Storage Structures for Storm

Infiltration Trench Manhole: SFilterDrain, DS/PN: S1.000

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.5
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	20.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.300
Invert Level (m)	96.400	Cap Infiltration Depth (m)	0.300

Porous Car Park Manhole: SPermPav1, DS/PN: S2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	5.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	99.350	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SPermPav2, DS/PN: S3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	6.9
Max Percolation (l/s)	9.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	99.350	Cap Volume Depth (m)	0.250

Cellular Storage Manhole: SSWFC3, DS/PN: S1.006

Invert Level (m)	98.350	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	0.800	12.0	0.0	0.801	0.0	0.0

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 4 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	21.000
Region	England and Wales	Ratio R	0.435
Cv (Summer)	0.750		
Cv (Winter)	0.840		

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)	15, 30, 60, 120, 240, 360, 480, 960, 1440
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)
S1.000	SFilterDrain	30 Winter	1	+0%	30/15 Summer				96.492
S1.001	SPump	30 Winter	1	+0%	100/15 Summer				96.481
S1.002	SSW1	15 Winter	1	+0%	30/15 Summer				98.660
S2.000	SDUMMY Permpav1	60 Winter	1	+0%					99.327
S2.001	SPermPav1	60 Winter	1	+0%	100/30 Winter				99.327
S1.003	SJunction	30 Winter	1	+0%					98.547
S1.004	SSW2	15 Winter	1	+0%	30/15 Summer				98.485
S1.005	SSW3	30 Winter	1	+0%	1/30 Winter				98.457
S3.000	SDUMMY PermPav2	960 Summer	1	+0%					99.410
S3.001	SPermPav2	1440 Winter	1	+0%					99.408
S1.006	SSWFC3	30 Winter	1	+0%	30/15 Summer				98.443

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	SFilterDrain	-0.058	0.000	0.28			0.6	OK	
S1.001	SPump	-0.069	0.000	0.28			0.6	OK	
S1.002	SSW1	-0.065	0.000	0.25			1.4	OK	
S2.000	SDUMMY Permpav1	-0.073	0.000	0.01			0.0	OK*	
S2.001	SPermPav1	-0.073	0.000	0.00		14	0.1	OK	
S1.003	SJunction	-0.066	0.000	0.24			1.5	OK*	
S1.004	SSW2	-0.055	0.000	0.40			2.3	OK	
S1.005	SSW3	0.007	0.000	0.86			2.9	SURCHARGED	
S3.000	SDUMMY PermPav2	-0.090	0.000	0.00			0.0	OK*	
S3.001	SPermPav2	-0.092	0.000	0.00			0.0	OK	
S1.006	SSWFC3	-0.007	0.000	0.44		16	1.7	OK	

Appendix J

MicroDrainage Hydraulic Modelling Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	21.000	Add Flow / Climate Change (%)	0
Ratio R	0.436	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

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
S1.000	11.852	0.000	0.0	0.007	4.00	0.0	0.600	o	100	Pipe/Conduit	
S1.001	11.949	-2.175	-5.5	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.002	11.160	0.112	99.6	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	
S2.000	2.510	0.000	0.0	0.000	4.00	0.0	0.600	o	100	Pipe/Conduit	
S2.001	1.911	0.787	2.4	0.002	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.003	7.388	0.073	101.2	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.004	8.844	0.090	98.0	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.005	4.605	0.000	0.0	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	
S3.000	2.435	0.000	0.0	0.000	4.00	0.0	0.600	o	100	Pipe/Conduit	
S3.001	1.372	1.050	1.3	0.004	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.006	2.105	0.020	105.3	0.000	0.00	0.0	0.600	o	100	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	51.53	6.84	96.450	0.007	0.0	0.0	0.0	0.07	0.5«	1.0
S1.001	43.00	9.72	96.450	0.007	0.0	0.0	0.0	0.07	0.5«	1.0
S1.002	42.43	9.96	98.625	0.015	0.0	0.0	0.0	0.77	6.0	1.7
S2.000	62.15	4.60	99.300	0.000	0.0	0.0	0.0	0.07	0.5	0.0
S2.001	62.11	4.61	99.300	0.002	0.0	0.0	0.0	5.00	39.3	0.3
S1.003	42.07	10.12	98.513	0.017	0.0	0.0	0.0	0.76	6.0	1.9
S1.004	41.64	10.31	98.440	0.025	0.0	0.0	0.0	0.78	6.1	2.8
S1.005	39.35	11.41	98.350	0.033	0.0	0.0	0.0	0.07	0.5«	3.5
S3.000	62.25	4.58	99.400	0.000	0.0	0.0	0.0	0.07	0.5	0.0
S3.001	62.23	4.59	99.400	0.004	0.0	0.0	0.0	6.82	53.6	0.7
S1.006	39.26	11.46	98.350	0.037	0.0	0.0	0.0	0.75	5.9	3.9

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)
SFilterDrain	96.950	0.500	Open Manhole	450	S1.000	96.450	100				
SPump	97.148	0.698	Open Manhole	450	S1.001	96.450	100	S1.000	96.450	100	
SSW1	99.250	0.625	Open Manhole	450	S1.002	98.625	100	S1.001	98.625	100	
SDUMMY Permpav1	99.850	0.550	Junction		S2.000	99.300	100				
SPermPav1	99.850	0.550	Open Manhole	450	S2.001	99.300	100	S2.000	99.300	100	
SJunction	99.850	1.337	Junction		S1.003	98.513	100	S1.002	98.513	100	
								S2.001	98.513	100	
SSW2	99.850	1.410	Open Manhole	450	S1.004	98.440	100	S1.003	98.440	100	
SSW3	99.800	1.450	Open Manhole	450	S1.005	98.350	100	S1.004	98.350	100	
SDUMMY PermPav2	99.850	0.450	Junction		S3.000	99.400	100				
SPermPav2	99.850	0.450	Open Manhole	450	S3.001	99.400	100	S3.000	99.400	100	
SSWFC3	99.850	1.500	Open Manhole	1200	S1.006	98.350	100	S1.005	98.350	100	
								S3.001	98.350	100	
SOutfall	99.900	1.570	Open Manhole	0		OUTFALL		S1.006	98.330	100	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SFilterDrain	526854.030	185669.729	526854.030	185669.729	Required	
SPump	526857.155	185658.297	526857.155	185658.297	Required	
SSW1	526845.213	185657.867	526845.213	185657.867	Required	
SDUMMY Permpav1	526840.096	185665.609			No Entry	
SPermPav1	526840.406	185668.099	526840.406	185668.099	Required	
SJunction	526842.243	185668.626			No Entry	
SSW2	526840.320	185675.758	526840.320	185675.758	Required	
SSW3	526845.889	185682.629	526845.889	185682.629	Required	
SDUMMY PermPav2	526839.138	185680.908			No Entry	
SPermPav2	526841.572	185680.984	526841.572	185680.984	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SSWFC3	526842.259	185679.797	526842.259	185679.797	Required	
SOutfall	526840.261	185679.133			No Entry	

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	100	SFilterDrain	96.950	96.450	0.400	Open Manhole	450
S1.001	o	100	SPump	97.148	96.450	0.598	Open Manhole	450
S1.002	o	100	SSW1	99.250	98.625	0.525	Open Manhole	450
S2.000	o	100	SDUMMY Permpav1	99.850	99.300	0.450	Junction	
S2.001	o	100	SPermPav1	99.850	99.300	0.450	Open Manhole	450
S1.003	o	100	SJunction	99.850	98.513	1.237	Junction	
S1.004	o	100	SSW2	99.850	98.440	1.310	Open Manhole	450
S1.005	o	100	SSW3	99.800	98.350	1.350	Open Manhole	450
S3.000	o	100	SDUMMY PermPav2	99.850	99.400	0.350	Junction	
S3.001	o	100	SPermPav2	99.850	99.400	0.350	Open Manhole	450
S1.006	o	100	SSWFC3	99.850	98.350	1.400	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	11.852	0.0	SPump	97.148	96.450	0.598	Open Manhole	450
S1.001	11.949	-5.5	SSW1	99.250	98.625	0.525	Open Manhole	450
S1.002	11.160	99.6	SJunction	99.850	98.513	1.237	Junction	
S2.000	2.510	0.0	SPermPav1	99.850	99.300	0.450	Open Manhole	450
S2.001	1.911	2.4	SJunction	99.850	98.513	1.237	Junction	
S1.003	7.388	101.2	SSW2	99.850	98.440	1.310	Open Manhole	450
S1.004	8.844	98.0	SSW3	99.800	98.350	1.350	Open Manhole	450
S1.005	4.605	0.0	SSWFC3	99.850	98.350	1.400	Open Manhole	1200
S3.000	2.435	0.0	SPermPav2	99.850	99.400	0.350	Open Manhole	450
S3.001	1.372	1.3	SSWFC3	99.850	98.350	1.400	Open Manhole	1200
S1.006	2.105	105.3	SOutfall	99.900	98.330	1.470	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	0.007	0.007	0.007
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.008	0.008	0.008
2.000	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.002	0.002	0.002
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.008	0.008	0.008
1.005	-	-	100	0.008	0.008	0.008
3.000	-	-	100	0.000	0.000	0.000
3.001	-	-	100	0.004	0.004	0.004
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.037	0.037	0.037

