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Flood Risk Assessment Compliance

For
Camp Road, Upper Heyford
Parcel D5a

Revision 1
March 2015

Contents

Appendices

1.0 Introduction

1.1 This Flood Risk Assessment Compliance report has been prepared on behalf of the Dorchester Group in support of their Reserved Matters application for Parcel D5a of the redevelopment off Camp Road, Upper Heyford.

1.2 The purpose of this report is to demonstrate that the proposed drainage design for Parcel D5a complies with the approved Flood Risk Assessment (FRA) carried out by Waterman dated October 2010 (Ref C11234 ES 001).

1.3 Parcel D5a is a Dorchester Group development located to the north east of the development (refer to the Site Residential Parcel Plan given in **Appendix A**).

1.4 This report is intended to assist in the discharge of any planning conditions that requires the developer to demonstrate compliance with the approved FRA.

2.0 Overview of Approved FRA

2.1 The entire site is located within Flood Zone 1.

2.2 The FRA sets out a detailed approach to attenuation across the Upper Heyford site which comprises of areas identified for retention, areas for refurbishment and areas for redevelopment to provide new residential dwellings.

2.3 The Environment Agency (EA) has confirmed that areas identified solely for retention and refurbishment do not require attenuation of existing surface water discharge.

2.4 The fundamental principle of the FRA is that runoff from proposed areas of redevelopment should be attenuated to existing 1 in 100 year flows with a 30% allowance for climate change.

2.5 Attenuation is to be provided through the use of balancing ponds, permeable paving and attenuation tanks where necessary. Swales will be incorporated through the site where appropriate.

2.6 The FRA splits the development into four main catchment areas and provides a series of calculations for each.

2.7 The FRA also requires a 10% betterment of existing flows entering the eastern tributary of the Gallos Brook.

3.0 Proposed Development

3.1 Parcel D5a of the proposed development is located to the north east of the Upper Heyford Site taking its main access off Camp Road via Soden Road.

3.2 Parcel D5a is a Dorchester Group development and comprises of 71 dwellings and 2.46 hectares (refer to **Appendix B** for proposed layouts).

3.3 The FRA denotes parcel D5a as being located within Catchment Area 4 as identified in the approved FRA.

3.4 The Indicative Surface Water Drainage Layout within the approved FRA suggests attenuation of surface water for Catchment 4 is provided by the use of, attenuation tanks, however due to the area of soft landscaping available, a pond has been proposed as an alternative. It is located on the parcel and upstream of the outfall which leads to the existing watercourse.

Discharge Strategy

3.5 Paragraph 3.20 of the FRA states: “In accordance with PPS25, local policy and EA guidance the rate of surface water runoff from new development would be controlled so that it does not increase over the existing situation for the 1 in 100 year even, while taking climate change into account”.

3.6 Paragraph 3.21 also goes on to require a 10% betterment of flows discharging to the east of the site, which includes Parcel D5a.

3.7 It is proposed to connect the new balancing pond and on parcel attenuation pond to the existing network at run 1.004 on the proposed calculations. This existing system provides an outfall for existing and new development to the tributary of the Gallos Brook to the east of the site.

3.8 Following a detailed assessment of the topographical survey, site visits and proposed layout below are the Microdrainage simulation results:

Parcel D5a		
Existing 1 in 100yr Discharge rate (l/s)	**Allowable 1 in 100yr Discharge rate + CC incl 10% betterment (l/s)**	**Actual 1 in 100yr Discharge rate + CC incl 10% betterment (l/s)**
174.8 l/s	157.3 l/s	96.6 l/s

3.9 The existing discharge rate is derived from runs 2.001 and 8.002 in the existing calculations

3.10 The proposed discharge rate is derived from runs 6.009 in the proposed calculations

Attenuation Strategy

3.12 Due to parcel D5a being part of a separate catchment to the majority of the scheme, it is proposed to deal with the D5a attenuation on parcel.

3.13 Soakaway tests at suitable depths have not been undertaken due to solid rock being encountered from 1.6m onwards in the on parcel borehole.

3.14 In accordance with the FRA permeable paving is to be provided on driveways. This will be lined and have a positive connection into the drainage system and will provide some at source attenuation and water quality improvement.

3.15 The attenuation pond will cater for the majority of the attenuation required and either be maintained by the Water Company or a management company.

3.16 The final discharge from the parcel will be controlled using a hydro-brake vortex controller.

3.17 Living roofs have been discounted as they are not in keeping with the strict urban planning requirements within a conservation area. Rain water harvesting has also been discounted due to ongoing maintenance issues and integration into domestic plumbing. Water butts will be provided on social units.

4.0 Hydraulic Performance
Parcel D5a

4.1 A detailed Microdrainage model has been constructed to simulate the 1 in 100 year (plus climate change) storm in both existing and proposed systems.

4.2 The Microdrainage model (refer to **Appendix D**) demonstrates that the proposed 1 in 100 year (plus climate change) discharge rate does not exceed 157.3 l/s at run 6.009.

4.3 The achieved discharge rate (96.6l/s) is significantly lower than the calculated allowable discharge.

Exceedance

4.4 If an area of the drainage network was to become blocked or in instances where a storm in excess of the designated storm occurs, there is the potential for the storage structures and drainage system to be overwhelmed, leading to flooding. Finished floor levels and external levels have been designed in consideration of these, so that during these periods flood water will be directed away from the proposed building entrances and into the roads and soft landscaping areas. See **Appendix E** for layout showing an indication of flood routes.

4.5 Flood water entering the parcel in the above scenarios via or arising from road 2 or from the western area of road 3 will flow north and ultimately overtop the kerb and flow to the west into the soft landscaping or re-enter the drainage network when capacity is available.

4.6 Flood water entering the parcel in the above scenarios via or arising from road 1, 3 or 4 will flow north and east ultimately overtopping the kerb and flowing off the parcel into the existing flood route or re-enter the drainage network when capacity is available.

4.7 This existing flood route to the north of the parcel runs east into the existing watercourse.

Pollution prevention

4.7 As the parking areas are smaller than 800m sq, PPG3 states that trapped gullies will provide suitable protection against contamination. Permeable areas will filter through granular material.

4.8 It is noted that the offsite sewer passes through a petrol interceptor before discharge into the existing watercourse which meets the requirements of PPG3. This interceptor is to be replaced with a modern version to ensure water quality remains high post-development.

5.0 Summary and Conclusions

5.1 This report has been prepared to allow discharge of any planning conditions which require evidence of compliance with the approved Waterman Flood Risk Assessment.

5.2 The FRA confirms no attenuation is required for areas being refurbished or retained.

5.3 The FRA requires surface water runoff from new developments to be restricted to existing 1 in 100 year runoff rates, and flows attenuated including a 30% allowance for climate change. A 10% betterment is to be provided on existing flows discharging to the eastern tributary of Gallos Brook.

