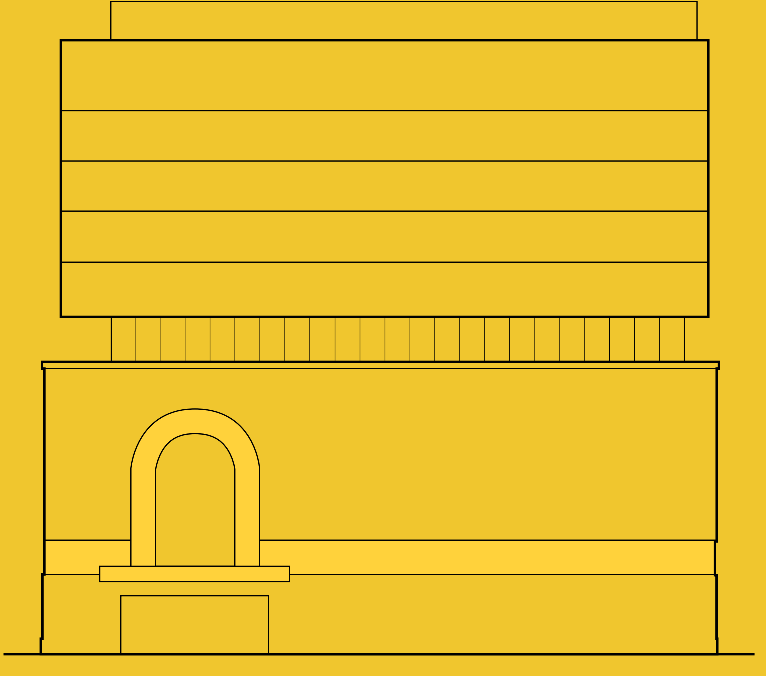

SAVILLE THEATRE

135 SHAFTESBURY AVENUE

SUSTAINABLE URBAN DRAINAGE

105465-PEF-ZZ-XX-DR-CD-000001-S2-P03_SDR

PELL FRISCHMANN

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Rev	Suit	Description	Date	Originator	Checker	Approver
S2	P01	Draft Issue	22/12/2023	H. McColl	D. Allum-Rooney	D. Allum-Rooney
S2	P02	Updated based on Comments	19/01/2024	T. Sturtridge	H. McColl	D. Allum-Rooney
S2	P03	Updated SuDS Provision	12/03/2024	H. McColl	D. Allum-Rooney	A. Murray

Ref. reference. Rev revision. Suit suitability.

Prepared for

Yoo Capital Investment Management LLP

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yoo CAPITAL Pell Frischmann

Contents

Figures

Tables

Appendices

1 Introduction & Report Context

1.1 Context and Commission

1.1.1 Pell Frischmann has been commissioned to develop a Sustainable Drainage Strategy to support a planning application for the refurbishment and extension of the existing building at 135 Shaftesbury Avenue. This development shall hereafter be referred to as the Saville Theatre.

1.1.2 This Sustainable Drainage Report will (SDR) will set out the key principles of the proposed surface and foul water drainage strategies and demonstrate accordance with local and national guidance and best practice.

1.1.3 This includes justification of:

- Outfall locations;
- Discharge rates;
- Volume of attenuation required on site;
- Sustainable Drainage Systems to be included within proposals

1.2 Information Consulted

1.2.1 A review of relevant information has been consulted to develop an appropriate drainage strategy for the development as follows:

- National Planning Policy Framework (NPPF), December 2023;
- Planning Practice Guidance (PPG), August 2022;
- Non-statutory technical standards for sustainable drainage systems, March 2015;
- Sewerage Sector Guidance, October 2019;
- The SuDS Manual C753 Version 6, 2015;
- Camden & Greater London Authority Sustainable Drainage Proforma;
- Approved Document H, Building Regulations;
- Camden Borough Council Strategic Flood Risk Assessment, 2014,

1.2.2 Pell Frischmann have been commissioned by Yoo Capital to develop a sustainable drainage strategy to support a detailed planning application. This document should be read in tandem with Pell Frischmann Flood Risk Assessment reference *105465-PEF-ZZ-XX-RP-YE-000010*.

2 Existing Site

2.1 Site Location and Existing Use

2.1.1 The footprint of the site, and thus the site boundary is approximately 800m^2 in size and is currently in use as a cinema.

2.1.2 The site is bound to the southwest by Stacey Street, the south east by Shaftesbury Avenue, the Northeast by St Giles Passage, and the Northwest by New Compton Street.