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	SFilterDrain	100	0.400	0.598	Unclassified	450	0	0.400	Unclassified
S1.001	SPump	100	0.525	0.598	Unclassified	450	0	0.598	Unclassified
S1.002	SSW1	100	0.525	1.237	Unclassified	450	0	0.525	Unclassified
S2.000	SDUMMY Permpav1	100	0.450	0.450	Unclassified				Junction
S2.001	SPermPav1	100	0.450	1.237	Unclassified	450	0	0.450	Unclassified
S1.003	SJunction	100	1.237	1.310	Unclassified				Junction
S1.004	SSW2	100	1.310	1.350	Unclassified	450	0	1.310	Unclassified
S1.005	SSW3	100	1.350	1.400	Unclassified	450	0	1.350	Unclassified
S3.000	SDUMMY PermPav2	100	0.350	0.350	Unclassified				Junction
S3.001	SPermPav2	100	0.350	1.400	Unclassified	450	0	0.350	Unclassified
S1.006	SSWFC3	100	1.400	1.470	Unclassified	1200	0	1.400	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)
S1.006	SOutfall	99.900	98.330	0.000	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 4 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Storm Duration (mins)	30
Ratio R	0.436		

Online Controls for Storm

Pump Manhole: SPump, DS/PN: S1.001, Volume (m³): 0.2

Invert Level (m) 96.450

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	2.0000	0.700	2.0000	1.300	2.0000	1.900	2.0000	2.500	2.0000
0.200	2.0000	0.800	2.0000	1.400	2.0000	2.000	2.0000	2.600	2.0000
0.300	2.0000	0.900	2.0000	1.500	2.0000	2.100	2.0000	2.700	2.0000
0.400	2.0000	1.000	2.0000	1.600	2.0000	2.200	2.0000	2.800	2.0000
0.500	2.0000	1.100	2.0000	1.700	2.0000	2.300	2.0000	2.900	2.0000
0.600	2.0000	1.200	2.0000	1.800	2.0000	2.400	2.0000	3.000	2.0000

Orifice Manhole: SPermPav1, DS/PN: S2.001, Volume (m³): 0.1

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 99.300

Orifice Manhole: SPermPav2, DS/PN: S3.001, Volume (m³): 0.1

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 99.400

Hydro-Brake® Optimum Manhole: SSWFC3, DS/PN: S1.006, Volume (m³): 1.7

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	98.350
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0	Kick-Flo®	0.504	1.6
Flush-Flo™	0.240	2.0	Mean Flow over Head Range	-	1.7

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	1.8	0.800	2.0	2.000	3.0	4.000	4.2	7.000	5.5
0.200	2.0	1.000	2.2	2.200	3.2	4.500	4.4	7.500	5.6
0.300	2.0	1.200	2.4	2.400	3.3	5.000	4.7	8.000	5.8
0.400	1.9	1.400	2.6	2.600	3.4	5.500	4.9	8.500	6.0
0.500	1.6	1.600	2.7	3.000	3.7	6.000	5.1	9.000	6.2
0.600	1.8	1.800	2.9	3.500	3.9	6.500	5.3	9.500	6.3

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 4 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	21.000
Region	England and Wales	Ratio R	0.435
Cv (Summer)	0.750		
Cv (Winter)	0.840		

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)	15, 30, 60, 120, 240, 360, 480, 960, 1440
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)
S1.000	SFilterDrain	15 Winter	30	+0%	30/15 Summer				96.561
S1.001	SPump	15 Winter	30	+0%	100/15 Summer				96.535
S1.002	SSW1	15 Winter	30	+0%	30/15 Summer				98.817
S2.000	SDUMMY Permpav1	30 Winter	30	+0%					99.366
S2.001	SPermPav1	30 Winter	30	+0%	100/30 Winter				99.366
S1.003	SJunction	15 Summer	30	+0%					98.613
S1.004	SSW2	15 Winter	30	+0%	30/15 Summer				98.738
S1.005	SSW3	30 Winter	30	+0%	1/30 Winter				98.668
S3.000	SDUMMY PermPav2	240 Winter	30	+0%					99.430
S3.001	SPermPav2	240 Winter	30	+0%					99.430
S1.006	SSWFC3	30 Winter	30	+0%	30/15 Summer				98.658

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	SFilterDrain	0.011	0.000	0.79		11	1.8	SURCHARGED	
S1.001	SPump	-0.015	0.000	0.75			1.7	OK	
S1.002	SSW1	0.092	0.000	0.71			4.0	SURCHARGED	
S2.000	SDUMMY Permpav1	-0.034	0.000	0.03			0.1	OK*	
S2.001	SPermPav1	-0.034	0.000	0.01		12	0.2	OK	
S1.003	SJunction	0.000	0.000	0.67			4.0	SURCHARGED*	
S1.004	SSW2	0.198	0.000	1.05			5.9	SURCHARGED	
S1.005	SSW3	0.218	0.000	2.05			7.0	SURCHARGED	
S3.000	SDUMMY PermPav2	-0.070	0.000	0.00			0.0	OK*	
S3.001	SPermPav2	-0.070	0.000	0.00			0.1	OK	
S1.006	SSWFC3	0.208	0.000	0.50		26	2.0	SURCHARGED	

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 4 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	21.000
Region	England and Wales	Ratio R	0.435
Cv (Summer)	0.750		
Cv (Winter)	0.840		

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)	15, 30, 60, 120, 240, 360, 480, 960, 1440
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)
S1.000	SFilterDrain	15 Winter	100	+40%	30/15 Summer				96.793
S1.001	SPump	15 Winter	100	+40%	100/15 Summer				96.775
S1.002	SSW1	15 Winter	100	+40%	30/15 Summer				99.246
S2.000	SDUMMY Permpav1	30 Winter	100	+40%					99.400
S2.001	SPermPav1	30 Winter	100	+40%	100/30 Winter				99.403
S1.003	SJunction	15 Summer	100	+40%					98.613
S1.004	SSW2	15 Winter	100	+40%	30/15 Summer				99.166
S1.005	SSW3	60 Winter	100	+40%	1/30 Winter				99.108
S3.000	SDUMMY PermPav2	120 Winter	100	+40%					99.487
S3.001	SPermPav2	120 Winter	100	+40%					99.487
S1.006	SSWFC3	60 Winter	100	+40%	30/15 Summer				99.098

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	SFilterDrain	0.243	0.000	1.08		9	2.4	FLOOD RISK	
S1.001	SPump	0.225	0.000	0.89			2.0	SURCHARGED	
S1.002	SSW1	0.521	0.000	1.07			6.1	FLOOD RISK	
S2.000	SDUMMY Permpav1	0.000	0.000	0.03			0.1	SURCHARGED*	
S2.001	SPermPav1	0.003	0.000	0.01		21	0.3	SURCHARGED	
S1.003	SJunction	0.000	0.000	1.05			6.3	SURCHARGED*	
S1.004	SSW2	0.626	0.000	1.59			9.0	SURCHARGED	
S1.005	SSW3	0.658	0.000	2.58			8.8	SURCHARGED	
S3.000	SDUMMY PermPav2	-0.013	0.000	0.00			0.0	OK*	
S3.001	SPermPav2	-0.013	0.000	0.01		116	0.2	OK	
S1.006	SSWFC3	0.648	0.000	0.50		66	2.0	SURCHARGED	

Appendix K

London Borough of Camden SuDS Pro-Forma

Camden

GREATER**LONDON**AUTHORITY

LoDEG

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	12 Pilgrim's Lane
Address & post code	12 Pilgrim's Lane Camden London NW3 1SN
OS Grid ref. (Easting, Northing)	E 526850
	N 185679
LPA reference (if applicable)	
Brief description of proposed work	Extension and refurbishment works.
Total site Area	785 m^2
Total existing impervious area	m^2
Total proposed impervious area	358 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	150mm Combined Water Connection to TW Sewer Beneath Pilgrim's Lane
Designer Name	Ryan Burt-Allen
Designer Position	Civil Engineer
Designer Company	Elliott Wood Partnership Ltd.

