


APPENDIX J
DRAINAGE CALCULATIONS

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	WHALEY GREENFIELD RUN OFF	
Date 03/05/2018 16:31 File GREENFIELD RUN OFF.SRCX	Designed by JonL Checked by	
Causeway	Source Control 2017.1.2	

IH 124 Mean Annual Flood

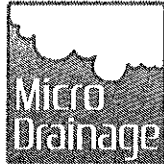
Input

Return Period (years)	100	Soil	0.450
Area (ha)	50.000	Urban	0.000
SAAR (mm)	1024	Region Number	Region 10

Results l/s

QBAR Rural	342.8
QBAR Urban	342.8
Q100 years	713.0
Q1 year	298.2
Q2 years	319.3
Q5 years	407.9
Q10 years	473.1
Q20 years	538.9
Q25 years	562.2
Q30 years	581.2
Q50 years	634.2
Q100 years	713.0
Q200 years	809.0
Q250 years	839.8
Q1000 years	1042.1

Discharge rate per hectare = $\frac{319.3}{50} = 6.4 \text{ l/s.}$

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	CUTTHORPE ROAD WHARFLEY GREENFIELD RUNOFF	
Date 11/09/2018 16:36 File LARGE SITE GREENFIELD R...	Designed by JonL Checked by	

Causeway Source Control 2017.1.2

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.000
Ratio R	0.392
Areal Reduction Factor	1.00
Area (ha)	6.350
SAAR (mm)	761
CWI	45.000
Urban	0.000
SPR	47.000

Results


Percentage Runoff (%)	30.70
Greenfield Runoff Volume (m ³)	1175.155

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 828 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	2.943	0.443	0.0	4.9	4.9	143.0	O K
30 min Summer	3.108	0.608	0.0	4.9	4.9	196.3	O K
60 min Summer	3.291	0.791	0.0	4.9	4.9	255.6	O K
120 min Summer	3.481	0.981	0.0	4.9	4.9	316.8	O K
180 min Summer	3.579	1.079	0.0	4.9	4.9	348.4	O K
240 min Summer	3.635	1.135	0.0	4.9	4.9	366.7	O K
360 min Summer	3.704	1.204	0.0	4.9	4.9	389.0	O K
480 min Summer	3.736	1.236	0.0	4.9	4.9	399.4	O K
600 min Summer	3.747	1.247	0.0	4.9	4.9	402.8	O K
720 min Summer	3.746	1.246	0.0	4.9	4.9	402.4	O K
960 min Summer	3.735	1.235	0.0	4.9	4.9	398.9	O K
1440 min Summer	3.697	1.197	0.0	4.9	4.9	386.5	O K
2160 min Summer	3.626	1.126	0.0	4.9	4.9	363.8	O K
2880 min Summer	3.551	1.051	0.0	4.9	4.9	339.4	O K
4320 min Summer	3.388	0.888	0.0	4.9	4.9	286.7	O K
5760 min Summer	3.207	0.707	0.0	4.9	4.9	228.2	O K
7200 min Summer	3.068	0.568	0.0	4.9	4.9	183.5	O K
8640 min Summer	2.959	0.459	0.0	4.9	4.9	148.2	O K
10080 min Summer	2.874	0.374	0.0	4.9	4.9	120.6	O K
15 min Winter	2.998	0.498	0.0	4.9	4.9	160.7	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	109.649	0.0	145.0	26
30 min Summer	75.673	0.0	200.6	40
60 min Summer	49.937	0.0	268.2	70
120 min Summer	31.760	0.0	341.2	128
180 min Summer	23.941	0.0	385.8	188
240 min Summer	19.434	0.0	417.6	246
360 min Summer	14.501	0.0	467.3	364
480 min Summer	11.758	0.0	505.0	482
600 min Summer	9.982	0.0	535.6	600
720 min Summer	8.726	0.0	561.6	682
960 min Summer	7.050	0.0	603.9	796
1440 min Summer	5.206	0.0	663.1	1054
2160 min Summer	3.834	0.0	744.1	1472
2880 min Summer	3.080	0.0	797.0	1884
4320 min Summer	2.259	0.0	876.2	2728
5760 min Summer	1.816	0.0	940.7	3456
7200 min Summer	1.533	0.0	992.6	4120
8640 min Summer	1.335	0.0	1037.2	4840
10080 min Summer	1.188	0.0	1076.2	5544
15 min Winter	109.649	0.0	162.6	26

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	3.184	0.684	0.0	4.9	4.9	220.8	O K
60 min Winter	3.392	0.892	0.0	4.9	4.9	288.2	O K
120 min Winter	3.607	1.107	0.0	4.9	4.9	357.5	O K
180 min Winter	3.720	1.220	0.0	4.9	4.9	394.0	O K
240 min Winter	3.787	1.287	0.0	4.9	4.9	415.8	O K
360 min Winter	3.873	1.373	0.0	4.9	4.9	443.5	O K
480 min Winter	3.917	1.417	0.0	4.9	4.9	457.7	O K
600 min Winter	3.938	1.438	0.0	4.9	4.9	464.4	O K
720 min Winter	3.943	1.443	0.0	4.9	4.9	466.2	O K
960 min Winter	3.929	1.429	0.0	4.9	4.9	461.5	O K
1440 min Winter	3.877	1.377	0.0	4.9	4.9	444.8	O K
2160 min Winter	3.775	1.275	0.0	4.9	4.9	411.9	O K
2880 min Winter	3.661	1.161	0.0	4.9	4.9	374.9	O K
4320 min Winter	3.412	0.912	0.0	4.9	4.9	294.5	O K
5760 min Winter	3.128	0.628	0.0	4.9	4.9	202.9	O K
7200 min Winter	2.939	0.439	0.0	4.9	4.9	141.7	O K
8640 min Winter	2.812	0.312	0.0	4.8	4.8	100.7	O K
10080 min Winter	2.731	0.231	0.0	4.6	4.6	74.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	75.673	0.0	224.7	40
60 min Winter	49.937	0.0	300.4	70
120 min Winter	31.760	0.0	382.2	126
180 min Winter	23.941	0.0	432.1	184
240 min Winter	19.434	0.0	467.6	242
360 min Winter	14.501	0.0	523.2	358
480 min Winter	11.758	0.0	565.2	470
600 min Winter	9.982	0.0	599.4	582
720 min Winter	8.726	0.0	628.1	692
960 min Winter	7.050	0.0	674.2	894
1440 min Winter	5.206	0.0	721.2	1116
2160 min Winter	3.834	0.0	833.5	1584
2880 min Winter	3.080	0.0	892.7	2048
4320 min Winter	2.259	0.0	981.3	2948
5760 min Winter	1.816	0.0	1053.7	3632
7200 min Winter	1.533	0.0	1111.8	4256
8640 min Winter	1.335	0.0	1161.8	4928
10080 min Winter	1.188	0.0	1205.7	5552

CODA Structures Ltd		Page 3
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03	Designed by MT	
File STORAGE AREA 1 30.05.19...	Checked by JL	
Causeway	Source Control 2017.1.2	


Rainfall Details

Rainfall Model	ESR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.720

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4 0.240	4	8 0.240	8	12 0.240

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03	Designed by MT	
File STORAGE AREA 1 30.05.19...	Checked by JL	
Causeway		Source Control 2017.1.2

Model Details

Storage is Online Cover Level (m) 5.000

Cellular Storage Structure

Invert Level (m) 2.500 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	340.0	0.0	1.501	0.0	0.0
1.500	340.0	0.0			


Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0098-5000-1500-5000
 Design Head (m) 1.500
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 98
 Invert Level (m) 2.500
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
Mean Flow over Head Range	-	4.3

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	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 2	
Date 12/09/2018 File STORAGE AREA 2.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 258 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.390	0.390	0.0	4.0	4.0	68.5	O K
30 min Summer	0.534	0.534	0.0	4.0	4.0	93.8	O K
60 min Summer	0.690	0.690	0.0	4.0	4.0	121.3	O K
120 min Summer	0.833	0.833	0.0	4.0	4.0	146.3	O K
180 min Summer	0.893	0.893	0.0	4.0	4.0	157.0	O K
240 min Summer	0.918	0.918	0.0	4.0	4.0	161.4	O K
360 min Summer	0.931	0.931	0.0	4.0	4.0	163.7	O K
480 min Summer	0.928	0.928	0.0	4.0	4.0	163.2	O K
600 min Summer	0.919	0.919	0.0	4.0	4.0	161.5	O K
720 min Summer	0.907	0.907	0.0	4.0	4.0	159.3	O K
960 min Summer	0.877	0.877	0.0	4.0	4.0	154.1	O K
1440 min Summer	0.808	0.808	0.0	4.0	4.0	142.0	O K
2160 min Summer	0.698	0.698	0.0	4.0	4.0	122.6	O K
2880 min Summer	0.564	0.564	0.0	4.0	4.0	99.1	O K
4320 min Summer	0.360	0.360	0.0	4.0	4.0	63.3	O K
5760 min Summer	0.238	0.238	0.0	4.0	4.0	41.8	O K
7200 min Summer	0.169	0.169	0.0	3.8	3.8	29.7	O K
8640 min Summer	0.130	0.130	0.0	3.6	3.6	22.8	O K
10080 min Summer	0.111	0.111	0.0	3.4	3.4	19.6	O K
15 min Winter	0.439	0.439	0.0	4.0	4.0	77.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.649	0.0	71.8	25
30 min Summer	75.673	0.0	99.3	40
60 min Summer	49.937	0.0	131.8	68
120 min Summer	31.760	0.0	167.7	126
180 min Summer	23.941	0.0	189.7	184
240 min Summer	19.434	0.0	205.3	242
360 min Summer	14.501	0.0	229.9	336
480 min Summer	11.758	0.0	248.5	394
600 min Summer	9.982	0.0	263.7	458
720 min Summer	8.726	0.0	276.6	524
960 min Summer	7.050	0.0	298.0	664
1440 min Summer	5.206	0.0	330.0	942
2160 min Summer	3.834	0.0	365.1	1364
2880 min Summer	3.080	0.0	391.1	1736
4320 min Summer	2.259	0.0	430.0	2424
5760 min Summer	1.816	0.0	461.3	3112
7200 min Summer	1.533	0.0	486.8	3752
8640 min Summer	1.335	0.0	508.7	4416
10080 min Summer	1.188	0.0	528.0	5144
15 min Winter	109.649	0.0	80.5	25

CoDa Structures

Consulting Civil & Structural Engineers
14 Springfield Court
Guisley
Leeds LS20 8FD

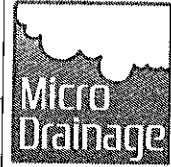
**FLOODING & DRAINAGE ASSESSMENT
FOR A MIXED USE DEVELOPMENT SITE
ADJACENT CLITHEROE ROAD, WHALLEY**

APPENDIX J

DRAINAGE CALCULATIONS

14 Springfield Court
 Guiseley
 Leeds LS20 8FD

WHALEY
 GREENFIELD RUN OFF



Date 03/05/2018 16:31
 File GREENFIELD RUN OFF.SRCX

Designed by JonL
 Checked by

Causeway

Source Control 2017.1.2

IH 124 Mean Annual Flood


Input

Return Period (years)	100	Soil	0.450
Area (ha)	50.000	Urban	0.000
SAAR (mm)	1024	Region Number	Region 10

Results l/s

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QBAR Urban	342.8
Q100 years	713.0
Q1 year	298.2
Q2 years	319.3 ←
Q5 years	407.9
Q10 years	473.1
Q20 years	538.9
Q25 years	562.2
Q30 years	581.2
Q50 years	634.2
Q100 years	713.0
Q200 years	809.0
Q250 years	839.8
Q1000 years	1042.1

Discharge rate per hectare = $\frac{319.3}{50} = 6.4 \text{ l/s.}$

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	CUTTHORPE ROAD WHARFLEY GREENFIELD RUNOFF	
Date 11/09/2018 16:36 File LARGE SITE GREENFIELD R...	Designed by JonL Checked by	
Causeway	Source Control 2017.1.2	

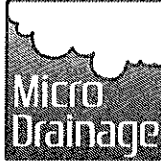
Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.000
Ratio R	0.392
Areal Reduction Factor	1.00
Area (ha)	6.350
SAAR (mm)	761
CWI	45.000
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	30.70
Greenfield Runoff Volume (m³)	1175.155

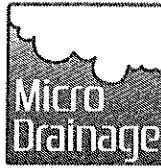
CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
Causeway	Source Control 2017.1.2	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 828 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	2.943	0.443	0.0	4.9	4.9	143.0	O K
30 min Summer	3.108	0.608	0.0	4.9	4.9	196.3	O K
60 min Summer	3.291	0.791	0.0	4.9	4.9	255.6	O K
120 min Summer	3.481	0.981	0.0	4.9	4.9	316.8	O K
180 min Summer	3.579	1.079	0.0	4.9	4.9	348.4	O K
240 min Summer	3.635	1.135	0.0	4.9	4.9	366.7	O K
360 min Summer	3.704	1.204	0.0	4.9	4.9	389.0	O K
480 min Summer	3.736	1.236	0.0	4.9	4.9	399.4	O K
600 min Summer	3.747	1.247	0.0	4.9	4.9	402.8	O K
720 min Summer	3.746	1.246	0.0	4.9	4.9	402.4	O K
960 min Summer	3.735	1.235	0.0	4.9	4.9	398.9	O K
1440 min Summer	3.697	1.197	0.0	4.9	4.9	386.5	O K
2160 min Summer	3.626	1.126	0.0	4.9	4.9	363.8	O K
2880 min Summer	3.551	1.051	0.0	4.9	4.9	339.4	O K
4320 min Summer	3.388	0.888	0.0	4.9	4.9	286.7	O K
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7200 min Summer	3.068	0.568	0.0	4.9	4.9	183.5	O K
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10080 min Summer	2.874	0.374	0.0	4.9	4.9	120.6	O K
15 min Winter	2.998	0.498	0.0	4.9	4.9	160.7	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	109.649	0.0	145.0	26
30 min Summer	75.673	0.0	200.6	40
60 min Summer	49.937	0.0	268.2	70
120 min Summer	31.760	0.0	341.2	128
180 min Summer	23.941	0.0	385.8	188
240 min Summer	19.434	0.0	417.6	246
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600 min Summer	9.982	0.0	535.6	600
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7200 min Summer	1.533	0.0	992.6	4120
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CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	3.184	0.684	0.0	4.9	4.9	220.8	O K
60 min Winter	3.392	0.892	0.0	4.9	4.9	288.2	O K
120 min Winter	3.607	1.107	0.0	4.9	4.9	357.5	O K
180 min Winter	3.720	1.220	0.0	4.9	4.9	394.0	O K
240 min Winter	3.787	1.287	0.0	4.9	4.9	415.8	O K
360 min Winter	3.873	1.373	0.0	4.9	4.9	443.5	O K
480 min Winter	3.917	1.417	0.0	4.9	4.9	457.7	O K
600 min Winter	3.938	1.438	0.0	4.9	4.9	464.4	O K
720 min Winter	3.943	1.443	0.0	4.9	4.9	466.2	O K
960 min Winter	3.929	1.429	0.0	4.9	4.9	461.5	O K
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2160 min Winter	3.775	1.275	0.0	4.9	4.9	411.9	O K
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4320 min Winter	3.412	0.912	0.0	4.9	4.9	294.5	O K
5760 min Winter	3.128	0.628	0.0	4.9	4.9	202.9	O K
7200 min Winter	2.939	0.439	0.0	4.9	4.9	141.7	O K
8640 min Winter	2.812	0.312	0.0	4.8	4.8	100.7	O K
10080 min Winter	2.731	0.231	0.0	4.6	4.6	74.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	75.673	0.0	224.7	40
60 min Winter	49.937	0.0	300.4	70
120 min Winter	31.760	0.0	382.2	126
180 min Winter	23.941	0.0	432.1	184
240 min Winter	19.434	0.0	467.6	242
360 min Winter	14.501	0.0	523.2	358
480 min Winter	11.758	0.0	565.2	470
600 min Winter	9.982	0.0	599.4	582
720 min Winter	8.726	0.0	628.1	692
960 min Winter	7.050	0.0	674.2	894
1440 min Winter	5.206	0.0	721.2	1116
2160 min Winter	3.834	0.0	833.5	1584
2880 min Winter	3.080	0.0	892.7	2048
4320 min Winter	2.259	0.0	981.3	2948
5760 min Winter	1.816	0.0	1053.7	3632
7200 min Winter	1.533	0.0	1111.8	4256
8640 min Winter	1.335	0.0	1161.8	4928
10080 min Winter	1.188	0.0	1205.7	5552

CODA Structures Ltd		Page 3
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03	Designed by MT	
File STORAGE AREA 1 30.05.19...	Checked by JL	
Causeway	Source Control 2017.1.2	


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.720

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	
From:	To:	From:	To:	From:	To:	
0	4	0.240	4	8	0.240	
				8	12	0.240

CODA Structures Ltd		Page 4
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 1	
Date 10/06/2019 15:03	Designed by MT	
File STORAGE AREA 1 30.05.19...	Checked by JL	
Causeway	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 5.000

Cellular Storage Structure

Invert Level (m) 2.500 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	340.0	0.0	1.501	0.0	0.0
1.500	340.0	0.0			


Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0098-5000-1500-5000
 Design Head (m) 1.500
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 98
 Invert Level (m) 2.500
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
Mean Flow over Head Range	-	4.3

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	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		


CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 2	
Date 12/09/2018 File STORAGE AREA 2.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 258 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	0.390	0.390	0.0	4.0	4.0	68.5	O K
30 min Summer	0.534	0.534	0.0	4.0	4.0	93.8	O K
60 min Summer	0.690	0.690	0.0	4.0	4.0	121.3	O K
120 min Summer	0.833	0.833	0.0	4.0	4.0	146.3	O K
180 min Summer	0.893	0.893	0.0	4.0	4.0	157.0	O K
240 min Summer	0.918	0.918	0.0	4.0	4.0	161.4	O K
360 min Summer	0.931	0.931	0.0	4.0	4.0	163.7	O K
480 min Summer	0.928	0.928	0.0	4.0	4.0	163.2	O K
600 min Summer	0.919	0.919	0.0	4.0	4.0	161.5	O K
720 min Summer	0.907	0.907	0.0	4.0	4.0	159.3	O K
960 min Summer	0.877	0.877	0.0	4.0	4.0	154.1	O K
1440 min Summer	0.808	0.808	0.0	4.0	4.0	142.0	O K
2160 min Summer	0.698	0.698	0.0	4.0	4.0	122.6	O K
2880 min Summer	0.564	0.564	0.0	4.0	4.0	99.1	O K
4320 min Summer	0.360	0.360	0.0	4.0	4.0	63.3	O K
5760 min Summer	0.238	0.238	0.0	4.0	4.0	41.8	O K
7200 min Summer	0.169	0.169	0.0	3.8	3.8	29.7	O K
8640 min Summer	0.130	0.130	0.0	3.6	3.6	22.8	O K
10080 min Summer	0.111	0.111	0.0	3.4	3.4	19.6	O K
15 min Winter	0.439	0.439	0.0	4.0	4.0	77.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	109.649	0.0	71.8	25
30 min Summer	75.673	0.0	99.3	40
60 min Summer	49.937	0.0	131.8	68
120 min Summer	31.760	0.0	167.7	126
180 min Summer	23.941	0.0	189.7	184
240 min Summer	19.434	0.0	205.3	242
360 min Summer	14.501	0.0	229.9	336
480 min Summer	11.758	0.0	248.5	394
600 min Summer	9.982	0.0	263.7	458
720 min Summer	8.726	0.0	276.6	524
960 min Summer	7.050	0.0	298.0	664
1440 min Summer	5.206	0.0	330.0	942
2160 min Summer	3.834	0.0	365.1	1364
2880 min Summer	3.080	0.0	391.1	1736
4320 min Summer	2.259	0.0	430.0	2424
5760 min Summer	1.816	0.0	461.3	3112
7200 min Summer	1.533	0.0	486.8	3752
8640 min Summer	1.335	0.0	508.7	4416
10080 min Summer	1.188	0.0	528.0	5144
15 min Winter	109.649	0.0	80.5	25

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 2	
Date 12/09/2018 File STORAGE AREA 2.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