5.4 The Microdrainage models demonstrate a significant betterment in parcel discharge rates.

APPENDIX A

Residential Parcel Plan

APPENDIX B

Proposed levels and drainage layouts

APPENDIX C

Existing Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW EAST EXISTING 15.07.13.SWS

Pipe Sizes SW EAST EXISTING 15.07.13 Manhole Sizes SW EAST EXISTING 15.07.13

FEH Rainfall Model

Return Period (years)	2
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	0.75
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for SW EAST EXISTING 15.07.13.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	35.951	0.629	57.2	0.031	5.00	0.0	0.600	o	225	
1.001	26.411	0.215	122.8	0.056	0.00	0.0	0.600	o	150	
2.000	14.225	0.225	63.2	0.090	5.00	0.0	0.600	o	150	
2.001	22.148	0.198	111.9	0.200	0.00	0.0	0.600	o	300	
1.002	10.321	0.104	99.2	0.100	0.00	0.0	0.600	o	300	

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	0.00	5.35	120.021	0.031	0.0	0.0	0.0	1.73	68.9	0.0
1.001	0.00	5.83	119.392	0.087	0.0	0.0	0.0	0.91	16.0	0.0
2.000	0.00	5.19	119.600	0.090	0.0	0.0	0.0	1.27	22.4	0.0
2.001	0.00	5.44	119.225	0.290	0.0	0.0	0.0	1.49	105.0	0.0
1.002	0.00	5.94	119.027	0.477	0.0	0.0	0.0	1.58	111.6	0.0

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW EAST EXISTING 15.07.13.SWS

Pipe Sizes SW EAST EXISTING 15.07.13 Manhole Sizes SW EAST EXISTING 15.07.13

FEH Rainfall Model

Return Period (years)	2
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	0.75
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for SW EAST EXISTING 15.07.13.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	35.951	0.629	57.2	0.031	5.00	0.0	0.600	o	225	
1.001	26.411	0.215	122.8	0.056	0.00	0.0	0.600	o	150	
2.000	14.225	0.225	63.2	0.090	5.00	0.0	0.600	o	150	
2.001	22.148	0.198	111.9	0.200	0.00	0.0	0.600	o	300	
1.002	10.321	0.104	99.2	0.100	0.00	0.0	0.600	o	300	

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	0.00	5.35	120.021	0.031	0.0	0.0	0.0	1.73	68.9	0.0
1.001	0.00	5.83	119.392	0.087	0.0	0.0	0.0	0.91	16.0	0.0
2.000	0.00	5.19	119.600	0.090	0.0	0.0	0.0	1.27	22.4	0.0
2.001	0.00	5.44	119.225	0.290	0.0	0.0	0.0	1.49	105.0	0.0
1.002	0.00	5.94	119.027	0.477	0.0	0.0	0.0	1.58	111.6	0.0

Network Design Table for SW EAST EXISTING 15.07.13.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
3.000	20.687	0.097	213.3	0.363	5.00	0.0	0.600	o	375	
4.000	30.988	0.327	94.8	0.293	5.00	0.0	0.600	o	225	
3.001	43.746	0.406	107.7	0.132	0.00	0.0	0.600	o	375	
5.000	25.387	0.211	120.3	0.099	5.00	0.0	0.600	o	100	
3.002	31.824	0.107	297.4	0.000	0.00	0.0	0.600	o	375	
3.003	10.659	0.040	266.5	0.029	0.00	0.0	0.600	o	375	
6.000	3.241	0.135	24.0	0.030	5.00	0.0	0.600	o	150	
1.003	5.982	0.017	351.9	0.000	0.00	0.0	0.600	o	525	
1.004	8.188	0.018	454.9	0.000	0.00	0.0	0.600	o	525	
7.000	8.461	0.042	201.5	0.159	5.00	0.0	0.600	o	225	
7.001	38.682	0.240	161.2	0.000	0.00	0.0	0.600	o	225	
7.002	7.950	0.001	7950.0	0.046	0.00	0.0	0.600	o	300	
8.000	20.838	0.169	123.3	0.515	5.00	0.0	0.600	o	225	

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)
3.000	0.00	5.28	119.600	0.363	0.0	0.0	0.0	1.24	136.6	0.0
4.000	0.00	5.38	119.980	0.293	0.0	0.0	0.0	1.34	53.4	0.0
3.001	0.00	5.80	119.503	0.788	0.0	0.0	0.0	1.75	192.7	0.0
5.000	0.00	5.60	119.583	0.099	0.0	0.0	0.0	0.70	5.5	0.0
3.002	0.00	6.31	119.097	0.887	0.0	0.0	0.0	1.05	115.5	0.0
3.003	0.00	6.47	118.990	0.916	0.0	0.0	0.0	1.11	122.1	0.0
6.000	0.00	5.03	119.257	0.030	0.0	0.0	0.0	2.06	36.5	0.0
1.003	0.00	6.55	118.917	1.423	0.0	0.0	0.0	1.19	257.2	0.0
1.004	0.00	6.69	118.365	1.423	0.0	0.0	0.0	1.04	225.9	0.0
7.000	0.00	5.15	118.929	0.159	0.0	0.0	0.0	0.92	36.5	0.0
7.001	0.00	5.78	118.887	0.159	0.0	0.0	0.0	1.03	40.8	0.0
7.002	0.00	6.57	118.572	0.205	0.0	0.0	0.0	0.17	11.8	0.0
8.000	0.00	5.30	119.471	0.515	0.0	0.0	0.0	1.18	46.8	0.0

Network Design Table for SW EAST EXISTING 15.07.13.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
8.001	45.406	0.311	146.0	0.120	0.00	0.0	0.600	o	225	
8.002	21.439	0.193	111.1	0.135	0.00	0.0	0.600	o	225	
8.003	14.461	0.152	95.1	0.100	0.00	0.0	0.600	o	225	
7.003	7.429	0.001	7429.0	0.000	0.00	0.0	0.600	o	300	
9.000	56.396	0.150	376.0	0.156	5.00	0.0	0.600	o	525	
9.001	8.750	0.030	291.7	0.000	0.00	0.0	0.600	o	525	
9.002	23.509	0.060	391.8	0.000	0.00	0.0	0.600	o	525	
1.005	37.754	0.097	389.2	0.000	0.00	0.0	0.600	o	825	
10.000	13.633	0.058	235.1	0.063	5.00	0.0	0.600	o	100	
10.001	17.441	0.070	250.0	0.000	0.00	0.0	0.600	o	100	
1.006	19.044	0.020	952.2	0.000	0.00	0.0	0.600	\/	40	
11.000	12.426	0.039	318.6	0.070	5.00	0.0	0.600	o	100	
11.001	9.076	0.010	907.6	0.006	0.00	0.0	0.600	o	100	
12.000	8.298	0.065	127.7	0.006	5.00	0.0	0.600	o	150	

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)
8.001	0.00	6.00	119.302	0.635	0.0	0.0	0.0	1.08	42.9	0.0
8.002	0.00	6.28	118.991	0.770	0.0	0.0	0.0	1.24	49.3	0.0
8.003	0.00	6.46	118.798	0.870	0.0	0.0	0.0	1.34	53.3	0.0
7.003	0.00	7.29	118.571	1.075	0.0	0.0	0.0	0.17	12.2	0.0
9.000	0.00	5.82	118.570	0.156	0.0	0.0	0.0	1.15	248.8	0.0
9.001	0.00	5.93	118.420	0.156	0.0	0.0	0.0	1.31	282.8	0.0
9.002	0.00	6.28	118.390	0.156	0.0	0.0	0.0	1.13	243.6	0.0
1.005	0.00	7.71	118.297	2.654	0.0	0.0	0.0	1.50	801.2	0.0
10.000	0.00	5.46	118.268	0.063	0.0	0.0	0.0	0.50	3.9	0.0
10.001	0.00	6.06	118.210	0.063	0.0	0.0	0.0	0.48	3.8	0.0
1.006	0.00	7.88	117.700	2.717	0.0	0.0	0.0	1.91	7493.7	0.0
11.000	0.00	5.49	118.143	0.070	0.0	0.0	0.0	0.43	3.3	0.0
11.001	0.00	6.10	118.104	0.076	0.0	0.0	0.0	0.25	1.9	0.0
12.000	0.00	5.16	118.017	0.006	0.0	0.0	0.0	0.89	15.7	0.0

