Sustainable Drainage Strategy

20-23 Greville Street

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Revision: 03
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GENERAL NOTES

REVISION HISTORY

Revision	Status	Date	Author	Reviewer	Approver
00	Concept	15/11/17	KF	PD	AL
01	Stage 2	15/12/17	KF	PD	AL
02	Stage 2	21/12/17	KF	PD	AL
03	Information	19/01/21	AM	GPD	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 carefully 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 since the planned extension is located on an existing hard standing.

The report reviews the planned increased roof area against The London Plan, Policy 5.13, Sustainable Drainage and Camden's planning guidance and in particular CPG3, Sustainability. In entering into the spirit of chapter 11 proposes the installation of a green roof to the area of the extension. The green roof will store rainfall during the period of a storm retaining much of a 1:100 year storm event and reducing surface water run-off from the extended roof 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 Climate Change, the resulting peak flow rate from the extension area will be decreased by at least 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 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.

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.

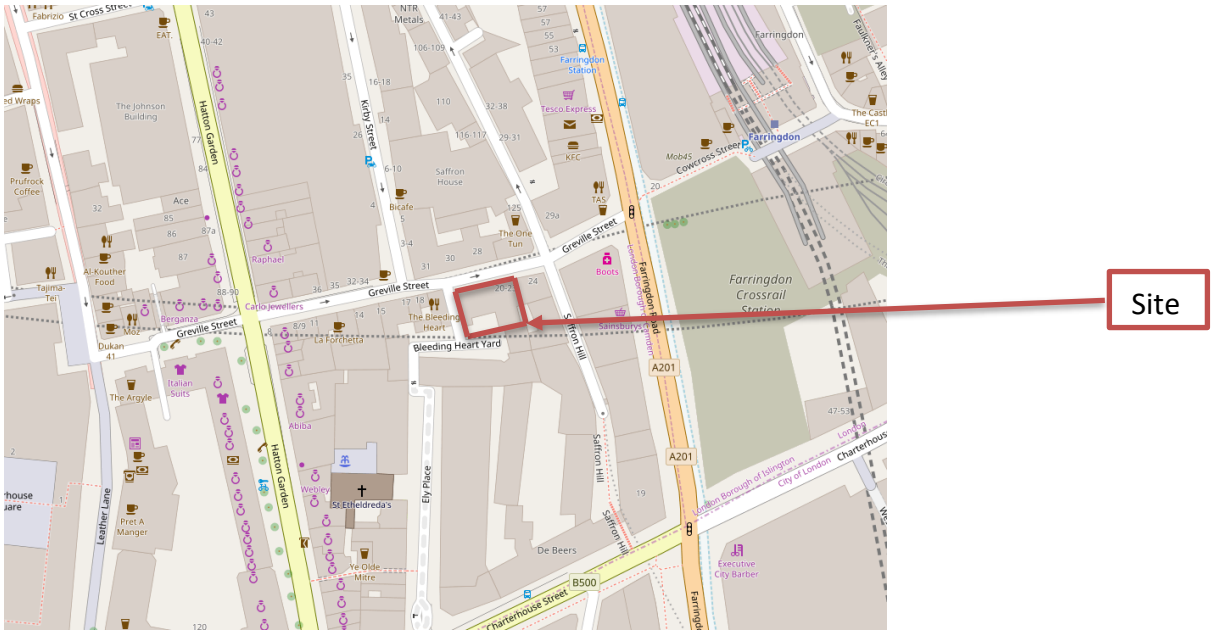

Figure 2.1 showing the approximate development boundary – Source: openstreetmap.org

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.

