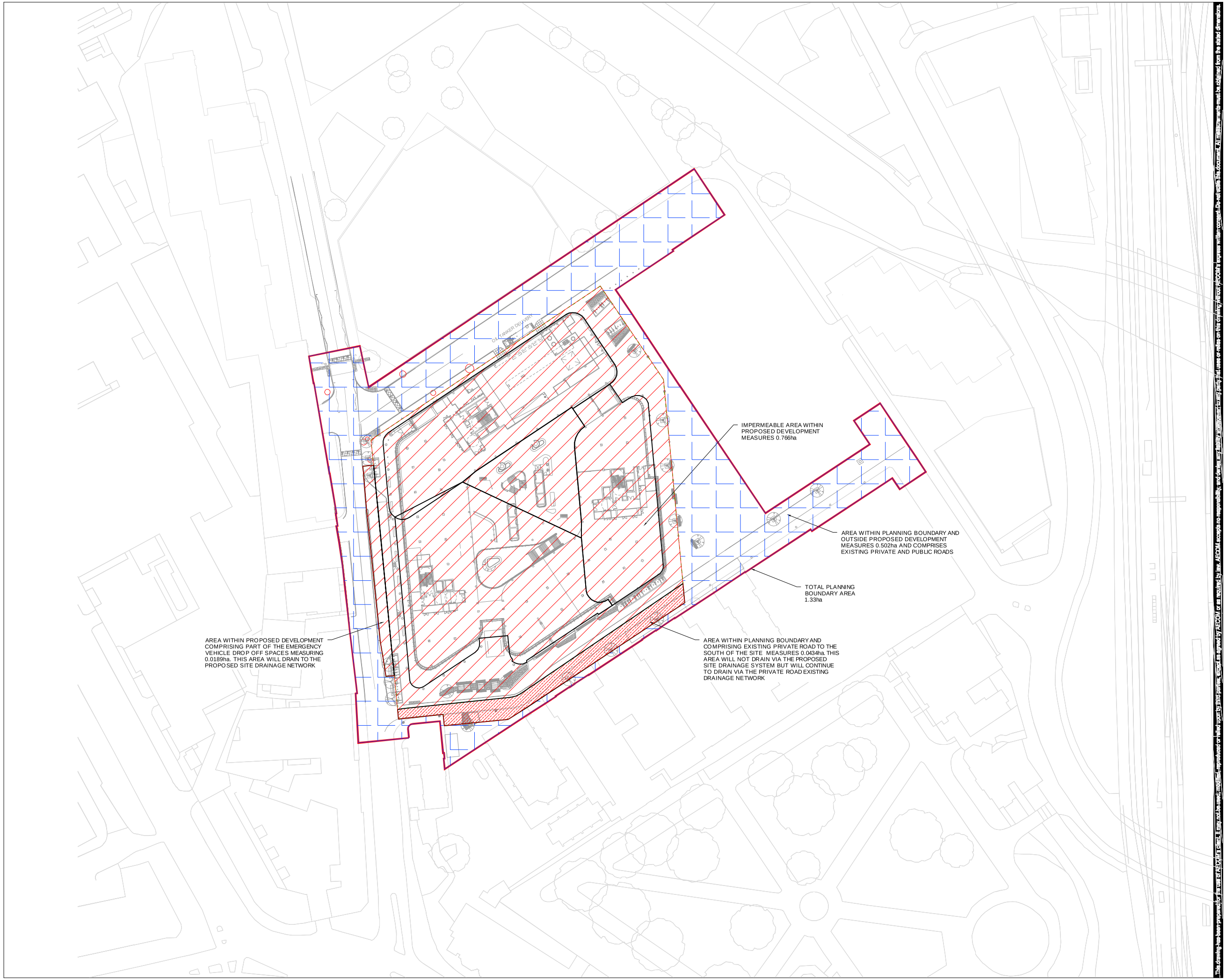

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

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Filename: C:\USERS\RODDY.PRAYAG\DESKTOP\MEH CAD\ORL-ACM-ZZ-00-DR-C-050015.DWG