2.1.3 The site location can be seen below in **Figure 2-1**.

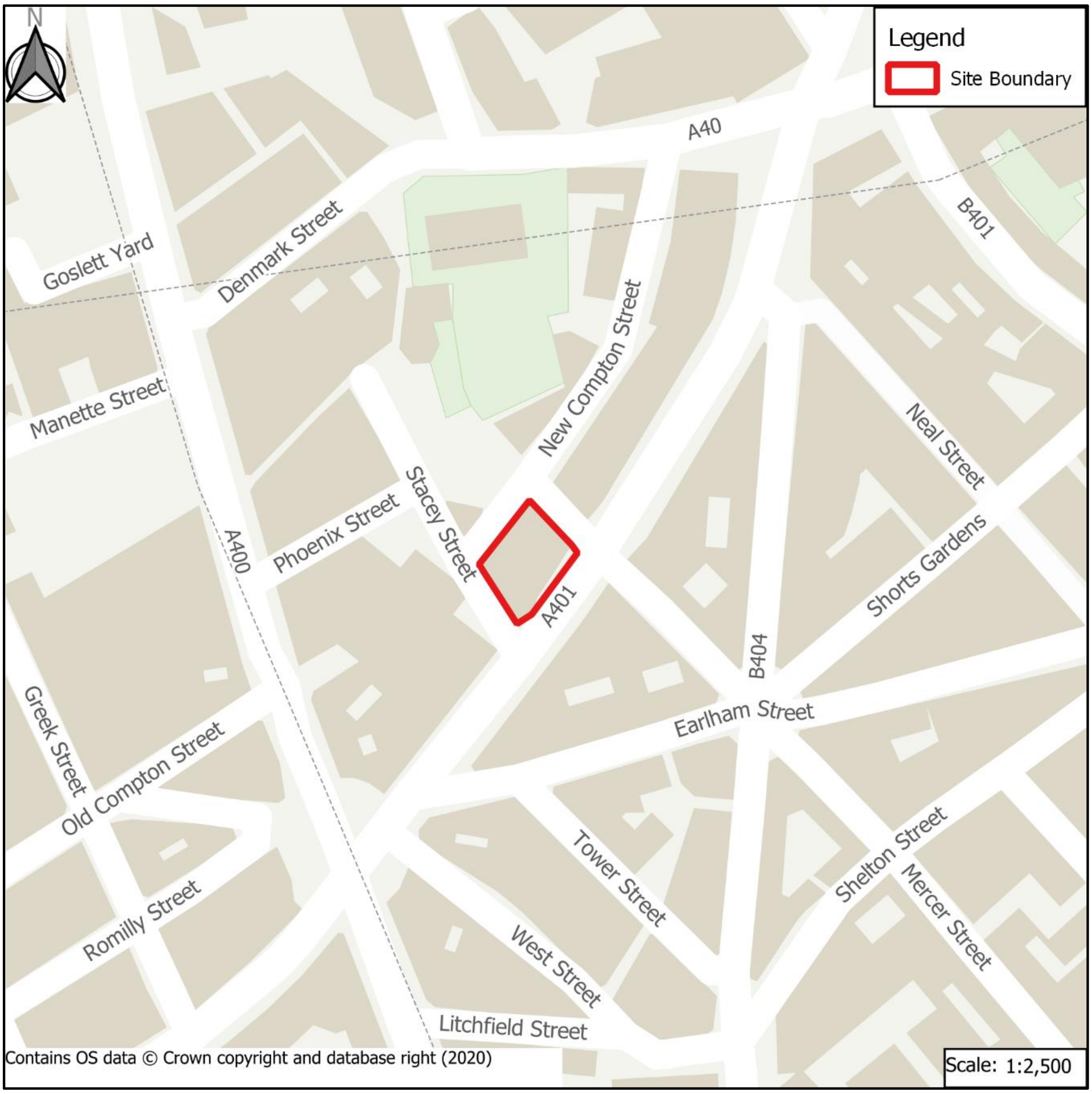


Figure 2-1 Site Location Plan

2.2 Topography

2.2.1 As previously mentioned, the application area is entirely occupied by an existing building. This building is accessed from various points at different levels, as can be seen from the stepped access at the front of the building.

