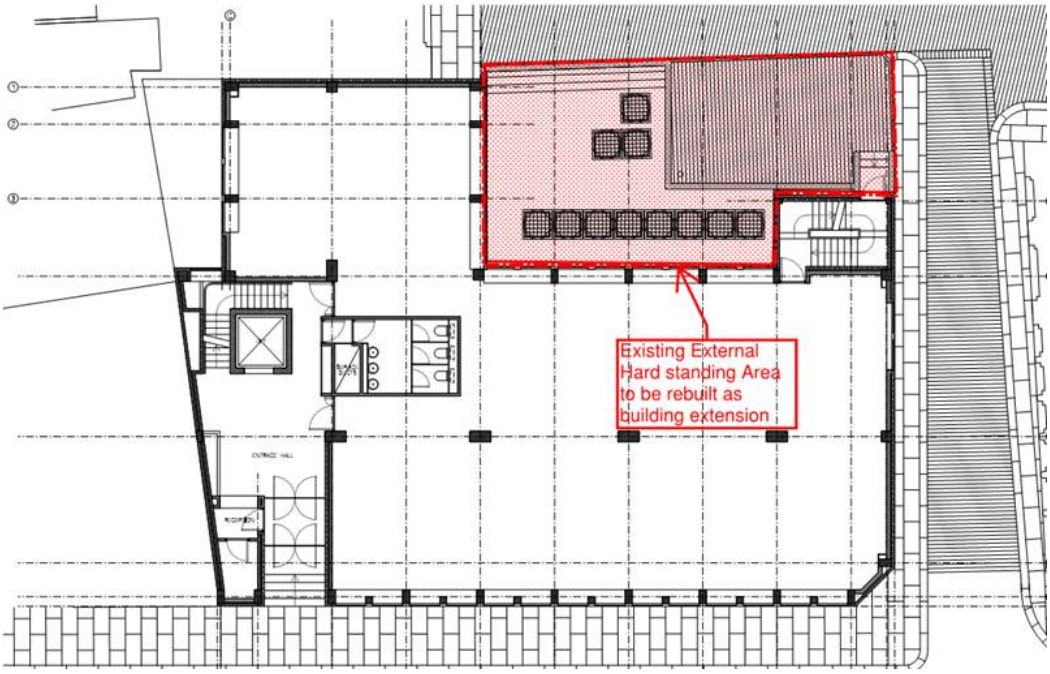

Image 5.2: Existing ground floor plan – Source: GROUPWORK Architects

As there are no records of on-site or nearby flooding it is proposed to retain the building's existing internal and below ground surface water drainage with additional elements connected to the extended building area.
Please refer to preliminary drainage drawings reference;
J3384-C-DR-0090 Below Ground Drainage - Lower Ground Floor
J3384-C-DR-0100 Below Ground Drainage - Ground Floor
A new surface water drainage connection is made to the combined sewer via a 7.04m^3 attenuation tank which will contain a 1:100 event storm for the duration and limit outfall to within 5l/s

6 DESIGN ASSUMPTIONS, CONSTRAINTS AND PARAMETERS

In accordance with the National Planning Policy Framework (NPPF) 2012, the effects of climate change are included within the assessment to reduce future flood risk. Following the recommended contingency allowances from the 19th February 2016, the following allowances should be made for the proposed development:

- **Peak Rainfall Intensity**: +40% (Upper End Allowance) for 2070 to 2115
- **Peak Rainfall Intensity**: +20% (Central Allowance) for 2070 to 2115

The design development is in line with the Camden Sustainability guide CPG3 chapter 11, Flooding and includes calculations for a 1 in 100-year storm event.

Hydrological Parameters

Hydrological Characteristics	Parameter	Unit	Value
Rainfall Model			FSR Rainfall
Hydrological Region	R	-	6
Standard Average Annual Rainfall	SAAR	mm	608
SOIL	S		2
M5-60		mm	20.9
Ratio	r	r	0.44
Rainfall intensity	M_1 , Z_2	mm , -	13.45. , 0.62
	M_{30} , Z_2	mm , -	32.98 , 1.54
	M_{100} , Z_2	mm , -	42.35 , 1.88
Summer Volumetric Run-off Coefficient	-	-	0.750
Winter Volumetric Run-off Coefficient	-	-	0.840
Rainfall Runoff Coefficient	C		0.96

Table 6.1: Hydrological Parameters – Source: uksuds.com and Innovyze's modelling software MicroDrainage

		Existing Area (m^2)	Proposed Area (m^2)	Difference (m^2)
Roof Area	Total	**450**	**550**	**+100**
External Impermeable Area	Total	**100**	**0**	**-100**
Site Area	Total	**550**	**550**	**0**

Table 6.2: Site Areas – Source: GROUPWORK Architects

The entire site lies on a plot of approximately 550m^2 and the site area remains unchanged. There is a 0% reduction in the total impermeable areas between existing and proposed. Onsite above ground drainage storage options such as swales, ponds and detention basins are not considered a viable solution for the site. However due to the proximity of surrounding buildings and the building is located on London Clay within a vulnerable groundwater area, infiltration is not deemed to be a viable option for this site. It is proposed that the outfall associated with the plan extended building area is attenuated through the inclusion of a green roof. The mitigation effects upon the new developed roof area are shown in the following table.

Return Period	Greenfield Runoff (l/s)	Existing Rates (l/s)	Proposed Un-mitigated Rates (l/s)	Maximum Proposed Mitigated Rates (l/s)	Difference (l/s) (Existing and Proposed Mitigated)
1 in 1	0.01	0.37	0.37	0.37	N/A
1 in 30	0.03	0.72	0.72	0.72	N/A
1 in 100	0.05	1.18	1.18	1	0.18
1 in 100 plus Climate Change (20%)	N/A	N/A	1.41	1	0.41
1in 100 plus Climate Change (40%)	N/A	N/A	1.65	1	0.65

Table 6.3: Peak flow run-off rates for various return periods for the new extension.

The above mitigated discharge rates assumes the proposed green roof is completely saturated and uses attenuation principles to limit the discharge to 1l/s. In reality lower flow rates are achievable but may increase the risk of blockages and increase maintenance costs. The green roof design will also act as a treatment process. The proposed limiting discharge rate is based on WADE product: restricted flow roof outlet and can also be achieved by a throttled outlet.

7 COMMENTARY

Flood Risk

The existing site is at very low risk of flooding from surface water and rivers. The development is situated within a groundwater vulnerability zone and currently there is no history of flooding on the site. The development is appropriate in accordance with the "flood risk vulnerability and flood zone compatibility" table from the government guidance documents on flood risk.

New Drainage

The proposed new build drainage scheme will provide a betterment to the existing run off values and meet policy requirements. Due to existing site constraints and unknown structural conditions it is proposed to keep the existing internal and below ground drainage system as close to the existing state as possible with new connections for new restaurant demises. The design assumptions mentioned above are considered conservative and the proposed attenuation tank will reduce discharge to below the existing case.