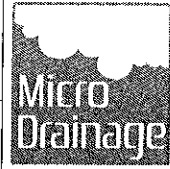
Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	0.603	0.603	0.0	4.0	4.0	105.9	O K
60 min Winter	0.779	0.779	0.0	4.0	4.0	136.9	O K
120 min Winter	0.944	0.944	0.0	4.0	4.0	165.9	O K
180 min Winter	2.694	2.694	0.0	6.3	6.3	177.5	O K
240 min Winter	3.327	3.327	0.0	7.0	7.0	178.1	O K
360 min Winter	4.365	4.365	0.0	8.0	8.0	179.2	O K
480 min Winter	4.298	4.298	0.0	7.9	7.9	179.1	O K
600 min Winter	3.657	3.657	0.0	7.3	7.3	178.5	O K
720 min Winter	2.832	2.832	0.0	6.5	6.5	177.6	O K
960 min Winter	0.996	0.996	0.0	4.0	4.0	175.1	O K
1440 min Winter	0.890	0.890	0.0	4.0	4.0	156.4	O K
2160 min Winter	0.718	0.718	0.0	4.0	4.0	126.2	O K
2880 min Winter	0.503	0.503	0.0	4.0	4.0	88.3	O K
4320 min Winter	0.240	0.240	0.0	4.0	4.0	42.1	O K
5760 min Winter	0.134	0.134	0.0	3.6	3.6	23.5	O K
7200 min Winter	0.104	0.104	0.0	3.2	3.2	18.3	O K
8640 min Winter	0.091	0.091	0.0	2.8	2.8	16.0	O K
10080 min Winter	0.082	0.082	0.0	2.5	2.5	14.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	75.673	0.0	111.3	40
60 min Winter	49.937	0.0	147.7	68
120 min Winter	31.760	0.0	187.9	124
180 min Winter	23.941	0.0	212.5	178
240 min Winter	19.434	0.0	230.0	222
360 min Winter	14.501	0.0	257.5	274
480 min Winter	11.758	0.0	278.4	350
600 min Winter	9.982	0.0	295.4	428
720 min Winter	8.726	0.0	309.9	512
960 min Winter	7.050	0.0	333.8	714
1440 min Winter	5.206	0.0	369.6	1020
2160 min Winter	3.834	0.0	409.0	1472
2880 min Winter	3.080	0.0	438.1	1828
4320 min Winter	2.259	0.0	481.7	2468
5760 min Winter	1.816	0.0	516.7	3064
7200 min Winter	1.533	0.0	545.2	3680
8640 min Winter	1.335	0.0	569.8	4408
10080 min Winter	1.188	0.0	591.4	5144

14 Springfield Court
 Guiseley
 Leeds LS20 8FD

Whalley, Clitheroe
 Stormwater Storage Calculation
 Area 2



Date 12/09/2018

Designed by MT

File STORAGE AREA 2.SRCX

Checked by JL

Causeway

Source Control 2018.1


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.353

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.118		0.118		0.118

CODA Structures Ltd		Page 4
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 2	
Date 12/09/2018	Designed by MT	
File STORAGE AREA 2.SRCX	Checked by JL	
Causeway		Source Control 2018.1

Model Details

Storage is Online Cover Level (m) 5.000

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	185.0	0.0	1.001	0.0	0.0
1.000	185.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0095-4000-1000-4000
 Design Head (m) 1.000
 Design Flow (l/s) 4.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 95
 Invert Level (m) 0.000
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	4.0
Flush-Flo™	0.294	4.0
Kick-Flo®	0.629	3.2
Mean Flow over Head Range	-	3.5

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

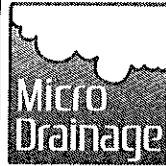
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	1.200	4.3	3.000	6.7	7.000	10.0
0.200	3.9	1.400	4.7	3.500	7.2	7.500	10.3
0.300	4.0	1.600	5.0	4.000	7.6	8.000	10.6
0.400	3.9	1.800	5.3	4.500	8.1	8.500	10.9
0.500	3.8	2.000	5.5	5.000	8.5	9.000	11.2
0.600	3.4	2.200	5.8	5.500	8.9	9.500	11.5
0.800	3.6	2.400	6.0	6.000	9.3		
1.000	4.0	2.600	6.2	6.500	9.6		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 836 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	0.299	0.299	0.0	5.0	5.0	147.7	O K
30 min Summer	0.410	0.410	0.0	5.0	5.0	202.7	O K
60 min Summer	0.535	0.535	0.0	5.0	5.0	264.1	O K
120 min Summer	0.664	0.664	0.0	5.0	5.0	327.9	O K
180 min Summer	0.732	0.732	0.0	5.0	5.0	361.5	O K
240 min Summer	0.772	0.772	0.0	5.0	5.0	381.2	O K
360 min Summer	0.821	0.821	0.0	5.0	5.0	405.7	O K
480 min Summer	0.845	0.845	0.0	5.0	5.0	417.6	O K
600 min Summer	0.855	0.855	0.0	5.0	5.0	422.4	O K
720 min Summer	0.856	0.856	0.0	5.0	5.0	422.8	O K
960 min Summer	0.851	0.851	0.0	5.0	5.0	420.5	O K
1440 min Summer	0.829	0.829	0.0	5.0	5.0	409.4	O K
2160 min Summer	0.783	0.783	0.0	5.0	5.0	386.7	O K
2880 min Summer	0.731	0.731	0.0	5.0	5.0	361.3	O K
4320 min Summer	0.615	0.615	0.0	5.0	5.0	303.7	O K
5760 min Summer	0.501	0.501	0.0	5.0	5.0	247.4	O K
7200 min Summer	0.408	0.408	0.0	5.0	5.0	201.7	O K
8640 min Summer	0.333	0.333	0.0	5.0	5.0	164.6	O K
10080 min Summer	0.274	0.274	0.0	5.0	5.0	135.3	O K
15 min Winter	0.336	0.336	0.0	5.0	5.0	165.9	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	109.649	0.0	146.4	26
30 min Summer	75.673	0.0	203.0	40
60 min Summer	49.937	0.0	274.6	70
120 min Summer	31.760	0.0	349.7	128
180 min Summer	23.941	0.0	395.4	188
240 min Summer	19.434	0.0	427.9	246
360 min Summer	14.501	0.0	478.8	364
480 min Summer	11.758	0.0	517.2	482
600 min Summer	9.982	0.0	548.4	600
720 min Summer	8.726	0.0	574.7	690
960 min Summer	7.050	0.0	617.2	802
1440 min Summer	5.206	0.0	674.0	1058
2160 min Summer	3.834	0.0	765.5	1476
2880 min Summer	3.080	0.0	819.8	1900
4320 min Summer	2.259	0.0	900.7	2724
5760 min Summer	1.816	0.0	968.8	3456
7200 min Summer	1.533	0.0	1022.1	4176
8640 min Summer	1.335	0.0	1067.7	4840
10080 min Summer	1.188	0.0	1107.1	5544
15 min Winter	109.649	0.0	164.3	26

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 3	
Date 12/09/2018 File STORAGE AREA 3.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2017.1.2	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	0.461	0.461	0.0	5.0	5.0	228.0	O K
60 min Winter	0.602	0.602	0.0	5.0	5.0	297.4	O K
120 min Winter	0.749	0.749	0.0	5.0	5.0	369.9	O K
180 min Winter	0.826	0.826	0.0	5.0	5.0	408.3	O K
240 min Winter	0.873	0.873	0.0	5.0	5.0	431.5	O K
360 min Winter	0.934	0.934	0.0	5.0	5.0	461.3	O K
480 min Winter	0.966	0.966	0.0	5.0	5.0	477.1	O K
600 min Winter	0.982	0.982	0.0	5.0	5.0	485.1	O K
720 min Winter	0.988	0.988	0.0	5.0	5.0	487.9	O K
960 min Winter	0.981	0.981	0.0	5.0	5.0	484.7	O K
1440 min Winter	0.950	0.950	0.0	5.0	5.0	469.1	O K
2160 min Winter	0.883	0.883	0.0	5.0	5.0	436.4	O K
2880 min Winter	0.806	0.806	0.0	5.0	5.0	398.3	O K
4320 min Winter	0.632	0.632	0.0	5.0	5.0	312.0	O K
5760 min Winter	0.450	0.450	0.0	5.0	5.0	222.2	O K
7200 min Winter	0.319	0.319	0.0	5.0	5.0	157.7	O K
8640 min Winter	0.229	0.229	0.0	4.9	4.9	113.2	O K
10080 min Winter	0.171	0.171	0.0	4.7	4.7	84.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	75.673	0.0	227.5	40
60 min Winter	49.937	0.0	307.8	70
120 min Winter	31.760	0.0	391.7	126
180 min Winter	23.941	0.0	442.9	184
240 min Winter	19.434	0.0	479.2	242
360 min Winter	14.501	0.0	535.9	358
480 min Winter	11.758	0.0	578.7	472
600 min Winter	9.982	0.0	613.2	584
720 min Winter	8.726	0.0	642.1	692
960 min Winter	7.050	0.0	687.6	898
1440 min Winter	5.206	0.0	731.1	1118
2160 min Winter	3.834	0.0	857.4	1584
2880 min Winter	3.080	0.0	918.1	2052
4320 min Winter	2.259	0.0	1008.6	2948
5760 min Winter	1.816	0.0	1085.2	3632
7200 min Winter	1.533	0.0	1145.0	4320
8640 min Winter	1.335	0.0	1196.2	4928
10080 min Winter	1.188	0.0	1240.7	5544

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 3	
Date 12/09/2018 File STORAGE AREA 3.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.742

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4 0.247	4	8 0.247	8	12 0.247

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 3	
Date 12/09/2018 File STORAGE AREA 3.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2

Model Details

Storage is Online Cover Level (m) 5.000

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	520.0	0.0	1.001	0.0	0.0
1.000	520.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0105-5000-1000-5000
 Design Head (m) 1.000
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 105
 Invert Level (m) 0.000
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0
Flush-Flo™	0.296	5.0
Kick-Flo®	0.637	4.1
Mean Flow over Head Range	-	4.3

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	3.6	1.200	5.4	3.000	8.4	7.000	12.5
0.200	4.8	1.400	5.8	3.500	9.0	7.500	12.9
0.300	5.0	1.600	6.2	4.000	9.6	8.000	13.3
0.400	4.9	1.800	6.6	4.500	10.1	8.500	13.7
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.1
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.5
0.800	4.5	2.400	7.5	6.000	11.6		
1.000	5.0	2.600	7.8	6.500	12.1		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 280 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	3.707	0.307	0.0	5.0	5.0	63.0	O K
30 min Summer	3.819	0.419	0.0	5.0	5.0	86.0	O K
60 min Summer	3.938	0.538	0.0	5.0	5.0	110.5	O K
120 min Summer	4.041	0.641	0.0	5.0	5.0	131.6	O K
180 min Summer	4.077	0.677	0.0	5.0	5.0	139.0	O K
240 min Summer	4.085	0.685	0.0	5.0	5.0	140.6	O K
360 min Summer	4.087	0.687	0.0	5.0	5.0	140.9	O K
480 min Summer	4.078	0.678	0.0	5.0	5.0	139.2	O K
600 min Summer	4.065	0.665	0.0	5.0	5.0	136.5	O K
720 min Summer	4.049	0.649	0.0	5.0	5.0	133.2	O K
960 min Summer	4.013	0.613	0.0	5.0	5.0	125.7	O K
1440 min Summer	3.927	0.527	0.0	5.0	5.0	108.2	O K
2160 min Summer	3.797	0.397	0.0	5.0	5.0	81.4	O K
2880 min Summer	3.696	0.296	0.0	5.0	5.0	60.8	O K
4320 min Summer	3.575	0.175	0.0	4.9	4.9	35.9	O K
5760 min Summer	3.525	0.125	0.0	4.7	4.7	25.6	O K
7200 min Summer	3.507	0.107	0.0	4.0	4.0	22.1	O K
8640 min Summer	3.496	0.096	0.0	3.5	3.5	19.7	O K
10080 min Summer	3.488	0.088	0.0	3.2	3.2	18.0	O K
15 min Winter	3.747	0.347	0.0	5.0	5.0	71.1	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.649	0.0	66.9	25
30 min Summer	75.673	0.0	92.7	39
60 min Summer	49.937	0.0	123.1	68
120 min Summer	31.760	0.0	156.7	124
180 min Summer	23.941	0.0	177.3	182
240 min Summer	19.434	0.0	191.9	232
360 min Summer	14.501	0.0	214.8	292
480 min Summer	11.758	0.0	232.2	356
600 min Summer	9.982	0.0	246.5	424
720 min Summer	8.726	0.0	258.5	494
960 min Summer	7.050	0.0	278.5	634
1440 min Summer	5.206	0.0	308.4	910
2160 min Summer	3.834	0.0	341.3	1276
2880 min Summer	3.080	0.0	365.6	1620
4320 min Summer	2.259	0.0	401.8	2296
5760 min Summer	1.816	0.0	431.2	2944
7200 min Summer	1.533	0.0	455.0	3672
8640 min Summer	1.335	0.0	475.4	4408
10080 min Summer	1.188	0.0	493.4	5136
15 min Winter	109.649	0.0	75.1	25

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14 Springfield Court Guisseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 4	
Date 12/09/2018	Designed by MT	
File STORAGE AREA 4.SRCX	Checked by JL	
Causeway		Source Control 2017.1.2

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	3.874	0.474	0.0	5.0	5.0	97.2	O K
60 min Winter	4.009	0.609	0.0	5.0	5.0	125.0	O K
120 min Winter	4.128	0.728	0.0	5.0	5.0	149.5	O K
180 min Winter	4.174	0.774	0.0	5.0	5.0	158.9	O K
240 min Winter	4.188	0.788	0.0	5.0	5.0	161.8	O K
360 min Winter	4.186	0.786	0.0	5.0	5.0	161.3	O K
480 min Winter	4.174	0.774	0.0	5.0	5.0	158.9	O K
600 min Winter	4.155	0.755	0.0	5.0	5.0	154.9	O K
720 min Winter	4.130	0.730	0.0	5.0	5.0	149.9	O K
960 min Winter	4.074	0.674	0.0	5.0	5.0	138.4	O K
1440 min Winter	3.946	0.546	0.0	5.0	5.0	111.9	O K
2160 min Winter	3.740	0.340	0.0	5.0	5.0	69.7	O K
2880 min Winter	3.608	0.208	0.0	5.0	5.0	42.7	O K
4320 min Winter	3.516	0.116	0.0	4.3	4.3	23.7	O K
5760 min Winter	3.495	0.095	0.0	3.5	3.5	19.5	O K
7200 min Winter	3.484	0.084	0.0	3.0	3.0	17.1	O K
8640 min Winter	3.476	0.076	0.0	2.6	2.6	15.6	O K
10080 min Winter	3.471	0.071	0.0	2.3	2.3	14.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	75.673	0.0	103.9	39
60 min Winter	49.937	0.0	138.0	68
120 min Winter	31.760	0.0	175.6	122
180 min Winter	23.941	0.0	198.6	180
240 min Winter	19.434	0.0	214.9	234
360 min Winter	14.501	0.0	240.6	326
480 min Winter	11.758	0.0	260.1	376
600 min Winter	9.982	0.0	276.1	456
720 min Winter	8.726	0.0	289.6	534
960 min Winter	7.050	0.0	312.0	688
1440 min Winter	5.206	0.0	345.5	990
2160 min Winter	3.834	0.0	382.3	1340
2880 min Winter	3.080	0.0	409.5	1648
4320 min Winter	2.259	0.0	450.2	2248
5760 min Winter	1.816	0.0	483.0	2944
7200 min Winter	1.533	0.0	509.6	3672
8640 min Winter	1.335	0.0	532.5	4408
10080 min Winter	1.188	0.0	552.7	5136

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 4	
Date 12/09/2018	Designed by MT	
File STORAGE AREA 4.SRCX	Checked by JL	
Causeway	Source Control 2017.1.2	

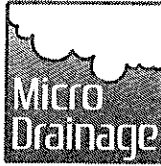
Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.330

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.110	4	8	0.110
				8	12
					0.110

CODA Structures Ltd		Page 4
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 4	
Date 12/09/2018 File STORAGE AREA 4.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2

Model Details

Storage is Online Cover Level (m) 5.000

Cellular Storage Structure

Invert Level (m) 3.400 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	216.0	0.0	0.801	0.0	0.0
0.800	216.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0109-5000-0800-5000
 Design Head (m) 0.800
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 109
 Invert Level (m) 3.400
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.241	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

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	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Causeway Source Control 2018.1

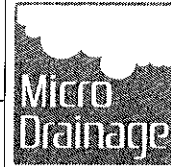
Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	0.633	0.633	4.0	37.1	O K
30 min Summer	0.793	0.793	4.0	50.6	O K
60 min Summer	0.951	0.951	4.0	63.2	O K
120 min Summer	1.071	1.071	4.0	71.5	O K
180 min Summer	1.082	1.082	4.0	72.2	O K
240 min Summer	1.066	1.066	4.0	71.2	O K
360 min Summer	1.034	1.034	4.0	69.1	O K
480 min Summer	0.999	0.999	4.0	66.7	O K
600 min Summer	0.962	0.962	4.0	64.0	O K
720 min Summer	0.923	0.923	4.0	61.1	O K
960 min Summer	0.846	0.846	4.0	54.9	O K
1440 min Summer	0.668	0.668	4.0	40.1	O K
2160 min Summer	0.455	0.455	4.0	22.4	O K
2880 min Summer	0.311	0.311	4.0	11.7	O K
4320 min Summer	0.160	0.160	3.6	3.1	O K
5760 min Summer	0.106	0.106	3.0	1.1	O K
7200 min Summer	0.089	0.089	2.6	0.8	O K
8640 min Summer	0.079	0.079	2.2	0.6	O K
10080 min Summer	0.072	0.072	2.0	0.5	O K
15 min Winter	0.694	0.694	4.0	42.3	O K
30 min Winter	0.878	0.878	4.0	57.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	109.649	0.0	42.1	24
30 min Summer	75.673	0.0	58.2	38
60 min Summer	49.937	0.0	76.8	66
120 min Summer	31.760	0.0	97.7	122
180 min Summer	23.941	0.0	110.4	168
240 min Summer	19.434	0.0	119.5	198
360 min Summer	14.501	0.0	133.8	264
480 min Summer	11.758	0.0	144.6	334
600 min Summer	9.982	0.0	153.5	404
720 min Summer	8.726	0.0	161.0	474
960 min Summer	7.050	0.0	173.4	614
1440 min Summer	5.206	0.0	192.1	870
2160 min Summer	3.834	0.0	212.2	1216
2880 min Summer	3.080	0.0	227.3	1540
4320 min Summer	2.259	0.0	250.1	2212
5760 min Summer	1.816	0.0	268.0	2928
7200 min Summer	1.533	0.0	282.8	3672
8640 min Summer	1.335	0.0	295.6	4360
10080 min Summer	1.188	0.0	306.9	5024
15 min Winter	109.649	0.0	47.2	25
30 min Winter	75.673	0.0	65.2	38

14 Springfield Court
 Guiseley
 Leeds LS20 8FD

Whalley, Clitheroe
 Stormwater Storage Calculation
 Area 5



Date 12/09/2018

Designed by MT

File STORAGE AREA 5.SRCX

Checked by JL

Causeway

Source Control 2018.1

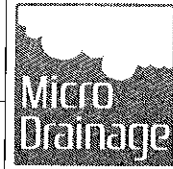
Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	1.084	1.084	4.0	72.3	O K
120 min Winter	2.634	2.634	5.8	81.8	O K
180 min Winter	2.923	2.923	6.1	82.1	O K
240 min Winter	2.557	2.557	5.7	81.7	O K
360 min Winter	1.283	1.283	4.1	80.2	O K
480 min Winter	1.161	1.161	4.0	76.6	O K
600 min Winter	1.084	1.084	4.0	72.3	O K
720 min Winter	1.014	1.014	4.0	67.7	O K
960 min Winter	0.884	0.884	4.0	58.0	O K
1440 min Winter	0.596	0.596	4.0	34.0	O K
2160 min Winter	0.306	0.306	4.0	11.4	O K
2880 min Winter	0.163	0.163	3.6	3.2	O K
4320 min Winter	0.094	0.094	2.7	0.9	O K
5760 min Winter	0.077	0.077	2.2	0.6	O K
7200 min Winter	0.069	0.069	1.9	0.4	O K
8640 min Winter	0.063	0.063	1.6	0.3	O K
10080 min Winter	0.058	0.058	1.5	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	49.937	0.0	86.0	66
120 min Winter	31.760	0.0	109.4	118
180 min Winter	23.941	0.0	123.7	146
240 min Winter	19.434	0.0	133.9	188
360 min Winter	14.501	0.0	149.8	280
480 min Winter	11.758	0.0	162.0	358
600 min Winter	9.982	0.0	171.9	436
720 min Winter	8.726	0.0	180.3	514
960 min Winter	7.050	0.0	194.2	664
1440 min Winter	5.206	0.0	215.2	916
2160 min Winter	3.834	0.0	237.7	1220
2880 min Winter	3.080	0.0	254.6	1512
4320 min Winter	2.259	0.0	280.1	2204
5760 min Winter	1.816	0.0	300.1	2848
7200 min Winter	1.533	0.0	316.7	3592
8640 min Winter	1.335	0.0	331.0	4336
10080 min Winter	1.188	0.0	343.8	4976

14 Springfield Court
 Guiseley
 Leeds LS20 8FD

Whalley, Clitheroe
 Stormwater Storage Calculation
 Area 5



Date 12/09/2018

Designed by MT

File STORAGE AREA 5.SRCX

Checked by JL

Causeway

Source Control 2018.1


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.205

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.068	4	8	0.068
				8	12
					0.068