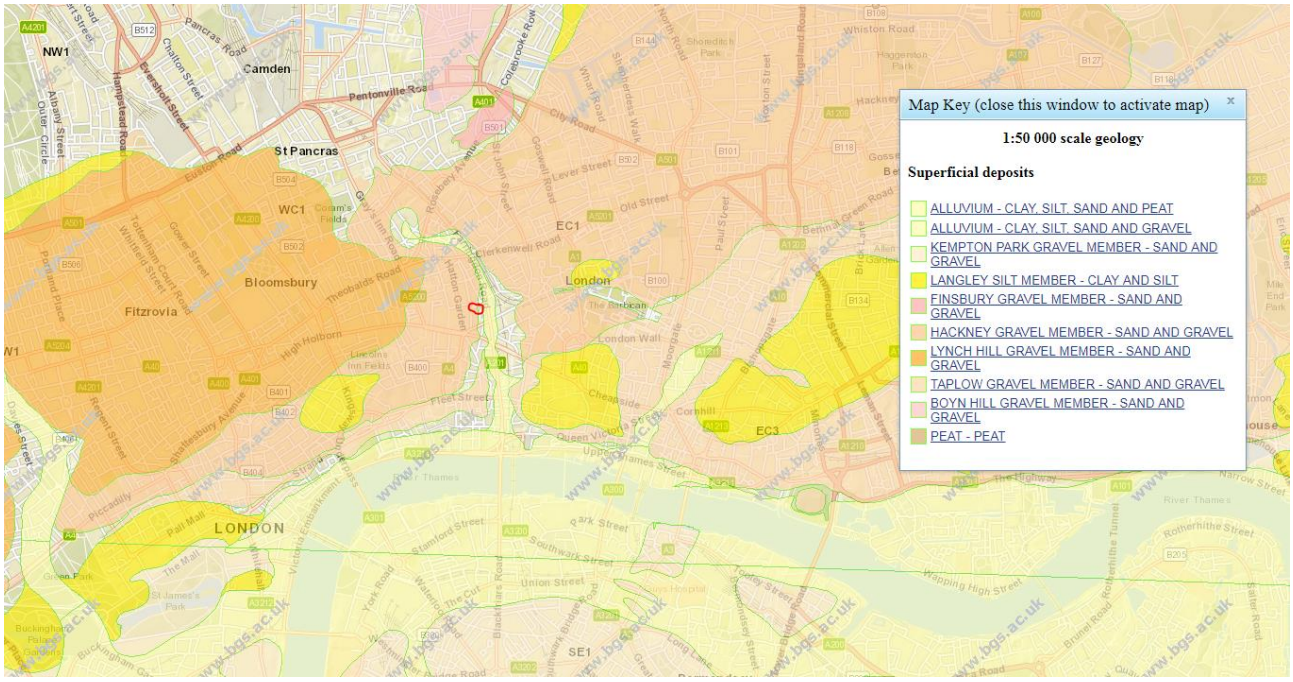

Image 2.2: Superficial Geology – Source: British Geological Survey

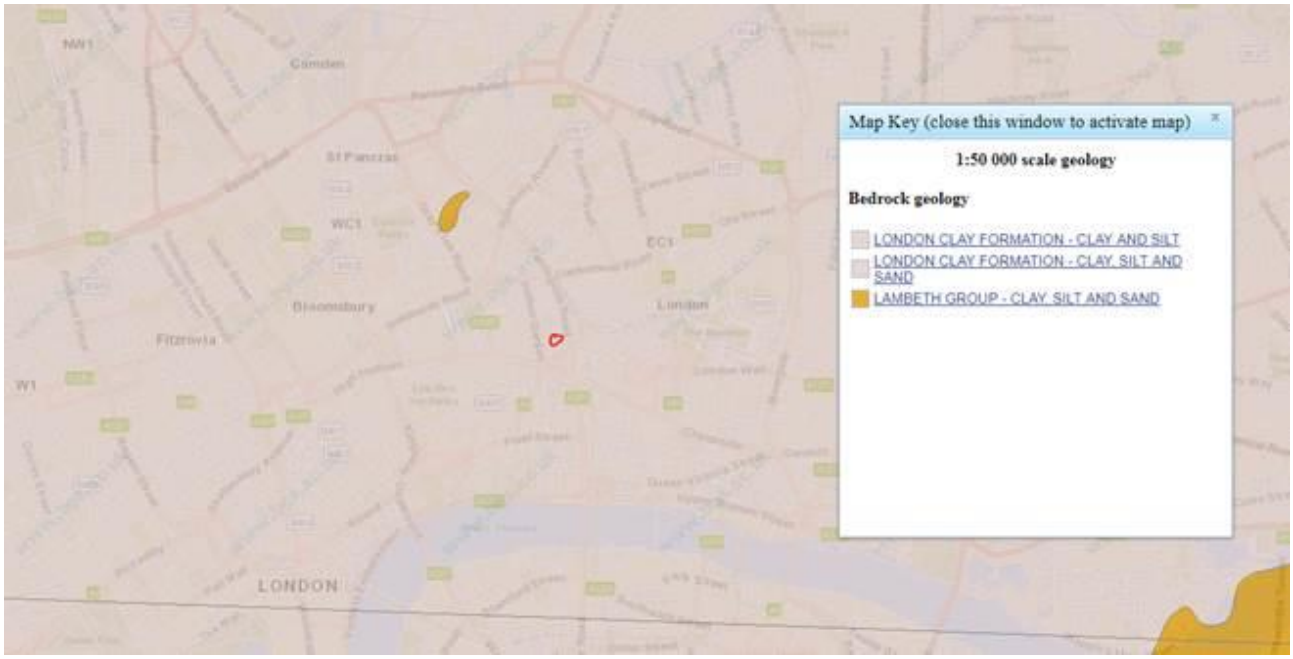

Image 2.3: Bedrock Geology – Source: British Geological Survey

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 picked up by Thames Water and now has a controlled discharge close to the ponds at Hamstead Heath (camden.gov.uk).

