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Land at Yatton
Catchment E @ 2.0 l/s/ha
No Surcharge



Date 15/03/2023 19:23
File CATCHMENT E_V4.MDX

Designed by RJH
Checked by

Innovyze

Network 2018.1

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
1.000	36.500	0.152	240.1	0.086	4.00	0.0	0.600	o	300	Pipe/Conduit
2.000	22.000	0.092	239.1	0.040	5.00	0.0	0.600	o	300	Pipe/Conduit
1.001	28.000	0.070	400.0	0.058	0.00	0.0	0.600	o	450	Pipe/Conduit
1.002	25.400	0.063	403.2	0.055	0.00	0.0	0.600	o	450	Pipe/Conduit
3.000	31.800	0.132	240.9	0.066	4.00	0.0	0.600	o	300	Pipe/Conduit
3.001	10.100	0.042	240.5	0.022	0.00	0.0	0.600	o	300	Pipe/Conduit
1.003	36.600	0.091	402.2	0.076	0.00	0.0	0.600	o	450	Pipe/Conduit
1.004	28.500	0.072	395.8	0.059	0.00	0.0	0.600	o	450	Pipe/Conduit
4.000	42.100	0.176	239.2	0.059	4.00	0.0	0.600	o	300	Pipe/Conduit
5.000	29.200	0.113	258.4	0.060	4.00	0.0	0.600	o	300	Pipe/Conduit
4.001	28.200	0.070	402.9	0.056	0.00	0.0	0.600	o	450	Pipe/Conduit
4.002	27.100	0.068	398.5	0.056	0.00	0.0	0.600	o	450	Pipe/Conduit
6.000	28.200	0.117	241.0	0.058	4.00	0.0	0.600	o	300	Pipe/Conduit
6.001	13.800	0.062	222.6	0.029	0.00	0.0	0.600	o	300	Pipe/Conduit
4.003	23.300	0.058	401.7	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit
4.004	37.200	0.093	400.0	0.077	0.00	0.0	0.600	o	450	Pipe/Conduit
4.005	18.600	0.046	404.3	0.039	0.00	0.0	0.600	o	450	Pipe/Conduit
7.000	25.900	0.108	239.8	0.034	5.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	6.611	0.086	0.0	1.01	71.4
2.000	6.551	0.040	0.0	1.01	71.6
1.001	6.309	0.184	0.0	1.01	160.7
1.002	6.239	0.239	0.0	1.01	160.0
3.000	6.500	0.066	0.0	1.01	71.3
3.001	6.368	0.088	0.0	1.01	71.4
1.003	6.176	0.403	0.0	1.01	160.2
1.004	6.085	0.462	0.0	1.02	161.5
4.000	6.635	0.059	0.0	1.01	71.5
5.000	6.572	0.060	0.0	0.97	68.8
4.001	6.309	0.175	0.0	1.01	160.1
4.002	6.239	0.231	0.0	1.01	161.0
6.000	6.500	0.058	0.0	1.01	71.3
6.001	6.383	0.087	0.0	1.05	74.2
4.003	6.171	0.367	0.0	1.01	160.3
4.004	6.113	0.444	0.0	1.01	160.7
4.005	6.020	0.483	0.0	1.00	159.8
7.000	6.225	0.034	0.0	1.01	71.5

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7.001	13.900	0.058	239.7	0.029	0.00	0.0	0.600	o	300	Pipe/Conduit
7.002	20.500	0.085	241.2	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit
1.005	12.500	0.031	403.2	0.000	4.00	0.0	0.600	o	450	Pipe/Conduit
1.006	18.500	1.219	15.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
7.001	6.117	0.063	0.0	1.01	71.5
7.002	6.059	0.132	0.0	1.01	71.3
1.005	5.500	1.077	0.0	1.01	160.0
1.006	5.469	1.077	0.0	5.24	833.3