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 5	
Date 12/09/2018 File STORAGE AREA 5.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 5.000

Pipe Structure

Diameter (m) 1.200 Length (m) 70.000
Slope (1:X) 500.000 Invert Level (m) 0.000

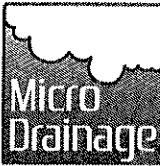
Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0092-4000-1200-4000
Design Head (m) 1.200
Design Flow (l/s) 4.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 92
Invert Level (m) 0.000
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	4.0
Flush-Flo™	0.359	4.0
Kick-Flo®	0.743	3.2
Mean Flow over Head Range	-	3.5

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)
0.100	2.9	1.200	4.0	3.000	6.1	7.000	9.1
0.200	3.8	1.400	4.3	3.500	6.6	7.500	9.4
0.300	4.0	1.600	4.6	4.000	7.0	8.000	9.7
0.400	4.0	1.800	4.8	4.500	7.4	8.500	10.0
0.500	3.9	2.000	5.1	5.000	7.8	9.000	10.3
0.600	3.8	2.200	5.3	5.500	8.2	9.500	10.6
0.800	3.3	2.400	5.5	6.000	8.5		
1.000	3.7	2.600	5.7	6.500	8.8		

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2017.1.2	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	3.149	0.649	14.4	237.8	O K
30 min Summer	3.283	0.783	14.4	324.9	O K
60 min Summer	3.422	0.922	14.4	414.4	O K
120 min Summer	3.545	1.045	14.8	492.2	O K
180 min Summer	3.597	1.097	15.1	520.4	O K
240 min Summer	3.610	1.110	15.2	526.9	O K
360 min Summer	3.603	1.103	15.2	523.4	O K
480 min Summer	3.587	1.087	15.1	515.2	O K
600 min Summer	3.570	1.070	15.0	506.2	O K
720 min Summer	3.553	1.053	14.8	496.7	O K
960 min Summer	3.519	1.019	14.6	476.0	O K
1440 min Summer	3.447	0.947	14.4	431.0	O K
2160 min Summer	3.340	0.840	14.4	361.5	O K
2880 min Summer	3.232	0.732	14.4	292.0	O K
4320 min Summer	3.016	0.516	14.4	153.6	O K
5760 min Summer	2.857	0.357	14.4	72.4	O K
7200 min Summer	2.739	0.239	14.2	32.1	O K
8640 min Summer	2.680	0.180	13.5	17.9	O K
10080 min Summer	2.661	0.161	12.1	14.2	O K
15 min Winter	3.196	0.696	14.4	268.7	O K
30 min Winter	3.348	0.848	14.4	367.2	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	109.649	0.0	255.5	25
30 min Summer	75.673	0.0	352.7	40
60 min Summer	49.937	0.0	465.5	68
120 min Summer	31.760	0.0	592.2	126
180 min Summer	23.941	0.0	669.6	184
240 min Summer	19.434	0.0	724.7	242
360 min Summer	14.501	0.0	811.1	312
480 min Summer	11.758	0.0	876.9	378
600 min Summer	9.982	0.0	930.6	442
720 min Summer	8.726	0.0	976.2	510
960 min Summer	7.050	0.0	1051.5	652
1440 min Summer	5.206	0.0	1164.8	928
2160 min Summer	3.834	0.0	1286.6	1340
2880 min Summer	3.080	0.0	1378.4	1736
4320 min Summer	2.259	0.0	1516.3	2424
5760 min Summer	1.816	0.0	1624.9	3064
7200 min Summer	1.533	0.0	1714.7	3688
8640 min Summer	1.335	0.0	1792.2	4400
10080 min Summer	1.188	0.0	1861.0	5112
15 min Winter	109.649	0.0	286.2	25
30 min Winter	75.673	0.0	395.1	39

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2017.1.2	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	3.510	1.010	14.6	470.4	O K
120 min Winter	3.692	1.192	15.7	563.9	O K
180 min Winter	3.802	1.302	16.4	601.1	O K
240 min Winter	3.852	1.352	16.7	613.4	O K
360 min Winter	3.855	1.355	16.7	614.0	O K
480 min Winter	3.806	1.306	16.4	602.2	O K
600 min Winter	3.763	1.263	16.2	590.1	O K
720 min Winter	3.724	1.224	15.9	576.3	O K
960 min Winter	3.647	1.147	15.5	544.8	O K
1440 min Winter	3.516	1.016	14.6	474.2	O K
2160 min Winter	3.346	0.846	14.4	365.8	O K
2880 min Winter	3.160	0.660	14.4	245.2	O K
4320 min Winter	2.836	0.336	14.4	64.2	O K
5760 min Winter	2.677	0.177	13.3	17.3	O K
7200 min Winter	2.651	0.151	11.3	12.6	O K
8640 min Winter	2.636	0.136	9.8	10.1	O K
10080 min Winter	2.625	0.125	8.7	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	49.937	0.0	521.4	68
120 min Winter	31.760	0.0	663.2	124
180 min Winter	23.941	0.0	749.9	180
240 min Winter	19.434	0.0	811.7	236
360 min Winter	14.501	0.0	908.5	342
480 min Winter	11.758	0.0	982.1	390
600 min Winter	9.982	0.0	1042.2	466
720 min Winter	8.726	0.0	1093.3	546
960 min Winter	7.050	0.0	1177.7	702
1440 min Winter	5.206	0.0	1304.6	1004
2160 min Winter	3.834	0.0	1441.0	1440
2880 min Winter	3.080	0.0	1543.8	1848
4320 min Winter	2.259	0.0	1698.2	2424
5760 min Winter	1.816	0.0	1819.9	2936
7200 min Winter	1.533	0.0	1920.5	3640
8640 min Winter	1.335	0.0	2007.3	4352
10080 min Winter	1.188	0.0	2084.4	5016

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 1.243

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.415	4	8	0.414
				8	12
					0.414

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14 Springfield Court Guiselley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2

Model Details

Storage is Online Cover Level (m) 5.000

Pipe Structure

Diameter (m)	Conduit Section	Length (m)	270.000
Slope (1:X)	500.000	Invert Level (m)	2.500
Section Number	12	Minor Dimm (mm)	1000
Conduit Type	[]	Side Slope (Deg)	90.0
Major Dimm (mm)	2400	Corner Splay (mm)	175
		* Hyd Radius (mm)	1.464
		XSect Area (m ²)	2.339

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0172-1450-1000-1450
Design Head (m)	1.000
Design Flow (l/s)	14.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	172
Invert Level (m)	2.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	14.5
Flush-Flo™	0.320	14.4
Kick-Flo®	0.699	12.2
Mean Flow over Head Range	-	12.3

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	6.1	1.200	15.8	3.000	24.5	7.000	36.8
0.200	13.9	1.400	17.0	3.500	26.3	7.500	38.0
0.300	14.4	1.600	18.1	4.000	28.1	8.000	39.2
0.400	14.3	1.800	19.2	4.500	29.7	8.500	40.4
0.500	14.0	2.000	20.1	5.000	31.3	9.000	41.5
0.600	13.5	2.200	21.1	5.500	32.7	9.500	42.6
0.800	13.0	2.400	22.0	6.000	34.1		
1.000	14.5	2.600	22.8	6.500	35.5		

Members Ref.

CALCULATIONS

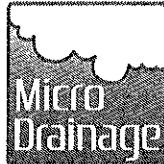
OUTPUT

The discharge volume from the developed site for the 1:100 year 6 hour event has been estimated by using the maximum discharge rate from the storage facility for each 30 minute period.

0	-	30	0.2	x	$60 \times 30 \times 10^{-3}$	=	0.36
30	-	60	1.6	x	1.8	=	2.88
60	-	90	3.1	x	1.8	=	5.58
90	-	120	4.2	x	1.8	=	7.56
120	-	150	4.7	x	1.8	=	8.46
150	-	180	4.9	x	1.8	=	8.82
180	-	210	4.9	x	1.8	=	8.82
210	-	240	4.6	x	1.8	=	8.28
240	-	270	4.0	x	1.8	=	7.20
270	-	300	4.1	x	1.8	=	7.38
300	-	330	4.2	x	1.8	=	7.56
330	-	360	4.2	x	1.8	=	7.56

Total 80.46 m³


Discharge from developed area = 80.4 m³

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr storm discharge Area 1	
Date 10/06/2019 15:06 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
Causeway	Source Control 2017.1.2	

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
2	2.500	0.000	0.1	0.0	0.0	0.0	0.0
4	2.500	0.000	0.3	0.0	0.0	0.0	0.0
6	2.500	0.000	0.7	0.0	0.0	0.0	0.1
8	2.501	0.001	1.2	0.0	0.0	0.0	0.2
10	2.501	0.001	1.8	0.0	0.0	0.0	0.4
12	2.502	0.002	2.6	0.0	0.0	0.0	0.6
14	2.503	0.003	3.3	0.0	0.0	0.0	1.0
16	2.504	0.004	4.1	0.0	0.0	0.0	1.4
18	2.506	0.006	4.7	0.0	0.0	0.0	2.0
20	2.508	0.008	5.4	0.0	0.0	0.0	2.6
22	2.510	0.010	5.9	0.0	0.1	0.1	3.2
24	2.512	0.012	6.3	0.0	0.1	0.1	4.0
26	2.515	0.015	6.7	0.0	0.1	0.1	4.7
28	2.517	0.017	7.1	0.0	0.2	0.2	5.6
30	2.520	0.020	7.4	0.0	0.2	0.2	6.4
32	2.522	0.022	7.6	0.0	0.3	0.3	7.3
34	2.525	0.025	7.8	0.0	0.3	0.3	8.2
36	2.528	0.028	7.9	0.0	0.4	0.4	9.1
38	2.531	0.031	8.1	0.0	0.5	0.5	10.0
40	2.534	0.034	8.2	0.0	0.6	0.6	10.9
42	2.536	0.036	8.2	0.0	0.7	0.7	11.8
44	2.539	0.039	8.3	0.0	0.8	0.8	12.7
46	2.542	0.042	8.3	0.0	0.9	0.9	13.6
48	2.545	0.045	8.3	0.0	1.0	1.0	14.5
50	2.548	0.048	8.3	0.0	1.1	1.1	15.3
52	2.550	0.050	8.3	0.0	1.2	1.2	16.2
54	2.553	0.053	8.3	0.0	1.3	1.3	17.1
56	2.555	0.055	8.3	0.0	1.4	1.4	17.9
58	2.558	0.058	8.3	0.0	1.5	1.5	18.7
60	2.560	0.060	8.3	0.0	1.6	1.6	19.5
62	2.563	0.063	8.4	0.0	1.7	1.7	20.3
64	2.565	0.065	8.4	0.0	1.8	1.8	21.1
66	2.568	0.068	8.4	0.0	2.0	2.0	21.9
68	2.570	0.070	8.5	0.0	2.1	2.1	22.7
70	2.573	0.073	8.5	0.0	2.2	2.2	23.4
72	2.575	0.075	8.6	0.0	2.3	2.3	24.2
74	2.577	0.077	8.7	0.0	2.4	2.4	25.0
76	2.580	0.080	8.9	0.0	2.5	2.5	25.7
78	2.582	0.082	9.0	0.0	2.6	2.6	26.5
80	2.584	0.084	9.2	0.0	2.7	2.7	27.3
82	2.587	0.087	9.4	0.0	2.8	2.8	28.1
84	2.589	0.089	9.7	0.0	2.8	2.8	28.9
86	2.592	0.092	9.9	0.0	2.9	2.9	29.7
88	2.595	0.095	10.3	0.0	3.0	3.0	30.6
90	2.597	0.097	10.6	0.0	3.1	3.1	31.4
92	2.600	0.100	11.0	0.0	3.2	3.2	32.4
94	2.603	0.103	11.3	0.0	3.3	3.3	33.3
96	2.606	0.106	11.8	0.0	3.4	3.4	34.3

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr storm discharge Area 1	
Date 10/06/2019 15:06 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2

Flood Routing through Storage Facility

Event: 360 min Winter

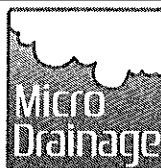
Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
98	2.609	0.109	12.3	0.0	3.5	3.5	35.3
100	2.613	0.113	12.8	0.0	3.6	3.6	36.4
102	2.616	0.116	13.3	0.0	3.7	3.7	37.5
104	2.620	0.120	13.8	0.0	3.8	3.8	38.7
106	2.624	0.124	14.5	0.0	3.9	3.9	39.9
108	2.628	0.128	15.1	0.0	3.9	3.9	41.3
110	2.632	0.132	15.8	0.0	3.9	3.9	42.6
112	2.637	0.137	16.5	0.0	4.0	4.0	44.1
114	2.641	0.141	17.2	0.0	4.0	4.0	45.6
116	2.646	0.146	18.0	0.0	4.1	4.1	47.3
118	2.652	0.152	18.8	0.0	4.1	4.1	49.0
120	2.657	0.157	19.7	0.0	4.2	4.2	50.8
122	2.663	0.163	20.4	0.0	4.2	4.2	52.7
124	2.669	0.169	21.4	0.0	4.2	4.2	54.7
126	2.676	0.176	22.2	0.0	4.3	4.3	56.8
128	2.683	0.183	23.2	0.0	4.3	4.3	59.0
130	2.690	0.190	24.1	0.0	4.4	4.4	61.3
132	2.697	0.197	25.1	0.0	4.4	4.4	63.8
134	2.705	0.205	26.1	0.0	4.5	4.5	66.3
136	2.713	0.213	27.1	0.0	4.5	4.5	69.0
138	2.722	0.222	28.2	0.0	4.5	4.5	71.7
140	2.731	0.231	29.1	0.0	4.6	4.6	74.6
142	2.740	0.240	30.2	0.0	4.6	4.6	77.6
144	2.750	0.250	31.1	0.0	4.6	4.6	80.7
146	2.760	0.260	32.2	0.0	4.7	4.7	84.0
148	2.770	0.270	33.2	0.0	4.7	4.7	87.4
150	2.781	0.281	34.3	0.0	4.7	4.7	90.8
152	2.792	0.292	35.3	0.0	4.8	4.8	94.4
154	2.804	0.304	36.3	0.0	4.8	4.8	98.2
156	2.816	0.316	37.3	0.0	4.8	4.8	102.0
158	2.828	0.328	38.2	0.0	4.8	4.8	106.0
160	2.841	0.341	39.2	0.0	4.8	4.8	110.0
162	2.854	0.354	40.1	0.0	4.8	4.8	114.2
164	2.867	0.367	41.0	0.0	4.9	4.9	118.5
166	2.880	0.380	41.9	0.0	4.9	4.9	122.9
168	2.894	0.394	42.7	0.0	4.9	4.9	127.4
170	2.909	0.409	43.5	0.0	4.9	4.9	131.9
172	2.923	0.423	44.2	0.0	4.9	4.9	136.6
174	2.938	0.438	44.9	0.0	4.9	4.9	141.4
176	2.953	0.453	45.4	0.0	4.9	4.9	146.2
178	2.968	0.468	46.0	0.0	4.9	4.9	151.1
180	2.983	0.483	46.5	0.0	4.9	4.9	156.1
182	2.999	0.499	46.8	0.0	4.9	4.9	161.1
184	3.014	0.514	47.1	0.0	4.9	4.9	166.2
186	3.030	0.530	47.1	0.0	4.8	4.8	171.2
188	3.046	0.546	47.1	0.0	4.8	4.8	176.3
190	3.061	0.561	46.8	0.0	4.8	4.8	181.4
192	3.077	0.577	46.5	0.0	4.8	4.8	186.4

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Date 10/06/2019 15:06 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
Causeway		Source Control 2017.1.2

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
194	3.092	0.592	46.0	0.0	4.8	4.8	191.4
196	3.108	0.608	45.4	0.0	4.8	4.8	196.3
198	3.123	0.623	44.9	0.0	4.7	4.7	201.1
200	3.137	0.637	44.2	0.0	4.7	4.7	205.9
202	3.152	0.652	43.5	0.0	4.7	4.7	210.6
204	3.166	0.666	42.7	0.0	4.7	4.7	215.2
206	3.180	0.680	41.9	0.0	4.7	4.7	219.7
208	3.194	0.694	41.0	0.0	4.6	4.6	224.1
210	3.207	0.707	40.1	0.0	4.6	4.6	228.4
212	3.220	0.720	39.2	0.0	4.6	4.6	232.6
214	3.233	0.733	38.2	0.0	4.5	4.5	236.7
216	3.245	0.745	37.3	0.0	4.5	4.5	240.7
218	3.257	0.757	36.3	0.0	4.5	4.5	244.6
220	3.269	0.769	35.3	0.0	4.4	4.4	248.4
222	3.280	0.780	34.3	0.0	4.4	4.4	252.0
224	3.291	0.791	33.2	0.0	4.3	4.3	255.5
226	3.302	0.802	32.2	0.0	4.3	4.3	259.0
228	3.312	0.812	31.1	0.0	4.3	4.3	262.2
230	3.322	0.822	30.2	0.0	4.2	4.2	265.4
232	3.331	0.831	29.1	0.0	4.2	4.2	268.5
234	3.340	0.840	28.2	0.0	4.1	4.1	271.4
236	3.349	0.849	27.1	0.0	4.1	4.1	274.2
238	3.357	0.857	26.1	0.0	4.0	4.0	276.9
240	3.365	0.865	25.1	0.0	4.0	4.0	279.5
242	3.373	0.873	24.1	0.0	3.9	3.9	282.0
244	3.380	0.880	23.2	0.0	3.9	3.9	284.4
246	3.387	0.887	22.2	0.0	3.9	3.9	286.6
248	3.394	0.894	21.4	0.0	3.9	3.9	288.8
250	3.400	0.900	20.4	0.0	3.9	3.9	290.8
252	3.406	0.906	19.7	0.0	4.0	4.0	292.7
254	3.412	0.912	18.8	0.0	4.0	4.0	294.6
256	3.417	0.917	18.0	0.0	4.0	4.0	296.3
258	3.422	0.922	17.2	0.0	4.0	4.0	297.9
260	3.427	0.927	16.5	0.0	4.0	4.0	299.5
262	3.432	0.932	15.8	0.0	4.0	4.0	300.9
264	3.436	0.936	15.1	0.0	4.0	4.0	302.3
266	3.440	0.940	14.5	0.0	4.0	4.0	303.6
268	3.444	0.944	13.8	0.0	4.0	4.0	304.8
270	3.447	0.947	13.3	0.0	4.0	4.0	306.0
272	3.451	0.951	12.8	0.0	4.0	4.0	307.0
274	3.454	0.954	12.3	0.0	4.1	4.1	308.1
276	3.457	0.957	11.8	0.0	4.1	4.1	309.0
278	3.459	0.959	11.3	0.0	4.1	4.1	309.9
280	3.462	0.962	11.0	0.0	4.1	4.1	310.8
282	3.465	0.965	10.6	0.0	4.1	4.1	311.6
284	3.467	0.967	10.3	0.0	4.1	4.1	312.3
286	3.469	0.969	9.9	0.0	4.1	4.1	313.0
288	3.471	0.971	9.7	0.0	4.1	4.1	313.7

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14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr storm discharge Area 1	
Date 10/06/2019 15:06 File STORAGE AREA 1 30.05.19...	Designed by MT Checked by JL	
Causeway	Source Control 2017.1.2	

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
290	3.473	0.973	9.4	0.0	4.1	4.1	314.4
292	3.475	0.975	9.2	0.0	4.1	4.1	315.0
294	3.477	0.977	9.0	0.0	4.1	4.1	315.6
296	3.479	0.979	8.9	0.0	4.1	4.1	316.2
298	3.481	0.981	8.7	0.0	4.1	4.1	316.8
300	3.482	0.982	8.6	0.0	4.1	4.1	317.3
302	3.484	0.984	8.5	0.0	4.1	4.1	317.9
304	3.486	0.986	8.5	0.0	4.1	4.1	318.4
306	3.487	0.987	8.4	0.0	4.1	4.1	318.9
308	3.489	0.989	8.4	0.0	4.1	4.1	319.4
310	3.490	0.990	8.4	0.0	4.1	4.1	319.9
312	3.492	0.992	8.3	0.0	4.1	4.1	320.4
314	3.494	0.994	8.3	0.0	4.1	4.1	320.9
316	3.495	0.995	8.3	0.0	4.1	4.1	321.4
318	3.497	0.997	8.3	0.0	4.1	4.1	321.9
320	3.498	0.998	8.3	0.0	4.1	4.1	322.4
322	3.500	1.000	8.3	0.0	4.1	4.1	323.0
324	3.501	1.001	8.3	0.0	4.1	4.1	323.5
326	3.503	1.003	8.3	0.0	4.1	4.1	324.0
328	3.505	1.005	8.3	0.0	4.2	4.2	324.5
330	3.506	1.006	8.2	0.0	4.2	4.2	324.9
332	3.508	1.008	8.2	0.0	4.2	4.2	325.4
334	3.509	1.009	8.1	0.0	4.2	4.2	325.9
336	3.510	1.010	7.9	0.0	4.2	4.2	326.4
338	3.512	1.012	7.8	0.0	4.2	4.2	326.8
340	3.513	1.013	7.6	0.0	4.2	4.2	327.2
342	3.514	1.014	7.4	0.0	4.2	4.2	327.6
344	3.515	1.015	7.1	0.0	4.2	4.2	328.0
346	3.517	1.017	6.7	0.0	4.2	4.2	328.3
348	3.517	1.017	6.3	0.0	4.2	4.2	328.6
350	3.518	1.018	5.9	0.0	4.2	4.2	328.9
352	3.519	1.019	5.4	0.0	4.2	4.2	329.0
354	3.519	1.019	4.7	0.0	4.2	4.2	329.1
356	3.519	1.019	4.1	0.0	4.2	4.2	329.2
358	3.519	1.019	3.3	0.0	4.2	4.2	329.1
360	3.518	1.018	2.6	0.0	4.2	4.2	329.0
362	3.518	1.018	1.8	0.0	4.2	4.2	328.7
364	3.517	1.017	1.2	0.0	4.2	4.2	328.4
366	3.516	1.016	0.7	0.0	4.2	4.2	328.0
368	3.514	1.014	0.3	0.0	4.2	4.2	327.6
370	3.513	1.013	0.1	0.0	4.2	4.2	327.1
372	3.511	1.011	0.0	0.0	4.2	4.2	326.6
374	3.510	1.010	0.0	0.0	4.2	4.2	326.1
376	3.508	1.008	0.0	0.0	4.2	4.2	325.6
378	3.507	1.007	0.0	0.0	4.2	4.2	325.1
380	3.505	1.005	0.0	0.0	4.2	4.2	324.6
382	3.503	1.003	0.0	0.0	4.1	4.1	324.1
384	3.502	1.002	0.0	0.0	4.1	4.1	323.6

Members Ref.


