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9 Joyce Way Whitchurch Shropshire SY13 1TZ	1 in 100 + 35% cc Sim Penley Phase 2	
Date 03/06/2021 File 1 in 100 + 35% cc Sim.MDX	Designed by KG Checked by	
Micro Drainage		Network 2018.1.1

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	7.473	0.094	79.5	0.032	5.00	0.600	o	150	Pipe/Conduit
2.000	8.978	0.127	70.7	0.069	5.00	0.600	o	150	Pipe/Conduit
3.000	9.452	0.296	31.9	0.045	5.00	0.600	o	150	Pipe/Conduit
1.001	13.449	0.247	54.4	0.000	0.00	0.600	o	150	Pipe/Conduit
1.002	6.330	0.042	150.7	0.000	0.00	0.600	o	150	Pipe/Conduit
1.003	47.000	0.118	398.3	0.177	0.00	0.600	[]	-79	Pipe/Conduit
1.004	11.785	0.045	261.9	0.000	0.00	0.600	o	150	Pipe/Conduit
1.005	13.919	0.053	262.6	0.000	0.00	0.600	o	150	Pipe/Conduit
1.006	5.193	0.019	273.3	0.000	0.00	0.600	o	150	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	1	66.220	64.268	1.802	64.856	64.174	0.532		1200
2.000	2	65.406	64.301	0.955	64.856	64.174	0.532		1200
3.000	3	65.933	64.470	1.313	64.856	64.174	0.532		1200
1.001	4	64.856	64.124	0.582	65.750	63.877	1.723		1200
1.002	5	65.750	63.877	1.723	64.750	63.835	0.765	Hydro-Brake®	1800
1.003	6	64.750	63.585	0.765	64.650	63.467	0.783		3000
1.004	7	64.650	63.467	1.033	64.650	63.422	1.078	Hydro-Brake®	3000
1.005	8	64.650	63.422	1.078	64.650	63.369	1.131		1200
1.006	9	64.650	63.369	1.131	64.650	63.350	1.150		1200

Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \ / open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m²)
-79	[]	4500	400	90.0		0.735	1.800

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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	66.220	64.268	1.802	Open Manhole	1200
2.000	o	150	2	65.406	64.301	0.955	Open Manhole	1200
3.000	o	150	3	65.933	64.470	1.313	Open Manhole	1200
1.001	o	150	4	64.856	64.124	0.582	Open Manhole	1200
1.002	o	150	5	65.750	63.877	1.723	Open Manhole	1800
1.003	[]	-79	6	64.750	63.585	0.765	Open Manhole	3000
1.004	o	150	7	64.650	63.467	1.033	Open Manhole	3000
1.005	o	150	8	64.650	63.422	1.078	Open Manhole	1200
1.006	o	150	9	64.650	63.369	1.131	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	7.473	79.5	4	64.856	64.174	0.532	Open Manhole	1200
2.000	8.978	70.7	4	64.856	64.174	0.532	Open Manhole	1200
3.000	9.452	31.9	4	64.856	64.174	0.532	Open Manhole	1200
1.001	13.449	54.4	5	65.750	63.877	1.723	Open Manhole	1800
1.002	6.330	150.7	6	64.750	63.835	0.765	Open Manhole	3000
1.003	47.000	398.3	7	64.650	63.467	0.783	Open Manhole	3000
1.004	11.785	261.9	8	64.650	63.422	1.078	Open Manhole	1200
1.005	13.919	262.6	9	64.650	63.369	1.131	Open Manhole	1200
1.006	5.193	273.3		64.650	63.350	1.150	Open Manhole	0

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)
1.006		64.650	63.350	0.000	0	0

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Micro Drainage Network 2018.1.1		
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 0.000 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 1 Number of Online Controls 2 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> 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) 18.000 Storm Duration (mins) 30 Ratio R 0.400		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.002, Volume (m³): 5.0

Unit Reference	MD-SHE-0081-3200-1280-3200
Design Head (m)	1.280
Design Flow (l/s)	3.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	81
Invert Level (m)	63.877
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.280	3.2
Flush-Flo™	0.352	3.1
Kick-Flo®	0.720	2.5
Mean Flow over Head Range	-	2.7