2.2.2 The wider topography of the area shows levels fall from North to South.

2.2.3 The topography as discussed above can be seen for the site and surrounding area in **Figure 2-2.**

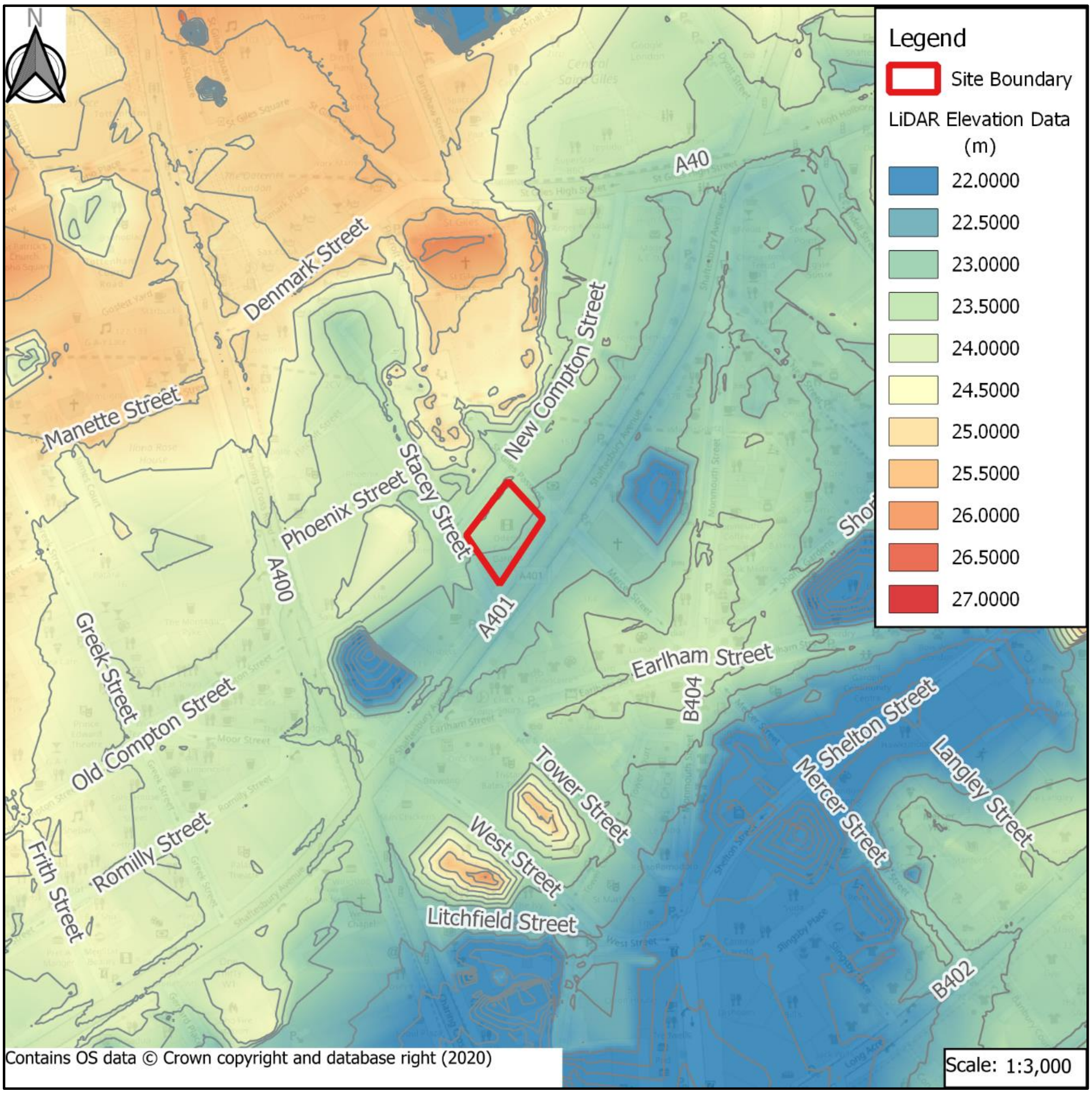


Figure 2-2 LiDAR Elevation Data

2.3 Existing Drainage Regime

Existing Surface Water Drainage Features

2.3.1 Given the existing use of the site as a cinema, it is assumed that the existing building is served by a traditional drainage system above ground – a system of gutters and down pipes convey roof runoff into the surrounding public sewerage network.

2.3.2 The interaction with the system serving the foul water generated by the building is unknown including the point at which the foul and surface water systems converge. This is discussed in **Section 4.**