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

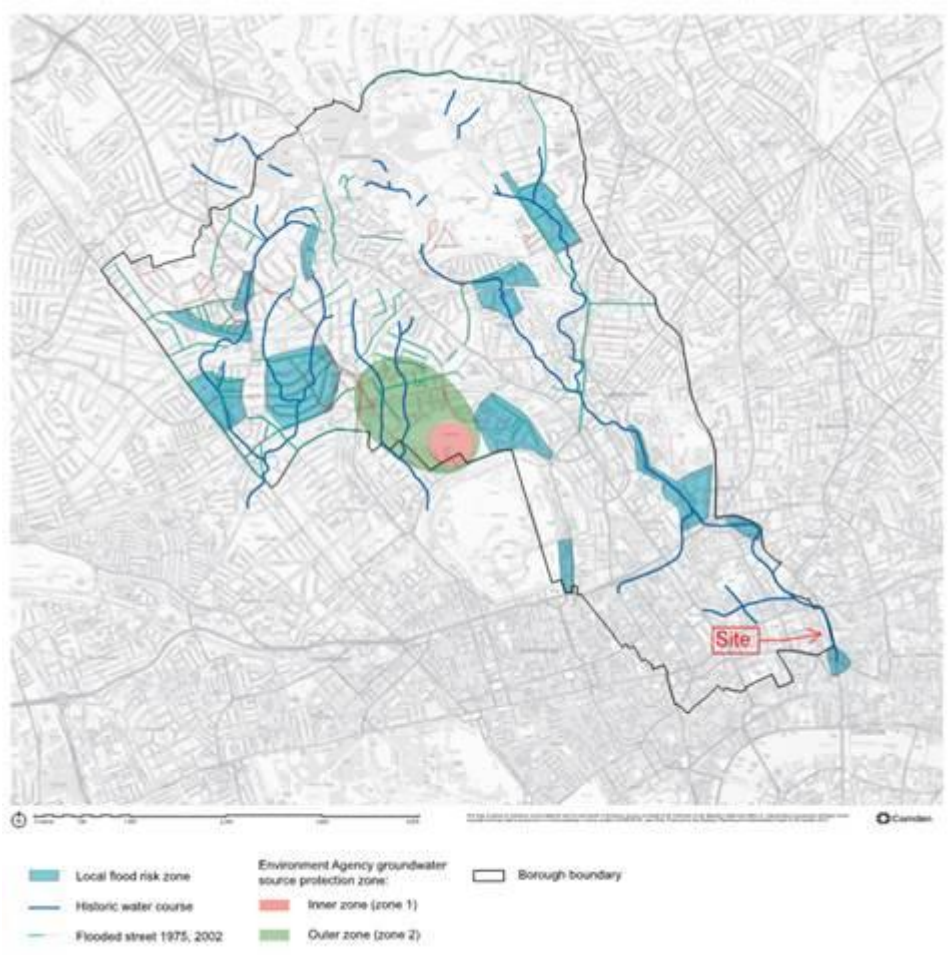

Image 2.4: Historic Flooding and Local Flood Risk Zones – Source: Camden Council

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 Greville Street Road 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.

