

Legend

- Site Boundary
- Planning Boundary
- Hardworks
 - Existing Vehicular Tarmacadam
 - Proposed permeable coloured tarmac
 - Paving Type 1
Permeable block paving
 - Paving Type 2
Permeable block paving
 - Self binding gravel
- Softworks
 - Proposed Grass / Meadow
 - Existing private gardens
 - Proposed shrub planting
with ecological value
 - Proposed Rain Garden
 - Proposed Wildflower
 - Proposed Garden Planting
 - Proposed Roof Planting
 - Proposed Tree
 - Existing Tree
- Boundary Treatment
 - Existing boundary fencing
 - Relocated existing boundary fencing
 - Proposed boundary treatment
 - Proposed Handrail to ramp
 - Proposed Retaining wall
Brickwork to match proposed building
 - Existing Retaining wall
- Furniture
 - Proposed Cycle Stand
 - Electric Car Charging Point
 - Proposed bench
 - Proposed play elements
 - Proposed picnic bench
 - Proposed moveable furniture
 - Proposed Cycle Store
 - Proposed Garden Shed

Appendix E – Existing Drainage Calculations

[Print](#)[Close Report](#)

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Luke Hornblow

Site name: Brunel Walk

Site location: Brunel Walk

Site Details

Latitude: 51.58429° N

Longitude: 0.07998° W

Reference: 4215588517

Date: Apr 13 2022 17:17

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): 0.4272

Methodology

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

SPR estimation method: Calculate from SOIL type

Soil characteristics

Default Edited

SOIL type: 4 4

HOST class: N/A N/A

SPR/SPRHOST: 0.47 0.47

Hydrological characteristics

Default Edited

SAAR (mm): 620 620

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 $SPR/SPRHOST \leq 0.3$?

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): 1.79 1.79

1 in 1 year (l/s): 1.52 1.52

1 in 30 years (l/s): 4.12 4.12

1 in 100 year (l/s): 5.71 5.71

1 in 200 years (l/s): 6.69 6.69

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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10 Aldersgate Street London EC1A 4HJ		
Date 19/04/2022 10:27 File 2844 - Existing SW Drai...	Designed by Luke.Hornblow Checked by	
Innovyze	Network 2020.1	

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 533126 189013 TQ 33126 89013
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
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

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.054	0.054	0.054
1.001	-	-	100	0.054	0.054	0.054
1.002	-	-	100	0.054	0.054	0.054
1.003	-	-	100	0.055	0.055	0.055
				Total	Total	Total
				0.217	0.217	0.217

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 Coefficient 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 FSR Profile Type Summer
 Return Period (years) 2 Cv (Summer) 0.750
 Region England and Wales Cv (Winter) 0.840
 M5-60 (mm) 20.700 Storm Duration (mins) 30
 Ratio R 0.438

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DTS Status ON								
Profile(s) Summer and Winter								
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440								
Return Period(s) (years) 2, 30, 100								
Climate Change (%) 0, 0, 0								

Appendix F – Proposed Drainage Calculations

Variables

Results

Design

Overview 2D

Overview 3D

Vt

FEH Rainfall

Return Period (years)

Version

Site

100

2013

GB 533126 189013 TQ 33126 89013

Point

...

Cv (Summer)

Cv (Winter)

Impervious Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr)

Safety Factor

Climate Change (%)

0.950

0.950

0.299

2.5

0.00000

2.0

40

Analyse

OK

Cancel

Help

Enter Cv between 0.100 and 1.000

Variables

Results

Design

Overview 2D

Overview 3D

Vt

Results

Global Variables require approximate storage of between 281 m³ and 346 m³.

These values are estimates only and should not be used for design purposes.