2.3.3 An extract of the sewer records for the area can be seen below in **Figure 2-3**.

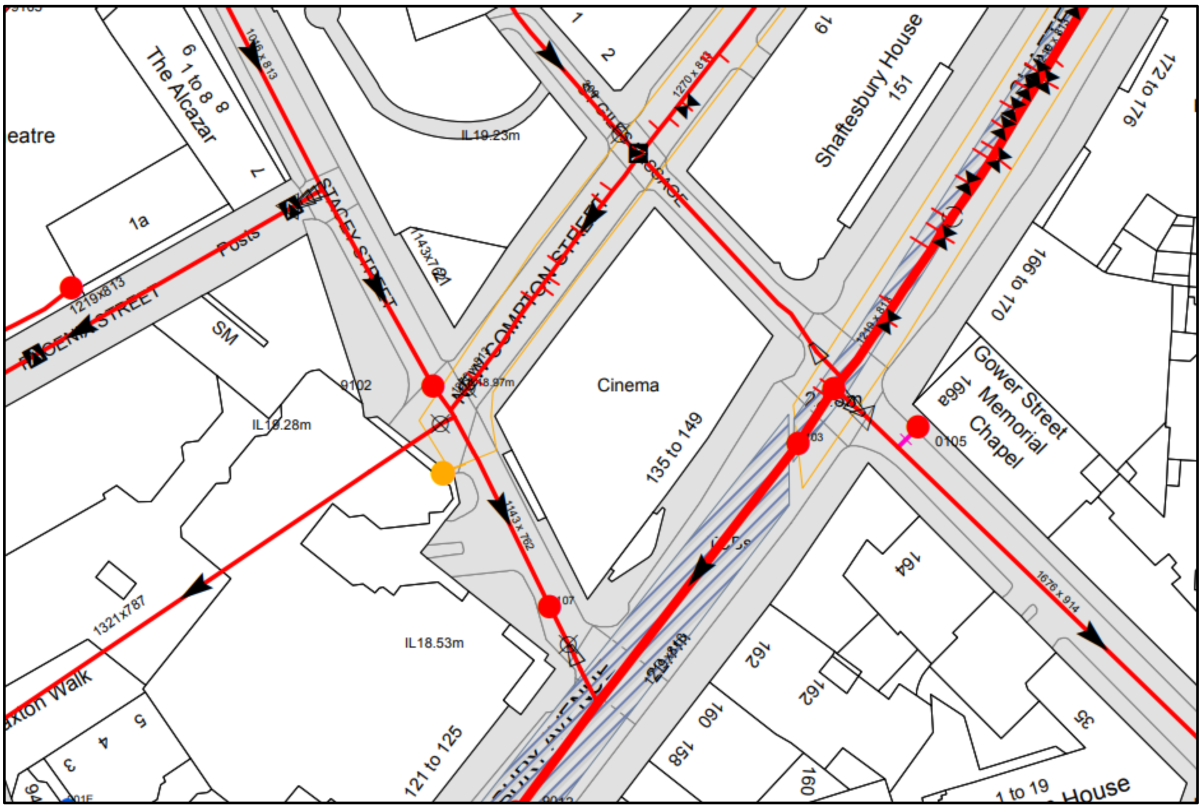


Figure 2-3 **Extract of Local Thames Water Sewer Network**

Existing runoff rate

2.3.4 The existing runoff rate has been assessed using a notional network model to calculate the peak runoff generated by a 15-minute event on the footprint of the building for several key return periods.

2.3.5 The calculated existing runoff rates pertaining to the site are summarised below in **Table 2-1**. The calculations for the below can be seen in **Appendix A.**

2.3.6 The 100 year + 40% Climate Change event peak runoff rate of 81.3l/s can be conveyed by a 300mm pipe laid at 1:100. It is likely that the existing building has multiple connections to the public sewer network.

Table 2-1 **Runoff Rates for existing site**

Return Period	Peak Runoff Rate (l/s)
2	16.8
30	43.9
100 (+40% Climate Change)	81.3

Existing Runoff Volume

2.3.7 In accordance with clause **S5** in *Non-statutory technical standards for sustainable drainage systems*;

S5 *Where reasonably practicable, for developments which have been previously developed, 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 must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

2.3.8 The greenfield runoff volume for the 360-minute, 100-year return period event is calculated at 12.1m^3. The calculations for this event can be seen in **Appendix B**.

2.3.9 The runoff volume for the existing site in its developed nature for the 360-minute, 100-year return period event calculated at 70m^3. Calculations for this can be seen in **Appendix C**.

2.3.10 Detailed designs should therefore adhere to the requirements outlined above.

Existing Surface Water Runoff Routing

2.3.11 The existing runoff generated by the site will be naturally directed toward local low points should the drainage infrastructure fail or exceed its inherent capacity. This will result in general direction of flow towards the low point within the A401 to the east of the site in accordance with Surface Water Flood Routing. This can be seen in **Figure 2-4** below.