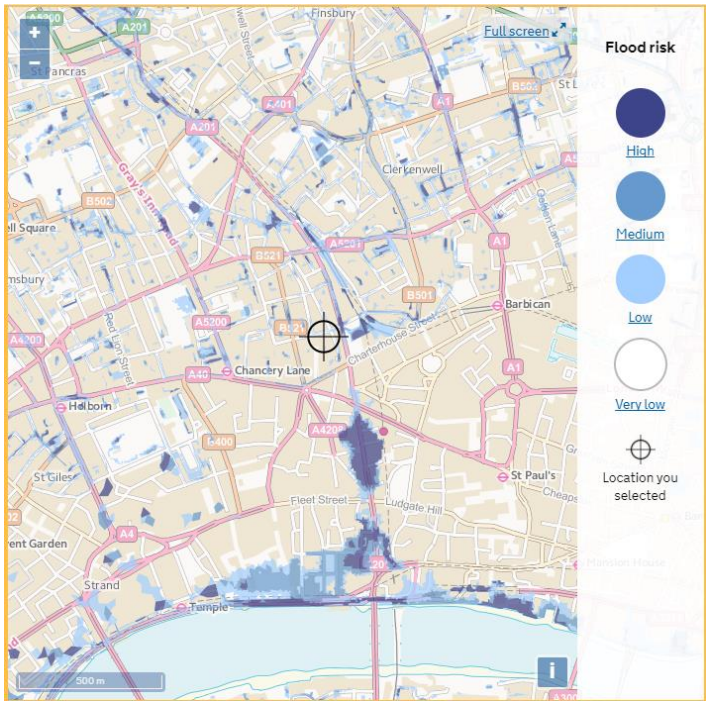

Image 3.1: Surface Water Flood Map – Source: Environment Agency.

4.2 RIVER AND SEA FLOODING

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

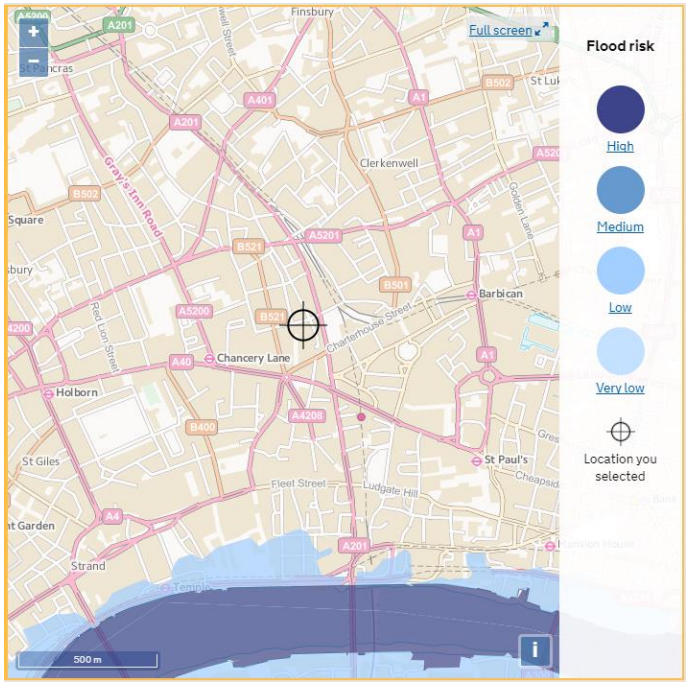

Image 3.2: River and Sea Flood Map – Source: Environment Agency.