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Refer to report.	
Bedrock geology classification	Refer to report.	
Site infiltration rate	N/A	m/s
Depth to groundwater level	N/A	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	N	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	TW Sewer Beneath Pilgrims Lane
Has the owner/regulator of the discharge location been consulted?	Yes

Camden

GREATER**LONDON**AUTHORITY

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	0.44			
1 in 1	0.38	2.8		1.7
1 in 30	1.02	7.1		2
1 in 100	1.41	9.1		2
1 in 100 + CC				2
Climate change allowance used		40%		

3b. Principal Method of Flow Control	Hydro-brake Vortez Flow Control

3c. Proposed SuDS Measures

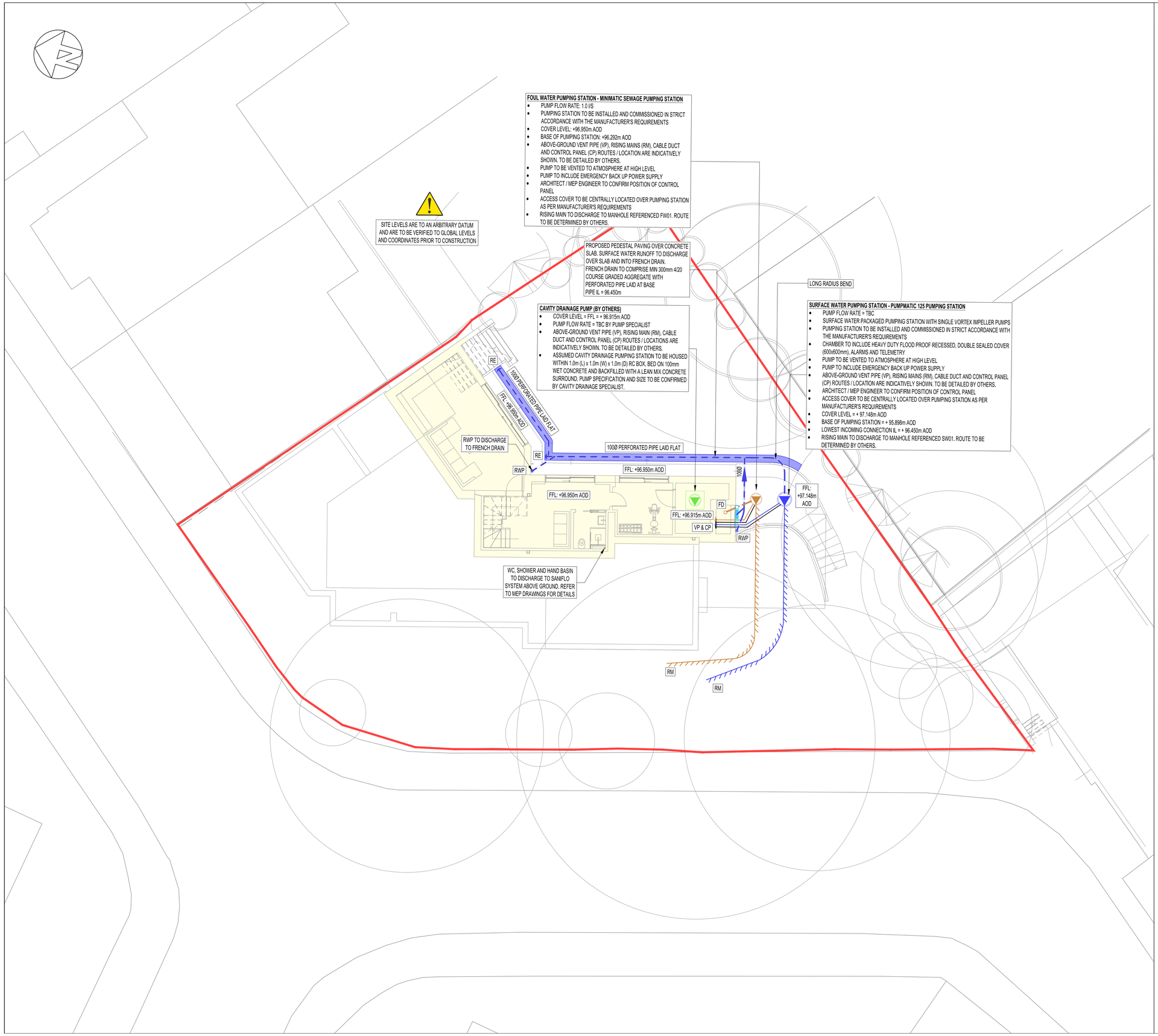
	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	358		13.6
Total	**358**	**0**	**13.6**

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Refer to report
Drainage hierarchy (2b)	Refer to report
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Refer to report
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Refer to report
Proposed SuDS measures & specifications (3b)	Refer to report
4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Refer to report
Detailed drainage design drawings, including exceedance flow routes	Refer to report
Detailed landscaping plans	Refer to report
Maintenance strategy	Refer to report
Demonstration of how the proposed SuDS measures improve:	Refer to report
a) water quality of the runoff?	Refer to report
b) biodiversity?	
c) amenity?	Refer to report