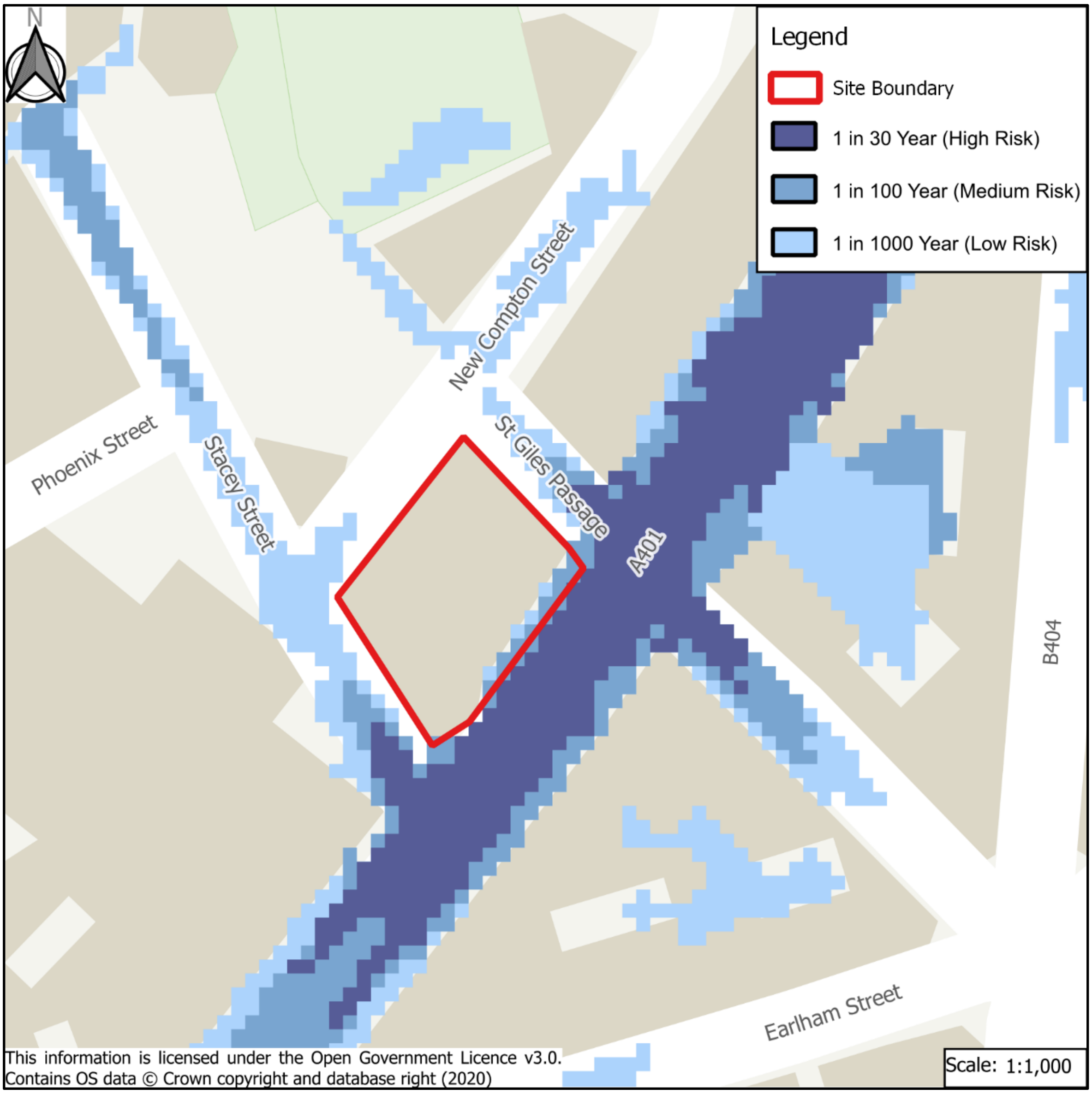


Figure 2-4 Risk of Flooding From Surface Water Mapping

2.4 Groundwater

2.4.1 As discussed in the aforementioned Pell Frischmann Flood Risk Assessment, the overall risk of groundwater flooding to the site is classified as low due to the Camden Borough Council's SFRA suggesting that it lies within an area of deep groundwater.

2.4.2 This suggests that changes in the level of water table within the site have little impact on the current drainage of the site in its undeveloped state.

3 Proposed Surface Water Drainage Strategy

3.1 Drainage Hierarchy Assessment

3.1.1 Prevailing local and national guidance (including being prescribed in Approved Document H of Building Regulations) dictates that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable;

- Water reuse, where a need is identified;
- Into the ground (infiltration), where ground conditions permit;
- To a surface water body or watercourse;
- To a surface water sewer, highway drain, or another drainage system;
- To a combined water sewer;

3.1.2 The overall aim of the drainage hierarchy is to manage surface water runoff close to where it falls and to mimic pre-existing drainage regimes.

3.1.3 A development-wide water reuse system should be considered within proposals to make use of runoff generated by the footprint of the building. This could include storage and greywater repurposing for e.g. irrigation for planting, laundry services etc.

3.1.4 It is likely to be unfeasible to manage the entire runoff via reuse, ergo an offsite discharge will be required.

3.1.5 The site is underlain by London Clay Formations, thus the potential use of infiltration as a means of surface water disposal is to be unlikely.

3.1.6 The next preferrable method for surface water disposal is a local waterbody or watercourse. The site's location, being far removed from any open watercourses, precludes this from being a feasible option.

3.1.7 The next most appropriate receptor for surface water should therefore be the public sewerage network. **Figure 2-3** shows that a comprehensive combined sewer network serves the local area and therefore represents a feasible method of surface water disposal.

3.1.8 As discussed earlier in this report, it is assumed that surface water currently drains from the site into the public sewerage network and therefore the methodology outlined in this section follows existing drainage patterns.

3.2 Outfall assessment

3.2.1 In order to prove the existing surface water sewer has capacity, Thames Water have been consulted on impacts of the development on the existing sewerage network. Results of this assessment for surface water are yet to be provided however it is considered that no impact will be made on the existing network due to the continuity of total impermeable area.

3.2.2 An improvement to the current situation is likely, given the proposed reduction in surface water runoff rates discharging into the public system.

3.2.3 It is recommended that a survey is commissioned to better understand the existing drainage connections from the cinema into the public network.

3.3 Approach to Surface Water Runoff Management

3.3.1 It is proposed that a runoff rate restriction will be imposed on rainfall falling onto the roof of the building, the resultant required attenuation volume is proposed to be provided within a blue roof structure. The building footprint is approximately 800m^2, representing no net change to existing conditions.

3.3.2 The equivalent greenfield runoff rate has been calculated using the ICPSuDS implementation of the IH124 method (see **Appendix D**). However, this results in a greenfield QBAR rate of 0.12l/s which at this stage is not considered a feasible rate to restrict to.