Project

MOORFIELDS EYE HOSPITAL

Client

MOORFIELDS EYE HOSPITAL AND UCL INSTITUTE OF OPHTHALMOLOGY

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Notes

Legend

- BUILDING BOUNDARY
- TOTAL IMPERMEABLE AREA TO BE DRAINED BY PROPOSED DRAINAGE NETWORK = 0.785 Ha THIS INCLUDES 0.0189 ha FOR EMERGENCY VEHICLE DROP OFF AREA
- IMPERMEABLE AREA WITHIN PROPOSED DEVELOPMENT BOUNDARY AND TO BE DRAINED BY EXISTING NETWORK SOUTH OF THE SITE = 0.0434 ha
- PROPOSED SITE PERMEABLE AREA = 0.000 Ha
- TOTAL PROPOSED DEVELOPMENT AREA = 0.828 Ha
- PLANNING APPLICATION BOUNDARY
- PUBLIC LAND WITHIN PLANNING BOUNDARY

ISSUE/REVISION

Rev	Date	Description	Drn/Chk/Appr
P1.0	14/10/20	ISSUED FOR PLANNING	JW/AV/RP

Suitability Status

S4 - Suitable For Stage Approval

Project Number

60588325

Sheet Title

PROPOSED PERMEABLE AND IMPERMEABLE AREAS

Sheet Number

ORL-ACM-ZZ-00-DR-C-050015

Scale: 1:500 @A1 **Rev:** P1.0

Appendix E Environment Agency Flood Map Report

Flood map for planning

Your reference	Location (easting/northing)	Created
MEH	**529690/183627**	**6 Sep 2020 13:45**

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn’t include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Environment Agency

Flood map for planning

Your reference
MEH

Location (easting/northing)
529690/183627

Scale
1:2500

Created
6 Sep 2020 13:45

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix F SuDS Pro-forma

Camden GREATERLONDONAUTHORITY LoDEG

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	Project Oriel, Moorfields Eye Hospital
Address & post code	St Pancras Way, London, NW1 0PE
OS Grid ref. (Easting, Northing)	E 529654
	N 183642
LPA reference (if applicable)	
Brief description of proposed work	The proposed development comprises a single building, which ranges from 7 to 9 storeys, with a lower ground floor and a covered atrium
Total site Area	7850 m^2
Total existing impervious area	7520 m^2
Total proposed impervious area	7850 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	no
Existing drainage connection type and location	Connected to Thames Water combined public sewer via private combined drainage network. See drawings with
Designer Name	Roddy Prayag
Designer Position	Principal Infrastructure Engineer
Designer Company	AECOM Ltd

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Not available on BGS maps: not expected - brownfield site likely to have made ground over London Clay
Bedrock geology classification	London Clay
Site infiltration rate	m/s
Depth to groundwater level	m below ground level
Is infiltration feasible?	No

2b. Drainage Hierarchy

	Feasible (Y/N)	Proposed (Y/N)
1 store rainwater for later use	N	N
2 use infiltration techniques, such as porous surfaces in non-clay areas	Y	N
3 attenuate rainwater in ponds or open water features for gradual release	N	N
4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
5 discharge rainwater direct to a watercourse	N	N
6 discharge rainwater to a surface water sewer/drain	N	N
7 discharge rainwater to the combined sewer.	Y	Y

2c. Proposed Discharge Details

Proposed discharge location	See drawings with Appendix E of FRADS for
Has the owner/regulator of the discharge location been consulted?	ry has been prepared and sent to Thames W