Appendix L

Proposed Below Ground Drainage Drawings & Details



BELOW GROUND DRAINAGE NOTES

1. THE LOCATION AND LEVEL OF EXISTING DRAINAGE CONNECTIONS AND EXISTING SERVICES IS TO BE CHECKED PRIOR TO COMMENCEMENT OF DRAINAGE WORKS. ANY VARIANCE TO THE DETAILS ON THIS DRAWING AND THE SCHEDULE IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
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5. PRIVATE FOUL AND SURFACE WATER DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS PART H, BS EN752 AND BS EN12056.
6. DRAINS AT BASEMENT LEVEL ARE TO BE CONSTRUCTED USING CAST IRON (ENSIGN OR EQUIVALENT) AND FLEXIBLY JOINTED TO BS 437.
7. DRAINS AT GROUND LEVEL ARE TO BE CONSTRUCTED USING VITRIFIED CLAY PIPES TO BS EN 295-1 SUPER STRENGTH SPECIFICATION (HEPWORTH SUPERSLEVE) OR SIMILAR APPROVED.
8. ALL SOIL CONNECTIONS UNDER BUILDINGS TO BE 100mm DIA LAID AT A MINIMUM GRADIENT OF 1/40 UNLESS NOTED OTHERWISE.
9. ALL SURFACE WATER CONNECTIONS TO BE 150mm DIAMETER AND TO BE LAID AT A MINIMUM GRADIENT OF 1/80 UNLESS NOTED OTHERWISE .
10. ALL SOIL CONNECTIONS AND RAINWATER PIPES SHOULD BE RODDABLE FROM GROUND LEVEL.
11. RAINWATER DOWN PIPES ARE TO CONNECT TO A DRAIN VIA A REST BEND. WHERE DRAINAGE IS COMBINED A 'P' TRAP MUST ALSO BE PROVIDED.
12. IN CASES OF IN SITU CONCRETE FLOOR SLABS, DRAINS ARE TO BE CAST INTEGRAL WITH THE SLAB WHERE PIPE COVER TO THE CROWN IS LESS THAN 300mm, - NOTE SPECIAL PROVISIONS APPLY TO BASEMENT FLOOR SLABS - SEE DETAILED DRAINAGE AND STRUCTURAL DRAWINGS. CONCRETE ENCASEMENT TO BE REINFORCED AS PER DRAINAGE DETAIL.
13. IN CASES OF SUSPENDED FLOORS WHERE A VOID OF 300mm OR MORE EXISTS BELOW FLOOR DRAINS ARE TO BE SUSPENDED USING A PROPRIETARY HANGER SYSTEM OR CAST INTEGRAL WITH THE FLOOR.
14. WHERE DRAINS PASS THROUGH FOUNDATIONS OR OTHER RIGID STRUCTURES A LINTEL OR SLEEVE IS TO BE USED AND PROVISION FOR FLEXIBILITY IS TO BE MADE USING ROCKER PIPES.
15. BACKFILLING OF DRAIN TRENCHES ADJACENT TO BUILDING OR OTHER STRUCTURES IS TO BE IN ACCORDANCE WITH DIAGRAM 8 OF THE BUILDING REGULATIONS.
16. ANY PIPE OR GULLY OR OTHER FITTING OR DUCT PENETRATING THE BASEMENT SLAB OR WALL IS TO BE WATERPROOFED USING HYDROPHILIC STRIPS OR PUDDLE FLANGES TO ENSURE A WATER TIGHT JOINT. CONCRETE SURROUND TO DRAINAGE PIPES AND FITTINGS MAY BE REQUIRED IN CERTAIN CASES - REFER TO DETAILED DRAINAGE DRAWINGS AND RELEVANT STRUCTURAL DETAILS.
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21. ALL MANHOLE COVER LEVELS SHOWN ARE APPROXIMATE AND ARE TO SUIT THE FINAL GROUND OR BUILDING LEVELS .
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23. ALL INTERNAL MANHOLE COVERS ARE TO BE NON-VENTILATING AND DOUBLE SEALED.
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27. INSPECTION CHAMBERS ARE TO HAVE A REDUCED ACCESS PIECE WHEN THE DEPTH IS GREATER THAN 1.2m TO THE BASE OF THE CHAMBER.

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

LEGEND

- PROPOSED SURFACE WATER PACKAGED PUMPING STATION
- PROPOSED SURFACE WATER RISING MAIN (RM)
- PROPOSED FOUL WATER PACKAGED PUMPING STATION
- PROPOSED FOUL WATER RISING MAIN (RM)
- PROPOSED FRENCH DRAIN
- PROPOSED BUILDING
- RWP RAIN WATER PIPE (RWP)
- PROPOSED LINEAR CHANNEL WITH HEELGUARD GRATING

rev	sc	date	by	chk	description
C3	S2	12.12.24	RBA	MTr	Construction Issue
C2	S2	17.10.24	RBA	KTr	Construction Issue
C1	S2	31.07.24	RBA	KTr	Construction Issue
T2	S2	06.02.24	HHu	KTr	Tender Issue
T1	S2	18.08.23	HHu	KTr	Tender Issue
P2	S2	07.10.22	MAs	HHu	Stage 4 Issue
P1	S2	03.10.22	MAs	HHu	Draft Stage 4 Issue

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Elliott Wood Partnership Ltd
Central London • Wimbledon • Nottingham
Consulting Structural and Civil Engineers
(020) 7499 5888 • elliottwood.co.uk

Project

12 Pilgrim's Lane
Hampstead Heath
London
NW3 1SN

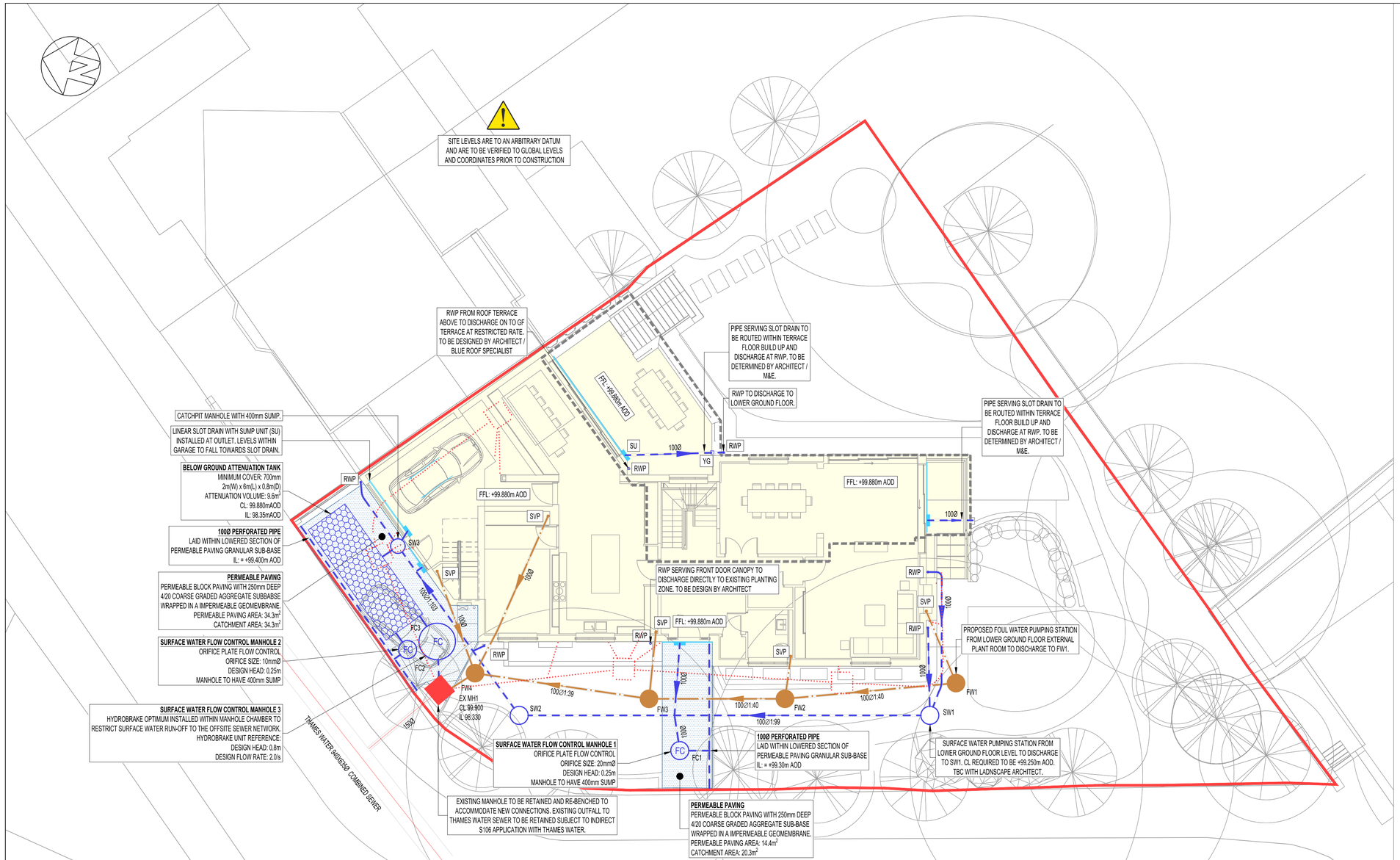
Drawing title

Proposed Below Ground Drainage General Arrangement - Lower Ground Floor Level

Scale (s)	Date	Drawn
1:100 @ A1 ; 1:200 @ A3	December 2024	RBA

Drawing status	Status	Revision
Construction Issue	S2	C3

Project no.	Originator	Zone	Level	Type	Role	drg no.
2210419	EWP	ZZ	LG	DR	C	0900



SW MANHOLE SCHEDULE

Manhole	Chamber Type	Cover Level (m)	Depth	Chamber Size	Clear Opening	Cover Grade	Notes
FC1	PPIC	CL = 99.800 SUMP LEVEL OF MANHOLE = 98.700 INV IN = 98.700 INV OUT = 98.700	1.100	450Ø	450x450	B125	ORIFICE PLATE FLOW CONTROL RECESSED COVER
FC2	PPIC	CL = 99.850 SUMP LEVEL OF MANHOLE = 99.000 INV IN = 99.000 INV OUT = 99.000	0.850	450Ø	450x450	D400	ORIFICE PLATE FLOW CONTROL RECESSED COVE 400mm DEEP SUMP
FC3	PCC	CL = 99.850 SUMP LEVEL OF MANHOLE = 98.350 INV IN = 98.350 INV OUT = 98.350	1.500	1200Ø	600x600	D400	HYDROBRAKE FLOW CONTROL RECESSED COVER
SW1	PPIC	CL = 99.250 SUMP LEVEL OF MANHOLE = 98.625 INV IN = 98.625 INV IN = 98.625 INV OUT = 98.625	0.625	450Ø	450x450	B125	RECESSED COVER
SW2	PPIC	CL = 99.850 SUMP LEVEL OF MANHOLE = 98.440 INV IN = 98.440 INV OUT = 98.440	1.410	450Ø	450x450	B125	REDUCED ACCESS PIECE REQUIRED
SW3	PPIC	CL = 99.800 SUMP LEVEL OF MANHOLE = 98.350 INV IN = 98.350 INV IN = 98.350 INV IN = 98.350 INV OUT = 98.350	1.450	450Ø	450x450	D400	300mm DEEP SUMP MANHOLE REDUCED ACCESS PIECE REQUIRED RECESSED COVER