Network Design Table for SW EAST EXISTING 15.07.13.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.007	31.260	0.035	893.1	0.000	0.00	0.0	0.600	\/	40	
13.000	33.909	0.096	353.2	0.107	5.00	0.0	0.600	o	100	
1.008	4.365	0.005	873.0	0.000	0.00	0.0	0.600	\/	40	

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)
1.007	0.00	8.14	117.680	2.799	0.0	0.0	0.0	1.97	7739.1	0.0
13.000	0.00	6.40	117.753	0.107	0.0	0.0	0.0	0.40	3.2	0.0
1.008	0.00	8.18	117.645	2.906	0.0	0.0	0.0	1.99	7828.5	0.0

Free Flowing Outfall Details for SW EAST EXISTING 15.07.13.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		0.000	117.640	0.000	0	0

Simulation Criteria for SW EAST EXISTING 15.07.13.SWS

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	1.000
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 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	FEH
Return Period (years)	100
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292

Synthetic Rainfall Details

F (1km)	2.461
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	15

Summary of Critical Results by Maximum Level (Rank 1) for SW EAST EXISTING 15.07.13.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 1.000
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 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	FEH
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Cv (Summer)	0.750
Cv (Winter)	0.840

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	0%					
1.001	15 Winter	100	0%	100/15 Summer	100/15 Summer			5
2.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			4
2.001	15 Winter	100	0%	100/15 Summer	100/15 Summer			3
1.002	15 Winter	100	0%	100/15 Summer	100/15 Summer			4
3.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			5
4.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			6
3.001	15 Summer	100	0%	100/15 Summer	100/15 Summer			2
5.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			9
3.002	15 Winter	100	0%	100/15 Summer	100/15 Summer			1
3.003	15 Winter	100	0%	100/15 Summer				
6.000	15 Winter	100	0%	100/15 Summer				
1.003	15 Winter	100	0%	100/15 Summer				
1.004	15 Winter	100	0%	100/15 Summer				

Summary of Critical Results by Maximum Level (Rank 1) for SW EAST EXISTING 15.07.13.SWS

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
7.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			4
7.001	15 Winter	100	0%	100/15 Summer	100/15 Summer			2
7.002	15 Winter	100	0%	100/15 Summer				
8.000	30 Winter	100	0%	100/15 Summer	100/15 Summer			11
8.001	15 Winter	100	0%	100/15 Summer	100/15 Summer			6
8.002	15 Winter	100	0%	100/15 Summer	100/15 Summer			3
8.003	15 Winter	100	0%	100/15 Summer				
7.003	15 Winter	100	0%	100/15 Summer				
9.000	15 Winter	100	0%					
9.001	15 Winter	100	0%	100/15 Summer				
9.002	15 Winter	100	0%	100/15 Summer				
1.005	15 Winter	100	0%					
10.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			8
10.001	15 Winter	100	0%	100/15 Summer				
1.006	15 Winter	100	0%					
11.000	15 Winter	100	0%	100/15 Summer	100/15 Summer			8
11.001	15 Winter	100	0%	100/15 Summer				
12.000	15 Winter	100	0%	100/15 Summer				
1.007	15 Winter	100	0%					
13.000	30 Winter	100	0%	100/15 Summer	100/15 Summer			10
1.008	15 Winter	100	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	0759	120.134	-0.112	0.000	0.28	0.0	18.0	OK
1.001	0761	120.088	0.546	11.059	1.62	0.0	24.7	FLOOD
2.000	1212	120.544	0.794	6.980	1.89	0.0	38.9	FLOOD
2.001	1211	120.237	0.712	6.547	1.21	0.0	112.4	FLOOD
1.002	0764	119.947	0.630	0.707	1.03	0.0	147.7	FLOOD
3.000	Ex MH	120.731	0.756	31.471	0.95	0.0	109.3	FLOOD
4.000	1257	120.812	0.607	41.742	1.58	0.0	78.8	FLOOD
3.001	0760	120.673	0.795	0.449	1.05	0.0	185.5	FLOOD
5.000	0763	120.412	0.729	19.104	2.11	0.0	11.3	FLOOD
3.002	0762	120.257	0.785	0.017	1.82	0.0	186.6	FLOOD
3.003	Ex MH	119.902	0.537	0.000	2.24	0.0	204.2	SURCHARGED
6.000	0767	119.707	0.300	0.000	0.76	0.0	17.6	FLOOD RISK
1.003	0766	119.624	0.182	0.000	2.31	0.0	362.7	FLOOD RISK
1.004	PI	119.109	0.219	0.000	2.81	0.0	357.5	SURCHARGED
7.000	0745	120.106	0.952	7.480	2.04	0.0	60.3	FLOOD
7.001	0746	119.952	0.840	0.145	1.53	0.0	59.3	FLOOD
7.002	1208	119.495	0.623	0.000	2.30	0.0	82.3	SURCHARGED
8.000	0711	120.165	0.469	123.952	1.20	0.0	50.8	FLOOD
8.001	0952	120.113	0.586	35.474	1.43	0.0	58.4	FLOOD
8.002	0953	120.190	0.974	6.280	1.39	0.0	62.4	FLOOD
8.003	1206	120.074	1.051	0.000	2.16	0.0	100.8	FLOOD RISK
7.003	Ex MH	119.385	0.514	0.000	4.80	0.0	181.4	SURCHARGED
9.000	0768	119.095	0.000	0.000	0.37	0.0	82.8	OK
9.001	0765	118.987	0.042	0.000	0.49	0.0	88.6	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for SW EAST EXISTING 15.07.13.SWS

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
9.002	Ex MH	118.948	0.033	0.000	0.42	0.0	82.8	SURCHARGED
1.005	0769	118.911	-0.211	0.000	0.91	0.0	574.6	OK
10.000	1226	118.907	0.539	9.196	2.37	0.0	8.8	FLOOD
10.001	1285	118.611	0.301	0.000	2.31	0.0	8.4	FLOOD RISK
1.006	Ditch	118.238	-0.733	0.000	0.29	0.0	579.6	OK
11.000	1267	118.561	0.318	12.673	2.32	0.0	7.3	FLOOD
11.001	1288	118.441	0.237	0.000	3.58	0.0	9.2	FLOOD RISK
12.000	1287	118.207	0.040	0.000	0.25	0.0	3.5	SURCHARGED
1.007	Ditch	118.204	-0.747	0.000	0.18	0.0	577.9	OK
13.000	1225	118.450	0.597	21.987	2.57	0.0	8.0	FLOOD
1.008	Ditch	118.144	-0.772	0.000	0.17	0.0	581.8	OK

APPENDIX D

Proposed Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW Proposed

Pipe Sizes Proposed Manhole Sizes Proposed

FEH Rainfall Model

Return Period (years)	2
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	0.75
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	35.951	0.629	57.2	0.031	5.00	0.0	0.600	o	225	🔒
1.001	26.411	0.215	122.8	0.056	0.00	0.0	0.600	o	150	🔓
1.002	10.321	0.104	99.2	0.100	0.00	0.0	0.600	o	300	🔓
2.000	20.687	0.097	213.3	0.363	5.00	0.0	0.600	o	375	🔒
3.000	30.988	0.327	94.8	0.293	5.00	0.0	0.600	o	225	🔒

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	0.00	5.35	120.021	0.031	0.0	0.0	0.0	1.73	68.9	0.0
1.001	0.00	5.83	119.392	0.087	0.0	0.0	0.0	0.91	16.0	0.0
1.002	0.00	5.94	119.027	0.187	0.0	0.0	0.0	1.58	111.6	0.0
2.000	0.00	5.28	119.600	0.363	0.0	0.0	0.0	1.24	136.6	0.0
3.000	0.00	5.38	119.980	0.293	0.0	0.0	0.0	1.34	53.4	0.0