Camden GREATERLONDONAUTHORITY LoDEG

3. Drainage Strategy

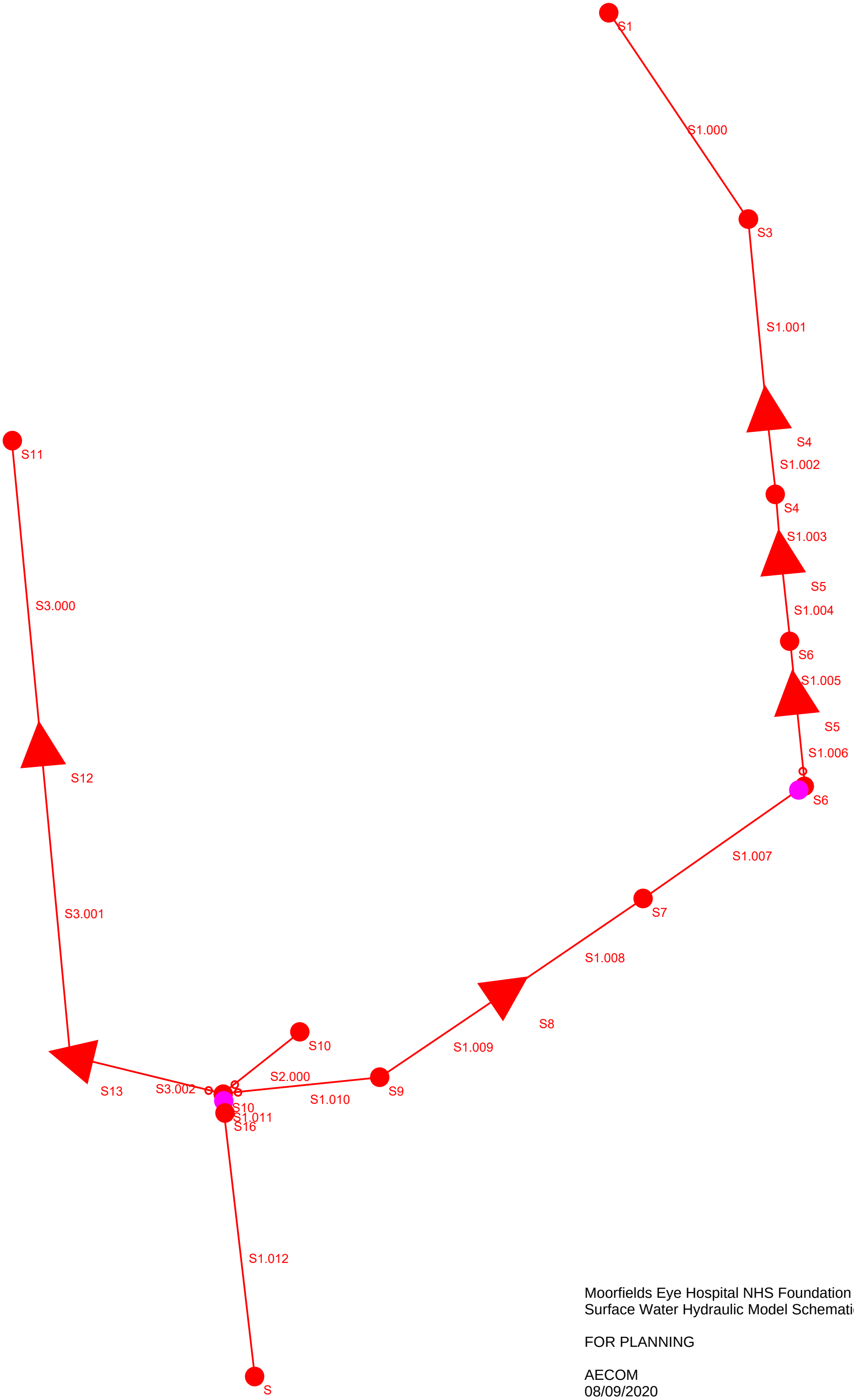
3a. Discharge Rates & Required Storage				
	Greenfield (GF) runoff rate (l/s)	Existing discharge rate (l/s)	Required storage for GF rate (m^3)	Proposed discharge rate (l/s)
Qbar	2.6			
1 in 1	2.2	76.6	101-149	11.5
1 in 30	6	130.6	215-293	19.6
1 in 100	8.4	138.6	276-370	20.8
1 in 100 + CC			421-558	20.8
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Vortex flow control unit		

3c. Proposed SuDS Measures			
	Catchment area (m^2)	Plan area (m^2)	Storage vol. (m^3)
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	720	720	130
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	7560		280
Total	**8280**	**720**	**410**

4. Supporting Information

4a. Discharge & Drainage Strategy	Page/section of drainage report
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Desk Study details as shown in FRADS - section 3.3
Drainage hierarchy (2b)	Details shown in FRADS - section 8.3
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Details shown in FRADS - section 8
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Details shown in FRADS - section 8
Proposed SuDS measures & specifications (3b)	Details shown in FRADS - section 8
4b. Other Supporting Details	Page/section of drainage report
Detailed Development Layout	Details shown in FRADS - Appendix E
Detailed drainage design drawings, including exceedance flow routes	Details shown in FRADS - Appendix E
Detailed landscaping plans	See planning application
Maintenance strategy	Details shown in FRADS - section 8.9
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	Details shown in FRADS - section 8.8
b) biodiversity?	Details shown in FRADS - section 8
c) amenity?	Details shown in FRADS - section 8