Analyse

OK

Cancel

Help

Enter Cv between 0.100 and 1.000

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10 Aldersgate Street London EC1A 4HJ	Associate Director Brunel Walk 1:100 Year + 40% CC	
Date 07/12/2022 File 2844-MD Model - No Blue...	Designed by Gurdeep Bansal Checked by GB	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes pipesize Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	100
FEH Rainfall Version	2013
Site Location GB 533126 189013 TQ 33126 89013	
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.950
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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.205	4-8	0.094

Total Area Contributing (ha) = 0.299

Total Pipe Volume (m³) = 9.808

Network Design Table for Storm

« - Indicates pipe capacity < flow

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
1.000	5.434	0.054	100.6	0.023	5.00	0.0	0.600	o	150	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)
1.000	50.00	5.09	12.500	0.023	0.0	0.0	0.0	1.00	17.7	4.0

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Innovyze	Network 2020.1.3	

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
1.001	13.374	0.134	99.8	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	22.312	0.279	80.0	0.027	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	3.630	0.045	80.7	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	31.069	0.388	80.1	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	6.836	0.085	80.4	0.026	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	24.973	0.416	60.0	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	9.575	0.160	59.8	0.035	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	17.755	0.938	18.9	0.007	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	23.517	0.235	100.1	0.017	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	16.573	0.166	99.8	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.011	8.557	0.086	99.5	0.016	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.012	14.562	0.146	99.7	0.048	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.013	19.805	0.198	100.0	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.014	3.593	0.209	17.2	0.000	0.00	0.0	0.600	o	150	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)
1.001	50.00	5.31	12.446	0.026	0.0	0.0	0.0	1.01	17.8	4.5
1.002	50.00	5.64	12.312	0.053	0.0	0.0	0.0	1.13	19.9	9.0
1.003	50.00	5.70	12.033	0.062	0.0	0.0	0.0	1.12	19.8	10.6
1.004	50.00	6.05	11.988	0.076	0.0	0.0	0.0	1.46	58.2	13.0
1.005	50.00	6.13	11.599	0.101	0.0	0.0	0.0	1.46	58.0	17.4
1.006	50.00	6.37	11.514	0.116	0.0	0.0	0.0	1.69	67.2	19.8
1.007	50.00	6.47	11.098	0.151	0.0	0.0	0.0	1.69	67.3	25.9
1.008	50.00	6.55	10.938	0.158	0.0	0.0	0.0	3.63	256.6	27.1
1.009	50.00	6.80	10.000	0.175	0.0	0.0	0.0	1.57	111.1	29.9
1.010	50.00	6.98	9.765	0.218	0.0	0.0	0.0	1.57	111.2	37.3
1.011	50.00	7.07	9.599	0.233	0.0	0.0	0.0	1.58	111.4	40.0
1.012	50.00	7.22	9.513	0.282	0.0	0.0	0.0	1.57	111.3	48.3
1.013	50.00	7.55	9.367	0.299	0.0	0.0	0.0	1.00	17.8«	51.3
1.014	50.00	7.57	9.169	0.299	0.0	0.0	0.0	2.44	43.1«	51.3

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	13.580	1.080	Open Manhole	1200	1.000	12.500	150				
2	13.470	1.024	Open Manhole	1200	1.001	12.446	150	1.000	12.446	150	
3	13.270	0.958	Open Manhole	1200	1.002	12.312	150	1.001	12.312	150	
4	13.350	1.317	Open Manhole	1200	1.003	12.033	150	1.002	12.033	150	
5	13.350	1.362	Open Manhole	1200	1.004	11.988	225	1.003	11.988	150	
6	13.220	1.621	Open Manhole	1200	1.005	11.599	225	1.004	11.600	225	1
7	13.150	1.636	Open Manhole	1200	1.006	11.514	225	1.005	11.514	225	
9	13.110	2.012	Open Manhole	1200	1.007	11.098	225	1.006	11.098	225	
10	13.000	2.062	Open Manhole	1200	1.008	10.938	300	1.007	10.938	225	
11	12.900	2.900	Open Manhole	100	1.009	10.000	300	1.008	10.000	300	
13	12.550	2.785	Open Manhole	1200	1.010	9.765	300	1.009	9.765	300	
14	12.450	2.851	Open Manhole	1200	1.011	9.599	300	1.010	9.599	300	
15	12.080	2.567	Open Manhole	1200	1.012	9.513	300	1.011	9.513	300	
16	11.420	2.053	Open Manhole	1200	1.013	9.367	150	1.012	9.367	300	
17	10.600	1.431	Open Manhole	1200	1.014	9.169	150	1.013	9.169	150	
	10.550	1.590	Open Manhole	0		OUTFALL		1.014	8.960	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	533025.598	189042.819	533025.598	189042.819	Required	
2	533031.032	189042.870	533031.032	189042.870	Required	
3	533031.750	189029.515	533031.750	189029.515	Required	
4	533054.055	189028.987	533054.055	189028.987	Required	
5	533055.614	189032.265	533055.614	189032.265	Required	
6	533086.683	189032.322	533086.683	189032.322	Required	
7	533086.632	189025.487	533086.632	189025.487	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
9	533111.602	189025.088	533111.602	189025.088	Required	
10	533121.103	189023.903	533121.103	189023.903	Required	
11	533135.841	189014.001	533135.841	189014.001	Required	
13	533158.972	189009.759	533158.972	189009.759	Required	
14	533175.280	189006.807	533175.280	189006.807	Required	
15	533183.632	189008.669	533183.632	189008.669	Required	
16	533197.990	189006.238	533197.990	189006.238	Required	
17	533200.915	188986.650	533200.915	188986.650	Required	
	533203.525	188984.182			No Entry	