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
2.001	43.746	0.406	107.7	0.132	0.00	0.0	0.600	o	375	
4.000	25.387	0.211	120.3	0.099	5.00	0.0	0.600	o	100	
2.002	31.824	0.107	297.4	0.000	0.00	0.0	0.600	o	375	
2.003	10.659	0.040	266.5	0.029	0.00	0.0	0.600	o	375	
5.000	3.241	0.135	24.0	0.030	5.00	0.0	0.600	o	150	
1.003	5.982	0.017	351.9	0.000	0.00	0.0	0.600	o	525	
6.000	10.291	0.100	102.9	0.067	5.00	0.0	0.600	o	150	
6.001	35.031	0.190	184.4	0.043	0.00	0.0	0.600	o	450	
7.000	8.639	0.150	57.6	0.058	5.00	0.0	0.600	o	150	
8.000	8.459	0.180	47.0	0.012	5.00	0.0	0.600	o	100	
6.002	20.609	0.050	412.2	0.046	0.00	0.0	0.600	o	450	
9.000	9.321	0.120	77.7	0.020	5.00	0.0	0.600	o	100	

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)
2.001	0.00	5.80	119.503	0.788	0.0	0.0	0.0	1.75	192.7	0.0
4.000	0.00	5.60	119.583	0.099	0.0	0.0	0.0	0.70	5.5	0.0
2.002	0.00	6.31	119.097	0.887	0.0	0.0	0.0	1.05	115.5	0.0
2.003	0.00	6.47	118.990	0.916	0.0	0.0	0.0	1.11	122.1	0.0
5.000	0.00	5.03	119.257	0.030	0.0	0.0	0.0	2.06	36.5	0.0
1.003	0.00	6.55	118.917	1.133	0.0	0.0	0.0	1.19	257.2	0.0
6.000	0.00	5.17	119.850	0.067	0.0	0.0	0.0	0.99	17.5	0.0
6.001	0.00	5.56	119.450	0.110	0.0	0.0	0.0	1.49	237.6	0.0
7.000	0.00	5.11	119.710	0.058	0.0	0.0	0.0	1.33	23.5	0.0
8.000	0.00	5.13	119.790	0.012	0.0	0.0	0.0	1.13	8.9	0.0
6.002	0.00	5.91	119.260	0.226	0.0	0.0	0.0	1.00	158.3	0.0
9.000	0.00	5.18	119.680	0.020	0.0	0.0	0.0	0.87	6.9	0.0

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
10.000	8.500	0.065	130.8	0.027	5.00	0.0	0.600	o	150	
10.001	17.464	0.085	205.5	0.025	0.00	0.0	0.600	o	225	
6.003	9.923	0.030	330.8	0.008	0.00	0.0	0.600	o	450	
6.004	44.707	0.110	406.4	0.072	0.00	0.0	0.600	o	450	
11.000	20.794	0.410	50.7	0.043	5.00	0.0	0.600	o	100	
12.000	13.000	0.410	31.7	0.034	5.00	0.0	0.600	o	100	
6.005	14.925	0.040	373.1	0.017	0.00	0.0	0.600	o	450	
6.006	20.938	0.060	349.0	0.069	0.00	0.0	0.600	o	450	
13.000	54.575	0.285	191.5	0.048	5.00	0.0	0.600	o	300	
14.000	9.910	0.505	19.6	0.020	5.00	0.0	0.600	o	100	
13.001	38.354	0.200	191.8	0.145	0.00	0.0	0.600	o	375	
13.002	15.342	0.080	191.8	0.028	0.00	0.0	0.600	o	375	
15.000	4.116	0.355	11.6	0.057	5.00	0.0	0.600	o	100	

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)
10.000	0.00	5.16	119.660	0.027	0.0	0.0	0.0	0.88	15.5	0.0
10.001	0.00	5.48	119.520	0.052	0.0	0.0	0.0	0.91	36.1	0.0
6.003	0.00	6.06	119.210	0.306	0.0	0.0	0.0	1.11	176.9	0.0
6.004	0.00	6.80	119.180	0.378	0.0	0.0	0.0	1.00	159.4	0.0
11.000	0.00	5.32	119.830	0.043	0.0	0.0	0.0	1.08	8.5	0.0
12.000	0.00	5.16	119.830	0.034	0.0	0.0	0.0	1.38	10.8	0.0
6.005	0.00	7.04	119.070	0.472	0.0	0.0	0.0	1.05	166.4	0.0
6.006	0.00	7.36	119.030	0.541	0.0	0.0	0.0	1.08	172.2	0.0
13.000	0.00	5.80	120.080	0.048	0.0	0.0	0.0	1.13	80.1	0.0
14.000	0.00	5.09	120.500	0.020	0.0	0.0	0.0	1.75	13.8	0.0
13.001	0.00	6.29	119.720	0.213	0.0	0.0	0.0	1.30	144.1	0.0
13.002	0.00	6.49	119.520	0.241	0.0	0.0	0.0	1.30	144.1	0.0
15.000	0.00	5.03	120.070	0.057	0.0	0.0	0.0	2.28	17.9	0.0

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
13.003	26.268	0.090	291.9	0.022	0.00	0.0	0.600	o	450	
13.004	21.846	0.070	312.1	0.086	0.00	0.0	0.600	o	450	
13.005	64.703	0.205	315.6	0.071	0.00	0.0	0.600	o	450	
13.006	10.487	0.030	349.6	0.052	0.00	0.0	0.600	o	450	
6.007	22.963	0.055	417.5	0.037	0.00	0.0	0.600	o	450	
6.008	8.116	0.015	541.1	0.000	0.00	0.0	0.600	o	600	
6.009	80.708	0.200	403.5	0.000	0.00	0.0	0.600	o	450	
6.010	11.808	0.031	380.9	0.000	0.00	0.0	0.600	o	450	
6.011	12.300	0.044	279.5	0.000	0.00	0.0	0.600	o	450	
1.004	1.833	0.010	183.3	0.000	0.00	0.0	0.600	o	525	
1.005	12.240	0.025	489.6	0.000	0.00	0.0	0.600	o	525	
1.006	8.190	0.018	455.0	0.000	0.00	0.0	0.600	o	525	
16.000	8.461	0.042	201.5	0.059	5.00	0.0	0.600	o	225	
16.001	38.682	0.240	161.2	0.000	0.00	0.0	0.600	o	225	
16.002	7.950	0.001	7950.0	0.046	0.00	0.0	0.600	o	300	
16.003	7.429	0.001	7429.0	0.000	0.00	0.0	0.600	o	300	
17.000	56.396	0.150	376.0	0.156	5.00	0.0	0.600	o	525	