CALCULATIONS

OUTPUT

The runoff volume from the site for the 1:100yr, 6hr event has been estimated by using the maximum discharge rate in each 30-minute period.

0-30	0.2	x	$60 \times 30 \times 10^3$	=	0.36
30-60	1.2	x	1.8	=	2.16
60-90	2.3	x	1.8	=	4.14
90-120	3.5	x	1.8	=	6.30
120-150	3.9	x	1.8	=	7.02
150-180	4.0	x	1.8	=	7.20
180-210	3.9	x	1.8	=	7.02
210-240	3.5	x	1.8	=	6.30
240-270	3.5	x	1.8	=	6.30
270-300	3.6	x	1.8	=	6.48
300-330	3.6	x	1.8	=	6.48
330-360	3.6	x	1.8	=	6.48
				total =	<u>66.24 m³</u>


Discharge from developed area = 66.24 m³

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 2	
Date 12/09/2018 File RUNOFF AREA 2.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
2	0.000	0.000	0.1	0.0	0.0	0.0	0.0
4	0.000	0.000	0.1	0.0	0.0	0.0	0.0
6	0.000	0.000	0.3	0.0	0.0	0.0	0.0
8	0.001	0.001	0.6	0.0	0.0	0.0	0.1
10	0.001	0.001	0.9	0.0	0.0	0.0	0.2
12	0.002	0.002	1.3	0.0	0.0	0.0	0.3
14	0.003	0.003	1.6	0.0	0.0	0.0	0.5
16	0.004	0.004	2.0	0.0	0.0	0.0	0.7
18	0.005	0.005	2.3	0.0	0.0	0.0	1.0
20	0.007	0.007	2.6	0.0	0.0	0.0	1.3
22	0.009	0.009	2.9	0.0	0.0	0.0	1.6
24	0.011	0.011	3.1	0.0	0.1	0.1	1.9
26	0.013	0.013	3.3	0.0	0.1	0.1	2.3
28	0.015	0.015	3.5	0.0	0.1	0.1	2.7
30	0.018	0.018	3.6	0.0	0.2	0.2	3.1
32	0.020	0.020	3.7	0.0	0.2	0.2	3.5
34	0.022	0.022	3.8	0.0	0.3	0.3	4.0
36	0.025	0.025	3.9	0.0	0.3	0.3	4.4
38	0.027	0.027	4.0	0.0	0.4	0.4	4.8
40	0.030	0.030	4.0	0.0	0.5	0.5	5.2
42	0.032	0.032	4.0	0.0	0.5	0.5	5.7
44	0.035	0.035	4.1	0.0	0.6	0.6	6.1
46	0.037	0.037	4.1	0.0	0.7	0.7	6.5
48	0.039	0.039	4.1	0.0	0.8	0.8	6.9
50	0.042	0.042	4.1	0.0	0.8	0.8	7.3
52	0.044	0.044	4.1	0.0	0.9	0.9	7.7
54	0.046	0.046	4.1	0.0	1.0	1.0	8.1
56	0.048	0.048	4.1	0.0	1.1	1.1	8.4
58	0.050	0.050	4.1	0.0	1.1	1.1	8.8
60	0.052	0.052	4.1	0.0	1.2	1.2	9.1
62	0.054	0.054	4.1	0.0	1.3	1.3	9.5
64	0.056	0.056	4.1	0.0	1.4	1.4	9.8
66	0.058	0.058	4.1	0.0	1.5	1.5	10.1
68	0.059	0.059	4.1	0.0	1.5	1.5	10.4
70	0.061	0.061	4.2	0.0	1.6	1.6	10.8
72	0.063	0.063	4.2	0.0	1.7	1.7	11.1
74	0.065	0.065	4.3	0.0	1.8	1.8	11.4
76	0.066	0.066	4.3	0.0	1.8	1.8	11.7
78	0.068	0.068	4.4	0.0	1.9	1.9	12.0
80	0.070	0.070	4.5	0.0	2.0	2.0	12.3
82	0.072	0.072	4.6	0.0	2.1	2.1	12.6
84	0.073	0.073	4.7	0.0	2.1	2.1	12.9
86	0.075	0.075	4.9	0.0	2.2	2.2	13.2
88	0.077	0.077	5.0	0.0	2.3	2.3	13.5
90	0.079	0.079	5.2	0.0	2.3	2.3	13.9
92	0.081	0.081	5.4	0.0	2.4	2.4	14.2
94	0.083	0.083	5.6	0.0	2.5	2.5	14.6
96	0.085	0.085	5.8	0.0	2.6	2.6	14.9

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 2	
Date 12/09/2018 File RUNOFF AREA 2.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
98	0.087	0.087	6.0	0.0	2.6	2.6	15.3
100	0.090	0.090	6.3	0.0	2.7	2.7	15.8
102	0.092	0.092	6.5	0.0	2.8	2.8	16.2
104	0.095	0.095	6.8	0.0	2.9	2.9	16.7
106	0.097	0.097	7.1	0.0	3.0	3.0	17.1
108	0.100	0.100	7.4	0.0	3.0	3.0	17.6
110	0.103	0.103	7.7	0.0	3.1	3.1	18.2
112	0.107	0.107	8.1	0.0	3.2	3.2	18.7
114	0.110	0.110	8.5	0.0	3.3	3.3	19.3
116	0.114	0.114	8.8	0.0	3.4	3.4	20.0
118	0.117	0.117	9.2	0.0	3.5	3.5	20.6
120	0.122	0.122	9.6	0.0	3.5	3.5	21.4
122	0.126	0.126	10.0	0.0	3.6	3.6	22.1
124	0.130	0.130	10.5	0.0	3.6	3.6	22.9
126	0.135	0.135	10.9	0.0	3.6	3.6	23.8
128	0.140	0.140	11.4	0.0	3.6	3.6	24.7
130	0.146	0.146	11.8	0.0	3.7	3.7	25.6
132	0.151	0.151	12.3	0.0	3.7	3.7	26.6
134	0.158	0.158	12.8	0.0	3.7	3.7	27.7
136	0.164	0.164	13.3	0.0	3.8	3.8	28.8
138	0.171	0.171	13.8	0.0	3.8	3.8	30.0
140	0.177	0.177	14.3	0.0	3.8	3.8	31.2
142	0.185	0.185	14.8	0.0	3.8	3.8	32.5
144	0.192	0.192	15.3	0.0	3.9	3.9	33.8
146	0.200	0.200	15.8	0.0	3.9	3.9	35.2
148	0.209	0.209	16.3	0.0	3.9	3.9	36.7
150	0.217	0.217	16.8	0.0	3.9	3.9	38.2
152	0.226	0.226	17.3	0.0	3.9	3.9	39.8
154	0.236	0.236	17.8	0.0	4.0	4.0	41.4
156	0.245	0.245	18.3	0.0	4.0	4.0	43.1
158	0.255	0.255	18.7	0.0	4.0	4.0	44.8
160	0.265	0.265	19.2	0.0	4.0	4.0	46.6
162	0.276	0.276	19.6	0.0	4.0	4.0	48.5
164	0.287	0.287	20.1	0.0	4.0	4.0	50.4
166	0.298	0.298	20.5	0.0	4.0	4.0	52.3
168	0.309	0.309	20.9	0.0	4.0	4.0	54.4
170	0.321	0.321	21.3	0.0	4.0	4.0	56.4
172	0.333	0.333	21.7	0.0	4.0	4.0	58.5
174	0.345	0.345	22.0	0.0	4.0	4.0	60.7
176	0.358	0.358	22.3	0.0	4.0	4.0	62.8
178	0.370	0.370	22.6	0.0	4.0	4.0	65.0
180	0.383	0.383	22.8	0.0	3.9	3.9	67.3
182	0.396	0.396	23.0	0.0	3.9	3.9	69.6
184	0.409	0.409	23.1	0.0	3.9	3.9	71.9
186	0.422	0.422	23.1	0.0	3.9	3.9	74.2
188	0.435	0.435	23.1	0.0	3.9	3.9	76.5
190	0.448	0.448	23.0	0.0	3.9	3.9	78.8
192	0.461	0.461	22.8	0.0	3.9	3.9	81.0

CODA Structures Ltd		Page 3
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 2	
Date 12/09/2018	Designed by MT	
File RUNOFF AREA 2.SRCX	Checked by JL	
Causeway	Source Control 2018.1	

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
194	0.474	0.474	22.6	0.0	3.8	3.8	83.3
196	0.487	0.487	22.3	0.0	3.8	3.8	85.5
198	0.499	0.499	22.0	0.0	3.8	3.8	87.7
200	0.512	0.512	21.7	0.0	3.8	3.8	89.9
202	0.524	0.524	21.3	0.0	3.7	3.7	92.0
204	0.536	0.536	20.9	0.0	3.7	3.7	94.1
206	0.547	0.547	20.5	0.0	3.6	3.6	96.2
208	0.559	0.559	20.1	0.0	3.6	3.6	98.2
210	0.570	0.570	19.6	0.0	3.6	3.6	100.1
212	0.581	0.581	19.2	0.0	3.5	3.5	102.0
214	0.591	0.591	18.7	0.0	3.5	3.5	103.9
216	0.601	0.601	18.3	0.0	3.4	3.4	105.7
218	0.611	0.611	17.8	0.0	3.4	3.4	107.5
220	0.621	0.621	17.3	0.0	3.3	3.3	109.2
222	0.631	0.631	16.8	0.0	3.2	3.2	110.8
224	0.640	0.640	16.3	0.0	3.3	3.3	112.4
226	0.648	0.648	15.8	0.0	3.3	3.3	114.0
228	0.657	0.657	15.3	0.0	3.3	3.3	115.4
230	0.665	0.665	14.8	0.0	3.3	3.3	116.8
232	0.672	0.672	14.3	0.0	3.3	3.3	118.2
234	0.680	0.680	13.8	0.0	3.3	3.3	119.5
236	0.687	0.687	13.3	0.0	3.4	3.4	120.7
238	0.693	0.693	12.8	0.0	3.4	3.4	121.8
240	0.700	0.700	12.3	0.0	3.4	3.4	122.9
242	0.705	0.705	11.8	0.0	3.4	3.4	124.0
244	0.711	0.711	11.4	0.0	3.4	3.4	125.0
246	0.716	0.716	10.9	0.0	3.4	3.4	125.9
248	0.721	0.721	10.5	0.0	3.4	3.4	126.8
250	0.726	0.726	10.0	0.0	3.4	3.4	127.6
252	0.730	0.730	9.6	0.0	3.5	3.5	128.3
254	0.734	0.734	9.2	0.0	3.5	3.5	129.1
256	0.738	0.738	8.8	0.0	3.5	3.5	129.7
258	0.742	0.742	8.5	0.0	3.5	3.5	130.3
260	0.745	0.745	8.1	0.0	3.5	3.5	130.9
262	0.748	0.748	7.7	0.0	3.5	3.5	131.4
264	0.751	0.751	7.4	0.0	3.5	3.5	131.9
266	0.753	0.753	7.1	0.0	3.5	3.5	132.4
268	0.756	0.756	6.8	0.0	3.5	3.5	132.8
270	0.758	0.758	6.5	0.0	3.5	3.5	133.2
272	0.760	0.760	6.3	0.0	3.5	3.5	133.5
274	0.761	0.761	6.0	0.0	3.5	3.5	133.8
276	0.763	0.763	5.8	0.0	3.5	3.5	134.1
278	0.765	0.765	5.6	0.0	3.5	3.5	134.4
280	0.766	0.766	5.4	0.0	3.5	3.5	134.6
282	0.767	0.767	5.2	0.0	3.5	3.5	134.8
284	0.768	0.768	5.0	0.0	3.5	3.5	135.0
286	0.769	0.769	4.9	0.0	3.5	3.5	135.2
288	0.770	0.770	4.7	0.0	3.5	3.5	135.3

CODA Structures Ltd		Page 4
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 2	
Date 12/09/2018 File RUNOFF AREA 2.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
290	0.771	0.771	4.6	0.0	3.5	3.5	135.5
292	0.771	0.771	4.5	0.0	3.5	3.5	135.6
294	0.772	0.772	4.4	0.0	3.5	3.5	135.7
296	0.773	0.773	4.3	0.0	3.6	3.6	135.8
298	0.773	0.773	4.3	0.0	3.6	3.6	135.9
300	0.774	0.774	4.2	0.0	3.6	3.6	136.0
302	0.774	0.774	4.2	0.0	3.6	3.6	136.0
304	0.775	0.775	4.1	0.0	3.6	3.6	136.1
306	0.775	0.775	4.1	0.0	3.6	3.6	136.2
308	0.775	0.775	4.1	0.0	3.6	3.6	136.3
310	0.776	0.776	4.1	0.0	3.6	3.6	136.3
312	0.776	0.776	4.1	0.0	3.6	3.6	136.4
314	0.776	0.776	4.1	0.0	3.6	3.6	136.5
316	0.777	0.777	4.1	0.0	3.6	3.6	136.5
318	0.777	0.777	4.1	0.0	3.6	3.6	136.6
320	0.777	0.777	4.1	0.0	3.6	3.6	136.6
322	0.778	0.778	4.1	0.0	3.6	3.6	136.7
324	0.778	0.778	4.1	0.0	3.6	3.6	136.8
326	0.779	0.779	4.1	0.0	3.6	3.6	136.8
328	0.779	0.779	4.1	0.0	3.6	3.6	136.9
330	0.779	0.779	4.0	0.0	3.6	3.6	137.0
332	0.780	0.780	4.0	0.0	3.6	3.6	137.0
334	0.780	0.780	4.0	0.0	3.6	3.6	137.1
336	0.780	0.780	3.9	0.0	3.6	3.6	137.1
338	0.780	0.780	3.8	0.0	3.6	3.6	137.1
340	0.780	0.780	3.7	0.0	3.6	3.6	137.2
342	0.780	0.780	3.6	0.0	3.6	3.6	137.2
344	0.780	0.780	3.5	0.0	3.6	3.6	137.2
346	0.780	0.780	3.3	0.0	3.6	3.6	137.1
348	0.780	0.780	3.1	0.0	3.6	3.6	137.1
350	0.780	0.780	2.9	0.0	3.6	3.6	137.0
352	0.779	0.779	2.6	0.0	3.6	3.6	136.9
354	0.778	0.778	2.3	0.0	3.6	3.6	136.8
356	0.777	0.777	2.0	0.0	3.6	3.6	136.6
358	0.776	0.776	1.6	0.0	3.6	3.6	136.4
360	0.775	0.775	1.3	0.0	3.6	3.6	136.2
362	0.773	0.773	0.9	0.0	3.6	3.6	135.9
364	0.771	0.771	0.6	0.0	3.5	3.5	135.5
366	0.769	0.769	0.3	0.0	3.5	3.5	135.2
368	0.767	0.767	0.1	0.0	3.5	3.5	134.8
370	0.765	0.765	0.1	0.0	3.5	3.5	134.4
372	0.762	0.762	0.0	0.0	3.5	3.5	133.9
374	0.760	0.760	0.0	0.0	3.5	3.5	133.5
376	0.757	0.757	0.0	0.0	3.5	3.5	133.1
378	0.755	0.755	0.0	0.0	3.5	3.5	132.7
380	0.753	0.753	0.0	0.0	3.5	3.5	132.3
382	0.750	0.750	0.0	0.0	3.5	3.5	131.8
384	0.748	0.748	0.0	0.0	3.5	3.5	131.4

Members Ref.

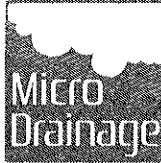
CALCULATIONS

OUTPUT

The runoff volume from the site for the 1:100yr. 6hr event has been estimated by using the maximum discharge rate in each 30-minute period.

0 - 30	0.1	x	$60 \times 30 \times 10^{-3}$	=	0.18
30 - 60	1.1	x	1.8	=	1.98
60 - 90	2.5	x	1.8	=	4.5
90 - 120	4.3	x	1.8	=	7.74
120 - 150	4.9	x	1.8	=	8.82
150 - 180	5.0	x	1.8	=	9.00
180 - 210	4.9	x	1.8	=	8.82
210 - 240	4.6	x	1.8	=	8.28
240 - 270	4.2	x	1.8	=	7.56
270 - 300	4.3	x	1.8	=	7.74
300 - 330	4.3	x	1.8	=	7.74
330 - 360	4.4	x	1.8	=	7.92
total =					80.28 m^3


Discharge from developed area = 80.28 m^3

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 3	
Date 12/09/2018 File RUNOFF AREA 3.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
2	0.000	0.000	0.1	0.0	0.0	0.0	0.0
4	0.000	0.000	0.3	0.0	0.0	0.0	0.0
6	0.000	0.000	0.7	0.0	0.0	0.0	0.1
8	0.000	0.000	1.2	0.0	0.0	0.0	0.2
10	0.001	0.001	1.9	0.0	0.0	0.0	0.4
12	0.001	0.001	2.7	0.0	0.0	0.0	0.7
14	0.002	0.002	3.4	0.0	0.0	0.0	1.0
16	0.003	0.003	4.3	0.0	0.0	0.0	1.5
18	0.004	0.004	4.9	0.0	0.0	0.0	2.0
20	0.006	0.006	5.5	0.0	0.0	0.0	2.7
22	0.007	0.007	6.1	0.0	0.0	0.0	3.3
24	0.009	0.009	6.5	0.0	0.0	0.0	4.1
26	0.011	0.011	7.0	0.0	0.1	0.1	4.9
28	0.013	0.013	7.3	0.0	0.1	0.1	5.7
30	0.015	0.015	7.6	0.0	0.1	0.1	6.6
32	0.017	0.017	7.8	0.0	0.2	0.2	7.5
34	0.019	0.019	8.0	0.0	0.2	0.2	8.5
36	0.021	0.021	8.2	0.0	0.2	0.2	9.4
38	0.023	0.023	8.3	0.0	0.3	0.3	10.4
40	0.025	0.025	8.4	0.0	0.3	0.3	11.3
42	0.027	0.027	8.5	0.0	0.4	0.4	12.3
44	0.029	0.029	8.5	0.0	0.5	0.5	13.3
46	0.031	0.031	8.6	0.0	0.5	0.5	14.2
48	0.033	0.033	8.6	0.0	0.6	0.6	15.2
50	0.035	0.035	8.6	0.0	0.7	0.7	16.2
52	0.038	0.038	8.6	0.0	0.8	0.8	17.1
54	0.040	0.040	8.6	0.0	0.8	0.8	18.0
56	0.042	0.042	8.6	0.0	0.9	0.9	19.0
58	0.044	0.044	8.6	0.0	1.0	1.0	19.9
60	0.046	0.046	8.6	0.0	1.1	1.1	20.8
62	0.048	0.048	8.6	0.0	1.2	1.2	21.7
64	0.050	0.050	8.6	0.0	1.2	1.2	22.6
66	0.051	0.051	8.7	0.0	1.3	1.3	23.5
68	0.053	0.053	8.7	0.0	1.4	1.4	24.4
70	0.055	0.055	8.8	0.0	1.5	1.5	25.2
72	0.057	0.057	8.9	0.0	1.6	1.6	26.1
74	0.059	0.059	9.0	0.0	1.7	1.7	27.0
76	0.061	0.061	9.1	0.0	1.8	1.8	27.9
78	0.063	0.063	9.3	0.0	1.9	1.9	28.8
80	0.065	0.065	9.5	0.0	2.0	2.0	29.6
82	0.067	0.067	9.7	0.0	2.1	2.1	30.6
84	0.069	0.069	10.0	0.0	2.2	2.2	31.5
86	0.071	0.071	10.2	0.0	2.3	2.3	32.4
88	0.073	0.073	10.6	0.0	2.4	2.4	33.4
90	0.075	0.075	10.9	0.0	2.5	2.5	34.4
92	0.078	0.078	11.3	0.0	2.6	2.6	35.4
94	0.080	0.080	11.7	0.0	2.7	2.7	36.5
96	0.082	0.082	12.1	0.0	2.8	2.8	37.6