FW MANHOLE SCHEDULE

Manhole	Chamber Type	Cover Level (m)	Depth	Chamber Size	Clear Opening	Cover Grade	Notes
FW1	PPIC	CL = 99.395 INV IN = 98.890 INV OUT = 98.890	0.695	450Ø	450x450	B125	RECESSED COVER
FW2	PPIC	CL = 99.680 INV IN = 98.700 INV IN = 98.700 INV OUT = 98.700	0.980	450Ø	450x450	B125	
FW3	PPIC	CL = 99.740 INV IN = 98.550 INV IN = 98.550 INV OUT = 98.550	1.190	450Ø	450x450	B125	
FW4	PPIC	CL = 99.870 INV IN = 98.350 INV IN = 98.350 INV IN = 98.350 INV OUT = 98.350	1.520	450Ø	450x450	B125	REDUCED ACCESS PIECE REQUIRED RECESSED COVER

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21. DETAILED DESIGN OF GEOCELLULAR ATTENUATION CRATES IS A CDP ITEM AND SHOULD BE BASED ON LEVEL, LAYOUT AND VOLUME DETAILS SHOWN. DETAILED DESIGN INFORMATION SHOULD BE PROVIDED TO THE CIVIL ENGINEER TO PASS COMMENT.
22. ALL MANHOLE COVER LEVELS SHOWN ARE APPROXIMATE AND ARE TO SUIT THE FINAL GROUND OR BUILDING LEVELS .
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LEGEND

- COMBINED WATER MANHOLE
- SURFACE WATER MANHOLE
- FOUL WATER MANHOLE
- EXISTING COMBINED WATER
- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- COMBINED WATER PIPE TO BE ABANDONED
- RWP RAIN WATER PIPE
- YG YARD GULLY
- GEOCELLULAR SURFACE WATER ATTENUATION (TO CONTRACTOR DESIGN)
- PERMEABLE SURFACING WITH 4/20 GRANULAR SUB-BASE LINED WITH IMPERMEABLE GEO-MEMBRANE
- PROPOSED BUILDING
- LOWER GROUND FLOOR EXTENT OUTLINE
- FC FLOW CONTROL CHAMBER
- SITE BOUNDARY
- SVP SOIL VENT PIPE

rev	sc	date	by	chk	description
C3	S2	12.12.24	RBA	MTr	Construction Issue
C2	S2	17.10.24	RBA	KTr	Construction Issue
C1	S2	31.07.24	RBA	KTr	Construction Issue
T2	S2	06.02.24	HHu	KTr	Tender Issue
T1	S2	18.08.23	HHu	KTr	Tender Issue
P2	S2	07.10.22	MAs	HHu	Stage 4 Issue
P1	S2	03.10.22	MAs	HHu	Draft Stage 4 Issue

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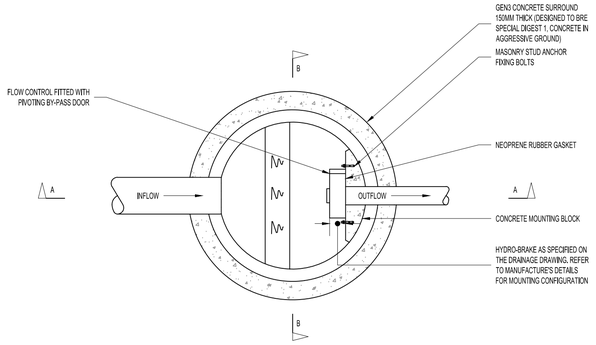
Project
12 Pilgrim's Lane
Hampstead Heath
London
NW3 1SN

Drawing title
Proposed Below Ground Drainage General Arrangement

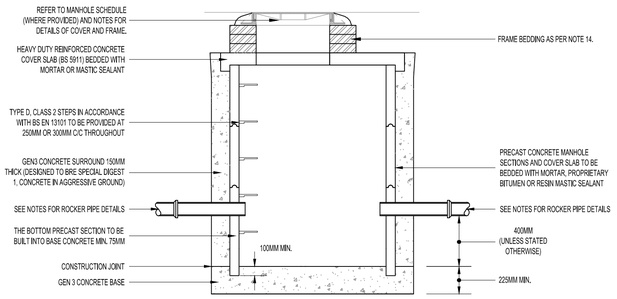
Scale (s)	Date	Drawn
1:100@ A1; 1:200@ A3	December 2024	RBA

Drawing status: Construction Issue — Status: S2 — Revision: C3

Project no.	Originator	Zone	Level	Type	Role	drg no.
2210419	EWP	ZZ	00	DR	C	1000



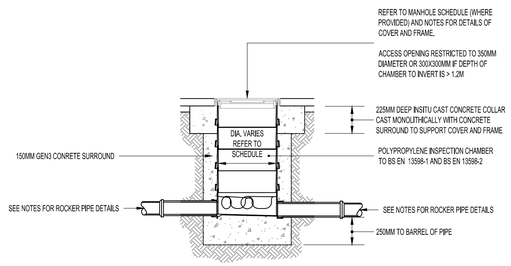
PLAN



SECTION

PRE-CAST CONCRETE CATCHPIT

SCALE: 1:25



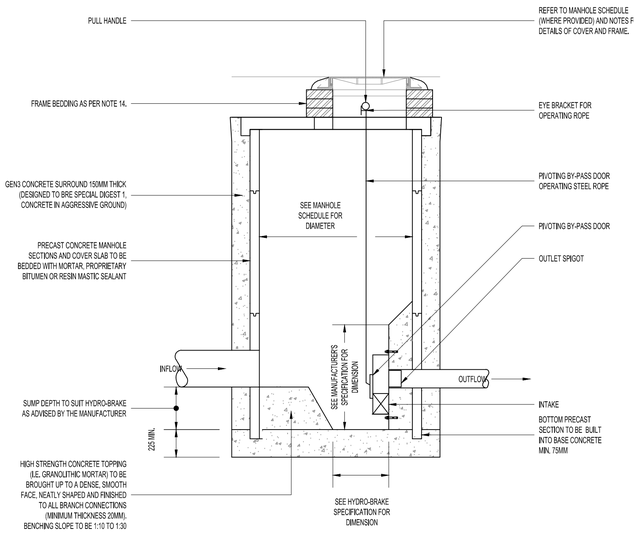
SECTION

POLYPROPYLENE INSPECTION CHAMBER

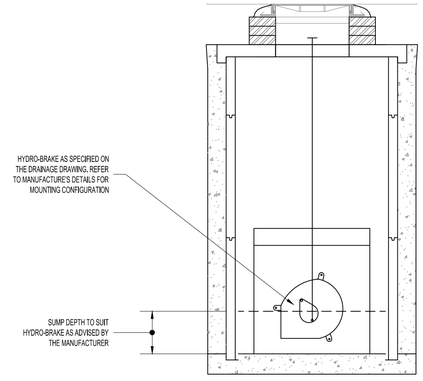
SCALE: 1:25

(DEPTH FROM COVER LEVEL TO INVERT OF PIPE 1.2M*)