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)
13.003	0.00	6.86	119.365	0.320	0.0	0.0	0.0	1.18	188.4	0.0
13.004	0.00	7.18	119.275	0.406	0.0	0.0	0.0	1.15	182.2	0.0
13.005	0.00	8.12	119.205	0.477	0.0	0.0	0.0	1.14	181.1	0.0
13.006	0.00	8.28	119.000	0.529	0.0	0.0	0.0	1.08	172.0	0.0
6.007	0.00	8.67	118.970	1.107	0.0	0.0	0.0	0.99	157.2	0.0
6.008	0.00	8.80	118.915	1.107	0.0	0.0	0.0	1.04	294.0	0.0
6.009	0.00	10.14	118.900	1.107	0.0	0.0	0.0	1.01	160.0	0.0
6.010	0.00	10.33	118.700	1.107	0.0	0.0	0.0	1.04	164.7	0.0
6.011	0.00	10.50	118.669	1.107	0.0	0.0	0.0	1.21	192.6	0.0
1.004	0.00	10.52	118.550	2.240	0.0	0.0	0.0	1.65	357.4	0.0
1.005	0.00	10.72	118.540	2.240	0.0	0.0	0.0	1.01	217.7	0.0
1.006	0.00	10.85	118.515	2.240	0.0	0.0	0.0	1.04	225.9	0.0
16.000	0.00	5.15	118.929	0.059	0.0	0.0	0.0	0.92	36.5	0.0
16.001	0.00	5.78	118.887	0.059	0.0	0.0	0.0	1.03	40.8	0.0
16.002	0.00	6.57	118.572	0.105	0.0	0.0	0.0	0.17	11.8	0.0
16.003	0.00	7.29	118.571	0.105	0.0	0.0	0.0	0.17	12.2	0.0
17.000	0.00	5.82	118.570	0.156	0.0	0.0	0.0	1.15	248.8	0.0

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
17.001	8.750	0.030	291.7	0.000	0.00	0.0	0.600	o	525	
17.002	23.509	0.060	391.8	0.000	0.00	0.0	0.600	o	525	
1.007	37.754	0.097	389.2	0.000	0.00	0.0	0.600	o	825	
18.000	29.679	0.180	164.9	0.030	5.00	0.0	0.600	o	225	
18.001	28.378	0.140	202.7	0.024	0.00	0.0	0.600	o	225	
18.002	39.790	0.190	209.4	0.008	0.00	0.0	0.600	o	225	
18.003	28.880	0.140	206.3	0.006	0.00	0.0	0.600	o	225	
18.004	25.000	0.085	294.1	0.012	0.00	0.0	0.600	o	300	
19.000	31.800	0.110	289.1	0.019	5.00	0.0	0.600	o	100	
18.005	31.430	0.030	1047.7	0.021	0.00	0.0	0.600	o	300	
18.006	16.950	0.180	94.2	0.000	0.00	0.0	0.600	o	100	
18.007	4.690	0.052	90.2	0.000	0.00	0.0	0.600	o	100	
18.008	13.633	0.058	235.1	0.051	0.00	0.0	0.600	o	100	
18.009	17.441	0.070	249.2	0.000	0.00	0.0	0.600	o	100	
1.008	19.044	0.020	952.2	0.000	0.00	0.0	0.600	\/	40	
20.000	12.426	0.039	318.6	0.070	5.00	0.0	0.600	o	100	

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)
17.001	0.00	5.93	118.420	0.156	0.0	0.0	0.0	1.31	282.8	0.0
17.002	0.00	6.28	118.390	0.156	0.0	0.0	0.0	1.13	243.6	0.0
1.007	0.00	11.27	118.297	2.501	0.0	0.0	0.0	1.50	801.2	0.0
18.000	0.00	5.49	119.340	0.030	0.0	0.0	0.0	1.02	40.4	0.0
18.001	0.00	6.00	119.160	0.054	0.0	0.0	0.0	0.91	36.4	0.0
18.002	0.00	6.74	119.020	0.062	0.0	0.0	0.0	0.90	35.8	0.0
18.003	0.00	7.27	118.830	0.068	0.0	0.0	0.0	0.91	36.0	0.0
18.004	0.00	7.73	118.615	0.080	0.0	0.0	0.0	0.91	64.4	0.0
19.000	0.00	6.18	118.840	0.019	0.0	0.0	0.0	0.45	3.5	0.0
18.005	0.00	8.83	118.530	0.120	0.0	0.0	0.0	0.48	33.8	0.0
18.006	0.00	9.18	118.500	0.120	0.0	0.0	0.0	0.79	6.2	0.0
18.007	0.00	9.28	118.320	0.120	0.0	0.0	0.0	0.81	6.4	0.0
18.008	0.00	9.74	118.268	0.171	0.0	0.0	0.0	0.50	3.9	0.0
18.009	0.00	10.34	118.210	0.171	0.0	0.0	0.0	0.48	3.8	0.0
1.008	0.00	11.44	117.700	2.672	0.0	0.0	0.0	1.91	7493.7	0.0
20.000	0.00	5.49	118.143	0.070	0.0	0.0	0.0	0.43	3.3	0.0

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
20.001	9.076	0.010	907.6	0.006	0.00	0.0	0.600	o	100	
21.000	8.298	0.065	127.7	0.006	5.00	0.0	0.600	o	150	
1.009	31.260	0.035	893.1	0.000	0.00	0.0	0.600	\/	40	
22.000	13.020	0.150	86.8	0.031	5.00	0.0	0.600	o	150	
22.001	46.306	0.445	104.1	0.064	0.00	0.0	0.600	o	225	
22.002	33.231	0.150	221.5	0.006	0.00	0.0	0.600	o	300	
22.003	27.677	0.100	276.8	0.046	0.00	0.0	0.600	o	300	
23.000	17.082	0.400	42.7	0.014	5.00	0.0	0.600	o	150	
24.000	19.030	0.896	21.2	0.024	5.00	0.0	0.600	o	150	
25.000	19.276	0.428	45.0	0.025	5.00	0.0	0.600	o	150	
26.000	17.832	0.120	148.6	0.006	5.00	0.0	0.600	o	150	
23.001	17.712	0.195	90.8	0.072	0.00	0.0	0.600	o	100	
22.004	23.954	0.100	239.5	0.006	0.00	0.0	0.600	o	300	

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)
20.001	0.00	6.10	118.104	0.076	0.0	0.0	0.0	0.25	1.9	0.0
21.000	0.00	5.16	118.017	0.006	0.0	0.0	0.0	0.89	15.7	0.0
1.009	0.00	11.70	117.680	2.754	0.0	0.0	0.0	1.97	7739.1	0.0
22.000	0.00	5.20	118.900	0.031	0.0	0.0	0.0	1.08	19.1	0.0
22.001	0.00	5.80	118.675	0.095	0.0	0.0	0.0	1.28	51.0	0.0
22.002	0.00	6.33	118.155	0.101	0.0	0.0	0.0	1.05	74.4	0.0
22.003	0.00	6.82	118.005	0.147	0.0	0.0	0.0	0.94	66.5	0.0
23.000	0.00	5.18	118.850	0.014	0.0	0.0	0.0	1.54	27.3	0.0
24.000	0.00	5.14	119.346	0.024	0.0	0.0	0.0	2.20	38.8	0.0
25.000	0.00	5.21	118.878	0.025	0.0	0.0	0.0	1.50	26.6	0.0
26.000	0.00	5.36	118.420	0.006	0.0	0.0	0.0	0.82	14.5	0.0
23.001	0.00	5.73	118.300	0.141	0.0	0.0	0.0	0.81	6.3	0.0
22.004	0.00	7.22	117.905	0.294	0.0	0.0	0.0	1.01	71.5	0.0

Network Design Table for SW Proposed

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
27.000	31.870	0.295	108.0	0.019	5.00	0.0	0.600	o	150	
22.005	11.380	0.045	252.9	0.049	0.00	0.0	0.600	o	300	
22.006	22.760	0.103	221.0	0.027	0.00	0.0	0.600	o	225	
1.010	4.365	0.005	873.0	0.000	0.00	0.0	0.600	\/	40	