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 3	
Date 12/09/2018 File RUNOFF AREA 3.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
98	0.085	0.085	12.6	0.0	2.9	2.9	38.7
100	0.088	0.088	13.1	0.0	3.1	3.1	39.9
102	0.090	0.090	13.7	0.0	3.2	3.2	41.1
104	0.093	0.093	14.3	0.0	3.3	3.3	42.4
106	0.096	0.096	14.9	0.0	3.4	3.4	43.8
108	0.099	0.099	15.5	0.0	3.5	3.5	45.2
110	0.102	0.102	16.3	0.0	3.7	3.7	46.7
112	0.106	0.106	17.0	0.0	3.8	3.8	48.2
114	0.109	0.109	17.8	0.0	3.9	3.9	49.8
116	0.113	0.113	18.6	0.0	4.0	4.0	51.6
118	0.117	0.117	19.4	0.0	4.2	4.2	53.3
120	0.121	0.121	20.3	0.0	4.3	4.3	55.2
122	0.125	0.125	21.1	0.0	4.4	4.4	57.2
124	0.130	0.130	22.0	0.0	4.5	4.5	59.2
126	0.135	0.135	22.9	0.0	4.5	4.5	61.4
128	0.140	0.140	23.9	0.0	4.5	4.5	63.6
130	0.145	0.145	24.9	0.0	4.6	4.6	66.0
132	0.150	0.150	25.9	0.0	4.6	4.6	68.5
134	0.156	0.156	26.9	0.0	4.6	4.6	71.1
136	0.162	0.162	27.9	0.0	4.7	4.7	73.9
138	0.168	0.168	29.0	0.0	4.7	4.7	76.7
140	0.175	0.175	30.0	0.0	4.7	4.7	79.7
142	0.182	0.182	31.1	0.0	4.8	4.8	82.8
144	0.189	0.189	32.1	0.0	4.8	4.8	86.0
146	0.196	0.196	33.2	0.0	4.8	4.8	89.3
148	0.203	0.203	34.2	0.0	4.9	4.9	92.8
150	0.211	0.211	35.3	0.0	4.9	4.9	96.4
152	0.219	0.219	36.4	0.0	4.9	4.9	100.1
154	0.228	0.228	37.4	0.0	4.9	4.9	103.9
156	0.237	0.237	38.5	0.0	4.9	4.9	107.9
158	0.246	0.246	39.4	0.0	4.9	4.9	112.0
160	0.255	0.255	40.4	0.0	5.0	5.0	116.2
162	0.264	0.264	41.3	0.0	5.0	5.0	120.5
164	0.274	0.274	42.3	0.0	5.0	5.0	124.9
166	0.284	0.284	43.1	0.0	5.0	5.0	129.4
168	0.294	0.294	44.0	0.0	5.0	5.0	134.0
170	0.304	0.304	44.8	0.0	5.0	5.0	138.8
172	0.315	0.315	45.5	0.0	5.0	5.0	143.6
174	0.326	0.326	46.3	0.0	5.0	5.0	148.5
176	0.337	0.337	46.8	0.0	5.0	5.0	153.5
178	0.348	0.348	47.4	0.0	5.0	5.0	158.6
180	0.359	0.359	47.9	0.0	4.9	4.9	163.7
182	0.370	0.370	48.3	0.0	4.9	4.9	168.9
184	0.382	0.382	48.5	0.0	4.9	4.9	174.1
186	0.393	0.393	48.6	0.0	4.9	4.9	179.3
188	0.405	0.405	48.5	0.0	4.9	4.9	184.6
190	0.416	0.416	48.3	0.0	4.9	4.9	189.8
192	0.428	0.428	47.9	0.0	4.9	4.9	195.0

CODA Structures Ltd		Page 3
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 3	
Date 12/09/2018	Designed by MT	
File RUNOFF AREA 3.SRCX	Checked by JL	
Causeway	Source Control 2018.1	

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
194	0.439	0.439	47.4	0.0	4.9	4.9	200.1
196	0.450	0.450	46.8	0.0	4.8	4.8	205.2
198	0.461	0.461	46.3	0.0	4.8	4.8	210.2
200	0.472	0.472	45.5	0.0	4.8	4.8	215.1
202	0.482	0.482	44.8	0.0	4.8	4.8	220.0
204	0.493	0.493	44.0	0.0	4.8	4.8	224.7
206	0.503	0.503	43.1	0.0	4.7	4.7	229.4
208	0.513	0.513	42.3	0.0	4.7	4.7	233.9
210	0.523	0.523	41.3	0.0	4.7	4.7	238.4
212	0.532	0.532	40.4	0.0	4.6	4.6	242.7
214	0.542	0.542	39.4	0.0	4.6	4.6	247.0
216	0.551	0.551	38.5	0.0	4.6	4.6	251.1
218	0.559	0.559	37.4	0.0	4.5	4.5	255.1
220	0.568	0.568	36.4	0.0	4.5	4.5	259.0
222	0.576	0.576	35.3	0.0	4.5	4.5	262.7
224	0.584	0.584	34.2	0.0	4.4	4.4	266.4
226	0.592	0.592	33.2	0.0	4.4	4.4	269.9
228	0.599	0.599	32.1	0.0	4.3	4.3	273.3
230	0.606	0.606	31.1	0.0	4.3	4.3	276.5
232	0.613	0.613	30.0	0.0	4.3	4.3	279.7
234	0.620	0.620	29.0	0.0	4.2	4.2	282.7
236	0.626	0.626	27.9	0.0	4.2	4.2	285.6
238	0.633	0.633	26.9	0.0	4.1	4.1	288.4
240	0.638	0.638	25.9	0.0	4.1	4.1	291.1
242	0.644	0.644	24.9	0.0	4.1	4.1	293.7
244	0.649	0.649	23.9	0.0	4.1	4.1	296.1
246	0.654	0.654	22.9	0.0	4.1	4.1	298.4
248	0.659	0.659	22.0	0.0	4.1	4.1	300.6
250	0.664	0.664	21.1	0.0	4.1	4.1	302.7
252	0.668	0.668	20.3	0.0	4.1	4.1	304.7
254	0.672	0.672	19.4	0.0	4.2	4.2	306.6
256	0.676	0.676	18.6	0.0	4.2	4.2	308.3
258	0.680	0.680	17.8	0.0	4.2	4.2	310.0
260	0.683	0.683	17.0	0.0	4.2	4.2	311.6
262	0.687	0.687	16.3	0.0	4.2	4.2	313.1
264	0.690	0.690	15.5	0.0	4.2	4.2	314.5
266	0.693	0.693	14.9	0.0	4.2	4.2	315.8
268	0.695	0.695	14.3	0.0	4.2	4.2	317.1
270	0.698	0.698	13.7	0.0	4.2	4.2	318.2
272	0.700	0.700	13.1	0.0	4.2	4.2	319.4
274	0.703	0.703	12.6	0.0	4.2	4.2	320.4
276	0.705	0.705	12.1	0.0	4.3	4.3	321.4
278	0.707	0.707	11.7	0.0	4.3	4.3	322.3
280	0.709	0.709	11.3	0.0	4.3	4.3	323.2
282	0.710	0.710	10.9	0.0	4.3	4.3	324.0
284	0.712	0.712	10.6	0.0	4.3	4.3	324.7
286	0.714	0.714	10.2	0.0	4.3	4.3	325.5
288	0.715	0.715	10.0	0.0	4.3	4.3	326.2

CODA Structures Ltd		Page 4
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 3	
Date 12/09/2018 File RUNOFF AREA 3.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Inflow (l/s)	Filtration (l/s)	Control (l/s)	Outflow (l/s)	Volume (m ³)
290	0.717	0.717	9.7	0.0	4.3	4.3	326.8
292	0.718	0.718	9.5	0.0	4.3	4.3	327.5
294	0.720	0.720	9.3	0.0	4.3	4.3	328.1
296	0.721	0.721	9.1	0.0	4.3	4.3	328.7
298	0.722	0.722	9.0	0.0	4.3	4.3	329.3
300	0.723	0.723	8.9	0.0	4.3	4.3	329.8
302	0.724	0.724	8.8	0.0	4.3	4.3	330.4
304	0.726	0.726	8.7	0.0	4.3	4.3	330.9
306	0.727	0.727	8.7	0.0	4.3	4.3	331.4
308	0.728	0.728	8.6	0.0	4.3	4.3	331.9
310	0.729	0.729	8.6	0.0	4.3	4.3	332.5
312	0.730	0.730	8.6	0.0	4.3	4.3	333.0
314	0.731	0.731	8.6	0.0	4.3	4.3	333.5
316	0.732	0.732	8.6	0.0	4.3	4.3	334.0
318	0.734	0.734	8.6	0.0	4.3	4.3	334.5
320	0.735	0.735	8.6	0.0	4.3	4.3	335.0
322	0.736	0.736	8.6	0.0	4.3	4.3	335.5
324	0.737	0.737	8.6	0.0	4.3	4.3	336.0
326	0.738	0.738	8.6	0.0	4.3	4.3	336.6
328	0.739	0.739	8.5	0.0	4.3	4.3	337.1
330	0.740	0.740	8.5	0.0	4.3	4.3	337.6
332	0.741	0.741	8.4	0.0	4.4	4.4	338.1
334	0.742	0.742	8.3	0.0	4.4	4.4	338.5
336	0.743	0.743	8.2	0.0	4.4	4.4	339.0
338	0.744	0.744	8.0	0.0	4.4	4.4	339.5
340	0.745	0.745	7.8	0.0	4.4	4.4	339.9
342	0.746	0.746	7.6	0.0	4.4	4.4	340.3
344	0.747	0.747	7.3	0.0	4.4	4.4	340.7
346	0.748	0.748	7.0	0.0	4.4	4.4	341.0
348	0.748	0.748	6.5	0.0	4.4	4.4	341.3
350	0.749	0.749	6.1	0.0	4.4	4.4	341.5
352	0.749	0.749	5.5	0.0	4.4	4.4	341.7
354	0.750	0.750	4.9	0.0	4.4	4.4	341.8
356	0.750	0.750	4.3	0.0	4.4	4.4	341.8
358	0.749	0.749	3.4	0.0	4.4	4.4	341.7
360	0.749	0.749	2.7	0.0	4.4	4.4	341.6
362	0.749	0.749	1.9	0.0	4.4	4.4	341.3
364	0.748	0.748	1.2	0.0	4.4	4.4	341.0
366	0.747	0.747	0.7	0.0	4.4	4.4	340.6
368	0.746	0.746	0.3	0.0	4.4	4.4	340.1
370	0.745	0.745	0.1	0.0	4.4	4.4	339.6
372	0.744	0.744	0.0	0.0	4.4	4.4	339.1
374	0.742	0.742	0.0	0.0	4.4	4.4	338.6
376	0.741	0.741	0.0	0.0	4.4	4.4	338.0
378	0.740	0.740	0.0	0.0	4.3	4.3	337.5
380	0.739	0.739	0.0	0.0	4.3	4.3	337.0
382	0.738	0.738	0.0	0.0	4.3	4.3	336.5
384	0.737	0.737	0.0	0.0	4.3	4.3	336.0

Members
Ref.

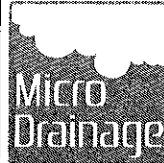
CALCULATIONS

OUTPUT

The runoff volume from the site for the 1:100yr, 6hr event has been estimated by using the maximum discharge rate in each 30-minute period.

0 - 30	0.2	x	$60 \times 30 \times 10^{-3}$	=	0.36
30 - 60	1.5	x	1.8	=	2.70
60 - 90	2.7	x	1.8	=	4.86
90 - 120	4.2	x	1.8	=	7.56
120 - 150	4.7	x	1.8	=	8.46
150 - 180	5.0	x	1.8	=	9.00
180 - 210	4.9	x	1.8	=	8.82
210 - 240	4.4	x	1.8	=	7.92
240 - 270	4.4	x	1.8	=	7.92
270 - 300	4.4	x	1.8	=	7.92
300 - 330	4.4	x	1.8	=	7.92
330 - 360	4.4	x	1.8	=	7.92
				total =	<u>81.72 m³</u>


Discharge from developed area = 81.72 m³

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 4	
Date 12/09/2018 File RUNOFF AREA 4.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
2	0.000	0.000	0.0	0.0	0.0	0.0	0.0
4	0.000	0.000	0.1	0.0	0.0	0.0	0.0
6	0.000	0.000	0.3	0.0	0.0	0.0	0.0
8	0.001	0.001	0.5	0.0	0.0	0.0	0.1
10	0.001	0.001	0.8	0.0	0.0	0.0	0.2
12	0.002	0.002	1.2	0.0	0.0	0.0	0.3
14	0.003	0.003	1.5	0.0	0.0	0.0	0.5
16	0.004	0.004	1.9	0.0	0.0	0.0	0.7
18	0.006	0.006	2.2	0.0	0.0	0.0	0.9
20	0.008	0.008	2.5	0.0	0.0	0.0	1.2
22	0.010	0.010	2.7	0.0	0.1	0.1	1.5
24	0.012	0.012	2.9	0.0	0.1	0.1	1.8
26	0.015	0.015	3.1	0.0	0.1	0.1	2.2
28	0.017	0.017	3.2	0.0	0.2	0.2	2.5
30	0.020	0.020	3.4	0.0	0.2	0.2	2.9
32	0.022	0.022	3.5	0.0	0.3	0.3	3.3
34	0.025	0.025	3.6	0.0	0.3	0.3	3.7
36	0.027	0.027	3.6	0.0	0.4	0.4	4.0
38	0.030	0.030	3.7	0.0	0.5	0.5	4.4
40	0.033	0.033	3.7	0.0	0.6	0.6	4.8
42	0.035	0.035	3.8	0.0	0.7	0.7	5.2
44	0.038	0.038	3.8	0.0	0.8	0.8	5.6
46	0.040	0.040	3.8	0.0	0.8	0.8	5.9
48	0.043	0.043	3.8	0.0	0.9	0.9	6.3
50	0.045	0.045	3.8	0.0	1.0	1.0	6.6
52	0.047	0.047	3.8	0.0	1.1	1.1	6.9
54	0.049	0.049	3.8	0.0	1.2	1.2	7.3
56	0.051	0.051	3.8	0.0	1.3	1.3	7.6
58	0.053	0.053	3.8	0.0	1.4	1.4	7.9
60	0.055	0.055	3.8	0.0	1.5	1.5	8.1
62	0.057	0.057	3.8	0.0	1.6	1.6	8.4
64	0.059	0.059	3.8	0.0	1.7	1.7	8.7
66	0.061	0.061	3.9	0.0	1.8	1.8	8.9
68	0.062	0.062	3.9	0.0	1.8	1.8	9.2
70	0.064	0.064	3.9	0.0	1.9	1.9	9.4
72	0.066	0.066	3.9	0.0	2.0	2.0	9.7
74	0.067	0.067	4.0	0.0	2.1	2.1	9.9
76	0.069	0.069	4.1	0.0	2.1	2.1	10.1
78	0.070	0.070	4.1	0.0	2.2	2.2	10.4
80	0.072	0.072	4.2	0.0	2.3	2.3	10.6
82	0.074	0.074	4.3	0.0	2.4	2.4	10.8
84	0.075	0.075	4.4	0.0	2.5	2.5	11.1
86	0.077	0.077	4.6	0.0	2.5	2.5	11.3
88	0.078	0.078	4.7	0.0	2.6	2.6	11.5
90	0.080	0.080	4.8	0.0	2.7	2.7	11.8
92	0.082	0.082	5.0	0.0	2.8	2.8	12.1
94	0.084	0.084	5.2	0.0	2.9	2.9	12.3
96	0.086	0.086	5.4	0.0	3.0	3.0	12.6

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 4	
Date 12/09/2018	Designed by MT	
File RUNOFF AREA 4.SRCX	Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter


Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
98	0.088	0.088	5.6	0.0	3.1	3.1	12.9
100	0.090	0.090	5.8	0.0	3.2	3.2	13.2
102	0.092	0.092	6.1	0.0	3.3	3.3	13.6
104	0.094	0.094	6.3	0.0	3.3	3.3	13.9
106	0.097	0.097	6.6	0.0	3.4	3.4	14.3
108	0.100	0.100	6.9	0.0	3.6	3.6	14.7
110	0.102	0.102	7.2	0.0	3.7	3.7	15.1
112	0.105	0.105	7.6	0.0	3.8	3.8	15.5
114	0.109	0.109	7.9	0.0	3.9	3.9	16.0
116	0.112	0.112	8.3	0.0	4.0	4.0	16.5
118	0.116	0.116	8.6	0.0	4.1	4.1	17.0
120	0.119	0.119	9.0	0.0	4.2	4.2	17.6
122	0.123	0.123	9.4	0.0	4.4	4.4	18.2
124	0.128	0.128	9.8	0.0	4.4	4.4	18.8
126	0.132	0.132	10.2	0.0	4.5	4.5	19.4
128	0.137	0.137	10.6	0.0	4.5	4.5	20.1
130	0.142	0.142	11.1	0.0	4.6	4.6	20.9
132	0.147	0.147	11.5	0.0	4.6	4.6	21.7
134	0.153	0.153	12.0	0.0	4.6	4.6	22.6
136	0.159	0.159	12.4	0.0	4.7	4.7	23.5
138	0.166	0.166	12.9	0.0	4.7	4.7	24.4
140	0.173	0.173	13.3	0.0	4.7	4.7	25.4
142	0.180	0.180	13.8	0.0	4.8	4.8	26.5
144	0.187	0.187	14.3	0.0	4.8	4.8	27.6
146	0.195	0.195	14.8	0.0	4.8	4.8	28.8
148	0.204	0.204	15.2	0.0	4.9	4.9	30.0
150	0.212	0.212	15.7	0.0	4.9	4.9	31.3
152	0.221	0.221	16.2	0.0	4.9	4.9	32.6
154	0.231	0.231	16.6	0.0	4.9	4.9	34.0
156	0.240	0.240	17.1	0.0	4.9	4.9	35.4
158	0.250	0.250	17.5	0.0	5.0	5.0	36.9
160	0.261	0.261	18.0	0.0	5.0	5.0	38.4
162	0.272	0.272	18.4	0.0	5.0	5.0	40.0
164	0.283	0.283	18.8	0.0	5.0	5.0	41.6
166	0.294	0.294	19.2	0.0	5.0	5.0	43.3
168	0.306	0.306	19.6	0.0	5.0	5.0	45.0
170	0.318	0.318	19.9	0.0	5.0	5.0	46.8
172	0.330	0.330	20.2	0.0	5.0	5.0	48.6
174	0.343	0.343	20.6	0.0	5.0	5.0	50.5
176	0.356	0.356	20.8	0.0	4.9	4.9	52.4
178	0.369	0.369	21.1	0.0	4.9	4.9	54.3
180	0.382	0.382	21.3	0.0	4.9	4.9	56.3
182	0.395	0.395	21.5	0.0	4.9	4.9	58.2
184	0.409	0.409	21.6	0.0	4.9	4.9	60.2
186	0.423	0.423	21.6	0.0	4.9	4.9	62.2
188	0.436	0.436	21.6	0.0	4.9	4.9	64.2
190	0.450	0.450	21.5	0.0	4.8	4.8	66.2
192	0.463	0.463	21.3	0.0	4.8	4.8	68.2