3.3.3 As the site is brownfield in nature, any proposed surface water drainage strategy should seek to maximise the improvement over current rates, and strive to achieve the lowest possible discharge rate within the technical limits of the design.

3.3.4 Given the development proposals comprise the building footprint over the entire site area, the main opportunities for surface water attenuation are through the use of a blue roof storage system, and green roof source control measures.

3.3.5 Within the layout, approximately 550m^2 of footprint has been identified as appropriate for areas of blue roof, avoiding services and structural cores.

3.3.6 At this stage, it is assumed that 80% of this area is able to be utilised as blue roof construction, giving an area of 440m^2.

3.3.7 A 100mm blue roof construction depth has been assumed to assess the volume that can be provided within such a system; this must be confirmed with a specialist blue roof designer/provider in due course.

3.3.8 Assuming a standard 0.95 porosity of the blue roof modular units, a total volume of approximately 42m^3 can be provided.

3.3.9 Based on the contributing area, this peak storage volume is shown in calculations to allow for an offsite discharge rate of 7l/s for all events up to the critical 1 in 100 year + 40% climate change event. This climate change allowance is in line with the Environment Agency's latest guidance on climate change allowances for drainage design[1].

3.3.10 An offsite discharge rate of 7l/s is equivalent to a 91% betterment on the current theoretical 1 in 100 year +40% discharge rate from a brownfield site. It also represents a 58% reduction on the 1 in 2 year brownfield rate for all events up to and including the 1 in 100 year+40%.

3.3.11 This strategy is based on the design parameters and constraints identified at this stage of the project. It demonstrates a feasible SuDS-based surface water drainage strategy for the scheme. Detailed design must review both the depth and area of blue roof attenuation systems that can be constructed to ensure the volume can be provided. It may be the case that the runoff rate can be altered to reflect the volume of storage possible at detailed design.

3.4 SuDS Strategy

3.4.1 While the volumetric strategy of attenuating water is carried out by inclusion of a blue roof as part of the roof construction, enhancements to water quality and addition of source control element will be delivered via inclusion of green roof areas.

3.4.2 There is the possibility of including water butts or small rain gardens on terraced floors on the northern elevation of the building to further add to source control and sustainable management of surface water. Opportunities for water reuse from the blue roof system could also be explored to provide irrigation to the green roof and cleaning/maintenance of the plant at roof level.

3.5 Principles of Maintenance and Adoption

3.5.1 For the proposed surface water drainage system to function correctly, it will need to be appropriately maintained. It is proposed that the drainage features on site are to be maintained by the operators of the building in its developed state.

3.5.2 The maintenance schedule adhered to for the network must be comprehensive and detail the specific maintenance requirements for each element of the drainage system.

3.5.3 For pipes, manholes and gullies, both general best practice and specific manufacturer maintenance protocols should be followed.

[1] Environment Agency (2022); *Flood risk assessments: climate change allowances*; available at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#peak-rainfall-intensity-allowance

4 Proposed Foul Water Drainage Strategy

4.1.1 In its undeveloped state, the site has existing connection into the Thames Water sewer network.

4.1.2 It is proposed to reuse existing connections into the sewer network for the proposed site.

4.1.3 The peak flow rate to be generated by the development will be confirmed with Thames Water pending a detailed schedule of accommodation and commercial use within the building.

5 Summary

5.1.1 This report and supporting appendices demonstrate that an appropriate surface water drainage strategy has been developed for the site based on sustainable drainage principles in line with the relevant local and national policy and standards.

5.1.2 This Sustainable Drainage Report is intended to support a detailed planning application and as such the level of detail included is commensurate with the nature of the proposals. **Table 5-1** provides a summary of key information.

Table 5-1 Summary of Key Information

<table>
<tr><th>Topic</th><th colspan="2">Existing Site</th><th>Proposed Development</th></tr>
<tr><td>Site Area (m^2)</td><td colspan="2">800</td><td>800</td></tr>
<tr><td>Impermeable Area (m^2)</td><td colspan="2">800</td><td>800</td></tr>
<tr><td>Number of Sub-Catchments</td><td colspan="2">1</td><td>1</td></tr>
<tr><td>Outfall Location(s)</td><td colspan="2">Combined Sewer Network</td><td>Combined Sewer Network</td></tr>
<tr><td rowspan="3">Peak Runoff Rate (l/s)</td><td>1 in 2-year</td><td>16.8</td><td rowspan="3">7l/s</td></tr>
<tr><td>1 in 30-year</td><td>43.9</td></tr>
<tr><td>1 in 100-year</td><td>81.3</td></tr>
<tr><td>Proposed Storage Volume (m^3)</td><td colspan="2">-</td><td>42m^3</td></tr>
<tr><td>SuDS Features</td><td colspan="2">-</td><td>Rainwater harvesting systems
Blue Roofs
Green Roofs</td></tr>
<tr><td>Maintenance Responsibilities</td><td colspan="2">Landowner</td><td>Landowner
Operators</td></tr>
</table>