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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)
1.000	o	150	1	13.580	12.500	0.930	Open Manhole	1200
1.001	o	150	2	13.470	12.446	0.874	Open Manhole	1200
1.002	o	150	3	13.270	12.312	0.808	Open Manhole	1200
1.003	o	150	4	13.350	12.033	1.167	Open Manhole	1200
1.004	o	225	5	13.350	11.988	1.137	Open Manhole	1200
1.005	o	225	6	13.220	11.599	1.396	Open Manhole	1200
1.006	o	225	7	13.150	11.514	1.411	Open Manhole	1200
1.007	o	225	9	13.110	11.098	1.787	Open Manhole	1200
1.008	o	300	10	13.000	10.938	1.762	Open Manhole	1200
1.009	o	300	11	12.900	10.000	2.600	Open Manhole	100
1.010	o	300	13	12.550	9.765	2.485	Open Manhole	1200
1.011	o	300	14	12.450	9.599	2.551	Open Manhole	1200
1.012	o	300	15	12.080	9.513	2.267	Open Manhole	1200
1.013	o	150	16	11.420	9.367	1.903	Open Manhole	1200
1.014	o	150	17	10.600	9.169	1.281	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)
1.000	5.434	100.6	2	13.470	12.446	0.874	Open Manhole	1200
1.001	13.374	99.8	3	13.270	12.312	0.808	Open Manhole	1200
1.002	22.312	80.0	4	13.350	12.033	1.167	Open Manhole	1200
1.003	3.630	80.7	5	13.350	11.988	1.212	Open Manhole	1200
1.004	31.069	80.1	6	13.220	11.600	1.395	Open Manhole	1200
1.005	6.836	80.4	7	13.150	11.514	1.411	Open Manhole	1200
1.006	24.973	60.0	9	13.110	11.098	1.787	Open Manhole	1200
1.007	9.575	59.8	10	13.000	10.938	1.837	Open Manhole	1200
1.008	17.755	18.9	11	12.900	10.000	2.600	Open Manhole	100
1.009	23.517	100.1	13	12.550	9.765	2.485	Open Manhole	1200
1.010	16.573	99.8	14	12.450	9.599	2.551	Open Manhole	1200
1.011	8.557	99.5	15	12.080	9.513	2.267	Open Manhole	1200
1.012	14.562	99.7	16	11.420	9.367	1.753	Open Manhole	1200
1.013	19.805	100.0	17	10.600	9.169	1.281	Open Manhole	1200
1.014	3.593	17.2		10.550	8.960	1.440	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.003	0.003	0.003
	User	-	100	0.006	0.006	0.009
	User	-	100	0.010	0.010	0.019
	User	-	100	0.004	0.004	0.023
	User	-	100	0.000	0.000	0.023
1.001	-	-	100	0.003	0.003	0.003
1.002	User	-	100	0.002	0.002	0.002
	User	-	100	0.016	0.016	0.018
	User	-	100	0.008	0.008	0.027
1.003	User	-	100	0.003	0.003	0.003
	User	-	100	0.004	0.004	0.007
	User	-	100	0.001	0.001	0.008
	User	-	100	0.001	0.001	0.009
1.004	User	-	100	0.012	0.012	0.012
	User	-	100	0.002	0.002	0.014
1.005	User	-	100	0.006	0.006	0.006
	User	-	100	0.020	0.020	0.026
1.006	User	-	100	0.007	0.007	0.007
	User	-	100	0.001	0.001	0.008
	User	-	100	0.003	0.003	0.011
	User	-	100	0.003	0.003	0.014
1.007	User	-	100	0.003	0.003	0.003
	User	-	100	0.032	0.032	0.035
1.008	-	-	100	0.007	0.007	0.007
1.009	User	-	100	0.004	0.004	0.004
	User	-	100	0.007	0.007	0.011
	User	-	100	0.006	0.006	0.017
1.010	User	-	100	0.013	0.013	0.013
	User	-	100	0.009	0.009	0.022
	User	-	100	0.011	0.011	0.033
	User	-	100	0.010	0.010	0.043
1.011	User	-	100	0.006	0.006	0.006
	User	-	100	0.009	0.009	0.016
1.012	User	-	100	0.017	0.017	0.017
	User	-	100	0.026	0.026	0.043
	User	-	100	0.005	0.005	0.048
1.013	User	-	100	0.018	0.018	0.018
1.014	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.299	0.299	0.299