4.3 RESERVOIR FLOODING

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

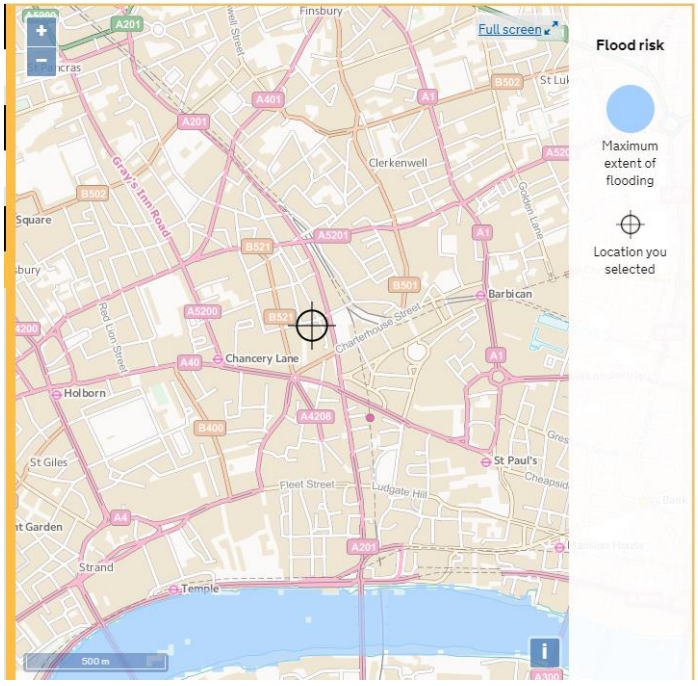

Image 3.2: Reservoir Flood Map – Source: Environment Agency.

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.

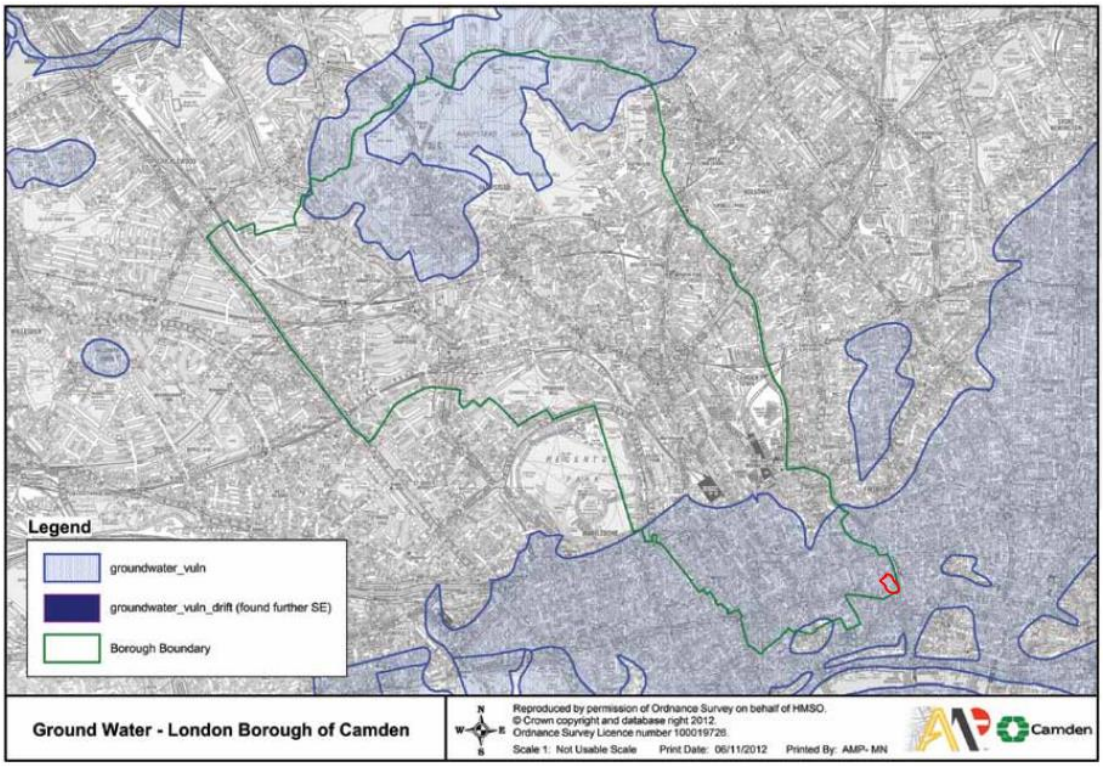

Image 3.3: Camden Ground Water Vulnerability Map – Source: Camden Council

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 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.