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)
27.000	0.00	5.55	118.250	0.019	0.0	0.0	0.0	0.97	17.1	0.0
22.005	0.00	7.41	117.805	0.362	0.0	0.0	0.0	0.98	69.6	0.0
22.006	0.00	7.84	117.760	0.389	0.0	0.0	0.0	0.88	34.8	0.0
1.010	0.00	11.74	117.645	3.143	0.0	0.0	0.0	1.99	7828.5	0.0

Free Flowing Outfall Details for SW Proposed

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010		0.000	117.640	0.000	0	0

Simulation Criteria for SW Proposed

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	1.000
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 Storage Structures	16
Number of Online Controls	1	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
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023

Synthetic Rainfall Details

D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	15

Online Controls for SW Proposed

Hydro-Brake® Manhole: 15 (D5a), DS/PN: 6.009, Volume (m³): 6.1

Design Head (m) 1.600 Hydro-Brake® Type Md6 SW Only Invert Level (m) 118.900
Design Flow (l/s) 92.0 Diameter (mm) 337

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.8	1.200	93.2	3.000	112.6	7.000	171.4
0.200	31.7	1.400	91.5	3.500	121.3	7.500	177.4
0.300	55.2	1.600	91.6	4.000	129.6	8.000	183.3
0.400	76.1	1.800	93.1	4.500	137.5	8.500	188.9
0.500	90.9	2.000	95.6	5.000	144.9	9.000	194.4
0.600	97.3	2.200	98.6	5.500	152.0	9.500	199.7
0.800	99.3	2.400	102.0	6.000	158.7		
1.000	96.6	2.600	105.5	6.500	165.2		

Pre-initialised control selected, excessive flows may result.

Storage Structures for SW Proposed

Porous Car Park Manhole: PP (D5a), DS/PN: 6.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.3
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	71.5	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.000	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 7.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	18.0
Max Percolation (l/s)	50.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	119.850	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 8.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	13.5
Max Percolation (l/s)	18.8	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.150	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 9.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	18.0
Max Percolation (l/s)	30.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.000	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 10.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	18.0
Max Percolation (l/s)	25.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.000	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 11.000

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	68.4
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0

Porous Car Park Manhole: PP (D5a), DS/PN: 11.000

Porosity	0.30	Slope (1:X)	300.0
Invert Level (m)	120.150	Depression Storage (mm)	5
Width (m)	8.8	Evaporation (mm/day)	3
Length (m)	28.0	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 12.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.7
Membrane Percolation (mm/hr)	1000	Length (m)	27.0
Max Percolation (l/s)	80.3	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.220	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 14.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	18.0
Max Percolation (l/s)	25.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.700	Cap Volume Depth (m)	0.000

Porous Car Park Manhole: PP (D5a), DS/PN: 15.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.1
Membrane Percolation (mm/hr)	1000	Length (m)	32.0
Max Percolation (l/s)	116.4	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	120.600	Cap Volume Depth (m)	0.000

Tank or Pond Manhole: Pond (D5a), DS/PN: 6.008

Invert Level (m) 118.915

Depth (m)	**Area (m²)**	**Depth (m)**	**Area (m²)**
0.000	204.4	1.885	639.3

Filter Drain Manhole: 5 (TC), DS/PN: 18.004

Infiltration Coefficient Base (m/hr)	0.01000	Trench Length (m)	17.0
Infiltration Coefficient Side (m/hr)	0.01000	Pipe Diameter (m)	0.300
Safety Factor	1.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Slope (1:X)	300.0
Invert Level (m)	118.425	Cap Volume Depth (m)	0.000
Trench Width (m)	2.0	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: FD (TC), DS/PN: 19.000

Infiltration Coefficient Base (m/hr)	0.00000	Trench Length (m)	31.0
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Diameter (m)	0.150
Safety Factor	1.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Slope (1:X)	300.0
Invert Level (m)	118.790	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: 7 (TC), DS/PN: 18.006

Infiltration Coefficient Base (m/hr)	0.01000	Trench Length (m)	28.0
Infiltration Coefficient Side (m/hr)	0.01000	Pipe Diameter (m)	0.300
Safety Factor	1.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Slope (1:X)	900.0
Invert Level (m)	118.500	Cap Volume Depth (m)	0.000
Trench Width (m)	2.0	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: 9 (TC), DS/PN: 18.008

Infiltration Coefficient Base (m/hr)	0.01000	Trench Length (m)	8.0
Infiltration Coefficient Side (m/hr)	0.01000	Pipe Diameter (m)	0.150
Safety Factor	1.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Slope (1:X)	90.0
Invert Level (m)	118.268	Cap Volume Depth (m)	0.000
Trench Width (m)	10.0	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: 16 (TC), DS/PN: 23.001

Infiltration Coefficient Base (m/hr)	0.01000	Trench Length (m)	92.0
Infiltration Coefficient Side (m/hr)	0.01000	Pipe Diameter (m)	0.150
Safety Factor	1.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	118.200	Cap Volume Depth (m)	0.000
Trench Width (m)	2.9	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: 19 (TC), DS/PN: 22.006

Infiltration Coefficient Base (m/hr)	0.01000	Trench Length (m)	25.0
Infiltration Coefficient Side (m/hr)	0.01000	Pipe Diameter (m)	0.150
Safety Factor	1.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	117.760	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	1.000
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	16
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Cv (Summer)	0.750
Cv (Winter)	0.840

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+30%					
1.001	15 Winter	100	+30%	100/15 Summer	100/15 Summer			5
1.002	15 Summer	100	+30%	100/15 Summer				
2.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			6
3.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			7
2.001	15 Winter	100	+30%	100/15 Summer	100/15 Summer			3
4.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10
2.002	15 Summer	100	+30%	100/15 Summer	100/15 Summer			1
2.003	15 Summer	100	+30%	100/15 Summer				
5.000	15 Winter	100	+30%	100/15 Summer				
1.003	15 Summer	100	+30%	100/15 Summer				
6.000	15 Winter	100	+30%	100/15 Summer				
6.001	15 Winter	100	+30%	100/15 Summer				
7.000	15 Winter	100	+30%	100/15 Summer				
8.000	15 Winter	100	+30%	100/15 Summer				

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
6.002	15 Winter	100	+30%	100/15 Summer				
9.000	15 Winter	100	+30%	100/15 Summer				
10.000	15 Winter	100	+30%	100/15 Summer				
10.001	15 Winter	100	+30%	100/15 Summer				
6.003	15 Winter	100	+30%	100/15 Summer				
6.004	15 Winter	100	+30%	100/15 Summer				
11.000	15 Winter	100	+30%	100/15 Summer				
12.000	15 Winter	100	+30%	100/15 Summer				
6.005	15 Winter	100	+30%	100/15 Summer				
6.006	15 Winter	100	+30%	100/15 Summer				
13.000	15 Winter	100	+30%	100/15 Summer				
14.000	15 Winter	100	+30%	100/15 Summer				
13.001	15 Winter	100	+30%	100/15 Summer				
13.002	15 Winter	100	+30%	100/15 Summer				
15.000	15 Winter	100	+30%	100/15 Summer				
13.003	15 Winter	100	+30%	100/15 Summer				
13.004	15 Winter	100	+30%	100/15 Summer				
13.005	15 Winter	100	+30%	100/15 Summer				
13.006	15 Winter	100	+30%	100/15 Summer				
6.007	15 Winter	100	+30%	100/15 Summer				
6.008	60 Winter	100	+30%	100/15 Summer				
6.009	60 Winter	100	+30%	100/15 Summer				
6.010	30 Winter	100	+30%	100/15 Summer				
6.011	30 Winter	100	+30%	100/15 Summer				
1.004	60 Winter	100	+30%	100/15 Summer				
1.005	60 Winter	100	+30%	100/15 Summer				
1.006	60 Winter	100	+30%	100/15 Summer				
16.000	15 Winter	100	+30%	100/15 Summer				
16.001	15 Winter	100	+30%	100/15 Summer				
16.002	15 Winter	100	+30%	100/15 Summer				
16.003	15 Winter	100	+30%	100/15 Summer				
17.000	15 Winter	100	+30%					
17.001	15 Winter	100	+30%					
17.002	15 Winter	100	+30%					
1.007	15 Winter	100	+30%					
18.000	15 Winter	100	+30%					
18.001	15 Winter	100	+30%	100/15 Summer				
18.002	15 Winter	100	+30%	100/15 Summer				
18.003	30 Winter	100	+30%	100/15 Summer				
18.004	30 Winter	100	+30%	100/15 Summer	100/30 Winter			1
19.000	60 Winter	100	+30%	100/15 Summer				
18.005	30 Winter	100	+30%	100/15 Summer				
18.006	30 Winter	100	+30%	100/15 Summer				
18.007	30 Winter	100	+30%	100/15 Summer				
18.008	60 Winter	100	+30%	100/15 Summer	100/30 Winter			3
18.009	60 Winter	100	+30%	100/15 Summer				
1.008	15 Winter	100	+30%					
20.000	15 Winter	100	+30%	100/15 Summer	100/15 Summer			9
20.001	15 Winter	100	+30%	100/15 Summer				
21.000	15 Winter	100	+30%					
1.009	15 Winter	100	+30%					