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)
1.014		10.550	8.960	0.000	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.950	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	2
Number of Online Controls	2	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 533126 189013 TQ 33126 89013
Data Type	Point
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	0.950
Cv (Winter)	0.840
Storm Duration (mins)	30

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Online Controls for Storm

Orifice Manhole: 7, DS/PN: 1.006, Volume (m³): 2.1

Diameter (m) 0.019 Discharge Coefficient 0.600 Invert Level (m) 11.514

Hydro-Brake® Optimum Manhole: 16, DS/PN: 1.013, Volume (m³): 3.3

Unit Reference	MD-SHE-0065-2500-1850-2500
Design Head (m)	1.850
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	65
Invert Level (m)	9.367
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.850	2.5
Flush-Flo™	0.286	1.8
Kick-Flo®	0.581	1.5
Mean Flow over Head Range	-	1.9

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)
0.100	1.5	1.200	2.0	3.000	3.1	7.000	4.6
0.200	1.8	1.400	2.2	3.500	3.3	7.500	4.8
0.300	1.8	1.600	2.3	4.000	3.6	8.000	4.9
0.400	1.8	1.800	2.5	4.500	3.8	8.500	5.1
0.500	1.7	2.000	2.6	5.000	4.0	9.000	5.2
0.600	1.5	2.200	2.7	5.500	4.1	9.500	5.3
0.800	1.7	2.400	2.8	6.000	4.3		
1.000	1.9	2.600	2.9	6.500	4.5		

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Storage Structures for Storm

Cellular Storage Manhole: 7, DS/PN: 1.006

Invert Level (m) 11.514 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	0.0	1.011	0.0	0.0
1.010	120.0	0.0			

Cellular Storage Manhole: 11, DS/PN: 1.009

Invert Level (m) 10.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	135.0	0.0	1.201	0.0	0.0
1.200	135.0	0.0			

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	1	-0.094	0.000	0.29		4.3	OK	
1.001	2	-0.094	0.000	0.29		4.7	OK	
1.002	3	-0.077	0.000	0.47		8.8	OK	
1.003	4	-0.051	0.000	0.77		10.2	OK	
1.004	5	-0.153	0.000	0.22		12.2	OK	
1.005	6	-0.078	0.000	0.05		2.1	OK	
1.006	7	0.006	0.000	0.01		0.4	SURCHARGED	
1.007	9	-0.177	0.000	0.10		5.6	OK	
1.008	10	-0.266	0.000	0.03		6.7	OK	
1.009	11	-0.156	0.000	0.02	147	1.6	OK	
1.010	13	0.101	0.000	0.06		5.2	SURCHARGED	
1.011	14	0.277	0.000	0.05		3.4	SURCHARGED	
1.012	15	0.369	0.000	0.05		4.2	SURCHARGED	
1.013	16	0.665	0.000	0.11		1.8	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.014	17	1440 Winter	2	+0%					9.193