Appendix A Existing Runoff Rate Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100	Volumetric Runoff Coeff.	1.000
		PIMP (%)	100
FEH Rainfall Version	2013	Add Flow / Climate Change (%)	0
Site Location	GB 528304 184308 TQ 28304 84308	Minimum Backdrop Height (m)	0.200
Data Type	Point	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	**Area (ha)**	**Time (mins)**	**Area (ha)**
0-4	0.061	4-8	0.018

Total Area Contributing (ha) = 0.079

Total Pipe Volume (m³) = 2.232

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	11.458	0.196	58.5	0.079	5.00	0.0	0.600	o	450	Pipe/Conduit	🔒
S1.001	2.578	0.006	407.1	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	🔓

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.07	0.000	0.079	0.0	0.0	0.0	2.66	423.5	14.3
S1.001	50.00	5.11	-0.196	0.079	0.0	0.0	0.0	1.00	159.3	14.3

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	S	48.000	-0.202	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	100	Winter Storms	Yes
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 528304 184308 TQ 28304 84308	Cv (Winter)	0.840
Data Type	Point	Storm Duration (mins)	30

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
FEH Rainfall Version 2013 Cv (Summer) 1.000
Site Location GB 528304 184308 TQ 28304 84308 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 360
Return Period(s) (years) 100
Climate Change (%) 0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	360 minute 100 year Summer I+0%	50.000	0.064	-0.386	0.000	0.05		0.084		12.3	OK
S1.001	S2	360 minute 100 year Summer I+0%	49.000	-0.102	-0.356	0.000	0.10		0.177		12.3	OK

Appendix B Greenfield Runoff Volume Calculations

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.600
Ratio R	0.437
Areal Reduction Factor	1.00
Area (ha)	0.080
SAAR (mm)	600
CWI	87.000
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	24.41
Greenfield Runoff Volume (m³)	12.092

Appendix C Existing Site Runoff Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	11.458	0.196	58.5	0.079	5.00	0.0	0.600	o	450	Pipe/Conduit	
S1.001	2.578	0.006	407.1	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.07	0.000	0.079	0.0	0.0	0.0	2.66	423.5	14.3
S1.001	50.00	5.11	-0.196	0.079	0.0	0.0	0.0	1.00	159.3	14.3

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	S	48.000	-0.202	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	0.840
Storm Duration (mins)	30

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 528304 184308 TQ 28304 84308
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	360 Summer	100	+0%					0.064
S1.001	S2	360 Summer	100	+0%					-0.102

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.386	0.000	0.05			12.3	OK	
S1.001	S2	-0.356	0.000	0.10			12.3	OK	

Appendix D Greenfield Runoff Rate Calculation

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Henry McColl
Site name:	Saville Theatre
Site location:	Camden

Site Details

Latitude:	51.51183° N
Longitude:	0.12977° W
Reference:	2081362878
Date:	Mar 12 2024 14:45

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.08

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	611	611
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

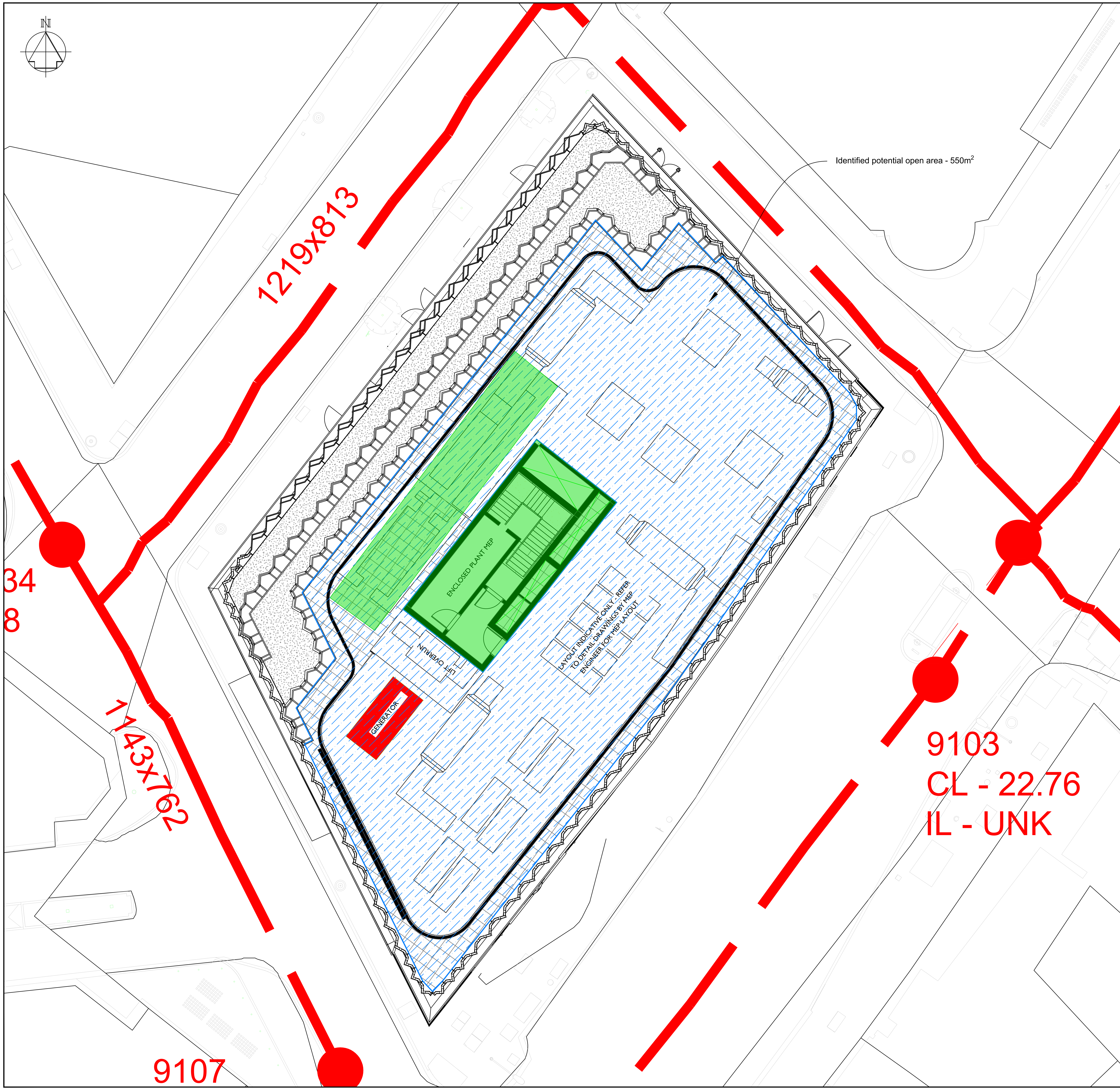
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default Edited