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
22.000	15 Winter	100	+30%	100/15 Summer	100/15 Winter			1
22.001	15 Winter	100	+30%	100/15 Summer				
22.002	15 Winter	100	+30%	100/15 Summer				
22.003	15 Winter	100	+30%	100/15 Summer				
23.000	15 Winter	100	+30%					
24.000	15 Winter	100	+30%					
25.000	15 Winter	100	+30%					
26.000	30 Winter	100	+30%	100/15 Summer				
23.001	30 Winter	100	+30%	100/15 Summer				
22.004	15 Winter	100	+30%	100/15 Summer				
27.000	15 Winter	100	+30%	100/15 Summer				
22.005	15 Winter	100	+30%	100/15 Summer	100/15 Summer			6
22.006	15 Winter	100	+30%	100/15 Summer				
1.010	15 Winter	100	+30%					

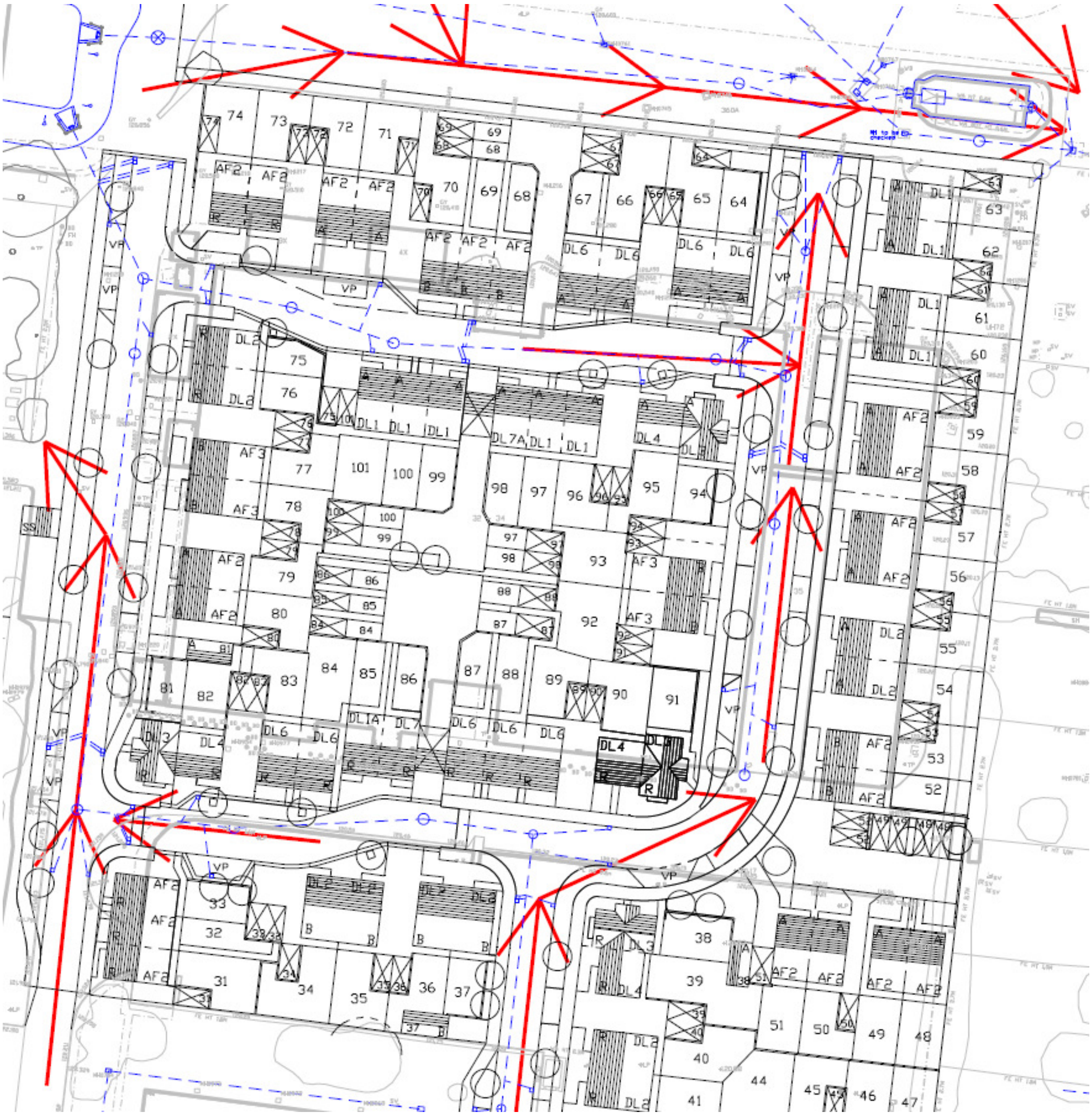
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	0759	120.171	-0.075	0.000	0.36	0.0	23.4	OK
1.001	0761	120.090	0.548	12.956	1.63	0.0	24.8	FLOOD
1.002	0764	119.762	0.435	0.000	1.26	0.0	101.8	FLOOD RISK
2.000	Ex MH	120.756	0.781	55.963	0.86	0.0	99.3	FLOOD
3.000	1257	120.835	0.630	65.075	1.50	0.0	75.0	FLOOD
2.001	0760	120.679	0.801	5.773	1.10	0.0	193.9	FLOOD
4.000	0763	120.420	0.737	27.010	2.11	0.0	11.3	FLOOD
2.002	0762	120.257	0.785	0.019	1.93	0.0	198.5	FLOOD
2.003	Ex MH	119.894	0.529	0.000	2.33	0.0	212.4	SURCHARGED
5.000	0767	119.732	0.325	0.000	1.01	0.0	23.1	FLOOD RISK
1.003	0766	119.594	0.152	0.000	2.14	0.0	335.6	FLOOD RISK
6.000	PP (D5a)	120.241	0.241	0.000	1.49	0.0	23.4	SURCHARGED
6.001	1 (D5a)	120.238	0.338	0.000	0.20	0.0	42.1	SURCHARGED
7.000	PP (D5a)	120.180	0.320	0.000	1.07	0.0	22.1	FLOOD RISK
8.000	PP (D5a)	120.238	0.348	0.000	0.98	0.0	8.0	SURCHARGED
6.002	2 (D5a)	120.227	0.517	0.000	0.49	0.0	63.2	SURCHARGED
9.000	PP (D5a)	120.161	0.381	0.000	1.36	0.0	8.7	SURCHARGED
10.000	PP (D5a)	120.217	0.407	0.000	1.24	0.0	16.8	FLOOD RISK
10.001	3 (D5a)	120.227	0.482	0.000	0.83	0.0	26.9	SURCHARGED
6.003	4 (D5a)	120.214	0.554	0.000	0.74	0.0	87.2	SURCHARGED
6.004	5 (D5a)	120.205	0.575	0.000	0.82	0.0	117.9	SURCHARGED
11.000	PP (D5a)	120.307	0.377	0.000	1.26	0.0	10.4	SURCHARGED
12.000	PP (D5a)	120.317	0.387	0.000	1.23	0.0	12.5	SURCHARGED
6.005	6 (D5a)	120.160	0.640	0.000	1.21	0.0	138.3	SURCHARGED
6.006	7 (D5a)	120.119	0.639	0.000	1.33	0.0	186.0	SURCHARGED
13.000	8 (D5a)	121.256	0.876	0.000	0.42	0.0	31.6	FLOOD RISK
14.000	PP (D5a)	120.892	0.292	0.000	1.08	0.0	13.8	SURCHARGED
13.001	9 (D5a)	121.166	1.071	0.000	0.91	0.0	119.1	SURCHARGED
13.002	10 (D5a)	121.006	1.111	0.000	1.22	0.0	134.8	SURCHARGED
15.000	PP (D5a)	120.740	0.570	0.000	1.42	0.0	21.8	SURCHARGED
13.003	11 (D5a)	120.890	1.075	0.000	0.88	0.0	140.3	SURCHARGED
13.004	11a (D5a)	120.797	1.072	0.000	1.29	0.0	192.8	SURCHARGED