Appendix G Proposed Drainage Calculations



Moorfields Eye Hospital NHS Foundation Trust
Surface Water Hydraulic Model Schematic

FOR PLANNING

AECOM
08/09/2020

Existing Network Details 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
S1.000	27.034	0.338	80.0	0.043	5.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	20.548	0.137	150.0	0.081	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.002	9.473	0.063	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.003	6.235	0.042	150.0	0.053	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.004	9.786	0.065	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.005	5.517	0.037	150.0	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.006	10.298	0.069	150.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.007	21.329	0.251	85.0	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.008	17.539	0.175	100.2	0.057	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.009	17.000	0.170	100.0	0.050	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.010	17.072	0.700	24.4	0.004	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.000	10.704	0.816	13.1	0.029	5.00	0.0	0.600	o	150	Pipe/Conduit
S3.000	33.002	0.165	200.0	0.221	5.00	0.0	0.600	o	300	Pipe/Conduit
S3.001	34.158	0.171	199.8	0.122	0.00	0.0	0.600	o	300	Pipe/Conduit
S3.002	17.044	0.086	198.2	0.016	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.011	2.064	0.014	147.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.012	28.789	0.290	99.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	20.414	0.043	0.0	1.12	19.9
S1.001	20.076	0.124	0.0	1.07	42.4
S1.002	19.939	0.124	0.0	1.07	42.4
S1.003	19.876	0.177	0.0	1.07	42.4
S1.004	19.834	0.177	0.0	1.07	42.4
S1.005	19.769	0.218	0.0	1.07	42.4
S1.006	19.732	0.228	0.0	1.07	42.4
S1.007	18.396	0.286	0.0	1.71	120.6
S1.008	18.145	0.343	0.0	1.57	111.0
S1.009	17.970	0.393	0.0	1.57	111.1
S1.010	17.800	0.397	0.0	3.20	226.0
S2.000	18.000	0.029	0.0	2.80	49.4
S3.000	17.522	0.221	0.0	1.11	78.3
S3.001	17.357	0.343	0.0	1.11	78.4
S3.002	17.186	0.359	0.0	1.11	78.7
S1.011	17.034	0.785	0.0	1.07	42.7
S1.012	17.020	0.785	0.0	1.31	52.2