PN	US/MH Name	Depth (m)	Surcharged Volume (m ³)	Flooded Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.014	17	-0.126	0.000	0.06		1.8	OK	

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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 Coefficient 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 2
Number of Online Controls 2 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 533126 189013 TQ 33126 89013
Data Type Point
Cv (Summer) 0.900
Cv (Winter) 0.900

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, 5760,
7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Level
							Act.	(m)
1.000	1	15 Summer	30	+0%	30/15 Summer			12.736
1.001	2	15 Summer	30	+0%	30/15 Summer			12.711
1.002	3	15 Summer	30	+0%	30/15 Summer			12.651
1.003	4	15 Summer	30	+0%	30/15 Summer			12.289
1.004	5	15 Summer	30	+0%	100/15 Summer			12.111
1.005	6	600 Winter	30	+0%	30/120 Summer			11.998
1.006	7	600 Winter	30	+0%	2/360 Winter			11.997
1.007	9	15 Summer	30	+0%				11.188
1.008	10	15 Summer	30	+0%				11.002
1.009	11	240 Winter	30	+0%	30/60 Summer			10.479
1.010	13	15 Summer	30	+0%	2/15 Summer			10.503

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Innovyze	Network 2020.1.3	

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

PN	US/MH Name	Surcharged		Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Overflow					
1.000	1	0.086	0.000	0.69				10.0	SURCHARGED	
1.001	2	0.115	0.000	0.73				11.9	SURCHARGED	
1.002	3	0.189	0.000	1.11				20.9	SURCHARGED	
1.003	4	0.106	0.000	1.86				24.7	SURCHARGED	
1.004	5	-0.102	0.000	0.57				31.0	OK	
1.005	6	0.174	0.000	0.10				4.1	SURCHARGED	
1.006	7	0.258	0.000	0.01				0.5	SURCHARGED	
1.007	9	-0.135	0.000	0.34				18.9	OK	
1.008	10	-0.236	0.000	0.10				22.6	OK	
1.009	11	0.179	0.000	0.04				3.5	SURCHARGED	
1.010	13	0.438	0.000	0.07				6.6	SURCHARGED	

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

US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act. Level
								(m)
1.011	14	15 Summer	30	+0%	2/15 Summer			10.629
1.012	15	15 Summer	30	+0%	2/15 Summer			10.699
1.013	16	15 Summer	30	+0%	2/15 Summer			10.731
1.014	17	15 Summer	30	+0%				9.196

US/MH		Surcharged	Flooded	Flow / Overflow		Half Drain	Pipe	Level	
PN	Name	Depth (m)	Volume (m³)	Cap.	(l/s)	Time (mins)	Flow (l/s)	Status	Exceeded
1.011	14	0.730	0.000	0.07			5.4	SURCHARGED	
1.012	15	0.886	0.000	0.08			7.1	SURCHARGED	
1.013	16	1.214	0.000	0.13			2.1	SURCHARGED	
1.014	17	-0.123	0.000	0.07			2.1	OK	

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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 Coefficient 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 2
 Number of Online Controls 2 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 533126 189013 TQ 33126 89013
 Data Type Point
 Cv (Summer) 0.900
 Cv (Winter) 0.900

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, 5760,
 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Water Level
							Act.	(m)
1.000	1	15 Summer	100	+40%	30/15 Summer			13.530
1.001	2	15 Summer	100	+40%	30/15 Summer			13.448
1.002	3	15 Summer	100	+40%	30/15 Summer			13.264
1.003	4	15 Summer	100	+40%	30/15 Summer			12.594
1.004	5	720 Winter	100	+40%	100/15 Summer			12.494
1.005	6	720 Winter	100	+40%	30/120 Summer			12.493
1.006	7	720 Winter	100	+40%	2/360 Winter			12.492
1.007	9	15 Summer	100	+40%				11.227
1.008	10	480 Winter	100	+40%				11.143
1.009	11	480 Winter	100	+40%	30/60 Summer			11.142
1.010	13	480 Winter	100	+40%	2/15 Summer			11.140