* UP TO 3.0M IF A REDUCED ACCESS COLLAR IS USED



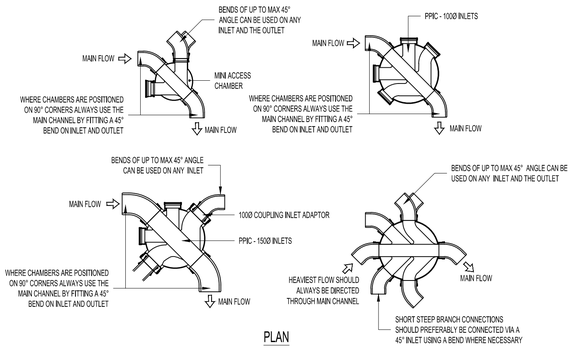
SECTION A-A



SECTION B-B

TYPICAL HYDRO-BRAKE FLOW CONTROL CHAMBER

SCALE: 1:25



PLAN

MINI ACCESS CHAMBER / PPIC TYPICAL INSTALLATION DETAILS

SCALE: 1:25

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

Notes:

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4. This drawing should be read in conjunction with all relevant Architect's, Engineer's and Services Engineer's specifications and drawings.
5. All drainage shall be constructed in accordance with the relevant provisions of current Building Regulations, BS EN 752, BS EN 12056 and Sewers for Adoption as appropriate.
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7. Details surrounding proprietary products and systems are indicative only. contractor to ensure all systems are installed strictly in accordance with the manufactures details.
8. All external manhole covers and frames located within vehicular areas are to be load class D400 and be 150mm deep unless stated otherwise.
9. All external manhole covers and frames located within pedestrian areas are to be load class B125 unless stated otherwise.
10. All external manhole covers and frames are to be installed square to the building, paving or highway channel lines.
11. All external manhole covers and frames shall comply with the relevant provisions of BS EN 124 and BS 7903 and shall be non-ventilated (single sealed) with closed keyways unless stated otherwise.
12. All internal manhole covers and frames are to be double sealed and recessed unless stated otherwise.
13. All manhole covers located on grease traps are to be double sealed.
14. Manhole cover frames shall be bedded on a gauged class 1 (3:1) sand/cement mortar to clause 2402 of SHW - mortar designation (i), and between 2 and 4 courses of engineering brickwork class 'b' to BS EN 771-1:2011 or precast concrete adjusting units - corbelling to be no more than 30mm per course.
15. Manholes < 3m deep shall be installed with type d class 1 steps, complying with the requirements of BS EN 13101:2002.
16. Manholes > 3m deep shall be installed with an appropriate fixed ladder complying with the requirements of BS EN 14396:2004.
17. Where rigid pipes are used, a flexible joint shall be provided as close as is feasible to the outside face of any structure into which a pipe is built, within 150mm for pipe diameters less than 300mm. The design of the joints shall be compatible with any subsequent movement. Rocker pipe lengths shall be in accordance with Table 1, unless stated otherwise.

Table 1	
Nominal Diameter (mm)	Effective Length (m)
150 - 600	0.6
600 - 750	1.0
over 750	1.25

18. Insitu concrete base and surround shall be class 'GEN3' in accordance with 'BRE Special Digest 1 - Concrete in Aggressive Ground' and the requirement of 'Sewers for Adoption'.

rev	sc	date	by	chk	description
C3	S2	12.12.24	RBA	MTr	Construction Issue
C2	S2	17.10.24	RBA	KTr	Construction Issue
C1	S2	02.08.24	RBA	KTr	Construction Issue
T1	S2	18.08.23	HHu	KTr	Tender Issue
P1	S2	29.09.22	MAs	HHu	Issued for information

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Project

12 Pilgrim's Lane
NW3 1SN

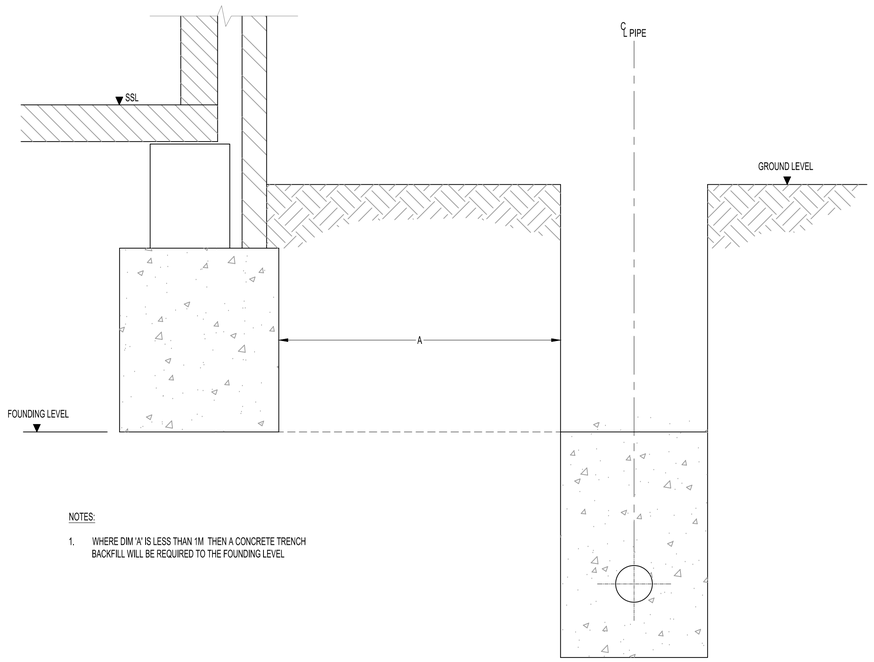
Drawing title

Typical Below Ground Drainage Details
(Sheet 1 of 3)

Scale (s)	Date	Drawn
AS NOTED	December 2024	RBA

Drawing status: Construction Issue — Status: S2 — Revision: C3

Project no.	Originator	Zone	Level	Type	Role	drg no.
2210419	EWP	ZZ	XX	DT	C	3000

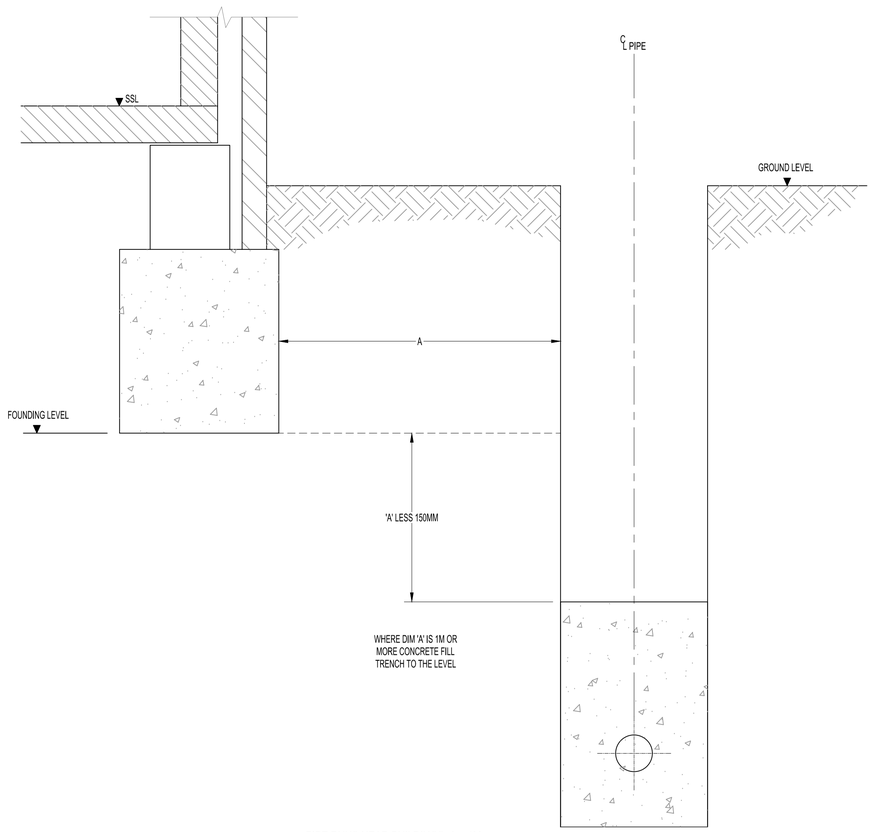


NOTES:

1. WHERE DIM 'A' IS LESS THAN 1M THEN A CONCRETE TRENCH BACKFILL WILL BE REQUIRED TO THE FOUNDING LEVEL

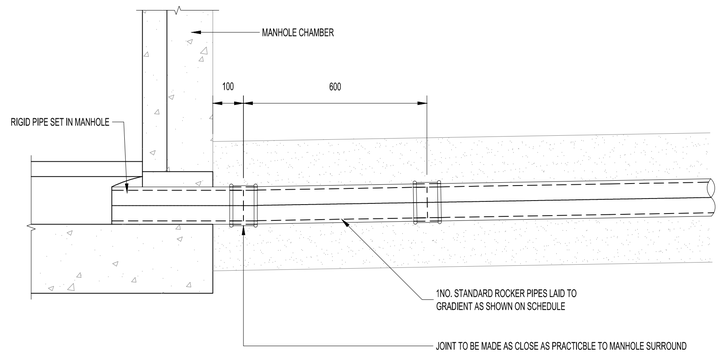
PIPE RUNS NEAR BUILDINGS: A < 1M

SCALE: 1:10



PIPE RUNS NEAR BUILDINGS: A > 1M

SCALE: 1:10

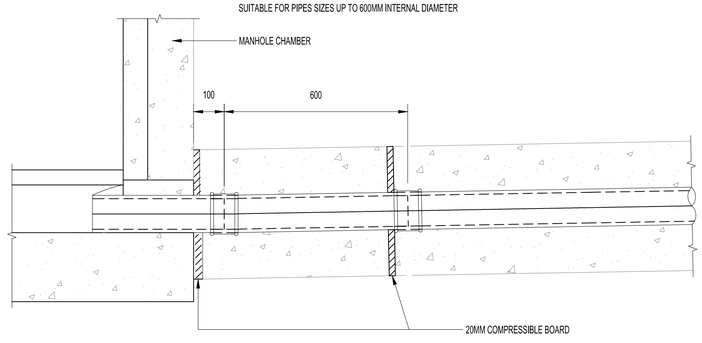


SECTION

TYPICAL ROCKER PIPE DETAIL

SCALE: 1:10

SUITABLE FOR PIPES SIZES UP TO 600MM INTERNAL DIAMETER

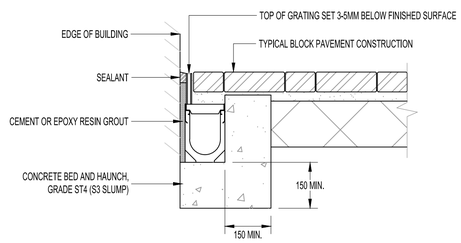


SECTION

TYPICAL ROCKER PIPE DETAIL IN CONCRETE SURROUND

SCALE: 1:10

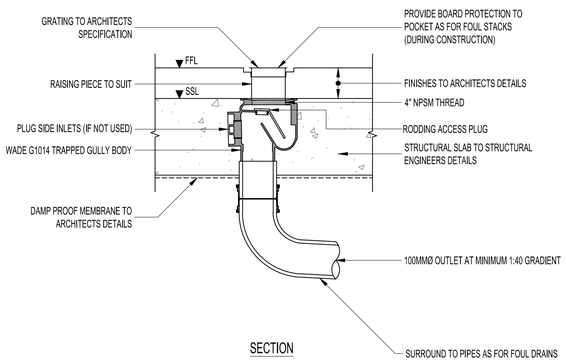
SUITABLE FOR PIPES SIZES UP TO 600MM INTERNAL DIAMETER



SECTION

TYPICAL ACO M100D LINEAR CHANNEL DRAIN WITH BRICKSLOT GRATING ADJACENT TO BUILDING

SCALE: 1:10



SECTION

TYPICAL WADE 1014 TRAPPED VERTICAL OUTLET FLOOR GULLY

SCALE: 1:10

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

Do not scale from this drawing.

Notes:

1. All dimensions are in millimeters unless stated otherwise.
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3. This drawing should be read in conjunction with the below ground drainage drawing(s) and manhole schedule(s).
4. This drawing should be read in conjunction with all relevant Architect's, Engineer's and Services Engineer's specifications and drawings.
5. All drainage shall be constructed in accordance with the relevant provisions of current Building Regulations, BS EN 752, BS EN 12056 and Sewers for Adoption as appropriate.
6. Pre-cast concrete products shall comply with the relevant provisions of BS 5911: Part 2, 200 & 230.
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10. All external manhole covers and frames are to be installed square to the building, paving or highway channel lines.
11. All external manhole covers and frames shall comply with the relevant provisions of BS EN 124 and BS 7903 and shall be non-ventilated (single sealed) with closed keyways unless stated otherwise.
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13. All manhole covers located on grease traps are to be double sealed.
14. Manhole cover frames shall be bedded on a gauged class 1 (3:1) sand/cement mortar to clause 2402 of SHW - mortar designation (i), and between 2 and 4 courses of engineering brickwork class 'b' to BS EN 771-1:2011 or precast concrete adjusting units - corbelling to be no more than 30mm per course.
15. Manholes < 3m deep shall be installed with type d class 1 steps, complying with the requirements of BS EN 13101:2002.
16. Manholes > 3m deep shall be installed with an appropriate fixed ladder complying with the requirements of BS EN 14396:2004.
17. Where rigid pipes are used, a flexible joint shall be provided as close as is feasible to the outside face of any structure into which a pipe is built, within 150mm for pipe diameters less than 300mm. The design of the joints shall be compatible with any subsequent movement. Rocker pipe lengths shall be in accordance with Table 1, unless stated otherwise.

Table 1	
Nominal Diameter (mm)	Effective Length (m)
150 - 600	0.6
600 - 750	1.0
over 750	1.25

18. Insitu concrete base and surround shall be class 'GEN3' in accordance with 'BRE Special Digest 1 - Concrete in Aggressive Ground' and the requirement of 'Sewers for Adoption'.

C3	S2	12.12.24	RBA	MTr	Construction Issue
C2	S2	17.10.24	RBA	KTr	Construction Issue
C1	S2	02.08.24	RBA	KTr	Construction Issue
T1	S2	18.08.23	HHu	KTr	Tender Issue
P1	S2	29.09.22	MAs	HHu	Issued for information
rev	sc	date	by	chk	description

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Project

12 Pilgrim's Lane

NW3 1SE

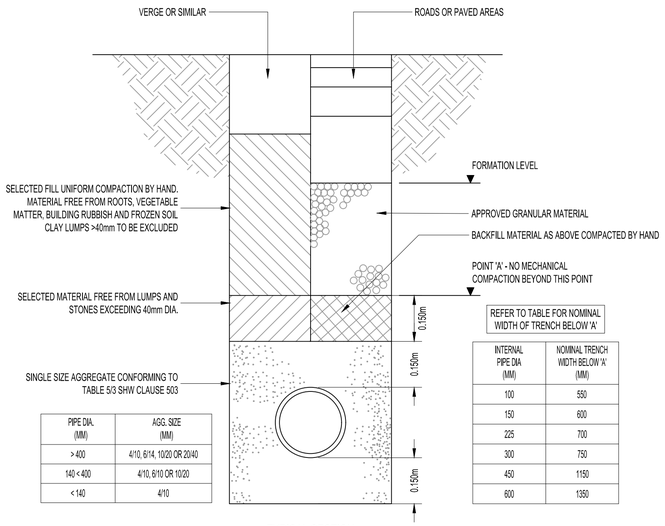
Drawing title

Typical Below Ground Drainage Details
(Sheet 2 of 3)

Scale (s)	Date	Drawn
AS NOTED	December 2024	RBA

Drawing status	Status	Revision
Construction Issue	S2	C3

Project no.	Originator	Zone	Level	Type	Role	drg no.
2210419	EWP	ZZ	XX	DT	C	3001



PIPE DIA. (MM)	AGG. SIZE (MM)
> 400	4/10, 6/14, 10/20 OR 20/40
140 < 400	4/10, 6/10 OR 10/20
< 140	4/10

REFER TO TABLE FOR NOMINAL WIDTH OF TRENCH BELOW 'A'