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	23.000	2.586	Open Manhole	1200	S1.000	20.414	150				
S3	23.140	3.064	Open Manhole	1200	S1.001	20.076	225	S1.000	20.076	150	
S4	23.330	3.391	Open Manhole	250	S1.002	19.939	225	S1.001	19.939	225	
S4	23.165	3.289	Open Manhole	1200	S1.003	19.876	225	S1.002	19.876	225	
S5	23.000	3.166	Open Manhole	250	S1.004	19.834	225	S1.003	19.834	225	
S6	22.850	3.081	Open Manhole	1200	S1.005	19.769	225	S1.004	19.769	225	
S5	22.700	2.968	Open Manhole	250	S1.006	19.732	225	S1.005	19.732	225	
S6	22.360	3.964	Open Manhole	1500	S1.007	18.396	300	S1.006	19.663	225	1192
S7	22.170	4.025	Open Manhole	1200	S1.008	18.145	300	S1.007	18.145	300	
S8	21.070	3.100	Open Manhole	300	S1.009	17.970	300	S1.008	17.970	300	
S9	20.180	2.380	Open Manhole	1200	S1.010	17.800	300	S1.009	17.800	300	
S10	19.300	1.300	Open Manhole	600	S2.000	18.000	150				
S11	19.850	2.328	Open Manhole	1200	S3.000	17.522	300				
S12	19.400	2.043	Open Manhole	300	S3.001	17.357	300	S3.000	17.357	300	
S13	19.120	1.934	Open Manhole	1200	S3.002	17.186	300	S3.001	17.186	300	
S10	19.500	2.466	Open Manhole	1500	S1.011	17.034	225	S1.010	17.100	300	141
								S2.000	17.184	150	75
								S3.002	17.100	300	141
S16	19.470	2.450	Open Manhole	1200	S1.012	17.020	225	S1.011	17.020	225	
S	19.200	2.470	Open Manhole	0		OUTFALL		S1.012	16.730	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	150	S1	23.000	20.414	2.436	Open Manhole	1200
S1.001	o	225	S3	23.140	20.076	2.839	Open Manhole	1200
S1.002	o	225	S4	23.330	19.939	3.166	Open Manhole	250
S1.003	o	225	S4	23.165	19.876	3.064	Open Manhole	1200
S1.004	o	225	S5	23.000	19.834	2.941	Open Manhole	250
S1.005	o	225	S6	22.850	19.769	2.856	Open Manhole	1200
S1.006	o	225	S5	22.700	19.732	2.743	Open Manhole	250
S1.007	o	300	S6	22.360	18.396	3.664	Open Manhole	1500
S1.008	o	300	S7	22.170	18.145	3.725	Open Manhole	1200
S1.009	o	300	S8	21.070	17.970	2.800	Open Manhole	300
S1.010	o	300	S9	20.180	17.800	2.080	Open Manhole	1200
S2.000	o	150	S10	19.300	18.000	1.150	Open Manhole	600
S3.000	o	300	S11	19.850	17.522	2.028	Open Manhole	1200
S3.001	o	300	S12	19.400	17.357	1.743	Open Manhole	300
S3.002	o	300	S13	19.120	17.186	1.634	Open Manhole	1200
S1.011	o	225	S10	19.500	17.034	2.241	Open Manhole	1500
S1.012	o	225	S16	19.470	17.020	2.225	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	27.034	80.0	S3	23.140	20.076	2.914	Open Manhole	1200
S1.001	20.548	150.0	S4	23.330	19.939	3.166	Open Manhole	250
S1.002	9.473	150.0	S4	23.165	19.876	3.064	Open Manhole	1200
S1.003	6.235	150.0	S5	23.000	19.834	2.941	Open Manhole	250
S1.004	9.786	150.0	S6	22.850	19.769	2.856	Open Manhole	1200
S1.005	5.517	150.0	S5	22.700	19.732	2.743	Open Manhole	250
S1.006	10.298	150.0	S6	22.360	19.663	2.472	Open Manhole	1500
S1.007	21.329	85.0	S7	22.170	18.145	3.725	Open Manhole	1200
S1.008	17.539	100.2	S8	21.070	17.970	2.800	Open Manhole	300
S1.009	17.000	100.0	S9	20.180	17.800	2.080	Open Manhole	1200
S1.010	17.072	24.4	S10	19.500	17.100	2.100	Open Manhole	1500
S2.000	10.704	13.1	S10	19.500	17.184	2.166	Open Manhole	1500
S3.000	33.002	200.0	S12	19.400	17.357	1.743	Open Manhole	300
S3.001	34.158	199.8	S13	19.120	17.186	1.634	Open Manhole	1200
S3.002	17.044	198.2	S10	19.500	17.100	2.100	Open Manhole	1500
S1.011	2.064	147.4	S16	19.470	17.020	2.225	Open Manhole	1200
S1.012	28.789	99.3	S	19.200	16.730	2.245	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.043	0.043	0.043
1.001	-	-	100	0.081	0.081	0.081
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.053	0.053	0.053
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.041	0.041	0.041
1.006	-	-	100	0.010	0.010	0.010
1.007	-	-	100	0.058	0.058	0.058
1.008	-	-	100	0.057	0.057	0.057
1.009	-	-	100	0.050	0.050	0.050
1.010	-	-	100	0.004	0.004	0.004
2.000	-	-	100	0.029	0.029	0.029
3.000	-	-	100	0.221	0.221	0.221
3.001	-	-	100	0.122	0.122	0.122
3.002	-	-	100	0.016	0.016	0.016
1.011	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.785	0.785	0.785

Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S1.000	S1	150	2.436	2.914	Unclassified	1200	0	2.436	Unclassified
S1.001	S3	225	2.839	3.166	Unclassified	1200	0	2.839	Unclassified
S1.002	S4	225	3.064	3.166	Unclassified	250	0	3.166	Unclassified
S1.003	S4	225	2.941	3.064	Unclassified	1200	0	3.064	Unclassified
S1.004	S5	225	2.856	2.941	Unclassified	250	0	2.941	Unclassified
S1.005	S6	225	2.743	2.856	Unclassified	1200	0	2.856	Unclassified
S1.006	S5	225	2.472	2.743	Unclassified	250	0	2.743	Unclassified
S1.007	S6	300	3.664	3.725	Unclassified	1500	0	3.664	Unclassified
S1.008	S7	300	2.800	3.725	Unclassified	1200	0	3.725	Unclassified
S1.009	S8	300	2.080	2.800	Unclassified	300	0	2.800	Unclassified
S1.010	S9	300	2.080	2.100	Unclassified	1200	0	2.080	Unclassified
S2.000	S10	150	1.150	2.166	Unclassified	600	0	1.150	Unclassified
S3.000	S11	300	1.743	2.028	Unclassified	1200	0	2.028	Unclassified
S3.001	S12	300	1.634	1.743	Unclassified	300	0	1.743	Unclassified
S3.002	S13	300	1.634	2.100	Unclassified	1200	0	1.634	Unclassified
S1.011	S10	225	2.225	2.241	Unclassified	1500	0	2.241	Unclassified
S1.012	S16	225	2.225	2.245	Unclassified	1200	0	2.225	Unclassified