CODA Structures Ltd		Page 3
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 4	
Date 12/09/2018 File RUNOFF AREA 4.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
194	0.477	0.477	21.1	0.0	4.8	4.8	70.2
196	0.490	0.490	20.8	0.0	4.8	4.8	72.1
198	0.503	0.503	20.6	0.0	4.7	4.7	74.0
200	0.516	0.516	20.2	0.0	4.7	4.7	75.9
202	0.528	0.528	19.9	0.0	4.7	4.7	77.8
204	0.541	0.541	19.6	0.0	4.6	4.6	79.6
206	0.553	0.553	19.2	0.0	4.6	4.6	81.4
208	0.564	0.564	18.8	0.0	4.5	4.5	83.1
210	0.576	0.576	18.4	0.0	4.5	4.5	84.8
212	0.587	0.587	18.0	0.0	4.4	4.4	86.4
214	0.598	0.598	17.5	0.0	4.4	4.4	88.0
216	0.609	0.609	17.1	0.0	4.3	4.3	89.6
218	0.619	0.619	16.6	0.0	4.2	4.2	91.1
220	0.629	0.629	16.2	0.0	4.1	4.1	92.6
222	0.638	0.638	15.7	0.0	4.1	4.1	94.0
224	0.648	0.648	15.2	0.0	4.1	4.1	95.4
226	0.657	0.657	14.8	0.0	4.1	4.1	96.7
228	0.665	0.665	14.3	0.0	4.1	4.1	97.9
230	0.673	0.673	13.8	0.0	4.2	4.2	99.1
232	0.681	0.681	13.3	0.0	4.2	4.2	100.2
234	0.688	0.688	12.9	0.0	4.2	4.2	101.3
236	0.695	0.695	12.4	0.0	4.2	4.2	102.3
238	0.701	0.701	12.0	0.0	4.2	4.2	103.3
240	0.707	0.707	11.5	0.0	4.3	4.3	104.2
242	0.713	0.713	11.1	0.0	4.3	4.3	105.0
244	0.719	0.719	10.6	0.0	4.3	4.3	105.8
246	0.724	0.724	10.2	0.0	4.3	4.3	106.5
248	0.728	0.728	9.8	0.0	4.3	4.3	107.2
250	0.732	0.732	9.4	0.0	4.3	4.3	107.9
252	0.736	0.736	9.0	0.0	4.3	4.3	108.4
254	0.740	0.740	8.6	0.0	4.3	4.3	109.0
256	0.743	0.743	8.3	0.0	4.4	4.4	109.5
258	0.746	0.746	7.9	0.0	4.4	4.4	109.9
260	0.749	0.749	7.6	0.0	4.4	4.4	110.3
262	0.752	0.752	7.2	0.0	4.4	4.4	110.7
264	0.754	0.754	6.9	0.0	4.4	4.4	111.0
266	0.756	0.756	6.6	0.0	4.4	4.4	111.3
268	0.757	0.757	6.3	0.0	4.4	4.4	111.5
270	0.759	0.759	6.1	0.0	4.4	4.4	111.8
272	0.760	0.760	5.8	0.0	4.4	4.4	111.9
274	0.761	0.761	5.6	0.0	4.4	4.4	112.1
276	0.762	0.762	5.4	0.0	4.4	4.4	112.2
278	0.763	0.763	5.2	0.0	4.4	4.4	112.3
280	0.764	0.764	5.0	0.0	4.4	4.4	112.4
282	0.764	0.764	4.8	0.0	4.4	4.4	112.5
284	0.764	0.764	4.7	0.0	4.4	4.4	112.5
286	0.764	0.764	4.6	0.0	4.4	4.4	112.6
288	0.764	0.764	4.4	0.0	4.4	4.4	112.6

CODA Structures Ltd		Page 4
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 4	
Date 12/09/2018 File RUNOFF AREA 4.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Control (l/s)	Σ Outflow (l/s)	Volume (m ³)
290	0.764	0.764	4.3	0.0	4.4	4.4	112.6
292	0.764	0.764	4.2	0.0	4.4	4.4	112.5
294	0.764	0.764	4.1	0.0	4.4	4.4	112.5
296	0.764	0.764	4.1	0.0	4.4	4.4	112.5
298	0.764	0.764	4.0	0.0	4.4	4.4	112.4
300	0.763	0.763	3.9	0.0	4.4	4.4	112.4
302	0.763	0.763	3.9	0.0	4.4	4.4	112.3
304	0.762	0.762	3.9	0.0	4.4	4.4	112.3
306	0.762	0.762	3.9	0.0	4.4	4.4	112.2
308	0.762	0.762	3.8	0.0	4.4	4.4	112.1
310	0.761	0.761	3.8	0.0	4.4	4.4	112.1
312	0.761	0.761	3.8	0.0	4.4	4.4	112.0
314	0.760	0.760	3.8	0.0	4.4	4.4	111.9
316	0.760	0.760	3.8	0.0	4.4	4.4	111.9
318	0.759	0.759	3.8	0.0	4.4	4.4	111.8
320	0.759	0.759	3.8	0.0	4.4	4.4	111.7
322	0.758	0.758	3.8	0.0	4.4	4.4	111.7
324	0.758	0.758	3.8	0.0	4.4	4.4	111.6
326	0.757	0.757	3.8	0.0	4.4	4.4	111.5
328	0.757	0.757	3.8	0.0	4.4	4.4	111.4
330	0.756	0.756	3.8	0.0	4.4	4.4	111.4
332	0.756	0.756	3.7	0.0	4.4	4.4	111.3
334	0.755	0.755	3.7	0.0	4.4	4.4	111.2
336	0.755	0.755	3.6	0.0	4.4	4.4	111.1
338	0.754	0.754	3.6	0.0	4.4	4.4	111.0
340	0.753	0.753	3.5	0.0	4.4	4.4	110.9
342	0.753	0.753	3.4	0.0	4.4	4.4	110.8
344	0.752	0.752	3.2	0.0	4.4	4.4	110.7
346	0.751	0.751	3.1	0.0	4.4	4.4	110.5
348	0.750	0.750	2.9	0.0	4.4	4.4	110.4
350	0.748	0.748	2.7	0.0	4.4	4.4	110.2
352	0.747	0.747	2.5	0.0	4.4	4.4	110.0
354	0.745	0.745	2.2	0.0	4.4	4.4	109.7
356	0.743	0.743	1.9	0.0	4.4	4.4	109.5
358	0.741	0.741	1.5	0.0	4.4	4.4	109.1
360	0.739	0.739	1.2	0.0	4.3	4.3	108.8
362	0.736	0.736	0.8	0.0	4.3	4.3	108.4
364	0.733	0.733	0.5	0.0	4.3	4.3	107.9
366	0.730	0.730	0.3	0.0	4.3	4.3	107.5
368	0.726	0.726	0.1	0.0	4.3	4.3	107.0
370	0.723	0.723	0.0	0.0	4.3	4.3	106.5
372	0.720	0.720	0.0	0.0	4.3	4.3	106.0
374	0.716	0.716	0.0	0.0	4.3	4.3	105.4
376	0.713	0.713	0.0	0.0	4.3	4.3	104.9
378	0.709	0.709	0.0	0.0	4.3	4.3	104.4
380	0.706	0.706	0.0	0.0	4.3	4.3	103.9
382	0.702	0.702	0.0	0.0	4.2	4.2	103.4
384	0.699	0.699	0.0	0.0	4.2	4.2	102.9

CoDa Structures

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LS20 8FD

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Contract

Whalley, Clitheroe

Job Ref.

7847

Part

Runoff volume - Area 5

Calc. Sheet No.

Drawing Ref.

Calculations by

Checked by

Date

MT

Sept '18

Members
Ref.

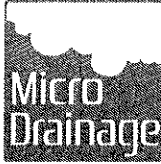
CALCULATIONS

OUTPUT

The runoff volume from the site for the 1:100 yr, 6hr event has been estimated by using the maximum discharge rate in each 30-minute period.

0-30	$1.8 \times 60 \times 30 \times 10^{-5}$	=	3.24
30-60	2.4×1.8	=	4.32
60-90	2.7×1.8	=	4.86
90-120	3.5×1.8	=	6.30
120-150	3.9×1.8	=	7.02
150-180	4.0×1.8	=	7.20
180-210	3.9×1.8	=	7.02
210-240	3.6×1.8	=	6.48
240-270	3.4×1.8	=	6.12
270-300	3.4×1.8	=	6.12
300-330	3.4×1.8	=	6.12
330-360	3.3×1.8	=	5.94
	total	=	70.74 m ³

Discharge from developed area = 70.74 m³


CODA Structures Ltd		Page 1
14 Springfield Court	Whalley, Clitheroe	
Guiseley Leeds LS20 8FD	1:100yr 6hr Storm Discharge Area 5	
Date 12/09/2018	Designed by MT	
File STORAGE AREA 5.SRCX	Checked by JL	

Causeway Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)
2	0.002	0.002	0.0	0.0	0.0	98	0.102	0.102	3.5	2.9	1.0
4	0.006	0.006	0.1	0.0	0.0	100	0.104	0.104	3.6	3.0	1.1
6	0.012	0.012	0.2	0.1	0.0	102	0.108	0.108	3.8	3.1	1.2
8	0.019	0.019	0.3	0.2	0.0	104	0.111	0.111	3.9	3.2	1.3
10	0.025	0.025	0.5	0.3	0.1	106	0.114	0.114	4.1	3.3	1.4
12	0.031	0.031	0.7	0.5	0.1	108	0.118	0.118	4.3	3.3	1.5
14	0.037	0.037	0.9	0.7	0.1	110	0.122	0.122	4.5	3.3	1.6
16	0.042	0.042	1.2	0.8	0.2	112	0.127	0.127	4.7	3.4	1.8
18	0.048	0.048	1.4	1.0	0.2	114	0.132	0.132	4.9	3.4	1.9
20	0.052	0.052	1.5	1.2	0.2	116	0.137	0.137	5.1	3.5	2.1
22	0.056	0.056	1.7	1.4	0.3	118	0.143	0.143	5.3	3.5	2.3
24	0.059	0.059	1.8	1.5	0.3	120	0.149	0.149	5.6	3.5	2.6
26	0.062	0.062	1.9	1.6	0.3	122	0.155	0.155	5.8	3.6	2.8
28	0.065	0.065	2.0	1.7	0.4	124	0.162	0.162	6.1	3.6	3.1
30	0.068	0.068	2.1	1.8	0.4	126	0.169	0.169	6.3	3.6	3.4
32	0.070	0.070	2.2	1.9	0.4	128	0.176	0.176	6.6	3.7	3.8
34	0.072	0.072	2.2	2.0	0.5	130	0.183	0.183	6.9	3.7	4.1
36	0.074	0.074	2.3	2.1	0.5	132	0.191	0.191	7.1	3.7	4.5
38	0.075	0.075	2.3	2.1	0.5	134	0.200	0.200	7.4	3.8	5.0
40	0.076	0.076	2.3	2.2	0.5	136	0.208	0.208	7.7	3.8	5.4
42	0.077	0.077	2.3	2.2	0.6	138	0.217	0.217	8.0	3.8	5.9
44	0.078	0.078	2.4	2.2	0.6	140	0.226	0.226	8.3	3.9	6.4
46	0.079	0.079	2.4	2.3	0.6	142	0.236	0.236	8.6	3.9	7.0
48	0.080	0.080	2.4	2.3	0.6	144	0.246	0.246	8.9	3.9	7.5
50	0.080	0.080	2.4	2.3	0.6	146	0.256	0.256	9.2	3.9	8.2
52	0.081	0.081	2.4	2.3	0.6	148	0.266	0.266	9.5	3.9	8.8
54	0.081	0.081	2.4	2.3	0.6	150	0.277	0.277	9.8	3.9	9.5
56	0.082	0.082	2.4	2.4	0.6	152	0.288	0.288	10.1	4.0	10.2
58	0.082	0.082	2.4	2.4	0.6	154	0.299	0.299	10.3	4.0	10.9
60	0.082	0.082	2.4	2.4	0.6	156	0.311	0.311	10.6	4.0	11.7
62	0.082	0.082	2.4	2.4	0.6	158	0.323	0.323	10.9	4.0	12.5
64	0.082	0.082	2.4	2.4	0.6	160	0.335	0.335	11.2	4.0	13.4
66	0.082	0.082	2.4	2.4	0.6	162	0.347	0.347	11.4	4.0	14.3
68	0.083	0.083	2.4	2.4	0.6	164	0.360	0.360	11.7	4.0	15.2
70	0.083	0.083	2.4	2.4	0.6	166	0.373	0.373	11.9	4.0	16.1
72	0.083	0.083	2.5	2.4	0.7	168	0.386	0.386	12.2	4.0	17.1
74	0.084	0.084	2.5	2.4	0.7	170	0.399	0.399	12.4	4.0	18.1
76	0.084	0.084	2.5	2.4	0.7	172	0.412	0.412	12.6	4.0	19.1
78	0.085	0.085	2.6	2.4	0.7	174	0.426	0.426	12.8	4.0	20.1
80	0.086	0.086	2.6	2.5	0.7	176	0.439	0.439	12.9	4.0	21.2
82	0.087	0.087	2.7	2.5	0.7	178	0.453	0.453	13.1	4.0	22.3
84	0.088	0.088	2.8	2.5	0.7	180	0.467	0.467	13.2	3.9	23.4
86	0.089	0.089	2.8	2.6	0.8	182	0.481	0.481	13.3	3.9	24.5
88	0.091	0.091	2.9	2.6	0.8	184	0.495	0.495	13.4	3.9	25.6
90	0.092	0.092	3.0	2.7	0.8	186	0.509	0.509	13.4	3.9	26.8
92	0.094	0.094	3.1	2.7	0.9	188	0.523	0.523	13.4	3.9	27.9
94	0.097	0.097	3.2	2.8	0.9	190	0.537	0.537	13.3	3.9	29.1
96	0.099	0.099	3.4	2.9	1.0	192	0.551	0.551	13.2	3.9	30.2

CODA Structures Ltd		Page 2
14 Springfield Court	Whalley, Clitheroe	
Guiseley	1:100yr 6hr Storm Discharge	
Leeds LS20 8FD	Area 5	
Date 12/09/2018	Designed by MT	
File STORAGE AREA 5.SRCX	Checked by JL	

Causeway Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

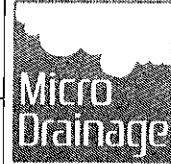
Time (mins)	Level (m)	Depth (m)	Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Inflow (l/s)	Control (l/s)	Volume (m³)
194	0.564	0.564	13.1	3.8	31.3	290	0.829	0.829	2.7	3.4	53.6
196	0.577	0.577	12.9	3.8	32.4	292	0.828	0.828	2.6	3.4	53.5
198	0.590	0.590	12.8	3.8	33.5	294	0.827	0.827	2.6	3.4	53.4
200	0.603	0.603	12.6	3.8	34.6	296	0.826	0.826	2.5	3.4	53.3
202	0.615	0.615	12.4	3.7	35.6	298	0.824	0.824	2.5	3.4	53.2
204	0.627	0.627	12.2	3.7	36.6	300	0.823	0.823	2.5	3.4	53.1
206	0.639	0.639	11.9	3.7	37.6	302	0.822	0.822	2.4	3.4	53.0
208	0.651	0.651	11.7	3.6	38.6	304	0.820	0.820	2.4	3.4	52.9
210	0.662	0.662	11.4	3.6	39.6	306	0.819	0.819	2.4	3.4	52.8
212	0.673	0.673	11.2	3.6	40.5	308	0.818	0.818	2.4	3.4	52.6
214	0.684	0.684	10.9	3.5	41.4	310	0.816	0.816	2.4	3.3	52.5
216	0.694	0.694	10.6	3.5	42.3	312	0.815	0.815	2.4	3.3	52.4
218	0.704	0.704	10.3	3.4	43.1	314	0.813	0.813	2.4	3.3	52.3
220	0.713	0.713	10.1	3.4	43.9	316	0.812	0.812	2.4	3.3	52.2
222	0.723	0.723	9.8	3.3	44.7	318	0.811	0.811	2.4	3.3	52.1
224	0.732	0.732	9.5	3.3	45.5	320	0.809	0.809	2.4	3.3	51.9
226	0.740	0.740	9.2	3.2	46.2	322	0.808	0.808	2.4	3.3	51.8
228	0.749	0.749	8.9	3.2	46.9	324	0.806	0.806	2.4	3.3	51.7
230	0.756	0.756	8.6	3.2	47.6	326	0.805	0.805	2.4	3.3	51.6
232	0.764	0.764	8.3	3.2	48.2	328	0.804	0.804	2.4	3.3	51.5
234	0.771	0.771	8.0	3.3	48.8	330	0.802	0.802	2.3	3.3	51.4
236	0.777	0.777	7.7	3.3	49.3	332	0.801	0.801	2.3	3.3	51.3
238	0.784	0.784	7.4	3.3	49.8	334	0.799	0.799	2.3	3.3	51.1
240	0.789	0.789	7.1	3.3	50.3	336	0.798	0.798	2.3	3.3	51.0
242	0.795	0.795	6.9	3.3	50.8	338	0.796	0.796	2.2	3.3	50.9
244	0.800	0.800	6.6	3.3	51.2	340	0.795	0.795	2.2	3.3	50.7
246	0.804	0.804	6.3	3.3	51.5	342	0.793	0.793	2.1	3.3	50.6
248	0.808	0.808	6.1	3.3	51.9	344	0.791	0.791	2.0	3.3	50.5
250	0.812	0.812	5.8	3.3	52.2	346	0.789	0.789	1.9	3.3	50.3
252	0.816	0.816	5.6	3.3	52.5	348	0.787	0.787	1.8	3.3	50.1
254	0.819	0.819	5.3	3.4	52.7	350	0.785	0.785	1.7	3.3	49.9
256	0.822	0.822	5.1	3.4	53.0	352	0.782	0.782	1.5	3.3	49.7
258	0.824	0.824	4.9	3.4	53.2	354	0.780	0.780	1.4	3.3	49.5
260	0.826	0.826	4.7	3.4	53.3	356	0.777	0.777	1.2	3.3	49.3
262	0.828	0.828	4.5	3.4	53.5	358	0.774	0.774	0.9	3.3	49.0
264	0.829	0.829	4.3	3.4	53.6	360	0.770	0.770	0.7	3.3	48.7
266	0.831	0.831	4.1	3.4	53.7	362	0.766	0.766	0.5	3.3	48.4
268	0.832	0.832	3.9	3.4	53.8	364	0.762	0.762	0.3	3.2	48.1
270	0.832	0.832	3.8	3.4	53.9	366	0.758	0.758	0.2	3.2	47.7
272	0.833	0.833	3.6	3.4	53.9	368	0.754	0.754	0.1	3.2	47.3
274	0.833	0.833	3.5	3.4	53.9	370	0.749	0.749	0.0	3.2	47.0
276	0.833	0.833	3.4	3.4	53.9	372	0.745	0.745	0.0	3.2	46.6
278	0.833	0.833	3.2	3.4	53.9	374	0.740	0.740	0.0	3.2	46.2
280	0.833	0.833	3.1	3.4	53.9	376	0.735	0.735	0.0	3.3	45.8
282	0.832	0.832	3.0	3.4	53.8	378	0.731	0.731	0.0	3.3	45.4
284	0.832	0.832	2.9	3.4	53.8	380	0.726	0.726	0.0	3.3	45.0
286	0.831	0.831	2.8	3.4	53.7	382	0.721	0.721	0.0	3.3	44.6
288	0.830	0.830	2.8	3.4	53.7	384	0.717	0.717	0.0	3.4	44.2