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)
0.100	2.4	1.200	3.1	3.000	4.7	7.000	7.1
0.200	2.9	1.400	3.3	3.500	5.1	7.500	7.3
0.300	3.0	1.600	3.5	4.000	5.4	8.000	7.5
0.400	3.1	1.800	3.7	4.500	5.7	8.500	7.7
0.500	3.0	2.000	3.9	5.000	6.0	9.000	8.0
0.600	2.9	2.200	4.1	5.500	6.3	9.500	8.2
0.800	2.6	2.400	4.3	6.000	6.6		
1.000	2.9	2.600	4.4	6.500	6.8		

Hydro-Brake® Optimum Manhole: 7, DS/PN: 1.004, Volume (m³): 87.6

Unit Reference	MD-SHE-0111-5000-0600-5000
Design Head (m)	0.600
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	111
Invert Level (m)	63.467
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Storage Structures for Storm

Tank or Pond Manhole: 4, DS/PN: 1.001

Invert Level (m) 64.124

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	59.5	0.700	295.1	1.400	0.0	2.100	0.0
0.100	84.6	0.800	340.2	1.500	0.0	2.200	0.0
0.200	112.6	0.900	388.1	1.600	0.0	2.300	0.0
0.300	143.4	1.000	438.9	1.700	0.0	2.400	0.0
0.400	177.1	1.100	550.0	1.800	0.0	2.500	0.0
0.500	213.5	1.200	0.0	1.900	0.0		
0.600	252.9	1.300	0.0	2.000	0.0		

Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m ³)	Pipe Volume (m ³)	Storage Structure Volume (m ³)	Total Volume (m ³)
1.000	1	2.208	0.132	0.000	2.340
2.000	2	1.250	0.159	0.000	1.408
3.000	3	1.655	0.167	0.000	1.822
1.001	4	0.828	0.238	293.051	294.117
1.002	5	4.766	0.112	0.000	4.878
1.003	6	8.235	84.600	0.000	92.835
1.004	7	8.362	0.208	0.000	8.570
1.005	8	1.389	0.246	0.000	1.635
1.006	9	1.449	0.092	0.000	1.541
Total		30.141	85.953	293.051	409.145

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m ³)	Pipe Volume (m ³)	Storage Structure Volume (m ³)	Total Volume (m ³)
1.000	1	2.208	0.111	0.000	2.319
2.000	2	1.250	0.137	0.000	1.387
3.000	3	1.655	0.146	0.000	1.800
1.001	4	0.828	0.211	293.051	294.090
1.002	5	4.766	0.069	0.000	4.836
1.003	6	8.235	79.200	0.000	87.435
1.004	7	8.362	0.171	0.000	8.533
1.005	8	1.389	0.225	0.000	1.614
1.006	9	1.449	0.081	0.000	1.530

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Volume Summary (Static)

Pipe	USMH	Manhole	Pipe	Storage	Total
Number	Name	Volume (m ³)	Volume (m ³)	Structure Volume (m ³)	Volume (m ³)
Total		30.141	80.352	293.051	403.544

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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 * 10m ³ /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
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	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	35, 35, 35

Water Level											
PN	US/MH		Storm	Return Period	Climate Change	First (X)		First (Y)	First (Z)	Overflow Act.	Water Level (m)
	Name					Surchage	Flood	Overflow			
1.000	1	120	Winter	100	+35%	30/30	Winter				64.555
2.000	2	15	Winter	100	+35%	30/15	Summer				64.815
3.000	3	15	Winter	100	+35%						64.578
1.001	4	120	Winter	100	+35%	30/15	Summer				64.553
1.002	5	120	Winter	100	+35%	1/15	Summer				64.541
1.003	6	240	Winter	100	+35%	100/240	Winter				64.054
1.004	7	240	Winter	100	+35%	1/60	Summer				64.054
1.005	8	180	Summer	100	+35%						63.497
1.006	9	1440	Winter	100	+35%						63.449

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Flow (l/s)		
1.000	1	0.137	0.000	0.31		5.3	SURCHARGED	
2.000	2	0.364	0.000	1.93		35.9	SURCHARGED	
3.000	3	-0.042	0.000	0.86		24.0	OK	
1.001	4	0.279	0.000	0.19		4.1	SURCHARGED	
1.002	5	0.514	0.000	0.25		3.0	SURCHARGED	
1.003	6	0.069	0.000	0.01		20.7	SURCHARGED	

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

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Overflow Cap.	Flow (l/s)		
1.004	7	0.437	0.000	0.50	5.0	SURCHARGED	
1.005	8	-0.075	0.000	0.50	5.0	OK	
1.006	9	-0.070	0.000	0.56	5.0	OK	