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)
S1.012	S	19.200	16.730	21.940	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.440		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6, DS/PN: S1.007, Volume (m³): 7.4

Unit Reference	MD-SHE-0122-1200-3900-1200
Design Head (m)	3.900
Design Flow (l/s)	12.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	122
Invert Level (m)	18.396
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.900	12.0	Kick-Flo®	1.097	6.6
Flush-Flo™	0.535	8.3	Mean Flow over Head Range	-	8.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.4	0.800	8.0	2.000	8.7	4.000	12.1	7.000	15.9
0.200	7.1	1.000	7.3	2.200	9.1	4.500	12.8	7.500	16.4
0.300	7.9	1.200	6.9	2.400	9.5	5.000	13.5	8.000	16.9
0.400	8.2	1.400	7.4	2.600	9.9	5.500	14.1	8.500	17.4
0.500	8.3	1.600	7.9	3.000	10.6	6.000	14.7	9.000	17.9
0.600	8.3	1.800	8.3	3.500	11.4	6.500	15.3	9.500	18.4

Complex Manhole: S10, DS/PN: S1.011, Volume (m³): 6.7

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0161-1150-0500-1150
Design Head (m)	0.500
Design Flow (l/s)	11.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	161
Invert Level (m)	17.034
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	11.5	Kick-Flo®	0.403	10.4
Flush-Flo™	0.239	11.5	Mean Flow over Head Range	-	9.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Hydro-Brake® Optimum

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.8	0.800	14.4	2.000	22.2	4.000	31.0	7.000	40.6
0.200	11.4	1.000	16.0	2.200	23.3	4.500	32.8	7.500	42.1
0.300	11.3	1.200	17.4	2.400	24.2	5.000	34.5	8.000	43.5
0.400	10.5	1.400	18.7	2.600	25.2	5.500	36.0	8.500	44.8
0.500	11.5	1.600	20.0	3.000	27.0	6.000	37.6	9.000	46.1
0.600	12.5	1.800	21.1	3.500	29.1	6.500	39.2	9.500	47.4

Storage Structures for Storm

Complex Manhole: S4, DS/PN: S1.002

Cellular Storage

Invert Level (m) 20.234 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	13.5	0.0	2.000	13.5	0.0	2.001	0.0	0.0

Complex Manhole: S5, DS/PN: S1.004

Cellular Storage

Invert Level (m) 19.834 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.2	0.0	2.000	14.2	0.0	2.001	0.0	0.0

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.0
Max Percolation (l/s)	12.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	21.984	Cap Volume Depth (m)	0.600

Complex Manhole: S5, DS/PN: S1.006

Cellular Storage

Invert Level (m) 20.005 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	12.0	0.0	2.000	12.0	0.0	2.001	0.0	0.0

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	22.000
Membrane Percolation (mm/hr)	1000	Width (m)	4.6
Max Percolation (l/s)	22.7	Length (m)	17.8
Safety Factor	2.0	Slope (1:X)	40.0
Porosity	0.30	Depression Storage (mm)	5

Porous Car Park

Evaporation (mm/day) 3 Cap Volume Depth (m) 0.600

Complex Manhole: S8, DS/PN: S1.009

Cellular Storage

Invert Level (m) 17.970 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	45.0	0.0	1.000	45.0	0.0	1.001	0.0	0.0

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.0
Membrane Percolation (mm/hr) 1000 Length (m) 50.0
Max Percolation (l/s) 69.4 Slope (1:X) 20.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 19.970 Cap Volume Depth (m) 0.600

Complex Manhole: S12, DS/PN: S3.001

Cellular Storage

Invert Level (m) 17.284 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	149.2	0.0	1.000	149.2	0.0	1.001	0.0	0.0