Table 3.1: Flood Risk Vulnerability Classification – Source: Department for Communities and Local Government

4.6 EXISTING DRAINAGE

The existing external area appears to be 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. There are no records of on-site public sewer or private drain flooding.

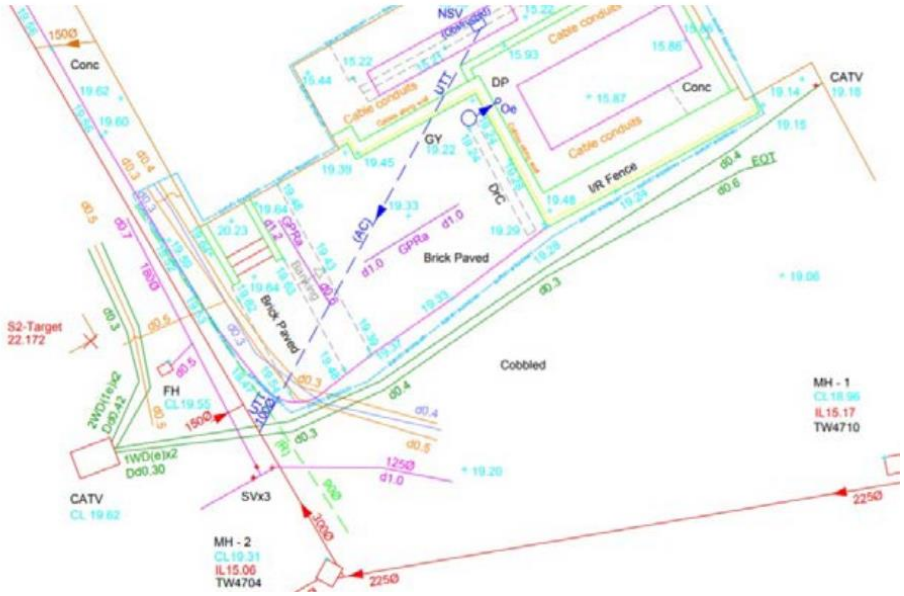

Image 4.6. Drainage Survey showing surface and combined drainage connections to sewer in Bleeding Heart Yard

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 for the new build area which will reduce the existing discharge rate for the extended roof area . Refer to the architects information for soil depths and nature of vegetation.

Conditional planning approval has been received, condition 8 requires that:

> *Prior to commencement of the relevant part of the works, full details of the sustainable drainage system including a green or green-blue roof based attenuation provision, covering the roof of the extension, shall be submitted to and approved in writing by the local planning authority. Such a system should be designed to accommodate all storms up to and including a 1:100 year storm with a 40% provision for climate change such that flooding does not occur in any part of the building or in any utility plant susceptible to water, and shall demonstrate a 30% or better reduction in run off rate for the extension area. Details shall include a lifetime maintenance plan, exceedance flows, and drainage calculations for the entire site in addition to the extension, and shall thereafter retained and maintained in accordance with the approved details.*
>
> *Reason: To reduce the rate of surface water run-off from the buildings and limit the impact on the storm-water drainage system in accordance with policies CC2 and CC3 of the London Borough of Camden Local Plan 2017.*