INTERNAL PIPE DIA (MM)	NOMINAL TRENCH WIDTH BELOW 'A' (MM)
100	550
150	600
225	700
300	750
450	1150
600	1350

TYPICAL SECTION

PIPE BEDDING AND SURROUND - EXTERNAL

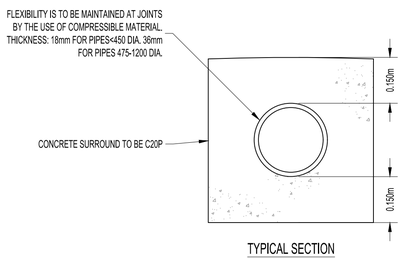
GRANULAR BEDDING - TYPE S

SCALE: 1:10

NOTES:

1. PIPEWORK TO BE LAID IN TYPE S GENERALLY BUT ARE TO BE LAID IN TYPE Z WHERE COVER IS LESS THAN:

   600mm UNDER SOFT LANDSCAPED AREAS
   900mm UNDER NON TRAFFICKED AREAS I.E. FOOTPATHS
   1200mm UNDER ROADS



TYPICAL SECTION

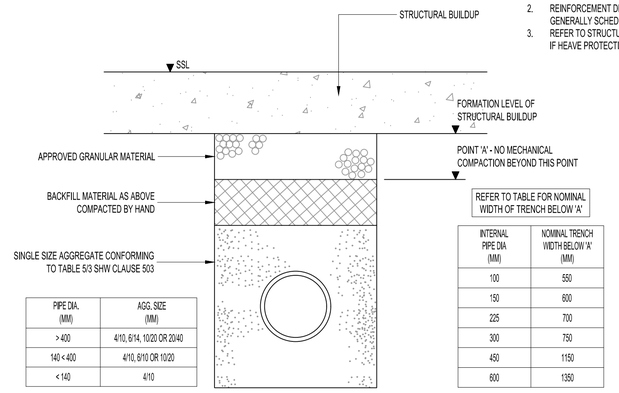
PIPE BEDDING AND SURROUND - EXTERNAL

CONCRETE SURROUND - TYPE Z

SCALE: 1:10

NOTES:

1. PIPEWORK TO BE LAID IN TYPE W GENERALLY BUT ARE TO BE LAID IN TYPE Y WHERE COVER IS LESS THAN 300mm TO THE PIPE SOFFIT
2. REINFORCEMENT DETAILED IN TYPE Y IS NOT GENERALLY SCHEDULED
3. REFER TO STRUCTURAL ENGINEERS DETAILS IF HEAVE PROTECTION IS REQUIRED.



PIPE DIA. (MM)	AGG. SIZE (MM)
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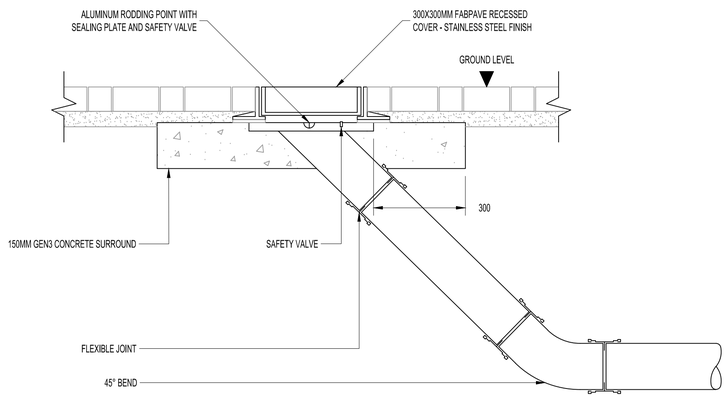
100	550
150	600
225	700
300	750
450	1150
600	1350

TYPICAL SECTION

PIPE BEDDING AND SURROUND - UNDER BUILDINGS

GRANULAR BEDDING - TYPE W

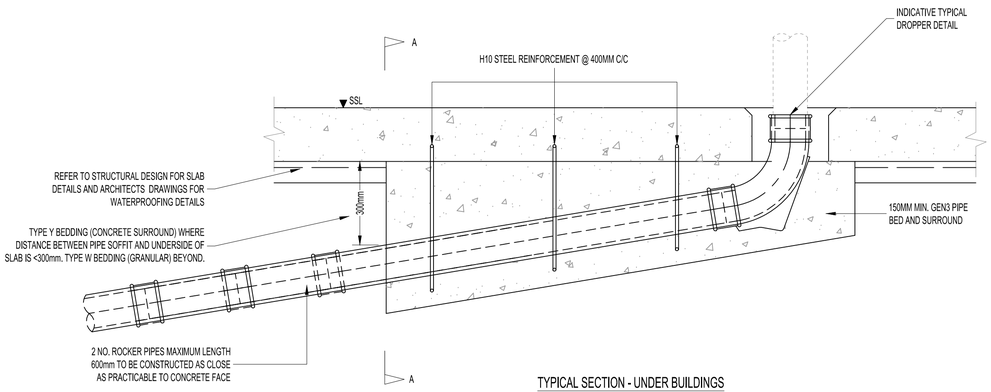
SCALE: 1:10



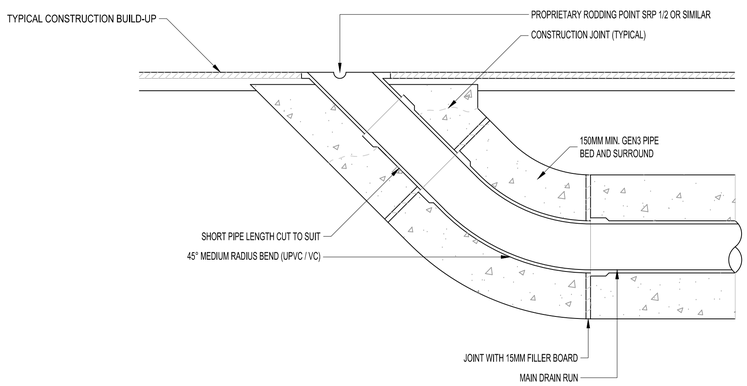
SECTION

TYPICAL RECESSED RODDING EYE

SCALE: 1:10



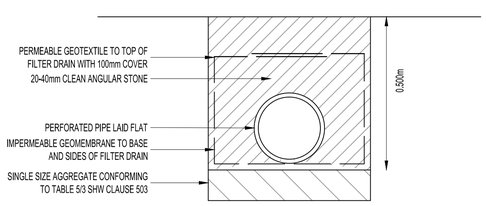
TYPICAL SECTION - UNDER BUILDINGS
WHERE TOP OF PIPE IS LESS THAN 300mm FROM UNDERSIDE OF STRUCTURAL SLAB



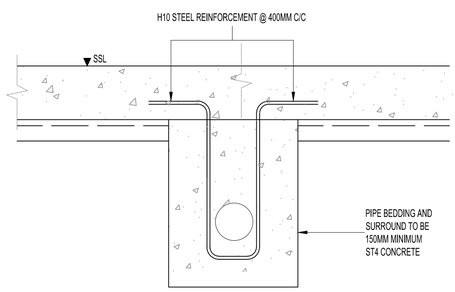
SECTION

TYPICAL RODDING EYE

SCALE: 1:10



FRENCH DRAIN DETAIL
SCALE: 1:10



SECTION A - A

CONCRETE SURROUND- TYPE Y - UNDER BUILDINGS

WHERE TOP OF PIPE IS LESS THAN 300mm FROM UNDERSIDE OF

STRUCTURAL SLAB.

SCALE: 1:10

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C3	S2	12.12.24	RBA	MTr	Construction Issue
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Project
12 Pilgrim's Lane
NW3 1SE

Drawing title
Typical Below Ground Drainage Details
(Sheet 3 of 3)

Scale (s)	Date	Drawn
AS NOTED	December 2024	RBA

Drawing status: Construction Issue — Status S2 — Revision C3

Project no.	Originator	Zone	Level	Type	Role	drg no.
2210419	EWP	ZZ	XX	DT	C	3002

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