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 4.0
Membrane Percolation (mm/hr) 1000 Length (m) 53.0
Max Percolation (l/s) 58.9 Slope (1:X) 0.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 18.284 Cap Volume Depth (m) 0.600

Complex Manhole: S13, DS/PN: S3.002

Cellular Storage

Invert Level (m) 17.186 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Cellular Storage

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	25.0	0.0	1.000	25.0	0.0	1.001	0.0	0.0

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.7
Max Percolation (l/s)	36.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	35.306	Cap Volume Depth (m)	0.600

1 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 21.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.440 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	15 Winter	1	+0%	30/15 Summer				20.475	-0.089	0.000
S1.001	S3	30 Winter	1	+0%	30/15 Summer				20.215	-0.086	0.000
S1.002	S4	30 Winter	1	+0%	1/15 Winter				20.207	0.043	0.000
S1.003	S4	30 Winter	1	+0%	1/15 Summer				20.203	0.102	0.000
S1.004	S5	30 Winter	1	+0%	1/15 Summer				20.198	0.139	0.000
S1.005	S6	30 Winter	1	+0%	1/15 Summer				20.191	0.197	0.000
S1.006	S5	30 Winter	1	+0%	1/15 Summer				20.186	0.229	0.000
S1.007	S6	30 Winter	1	+0%	1/15 Summer				20.177	1.481	0.000
S1.008	S7	15 Winter	1	+0%	100/60 Winter				18.225	-0.220	0.000
S1.009	S8	30 Winter	1	+0%	100/30 Winter				18.058	-0.212	0.000
S1.010	S9	30 Winter	1	+0%	100/15 Summer				17.862	-0.238	0.000
S2.000	S10	15 Winter	1	+0%	100/30 Summer				18.032	-0.118	0.000
S3.000	S11	15 Winter	1	+0%	30/15 Summer				17.667	-0.155	0.000
S3.001	S12	180 Winter	1	+0%	30/15 Winter				17.536	-0.121	0.000
S3.002	S13	180 Winter	1	+0%	1/60 Winter				17.533	0.047	0.000
S1.011	S10	180 Winter	1	+0%	1/15 Summer				17.531	0.272	0.000
S1.012	S16	600 Summer	1	+0%					17.094	-0.151	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.34		6.4	OK	
S1.001	S3	0.36		13.7	OK	
S1.002	S4	0.38		13.5	SURCHARGED	
S1.003	S4	0.62		18.7	SURCHARGED	
S1.004	S5	0.44		15.4	SURCHARGED	
S1.005	S6	0.62		18.7	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.006	S5	0.50		17.7	SURCHARGED	
S1.007	S6	0.08		8.3	SURCHARGED	
S1.008	S7	0.16		15.1	OK	
S1.009	S8	0.19		18.1	OK	
S1.010	S9	0.10		18.5	OK	
S2.000	S10	0.10		4.4	OK	
S3.000	S11	0.46		33.2	OK	
S3.001	S12	0.11		8.0	OK	
S3.002	S13	0.15		9.9	SURCHARGED	
S1.011	S10	0.40		11.5	SURCHARGED	
S1.012	S16	0.24		11.5	OK	