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

Image 4.1: Existing external area (approximately 100m²) – Source: Google Maps

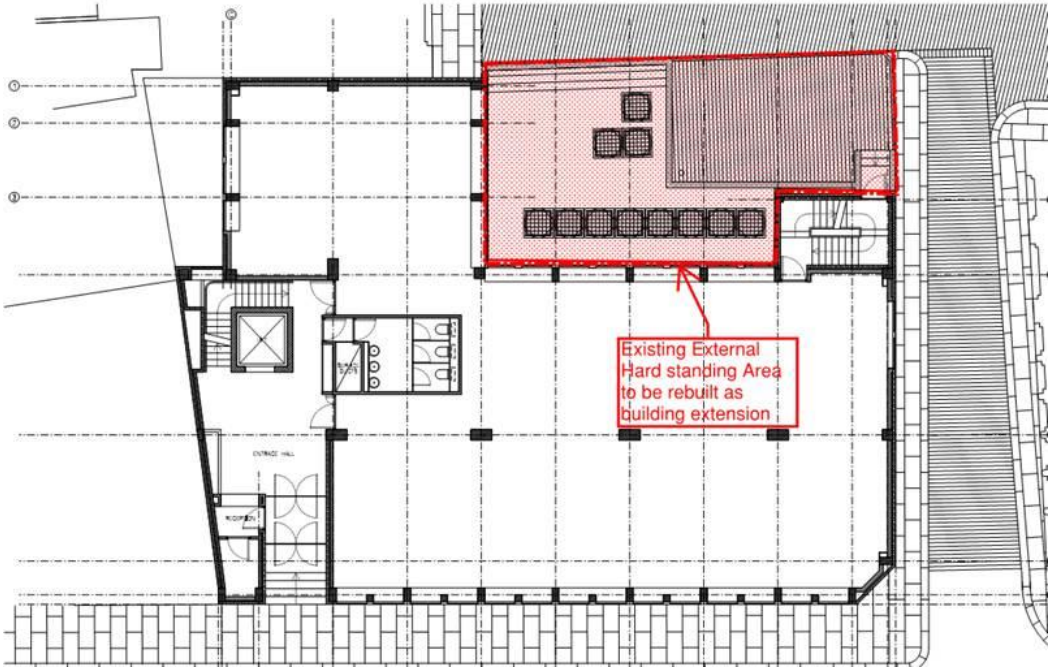

Image 2: Existing ground floor plan – Source: GROUPWORK Architects

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 drainage drawings for further information.

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 London Plan, Policy 5.13, Sustainable Drainage and 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 5.1: 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 5.2: 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. Due to the proximity of surrounding buildings and as 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 additional roof 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)	% Betterment
1 in 1	0.13	1.5	1.5	0.4	1.10	73
1 in 30	0.36	3.8	3.8	1.3	2.50	66
1 in 100	0.49	4.8	4.8	1.8	3.00	63
1 in 100 plus Climate Change (20%)	N/A	N/A	5.8	2.3	3.50	60
1in 100 plus Climate Change (40%)	N/A	N/A	6.8	2.7	4.10	60

Table 5.3: Peak flow run-off rates for various return periods for the new extension.

As shown in the above table a 30% or better reduction in run off rate for the extension area is achieved as required by planning condition 8.

The whole site peak run-off rates can therefore by summarised 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)	% Betterment
1 in 1	0.72	8.3	8.3	7.2	1.1	13
1 in 30	1.98	20.3	20.3	18.0	2.3	11
1 in 100	2.20	27.3	27.3	23.3	4.0	15
1 in 100 plus Climate Change (20%)	N/A	N/A	31.7	27.3	4.4	14
1in 100 plus Climate Change (40%)	N/A	N/A	38.2	31.7	6.5	17

Table 5.4: Peak flow run-off rates for various return periods for the site.

The above mitigated discharge rates assumes the proposed green roof is completely saturated and uses attenuation principles to limit the discharge. 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 green roof is required to have 3000L volume to meet the peak flow rate reduction.

Refer to Webb Yates Document; *Surface and Foul Water Calculation Pack - J3304-C-CA-0001* for the MicroDrainage calculations.

7 MAINTENANCE SCHEDULE

The drainage system is designed to minimise maintenance requirements; however, a full maintenance scheme will be established for those elements not being offered for adoption.

The surface and foul drains, will be maintained by the Freeholder to the manufacturer's recommendations as part of their property maintenance program.

7.1 BELOW GROUND DRAINAGE PIPED SYSTEMS

The below ground piped system should be inspected every 10 years as a minimum and repaired and cleansed where necessary.

7.2 GULLIES AND CHANNEL DRAINS

Gullies and channel drains should be cleaned out very six months or when required.

7.3 GREENROOFS

As per manufacturers recommendations.

8 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 runoff values and meet the 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 green roof will reduced site discharge.

The design meets the requirements of planning condition 8, and demonstrates a 30% or better reduction in run off rate for the extension area.