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

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
13.005	12 (D5a)	120.676	1.021	0.000	1.36	0.0	228.6	SURCHARGED
13.006	13 (D5a)	120.245	0.795	0.000	2.29	0.0	257.7	SURCHARGED
6.007	14 (D5a)	120.027	0.607	0.000	3.46	0.0	449.7	SURCHARGED
6.008	Pond (D5a)	119.917	0.402	0.000	0.57	0.0	98.0	SURCHARGED
6.009	15 (D5a)	119.925	0.575	0.000	0.64	0.0	96.7	SURCHARGED
6.010	16 (D5a)	119.473	0.323	0.000	0.90	0.0	95.3	SURCHARGED
6.011	17 (D5a)	119.460	0.341	0.000	0.69	0.0	96.8	SURCHARGED
1.004	18 (D5a)	119.415	0.340	0.000	1.63	0.0	289.0	SURCHARGED
1.005	PI (D5a)	119.274	0.209	0.000	2.40	0.0	285.9	SURCHARGED
1.006	19 (D5a)	119.135	0.095	0.000	2.25	0.0	285.9	SURCHARGED
16.000	0745	119.455	0.301	0.000	1.49	0.0	44.0	SURCHARGED
16.001	0746	119.353	0.241	0.000	1.11	0.0	43.1	SURCHARGED
16.002	1208	119.049	0.177	0.000	2.12	0.0	75.9	SURCHARGED
16.003	Ex MH	118.951	0.080	0.000	2.01	0.0	76.1	SURCHARGED
17.000	0768	118.891	-0.204	0.000	0.51	0.0	114.9	OK
17.001	0765	118.843	-0.102	0.000	0.52	0.0	93.5	OK
17.002	Ex MH	118.825	-0.090	0.000	0.47	0.0	91.2	OK
1.007	0769	118.777	-0.345	0.000	0.64	0.0	403.6	OK
18.000	1 (TC)	119.546	-0.019	0.000	0.58	0.0	21.9	OK
18.001	2 (TC)	119.491	0.106	0.000	1.06	0.0	35.8	SURCHARGED
18.002	3 (TC)	119.351	0.106	0.000	1.12	0.0	37.9	SURCHARGED
18.003	4 (TC)	119.316	0.261	0.000	0.92	0.0	31.0	SURCHARGED
18.004	5 (TC)	119.300	0.385	0.138	0.52	0.0	29.8	FLOOD
19.000	FD (TC)	119.309	0.369	0.000	1.10	0.0	3.8	SURCHARGED
18.005	6 (TC)	119.294	0.464	0.000	1.64	0.0	41.2	SURCHARGED
18.006	7 (TC)	119.285	0.685	0.000	1.27	0.0	7.5	FLOOD RISK
18.007	8 (TC)	118.996	0.576	0.000	1.37	0.0	7.6	FLOOD RISK
18.008	9 (TC)	118.901	0.533	3.195	2.26	0.0	8.4	FLOOD
18.009	1285 (TC)	118.605	0.295	0.000	2.30	0.0	8.4	FLOOD RISK
1.008	Ditch	118.165	-0.806	0.000	0.21	0.0	410.0	OK
20.000	1267	118.566	0.323	18.363	2.34	0.0	7.4	FLOOD
20.001	1288	118.470	0.266	0.000	3.78	0.0	9.7	FLOOD RISK
21.000	1287	118.138	-0.029	0.000	0.34	0.0	4.6	OK
1.009	Ditch	118.132	-0.819	0.000	0.12	0.0	408.8	OK
22.000	10 (TC)	120.060	1.010	0.017	1.27	0.0	22.0	FLOOD
22.001	11 (TC)	119.828	0.928	0.000	1.32	0.0	64.5	FLOOD RISK
22.002	12 (TC)	119.002	0.547	0.000	1.00	0.0	67.8	FLOOD RISK
22.003	13 (TC)	118.846	0.541	0.000	1.46	0.0	87.8	FLOOD RISK
23.000	14 (TC)	118.919	-0.081	0.000	0.43	0.0	10.8	OK
24.000	1191 (TC)	119.422	-0.074	0.000	0.51	0.0	18.5	FLOOD RISK
25.000	1266 (TC)	118.978	-0.050	0.000	0.77	0.0	19.2	OK
26.000	15 (TC)	118.863	0.293	0.000	0.22	0.0	3.0	SURCHARGED
23.001	16 (TC)	118.861	0.461	0.000	1.68	0.0	10.2	FLOOD RISK
22.004	17 (TC)	118.638	0.433	0.000	1.48	0.0	93.9	FLOOD RISK
27.000	RE (TC)	118.644	0.244	0.000	0.87	0.0	14.2	FLOOD RISK
22.005	18 (TC)	118.429	0.324	29.007	1.27	0.0	70.7	FLOOD
22.006	19 (TC)	118.389	0.404	0.000	2.13	0.0	67.8	FLOOD RISK
1.010	Ditch	118.081	-0.835	0.000	0.14	0.0	460.6	OK

APPENDIX E

Flood routing



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VP
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DL1 DL1 DL1 DL7A DL1 DL1 DL4
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AF3 78
AF2 79 93 AF3
AF2 80 92 AF3
81 82 83 84 85 86 87 88 89 90 91
DL3 DL4 DL6 DL6 DL1A DL7 DL6 DL6 DL6 DL4
63 DL1 62 DL1 61 DL1 60
AF2 59 AF2 58 AF2 57 AF2 56
DL2 55 DL2 54 AF2 53 AF2 52
SS
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34 35 36 37
DL3 38 39 DL4 DL2 40 DL2 41
AF2 AF2 AF2 AF2
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44 45 46 47