30 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	21.000
Region	England and Wales	Ratio R	0.440
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	60 Winter	30	+0%	30/15 Summer				20.977	0.413	0.000
S1.001	S3	60 Winter	30	+0%	30/15 Summer				20.968	0.667	0.000
S1.002	S4	60 Winter	30	+0%	1/15 Winter				20.959	0.795	0.000
S1.003	S4	60 Winter	30	+0%	1/15 Summer				20.953	0.852	0.000
S1.004	S5	60 Winter	30	+0%	1/15 Summer				20.948	0.889	0.000
S1.005	S6	60 Winter	30	+0%	1/15 Summer				20.940	0.946	0.000
S1.006	S5	60 Winter	30	+0%	1/15 Summer				20.934	0.977	0.000
S1.007	S6	60 Winter	30	+0%	1/15 Summer				20.923	2.227	0.000
S1.008	S7	15 Winter	30	+0%	100/60 Winter				18.263	-0.182	0.000
S1.009	S8	15 Winter	30	+0%	100/30 Winter				18.117	-0.153	0.000
S1.010	S9	180 Winter	30	+0%	100/15 Summer				18.000	-0.100	0.000
S2.000	S10	15 Winter	30	+0%	100/30 Summer				18.050	-0.100	0.000
S3.000	S11	180 Winter	30	+0%	30/15 Summer				17.999	0.177	0.000
S3.001	S12	180 Winter	30	+0%	30/15 Winter				17.996	0.339	0.000
S3.002	S13	180 Winter	30	+0%	1/60 Winter				17.991	0.505	0.000
S1.011	S10	180 Winter	30	+0%	1/15 Summer				17.993	0.734	0.000
S1.012	S16	180 Winter	30	+0%					17.105	-0.140	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.39		7.3	SURCHARGED	
S1.001	S3	0.51		19.6	SURCHARGED	
S1.002	S4	0.37		12.9	SURCHARGED	
S1.003	S4	0.63		18.9	SURCHARGED	
S1.004	S5	0.33		11.7	SURCHARGED	
S1.005	S6	0.44		13.2	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.006	S5	0.38		13.5	SURCHARGED	
S1.007	S6	0.09		9.8	SURCHARGED	
S1.008	S7	0.33		31.2	OK	
S1.009	S8	0.48		45.4	OK	
S1.010	S9	0.09		17.7	OK	
S2.000	S10	0.24		10.8	OK	
S3.000	S11	0.25		17.6	SURCHARGED	
S3.001	S12	0.15		10.7	SURCHARGED	
S3.002	S13	0.19		12.5	SURCHARGED	
S1.011	S10	0.52		15.0	SURCHARGED	
S1.012	S16	0.31		15.0	OK	

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	21.000 Cv (Summer) 0.750
Region England and Wales		Ratio R	0.440 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	60 Winter	100	+40%	30/15 Summer				22.371	1.807	0.000
S1.001	S3	60 Winter	100	+40%	30/15 Summer				22.358	2.057	0.000
S1.002	S4	60 Winter	100	+40%	1/15 Winter				22.346	2.182	0.000
S1.003	S4	60 Winter	100	+40%	1/15 Summer				22.339	2.238	0.000
S1.004	S5	60 Winter	100	+40%	1/15 Summer				22.331	2.272	0.000
S1.005	S6	60 Winter	100	+40%	1/15 Summer				22.321	2.327	0.000
S1.006	S5	60 Winter	100	+40%	1/15 Summer				22.314	2.357	0.000
S1.007	S6	60 Winter	100	+40%	1/15 Summer				22.301	3.605	0.000
S1.008	S7	180 Winter	100	+40%	100/60 Winter				18.841	0.396	0.000
S1.009	S8	180 Winter	100	+40%	100/30 Winter				18.830	0.560	0.000
S1.010	S9	180 Winter	100	+40%	100/15 Summer				18.827	0.727	0.000
S2.000	S10	180 Winter	100	+40%	100/30 Summer				18.824	0.674	0.000
S3.000	S11	180 Winter	100	+40%	30/15 Summer				18.826	1.004	0.000
S3.001	S12	180 Winter	100	+40%	30/15 Winter				18.820	1.163	0.000
S3.002	S13	180 Winter	100	+40%	1/60 Winter				18.828	1.342	0.000
S1.011	S10	180 Winter	100	+40%	1/15 Summer				18.822	1.563	0.000
S1.012	S16	180 Winter	100	+40%					17.122	-0.123	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.62		11.7	SURCHARGED	
S1.001	S3	0.93		35.8	SURCHARGED	
S1.002	S4	0.35		12.4	SURCHARGED	
S1.003	S4	0.90		26.9	SURCHARGED	
S1.004	S5	0.38		13.4	SURCHARGED	
S1.005	S6	0.63		18.9	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.006	S5	0.38		13.5	SURCHARGED	
S1.007	S6	0.11		11.8	FLOOD RISK	
S1.008	S7	0.20		18.6	SURCHARGED	
S1.009	S8	0.26		25.0	SURCHARGED	
S1.010	S9	0.12		23.7	SURCHARGED	
S2.000	S10	0.10		4.3	SURCHARGED	
S3.000	S11	0.45		32.0	SURCHARGED	
S3.001	S12	0.16		11.3	SURCHARGED	
S3.002	S13	0.19		12.5	FLOOD RISK	
S1.011	S10	0.71		20.4	SURCHARGED	
S1.012	S16	0.42		20.4	OK	

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