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	1	0.880	0.000	1.16		16.8	FLOOD RISK	
1.001	2	0.852	0.000	1.14		18.5	FLOOD RISK	
1.002	3	0.802	0.000	1.68		31.6	FLOOD RISK	
1.003	4	0.411	0.000	2.74		36.4	SURCHARGED	
1.004	5	0.281	0.000	0.10		5.2	SURCHARGED	
1.005	6	0.669	0.000	0.16		6.8	SURCHARGED	
1.006	7	0.753	0.000	0.01		0.7	SURCHARGED	
1.007	9	-0.096	0.000	0.63		35.0	OK	
1.008	10	-0.095	0.000	0.02		4.7	OK	
1.009	11	0.842	0.000	0.05		4.4	SURCHARGED	
1.010	13	1.075	0.000	0.04		4.1	SURCHARGED	

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

US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act. Level
								(m)
1.011	14	480 Winter	100	+40%	2/15 Summer			11.139
1.012	15	480 Winter	100	+40%	2/15 Summer			11.138
1.013	16	480 Winter	100	+40%	2/15 Summer			11.136
1.014	17	480 Winter	100	+40%				9.198

US/MH		Surcharged	Flooded	Half Drain		Pipe			
PN	Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.011	14	1.240	0.000	0.05			3.7	SURCHARGED	
1.012	15	1.325	0.000	0.03			3.0	SURCHARGED	
1.013	16	1.619	0.000	0.15			2.4	FLOOD RISK	
1.014	17	-0.121	0.000	0.09			2.4	OK	

Appendix G – Suds Proforma

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	Brunel Walk Stage 3
	Address & post code	1-36 Brunel Walk. Tottenham, London N15 5HQ
	OS Grid ref. (Easting, Northing)	E 533110 N 189010
	LPA reference (if applicable)	
	Brief description of proposed work	Development proposals include the redevelopment of Brunel Walk to provide 46 new residential dwellings along with associated hard and soft landscape, and landscaping improvements to the Turner Avenue Estate.
	Total site Area	4564 m ²
	Total existing impervious area	2168 m ²
	Total proposed impervious area	2990 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	Existing FW connection to TWMH101M Existing SW between TWMH003 & 2901
	Designer Name	Luke Hornblow
	Designer Position	Civil Engineer
Designer Company	Meinhardt	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	No recorded superficial deposits	
	Bedrock geology classification	London Clay Formation.	
	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	Y	
	2 use infiltration techniques, such as porous surfaces in non-clay areas	N	
	3 attenuate rainwater in ponds or open water features for gradual release	N	
	4 attenuate rainwater by storing in tanks or sealed water features for gradual release		Y
	5 discharge rainwater direct to a watercourse	N	
	6 discharge rainwater to a surface water sewer/drain		Y
	7 discharge rainwater to the combined sewer.	N	
	2c. Proposed Discharge Details		
	Proposed discharge location	Thames Water Manhole Ref: 2901	
Has the owner/regulator of the discharge location been consulted?	Yes		

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	1.79			
	1 in 1	1.52	31.9		2.5
	1 in 30	4.12	95.9		2.5
	1 in 100	5.71	126.5		2.5
	1 in 100 + CC			314	2.5
	Climate change allowance used		40%		
	3b. Principal Method of Flow Control		Hydrobrake		
	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	916	916	0	
	Blue roofs	0	0	0	
	Filter strips	0	0	0	
	Filter drains	0	0	0	
	Bioretention / tree pits	0	0	0	
	Pervious pavements	0	0	0	
	Swales	0	0	0	
	Basins/ponds	0	0	0	
	Attenuation tanks	2990		315	
	Total	3906	916	315	

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 2.2, 4.4.1 & 4.4.2 of Drainage Strategy Report
	Drainage hierarchy (2b)	Section 4.4 & 6
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Appendix C approval from TW
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 4.3.3 & Appendix E
	Proposed SuDS measures & specifications (3b)	At later design stage
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Appendix D
	Detailed drainage design drawings, including exceedance flow routes	Appendix A
	Detailed landscaping plans	Appendix D
	Maintenance strategy	Section 4.5
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	At later design stage
	b) biodiversity?	At later design stage
	c) amenity?	At later design stage



Meinhardt (UK) Ltd
10 Aldersgate Street
London
EC1A 4HJ
T: +44 (0) 20 7831 7969 F: +44 (0) 20 7404 7872

www.meinhardt.co.uk