14 Springfield Court
Guiseley
Leeds LS20 8FD

Whalley, Clitheroe
1:100yr 6hr Storm Discharge
Area 5

Date 12/09/2018
File STORAGE AREA 5.SRCX

Designed by MT
Checked by JL



Causeway Source Control 2018.1

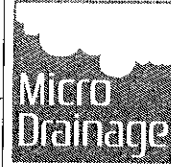
Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)
386	0.712	0.712	0.0	3.4	43.8	482	0.452	0.452	0.0	4.0	22.2
388	0.707	0.707	0.0	3.4	43.4	484	0.446	0.446	0.0	4.0	21.7
390	0.702	0.702	0.0	3.4	43.0	486	0.440	0.440	0.0	4.0	21.3
392	0.697	0.697	0.0	3.5	42.6	488	0.434	0.434	0.0	4.0	20.8
394	0.692	0.692	0.0	3.5	42.2	490	0.428	0.428	0.0	4.0	20.3
396	0.687	0.687	0.0	3.5	41.7	492	0.422	0.422	0.0	4.0	19.8
398	0.682	0.682	0.0	3.5	41.3	494	0.416	0.416	0.0	4.0	19.4
400	0.677	0.677	0.0	3.5	40.9	496	0.410	0.410	0.0	4.0	18.9
402	0.672	0.672	0.0	3.6	40.5	498	0.403	0.403	0.0	4.0	18.4
404	0.667	0.667	0.0	3.6	40.0	500	0.397	0.397	0.0	4.0	17.9
406	0.662	0.662	0.0	3.6	39.6	502	0.391	0.391	0.0	4.0	17.4
408	0.657	0.657	0.0	3.6	39.2	504	0.384	0.384	0.0	4.0	17.0
410	0.652	0.652	0.0	3.6	38.7	506	0.378	0.378	0.0	4.0	16.5
412	0.647	0.647	0.0	3.6	38.3	508	0.371	0.371	0.0	4.0	16.0
414	0.642	0.642	0.0	3.7	37.9	510	0.365	0.365	0.0	4.0	15.5
416	0.637	0.637	0.0	3.7	37.4	512	0.358	0.358	0.0	4.0	15.1
418	0.631	0.631	0.0	3.7	37.0	514	0.352	0.352	0.0	4.0	14.6
420	0.626	0.626	0.0	3.7	36.5	516	0.345	0.345	0.0	4.0	14.1
422	0.621	0.621	0.0	3.7	36.1	518	0.338	0.338	0.0	4.0	13.6
424	0.616	0.616	0.0	3.7	35.7	520	0.331	0.331	0.0	4.0	13.1
426	0.610	0.610	0.0	3.7	35.2	522	0.324	0.324	0.0	4.0	12.7
428	0.605	0.605	0.0	3.7	34.8	524	0.317	0.317	0.0	4.0	12.2
430	0.600	0.600	0.0	3.8	34.3	526	0.310	0.310	0.0	4.0	11.7
432	0.594	0.594	0.0	3.8	33.9	528	0.303	0.303	0.0	4.0	11.2
434	0.589	0.589	0.0	3.8	33.4	530	0.296	0.296	0.0	4.0	10.7
436	0.584	0.584	0.0	3.8	32.9	532	0.289	0.289	0.0	4.0	10.3
438	0.578	0.578	0.0	3.8	32.5	534	0.282	0.282	0.0	4.0	9.8
440	0.573	0.573	0.0	3.8	32.0	536	0.274	0.274	0.0	3.9	9.3
442	0.567	0.567	0.0	3.8	31.6	538	0.267	0.267	0.0	3.9	8.8
444	0.562	0.562	0.0	3.8	31.1	540	0.259	0.259	0.0	3.9	8.4
446	0.556	0.556	0.0	3.8	30.7	542	0.252	0.252	0.0	3.9	7.9
448	0.551	0.551	0.0	3.9	30.2	544	0.244	0.244	0.0	3.9	7.4
450	0.545	0.545	0.0	3.9	29.7	546	0.236	0.236	0.0	3.9	7.0
452	0.539	0.539	0.0	3.9	29.3	548	0.228	0.228	0.0	3.9	6.5
454	0.534	0.534	0.0	3.9	28.8	550	0.220	0.220	0.0	3.8	6.0
456	0.528	0.528	0.0	3.9	28.3	552	0.211	0.211	0.0	3.8	5.6
458	0.522	0.522	0.0	3.9	27.9	554	0.203	0.203	0.0	3.8	5.1
460	0.517	0.517	0.0	3.9	27.4	556	0.194	0.194	0.0	3.7	4.7
462	0.511	0.511	0.0	3.9	26.9	558	0.185	0.185	0.0	3.7	4.2
464	0.505	0.505	0.0	3.9	26.5	560	0.176	0.176	0.0	3.7	3.8
466	0.500	0.500	0.0	3.9	26.0	562	0.167	0.167	0.0	3.6	3.4
468	0.494	0.494	0.0	3.9	25.5	564	0.157	0.157	0.0	3.6	2.9
470	0.488	0.488	0.0	3.9	25.1	566	0.147	0.147	0.0	3.5	2.5
472	0.482	0.482	0.0	3.9	24.6	568	0.136	0.136	0.0	3.4	2.1
474	0.476	0.476	0.0	3.9	24.1	570	0.124	0.124	0.0	3.4	1.7
476	0.470	0.470	0.0	3.9	23.6	572	0.111	0.111	0.0	3.2	1.3
478	0.464	0.464	0.0	3.9	23.2	574	0.096	0.096	0.0	2.8	0.9
480	0.458	0.458	0.0	4.0	22.7	576	0.081	0.081	0.0	2.3	0.6

14 Springfield Court
 Guiseley
 Leeds LS20 8FD

Whalley, Clitheroe
 1:100yr 6hr Storm Discharge
 Area 5



Date 12/09/2018

Designed by MT

File STORAGE AREA 5.SRCX

Checked by JL

Causeway

Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m ³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m ³)
578	0.065	0.065	0.0	1.7	0.4	604	0.002	0.002	0.0	0.0	0.0
580	0.049	0.049	0.0	1.1	0.2	606	0.002	0.002	0.0	0.0	0.0
582	0.035	0.035	0.0	0.6	0.1	608	0.001	0.001	0.0	0.0	0.0
584	0.024	0.024	0.0	0.3	0.0	610	0.001	0.001	0.0	0.0	0.0
586	0.015	0.015	0.0	0.1	0.0	612	0.001	0.001	0.0	0.0	0.0
588	0.010	0.010	0.0	0.1	0.0	614	0.001	0.001	0.0	0.0	0.0
590	0.007	0.007	0.0	0.0	0.0	616	0.001	0.001	0.0	0.0	0.0
592	0.005	0.005	0.0	0.0	0.0	618	0.001	0.001	0.0	0.0	0.0
594	0.004	0.004	0.0	0.0	0.0	620	0.001	0.001	0.0	0.0	0.0
596	0.003	0.003	0.0	0.0	0.0	622	0.001	0.001	0.0	0.0	0.0
598	0.003	0.003	0.0	0.0	0.0	624	0.001	0.001	0.0	0.0	0.0
600	0.002	0.002	0.0	0.0	0.0	626	0.001	0.001	0.0	0.0	0.0
602	0.002	0.002	0.0	0.0	0.0	628	0.000	0.000	0.0	0.0	0.0

Members Ref.

CALCULATIONS


OUTPUT

The discharge volume from the developed side for the 1:100 year 6 hour event has been estimated by using the maximum discharge rate from the storage facility for each 30 minute period.

0	-	30	10.3	x	$60 \times 30 \times 10^{-3}$	=	18.54
30	-	60	13.6	x	1.8	=	24.48
60	-	90	14.4	x	1.8	=	25.92
90	-	120	16.2	x	1.8	=	29.16
120	-	150	17.4	x	1.8	=	31.32
150	-	180	17.6	x	1.8	=	31.68
180	-	210	17.5	x	1.8	=	31.50
210	-	240	16.7	x	1.8	=	30.06
240	-	270	15.7	x	1.8	=	28.26
270	-	300	15.0	x	1.8	=	27.00
300	-	330	15.0	x	1.8	=	27.00
330	-	360	15.1	x	1.8	=	27.18

Total 332.10 m³

Discharge from developed area = 332.10 m³


CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	

Causeway Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Inflow (l/s)	Control (l/s)	Volume (m³)
2	0.007	0.007	0.2	0.0	0.0	98	0.252	0.252	21.2	14.8	11.3
4	0.017	0.017	0.5	0.2	0.0	100	0.259	0.259	22.0	14.9	12.1
6	0.029	0.029	1.2	0.6	0.1	102	0.267	0.267	23.0	15.1	13.0
8	0.041	0.041	2.0	1.2	0.2	104	0.275	0.275	23.9	15.2	14.0
10	0.053	0.053	3.1	1.9	0.3	106	0.283	0.283	25.0	15.3	15.1
12	0.065	0.065	4.5	2.8	0.5	108	0.293	0.293	26.0	15.5	16.3
14	0.077	0.077	5.7	3.8	0.7	110	0.302	0.302	27.3	15.6	17.6
16	0.089	0.089	7.1	4.9	0.9	112	0.312	0.312	28.5	15.7	19.1
18	0.099	0.099	8.2	5.9	1.2	114	0.323	0.323	29.8	15.9	20.7
20	0.109	0.109	9.3	6.8	1.5	116	0.334	0.334	31.1	16.0	22.4
22	0.117	0.117	10.2	7.7	1.8	118	0.345	0.345	32.4	16.1	24.3
24	0.125	0.125	10.9	8.5	2.1	120	0.357	0.357	34.0	16.2	26.4
26	0.132	0.132	11.6	9.2	2.4	122	0.369	0.369	35.3	16.3	28.6
28	0.139	0.139	12.2	9.8	2.7	124	0.381	0.381	36.9	16.5	30.9
30	0.145	0.145	12.7	10.3	3.0	126	0.393	0.393	38.3	16.6	33.5
32	0.151	0.151	13.1	10.8	3.2	128	0.406	0.406	40.1	16.7	36.2
34	0.156	0.156	13.5	11.2	3.5	130	0.419	0.419	41.6	16.8	39.1
36	0.161	0.161	13.7	11.6	3.8	132	0.433	0.433	43.3	16.8	42.1
38	0.165	0.165	13.9	11.9	4.0	134	0.446	0.446	45.1	16.9	45.4
40	0.169	0.169	14.1	12.1	4.3	136	0.460	0.460	46.7	17.0	48.9
42	0.173	0.173	14.2	12.4	4.5	138	0.474	0.474	48.6	17.1	52.6
44	0.176	0.176	14.3	12.6	4.7	140	0.488	0.488	50.2	17.2	56.5
46	0.179	0.179	14.4	12.8	4.9	142	0.503	0.503	52.1	17.2	60.5
48	0.181	0.181	14.4	13.0	5.1	144	0.518	0.518	53.7	17.3	64.8
50	0.184	0.184	14.4	13.2	5.2	146	0.533	0.533	55.6	17.3	69.3
52	0.186	0.186	14.4	13.3	5.4	148	0.549	0.549	57.4	17.4	74.0
54	0.187	0.187	14.4	13.5	5.5	150	0.564	0.564	59.2	17.4	78.9
56	0.189	0.189	14.4	13.5	5.6	152	0.581	0.581	60.9	17.5	84.0
58	0.190	0.190	14.4	13.6	5.7	154	0.597	0.597	62.6	17.5	89.3
60	0.192	0.192	14.4	13.6	5.8	156	0.614	0.614	64.5	17.5	94.9
62	0.193	0.193	14.4	13.6	5.9	158	0.631	0.631	66.0	17.5	100.6
64	0.194	0.194	14.5	13.7	6.0	160	0.648	0.648	67.7	17.6	106.5
66	0.195	0.195	14.5	13.7	6.1	162	0.666	0.666	69.2	17.6	112.6
68	0.197	0.197	14.6	13.7	6.2	164	0.684	0.684	70.8	17.6	118.9
70	0.198	0.198	14.7	13.7	6.3	166	0.702	0.702	72.3	17.6	125.4
72	0.200	0.200	14.9	13.8	6.4	168	0.721	0.721	73.7	17.6	132.0
74	0.202	0.202	15.1	13.8	6.6	170	0.739	0.739	75.1	17.6	138.8
76	0.204	0.204	15.3	13.9	6.7	172	0.758	0.758	76.2	17.6	145.8
78	0.206	0.206	15.6	13.9	6.9	174	0.777	0.777	77.5	17.6	152.9
80	0.209	0.209	15.9	14.0	7.1	176	0.796	0.796	78.5	17.5	160.2
82	0.212	0.212	16.3	14.0	7.4	178	0.816	0.816	79.5	17.5	167.5
84	0.215	0.215	16.7	14.1	7.7	180	0.835	0.835	80.2	17.5	175.0
86	0.219	0.219	17.1	14.2	8.0	182	0.855	0.855	80.9	17.5	182.6
88	0.223	0.223	17.7	14.3	8.4	184	0.874	0.874	81.3	17.4	190.2
90	0.228	0.228	18.2	14.4	8.8	186	0.894	0.894	81.4	17.4	197.9
92	0.233	0.233	18.9	14.5	9.3	188	0.913	0.913	81.3	17.4	205.6
94	0.239	0.239	19.6	14.6	9.9	190	0.932	0.932	80.9	17.3	213.2
96	0.245	0.245	20.4	14.7	10.5	192	0.951	0.951	80.2	17.3	220.8

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

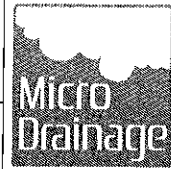
Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)
194	0.970	0.970	79.5	17.2	228.3	290	1.371	1.371	16.3	14.9	391.4
196	0.988	0.988	78.4	17.2	235.7	292	1.371	1.371	15.9	14.9	391.5
198	1.006	1.006	77.5	17.1	243.0	294	1.371	1.371	15.6	14.9	391.6
200	1.024	1.024	76.2	17.1	250.2	296	1.372	1.372	15.3	14.9	391.7
202	1.041	1.041	75.1	17.0	257.2	298	1.372	1.372	15.1	14.9	391.7
204	1.058	1.058	73.7	17.0	264.1	300	1.372	1.372	14.9	14.9	391.7
206	1.074	1.074	72.3	16.9	270.8	302	1.372	1.372	14.7	14.9	391.7
208	1.090	1.090	70.8	16.9	277.4	304	1.372	1.372	14.6	14.9	391.7
210	1.106	1.106	69.2	16.8	283.8	306	1.371	1.371	14.5	14.9	391.6
212	1.121	1.121	67.7	16.7	290.0	308	1.371	1.371	14.5	14.9	391.6
214	1.135	1.135	66.0	16.7	296.0	310	1.371	1.371	14.4	14.9	391.5
216	1.150	1.150	64.5	16.6	301.8	312	1.371	1.371	14.4	14.9	391.5
218	1.163	1.163	62.6	16.5	307.4	314	1.371	1.371	14.4	14.9	391.4
220	1.177	1.177	60.9	16.5	312.9	316	1.371	1.371	14.4	14.9	391.3
222	1.189	1.189	59.1	16.4	318.1	318	1.371	1.371	14.4	14.9	391.3
224	1.202	1.202	57.3	16.3	323.1	320	1.370	1.370	14.4	14.9	391.2
226	1.213	1.213	55.6	16.2	328.0	322	1.370	1.370	14.4	14.9	391.1
228	1.225	1.225	53.7	16.2	332.6	324	1.370	1.370	14.4	14.9	391.1
230	1.236	1.236	52.1	16.1	337.0	326	1.370	1.370	14.4	15.0	391.0
232	1.246	1.246	50.2	16.0	341.2	328	1.370	1.370	14.3	15.0	390.9
234	1.256	1.256	48.6	16.0	345.2	330	1.369	1.369	14.2	15.0	390.8
236	1.265	1.265	46.7	15.9	349.0	332	1.369	1.369	14.1	15.0	390.7
238	1.274	1.274	45.1	15.8	352.6	334	1.369	1.369	13.9	15.0	390.6
240	1.282	1.282	43.3	15.8	356.0	336	1.369	1.369	13.7	15.0	390.5
242	1.290	1.290	41.6	15.7	359.3	338	1.368	1.368	13.5	15.0	390.3
244	1.298	1.298	40.1	15.6	362.3	340	1.368	1.368	13.1	15.0	390.1
246	1.305	1.305	38.3	15.6	365.1	342	1.367	1.367	12.7	15.0	389.9
248	1.312	1.312	36.9	15.5	367.8	344	1.366	1.366	12.2	15.0	389.6
250	1.318	1.318	35.3	15.5	370.2	346	1.365	1.365	11.6	15.0	389.2
252	1.323	1.323	34.0	15.4	372.5	348	1.364	1.364	10.9	15.0	388.8
254	1.329	1.329	32.4	15.4	374.7	350	1.363	1.363	10.2	15.0	388.2
256	1.334	1.334	31.1	15.3	376.6	352	1.361	1.361	9.3	15.0	387.6
258	1.338	1.338	29.8	15.3	378.5	354	1.359	1.359	8.2	15.1	386.8
260	1.342	1.342	28.4	15.2	380.1	356	1.357	1.357	7.1	15.1	385.9
262	1.346	1.346	27.3	15.2	381.6	358	1.354	1.354	5.7	15.1	384.9
264	1.350	1.350	26.0	15.2	383.0	360	1.351	1.351	4.5	15.1	383.7
266	1.353	1.353	25.0	15.1	384.3	362	1.348	1.348	3.1	15.2	382.3
268	1.356	1.356	23.9	15.1	385.4	364	1.344	1.344	2.0	15.2	380.8
270	1.358	1.358	23.0	15.1	386.4	366	1.340	1.340	1.1	15.3	379.2
272	1.361	1.361	22.0	15.0	387.3	368	1.336	1.336	0.5	15.3	377.4
274	1.362	1.362	21.2	15.0	388.1	370	1.331	1.331	0.2	15.3	375.6
276	1.364	1.364	20.3	15.0	388.8	372	1.327	1.327	0.0	15.4	373.8
278	1.366	1.366	19.6	15.0	389.4	374	1.322	1.322	0.0	15.4	372.0
280	1.367	1.367	18.9	15.0	389.9	376	1.317	1.317	0.0	15.5	370.1
282	1.368	1.368	18.2	15.0	390.3	378	1.313	1.313	0.0	15.5	368.3
284	1.369	1.369	17.7	15.0	390.7	380	1.308	1.308	0.0	15.5	366.4
286	1.370	1.370	17.1	15.0	391.0	382	1.304	1.304	0.0	15.6	364.5
288	1.370	1.370	16.7	14.9	391.2	384	1.299	1.299	0.0	15.6	362.6

14 Springfield Court
Guiseley
Leeds LS20 8FD

Whalley, Clitheroe
1:100yr 6hr Storm Discharge
Area 6



Date 12/09/2018

Designed by MT

File STORAGE AREA 6.SRCX

Checked by JL

Causeway

Source Control 2018.1

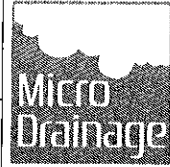
Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)
386	1.294	1.294	0.0	15.7	360.8	482	1.063	1.063	0.0	17.0	266.3
388	1.290	1.290	0.0	15.7	358.9	484	1.058	1.058	0.0	17.0	264.3
390	1.285	1.285	0.0	15.7	357.0	486	1.053	1.053	0.0	17.0	262.3
392	1.280	1.280	0.0	15.8	355.1	488	1.048	1.048	0.0	17.0	260.2
394	1.276	1.276	0.0	15.8	353.2	490	1.043	1.043	0.0	17.0	258.2
396	1.271	1.271	0.0	15.8	351.3	492	1.038	1.038	0.0	17.0	256.1
398	1.266	1.266	0.0	15.9	349.4	494	1.033	1.033	0.0	17.1	254.1
400	1.261	1.261	0.0	15.9	347.5	496	1.028	1.028	0.0	17.1	252.0
402	1.257	1.257	0.0	16.0	345.6	498	1.023	1.023	0.0	17.1	250.0
404	1.252	1.252	0.0	16.0	343.7	500	1.018	1.018	0.0	17.1	247.9
406	1.247	1.247	0.0	16.0	341.8	502	1.013	1.013	0.0	17.1	245.9
408	1.243	1.243	0.0	16.1	339.8	504	1.008	1.008	0.0	17.1	243.8
410	1.238	1.238	0.0	16.1	337.9	506	1.003	1.003	0.0	17.2	241.8
412	1.233	1.233	0.0	16.1	336.0	508	0.998	0.998	0.0	17.2	239.7
414	1.228	1.228	0.0	16.1	334.0	510	0.993	0.993	0.0	17.2	237.7
416	1.224	1.224	0.0	16.2	332.1	512	0.988	0.988	0.0	17.2	235.6
418	1.219	1.219	0.0	16.2	330.2	514	0.983	0.983	0.0	17.2	233.5
420	1.214	1.214	0.0	16.2	328.2	516	0.977	0.977	0.0	17.2	231.5
422	1.209	1.209	0.0	16.3	326.3	518	0.972	0.972	0.0	17.2	229.4
424	1.204	1.204	0.0	16.3	324.3	520	0.967	0.967	0.0	17.2	227.3
426	1.200	1.200	0.0	16.3	322.3	522	0.962	0.962	0.0	17.3	225.3
428	1.195	1.195	0.0	16.4	320.4	524	0.957	0.957	0.0	17.3	223.2
430	1.190	1.190	0.0	16.4	318.4	526	0.952	0.952	0.0	17.3	221.1
432	1.185	1.185	0.0	16.4	316.5	528	0.947	0.947	0.0	17.3	219.0
434	1.180	1.180	0.0	16.4	314.5	530	0.941	0.941	0.0	17.3	217.0
436	1.176	1.176	0.0	16.5	312.5	532	0.936	0.936	0.0	17.3	214.9
438	1.171	1.171	0.0	16.5	310.5	534	0.931	0.931	0.0	17.3	212.8
440	1.166	1.166	0.0	16.5	308.6	536	0.926	0.926	0.0	17.3	210.7
442	1.161	1.161	0.0	16.5	306.6	538	0.921	0.921	0.0	17.4	208.6
444	1.156	1.156	0.0	16.6	304.6	540	0.915	0.915	0.0	17.4	206.6
446	1.151	1.151	0.0	16.6	302.6	542	0.910	0.910	0.0	17.4	204.5
448	1.147	1.147	0.0	16.6	300.6	544	0.905	0.905	0.0	17.4	202.4
450	1.142	1.142	0.0	16.6	298.6	546	0.900	0.900	0.0	17.4	200.3
452	1.137	1.137	0.0	16.7	296.6	548	0.894	0.894	0.0	17.4	198.2
454	1.132	1.132	0.0	16.7	294.6	550	0.889	0.889	0.0	17.4	196.1
456	1.127	1.127	0.0	16.7	292.6	552	0.884	0.884	0.0	17.4	194.0
458	1.122	1.122	0.0	16.7	290.6	554	0.878	0.878	0.0	17.4	191.9
460	1.117	1.117	0.0	16.7	288.6	556	0.873	0.873	0.0	17.4	189.9
462	1.112	1.112	0.0	16.8	286.6	558	0.868	0.868	0.0	17.4	187.8
464	1.108	1.108	0.0	16.8	284.6	560	0.862	0.862	0.0	17.5	185.7
466	1.103	1.103	0.0	16.8	282.6	562	0.857	0.857	0.0	17.5	183.6
468	1.098	1.098	0.0	16.8	280.5	564	0.852	0.852	0.0	17.5	181.5
470	1.093	1.093	0.0	16.8	278.5	566	0.846	0.846	0.0	17.5	179.4
472	1.088	1.088	0.0	16.9	276.5	568	0.841	0.841	0.0	17.5	177.3
474	1.083	1.083	0.0	16.9	274.5	570	0.835	0.835	0.0	17.5	175.2
476	1.078	1.078	0.0	16.9	272.4	572	0.830	0.830	0.0	17.5	173.1
478	1.073	1.073	0.0	16.9	270.4	574	0.825	0.825	0.0	17.5	171.0
480	1.068	1.068	0.0	16.9	268.4	576	0.819	0.819	0.0	17.5	168.9