Q_{BAR} (l/s):	0.12	0.12
1 in 1 year (l/s):	0.11	0.11
1 in 30 years (l/s):	0.29	0.29
1 in 100 year (l/s):	0.4	0.4
1 in 200 years (l/s):	0.47	0.47

Appendix E Drainage Strategy



Drainage Strategy Notes

Existing Runoff Rate

Given the nature of development, (i.e. demolition of an existing structure and reuse of the same footprint), a runoff rate for the existing building has been calculated as follows

Given the absence of a comprehensive survey of the drainage infrastructure serving the existing development, an estimation on existing runoff has been made under the assumption that there is no restriction on runoff leaving the site.

Existing building footprint - 791m^2
Volumetric runoff coefficient - 1
Return Period - 100 years

Approx. offsite flow rate for the 15 minute, 100 year return period event - 58.7l/s

Greenfield Runoff Rate

As proposed within Camden Borough Councils drainage advice/Proforma document; '*Post-development surface water discharge rate should be limited to greenfield runoff rates. Proposals for higher discharge rates should be agreed with the LLFA ahead of submission of the Planning Application. Clear evidence should be provided with the Planning Application to show why greenfield rates cannot be achieved.*

Based on the above, an assessment of the greenfield rate has been undertaken using the Interim Code of Practice for SuDS (the modified IH124 method).

A general rate of 1.56l/s/ha has been calculated for the areas giving the site a calculated greenfield runoff of **0.12l/s**.

If the runoff from the site is required to be restricted to this value for all events up to the 100 year + 40% CC - approximately **118m^3** storage is required.

Under the current architectural layout of the roof, it is unfeasible to deliver this quantum of storage at roof level.

Due to the nature of the development (i.e. the application area **is** the building footprint, there are no external areas to place storage) an assessment of the minimum discharge rate has been undertaken henceforth.

Minimum discharge rate assessment

Approximately 550m^2 of open area within the roof footprint has been identified on this plan as areas of possible Blue Roof.

An 80% Utility of this area has been taken for conservatism, giving a design area of 440m^2

At 100mm depth (1 unit) and an assumed 95% Void ratio, an approximate volume of **42m^3** can be provided at roof level.

If this is provided, an offsite discharge rate of approximately **7l/s** is required for all events up to the 100 year + 40% CC a **51.7l/s** (or **88%**) betterment on the existing runoff.

These high level assessments require reassessment by a Blue Roof specialist - until reassessed these are indicative only.

KEY:

IDENTIFIED BLUE ROOF AREA (550m^2)

INDICATIVE GREEN ROOF (108m^2)

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G4. NORTH SHOWN INDICATIVE ONLY

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REV	DESCRIPTION	DRN	CHK	APP	DATE
P03	Updated to new footprint	HM	DAR	DAR	11.05.24
P02	Updated to new assessed footprint	HM	DAR	DAR	07.03.24
P01	Initial Issue	HM	DAR	DAR	22.11.23

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Drawing Title
Indicative Drainage Assessment

Drawing Status
PRELIMINARY

	Name	Date
Drawn	H. McCOLL	22.11.23
Designed	H. McCOLL	22.11.23
Eng Chk	D. ALLUM-ROONEY	22.11.23
Approved	D. ALLUM-ROONEY	22.11.23

Status Code: S2
Scale: 1:100
Revision: P03

Drawing No.
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