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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	300	S1	8.200	6.611	1.289	Open Manhole	1200
2.000	o	300	S2/1	8.200	6.551	1.349	Open Manhole	1200
1.001	o	450	S2	7.450	6.309	0.691	Open Manhole	1200
1.002	o	450	S3	8.200	6.239	1.511	Open Manhole	1200
3.000	o	300	S4/2	8.150	6.500	1.350	Open Manhole	1200
3.001	o	300	S4/1	8.450	6.368	1.782	Open Manhole	1200
1.003	o	450	S4	8.400	6.176	1.774	Open Manhole	1200
1.004	o	450	S5	8.100	6.085	1.565	Open Manhole	1200
4.000	o	300	S5	8.100	6.635	1.165	Open Manhole	1200
5.000	o	300	S6/1	8.100	6.572	1.228	Open Manhole	1200
4.001	o	450	S6	8.000	6.309	1.241	Open Manhole	1200
4.002	o	450	S7	8.200	6.239	1.511	Open Manhole	1200
6.000	o	300	S8/1	8.100	6.500	1.300	Open Manhole	1200
6.001	o	300	S8/2	8.400	6.383	1.717	Open Manhole	1200
4.003	o	450	S8	8.450	6.171	1.829	Open Manhole	1200
4.004	o	450	S9	8.220	6.113	1.657	Open Manhole	1200
4.005	o	450	S10	7.900	6.020	1.430	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	36.500	240.1	S2	7.450	6.459	0.691	Open Manhole	1200
2.000	22.000	239.1	S2	7.450	6.459	0.691	Open Manhole	1200
1.001	28.000	400.0	S3	8.200	6.239	1.511	Open Manhole	1200
1.002	25.400	403.2	S4	8.400	6.176	1.774	Open Manhole	1200
3.000	31.800	240.9	S4/1	8.450	6.368	1.782	Open Manhole	1200
3.001	10.100	240.5	S4	8.400	6.326	1.774	Open Manhole	1200
1.003	36.600	402.2	S5	8.100	6.085	1.565	Open Manhole	1200
1.004	28.500	395.8	S11	8.000	6.013	1.537	Open Manhole	1200
4.000	42.100	239.2	S6	8.000	6.459	1.241	Open Manhole	1200
5.000	29.200	258.4	S6	8.000	6.459	1.241	Open Manhole	1200
4.001	28.200	402.9	S7	8.200	6.239	1.511	Open Manhole	1200
4.002	27.100	398.5	S8	8.450	6.171	1.829	Open Manhole	1200
6.000	28.200	241.0	S8/2	8.400	6.383	1.717	Open Manhole	1200
6.001	13.800	222.6	S8	8.450	6.321	1.829	Open Manhole	1200
4.003	23.300	401.7	S9	8.220	6.113	1.657	Open Manhole	1200
4.004	37.200	400.0	S10	7.900	6.020	1.430	Open Manhole	1200
4.005	18.600	404.3	S11	8.000	5.974	1.576	Open Manhole	1200

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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)
7.000	o	300	S11/1	8.100	6.225	1.575	Open Manhole	1200
7.001	o	300	S11/2	8.100	6.117	1.683	Open Manhole	1200
7.002	o	300	s11/3	8.100	6.059	1.741	Open Manhole	1200
1.005	o	450	S11	8.000	5.500	2.050	Open Manhole	1200
1.006	o	450	S12	8.000	5.469	2.081	Open Manhole	2100

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)
7.000	25.900	239.8	S11/2	8.100	6.117	1.683	Open Manhole	1200
7.001	13.900	239.7	s11/3	8.100	6.059	1.741	Open Manhole	1200
7.002	20.500	241.2	S11	8.000	5.974	1.726	Open Manhole	1200
1.005	12.500	403.2	S12	8.000	5.469	2.081	Open Manhole	2100
1.006	18.500	15.2		5.000	4.250	0.300	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH D1 (1km)	0.362	Summer Storms	Yes
Return Period (years)	100 D2 (1km)	0.381	Winter Storms	No
FEH Rainfall Version	1999 D3 (1km)	0.330	Cv (Summer)	0.750
Site Location	E (1km)	0.295	Cv (Winter)	0.840
	C (1km)	-0.028	F (1km)	2.426
			Storm Duration (mins)	30

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S12, DS/PN: 1.006, Volume (m³): 10.5

Unit Reference MD-SHE-0061-2000-1500-2000
 Design Head (m) 1.500
 Design Flow (l/s) 2.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 61
 Invert Level (m) 5.469
 Minimum Outlet Pipe Diameter (mm) 75
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	2.0	Kick-Flo®	0.545	1.3
Flush-Flo™	0.269	1.6	Mean Flow over Head Range	-	1.5

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	1.3	0.800	1.5	2.000	2.3	4.000	3.1	7.000	4.1
0.200	1.5	1.000	1.7	2.200	2.4	4.500	3.3	7.500	4.2
0.300	1.6	1.200	1.8	2.400	2.5	5.000	3.5	8.000	4.3
0.400	1.5	1.400	1.9	2.600	2.6	5.500	3.6	8.500	4.5
0.500	1.4	1.600	2.1	3.000	2.7	6.000	3.8	9.000	4.6
0.600	1.3	1.800	2.2	3.500	3.0	6.500	3.9	9.500	4.7

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Storage Structures for Storm