14 Springfield Court
Guiseley
Leeds LS20 8FD

Whalley, Clitheroe
1:100yr 6hr Storm Discharge
Area 6



Date 12/09/2018
File STORAGE AREA 6.SRCX

Designed by MT
Checked by JL


Causeway

Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m ³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m ³)
578	0.814	0.814	0.0	17.5	166.8	674	0.521	0.521	0.0	17.3	65.9
580	0.808	0.808	0.0	17.5	164.7	676	0.514	0.514	0.0	17.3	63.8
582	0.803	0.803	0.0	17.5	162.6	678	0.507	0.507	0.0	17.2	61.7
584	0.797	0.797	0.0	17.5	160.5	680	0.500	0.500	0.0	17.2	59.7
586	0.792	0.792	0.0	17.5	158.4	682	0.492	0.492	0.0	17.2	57.6
588	0.786	0.786	0.0	17.5	156.3	684	0.485	0.485	0.0	17.1	55.5
590	0.780	0.780	0.0	17.6	154.2	686	0.477	0.477	0.0	17.1	53.5
592	0.775	0.775	0.0	17.6	152.0	688	0.470	0.470	0.0	17.1	51.4
594	0.769	0.769	0.0	17.6	149.9	690	0.462	0.462	0.0	17.0	49.4
596	0.764	0.764	0.0	17.6	147.8	692	0.454	0.454	0.0	17.0	47.3
598	0.758	0.758	0.0	17.6	145.7	694	0.446	0.446	0.0	16.9	45.3
600	0.752	0.752	0.0	17.6	143.6	696	0.437	0.437	0.0	16.9	43.3
602	0.747	0.747	0.0	17.6	141.5	698	0.429	0.429	0.0	16.8	41.3
604	0.741	0.741	0.0	17.6	139.4	700	0.420	0.420	0.0	16.8	39.2
606	0.735	0.735	0.0	17.6	137.3	702	0.411	0.411	0.0	16.7	37.2
608	0.729	0.729	0.0	17.6	135.2	704	0.402	0.402	0.0	16.6	35.2
610	0.723	0.723	0.0	17.6	133.1	706	0.392	0.392	0.0	16.6	33.3
612	0.718	0.718	0.0	17.6	131.0	708	0.383	0.383	0.0	16.5	31.3
614	0.712	0.712	0.0	17.6	128.8	710	0.373	0.373	0.0	16.4	29.3
616	0.706	0.706	0.0	17.6	126.7	712	0.362	0.362	0.0	16.3	27.3
618	0.700	0.700	0.0	17.6	124.6	714	0.351	0.351	0.0	16.2	25.4
620	0.694	0.694	0.0	17.6	122.5	716	0.340	0.340	0.0	16.1	23.5
622	0.688	0.688	0.0	17.6	120.4	718	0.328	0.328	0.0	15.9	21.5
624	0.682	0.682	0.0	17.6	118.3	720	0.316	0.316	0.0	15.8	19.6
626	0.676	0.676	0.0	17.6	116.2	722	0.303	0.303	0.0	15.6	17.8
628	0.670	0.670	0.0	17.6	114.1	724	0.290	0.290	0.0	15.4	15.9
630	0.664	0.664	0.0	17.6	112.0	726	0.276	0.276	0.0	15.2	14.1
632	0.658	0.658	0.0	17.6	109.9	728	0.260	0.260	0.0	15.0	12.2
634	0.652	0.652	0.0	17.6	107.8	730	0.244	0.244	0.0	14.7	10.5
636	0.646	0.646	0.0	17.6	105.7	732	0.226	0.226	0.0	14.3	8.7
638	0.640	0.640	0.0	17.5	103.5	734	0.207	0.207	0.0	13.9	7.0
640	0.634	0.634	0.0	17.5	101.4	736	0.186	0.186	0.0	13.3	5.4
642	0.627	0.627	0.0	17.5	99.3	738	0.162	0.162	0.0	11.7	3.9
644	0.621	0.621	0.0	17.5	97.2	740	0.138	0.138	0.0	9.7	2.6
646	0.615	0.615	0.0	17.5	95.1	742	0.112	0.112	0.0	7.2	1.6
648	0.608	0.608	0.0	17.5	93.0	744	0.087	0.087	0.0	4.7	0.9
650	0.602	0.602	0.0	17.5	90.9	746	0.064	0.064	0.0	2.7	0.4
652	0.596	0.596	0.0	17.5	88.8	748	0.044	0.044	0.0	1.3	0.2
654	0.589	0.589	0.0	17.5	86.7	750	0.028	0.028	0.0	0.6	0.1
656	0.583	0.583	0.0	17.5	84.6	752	0.016	0.016	0.0	0.2	0.0
658	0.576	0.576	0.0	17.4	82.5	754	0.009	0.009	0.0	0.1	0.0
660	0.569	0.569	0.0	17.4	80.4	756	0.006	0.006	0.0	0.0	0.0
662	0.563	0.563	0.0	17.4	78.4	758	0.004	0.004	0.0	0.0	0.0
664	0.556	0.556	0.0	17.4	76.3	760	0.003	0.003	0.0	0.0	0.0
666	0.549	0.549	0.0	17.4	74.2	762	0.002	0.002	0.0	0.0	0.0
668	0.542	0.542	0.0	17.4	72.1	764	0.002	0.002	0.0	0.0	0.0
670	0.535	0.535	0.0	17.3	70.0	766	0.001	0.001	0.0	0.0	0.0
672	0.528	0.528	0.0	17.3	67.9	768	0.001	0.001	0.0	0.0	0.0

CODA Structures Ltd		Page 5
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe 1:100yr 6hr Storm Discharge Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	

Causeway Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m ³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m ³)
770	0.001	0.001	0.0	0.0	0.0	774	0.001	0.001	0.0	0.0	0.0
772	0.001	0.001	0.0	0.0	0.0	776	0.000	0.000	0.0	0.0	0.0

Members
Ref.

CALCULATIONS

OUTPUT

For 1:100 yr 6hr storm

$$\text{Greenfield Volumetric run off} = 1175 \text{ m}^3$$

$$\text{Total developed area} = 3.59 \text{ Ha}$$

$$\text{Remaining undeveloped area} = 6.35 - 3.59$$

$$= 2.76 \text{ Ha.}$$

$$\text{Volumetric discharge from undeveloped area} = \frac{2.76}{6.35} \times 1175$$

$$= 510.7 \text{ m}^3$$

$$\text{Volumetric discharge from developed area} = 80.4 + 66.2 + 80.3 + 81.7 + 20.7 + 332.1$$

$$= 711.4 \text{ m}^3$$

$$\begin{aligned} \text{Total Volumetric Discharge} &= 711.4 + 510.7 \\ &= 1222.1 \text{ m}^3 > 1175 \text{ m}^3 \end{aligned}$$

∴ reduce discharge from residential areas to 14.5 l/s.

From revised calculation for Area G the

$$\text{volumetric discharge reduces by } 332.1 - 248.6$$

$$= 83.5 \text{ m}^3$$

$$\begin{aligned} \text{Total Volumetric Discharge} &= 1222.1 - 83.5 \\ &= 1138.6 \text{ m}^3 < 1175 \text{ m}^3 \end{aligned}$$

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Contract

Whalley, Clitheroe

Job Ref.

7847

Part

Runoff Volume - Area 6 (Revised Discharge rate)

Calc. Sheet No.

Drawing Ref.

Calculations by

Checked by

Date

MT

Sept '18

Members Ref.


CALCULATIONS

OUTPUT

The runoff volume from the site for the 1:100yr, 6hr event has been estimated by using the maximum discharge rate in each 30-minute period.

0 - 30	10.9	x	$60 \times 30 \times 10^{-3}$	=	19.62
30 - 60	12.6	x	1.8	=	22.68
60 - 90	13.3	x	1.8	=	23.94
90 - 120	13.8	x	1.8	=	24.84
120 - 150	14.0	x	1.8	=	25.20
150 - 180	13.9	x	1.8	=	25.02
180 - 210	13.0	x	1.8	=	23.40
210 - 240	12.5	x	1.8	=	22.50
240 - 270	13.3	x	1.8	=	23.94
270 - 300	17.7	x	1.8	=	31.86
300 - 330	18.7	x	1.8	=	33.66
330 - 360	18.6	x	1.8	=	33.48
				total =	249.60m ³


Discharge from developed Area = 249.60m³

CODA Structures Ltd		Page 1
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway		Source Control 2018.1

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)
2	0.008	0.008	0.2	0.0	0.0	98	0.404	0.404	27.5	13.4	35.7
4	0.020	0.020	0.6	0.3	0.0	100	0.412	0.412	28.6	13.5	37.4
6	0.033	0.033	1.5	0.7	0.1	102	0.421	0.421	29.9	13.5	39.3
8	0.047	0.047	2.6	1.5	0.2	104	0.429	0.429	31.1	13.6	41.4
10	0.061	0.061	4.1	2.3	0.4	106	0.439	0.439	32.5	13.6	43.6
12	0.076	0.076	5.8	3.4	0.6	108	0.448	0.448	33.8	13.6	45.9
14	0.090	0.090	7.5	4.6	1.0	110	0.458	0.458	35.5	13.7	48.4
16	0.104	0.104	9.3	5.8	1.3	112	0.469	0.469	37.0	13.7	51.1
18	0.117	0.117	10.7	6.9	1.8	114	0.479	0.479	38.7	13.7	54.0
20	0.129	0.129	12.1	7.9	2.2	116	0.491	0.491	40.4	13.8	57.1
22	0.141	0.141	13.2	8.7	2.8	118	0.502	0.502	42.2	13.8	60.4
24	0.152	0.152	14.2	9.4	3.3	120	0.514	0.514	44.2	13.8	63.9
26	0.163	0.163	15.1	10.1	3.9	122	0.526	0.526	45.9	13.9	67.7
28	0.173	0.173	15.9	10.7	4.5	124	0.539	0.539	48.0	13.9	71.6
30	0.183	0.183	16.6	10.9	5.2	126	0.553	0.553	49.8	13.9	75.9
32	0.192	0.192	17.0	11.1	5.9	128	0.566	0.566	52.1	13.9	80.3
34	0.202	0.202	17.5	11.3	6.6	130	0.581	0.581	54.1	14.0	85.0
36	0.211	0.211	17.8	11.4	7.4	132	0.596	0.596	56.4	14.0	90.0
38	0.220	0.220	18.1	11.6	8.1	134	0.611	0.611	58.6	14.0	95.2
40	0.229	0.229	18.3	11.7	8.9	136	0.627	0.627	60.8	14.0	100.7
42	0.237	0.237	18.5	11.8	9.7	138	0.643	0.643	63.2	14.0	106.4
44	0.245	0.245	18.6	12.0	10.5	140	0.660	0.660	65.3	14.0	112.4
46	0.252	0.252	18.7	12.1	11.3	142	0.677	0.677	67.7	14.0	118.7
48	0.259	0.259	18.7	12.2	12.1	144	0.695	0.695	69.8	14.0	125.3
50	0.266	0.266	18.7	12.2	12.9	146	0.713	0.713	72.3	14.0	132.2
52	0.272	0.272	18.7	12.3	13.7	148	0.731	0.731	74.6	14.0	139.3
54	0.278	0.278	18.7	12.4	14.4	150	0.751	0.751	76.9	14.0	146.7
56	0.284	0.284	18.7	12.5	15.2	152	0.770	0.770	79.2	13.9	154.4
58	0.290	0.290	18.7	12.5	15.9	154	0.790	0.790	81.4	13.9	162.4
60	0.295	0.295	18.7	12.6	16.7	156	0.811	0.811	83.8	13.9	170.6
62	0.301	0.301	18.8	12.6	17.4	158	0.832	0.832	85.8	13.9	179.1
64	0.306	0.306	18.8	12.7	18.1	160	0.853	0.853	88.1	13.8	187.9
66	0.311	0.311	18.9	12.7	18.9	162	0.875	0.875	89.9	13.8	196.9
68	0.316	0.316	19.0	12.8	19.6	164	0.897	0.897	92.1	13.7	206.2
70	0.321	0.321	19.2	12.8	20.4	166	0.920	0.920	93.9	13.7	215.7
72	0.326	0.326	19.3	12.9	21.1	168	0.943	0.943	95.8	13.6	225.4
74	0.331	0.331	19.6	12.9	21.9	170	0.966	0.966	97.6	13.6	235.4
76	0.336	0.336	19.9	13.0	22.7	172	0.990	0.990	99.1	13.5	245.6
78	0.341	0.341	20.3	13.0	23.6	174	1.014	1.014	100.8	13.4	256.0
80	0.346	0.346	20.7	13.0	24.5	176	1.039	1.039	102.0	13.3	266.5
82	0.351	0.351	21.1	13.1	25.4	178	1.063	1.063	103.3	13.2	277.3
84	0.357	0.357	21.7	13.1	26.4	180	1.088	1.088	104.3	13.1	288.1
86	0.363	0.363	22.3	13.2	27.5	182	1.114	1.114	105.1	13.0	299.1
88	0.369	0.369	23.0	13.2	28.6	184	1.139	1.139	105.7	12.9	310.2
90	0.375	0.375	23.7	13.3	29.8	186	1.165	1.165	105.8	12.7	321.4
92	0.382	0.382	24.6	13.3	31.1	188	1.190	1.190	105.7	12.5	332.6
94	0.389	0.389	25.5	13.3	32.5	190	1.216	1.216	105.1	12.4	343.7
96	0.396	0.396	26.5	13.4	34.1	192	1.241	1.241	104.3	12.2	354.8

CODA Structures Ltd		Page 2
14 Springfield Court Guiseley Leeds LS20 8FD	Whalley, Clitheroe Stormwater Storage Calculation Area 6	
Date 12/09/2018 File STORAGE AREA 6.SRCX	Designed by MT Checked by JL	
Causeway	Source Control 2018.1	

Flood Routing through Storage Facility

Event: 360 min Winter

Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)	Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Control (l/s)	Volume (m³)
194	1.267	1.267	103.3	11.9	365.8	290	2.183	2.183	21.1	13.9	624.3
196	1.292	1.292	102.0	11.7	376.7	292	2.216	2.216	20.7	14.0	625.2
198	1.317	1.317	100.8	11.5	387.5	294	2.444	2.444	20.3	14.6	625.9
200	1.342	1.342	99.1	11.2	398.1	296	3.008	3.008	19.9	16.1	626.5
202	1.367	1.367	97.6	11.1	408.6	298	3.385	3.385	19.6	17.1	626.8
204	1.391	1.391	95.8	11.2	418.8	300	3.637	3.637	19.3	17.7	627.1
206	1.415	1.415	93.9	11.3	428.9	302	3.803	3.803	19.2	18.1	627.3
208	1.439	1.439	92.1	11.4	438.7	304	3.912	3.912	19.0	18.3	627.4
210	1.462	1.462	89.9	11.5	448.2	306	3.980	3.980	18.9	18.4	627.4
212	1.485	1.485	88.1	11.6	457.5	308	4.022	4.022	18.8	18.5	627.5
214	1.508	1.508	85.8	11.6	466.6	310	4.047	4.047	18.8	18.6	627.5
216	1.530	1.530	83.8	11.7	475.3	312	4.062	4.062	18.7	18.6	627.5
218	1.552	1.552	81.4	11.8	483.8	314	4.071	4.071	18.7	18.7	627.5
220	1.573	1.573	79.2	11.9	492.0	316	4.078	4.078	18.7	18.7	627.5
222	1.594	1.594	76.9	11.9	500.0	318	4.084	4.084	18.7	18.7	627.5
224	1.615	1.615	74.5	12.0	507.6	320	4.089	4.089	18.7	18.7	627.5
226	1.635	1.635	72.3	12.1	515.0	322	4.093	4.093	18.7	18.7	627.5
228	1.655	1.655	69.8	12.2	522.1	324	4.096	4.096	18.7	18.7	627.5
230	1.674	1.674	67.7	12.2	528.9	326	4.095	4.095	18.7	18.7	627.5
232	1.693	1.693	65.3	12.3	535.4	328	4.088	4.088	18.6	18.7	627.5
234	1.712	1.712	63.2	12.4	541.6	330	4.073	4.073	18.5	18.7	627.5
236	1.730	1.730	60.7	12.4	547.6	332	4.047	4.047	18.3	18.6	627.5
238	1.748	1.748	58.6	12.5	553.2	334	4.008	4.008	18.1	18.5	627.5
240	1.765	1.765	56.3	12.5	558.6	336	3.951	3.951	17.8	18.4	627.4
242	1.782	1.782	54.1	12.6	563.7	338	3.875	3.875	17.5	18.2	627.3
244	1.799	1.799	52.1	12.6	568.6	340	3.774	3.774	17.0	18.0	627.2
246	1.816	1.816	49.8	12.7	573.2	342	3.648	3.648	16.6	17.7	627.1
248	1.833	1.833	48.0	12.8	577.5	344	3.492	3.492	15.9	17.3	626.9
250	1.849	1.849	45.9	12.8	581.6	346	3.299	3.299	15.1	16.9	626.7
252	1.866	1.866	44.2	12.9	585.5	348	3.071	3.071	14.2	16.3	626.5
254	1.882	1.882	42.2	12.9	589.1	350	2.802	2.802	13.2	15.6	626.3
256	1.898	1.898	40.4	13.0	592.5	352	2.496	2.496	12.1	14.8	625.9
258	1.914	1.914	38.7	13.0	595.7	354	2.249	2.249	10.7	14.1	625.6
260	1.929	1.929	37.0	13.1	598.7	356	2.214	2.214	9.3	14.0	625.1
262	1.945	1.945	35.5	13.1	601.5	358	2.187	2.187	7.5	13.9	624.4
264	1.961	1.961	33.8	13.2	604.0	360	2.163	2.163	5.8	13.8	623.6
266	1.976	1.976	32.5	13.2	606.4	362	2.139	2.139	4.1	13.7	622.5
268	1.992	1.992	31.1	13.3	608.7	364	2.118	2.118	2.6	13.7	621.3
270	2.007	2.007	29.9	13.3	610.7	366	2.098	2.098	1.5	13.6	619.9
272	2.022	2.022	28.6	13.4	612.6	368	2.079	2.079	0.6	13.5	618.4
274	2.037	2.037	27.5	13.4	614.4	370	2.061	2.061	0.2	13.5	616.8
276	2.053	2.053	26.5	13.5	616.0	372	2.045	2.045	0.0	13.4	615.2
278	2.069	2.069	25.4	13.5	617.5	374	2.030	2.030	0.0	13.4	613.6
280	2.085	2.085	24.6	13.6	618.9	376	2.017	2.017	0.0	13.4	612.0
282	2.102	2.102	23.7	13.6	620.2	378	2.004	2.004	0.0	13.3	610.4
284	2.119	2.119	23.0	13.7	621.3	380	1.992	1.992	0.0	13.3	608.8
286	2.137	2.137	22.3	13.7	622.4	382	1.981	1.981	0.0	13.2	607.2
288	2.159	2.159	21.7	13.8	623.4	384	1.971	1.971	0.0	13.2	605.6

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7847

Part

Calc. Sheet No.

Drawing Ref.

Calculations by

Checked by

Date

MT

Sept '18

Members
Ref.

CALCULATIONS

OUTPUT

For 1:100 yr, 6hr storm, Greenfield runoff

$$= 1175 \text{ m}^3$$

Total Hardcover area = 3.49 Ha

Remaining undeveloped area = 6.35 - 3.49 = 2.86 Ha

Total volumetric discharge from developed areas

$$= 629.9 \text{ m}^3$$

Total volumetric discharge from undeveloped area

$$= \frac{2.86}{6.35} \times 1175 = 529.2 \text{ m}^3$$

Total volumetric discharge from developed site

$$= 629.9 + 529.2 = 1159.1 \text{ m}^3 < 1175 \text{ m}^3$$