Tank or Pond Manhole: S11, DS/PN: 1.005

Invert Level (m) 5.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	292.0	1.200	987.0	2.400	1681.0	3.600	1681.0	4.800	1681.0
0.200	397.0	1.400	1118.0	2.600	1681.0	3.800	1681.0	5.000	1681.0
0.400	507.0	1.600	1252.0	2.800	1681.0	4.000	1681.0		
0.600	621.0	1.800	1391.0	3.000	1681.0	4.200	1681.0		
0.800	739.0	2.000	1533.0	3.200	1681.0	4.400	1681.0		
1.000	861.0	2.200	1681.0	3.400	1681.0	4.600	1681.0		

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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 * 10m³/ha Storage 0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D1 (1km) 0.362 F (1km) 2.426
FEH Rainfall Version 1999 D2 (1km) 0.381 Cv (Summer) 0.750
Site Location D3 (1km) 0.330 Cv (Winter) 0.840
C (1km) -0.028 E (1km) 0.295

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
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	S1	15 Winter	100	+40%	100/15 Summer				7.561	0.650
2.000	S2/1	15 Winter	100	+40%	100/15 Summer				7.503	0.652
1.001	S2	15 Winter	100	+40%	100/15 Summer				7.420	0.661
1.002	S3	15 Winter	100	+40%	100/15 Summer				7.351	0.662
3.000	S4/2	15 Winter	100	+40%	100/15 Summer				7.406	0.606
3.001	S4/1	15 Winter	100	+40%	100/15 Summer				7.319	0.651
1.003	S4	15 Winter	100	+40%	100/15 Summer				7.245	0.619
1.004	S5	2880 Winter	100	+40%	100/15 Summer				7.022	0.487
4.000	S5	15 Winter	100	+40%	100/15 Summer				7.642	0.707
5.000	S6/1	15 Winter	100	+40%	100/15 Summer				7.636	0.764
4.001	S6	15 Winter	100	+40%	100/15 Summer				7.557	0.798
4.002	S7	15 Winter	100	+40%	100/15 Summer				7.499	0.810
6.000	S8/1	15 Winter	100	+40%	100/15 Summer				7.566	0.766
6.001	S8/2	15 Winter	100	+40%	100/15 Summer				7.483	0.800
4.003	S8	15 Winter	100	+40%	100/15 Summer				7.401	0.780
4.004	S9	15 Winter	100	+40%	100/15 Summer				7.183	0.620
4.005	S10	2880 Winter	100	+40%	30/15 Winter				7.022	0.552
7.000	S11/1	2880 Winter	100	+40%	100/15 Summer				7.022	0.497
7.001	S11/2	2880 Winter	100	+40%	30/1440 Winter				7.022	0.605
7.002	s11/3	2880 Winter	100	+40%	30/720 Winter				7.022	0.663
1.005	S11	2880 Winter	100	+40%	1/600 Winter				7.022	1.072
1.006	S12	2880 Winter	100	+40%	1/480 Winter				7.041	1.122

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	1.00		65.8	SURCHARGED	
2.000	S2/1	0.000	0.47		29.6	SURCHARGED	

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

PN	US/MH Name	Flooded		Overflow (l/s)	Pipe	Status	Level Exceeded
		Volume (m ³)	Flow / Cap.		Flow (l/s)		
1.001	S2	0.000	0.99		135.7	FLOOD RISK	
1.002	S3	0.000	1.28		172.0	SURCHARGED	
3.000	S4/2	0.000	0.77		50.2	SURCHARGED	
3.001	S4/1	0.000	1.17		65.4	SURCHARGED	
1.003	S4	0.000	2.00		282.6	SURCHARGED	
1.004	S5	0.000	0.06		8.8	SURCHARGED	
4.000	S5	0.000	0.64		42.8	SURCHARGED	
5.000	S6/1	0.000	0.71		44.1	SURCHARGED	
4.001	S6	0.000	0.92		125.8	SURCHARGED	
4.002	S7	0.000	1.18		161.8	SURCHARGED	
6.000	S8/1	0.000	0.66		42.3	SURCHARGED	
6.001	S8/2	0.000	1.00		61.2	SURCHARGED	
4.003	S8	0.000	1.89		251.2	SURCHARGED	
4.004	S9	0.000	2.10		297.8	SURCHARGED	
4.005	S10	0.000	0.08		9.2	SURCHARGED	
7.000	S11/1	0.000	0.01		0.6	SURCHARGED	
7.001	S11/2	0.000	0.02		1.1	SURCHARGED	
7.002	s11/3	0.000	0.04		2.4	SURCHARGED	
1.005	S11	0.000	0.03		2.7	SURCHARGED	
1.006	S12	0.000	0.00		2.0	SURCHARGED	